3-1-2005

Justification for Class III Permit Modification March 2005 SWMU226 Operable Unit 1302 Old Acid Waste Line at Technical Area I

Sandia National Laboratories/NM

This work supported by the
United States Department of Energy
under contract DE-AC04-94AL85000.

Sandia National Laboratories

SWMU 226
Old Acid Waste Line

Environmental Restoration Project

Site History

- SWMU 226, the Old Acid Waste Line, extends from north-central section of TA-I toward the south to an outfall (SWMU 46) on the northern edge of the Tijeras Arroyo. The site is approximately 2.5 acres.
- The line is a system of buried piping that previously collected waste water from six buildings in TA-I. The waste line is constructed of vitrified clay pipe ranging in diameter from 4 to 8 in., buried at depths ranging from 4 to 10 ft bgs, and is approximately 1.3 miles in length. The site includes the soil surrounding the abandoned line.
- From 1948 through the late 1960s, the Old Acid Waste Line received waste water containing acids, photographic processing solutions, electroplating solutions, and various organic compounds such as acetone, alcohols, trichloroethylene, and toluene. The buildings connected to the waste line housed various shops (instrument repair, machining, ceramics, sheet metal, welding, paint, and plating), a foundry, microelectronic clean rooms, office space, general research laboratories, environmental-conditions test chambers, storage rooms, a photographic processing laboratory, and facilities for the assembly of weapon components. In the late 1960s, the Old Acid Waste Line received an estimated 130,000 gal per day of waste water.
- Employee interviews noted that it in the 1950s, 1960s, and 1970s it was common laboratory practice to place hazardous and radioactive wastes in containers rather than being disposed of in the waste line. Wastes deposited in the containers were disposed of at the chemical waste or the radioactive waste landfills located in TA-III. Small quantities of organic compounds were disposed of in sewer lines connected to the Old Acid Waste Line.
- The acid waste line was abandoned in the mid- to late-1960s; the portion of the line north of I Street was integrated into the sanitary sewer system. Any industrial discharges that had been routed to the northern portion of the acid waste line and that were not discontinued at that time became part of the sanitary system effluent.
- Because the original systems were old and deteriorated, a multi-year infrastructure project was undertaken to upgrade the storm drain, sanitary sewer, and domestic water systems. This project was completed in September 2003.

Depth to Groundwater

- The regional aquifer is approximately 535 ft bgs, and a perched aquifer (not a source of drinking water) is approximately 275 ft bgs.

Constituents of Concern

- VOCs
- SVOCs
- PCBs
- Metals
- Radionuclides

Investigations

- Several pre-RFI investigations were conducted and documented in the RFI Workplan. They included radiation screening of the acid waste line outfall area; sediment sampling near manholes south of TA-I; sediment and soil sampling at two branch segments of the system that served Building 839 prior to demolition of the building; and soil sampling near a communications duct excavation that crossed the acid waste line. These investigations were conducted from 1992 through 1994.
- Because of elevated tritium activities and PCB concentrations within the acid waste line near Building 839, a VCM was conducted in 1995 to remove the contaminated section of the acid waste line. Verification samples were collected to ensure that no contaminated soil remained after the removal of the lines.
- In 1993, an in-line camera survey was conducted.
- RFI site characterization for SWMU 226 was conducted in 1995. Using the results of the 1993 in-line camera survey, soil samples were collected from locations along the waste line to approximately 14 ft bgs. Sediment samples were also collected within the line. Low concentrations of VOCs, SVOCs, and PCBs were detected. Several metals and radionuclides were slightly above background levels. Plutonium, that has no background activity, was also detected.
- In 2002, two previous sample locations were resampled and 6 locations offset from previous sample locations were sampled. The maximum sampling depth was 10 ft bgs. The samples were analyzed for VOCs, SVOCs, and isotopic plutonium, but the specific COCs analyzed for at each location varied. Several SVOCs were detected. No plutonium was detected.

Summary of Data Used for NFA Justification

- The 1995 and 2002 sampling events resulted in 214 analyses. VOCs and SVOCs were detected and numerous metals were found above background values. The maximum concentration of total PCBs was 0.0851 mg/kg. Two radionuclides, U-234 and U-238, were slightly above background activities. Pu-238 and Pu-239 were detected.

Recommended Future Land Use

- Industrial land use was established for this site.

Results of Risk Analysis

- Risk assessment results for the residential scenario are calculated per NMED risk assessment guidance as presented in "Supplemental Risk Document Supporting Class 3 Permit Modification Process" (SNL October 2003).
- Because COCs were present in concentrations greater than background-screening levels or because constituents were present that did not have background-screening numbers, it was necessary to perform a risk assessment for the site. The risk assessment analysis evaluated the potential for adverse health effects for the residential land-use scenario.
- The maximum concentration for total PCBs was 0.0851 mg/kg. This concentration is less than the EPA screening level of 1 mg/kg (40 CFR §761). Because the maximum concentration for PCBs at this site is less than the screening value, PCBs are eliminated from further consideration in the human health risk assessment.
- The residential HI (0.63) is below the NMED guidance. The total estimated excess cancer risk for the residential land-use scenario, 3E-5, is above the NMED guideline. However, the UCL of the average concentration for the main contributor to risk, arsenic, is below the background and arsenic was eliminated from the risk calculation. With the removal of arsenic the HI is reduced to 0.32, and the total estimated excess cancer risk is reduced to 7E-6. Thus, by using realistic concentrations in the risk calculations that more accurately depict actual site conditions, the total risk calculations are below NMED guidelines.
- The residential land-use scenario incremental TEDE was 1.4E-1 mrem/yr, which is below the EPA numerical guideline of 75 mrem/yr. Therefore, SWMU 226 is eligible for unrestricted radiological release.
- Using the SNL predictive ecological risk assessment methodology, the ecological risk for SWMU 226 is expected to be low.
- In conclusion, human health and ecological risks are acceptable per NMED guidance. Thus, SWMU 226

Risk Assessment Values for SWMU 226 Nonradiological COCs

COC Name	Maximum Concentration / UCL (mg/kg)	Residential Land Use Scenario	
		Hazard Index	Cancer Risk
Inorganic			
Arsenic	6.69 / 3.3	0.31 / Below Background	2E-5 / Below Background
Barium	136	0.05	--
Cadmium	0.737	0.02	5E-10
Chromium VI	1	0.00	5E-9
Copper	27.7	0.01	--
Mercury	0.269	0.02	--
Selenium	0.132	0.00	--
Silver	1.27	0.00	--
Vanadium	59.9	0.11	--
Organic			
Acenaphthene	0.00911 J	0.00	--
Acetone	0.0567	0.00	--
Benzo(a)pyrene	0.124	0.00	2E-6
Benzo(b)fluoranthene	0.134	0.00	2E-7
Benzo(ghi)perylene	0.147	0.00	2E-6
2-Butanone	0.01	0.00	--
Chrysene	0.0733	0.00	1E-9
1,4-Dichlorobenzene	0.0313 J	0.00	1E-8
Fluoranthene	0.178 J	0.00	--
Fluorene	0.00619 J	0.00	--
Indeno(1,2,3-cd) pyrene	0.148	0.00	2E-7
Methylene chloride	0.122	0.01	2E-6
Pentachlorophenol	0.183 J	0.00	4E-8
Phenanthrene	0.0629	0.07	--
Phenol	0.34	0.00	--
Pyrene	0.178 J	0.00	--
Toluene	0.00568 J	0.00	--
Total		**0.63 / 0.32**	**3E-5 / 7E-6**

-- = Information not available.

For More Information Contact

U.S. Department of Energy
Sandia Site Office
Environmental Restoration
Mr. John Gould
Telephone (505) 845-6089

Sandia National Laboratories
Environmental Restoration Project
Task Leader: Brenda Langkopf
Telephone (505) 284-3272

Sandia National Laboratories

Justification for Class III Permit Modification March 2005

SWMU 226
Operable Unit 1302
Old Acid Waste Line at Technical Area I

NFA Originally Submitted May 1997
RSI Response June 1998
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RSI Response September 2004

Environmental Restoration Project

United States Department of Energy
Sandia Site Office

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

ER/REQ/MAN

Department of Energy
Field Office, Albuquerque
Kirtland Area Office
P.O. Box 5400
Albuquerque, New Mexico 87115

MAY 22 1997

INFORMATION COPY
SHEARS # 30068

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Benito Garcia, Bureau Chief
New Mexico Environment Department
Hazardous and Radioactive Materials Bureau
2044 Galisteo Street
P.O. Box 26110
Santa Fe, NM 87505-2100

Dear Mr. Garcia:

Enclosed are two copies of the seventh submission of No Further Action (NFA) proposals for Sandia National Laboratories/New Mexico (SNL/NM), ID Number NM5890110518-1. Nine SNL/NM environmental restoration sites are included in this package:

OU 1295		
	Site 144	Building 9980 Septic System
	Site 145	Building 9981/9982 Septic System
	Site 147	Building 9925 Septic System
OU 1302		
	Site 42	Acid Spill Water Treatment Facility
	Site 96	Storm Drain System
	Site 187	TA-I Sanitary Sewer Lines
	Site 226	Old Acid Waste Line
OU 1333		
	Site 12A	Open Dump: Lurance Canyon Burn Site
OU 1335		
	Site 112	Explosive Contaminated Sump (Building 9956)

Ecological risk assessments are not included with these proposals, but will be submitted as addenda following an agreement between NMED and DOE regarding how these assessments will be conducted and presented.

Three of the sites listed above (Sites 96, 187, and 226) are expected to be impacted by a Tech Area I storm and sanitary sewer system upgrade. Both systems, which are 30 to 50 years old, are deteriorated and undersized, and upgrading of the systems will be environmentally beneficial. This project has been funded in the amount of $15.4 million by the US Congress as a line item in the federal budget. The majority of the repairs on these systems can be achieved in-situ by slip-lining portions of degraded lines. However, excavation and removal for access and partial replacement will be required at several locations throughout the systems during the upgrade project, and this work will be greatly affected by the regulatory status of the ER sites. It is very possible that a delay in proceeding with the project would result in a loss of funding due to intense competition for funds among various Federal agencies. As a result, we request that these sites be given a priority for review so that we may address any comments as expeditiously as possible.

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v. meet with your staff at their convenience to give them a short briefing on th s and answer any questions they may have on the upgrade project's on the ER sites.

If you have a.., questions, or would like to schedule a meeting, please contact John Gould at (505) 845-6089, or Mark Jackson at (505) 845-6288.

Sincerely,

George K. Lasker

for Michael J. Zamorski
Acting Area Manager

Enclosures

cc w/enclosures:
T. Trujillo, AL, ERD
W. Cox, SNL, MS 1147
J. Parker, NMED/OB
W. Stone, NMED/OB
D. Neleigh, EPA, Region 6 (2 copies via Certified Mail)

cc w/o enclosure:
B. Oms, DOE/KAO
H. Craig, KAO
S. Dinwiddie, NMED
T. Davis, NMED
S. Kruse, NMED
D. Fate, SNL, MS 1148
C. Lojek, SNL, MS 1148
F. Nimick, SNL, MS 1147
E. Mignardot, SNL, MS 1147
M. Davis, SNL, MS 1147
B. Locke, SNL, MS 0903

PROPOSAL FOR
RISK-BASED NO FURTHER ACTION
ENVIRONMENTAL RESTORATION SITE 226
ACID WASTE LINE
OPERABLE UNIT 1302
May 1997

Prepared by
Sandia National Laboratories/New Mexico
Environmental Restoration Project
Albuquerque, New Mexico

Prepared for
U.S. Department of Energy

TABLE OF CONTENTS

ACRONYMS

bgs	below ground surface
CAB	cellulose acetate butyrate
CEARP	Comprehensive Environmental Assessment and Response Program
COA	City of Albuquerque
COC	constituents of concern
DOE	Department of Energy
DV	data verification/validation
EPA	Environmental Protection Agency
ER	Environmental Restoration
ERDMS	ER data management system
FID	flame ionization detector
GPS	global positioning system
MDA	minimum detectable activity
ml	milliliter
mrem/yr	
MS	matrix spike
MSD	matrix spike duplicate
NEPA	National Environmental Policy Act
NFA	No Further Action
NMED	New Mexico Environmental Department
PCB	polychlorinated biphenyl
pCi/g	picoCurie per gram
PID	photoionization detector
PIP	Program Implementation Plan
ppb	parts per billion
PRS	potential release site
Pu	plutonium
RFI	RCRA Facility Investigation
SMO	SNL/NM Sample Management Office
SNL/NM	Sandia National Laboratories/New Mexico

SVOC	semi-volatile organic compound
TA	Technical Area
TAL	target analyte list
U	uranium
UTL	upper tolerance limit
VCM	Voluntary Corrective Measure
VOC	volatile organic compound

1.0 INTRODUCTION

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a No Further Action (NFA) decision for Environmental Restoration (ER) Site 226 determined by the risk-based analysis with confirmatory sampling criterion (NFA Criterion 5; NMED et al. 1995).

1.1 ER Site Identification Number and Name

ER Site 226 (herein referred to as the site) is the Old Acid Waste Line, and is included in Operable Unit 1302. The old acid waste line outfall was listed as Site 46 based on information obtained during the Comprehensive Environmental Assessment and Response Program (CEARP) Phase I interviews (DOE, 1987). The old acid waste line was distinguished from the acid waste line outfall and was designated ER Site 226 in October 1992 (Miller, 1992). The outfall is being investigated under ADS 1309, Tijeras Arroyo; the line is being investigated under ADS 1302, TA-I. The original ER site name was the Acid Waste Line (TA-I). The ER site name was changed to the Old Acid Waste Line during the development of the TA-I RFI Work Plans (SNL/NM, 1995).

1.2 SNL/NM NFA Process

The basis for proposing an NFA is thoroughly described in Section 4.5.3 of the Draft *Program Implementation Plan (PIP) for Albuquerque Potential Release Sites* (SNL/NM 1994a), and in Annex B of the *Environmental Restoration Document of Understanding* (NMED et al., 1995). ER Site 226 is being proposed for a risk-based, confirmatory sampling NFA decision based on NFA Criterion 5. The potential release site (PRS) has been characterized in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

1.3 Local Setting

The acid waste line was installed between 1948 and 1950 and was constructed of 4- to 8-inch diameter vitreous clay pipe. The system extended from three origins in the north central section of TA-I south to an outfall north of the Tijeras Arroyo (Appendix A, Plate 1-1). Lateral lines extended to buildings served by the line. The line remains in place and lies from 4 to 10 ft below ground surface (bgs) within TA-I and at an average of

8 ft bgs south of TA-I. Based on a review of architectural and mechanical drawings of TA-I buildings and interviews with present and retired SNL/NM employees, waste was discharged into the acid line from:

- Building 839, instrument repair and general research laboratory activities.
- Building 840, machine and ceramics shops.
- Building 841, a foundry and plating and coating shop.
- Building 860, environmental testing.
- Building 863, motion picture film processing.
- Building 892, weapons production.

2.0 HISTORY OF THE SWMU

This section provides a summary of the historical information that has been obtained at the site.

2.1 Sources of Supporting Information

Detailed information regarding the site is provided in the following documents.

- *Comprehensive Environmental Assessment and Response Program (CEARP), Phase I: Installation Assessment, Sandia National Laboratories, Albuquerque, New Mexico* [DRAFT] (DOE, 1987).
- *Final RCRA Facilities Assessment Report of Solid Waste Management Units at Sandia National Laboratories, Albuquerque, New Mexico* (EPA, 1987).
- *Program Implementation Plan for Albuquerque Potential Release Sites* [Draft] (SNL/NM, 1994a).
- *Technical Area I (ADS 1302) RCRA Facility Investigation Work Plan* (SNL/NM, 1995).

2.2 Previous Audits, Inspections, and Findings

The site was first listed as a potential SWMU by the *Comprehensive Environmental Assessment and Response Program (CEARP), Phase I: Installation Assessment, Sandia National Laboratories, Albuquerque, New Mexico* [DRAFT] (DOE, 1987). The listing resulted from information collected during the Phase I interviews in which the line was reported to have received about 130,000 gal/day of discharge comprised primarily of cooling water blowdown but also containing chromates, ferric chloride, and liquids from etching, plating, and photographic film developing processes. An estimated 200 gal/day of spent chromic acid was discharged to the line.

2.3 Historical Operations

The acid waste line was in continuous operation from 1948 through approximately 1967. In the mid- to late-1960s, use of the acid waste line for its original purpose was discontinued. Discharge from the line is evident in aerial photographs taken from 1964 to 1967; the actual date that discharges

ceased is unknown. Around this time (actual date unknown) the line was separated at the intersection of I and 9th Streets. The southern portion was capped at that intersection and was abandoned in place; all discharges to the line south of the intersection were discontinued. The portion of the line north of I Street was connected to the sanitary sewer system near the intersection and remains active. When the northern portion of the line was rerouted to the sanitary sewer system, the acid effluent was then discharged to the sanitary sewer or the waste was collected at the point of generation as chemical waste for off-site disposal.

3.0 EVALUATION OF RELEVANT EVIDENCE

The section summarizes the data collected and evaluated from operational practices, previous investigations, and the RFI investigation.

3.1 Unit Characteristics

The acid waste line is either a part of the sanitary sewer system or abandoned in place (Section 2.3). All operational safeguards are overseen by TA-I facility personnel.

3.2 Operating Practices

Hazardous wastes were not managed or contained at the site. However, hazardous wastes were transferred through the line that may have been released to the surrounding soils from breaks within the line.

3.3 Presence or Absence of Visual Evidence

No visual evidence of hazardous waste constituents were seen on the surface or in soil samples collected for chemical and radionuclide analyses during the ER Site 226 RFI field investigation.

3.4 Results of Previous Sampling Surveys

Several previous investigations have been conducted in and around the old acid waste line. These investigations have included a radiation screening of the acid waste line outfall area (SNL/NM, 1994b); sediment sampling at two manhole locations in the south end of the system (IT Corp., 1994a); sediment and soil sampling at two branch segments of the system that served Building 839 prior to demolition of the building (IT Corp., 1994a, b); and soil sampling during an excavation trench that crossed the acid waste line (IT Corp., 1992a; Burton, 1992). Soil sampling was also performed during a voluntary corrective measure (VCM) that removed those portions of the acid waste line that served former Building 839 (IT Corp., 1995).

All sample results and documentation associated with the investigations that had previously been conducted were summarized in the TA-I RFI Work Plan (SNL/NM, 1995) and the VCM Report for the Building 839 acid waste line removal (IT Corp., 1995). In summary, the information gathered prior to the TA-I RFI indicated that there were no elevated depleted uranium or gamma radiation anomalies at the acid waste line outfall; elevated lead and total

chromium were detected in sediments collected from two manholes located at the south end of the system; and sediments from within the sections of line exiting Building 839 were contaminated with PCBs, metals (beryllium and lead), and radionuclides (tritium, uranium-238, radium-224, and bismuth-214).

A VCM was proposed to the EPA to remove the contaminated sections of the Building 839 acid waste line, associated uncontaminated sewer system lines, and possible contaminated soils associated with the acid waste lines. In April 1995 authorization was granted by the EPA to conduct the VCM and this action was completed by May 1995 (IT Corp., 1995). Verification samples were collected as part of the VCM to ensure that no contaminated soils remained in the area after the removal of the lines. The results of this confirmatory sampling verified that the contaminants were contained within the acid waste line and that all contaminated soil was removed during the VCM (IT Corp., 1995).

3.5 Assessment of Gaps in Information

The RFI field investigation was designed to fully characterize each area of potential concern within the site. The RFI Sampling and Analysis Plan for this site is provided in Appendix B.

3.6 Confirmatory Sampling

The following subsection provides a summary of the RFI field investigation and the evaluation of the data collected and analyzed during the investigation.

3.6.1 Project Summary

The objectives of the field investigation were to determine the potential vertical and horizontal extent of soil contamination at breaks in the underground lines and to determine potential contamination within the abandoned sections of the line. The potential constituents of concern (COCs) are radioactive materials, metals, VOCs, SVOCs, and PCBs. These COCs were based on known building activities and processes and on historical data.

ER Site 226 field investigation started July 12, 1995 and was completed July 21, 1995. The field activities included conducting an in-line camera survey of the acid waste line, drilling soil boreholes, collecting subsurface soil samples for chemical and radionuclide analysis, collecting sediments from inside abandoned manhole (line) locations for chemical and radionuclide

analysis, collecting waste samples for chemical and radionuclide analysis, handling the waste generated during drilling, and surveying borehole locations.

3.6.1.1 Health and Safety Monitoring

A photoionization detector (PID) and/or flame ionization detector (FID) was used to monitor the breathing zone around the drilling and the general background for organic vapors during soil borehole activities. In addition, a pancake probe was used to monitor alpha and beta/gamma radiation. The PID and FID readings for the breathing zone and the general area were zero for all soil boreholes except for one reading of 5 ppm at location TI226-GP-022. The high reading was attributed to a fire training exercise taking place next to the drilling activities. The PID and FID were calibrated daily and the readings were documented on the field activity daily logs. The pancake probe readings ranged from 35 to 70 counts per minute and are within normal background levels. These readings were also documented on the field activity daily logs.

3.6.1.2 In-Line Camera Survey

During the spring of 1993, an in-line camera survey was conducted in the acid waste line, the resulting data were used to identify pipe deficiencies. This was a major tool for the placement of soil boreholes, as discussed in the Work Plan (SNL/NM, 1995). For this field investigation, another in-line camera survey was conducted to reconfirm the exact location of each pipe deficiency for soil borehole placement. The camera crew located the in-line problem and then marked aboveground the location/depth of the pipe deficiency. This survey placement ensured that the location to be sampled was accurately identified.

3.6.1.3 Drilling Program

The drilling program was conducted using a truck-mounted Geoprobe® drill rig. A total of 24 soil boreholes (TI226-GP-001 through TI226-GP-024) were placed along the acid waste line (Appendix A, Plate 1-1). Soil borehole numbers T1226-GP-005 and T1226-GP-023 were used to identify duplicate soil samples collected during the project.

3.6.1.4 Soil Collection

Soil samples were collected approximately 18 inches below the acid waste line at each borehole using the Geoprobe® rig equipped with a 2.5-inch outside diameter by 24-inch long core sampler which was lined with a

cellulose acetate butyrate (CAB) sleeve. Samples were collected at depths ranging from 6 to 14 feet bgs. Upon removal of the CAB liner from the sampler, one 6-inch section was cut from the liner. This section was sealed with tape and prepared for shipment to an off-site laboratory for VOC analyses. The remaining sample was composited, placed into appropriate containers, and also prepared for shipment to the off-site laboratories for SVOC, PCB, TAL metals, isotopic uranium, plutonium, and tritium, and to the on-site laboratory for gamma spectroscopy analyses. Usually two sampling runs with the Geoprobe® were required to collect enough soil sample for these analyses.

The samples collected and the analyses performed on these samples are listed in Appendix C, Table 1. Twenty-four (includes two duplicates) soil samples were collected and sent to off-site and on-site laboratories.

In addition, three sediment samples (TI226-SD-001 to TI226-SD-003) were collected for the project (Appendix A, Plate 1-1). The work plan proposed sediment sample collection in three manholes (AWMH-11, AWMH-12, and AWMH-15) associated with the acid waste line (SNL/NM, 1995). Manholes AWMH-11 and AWMH-12 could not be located by the camera survey or by visual inspection of the locations as identified from as-built drawings. One sediment sample was collected at Manhole AWMH-15. An additional sediment sample was collected at Manhole AWMH-10 located approximately 70 feet south of Building 8894 (security guard building). This sample location is downgradient of manhole AWMH-15. The third sediment sample was collected near the acid waste line outfall. These samples were sent to the same laboratories and analyzed for the same parameters as the subsurface soil samples (Appendix C, Table 1).

3.6.1.5 Sample Packaging and Shipping

Soil samples sent to the off-site laboratories for VOC analysis were collected in CAB liners or glass bottles containing 125-ml of soil; for SVOCs, PCBs, and TAL metals analysis samples were collected into 500-ml glass bottles. Soil samples sent to the off-site laboratory for tritium analysis were collected into one liter amber glass bottles and soil samples for isotopic uranium and isotopic plutonium analysis were collected into 500-ml plastic bottles. Soil samples sent to the on-site laboratory for gamma spectroscopy analysis were collected into 500-ml Marenelli beakers. All liner and bottle sets were labeled, sealed with custody tape, and placed in a protective bubble-wrap Ziplock bag. The soil samples were placed on ice in the field and cooled to 4°C.

Samples were delivered to the SNL/NM Sample Management Office (SMO) on a daily basis. SMO personnel performed cross-checking of the information on the sample labels against the data on the Analysis Request and Chain-of-Custody (ARCOC) forms, and prepared samples for shipment. Samples were shipped by overnight delivery to off-site laboratories for chemical and radionuclide analyses. The gamma spectroscopy samples were delivered to the on-site laboratory the same day as delivery to SMO.

3.6.1.6 Survey Soil Borehole Locations

Soil borehole and sediment locations were surveyed with global positioning system (GPS) equipment. The GPS data included northing and easting coordinates for each borehole. The soil borehole and sediment sample location elevations were determined by topographic maps.

3.6.1.7 Field Quality Control Samples

Four types of field QC samples were shipped for analysis during the field investigation: field duplicate subsurface soil samples, equipment rinsate blank samples, soil and water trip blank samples, and field soil blank samples. Additional soils were collected for matrix spike/matrix spike duplicate analysis. Sample number, date/time of sample event, location, and analyses performed are presented in Appendix C, Table 1.

Two subsurface soil field duplicate samples were collected and analyzed for the same parameters as their corresponding samples. The subsurface soil samples were collected by splitting the CAB sleeve crosswise in two pieces for VOC analysis. For the remaining analyses, soils were removed from the CAB sleeves into a stainless steel bowl and composited, then transferred into appropriate containers. The sediment samples were collected by scooping up the dirt, compositing, and placing it in the appropriate containers.

Two equipment rinsate blank samples were collected from deionized water poured over the sampling equipment after decontamination of the equipment. The samples were analyzed for all parameters for which soil samples were analyzed.

Two field blank soil samples were exposed (open jar) to atmospheric conditions around the drilling/sampling operation and analyzed for VOCs only. The field blanks, which consisted of glass bottles filled with clean soils, were supplied by the SMO field office.

Trip blank samples were submitted with each shipment which contained samples for VOC analysis. Ten trip blanks (seven soil and three water) accompanied the sample containers to the field and back to the laboratory.

3.6.2 Data Management

Upon sample shipment to the off-site laboratories, sample information was entered into a database to track the status of each sample. Upon completion of the laboratory analyses, SMO received analytical results in a summary data report and laboratory QC report.

The data summary (Certificate of Analysis) reports were reviewed by the SMO for completeness and accuracy as required by SNL/NM TOP 94-03 (SNL/NM, 1994c). Data validation was performed using SNL/NM Data Verification/Validation (DV) Level 1 (DV1) and Level 2 (DV2) checklists. SMO submitted the original ARCOCs, the Certificate of Analysis Reports, and the DV1/DV2 review reports to the Environmental Operations Record Center. In addition, the laboratories submitted analytical data in an electronic format for loading into the ER data management system (ERDMS). All chemical and radionuclide analytical data tables generated for this report except gamma spectroscopy data were downloaded through the ERDMS.

3.6.3 Analytical Data Summary

This section discusses the analytical methods and the analytical results of the subsurface soil and sediment samples.

3.6.3.1 Analytical Methods

Subsurface soil and sediment samples sent to off-site laboratories were analyzed by the following approved EPA methods: Method 8240/8260 for VOCs, Method 8270 for SVOCs, Method 8080 for PCBs, Method 6010 for TAL metals, and Methods 7471/7470 for mercury. For the radionuclide samples, the off-site laboratory used methods EPIA-011/-011B for isotopic uranium and EPIA-012/-012B for isotopic plutonium and (for a single sample of decontaminated water only) isotopic thorium. The tritium samples were analyzed by the off-site laboratory using method LAL-91-SOP-0067. In addition, the gamma spectroscopy samples were analyzed following SNL/NM-approved analytical procedures by the on-site laboratory.

Analytical results for organic compounds listed "J" values for some compounds. A "J" indicates an estimated value for a compound that was detected at a level less than the reporting limit but greater than the method detection limit. Data results flagged as "J" values are included in the data summary tables used in this report; however, because "J" values may

represent false-positive concentrations, care should be used when evaluating these analytical results.

3.6.2.2 Subsurface Soil Sample Results

A total of 24 subsurface soil samples (includes two field duplicates) were sent to the off-site laboratories for analysis. Table 2 (Appendix C) summarizes the VOC analytical results, Table 3 (Appendix C) summarizes the SVOC analytical results, and Table 4 (Appendix C) summarizes the PCB analytical results. Metal analytical results are provided in Table 5 (Appendix C). Table 6 (Appendix C) summarizes the radionuclide analytical results.

VOC Results

Soil samples were non-detect or J values for VOCs except acetone, which had six elevated values ranging from 21.1 to 56.7 parts per billion (ppb), and methylene chloride, with seven elevated values ranging from 19.7 to 127 ppb. The J value compounds were acetone, methylene chloride, and toluene.

Trip blanks either yielded non-detect or J values for all VOC analyses except for acetone (two samples) with values at 43.6 and 96.9 ppb and methylene chloride (one sample) with a value at 6.27 (B) ppb.

Equipment rinsate blank samples were non-detect for all VOC analyses.

Field blanks either yielded non-detect or J values for all VOC analyses except for acetone (one sample) at 45.2 ppb and methylene chloride (one sample) at 22.9 ppb.

SVOC Results

Soil samples were either non-detect or J values for SVOCs.

Equipment rinsate blanks were non-detect for SVOCs.

PCB Results

All samples were non-detect for PCBs except for one elevated value of Aroclor 1260 at 56 ppb.

Equipment rinsate blanks were non-detect for PCBs.

TAL Metals Results

A complete discussion of the metal results is provided in Section 3.6.4.1.

Equipment rinsate blank sample for metals were either non-detect or J values except for low elevated values for calcium, iron, sodium, magnesium, and nickel.

Radionuclide Results

Plutonium (Pu)-238, Pu-239/240, uranium (U)-233/234, and U-238 were detected with elevated values above reporting limits. Two samples had elevated values of Pu-238 with the highest value at 0.371±0.0875 pCi/g. One sample had an elevated value of Pu-239/240 of 0.915±0.113 pCi/g. Twenty-two samples had elevated values of U-233/234, with the highest value at 1.61±0.197 pCi/g. Twenty-two samples had elevated values of U-238, with the highest value at 1.41±0.191 pCi/g. U-235 was not detected above the off-site laboratory's reporting limit. Tritium was not detected above the off-site laboratory's minimum detectable activity (MDA).

Equipment rinsate blank for radionuclide compounds were below laboratory reporting limits except one slightly elevated value of U-233/234 at 1.58±0.949 pCi/L and one slightly elevated value of U-238 at 1.10±0.803 pCi/L.

Gamma spectroscopy results were within normal background levels. Gamma spectroscopy analytical reports with results are located in the Environmental Operations Record Center.

3.6.3.3 Sediment Sample Results

Three subsurface soil samples were sent to the off-site laboratories for analysis. Table 2 (Appendix C) summarizes the VOC analytical results, Table 3 (Appendix C) summarizes the SVOC analytical results, and Table 4 (Appendix C) summarizes the PCB analytical results. Metal analytical results are provided in Table 5 (Appendix C). Table 6 (Appendix C) summarizes the radionuclide analytical results.

VOC Results

Sediment, trip, and equipment rinsate blank samples were non-detect or J values for VOCs. The J value compounds were acetone and methylene chloride.

SVOC Results

Sediment and equipment rinsate blank samples were non-detect for SVOCs.

PCB Results

Sediment samples were non-detect for PCBs except for one elevated value of Aroclor 1254 at 44.6 ppb, and one J value for Aroclor 1260. Equipment rinsate blank samples were non-detect for PCBs.

TAL Metal Results

A complete discussion of the metal results is provided in Section 3.6.4.2.

Radionuclide Results

For sediment samples, U-233/234 and U-238 were detected with elevated values above reporting limits in three samples. The highest value of U-233/234 was 0.913±0.107 pCi/g. The highest value of U-238 was 0.809±0.0981 pCi/g. U-235, Pu-238, and Pu-239/240 were not detected above the off-site laboratory's reporting limit. Tritium was not detected above the off-site laboratory's MDA.

Gamma spectroscopy results were within normal background levels. Gamma spectroscopy analytical reports with results are located in the Environmental Operations Record Center.

3.6.4 Statistical Analysis/Evaluation of Concentrations

Statistical analysis of the VOC, SVOC, PCB, isotopic plutonium, and tritium results could not be completed, due to the small number of elevated values from Site 226 data and the lack of positive hits for the above-mentioned compounds from the TA-I background soil investigation (SNL/NM, 1996).

The chemical and radionuclide data evaluation discussion is provided using the following guidelines: comparing the VOC, SVOC, and PCB analytical results to EPA proposed Subpart S action level for soils (EPA, 1990) and comparing the metal and isotopic uranium analytical results to the background soil data collected during the TA-I field investigation, the site-wide background study for SNL/NM (IT Corp., 1996), and EPA Subpart S action levels for soils (metals only). For updated soil action levels, some values (e.g., zinc) were taken from "Report of Generic Action Level Assistance for the Sandia National Laboratories/New Mexico Environmental Restoration Program" (IT Corp., 1994c). The generic values from this report were made current for guidance through June, 1994 according to RCRA proposed Subpart S methods. Any soil action level used from that report will be referred to as "generic action level for soils". For TA-I background metal

and radionuclide analytical results, the UTL/95th percentile values were developed using the software package Statgraphics (SNL/NM, 1996). In addition, the isotopic plutonium results has been compared to the off-site laboratory reporting limit (RL) and the tritium results was been compared to the off-site laboratory minimum detectable activity (MDA).

Based on the soil evaluation (Sections 3.6.4.1 and 3.6.4.2), a risk assessment analysis was completed on certain radionuclide data that indicated detections above background levels. A summary of that analysis is provided in Section 3.7.

3.6.4.1 Subsurface Soil Evaluation

VOC results were either non-detect or J values except for acetone and methlyene chloride for all samples. The elevated values of acetone (21.1 to 56.7 ppb) and the values of methlyene chloride (19.7 to 127 ppb) are well below the EPA proposed Subpart S action levels of 8,000,000 ppb and 90,000 ppb, respectively. In addition, acetone and methylene chloride are common laboratory contaminants.

SVOC results were non-detect or J values for all samples. Only one estimated value of pyrene (178 ppb) and one estimated value of fluoranthene (178 ppb) were detected at one sampling location, TI226-GP-009 at 6 feet bgs. Both compounds are well below the EPA proposed Subpart S action levels of 2,000,000 ppb for pyrene and 3,000,000 ppb for fluoranthene.

All PCB results were non-detect except for one elevated value of 56 ppb at TI226-GP-009 at 6 feet bgs. This value is below the EPA proposed Subpart S action level of 90 ppb.

TAL metals were compared first to TA-I background levels, second to SNL/NM site-wide background levels, and third, to EPA proposed Subpart S action levels and/or the generic action level for soils (Appendix C, Table 7). The metals are within TA-I background levels, SNL/NM background levels, and/or proposed Subpart S action levels except for beryllium, calcium, iron, and magnesium. Although calcium, iron, and magnesium were above background levels, these chemicals are considered essential nutrients and should not be considered COCs for this site. In addition, beryllium was detected below background levels, but above the proposed Subpart S action level for soils. But beryllium occurs at naturally high concentrations in the soils within this geologic region and should not be considered a COC for Site 226.

Isotopic uranium (U-235, U-233/234, and U-238) results were compared first to TA-I background levels, and second to SNL/NM site-wide background

levels (Appendix C, Table 8). All U-235 values are below TA-I and/or SNL/NM background levels. U-238 was detected above SNL/NM site-wide background level (1.3 pCi/g) at two locations, TI226-GP-012 at 6 feet bgs (1.3±0.168 pCi/g) and TI226-GP-013 at 6 feet bgs (1.41±0.191 pCi/g). U-233/234 was detected above SNL/NM site-wide background level (1.6 pCi/g) at one location, TI226-GP-012 at 6 feet bgs (1.61±0.197 pCi/g). U-238 and U-233/234 were included in the risk assessment analysis.

Isotopic plutonium (Pu-238 and Pu-239/240) results were compared to the off-site laboratory RL (Appendix C, Table 6).

- All Pu-238 results were below the RL (0.03 pCi/g) except at two sample locations: TI226-GP-018 (0.371 ± 0.0875 pCi/g), and TI226-GP-011 (0.157 ± 0.0371 pCi/g).

- All Pu-239/240 results were below the RL (0.03 pCi/g) except at one sample location, TI226-GP-011 with a elevated value of 0.915 ± 0.113 pCi/g.

Based on the data evaluation, isotopic plutonium was included in the risk assessment analysis.

Tritium results (Appendix C, Table 6) were compared to the off-site laboratory MDA (ranging from 250 to 260 pCi/L). All tritium results were below the off-site laboratory's MDA.

3.6.4.2 Sediment Evaluation

VOC and SVOC results were either non-detect or J values for all samples. Based on this data evaluation,

All PCB results were non-detect except for one elevated value of Aroclor 1254 (44.6 ppb) and one estimated value of Aroclor 1260 (40.5 ppb). These values are below the EPA Subpart S action level of 90 ppb.

TAL metals were compared first to TA-I background levels, second to SNL/NM site-wide background levels, and third to EPA proposed Subpart S action levels and/or the generic action level for soils (Appendix C, Table 7). The metals are within TA-I background levels, SNL/NM background levels, and/or proposed Subpart S action levels except for beryllium. Beryllium was detected below background levels, but above the proposed Subpart S action level for soils. But beryllium occurs at naturally high concentrations in the soils within this geologic region and should not be considered a COC for Site 226.

Isotopic uranium (U-235, U-233/234, and U-238) results were compared first to TA-I background levels, and second to SNL/NM site-wide background levels (Appendix C, Table 8). All isotopic uranium values are below TA-I and/or SNL/NM background levels.

All isotopic plutonium (Pu-238 and Pu-239/240) and tritium results were below the off-site laboratory RL (Appendix C, Table 6).

3.7 Risk Analysis

The following subsections summarize the results of the risk assessment process for both human and ecological risk related factors.

3.7.1 Human Risk Analysis

ER Site 226 has been recommended for industrial land-use (DOE, 1996). A complete discussion of the risk assessment process, results, and uncertainties is provided in Appendix D. Due to the presence of radionuclides in concentrations greater than background levels, it was necessary to perform a human health risk assessment analysis for the site. Besides radionuclides, any organics and/or inorganics detected above their reporting limits were included in this assessment. The risk assessment process results in a quantitative evaluation of the potential adverse human health effects caused by constituents in the site's soil. The risk assessment report calculated the Hazard Index and excess cancer risk for both an industrial land-use and residential land-use setting. The excess cancer risk from nonradioactive COCs and the radioactive COCs is not additive (EPA, 1989).

In summary, the Hazard Index calculated for chemical compounds is 0.09 and the incremental Hazard Index is 0.01 for the industrial land-use scenario, which is less than the numerical standard of 1.0 suggested by risk assessment guidance (EPA, 1989). The excess cancer risk for chemical compounds is 3×10^{-6} in an industrial land-use setting which is at the lower end of the suggested range of acceptable risk of 10^{-6} and 10^{-4} (EPA, 1989). There was no incremental excess cancer risk for the industrial land-use scenerio. The excess cancer risk for radionuclides is 3.0×10^{-7} for industrial land-use scenario, which is much less than risk values calculated due to naturally occurring radiation and from intakes considered background concentration values. In addition, the estimated effective dose equivalent for an industrial land-use setting is 0.08 mrem/yr well below the standard dose limit of 15 mrem/yr (40CFR196, 1994).

The residential land-use scenarios for this site are provided only for comparison in the risk assessment report (Appendix D). The report concludes that Site 226 does not have significant potential to affect human health under either an industrial land-use scenario.

3.7.2 Ecological Risk Analysis

It is unlikely that activities or COCs at Site 226 will have much impact on ecological risk. TA-I is an industrial complex and has been heavily disturbed by humans for over 50 years. Given the amount of known and potential human intrusion, a great diversity or abundance of nonhuman species is unlikely. Much of the relevant ecological information for TA-I can be found in the National Environmental Policy Act (NEPA) compliance document (SNL/NM, 1992).

3.8 Rationale For Pursuing a Risk-Based NFA Decision

Twenty-four soil borehole locations were drilled around the TA-I acid waste line. In addition, three sediment samples were collected. The data evaluation for the subsurface soil and sediment samples shows no VOC, SVOC, TAL metals, or PCB COCs, but some radionuclide compounds were detected above background levels. Based on the field investigation data and the human health risk assessment analysis, an NFA is being recommended for Site 226 for the following reasons:

- No VOCs or radionuclide compounds were detected above background levels during the field screening program.
- Gamma spectroscopy results were within normal background levels.
- VOCs and SVOCs were either non-detect or J values (by the off-site laboratory analysis).
- PCBs results were either non-detect and/or J values except for two samples. All detected PCB values were well below proposed Subpart S action levels for soils.
- All TAL metals were either below TA-I and SNL/NM background levels or below proposed Subpart S action levels for soils.
- U-235 and tritium results were not detected above relevant reporting limits or SNL/NM background levels.

- No COCs (chemical or radionuclide) were present in concentrations considered hazardous to human health for an industrial and/or a residential land-use scenario.

Based on site history and the data evaluated from the field investigation, neither further investigation nor a VCM are recommended for Site 226.

4.0 CONCLUSION

Based upon the evidence cited above, no potential remains for a release of hazardous and radionuclide waste that pose a threat to human health or the environment. Therefore, ER Site 226 is recommended for an NFA determination based on NFA Criterion 5. The potential release site has been characterized in accordance with current applicable state or federal regulations, and the available data indicated that contaminants pose an acceptable level of risk under current and projected future land use.

5.0 REFERENCES

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Appendix A

ER Site 226 Figures

Appendix B

Section 5.12 of the TA-I RFI Work Plan (SNL/NM, 1995)

5.12 ER Site 226, Acid Waste Line

5.12.1 Site Description and History

The acid waste line was installed between 1948 and 1950 and was constructed of 4- to 8-inch diameter vitreous clay pipe. The system extended from three origins in the north central section of TA-I south to an outfall north of the Tijeras Arroyo (Plates 5-9 to 5-11). Lateral lines extended to buildings served by the line. The line remains in place and lies from 4 to 10 ft bgs within TA-I and at an average of 8 ft bgs south of TA-I. Based on a review of architectural and mechanical drawings of TA-I buildings and interviews with present and retired SNL/NM employees, waste was discharged into the acid line from:

- Building 839, instrument repair and general research laboratory activities.
- Building 840, machine and ceramics shops.
- Building 841, a foundry and plating and coating shop.
- Building 860, environmental testing.
- Building 863, motion picture film processing.
- Building 892, weapons production.

In the mid- to late-1960s, use of the acid waste line for its original purpose was discontinued. At this time the line was separated at the intersection of I and 9th Streets. The southern portion was capped at that intersection and was abandoned in place (8 to 10 ft below grade); all discharges to the line south of the intersection were discontinued. Discharge from the line is evident in aerial photographs taken from 1964 to 1967; the actual date that discharges ceased is unknown. The portion of the line north of I Street was connected to the sanitary sewer system near the intersection and remains active. When the northern portion of the line was rerouted to the sanitary system, the acid effluent was then either discharged to the sanitary sewer or the waste was collected at the point of generation as chemical waste for off-site disposal.

Based on information gathered in employee interviews, the old acid waste line outfall was listed as ER Site 46 during the CEARP Phase I (DOE 1987). The acid waste line was distinguished from the acid waste line outfall and was designated ER Site 226 in October 1992 (Miller 1992). The acid waste line outfall is being investigated under ADS 1309, Tijeras Arroyo; the acid waste line is being investigated under ADS 1302, TA-I. ER Site 226 boundaries are based on whether the line is active (as part of the sanitary sewer system) or inactive and abandoned. Site 226 includes all abandoned line

and soil near the abandoned line where potential COCs have been detected. For the active portion of the line, Site 226 is limited to soil near those portions of the line where breaks have been identified and potential COCs have been detected. The ER Site will be investigated to assess if potential COCs may have been released to the soil surrounding the piping.

Reportedly, the acid waste line received about 130,000 gal/day of discharge comprised primarily of cooling water blowdown but also containing chromates, ferric chloride, and liquids from etching, plating, and photographic film developing processes. An estimated 200 gal/day of spent chromic acid was discharged to the acid waste line. As stated above, the exact duration of system use is unknown but is estimated to be approximately 15 years. Table 5-31 identifies some of the process waste which was discharged to the line from TA-I buildings.

5.12.2 Previous Investigations

5.12.2.1 Radiation Screening of Acid Line Outfall Area

A gamma scan survey was conducted in 1994 for beta/gamma radiation at the acid waste line outfall (ER Site 46, investigated under ADS 1309). It was performed at 6 ft centers over the exterior surface area of the site, providing 100 percent coverage. No visible signs of depleted uranium were noted and no gamma anomalies were detected above background (SNL/NM 1994d).

5.12.2.2 Line Sediment Investigations

Two investigations of the acid waste line sediment constituents have been conducted to date:

- Sediment samples from inside the line were collected as part of the investigation of surface soil in current and historic storm sewer discharge areas conducted in May 1992 (IT Corp. 1992d); and
- Sediment samples were collected in December 1993, January 1994, and April 1994 from two branches of the line serving Building 839 prior to demolition of that structure (IT Corp. 1994e, f).

Table 5-31. Wastes Discharged to Acid Waste Line From Buildings in TA-I

Building Number	Building Use	Possible Wastes Discharged
839	Instrument repair and general research laboratory	Solvents, metal alloys
840	Machine and ceramic shop	Lead oxide, solvents, coolant oils
841	Foundry; plating and coating shop	Electroplating solutions, lead, ferric chloride, copper solutions, strippers, solvents, paints, chromic acid
860	Environmental Testing	Unknown
863	Motion Picture Film Processing	Photographic solutions, solvents, silver
892	Weapons Production	DU, acetone, toluene, hydrogen sulfide, neutralizing material, sodium hydroxide

5.12.2.2.1. *Manholes South of Technical Area I*

Sediment samples were collected during May 1992 from within the acid waste line at three manholes west of TA-II from the portion of the acid waste line north of TA-IV, near the East Ordnance Road, and parallel to 9th Street (Figure 5-34). Field screening detected no Vows and measured radiation levels were within 3-sigma of background. Sediment samples were analyzed at an off-site analytical laboratory for TC metals, TCLP metals, VOCs, and SVOCs and for tritium, gross alpha, gross beta, and gamma spectroscopy with five reported isotopes (cesium-137, potassium-40, radium-224, radium-226, and radium-228) by an off-site radiological laboratory. Insufficient sample volume was available to perform VOC, SVOC, and TCLP metals analyses at Manhole No. 1.

Results of sediment analyses (except TCLP metals and radionuclide results) were compared with soil action levels derived in accordance with the methodology presented in proposed Subpart S (EPA 1990b). No VOCs, SVOCs, or metals with the exception of chromium and lead exceeded the derived action levels. The chromium action level derived is for hexavalent chromium because EPA-approved toxicity data for total chromium are not available. The levels of total chromium detected (900 mg/kg and 839 mg/kg from Manholes 1 and 3, respectively) exceeded the hexavalent chromium action level of 400 mg/kg. Lead was detected at concentrations ranging from 434 to 902 mg/kg in the line sediment. No EPA toxicity data are available for lead; the action level for lead in soil currently recommended by the EPA is 500 mg/kg. Leachable metals (by TCLP) are below the regulatory toxicity characteristic levels specified in 40 CFR 261.

Results of the radiological analyses are summarized in Table 5-32. The only non-naturally occurring isotope detected was cesium-137, which reportedly results from global fallout of radionuclides originating from surface nuclear tests (Purrymun *et al.*, 1987). Neither cesium-137 nor radium-226 exceed DOE guidelines (DOE 1983) for any location. There are no guidelines for the other isotopes detected in the sediment. Background data from the SNL/NM sitewide soil background study have been determined for all five radionuclides analyzed (IT Corp. 1994b) and are shown for comparison purposes in Table 5-32. Radium-224 and radium-228 in the sediments slightly exceeded the soil background values at both Manholes No.1 and No.2 (IT Corp. 1992d).

Table 5-32. Radionuclides Detected in Manhole No. 2

Analyte	Range of Results	SNL/NM Background (Range)
Gross alpha	15.2 to 44.9 pCi/g	None available
Gross beta	21.4 to 38.8 pCi/g	None available
^{137}Cs	0.226 to 0.664 pCi/g	0.004 - 10.1 pCi/g
^{40}K	13.1 to 22.4 pCi/g	0.192 - 31 pCi/g
^{224}Ra	0.644 to 1.31 pCi/g	0.43 - 0.97 pCi/g
^{226}Ra	0.687 to 1.01 pCi/g	0.5 - 2.09 pCi/g
^{228}Ra	0.732 to 1.25 pCi/g	0.45 - 1.05 pCi/g

5.12.2.2.2. Sediment Sampling of the Building 839 Acid Waste Lines

Prior to the demolition of Building 839, two acid waste line laterals that once served the building were investigated during 1993 and 1994 (Figure 5-34). Sediment from the interior and soil surrounding the lines were sampled. The sediment sampling is described below and the soil sampling is described in Section 5.12.2.3.

Three sediment samples were collected from two acid waste line laterals near Building 839 in December 1993 and January 1994. The samples were analyzed for VOCs, SVOCs, TAL inorganics, and PCBs (north line only) by an off-site analytical laboratory. Gamma-emitting radionuclides were analyzed on site and tritium was analyzed by an off-site radiological laboratory. Based on the gamma spectrum results, the sediment sample from the north acid waste line was subsequently analyzed for isotopic thorium by the off-site radiological laboratory. In April 1994 during an additional investigation, a wipe sample was collected for PCBs from the interior of the north acid waste line from a break near a clean out (CO1) and a sediment sample was collected for PCBs from the interior of the north acid waste line at the same location as the original sediment sample.

Results of the sediment sampling indicated that certain COCs were present in the line interior. Beryllium exceeded the action level of 0.2 mg/kg derived in accordance with the methodology in proposed Subpart S (EPA 1990b) in all three samples, with concentrations ranging from 0.3 to 1.2 mg/kg and it exceeded the SNL/NM background concentration of 0.785 for the sample from the west end of the south acid line. Lead was detected above the SNL/NM soil background level of 15.0 mg/kg in the samples from the east end of the south acid line (19.0 mg/kg) and the north acid line (118 mg/kg). No other metals were detected at concentrations above the action levels derived in accordance with the methodology in proposed Subpart S (EPA 1990b). Several VOCs were detected in the sediment, though none were above proposed Subpart S action levels (EPA 1990b). No SVOCs of concern were detected. All three sediment samples were analyzed for pH; values ranged from 6.6 to 8.7 and are considered to be consistent with the natural soil. The PCB Aroclor 1242 was detected in the sample from the north acid waste line at a concentration of 27,000 μg/kg, which is above the TSCA cleanup level of 10,000 μg/kg (40 CFR 761, Subpart G) and the risk-based action level of 90 μg/kg derived in accordance with the methodology in proposed Subpart S (EPA 1990b, IT Corp. 1994e). The sediment collected from the north acid line in May 1994 confirmed the elevated PCB level; a concentration of 37,000 μg/kg was detected. No PCBs were detected on the wipe sample collected from the location near CO1 (IT Corp. 1994f). Since no constituents were detected above action level except where noted, a baseline risk assessment was considered unnecessary at the time.

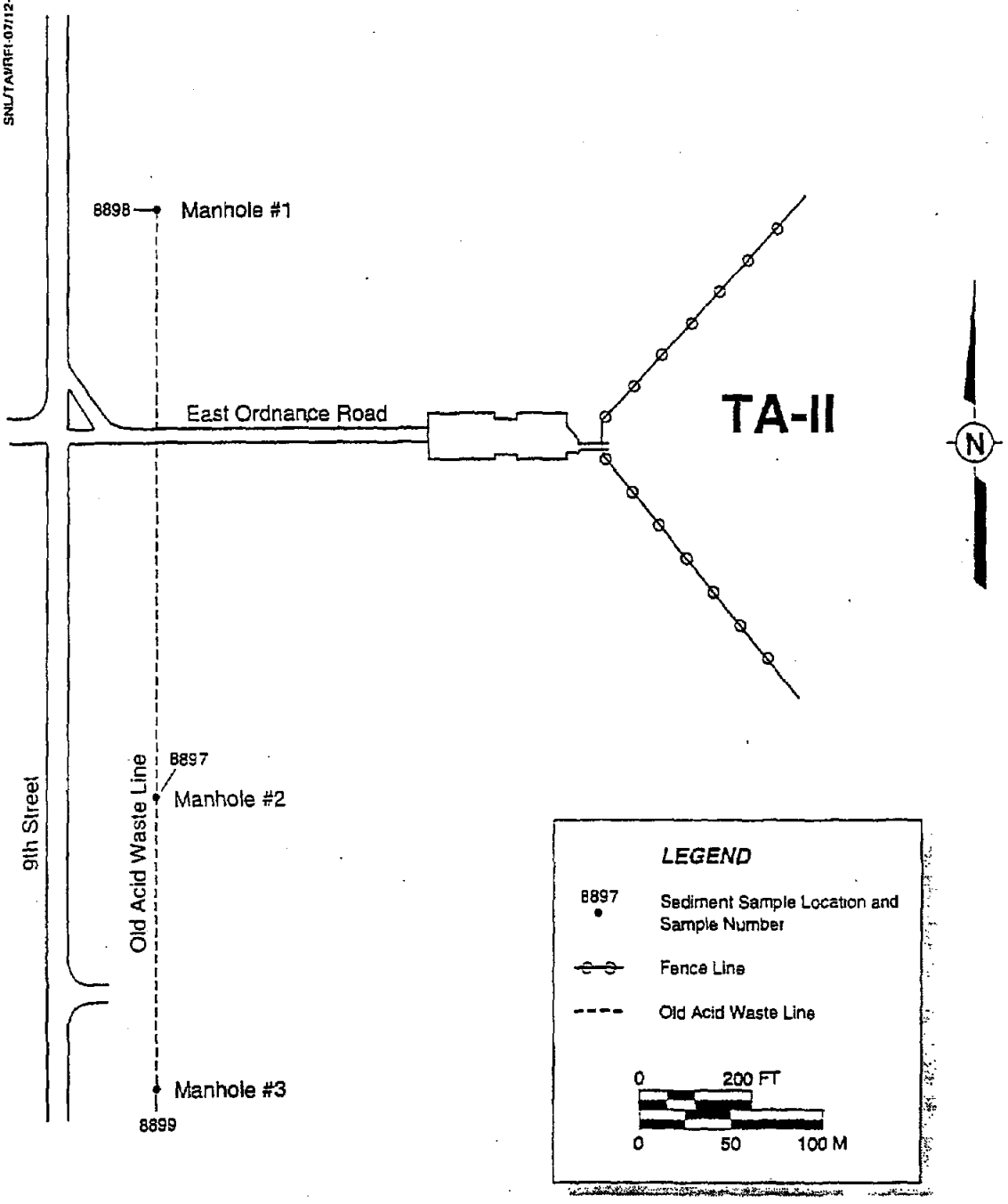


Figure 5-34
ER Site 226: Old Acid Waste Line, Previous Sediment Sample Locations

Two of the three sediment samples collected were analyzed for gamma-emitting radionuclides and tritium. The sample from the east end of the south line was not analyzed for radionuclides because of insufficient sample volume. The sample from the west end of the south line contained radionuclide activities consistent with natural background concentrations. The sample from the north acid line exhibited a tritium concentration of 920 pCi/L and contained radionuclide activities slightly above natural background concentrations that made it suspect for thorium contamination. Subsequent isotopic thorium analysis indicated that the thorium isotope level was within the natural background concentrations found at SNL/NM (IT Corp. 1994f).

Based on the sediment results, it was determined that additional investigation of the soils surrounding the acid lines was warranted. The additional soil investigation focused on metals, VOCs, and tritium; the results are discussed in Section 5.12.2.3.

5.12.2.3 Previous Soil Sampling and Analysis

Soil adjacent to several breaks identified in the camera survey has been sampled and analyzed in conjunction with two facilities projects at SNL/NM. These are described below.

5.12.2.3.1. Communications Duct at K and 9th Streets

In the spring of 1992, prior to excavating a trench across a segment of the acid line for a communication line, 10 soil samples were collected near the intersection of K and 9th Streets (Figure 5-35). The soil was analyzed for total metals, VOCs, SVOCs, tritium, and by gamma spectroscopy. Five samples were collected 3 ft bgs at the approximate depth of the acid waste line, and five samples were collected 8 ft bgs at the depth of the proposed communication lines. Three background and QA/QC samples were also collected. No soil sampled contained constituents in concentrations that exceed RCRA waste characterization thresholds (40 CFR 261), proposed Subpart S risk-based action levels (EPA 1990b), or DOE guidelines (IT Corp. 1992e; Burton 1992). Since no constituents were detected above action levels, a baseline risk assessment was considered unnecessary at the time.

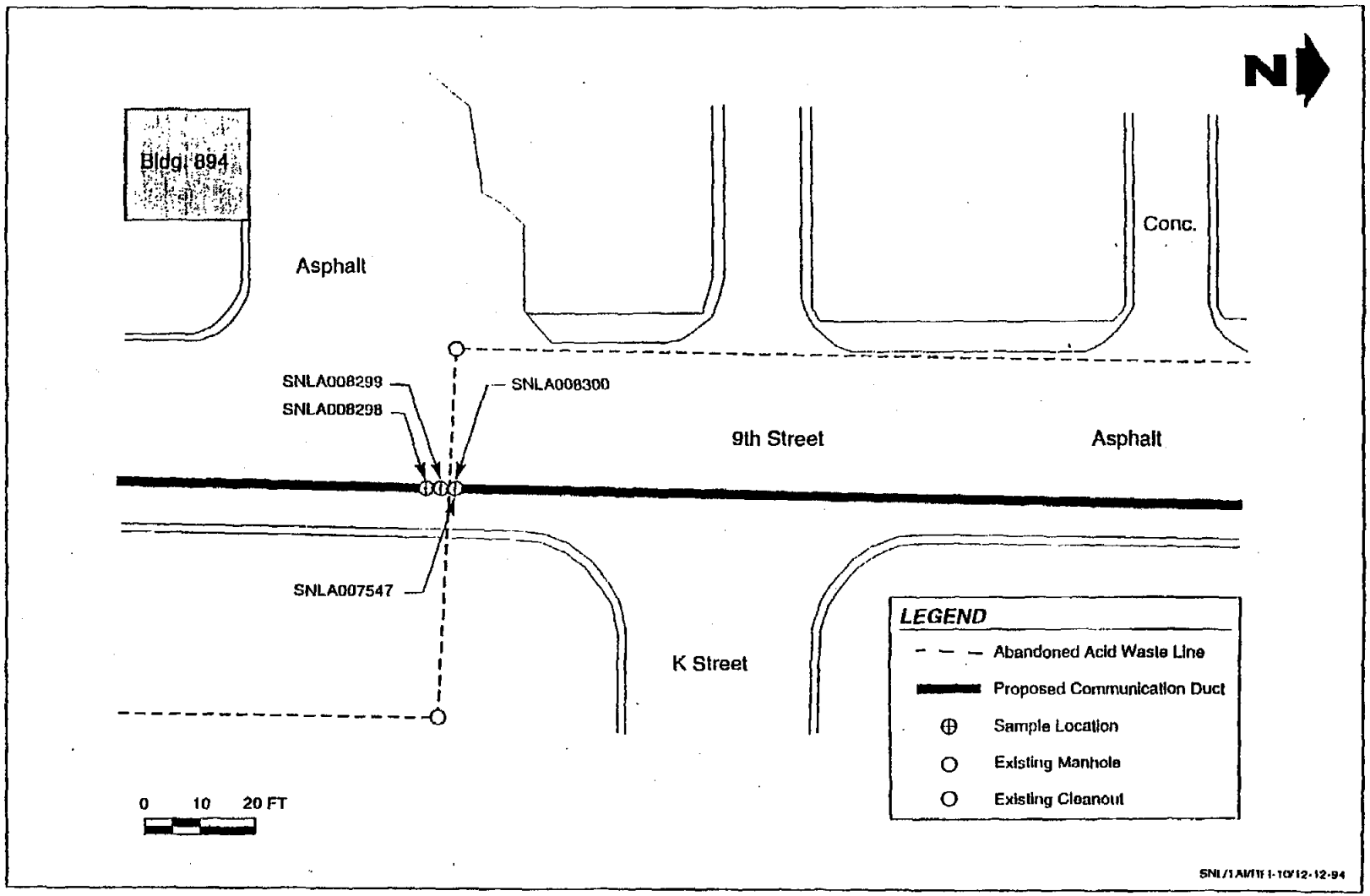


Figure 5-35
ER Site 226: Location of Samples Collected Near Intersection of Communications Duct and Acid Waste Line, 9th and K Streets

5.12.2.3.2. *Building 839 Acid Waste Line Soil Sampling*

Based on the results of sediment samples collected in December 1993 and January 1994 from the interior of the acid waste line laterals north and south of Building 839 (Subsection 5.12.2.2). additional sampling was conducted in April and May 1994 (IT Corp. 1994f). Soil samples were collected adjacent to the three original acid waste line sampling locations, and, for each of the three, at 4 points approximately 15 ft from the original locations. In addition, samples were collected at two locations that had not previously been sampled adjacent to breaks in the main acid waste line which runs east of Building 839 and at two locations near CO1 in the north acid waste line. At each of the 19 soil sample locations, samples were collected at two depths. The three locations at the original sediment sample locations were sampled 5 ft and 10 ft below the depth of the line (*i.e.*, at 9 ft and 14 ft. bgs). At the other 16 locations, samples were collected at the line depth and 5 ft below line depth (*i.e.*, at approximately 4 ft and 9 ft bgs).

Samples were shipped to an off-site analytical laboratory for TAL inorganics and organic analyses; to the SNL/NM on-site radiological laboratory for gamma spectroscopy; and to an off-site radiological laboratory for tritium analysis. Specific analyses for samples associated with previous sampling were based on the results of the sediment sampling. Samples collected from the east acid waste line were analyzed for metals, VOCs, SVOCs, PCBs, gamma-emitting radionuclides, and tritium.

Near the east acid waste line, no VOCs, SVOCs, PCBs, or metals were detected at levels that exceeded the action levels derived in accordance with the methodology specified in proposed Subpart S (EPA 1990b) and/or SNL/NM soil background levels. Several VOCs and one PCB congener were detected at the line depth but not in the 5-ft sample. This bounds the vertical extent of these constituents at the location and provides useful information about the migration of VOCs and PCBs in TA-I soils. Since no constituents were detected above action levels, a baseline risk assessment was considered unnecessary at the time. Gamma-emitting radionuclides detected near the east acid line at values greater than SNL/NM soil background levels were uranium-238, radium-226, bismuth-214, and radium-224. Tritium was detected in three samples at levels ranging from 330 to 420 pCi/L, which exceed the SNL/NM action level of 250 pCi/L (SNL/NM 1994e).

Fifteen of the soil samples (including 1 duplicate) collected near the north acid line were analyzed for VOCs, PCBs, total TAL inorganics, gamma-emitting radionuclides, and tritium. One soil sample collected immediately below the line at an offset cracked joint near CO1 was analyzed for PCBs only. No PCBs were detected in any of the soil samples collected near the north acid waste line. No VOCs

were detected at levels exceeding the risk-based action levels derived in accordance with the methodology in proposed Subpart S (EPA 1990b). All metals detected except beryllium were below risk-based action levels derived in accordance with the methodology in proposed Subpart S (EPA 1990b) and/or SNL/NM soil background metals concentrations. Beryllium was detected in all the samples except one at levels exceeding the proposed Subpart S action level of 0.2 mg/kg (EPA 1990b); no level exceeded the SNL/NM soil background level of 0.785 mg/kg. Gamma-emitting radionuclides detected near the north acid waste line at values greater than SNL/NM soil background levels were uranium-238, radium-228, radium-226, bismuth-214, and radium-224. Tritium was detected in ten samples at levels ranging from 290 to 470 pCi/L, which exceed the SNL/NM action level of 250 pCi/L (SNL/NM 1994g). Since no constituents were detected above action levels, a baseline risk assessment was considered unnecessary at the time.

The 10 soil samples collected from five locations near the eastern end of the southern acid waste line were analyzed for total TAL inorganics. All metals detected were below risk-based action levels derived in accordance with the methodology in proposed Subpart S (EPA 1990b) and/or SNL/NM soil background metals concentrations. Since no constituents were detected above action levels, a baseline risk assessment was considered unnecessary at the time.

The 10 soil samples collected from five locations near the western end of the south acid waste line were analyzed for tritium, gamma-emitting radionuclides, VOCs, and total TAL inorganics. All VOCs and metals detected, except beryllium and barium, were below risk-based action levels derived in accordance with the methodology in proposed Subpart S (EPA 1990b) and/or SNL/NM soil background metals concentrations. Beryllium was detected in all the samples except one at levels exceeding the proposed Subpart S action level of 0.2 mg/kg (EPA 1990b); no level exceeded the SNL/NM soil background level of 0.785 mg/kg. Barium was detected in three samples at levels exceeding the SNL/NM background level of 398 mg/kg but below the proposed Subpart S action level of 4000 mg/kg (EPA 1990b). Gamma-emitting radionuclides detected at values greater than SNL/NM soil background levels were uranium-238, bismuth-214, and radium-224. Tritium was detected in nine samples at levels ranging from 380 to 1100 pCi/L, which exceed the SNL/NM action level of 250 pCi/L (SNL/NM 1994e; IT Corp. 1994f).

The second phase of sampling identified that the contaminated material was confined to within the acid lines. The tritium detected near the western end of the south acid waste line could not be attributed to effluent from the line as it was also detected at the surface at other locations at Building

839. Subsequent calculations have confirmed that the health and safety risk to personnel associated with the levels of tritium detected in the soil are much lower than DOE guidelines (Eidson 1994). A VCM is being proposed to the EPA to remove these sections of contaminated acid waste lines as well as uncontaminated sewer lines. The VCM Plan, Waste Management Plan, and Sampling and Analysis Plan are presently in draft and are anticipated to be ready for regulatory review in the second quarter of fiscal year 1995. The VCM is planned to be conducted at the Building 839 acid waste line and the Building 838 and 839 sewer lines. Verification samples will be collected as part of the VCM to ensure that no contaminated soil remains after the removal of the lines.

5.12.2.4 Camera Survey

In the spring of 1993, an in-line camera survey was performed on an estimated 60,000 ft of the sanitary sewer and acid waste line to identify breaks. In the fall of 1993, a second camera survey identified additional breaks in sewer lines serving buildings of potential concern and abandoned lines. These investigations are described in detail in Section 5.10. Several deficiencies were identified and evaluated (Plates 5-9 to 5-11). The following criteria have been used to define pipe deficiencies (Jones 1994):

- A minor crack is a hairline crack which shows no sign of an open void in the pipe material.
- A moderate crack has a visible void in the pipe wall and may have an offset of pipe material at the crack.
- A severe crack was noted in cases where soil was visible through the opening in the pipe.
- A slight offset joint has a deflection of approximately 1/4 inch or less.
- A moderate offset joint has an exposed gasket or a joint deflection greater than 1/4 inch.
- A severe offset joint has soil visible through the offset joint.
- Where there are roots in the lines, particularly in clay pipe, there is the potential for a moderate crack.
- Where not specified, offset joints are slight breaks.
- Where an offset joint is noted to be cracked, the break is moderate.
- Where there is either a joint with offset, a joint with roots, a possible old repair, or a cracked joint, the break is moderate.

- Where there is a broken pipe, a bad joint, an old repair, or a hole in the pipe, the break is severe.

Pipe deficiencies and break locations are shown on the plates. Deficiencies or breaks are shown as slight, moderate, or severe by line weight around, and shading within the keyed note symbol in both the legend and the plate. Keyed notes which do not indicate a pipe deficiency or break are screened back. Keyed notes which pertain to the sanitary sewer system are denoted by an "S".

5.12.3 Nature and Extent of Contamination

There are limited data available on the nature and extent of contamination associated with the acid waste line. Two investigations of sediment from the line interior, a radiation survey of the outfall area, a camera survey of the line interior, an investigation of soil near two lateral lines at a single building, and an investigation of two break locations in the portion of the line incorporated into the sanitary system have been conducted to date. All other information on the nature of possible contamination is based on knowledge of processes producing the waste discharged to the line.

The investigations indicate that chemicals and radioactive materials from industrial processes may remain in the abandoned portions of the line. These chemicals and radioactive materials have been detected near breaks in the line, but at levels much lower than action levels. The constituents detected have been limited in extent to within 15 ft of the breaks.

5.12.4 Conceptual Model

The conceptual model for the acid waste line is based on available information on system usage, the line break locations identified by the camera survey, and the results of previous investigations. Based on known building activities and processes and data collected to date, the waste may have contained radioactive materials as well as metals, VOCs, SVOCs, and PCBs. Deficiencies in lines that have carried industrial or laboratory waste provide a pathway for the waste to the surrounding soil. Because the acid waste line was designed to flow full, breaks located anywhere in the line are assumed to constitute a potential release pathway. However, the line was used for acid discharges for only approximately 15 of the last 45 years. It is unreasonable to assume that each line break identified in 1993 was present when the system was operating 30 years previously. Similarly, every pipe deficiency or line break cannot be assumed to be the source of a release. Many pipe deficiencies may

have occurred during the 25-year period after the system was abandoned (south of I Street) or incorporated into the sanitary sewer system (north of I Street).

Based on available data and knowledge of system use, the potential COCs would not be expected to migrate substantially from the release site, nor be present in concentrations which pose a risk to human health or the environment. There is little potential for lateral contaminant migration. In most cases the lines are buried 4 to 8 ft bgs. There is no grade or local topography, nor surface runoff or overland flow which would contribute to lateral contaminant migration. There is the potential for vertical migration through the vadose zone. If there were breaks in the lines during system use and in the portion converted to sanitary sewer, then the flow in the line may have created an hydraulic head to drive the flow through the vadose zone. The COCs present in the soil could also migrate vertically through the vadose zone with infiltrating precipitation; however, that migration mechanism is limited because of the extensive paving in TA-I.

In order to develop a strategy for investigating releases from the acid waste line, a model of migration of contaminants through the vadose zone was assumed. A crack or other deficiency in the line is considered a point source for release. Because of the low potential for lateral migration, any release is assumed to migrate downward in a conical zone. The release is assumed to spread at approximately a 45 degree angle from the vertical as it migrates vertically.

The potential COCs in the acid waste line are similar to those in the Storm Drain System except that bases have been excluded. Information on the mobility and persistence of the potential COCs is given in the Storm Drain Conceptual Model, Subsection 5.10.4.

A release from the acid waste line would not pose a direct risk to human health and the environment. The affected area lies a minimum of 4 ft bgs and, in many areas, is 8 ft bgs. Unless the line is accessed for construction purposes, there should be no direct contact with the affected soil via inhalation, ingestion, or dermal exposure. If construction is required, proper precautions will be taken to protect site workers. Five hundred feet separate the potential release source and the local aquifer, limiting the potential risk to potable water quality.

Potential corrective measures at the acid waste line are primarily limited to excavation and off-site treatment or disposal. Because of the wide range of contaminants that may be present and the

probable distribution of COCs at break locations, *in situ* and on-site treatment technologies are not considered technically or economically feasible at this time. However, on-site treatment may be feasible if a large soil volume is affected. If data collected indicate that, because of the areal and vertical extent of COCs, the volume of soil to be generated from releases along the lines warrant it, on-site treatment technologies will be evaluated.

5.12.5 Sampling Plan

The sampling strategy selected for the acid waste line is designed to characterize potential releases from the system at the break locations identified by the in-line camera survey and to characterize any material remaining within abandoned portions of the line.

General DQOs for TA-I RFI are given in Section 4.3. Specific DQOs for the acid waste line investigation include:

- Determining if any VOCs, SVOCs, metals, PCBs, and/or radionuclides have been released to the soil within 18 inches of an identified line break or are constituents of any material remaining within abandoned portions of the line.
- Producing data of adequate quality (Level III) for all shallow subsurface samples at each break location under investigation so that risk calculations may be performed for an individual break location.
- Producing data of adequate quality (Level III) for all sediment samples so that risk calculations may be performed for material remaining within the line.
- Characterizing the vertical extent of any COCs detected above action levels near the acid waste lines by collecting samples from deep soil borings for analysis (Level II and Level III).
- Producing data of adequate quality (Level III) for 20 percent of deep borehole samples so that risk calculations may be performed and corrective measures may be evaluated.

The DQOs will be achieved through implementation of the sampling strategy outlined below. If contaminants are detected in the soil samples at concentrations above the action levels, additional samples (*i.e.*, boreholes) will be collected. Analytical Levels II and III will be required for analytical procedures identified under this plan. Data will be collected during sediment and shallow subsurface soil sampling and deep soil boring investigations.

5.12.5.1 Shallow Subsurface Soils Near Lines and Line Sediment

5.12.5.1.1. Data Collection

Soil samples will be collected adjacent to the breaks identified by the in-line camera survey (Plates 5-9 to 5-11). The sample locations are indicated on the figures using bolded circles around the keyed note symbol on the figure. In many cases, the breaks are clustered around a line segment. Where samples are clustered, a streamlined sampling approach will be taken. Soil will be sampled at one location, selected to be representative of the potential worst case release to surrounding soil. The streamlined approach has been adopted based on the homogenous nature of the effluent. The effluent and any COCs which have entered the system would be the same along a given line or section of line that received discharge from the same source. COCs present would be diluted with discharge from additional lines downstream of each connection and at the confluence of lines. The in-line camera survey identified lines from buildings where radiological and chemical constituents were discharged to the acid waste line and off-set joints or line breaks from which these constituents may have been released to soil. Given the break density and severity designations, the criteria listed below comprise the bases for the selected sample locations.

- Where two or more breaks are located along 100 ft of pipe, the most severe and most upgradient break will be sampled. For example, south of Building 841 there are three line deficiencies within 100 ft of one another (Plate 5-10; Keyed Note Nos. 44, 45, and 46). The sample location chosen is the northern-most of the three (No. 46) because it is the most upgradient and is severe; the other two are moderate deficiencies.

- Where two keyed notes of the same severity were located downgradient of a building connection, the keyed note legend was consulted to select the location having the greatest potential to be the source of a release. For example, east of Building 840, five severe deficiencies were identified (Plate 5-10; Keyed Note Nos. 53 to 57). The northern-most deficiency (No. 57) was chosen as the sample location because it is both the most upgradient (and contaminants are less likely to be diluted) and the pipe is offset on the bottom side, making it the most likely source of a release.

- Where there are two or more slight breaks within 100 ft of pipe, the most upgradient break will be sampled;

- Where five or more severe breaks are clustered along 100 ft of pipe, the most upgradient break and that break nearest a downgradient connection will be sampled (*i.e.*, two breaks will be sampled if more than four severe breaks are located within 100 ft); and

- Where a break is over 100 ft from another break location, the break location will be sampled.

No buildings south of Building 892 were connected to the acid waste line. Sample locations south of that building have been selected based on break location, density, and severity as well as knowledge of the homogeneous flow through the line from Building 892 south to the Tijeras Arroyo. The breaks occur in eight clusters; the distance between clusters ranges from 150 to more than 600 ft. The most upgradient breaks at four of the eight clusters are severe. For example, in Plate 5-11, Keyed Notes Nos. 2 and 13 in Block 10d are the most upgradient and severe breaks in the clusters. These locations were selected to provide the most conservative estimate of the extent of a potential release from a break in the line south of Building 892.

In other clusters, such as Plate 5-11, Keyed Note No. 3 in Block 7d, a severe break is within 75 ft of the most upgradient break in the cluster. This severe break was selected to be representative of a potential release from the line segment for that cluster. There are no severe breaks in the other three clusters. In two clusters, a moderate break is, or is adjacent to, the most upgradient break location. In these clusters, the most upgradient moderate break provides the most conservative sample location (Plate 5-9, Keyed Notes Nos. 4 and 12 in Blocks 4d and 7b).

In the final cluster, there are two slight breaks and slight offset joints lying 3 ft apart, identified as Plate 5-9, Keyed Notes Nos. 1 and 2 in Block 4d. One location will be sampled due to the proximity of these deficiencies to one another and their distance from upgradient (600 ft) and downgradient (150 ft) clusters.

One soil sample will be collected by hand auger within 18 inches directly below or adjacent to the line at the locations shown in Plates 5-9 and 5-11 for field screening, lithologic logging, and laboratory analyses. Soil for laboratory analysis will be transferred from the sampling device to the sample containers immediately upon collection. Additional soil will be collected for screening and logging and then disposed of as IDW. Sediment remaining in the abandoned line (*i.e.*, that portion of the line south of I Street) will be collected from three manholes near Buildings 893, 892, and 819 (Manholes AWMH15, AWMH12, and AWMH11) if sediment volume allows. If sufficient volume is available, the sediment will also be field screened for VOCs. The manholes were chosen based on proximity to buildings contributing substantial effluent to the acid waste sewer; however, the locations may be changed if no sediment remains in the line at these manholes.

5.12.5.1.2. Analytical Parameters

Environmental, QA/QC, and waste management samples are listed in Table 5-33 for the sediment samples and Table 5-34 for the shallow subsurface samples at the end of this subsection. Shallow subsurface samples collected near or below acid waste lines and sediment samples collected from the line interior will be analyzed at an off-site analytical and radiological laboratory (Level III) for VOCs, SVOCs, PCBs, total TAL inorganics, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium, and at the on-site laboratory by gamma spectroscopy (Level II). All sediment and thirty percent of the collected soil samples (chosen on a random basis) will be analyzed for hexavalent chromium. Field screening for VOCs using a PID or FID and for alpha and beta/gamma radiation using alpha scintillation and Geiger-Mueller pancake probes will be conducted as samples are collected.

5.12.5.2 Borehole Investigation

5.12.5.2.1. Data Collection

At break locations where the shallow subsurface analytical results exceed risk-based action levels derived in accordance with the methodology presented in proposed Subpart S (EPA 1990b) and SNL/NM background metals and radionuclide concentrations, boreholes will be drilled and additional soil samples will be collected (Section 4.1.2). At those break locations where the shallow subsurface sampling does not indicate the presence of contamination, boreholes will not be drilled. One borehole will initially be drilled approximately 18 inches downgradient from the hot shallow subsurface sample location. The vertical extent of potential contamination will be determined using on-site field laboratory analyses. Three additional boreholes will be located radially around the initial borehole, with one located downgradient from the initial borehole, adjacent to the pipe. The distance of these boreholes from the central borehole will be dependent upon the vertical extent of potential contamination: the distance should equal approximately one-half the vertical extent of the potential contamination as determined using field screening or on-site laboratory analyses, to a maximum of 25 feet. The distance and location of the radial boreholes may be modified based on available screening techniques, site clearance, and access.

At each borehole location, a hollow-stem auger will be used to collect samples for field screening (if available for COCs detected), lithologic logging, and for laboratory analysis (Level II or III).

Borehole sampling will be initiated at the depth of the shallow subsurface sample. Samples will be collected at 5 ft intervals from 0 to 50 ft, at 10 ft intervals from 50 to 100 ft, and at 20 ft intervals at depths greater than 100 ft. The boreholes will be drilled until two samples are determined to be uncontaminated by means of field screening or on-site analysis, as appropriate, or to the depth limits of the drilling method. Sampling will then be terminated.

Split samples will initially be collected at the two shallowest 5 ft intervals. One split from each depth will be sealed, labeled, and set aside for possible off-site laboratory analysis. The other split will be logged for lithology and field screened or analyzed at the on-site analytical laboratory, as appropriate for the COCs under investigation. The samples will also be surveyed for beta/gamma radiation using a Geiger-Meuller pancake probe. If no COCs are detected, then these two 5-ft samples will be considered uncontaminated and sent for confirmatory off-site laboratory analysis. If one of the first two samples is contaminated, then the borehole will be advanced and sampled at the intervals described above until two consecutive intervals are determined to be uncontaminated. To meet the objectives described above, at least 20 percent of the samples will be submitted for off-site verification analysis, including the sample showing the highest screening value (to characterize the nature of the COCs) and one sample from each of the two deepest uncontaminated sample intervals (to characterize the vertical extent of COCs). Other samples may be chosen by the field geologist, using professional judgement, to be representative of the sample set. Core not submitted for laboratory analysis will be disposed of as IDW.

If boreholes are determined to be necessary, they will be located as described above. For planning purposes, borehole depth is estimated to be approximately 100 ft bgs, but the depth may be extended based on the field screening results. Actual depth of vertical sampling may vary according to field conditions and the equipment capabilities. At least three soil samples will be collected for Level III analysis from each borehole as well as additional QA/QC samples.

5.12.5.2.2. Analytical Parameters

Table 5-35 at the end of this subsection is an example table listing the environmental, QA/QC, and waste management samples for a single borehole. Samples collected from the deep borings will be analyzed only for the parameters detected in the shallow subsurface samples. Field screening for VOCs using a PID or FID and for alpha and beta/gamma radiation using alpha scintillation and Geiger-Mueller pancake probes will be conducted as samples are collected.

Table 5-33. ER Site 226: Sediment Sample Identification and Analytical Specifications

ER SITE 226 : (Acid Waste Line)					FIELD SCREENING (a)					ON-SITE LAB ANALYSES (b) (c) (d)				OFF-SITE LAB ANALYSES (d) (e) (f)											
FIELD NUMBER Assign Bar-Coded Sample Number In Field	SAMPLE ID (g) See Plates 5-9 and 5-10 for Locations 11226-	SAMPLE METHOD (e.g. Geoprobe, Soil Boring, Hand Auger, etc.)	SAMPLE TYPE (e.g. Surface Soil, Sediment, Rinsate Blank, Trip Blank, Duplicate, etc.)	SAMPLE DEPTH (ft)	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	TPH (8015)	SVOCs (8270)	PCBs (8080)	TAL INORGANICS (h)	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311) (h)	TCLP ORGANICS (1311/8270/8240)	HEX CHROMIUM
	SD-001-	SCOOP	SEDIMENT	NA	X				X					X		X	X	X	X	X		X			X
	SD-002-	SCOOP	SEDIMENT	NA	X				X					X		X	X	X	X	X		X			X
	SD-003	SCOOP	SEDIMENT	NA	X				X					X		X	X	X	X	X		X			X
	SD-004-	SCOOP	SEDIMENT	NA	X				X					X		X	X	X	X	X		X			X
	SD-005-	SCOOP	SEDIMENT	NA	X				X					X		X	X	X	X	X		X			X
	SD-006-	SCOOP	F.D./SEDIMENT	NA	X				X					X		X	X	X	X	X		X			X
	EB-001-	GRAB	EQUIP. BLANK	NA	X									X		X	X	X	X	X		X			
	FB-001-	GRAB	FIELD BLANK	NA	X									X		X	X	X	X	X		X			
	TB-001-	NA	TRIP BLANK	NA	X									X											
The actual number of waste management samples will be based on soil analytical results, and types and number of containers used.																									
	DRM-001-	GRAB	SOLID WASTE	NA	X				X										X	X	X	X	X	X	
			TOTAL SAMPLES		10				7					9		9	9	9	10	10	1	10	1	1	6

Total Samples: Field Screening = 17; On-site Lab = 9; Off-site Lab =10.

Notes

(a) Analytical Level I Data. Field screening methods and rationale are discussed in the text

(b) Analytical Level II Data. On site lab sample container volume/type requirements will be determined by the on site laboratory during mobilization

(c) On-site lab analytical methods will be determined at a later date

(d) All geochemical laboratory samples will be preserved on ice unless otherwise noted

(e) Analytical Level III Data. Consists of duplicates of 20% of the on-site laboratory analytical samples

(f) Off site lab sample container volume/type requirements for soil and water will be determined by the Sample Management Office during mobilization

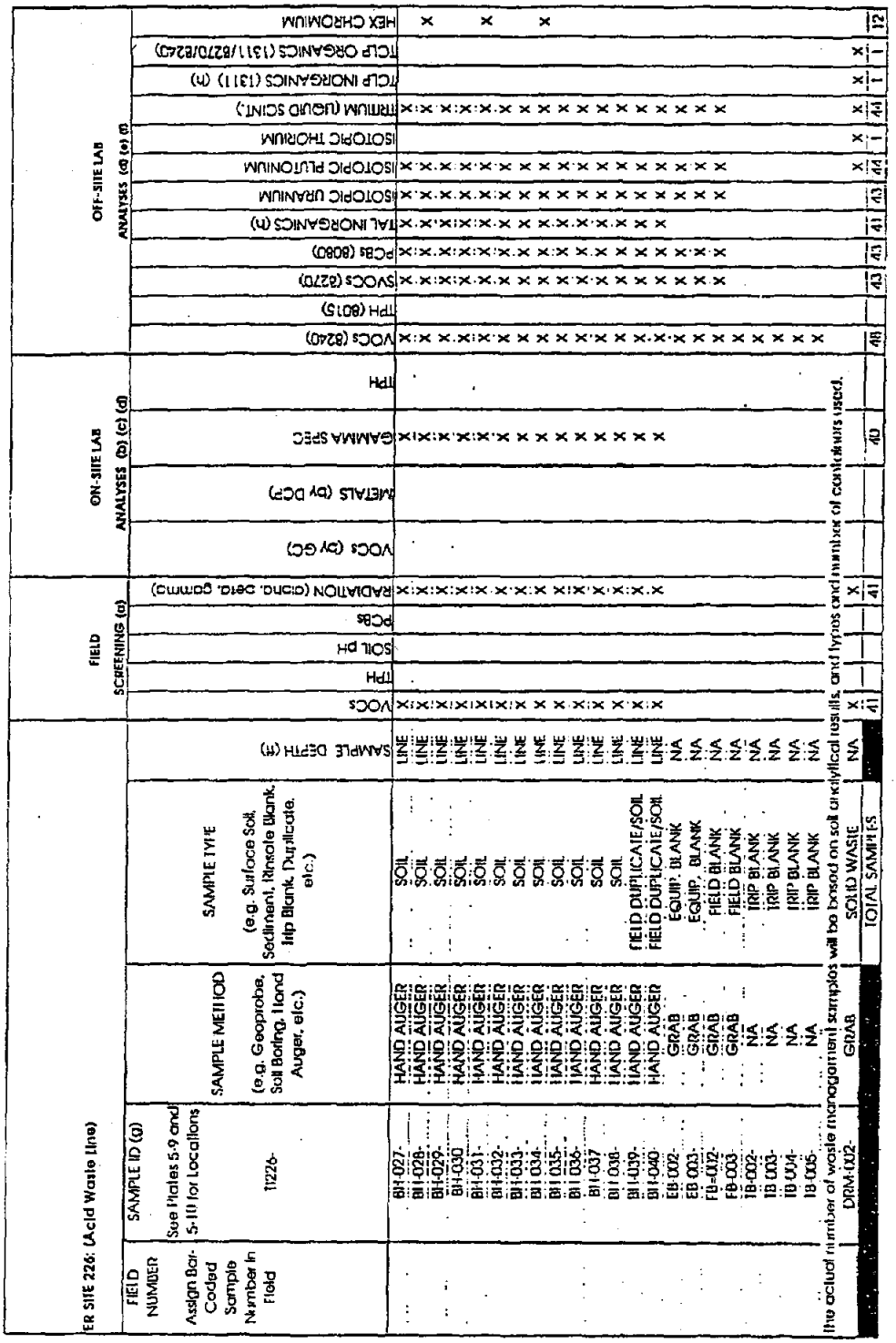
(g) The Sample ID contains information regarding location, matrix, depth, etc. This sample identification scheme is described in Section 4.4

(h) Inorganics analytical methods include 6010 and 7000 series analysis

Table 5-34. ER Site 226: Shallow Subsurface Soil Sample Identification and Analytical Specifications

ER SITE 226: (Acid Waste Line)					FIELD SCREENING (a)					ON-SITE LAB ANALYSES (b) (c) (d)				OFF-SITE LAB ANALYSES (d) (e) (f)											
FIELD NUMBER Assign Bar-Coded Sample Number in Field	SAMPLE ID (g) See Plates 5-9 and 5-10 for Locations TI226-	SAMPLE METHOD (e.g. Geoprobe, Soil Boring, Hand Auger, etc.)	SAMPLE TYPE (e.g. Surface Soil, Sediment, Rinsate Blank, Trip Blank, Duplicate, etc.)	SAMPLE DEPTH (ft)	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	TPH (8015)	SVOCs (8270)	PCBs (8080)	TAL INORGANICS (h)	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311) (h)	TCLP ORGANICS (1311/8270/8240)	HEX CHROMIUM
	BH-001-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			X
	BH-002-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-003-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-004-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			X
	BH-005-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-006-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-007-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			X
	BH-008-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-009-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-010-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			X
	BH-011-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-012-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-013-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			X
	BH-014-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-015-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-016-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			X
	BH-017-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-018	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-019	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			X
	BH-020	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-021	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-022	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			X
	BH-023-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-024-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			
	BH-025-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			X
	BH-026-	HAND AUGER	SOIL	LINE	X				X			X		X		X	X	X	X	X		X			

Table 5-34. (page 2 of 3)



ER SITE 226: (Acid Waste Line)					FIELD SCREENING (a)				ON-SITE LAB ANALYSES (b) (c) (d)				OFF-SITE LAB ANALYSES (a) (e) (f)													
FIELD NUMBER Assign Bar-Coded Sample Number in Field	SAMPLE ID (g) See Plates 5-9 and 5-10 for Locations 11226-	SAMPLE METHOD (e.g. Geoprobe, Soil Boring, Hand Auger, etc.)	SAMPLE TYPE (e.g. Surface Soil, Sediment, Rinsate Blank, Trip Blank, Duplicate, etc.)	SAMPLE DEPTH (ft)	VOCs	TPH	SOIL pH	PCBs	RADIATION (gross, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	TPH (8015)	SVOCs (8270)	PCBs (8080)	TAL INORGANICS (ft)	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311) (ft)	TCLP ORGANICS (1311/8270/8240)	HEX CHROMIUM	
	BH-027-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-028-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-029-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-030-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-031-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-032-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-033-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-034-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-035-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-036-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-037-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-038-	HAND AUGER	SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-039-	HAND AUGER	FIELD DUPLICATE/SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	BH-040-	HAND AUGER	FIELD DUPLICATE/SOIL	LINE	X				X			X		X		X		X	X	X	X	X	X	X	X
	EB-002-	GRAB	EQUIP. BLANK	NA																					
	EB-003-	GRAB	EQUIP. BLANK	NA																					
	FB-002-	GRAB	FIELD BLANK	NA																					
	FB-003-	GRAB	FIELD BLANK	NA																					
	TB-002-	NA	TRIP BLANK	NA																					
	TB-003-	NA	TRIP BLANK	NA																					
	TB-004-	NA	TRIP BLANK	NA																					
	TB-005-	NA	TRIP BLANK	NA																					
The actual number of waste management samples will be based on soil analytical results, and types and number of containers used.																									
	DRM-002-	GRAB	SOLID WASTE	NA	X	—	—	—	X	—	—	40	—	48	—	43	43	41	43	44	1	44	1	1	12
			TOTAL SAMPLES		41				41																

Table 5-34. (page 3 of 3)

ER SITE 226: (Acid Waste Line)					FIELD SCREENING (a)					ON-SITE LAB ANALYSES (b) (c) (d)				OFF-SITE LAB ANALYSES (d) (e) (f)									
FIELD NUMBER Assign Bar-Coded Sample Number in Field	SAMPLE ID (g) See Plates 5-9 and 5-10 for Locations 11226-	SAMPLE METHOD (e.g. Geoprobe, Soil Boring, Hand Auger, etc.)	SAMPLE TYPE (e.g. Surface Soil, Sediment, Rinsate Blank, Trip Blank, Duplicate, etc.)	SAMPLE DEPTH (ft)	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	TPH (8015)	SVOCs (8270)	PCBs (8080)	TAL INORGANICS (h)	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311) (h)	TCLP ORGANICS (1311/8270/8240)	HEX CHROMIUM
Total Samples: Field Screening =41; On-site Lab = 40; Off-site Lab = 49.																								

Notes

(a) Analytical Level I Data: Field screening methods and rationale are discussed in the text

(b) Analytical Level II Data: On-site Lab sample container volume/type requirements will be determined by the on-site laboratory during mobilization

(c) On site lab analytical methods will be determined at a later date

(d) All geochemical laboratory samples will be preserved on ice unless otherwise noted

(e) Analytical Level III Data: Consists of duplicates of 20% of the on-site laboratory analytical samples

(f) Off site Lab sample container volume/type requirements for soil and water will be determined by the Sample Management Office during mobilization

(g) The Sample ID contains information regarding location, matrix, depth, etc.; the sample identification scheme is described in Section 4.4

(h) Inorganics analytical methods include 6010 and 7000 series analysis.

Table 5-35. ER Site 226: Borehole Soil Sample Identification and Analytical Specifications

ER SITE 226 : (Acid Waste line)					FIELD SCREENING (a)				ON-SITE LAB ANALYSES (b) (c) (d)			OFF-SITE LAB ANALYSES (e) (f)											
FIELD NUMBER Assign Bar-Coded Sample Number in Field	SAMPLE ID (g) TI226-	SAMPLE METHOD (e.g. Geoprobe, Soil Boring, Hand Auger, etc.)	SAMPLE TYPE (e.g. Surface Soil, Sediment, Rinsate Blank, Trip Blank, Duplicate, etc.)	SAMPLE DEPTH (ft)	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	TPH (8015)	SVOCs (8270)	PCBs (8080)	TAL INORGANICS (7)	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311) (7)	TCLP ORGANICS (1311/8270/8240)	HEX CHROMIUM
The total number of boreholes will be based on the analytical results of the shallow subsurface soil investigation.	BH-001	SOIL BORING	SOIL	5	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	10	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	15	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	20	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	25	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	30	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	35	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	40	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	45	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	50	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	55	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	60	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	70	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	80	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	90	X				X			X		X	X						X		
	BH-001	SOIL BORING	SOIL	100	X				X			X		X	X						X		
	BH-002	SOIL BORING	FIELD DUPLICATE/SOIL	NA	X				X			X		X	X						X		
	EB-001	NA	EQUIP. BLANK	NA	X				X			X		X	X						X		
	FB-001	NA	FIELD BLANK	NA	X				X			X		X	X						X		
The actual number of waste management samples will be based on soil analytical results, and types and number of containers used.	TB-001	NA	TRIP BLANK	NA										X									
	DRM-001	GRAB	SOLID WASTE	NA																			
			TOTAL SAMPLES		17				16			16		7		6	6	6	6	6	1	6	1	4
Total Samples: Field Screening = 17; On-site Lab =16; Off-site Lab =8																							

Table 5-35. (page 2 of 2)

ER SITE 226 : (Acid Waste Line)					FIELD SCREENING (a)					ON-SITE LAB ANALYSES (b) (c) (d)				OFF-SITE LAB ANALYSES (d) (e) (f)										
FIELD NUMBER Assign Bar-Coded Sample Number in Field	SAMPLE ID (g) TI226-	SAMPLE METHOD (e.g. Geoprobe, Soil Boring, Hand Auger, etc.)	SAMPLE TYPE (e.g. Surface Soil, Sediment, Rinsate Blank, Trip Blank, Duplicate, etc.)	SAMPLE DEPTH (ft)	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	TPH (8015)	SVOCs (8270)	PCBs (8080)	TAL INORGANICS (h)	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311) (h)	TCLP ORGANICS (1311/8270/8240)	HEX CHROMIUM

Notes

(a) Analytical Level I Data: field screening methods and rationale are discussed in the text.

(b) Analytical Level II Data: On-site lab sample container volume/type requirements will be determined by the on site laboratory during mobilization

(c) On site lab analytical methods will be determined at a later date.

(d) All geochemical laboratory samples will be preserved on ice unless otherwise noted

(e) Analytical Level II Data: Consists of duplicates of 20% of the on-site laboratory analytical samples

(f) Off-site Lab sample container volume/type requirements for soil and water will be determined by the Sample Management Office during mobilization

(g) The Sample ID contains information regarding location, matrix, depth, etc.; this sample identification scheme is described in Section 4.4.

(h) Inorganics analytical methods include 6010 and 7000 series analysis.

Appendix C

ER Site 226 Data Summary Tables

.BLE 1

ER Site 226: Listing of Samples Collected and Analysis Performed

ER SITE 226				FIELD SCREENING					ON-SITE LAB ANALYSES				OFF-SITE LAB ANALYSES												
FIELD NUMBER Assign Bar-Coded Sample Number in Field	DATE/TIME Date and Time the sample was collected	SAMPLE ID See Plate 1-1 for Locations TI226-	REMARKS	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	SVOCs (8270)	TAL INORGANICS	PCB	HEX CHROMIUM	TOTAL CYANIDE	MERCURY	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311)	TCLP ORGANICS (1311/8270/8240)
022969-01	7/12/95-8:15	GP-001-010-S		X				X					X												
022969-02	7/12/95-8:15	GP-001-010-S		X				X						X	X	X	X								
022969-03	7/12/95-8:15	GP-001-010-S		X				X												X	X				
022969-04	7/12/95-8:15	GP-001-010-S		X				X															X		
022969-05	7/12/95-8:15	GP-001-010-S		X				X			X														
022970-01	7/12/95-9:20	GP-002-008-S		X				X					X												
022970-02	7/12/95-9:20	GP-002-008-S		X				X						X	X	X									
022970-03	7/12/95-9:20	GP-002-008-S		X				X												X	X				
022970-04	7/12/95-9:20	GP-002-008-S		X				X															X		
022970-05	7/12/95-9:20	GP-002-008-S		X				X			X														
022971-01	7/12/95-10:20	GP-003-008-S		X				X					X												
022971-02	7/12/95-10:20	GP-003-008-S		X				X						X	X	X									
022971-03	7/12/95-10:20	GP-003-008-S		X				X												X	X				
022971-04	7/12/95-10:20	GP-003-008-S		X				X															X		
022971-05	7/12/95-10:20	GP-003-008-S		X				X			X														
022972-01	7/12/95-11:30	GP-004-007-S		X				X					X												
022972-02	7/12/95-11:30	GP-004-007-S		X				X						X	X	X	X								
022972-03	7/12/95-11:30	GP-004-007-S		X				X												X	X				
022972-04	7/12/95-11:30	GP-004-007-S		X				X															X		
022972-05	7/12/95-11:30	GP-004-007-S		X				X			X														
022974-01	7/12/95-13:55	GP-006-006-S		X				X					X												
022974-02	7/12/95-13:55	GP-006-006-S		X				X						X	X	X									
022974-03	7/12/95-13:55	GP-006-006-S		X				X												X	X				
022974-04	7/12/95-13:55	GP-006-006-S		X				X															X		
022974-05	7/12/95-13:55	GP-006-006-S		X				X			X														
022978-01	7/13/95-8:20	GP-007-006-S		X				X					X												
022978-02	7/13/95-8:20	GP-007-006-S		X				X						X	X	X									
022978-03	7/13/95-8:20	GP-007-006-S		X				X												X	X				
022978-04	7/13/95-8:20	GP-007-006-S		X				X															X		
022978-05	7/13/95-8:20	GP-007-006-S		X				X			X														
022979-01	7/13/95-8:55	GP-008-007-S		X				X					X												

TABLE 1

ER Site 226: Listing of Samples Collected and Analysis Performed

ER SITE 226				FIELD SCREENING					ON-SITE LAB ANALYSES				OFF-SITE LAB ANALYSES												
FIELD NUMBER Assign Bar-Coded Sample Number in Field	DATE/TIME Date and Time the sample was collected	SAMPLE ID See Plate 1-1 for Locations TI226-	REMARKS	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	SVOCs (8270)	TAL INORGANICS	PCB	HEX CHROMIUM	TOTAL CYANIDE	MERCURY	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311)	TCLP ORGANICS (1311/8270/8240)
022979-02	7/13/95-8:55	GP-008-007-S		X				X						X	X	X	X								
022979-03	7/13/95-8:55	GP-008-007-S		X				X												X	X				
022979-04	7/13/95-8:55	GP-008-007-S		X				X															X		
022979-05	7/13/95-8:55	GP-008-007-S		X				X			X														
022980-01	7/13/95-9:40	GP-009-006-S		X				X					X												
022980-02	7/13/95-9:40	GP-009-006-S		X				X						X	X	X									
022980-03	7/13/95-9:40	GP-009-006-S		X				X												X	X				
022980-04	7/13/95-9:40	GP-009-006-S		X				X															X		
022980-05	7/13/95-9:40	GP-009-006-S		X				X			X														
022981-01	7/13/95-10:30	GP-010-007-S		X				X					X												
022981-02	7/13/95-10:30	GP-010-007-S		X				X						X	X	X									
022981-03	7/13/95-10:30	GP-010-007-S		X				X												X	X				
022981-04	7/13/95-10:30	GP-010-007-S		X				X															X		
022981-05	7/13/95-10:30	GP-010-007-S		X				X			X														
022982-01	7/13/95-11:15	GP-011-005-S		X				X					X												
022982-02	7/13/95-11:15	GP-011-005-S		X				X						X	X	X	X								
022982-03	7/13/95-11:15	GP-011-005-S		X				X												X	X				
022982-04	7/13/95-11:15	GP-011-005-S		X				X															X		
022982-05	7/13/95-11:15	GP-011-005-S		X				X			X														
022983-01	7/13/95-12:50	GP-012-006-S		X				X					X												
022983-02	7/13/95-12:50	GP-012-006-S		X				X						X	X	X									
022983-03	7/13/95-12:50	GP-012-006-S		X				X												X	X				
022983-04	7/13/95-12:50	GP-012-006-S		X				X															X		
022983-05	7/13/95-12:50	GP-012-006-S		X				X			X														
022984-01	7/13/95-13:30	GP-013-006-S		X				X					X												
022984-02	7/13/95-13:30	GP-013-006-S		X				X						X	X	X									
022984-03	7/13/95-13:30	GP-013-006-S		X				X												X	X				
022984-04	7/13/95-13:30	GP-013-006-S		X				X															X		
022984-05	7/13/95-13:30	GP-013-006-S		X				X			X														
022985-01	7/13/95-14:10	GP-014-006-S	MS/MSD	X				X					X												
022985-02	7/13/95-14:10	GP-014-006-S	MS/MSD	X				X						X	X	X	X								

TABLE 1

ER Site 226: Listing of Samples Collected and Analysis Performed

ER SITE 226				FIELD SCREENING					ON-SITE LAB ANALYSES				OFF-SITE LAB ANALYSES												
FIELD NUMBER Assign Bar-Coded Sample Number in Field	DATE/TIME Date and Time the sample was collected	SAMPLE ID See Plate 1-1 for Locations TI226-	REMARKS	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	SVOCs (8270)	TAL INORGANICS	PCB	HEX CHROMIUM	TOTAL CYANIDE	MERCURY	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311)	TCLP ORGANICS (1311/8270/8240)
022985-03	7/13/95-14:10	GP-014-006-S		X				X												X	X				
022985-04	7/13/95-14:10	GP-014-006-S		X				X															X		
022985-05	7/13/95-14:10	GP-014-006-S		X				X			X														
022988-01	7/14/95-8:40	GP-015-010-S		X				X					X												
022988-02	7/14/95-8:40	GP-015-010-S		X				X						X	X	X									
022988-03	7/14/95-8:40	GP-015-010-S		X				X												X	X				
022988-04	7/14/95-8:40	GP-015-010-S		X				X															X		
022988-05	7/14/95-8:40	GP-015-010-S		X				X			X														
022989-01	7/14/95-9:55	GP-016-010-S		X				X					X												
022989-02	7/14/95-9:55	GP-016-010-S		X				X						X	X	X									
022989-03	7/14/95-9:55	GP-016-010-S		X				X												X	X				
022989-04	7/14/95-9:55	GP-016-010-S		X				X															X		
022989-05	7/14/95-9:55	GP-016-010-S		X				X			X														
022995-01	7/17/95-9:30	GP-017-010-S		X				X					X												
022995-02	7/17/95-9:30	GP-017-010-S		X				X						X	X	X	X								
022995-03	7/17/95-9:30	GP-017-010-S		X				X												X	X				
022995-04	7/17/95-9:30	GP-017-010-S		X				X															X		
022995-05	7/17/95-9:30	GP-017-010-S		X				X			X														
022996-01	7/17/95-10:55	GP-018-010-S		X				X					X												
022996-02	7/17/95-10:55	GP-018-010-S		X				X						X	X	X									
022996-03	7/17/95-10:55	GP-018-010-S		X				X												X	X				
022996-04	7/17/95-10:55	GP-018-010-S		X				X															X		
022996-05	7/17/95-10:55	GP-018-010-S		X				X			X														
022997-01	7/17/95-13:30	GP-019-014-S		X				X					X												
022997-02	7/17/95-13:30	GP-019-014-S		X				X						X	X	X									
022997-03	7/17/95-13:30	GP-019-014-S		X				X												X	X				
022997-04	7/17/95-13:30	GP-019-014-S		X				X															X		
022997-05	7/17/95-13:30	GP-019-014-S		X				X			X														
022998-01	7/18/95-8:38	GP-020-009-S		X				X					X												
022998-02	7/18/95-8:38	GP-020-009-S		X				X						X	X	X	X								
022998-03	7/18/95-8:38	GP-020-009-S		X				X												X	X				

TABLE 1

ER Site 226: Listing of Samples Collected and Analysis Performed

ER SITE 226				FIELD SCREENING					ON-SITE LAB ANALYSES				OFF-SITE LAB ANALYSES											
FIELD NUMBER Assign Bar-Coded Sample Number in Field	DATE/TIME Date and Time the sample was collected	SAMPLE ID See Plate 1-1 for Locations TI226-	REMARKS	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	SVOCs (8270)	TAL INORGANICS	PCB	HEX CHROMIUM	TOTAL CYANIDE	MERCURY	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311)	TCLP ORGANICS (1311/8270/8240)
022998-04	7/18/95-8:38	GP-020-009-S		X				X															X		
022998-05	7/18/95-8:38	GP-020-009-S		X				X			X														
023000-01	7/18/95-9:45	GP-021-007-S	MS/MSD	X				X					X												
023000-02	7/18/95-9:45	GP-021-007-S	MS/MSD	X				X						X	X	X									
023000-03	7/18/95-9:45	GP-021-007-S		X				X												X	X				
023000-04	7/18/95-9:45	GP-021-007-S		X				X															X		
023000-05	7/18/95-9:45	GP-021-007-S		X				X			X														
024719-01	7/18/95-10:20	GP-022-006-S		X				X					X												
024719-02	7/18/95-10:20	GP-022-006-S		X				X						X	X	X									
024719-03	7/18/95-10:20	GP-022-006-S		X				X												X	X				
024719-04	7/18/95-10:20	GP-022-006-S		X				X															X		
024719-05	7/18/95-10:20	GP-022-006-S		X				X			X														
024721-01	7/20/95-10:10	GP-024-014-S											X												
024721-02	7/20/95-10:10	GP-024-014-S												X	X	X	X								
024721-03	7/20/95-10:10	GP-024-014-S																		X	X				
024721-04	7/20/95-10:10	GP-024-014-S																					X		
024726-01	7/20/95-9:45	SD-001-001-SS	ACID OUTFALL										X												
024726-02	7/20/95-9:45	SD-001-001-SS	ACID OUTFALL											X	X	X	X								
024726-03	7/20/95-9:45	SD-001-001-SS	ACID OUTFALL																	X	X				
024726-04	7/20/95-9:45	SD-001-001-SS	ACID OUTFALL																				X		
024726-05	7/20/95-9:45	SD-001-001-SS	ACID OUTFALL								X														
024789-01	8/1/95-8:50	SD-002-000-S	AWMH-15	X				X					X												
024789-02	8/1/95-8:50	SD-002-000-S	AWMH-15	X				X						X	X	X	X								
024789-03	8/1/95-8:50	SD-002-000-S	AWMH-15	X				X												X	X				
024789-04	8/1/95-8:50	SD-002-000-S	AWMH-15	X				X															X		
024789-05	8/1/95-8:50	SD-002-000-S	AWMH-15	X				X			X														
024790-01	8/1/95-11:00	SD-003-000-S	AWMH-10(MS/MSD)	X				X					X												
024790-02	8/1/95-11:00	SD-003-000-S	AWMH-10(MS/MSD)	X				X						X	X	X									
024790-03	8/1/95-11:00	SD-003-000-S	AWMH-10	X				X												X	X				

BLE 1

ER Site 226: Listing of Samples Collected and Analysis Performed

ER SITE 226				FIELD SCREENING					ON-SITE LAB ANALYSES				OFF-SITE LAB ANALYSES													
FIELD NUMBER Assign Bar-Coded Sample Number in Field	DATE/TIME Date and Time the sample was collected	SAMPLE ID See Plate 1-1 for Locations TI226-	REMARKS	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	SVOCs (8270)	TAL INORGANICS	PCB	HEX CHROMIUM	TOTAL CYANIDE	MERCURY	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311)	TCLP ORGANICS (1311/8270/8240)
024790-04	8/1/95-11:00	SD-003-000-S	AWMH-10	X				X															X		
024790-05	8/1/95-11:00	SD-003-000-S	AWMH-10	X				X			X														
022973-01	7/12/95-12:50	GP-005-007-S	DUP OF 022972-01	X				X					X												
022973-02	7/12/95-12:50	GP-005-007-S	DUP OF 022972-02	X				X						X	X	X	X								
022973-03	7/12/95-12:50	GP-005-007-S	DUP OF 022972-03	X				X												X	X				
022973-04	7/12/95-12:50	GP-005-007-S	DUP OF 022972-04	X				X															X		
022973-05	7/12/95-12:50	GP-005-007-S	DUP OF 022972-05	X				X			X														
024720-01	7/18/95-10:45	GP-023-006-S	DUP OF 024719-01	X				X					X												
024720-02	7/18/95-10:45	GP-023-006-S	DUP OF 024719-02	X				X						X	X	X									
024720-03	7/18/95-10:45	GP-023-006-S	DUP OF 024719-03	X				X												X	X				
024720-04	7/18/95-10:45	GP-023-006-S	DUP OF 024719-04	X				X															X		
024720-05	7/18/95-10:45	GP-023-006-S	DUP OF 024719-05	X				X			X														
022975-01	7/12/95-14:30	EB-001-000-W											X												
022975-02	7/12/95-14:30	EB-001-000-W												X											
022975-03	7/12/95-14:30	EB-001-000-W													X										
022975-04	7/12/95-14:30	EB-001-000-W																X							
022975-05	7/12/95-14:30	EB-001-000-W														X									
022975-06	7/12/95-14:30	EB-001-000-W																					X		
022975-07	7/12/95-14:30	EB-001-000-W																		X	X				
024722-01	7/18/95-15:10	EB-002-000-W											X												
024722-02	7/18/95-15:10	EB-002-000-W												X											
024722-03	7/18/95-15:10	EB-002-000-W													X										
024722-04	7/18/95-15:10	EB-002-000-W																X							
024722-05	7/18/95-15:10	EB-002-000-W														X									
024722-06	7/18/95-15:10	EB-002-000-W																					X		
024722-07	7/18/95-15:10	EB-002-000-W																		X	X				

TABLE 1

ER Site 226: Listing of Samples Collected and Analysis Performed

ER SITE 226				FIELD SCREENING					ON-SITE LAB ANALYSES				OFF-SITE LAB ANALYSES											
FIELD NUMBER Assign Bar-Coded Sample Number in Field	DATE/TIME Date and Time the sample was collected	SAMPLE ID See Plate 1-1 for Locations TI226-	REMARKS	VOCs	TPH	SOIL pH	PCBs	RADIATION (alpha, beta, gamma)	VOCs (by GC)	METALS (by DCP)	GAMMA SPEC	TPH	VOCs (8240)	SVOCs (8270)	TAL INORGANICS	PCB	HEX CHROMIUM	TOTAL CYANIDE	MERCURY	ISOTOPIC URANIUM	ISOTOPIC PLUTONIUM	ISOTOPIC THORIUM	TRITIUM (LIQUID SCINT.)	TCLP INORGANICS (1311)	TCLP ORGANICS (1311/8270/8240)
022987-01	7/13/95-14:25	FB-001-000-S											X												
024718-01	7/18/95-8:50	FB-002-000-S											X												
022976-01	7/12/95-7:40	TB-001-000-S											X												
022977-01	7/12/95-14:20	TB-002-000-W											X												
022986-01	7/13/95-7:50	TB-003-000-S											X												
022990-01	7/14/95-8:00	TB-004-000-S											X												
022999-01	7/17/95-7:52	TB-005-000-S											X												
024723-01	7/18/95-7:30	TB-006-000-S											X												
024724-01	7/18/95-15:00	TB-007-000-W											X												
024727-01	7/20/95-8:40	TB-008-000-S											X												
024793-01	8/1/95-8:35	TB-009-000-S											X												
024792-01	8/1/95-12:05	TB-010-000-W											X												
024725-01	8/1/95-13:00	DRM-001-000-W	DECON WATER	X				X					X												
024725-02	8/1/95-13:00	DRM-001-000-W	DECON WATER	X				X						X											
024725-03	8/1/95-13:00	DRM-001-000-W	DECON WATER	X				X							X				X						
024725-04	8/1/95-13:00	DRM-001-000-W	DECON WATER	X				X										X							
024725-05	8/1/95-13:00	DRM-001-000-W	DECON WATER	X				X								X									
024725-06	8/1/95-13:00	DRM-001-000-W	DECON WATER	X				X															X		
024725-07	8/1/95-13:00	DRM-001-000-W	DECON WATER	X				X													X	X	X		
024725-08	8/1/95-13:00	DRM-001-000-W	DECON WATER	X				X									X								

TABLE 2

ER Site 226: Detected VOC Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
Subsurface Soil						
T1226-GP-001-010-S	12-JUL-95	ACETONE	12.8	J	20	ug/kg
T1226-GP-001-010-S	12-JUL-95	METHYLENE CHLORIDE	2.54	J	10	ug/kg
T1226-GP-002-008-S	12-JUL-95	ACETONE	12	J	20	ug/kg
T1226-GP-002-008-S	12-JUL-95	METHYLENE CHLORIDE	2.59	J	10	ug/kg
T1226-GP-003-008-S	12-JUL-95	METHYLENE CHLORIDE	2.33	J	10	ug/kg
T1226-GP-004-007-S	12-JUL-95	ACETONE	10.4	J	20	ug/kg
T1226-GP-004-007-S	12-JUL-95	METHYLENE CHLORIDE	2.33	J	10	ug/kg
T1226-GP-006-006-S	12-JUL-95	ACETONE	11	J	20	ug/kg
T1226-GP-006-006-S	12-JUL-95	METHYLENE CHLORIDE	2.55	J	10	ug/kg
T1226-GP-007-006-S	13-JUL-95	METHYLENE CHLORIDE	28.3		10	ug/kg
T1226-GP-007-006-S	13-JUL-95	ACETONE	30.8		20	ug/kg
T1226-GP-008-007-S	13-JUL-95	ACETONE	17.8	J	20	ug/kg
T1226-GP-008-007-S	13-JUL-95	METHYLENE CHLORIDE	19.7		10	ug/kg
T1226-GP-009-006-S	13-JUL-95	TOLUENE	8.68	J	10	ug/kg
T1226-GP-009-006-S	13-JUL-95	ACETONE	56.7		20	ug/kg
T1226-GP-009-006-S	13-JUL-95	METHYLENE CHLORIDE	22.7		10	ug/kg
T1226-GP-010-007-S	13-JUL-95	METHYLENE CHLORIDE	20.7		10	ug/kg
T1226-GP-010-007-S	13-JUL-95	ACETONE	21.1		20	ug/kg
T1226-GP-011-005-S	13-JUL-95	TOLUENE	5.3	J	10	ug/kg
T1226-GP-011-005-S	13-JUL-95	METHYLENE CHLORIDE	127		10	ug/kg
T1226-GP-012-006-S	13-JUL-95	ACETONE	38.8		20	ug/kg
T1226-GP-012-006-S	13-JUL-95	METHYLENE CHLORIDE	28.1		10	ug/kg
T1226-GP-013-006-S	13-JUL-95	METHYLENE CHLORIDE	26.4		10	ug/kg
T1226-GP-014-006-S	13-JUL-95	METHYLENE CHLORIDE	9.92	J	10	ug/kg
T1226-GP-014-006-S	13-JUL-95	ACETONE	36.4		20	ug/kg
T1226-GP-015-010-S	14-JUL-95	METHYLENE CHLORIDE	7.4	BJ	10	ug/kg
T1226-GP-016-010-S	14-JUL-95	METHYLENE CHLORIDE	7.23	BJ	10	ug/kg
T1226-GP-017-010-S	17-JUL-95	METHYLENE CHLORIDE	6.96	BJ	10	ug/kg
T1226-GP-018-010-S	17-JUL-95	METHYLENE CHLORIDE	7.24	BJ	10	ug/kg
T1226-GP-019-014-S	17-JUL-95	ACETONE	15.8	J	20	ug/kg
T1226-GP-019-014-S	17-JUL-95	METHYLENE CHLORIDE	2.7	J	10	ug/kg
T1226-GP-020-009-S	18-JUL-95	METHYLENE CHLORIDE	2.78	J	10	ug/kg

TABLE 2
ER Site 226: Detected VOC Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-021-007-S	18-JUL-95	METHYLENE CHLORIDE	2.89	J	10	ug/kg
T1226-GP-022-006-S	18-JUL-95	ACETONE	39.8		20	ug/kg
T1226-GP-022-006-S	18-JUL-95	METHYLENE CHLORIDE	3.33	J	10	ug/kg
T1226-GP-024-014-S	20-JUL-95	ACETONE	10.8	J	20	ug/kg
T1226-GP-024-014-S	20-JUL-95	METHYLENE CHLORIDE	3.03	J	10	ug/kg
Duplicate						
T1226-GP-005-007-S	12-JUL-95	ACETONE	12	J	20	ug/kg
T1226-GP-005-007-S	12-JUL-95	METHYLENE CHLORIDE	2.55	J	10	ug/kg
T1226-GP-023-006-S	18-JUL-95	ACETONE	13.2	J	20	ug/kg
T1226-GP-023-006-S	18-JUL-95	METHYLENE CHLORIDE	2.57	J	10	ug/kg
Sediment						
T1226-SD-001-001-SS	20-JUL-95	ACETONE	17.7	J	20	ug/kg
T1226-SD-001-001-SS	20-JUL-95	METHYLENE CHLORIDE	3.03	J	10	ug/kg
T1226-SD-002-001-SS	1-Aug-95	METHYLENE CHLORIDE	3.99	JB	10	ug/kg
T1226-SD-003-001-SS	1-Aug-95	METHYLENE CHLORIDE	4.28	JB	10	ug/kg
Field Blanks						
T1226-FB-001-000-S	13-JUL-95	ACETONE	45.2	J	20	ug/kg
T1226-FB-001-000-S	13-JUL-95	METHYLENE CHLORIDE	22.9	J	10	ug/kg
T1226-FB-002-000-S	18-JUL-95	ACETONE	11.9	J	20	ug/kg
T1226-FB-002-000-S	18-JUL-95	METHYLENE CHLORIDE	2.88	J	10	ug/kg
Trip Blanks						
T1226-TB-001-000-S	12-JUL-95	ACETONE	96.9		20	ug/kg
T1226-TB-001-000-S	12-JUL-95	METHYLENE CHLORIDE	2.34	J	10	ug/kg
T1226-TB-002-000-W	12-JUL-95	METHYLENE CHLORIDE	6.27	B	2	ug/l
T1226-TB-003-000-S	13-JUL-95	METHYLENE CHLORIDE	7.59	JB	10	ug/kg
T1226-TB-005-000-S	17-JUL-95	ACETONE	14.8	J	20	ug/kg
T1226-TB-005-000-S	17-JUL-95	METHYLENE CHLORIDE	7.54	JB	10	ug/kg
T1226-TB-006-000-S	18-JUL-95	ACETONE	11.6	J	20	ug/kg
T1226-TB-006-000-S	18-JUL-95	METHYLENE CHLORIDE	2.99	J	10	ug/kg

TABLE 2

ER Site 226: Detected VOC Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-TB-007-000-W	18-JUL-95	ACETONE	43.6		10	ug/l
T1226-TB-007-000-W	18-JUL-95	METHYLENE CHLORIDE	1.39	JB	2	ug/l
T1226-TB-009-000-S	1-Aug-95	METHYLENE CHLORIDE	3.65	JB	10	ug/kg
T1226-TB-010-000-W	1-Aug-95	METHYLENE CHLORIDE	1.01	JB	2	ug/l

J = estimated value

B = found in method blank

TABLE 3

ER Site 226: Detected SVOC Analytical Results for Subsurface Soil Samples

SAMPLE NUMBER	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-009-006-S	PYRENE	178	J	333	ug/kg
T1226-GP-009-006-S	FLUORANTHENE	178	J	333	ug/kg

J = estimated value

TABLE 4

ER Site 226: Detected PCB Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
Subsurface Soil						
T1226-GP-009-006-S	13-JUL-95	AROCLOR 1260	56		41.4	ug/kg
Sediment						
T1226-SD-003-000-S	01-AUG-95	AROCLOR 1254	44.6		41.1	ug/kg
T1226-SD-003-000-S	01-AUG-95	AROCLOR 1260	40.5	J	41.1	ug/kg

J = estimated value

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
Subsurface Soil						
T1226-GP-001-010-S	12-JUL-95	ALUMINUM	4620	B	4.76	mg/kg
T1226-GP-001-010-S	12-JUL-95	ANTIMONY	0.12	J	0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	ARSENIC	1.61		0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	BARIUM	70.3	B	0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	BERYLLIUM	0.23	BJ	0.476	mg/kg
T1226-GP-001-010-S	12-JUL-95	CADMIUM	0.319	J	0.476	mg/kg
T1226-GP-001-010-S	12-JUL-95	CALCIUM	26600	B	9.52	mg/kg
T1226-GP-001-010-S	12-JUL-95	CHROMIUM	5.56		0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	CHROMIUM (VI)	0.1	U	0.4	mg/kg
T1226-GP-001-010-S	12-JUL-95	COBALT	3.67	B	0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	COPPER	6.54	B	0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	IRON	11300		4.76	mg/kg
T1226-GP-001-010-S	12-JUL-95	LEAD	3.84		0.286	mg/kg
T1226-GP-001-010-S	12-JUL-95	MAGNESIUM	2710	B	0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	MANGANESE	209	B	0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	MERCURY	0.0215	BJ	0.031	mg/kg
T1226-GP-001-010-S	12-JUL-95	NICKEL	6.35		0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	POTASSIUM	1190		9.52	mg/kg
T1226-GP-001-010-S	12-JUL-95	SELENIUM	0.136	U	0.476	mg/kg
T1226-GP-001-010-S	12-JUL-95	SILVER	0.237	U	0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	SODIUM	59.2	B	9.52	mg/kg
T1226-GP-001-010-S	12-JUL-95	THALLIUM	0.197	U	0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	VANADIUM	20.3	B	0.952	mg/kg
T1226-GP-001-010-S	12-JUL-95	ZINC	21.6	B	1.9	mg/kg
T1226-GP-002-008-S	12-JUL-95	ALUMINUM	4790	B	4.95	mg/kg
T1226-GP-002-008-S	12-JUL-95	ANTIMONY	0.0948	U	0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	ARSENIC	1.6		0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	BARIUM	64.8	B	0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	BERYLLIUM	0.253	BJ	0.495	mg/kg
T1226-GP-002-008-S	12-JUL-95	CADMIUM	0.289	J	0.495	mg/kg
T1226-GP-002-008-S	12-JUL-95	CALCIUM	20500	B	9.9	mg/kg
T1226-GP-002-008-S	12-JUL-95	CHROMIUM	5.54		0.99	mg/kg

TABLE 5
ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-002-008-S	12-JUL-95	COBALT	4.1	B	0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	COPPER	8.62	B	0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	IRON	9870		4.95	mg/kg
T1226-GP-002-008-S	12-JUL-95	LEAD	4.39		0.297	mg/kg
T1226-GP-002-008-S	12-JUL-95	MAGNESIUM	2740	B	0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	MANGANESE	178	B	0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	MERCURY	0.0186	BJ	0.0286	mg/kg
T1226-GP-002-008-S	12-JUL-95	NICKEL	5.1		0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	POTASSIUM	1140		9.9	mg/kg
T1226-GP-002-008-S	12-JUL-95	SELENIUM	0.142	U	0.495	mg/kg
T1226-GP-002-008-S	12-JUL-95	SILVER	0.247	U	0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	SODIUM	68.2	B	9.9	mg/kg
T1226-GP-002-008-S	12-JUL-95	THALLIUM	0.205	U	0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	VANADIUM	18.6	B	0.99	mg/kg
T1226-GP-002-008-S	12-JUL-95	ZINC	22.3	B	1.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	ALUMINUM	4290	B	4.9	mg/kg
T1226-GP-003-008-S	12-JUL-95	ANTIMONY	0.107	J	0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	ARSENIC	1.54		0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	BARIUM	79	B	0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	BERYLLIUM	0.227	BJ	0.49	mg/kg
T1226-GP-003-008-S	12-JUL-95	CADMIUM	0.477	J	0.49	mg/kg
T1226-GP-003-008-S	12-JUL-95	CALCIUM	26000	B	9.8	mg/kg
T1226-GP-003-008-S	12-JUL-95	CHROMIUM	5.57		0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	COBALT	3.64	B	0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	COPPER	9.2	B	0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	IRON	8440		4.9	mg/kg
T1226-GP-003-008-S	12-JUL-95	LEAD	4.14		0.294	mg/kg
T1226-GP-003-008-S	12-JUL-95	MAGNESIUM	2980	B	0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	MANGANESE	174	B	0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	MERCURY	0.021	BJ	0.0268	mg/kg
T1226-GP-003-008-S	12-JUL-95	NICKEL	11.9		0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	POTASSIUM	1200		9.8	mg/kg
T1226-GP-003-008-S	12-JUL-95	SELENIUM	0.14	U	0.49	mg/kg

TABLE 5
ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-003-008-S	12-JUL-95	SILVER	0.244	U	0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	SODIUM	55.4	B	9.8	mg/kg
T1226-GP-003-008-S	12-JUL-95	THALLIUM	0.203	U	0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	VANADIUM	15.5	B	0.98	mg/kg
T1226-GP-003-008-S	12-JUL-95	ZINC	23.2	B	1.96	mg/kg
T1226-GP-004-007-S	12-JUL-95	ALUMINUM	7110	B	5	mg/kg
T1226-GP-004-007-S	12-JUL-95	ANTIMONY	0.207	J	1	mg/kg
T1226-GP-004-007-S	12-JUL-95	ARSENIC	2.63		1	mg/kg
T1226-GP-004-007-S	12-JUL-95	BARIUM	404	B	1	mg/kg
T1226-GP-004-007-S	12-JUL-95	BERYLLIUM	0.354	BJ	0.5	mg/kg
T1226-GP-004-007-S	12-JUL-95	CADMIUM	0.347	J	0.5	mg/kg
T1226-GP-004-007-S	12-JUL-95	CALCIUM	20900	B	10	mg/kg
T1226-GP-004-007-S	12-JUL-95	CHROMIUM	7.21		1	mg/kg
T1226-GP-004-007-S	12-JUL-95	CHROMIUM (VI)	0.1	U	0.4	mg/kg
T1226-GP-004-007-S	12-JUL-95	COBALT	4.73	B	1	mg/kg
T1226-GP-004-007-S	12-JUL-95	COPPER	7.63	B	1	mg/kg
T1226-GP-004-007-S	12-JUL-95	IRON	12000		5	mg/kg
T1226-GP-004-007-S	12-JUL-95	LEAD	5.39		0.3	mg/kg
T1226-GP-004-007-S	12-JUL-95	MAGNESIUM	4600	B	1	mg/kg
T1226-GP-004-007-S	12-JUL-95	MANGANESE	219	B	1	mg/kg
T1226-GP-004-007-S	12-JUL-95	MERCURY	0.0686	B	0.0326	mg/kg
T1226-GP-004-007-S	12-JUL-95	NICKEL	8.14		1	mg/kg
T1226-GP-004-007-S	12-JUL-95	POTASSIUM	1540		10	mg/kg
T1226-GP-004-007-S	12-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-004-007-S	12-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-004-007-S	12-JUL-95	SODIUM	121	B	10	mg/kg
T1226-GP-004-007-S	12-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-004-007-S	12-JUL-95	VANADIUM	25.5	B	1	mg/kg
T1226-GP-004-007-S	12-JUL-95	ZINC	29	B	2	mg/kg
T1226-GP-006-006-S	12-JUL-95	ALUMINUM	9710	B	4.9	mg/kg
T1226-GP-006-006-S	12-JUL-95	ANTIMONY	0.114	J	0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	ARSENIC	3.33		0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	BARIUM	141	B	0.98	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-006-006-S	12-JUL-95	BERYLLIUM	0.501	B	0.49	mg/kg
T1226-GP-006-006-S	12-JUL-95	CADMIUM	0.461	J	0.49	mg/kg
T1226-GP-006-006-S	12-JUL-95	CALCIUM	25200	B	9.8	mg/kg
T1226-GP-006-006-S	12-JUL-95	CHROMIUM	9.58		0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	COBALT	6	B	0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	COPPER	10.5	B	0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	IRON	14600		4.9	mg/kg
T1226-GP-006-006-S	12-JUL-95	LEAD	7.57		0.294	mg/kg
T1226-GP-006-006-S	12-JUL-95	MAGNESIUM	5350	B	0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	MANGANESE	302	B	0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	MERCURY	0.0222	BJ	0.0298	mg/kg
T1226-GP-006-006-S	12-JUL-95	NICKEL	10.3		0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	POTASSIUM	1950		9.8	mg/kg
T1226-GP-006-006-S	12-JUL-95	SELENIUM	0.14	U	0.49	mg/kg
T1226-GP-006-006-S	12-JUL-95	SILVER	0.244	U	0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	SODIUM	118	B	9.8	mg/kg
T1226-GP-006-006-S	12-JUL-95	THALLIUM	0.203	U	0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	VANADIUM	24.9	B	0.98	mg/kg
T1226-GP-006-006-S	12-JUL-95	ZINC	36.6	B	1.96	mg/kg
T1226-GP-007-006-S	13-JUL-95	ALUMINUM	6890	B	5	mg/kg
T1226-GP-007-006-S	13-JUL-95	ANTIMONY	0.307	BJ	1	mg/kg
T1226-GP-007-006-S	13-JUL-95	ARSENIC	2.37		1	mg/kg
T1226-GP-007-006-S	13-JUL-95	BARIUM	148	B	1	mg/kg
T1226-GP-007-006-S	13-JUL-95	BERYLLIUM	0.377	BJ	0.5	mg/kg
T1226-GP-007-006-S	13-JUL-95	CADMIUM	0.146	J	0.5	mg/kg
T1226-GP-007-006-S	13-JUL-95	CALCIUM	26700	B	10	mg/kg
T1226-GP-007-006-S	13-JUL-95	CHROMIUM	7.17	B	1	mg/kg
T1226-GP-007-006-S	13-JUL-95	COBALT	4.71		1	mg/kg
T1226-GP-007-006-S	13-JUL-95	COPPER	8.18		1	mg/kg
T1226-GP-007-006-S	13-JUL-95	IRON	11200		5	mg/kg
T1226-GP-007-006-S	13-JUL-95	LEAD	5.8		0.3	mg/kg
T1226-GP-007-006-S	13-JUL-95	MAGNESIUM	4190	B	1	mg/kg
T1226-GP-007-006-S	13-JUL-95	MANGANESE	219	B	1	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-007-006-S	13-JUL-95	MERCURY	0.0231	BJ	0.0328	mg/kg
T1226-GP-007-006-S	13-JUL-95	NICKEL	8.19		1	mg/kg
T1226-GP-007-006-S	13-JUL-95	POTASSIUM	1370	B	10	mg/kg
T1226-GP-007-006-S	13-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-007-006-S	13-JUL-95	SILVER	1.27		1	mg/kg
T1226-GP-007-006-S	13-JUL-95	SODIUM	106	B	10	mg/kg
T1226-GP-007-006-S	13-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-007-006-S	13-JUL-95	VANADIUM	19.2		1	mg/kg
T1226-GP-007-006-S	13-JUL-95	ZINC	28.7	B	2	mg/kg
T1226-GP-008-007-S	13-JUL-95	ALUMINUM	7160	B	5	mg/kg
T1226-GP-008-007-S	13-JUL-95	ANTIMONY	0.273	BJ	1	mg/kg
T1226-GP-008-007-S	13-JUL-95	ARSENIC	2.57		1	mg/kg
T1226-GP-008-007-S	13-JUL-95	BARIUM	113	B	1	mg/kg
T1226-GP-008-007-S	13-JUL-95	BERYLLIUM	0.376	BJ	0.5	mg/kg
T1226-GP-008-007-S	13-JUL-95	CADMIUM	0.161	J	0.5	mg/kg
T1226-GP-008-007-S	13-JUL-95	CALCIUM	17800	B	10	mg/kg
T1226-GP-008-007-S	13-JUL-95	CHROMIUM	7.51	B	1	mg/kg
T1226-GP-008-007-S	13-JUL-95	CHROMIUM (VI)	0.2	J	0.4	mg/kg
T1226-GP-008-007-S	13-JUL-95	COBALT	4.9		1	mg/kg
T1226-GP-008-007-S	13-JUL-95	COPPER	7.75		1	mg/kg
T1226-GP-008-007-S	13-JUL-95	IRON	12900		5	mg/kg
T1226-GP-008-007-S	13-JUL-95	LEAD	6.07		0.3	mg/kg
T1226-GP-008-007-S	13-JUL-95	MAGNESIUM	4280	B	1	mg/kg
T1226-GP-008-007-S	13-JUL-95	MANGANESE	241	B	1	mg/kg
T1226-GP-008-007-S	13-JUL-95	MERCURY	0.0266	BJ	0.0288	mg/kg
T1226-GP-008-007-S	13-JUL-95	NICKEL	8.25		1	mg/kg
T1226-GP-008-007-S	13-JUL-95	POTASSIUM	1670	B	10	mg/kg
T1226-GP-008-007-S	13-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-008-007-S	13-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-008-007-S	13-JUL-95	SODIUM	97.1	B	10	mg/kg
T1226-GP-008-007-S	13-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-008-007-S	13-JUL-95	VANADIUM	22		1	mg/kg
T1226-GP-008-007-S	13-JUL-95	ZINC	32	B	2	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-009-006-S	13-JUL-95	ALUMINUM	6020	B	5	mg/kg
T1226-GP-009-006-S	13-JUL-95	ANTIMONY	0.247	BJ	1	mg/kg
T1226-GP-009-006-S	13-JUL-95	ARSENIC	3.13		1	mg/kg
T1226-GP-009-006-S	13-JUL-95	BARIUM	154	B	1	mg/kg
T1226-GP-009-006-S	13-JUL-95	BERYLLIUM	0.357	BJ	0.5	mg/kg
T1226-GP-009-006-S	13-JUL-95	CADMIUM	0.198	J	0.5	mg/kg
T1226-GP-009-006-S	13-JUL-95	CALCIUM	37500	B	10	mg/kg
T1226-GP-009-006-S	13-JUL-95	CHROMIUM	6.09	B	1	mg/kg
T1226-GP-009-006-S	13-JUL-95	COBALT	4.02		1	mg/kg
T1226-GP-009-006-S	13-JUL-95	COPPER	7.58		1	mg/kg
T1226-GP-009-006-S	13-JUL-95	IRON	10000		5	mg/kg
T1226-GP-009-006-S	13-JUL-95	LEAD	6.29		0.3	mg/kg
T1226-GP-009-006-S	13-JUL-95	MAGNESIUM	3920	B	1	mg/kg
T1226-GP-009-006-S	13-JUL-95	MANGANESE	178	B	1	mg/kg
T1226-GP-009-006-S	13-JUL-95	MERCURY	0.0221	BJ	0.0282	mg/kg
T1226-GP-009-006-S	13-JUL-95	NICKEL	8.2		1	mg/kg
T1226-GP-009-006-S	13-JUL-95	POTASSIUM	1240	B	10	mg/kg
T1226-GP-009-006-S	13-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-009-006-S	13-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-009-006-S	13-JUL-95	SODIUM	84.8	B	10	mg/kg
T1226-GP-009-006-S	13-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-009-006-S	13-JUL-95	VANADIUM	19.4		1	mg/kg
T1226-GP-009-006-S	13-JUL-95	ZINC	28.4	B	2	mg/kg
T1226-GP-010-007-S	13-JUL-95	ALUMINUM	5560	B	5	mg/kg
T1226-GP-010-007-S	13-JUL-95	ANTIMONY	0.271	BJ	1	mg/kg
T1226-GP-010-007-S	13-JUL-95	ARSENIC	3.29		1	mg/kg
T1226-GP-010-007-S	13-JUL-95	BARIUM	329	B	1	mg/kg
T1226-GP-010-007-S	13-JUL-95	BERYLLIUM	0.335	BJ	0.5	mg/kg
T1226-GP-010-007-S	13-JUL-95	CADMIUM	0.104	J	0.5	mg/kg
T1226-GP-010-007-S	13-JUL-95	CALCIUM	41800	B	50	mg/kg
T1226-GP-010-007-S	13-JUL-95	CHROMIUM	5.08	B	1	mg/kg
T1226-GP-010-007-S	13-JUL-95	COBALT	3.01		1	mg/kg
T1226-GP-010-007-S	13-JUL-95	COPPER	5.73		1	mg/kg

TABLE 5
ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-010-007-S	13-JUL-95	IRON	7240		5	mg/kg
T1226-GP-010-007-S	13-JUL-95	LEAD	3.73		0.3	mg/kg
T1226-GP-010-007-S	13-JUL-95	MAGNESIUM	2950	B	1	mg/kg
T1226-GP-010-007-S	13-JUL-95	MANGANESE	90.2	B	1	mg/kg
T1226-GP-010-007-S	13-JUL-95	MERCURY	0.0182	BJ	0.026	mg/kg
T1226-GP-010-007-S	13-JUL-95	NICKEL	5.92		1	mg/kg
T1226-GP-010-007-S	13-JUL-95	POTASSIUM	730	B	10	mg/kg
T1226-GP-010-007-S	13-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-010-007-S	13-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-010-007-S	13-JUL-95	SODIUM	284	B	10	mg/kg
T1226-GP-010-007-S	13-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-010-007-S	13-JUL-95	VANADIUM	18.1		1	mg/kg
T1226-GP-010-007-S	13-JUL-95	ZINC	13.7	B	2	mg/kg
T1226-GP-011-005-S	13-JUL-95	ALUMINUM	9110	B	5	mg/kg
T1226-GP-011-005-S	13-JUL-95	ANTIMONY	0.269	BJ	1	mg/kg
T1226-GP-011-005-S	13-JUL-95	ARSENIC	3.42		1	mg/kg
T1226-GP-011-005-S	13-JUL-95	BARIUM	216	B	1	mg/kg
T1226-GP-011-005-S	13-JUL-95	BERYLLIUM	0.452	BJ	0.5	mg/kg
T1226-GP-011-005-S	13-JUL-95	CADMIUM	0.248	J	0.5	mg/kg
T1226-GP-011-005-S	13-JUL-95	CALCIUM	30100	B	10	mg/kg
T1226-GP-011-005-S	13-JUL-95	CHROMIUM	9.98	B	1	mg/kg
T1226-GP-011-005-S	13-JUL-95	CHROMIUM (VI)	0.2	J	0.4	mg/kg
T1226-GP-011-005-S	13-JUL-95	COBALT	5.02		1	mg/kg
T1226-GP-011-005-S	13-JUL-95	COPPER	7.36		1	mg/kg
T1226-GP-011-005-S	13-JUL-95	IRON	12600		5	mg/kg
T1226-GP-011-005-S	13-JUL-95	LEAD	6.19		0.3	mg/kg
T1226-GP-011-005-S	13-JUL-95	MAGNESIUM	4780	B	1	mg/kg
T1226-GP-011-005-S	13-JUL-95	MANGANESE	208	B	1	mg/kg
T1226-GP-011-005-S	13-JUL-95	MERCURY	0.0249	BJ	0.0308	mg/kg
T1226-GP-011-005-S	13-JUL-95	NICKEL	11.3		1	mg/kg
T1226-GP-011-005-S	13-JUL-95	POTASSIUM	1580	B	10	mg/kg
T1226-GP-011-005-S	13-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-011-005-S	13-JUL-95	SILVER	0.249	U	1	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-011-005-S	13-JUL-95	SODIUM	108	B	10	mg/kg
T1226-GP-011-005-S	13-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-011-005-S	13-JUL-95	VANADIUM	33.2		1	mg/kg
T1226-GP-011-005-S	13-JUL-95	ZINC	28.5	B	2	mg/kg
T1226-GP-012-006-S	13-JUL-95	ALUMINUM	11000	B	5	mg/kg
T1226-GP-012-006-S	13-JUL-95	ANTIMONY	0.275	BJ	1	mg/kg
T1226-GP-012-006-S	13-JUL-95	ARSENIC	3.27		1	mg/kg
T1226-GP-012-006-S	13-JUL-95	BARIUM	135	B	1	mg/kg
T1226-GP-012-006-S	13-JUL-95	BERYLLIUM	0.532	B	0.5	mg/kg
T1226-GP-012-006-S	13-JUL-95	CADMIUM	0.192	J	0.5	mg/kg
T1226-GP-012-006-S	13-JUL-95	CALCIUM	26100	B	10	mg/kg
T1226-GP-012-006-S	13-JUL-95	CHROMIUM	12.7	B	1	mg/kg
T1226-GP-012-006-S	13-JUL-95	COBALT	6.05		1	mg/kg
T1226-GP-012-006-S	13-JUL-95	COPPER	9.97		1	mg/kg
T1226-GP-012-006-S	13-JUL-95	IRON	16000		5	mg/kg
T1226-GP-012-006-S	13-JUL-95	LEAD	7.69		0.3	mg/kg
T1226-GP-012-006-S	13-JUL-95	MAGNESIUM	5830	B	1	mg/kg
T1226-GP-012-006-S	13-JUL-95	MANGANESE	284	B	1	mg/kg
T1226-GP-012-006-S	13-JUL-95	MERCURY	0.0241	BJ	0.025	mg/kg
T1226-GP-012-006-S	13-JUL-95	NICKEL	12.1		1	mg/kg
T1226-GP-012-006-S	13-JUL-95	POTASSIUM	2120	B	10	mg/kg
T1226-GP-012-006-S	13-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-012-006-S	13-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-012-006-S	13-JUL-95	SODIUM	260	B	10	mg/kg
T1226-GP-012-006-S	13-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-012-006-S	13-JUL-95	VANADIUM	28.7		1	mg/kg
T1226-GP-012-006-S	13-JUL-95	ZINC	37.9	B	2	mg/kg
T1226-GP-013-006-S	13-JUL-95	ALUMINUM	8820	B	5	mg/kg
T1226-GP-013-006-S	13-JUL-95	ANTIMONY	0.283	BJ	1	mg/kg
T1226-GP-013-006-S	13-JUL-95	ARSENIC	3.13		1	mg/kg
T1226-GP-013-006-S	13-JUL-95	BARIUM	109	B	1	mg/kg
T1226-GP-013-006-S	13-JUL-95	BERYLLIUM	0.44	BJ	0.5	mg/kg
T1226-GP-013-006-S	13-JUL-95	CADMIUM	0.154	J	0.5	mg/kg

TABLE 5
ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-013-006-S	13-JUL-95	CALCIUM	29000	B	10	mg/kg
T1226-GP-013-006-S	13-JUL-95	CHROMIUM	8.66	B	1	mg/kg
T1226-GP-013-006-S	13-JUL-95	COBALT	4.98		1	mg/kg
T1226-GP-013-006-S	13-JUL-95	COPPER	8.15		1	mg/kg
T1226-GP-013-006-S	13-JUL-95	IRON	12300		5	mg/kg
T1226-GP-013-006-S	13-JUL-95	LEAD	6.67		0.3	mg/kg
T1226-GP-013-006-S	13-JUL-95	MAGNESIUM	4990	B	1	mg/kg
T1226-GP-013-006-S	13-JUL-95	MANGANESE	235	B	1	mg/kg
T1226-GP-013-006-S	13-JUL-95	MERCURY	0.0206	BJ	0.0368	mg/kg
T1226-GP-013-006-S	13-JUL-95	NICKEL	8.91		1	mg/kg
T1226-GP-013-006-S	13-JUL-95	POTASSIUM	1690	B	10	mg/kg
T1226-GP-013-006-S	13-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-013-006-S	13-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-013-006-S	13-JUL-95	SODIUM	92.2	B	10	mg/kg
T1226-GP-013-006-S	13-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-013-006-S	13-JUL-95	VANADIUM	24.9		1	mg/kg
T1226-GP-013-006-S	13-JUL-95	ZINC	31.7	B	2	mg/kg
T1226-GP-014-006-S	13-JUL-95	ALUMINUM	8740	B	5	mg/kg
T1226-GP-014-006-S	13-JUL-95	ANTIMONY	0.302	BJ	1	mg/kg
T1226-GP-014-006-S	13-JUL-95	ARSENIC	2.82		1	mg/kg
T1226-GP-014-006-S	13-JUL-95	BARIUM	151	B	1	mg/kg
T1226-GP-014-006-S	13-JUL-95	BERYLLIUM	0.433	BJ	0.5	mg/kg
T1226-GP-014-006-S	13-JUL-95	CADMIUM	0.138	J	0.5	mg/kg
T1226-GP-014-006-S	13-JUL-95	CALCIUM	21000	B	10	mg/kg
T1226-GP-014-006-S	13-JUL-95	CHROMIUM	9.21	B	1	mg/kg
T1226-GP-014-006-S	13-JUL-95	CHROMIUM (VI)	0.1	U	0.4	mg/kg
T1226-GP-014-006-S	13-JUL-95	COBALT	5.41		1	mg/kg
T1226-GP-014-006-S	13-JUL-95	COPPER	8.8		1	mg/kg
T1226-GP-014-006-S	13-JUL-95	IRON	13500		5	mg/kg
T1226-GP-014-006-S	13-JUL-95	LEAD	6.31		0.3	mg/kg
T1226-GP-014-006-S	13-JUL-95	MAGNESIUM	4550	B	1	mg/kg
T1226-GP-014-006-S	13-JUL-95	MANGANESE	238	B	1	mg/kg
T1226-GP-014-006-S	13-JUL-95	MERCURY	0.0168	BJ	0.0282	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-014-006-S	13-JUL-95	NICKEL	12.3		1	mg/kg
T1226-GP-014-006-S	13-JUL-95	POTASSIUM	1790	B	10	mg/kg
T1226-GP-014-006-S	13-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-014-006-S	13-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-014-006-S	13-JUL-95	SODIUM	189	B	10	mg/kg
T1226-GP-014-006-S	13-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-014-006-S	13-JUL-95	VANADIUM	23.8		1	mg/kg
T1226-GP-014-006-S	13-JUL-95	ZINC	32	B	2	mg/kg
T1226-GP-015-010-S	14-JUL-95	ALUMINUM	6970	B	5	mg/kg
T1226-GP-015-010-S	14-JUL-95	ANTIMONY	0.329	BJ	1	mg/kg
T1226-GP-015-010-S	14-JUL-95	ARSENIC	3.09		1	mg/kg
T1226-GP-015-010-S	14-JUL-95	BARIUM	76.6	B	1	mg/kg
T1226-GP-015-010-S	14-JUL-95	BERYLLIUM	0.35	BJ	0.5	mg/kg
T1226-GP-015-010-S	14-JUL-95	CADMIUM	0.142	J	0.5	mg/kg
T1226-GP-015-010-S	14-JUL-95	CALCIUM	67700	B	50	mg/kg
T1226-GP-015-010-S	14-JUL-95	CHROMIUM	6.79	B	1	mg/kg
T1226-GP-015-010-S	14-JUL-95	COBALT	3.99		1	mg/kg
T1226-GP-015-010-S	14-JUL-95	COPPER	5.89		1	mg/kg
T1226-GP-015-010-S	14-JUL-95	IRON	9650		5	mg/kg
T1226-GP-015-010-S	14-JUL-95	LEAD	4.88		0.3	mg/kg
T1226-GP-015-010-S	14-JUL-95	MAGNESIUM	4750	B	1	mg/kg
T1226-GP-015-010-S	14-JUL-95	MANGANESE	160	B	1	mg/kg
T1226-GP-015-010-S	14-JUL-95	MERCURY	0.0276	BJ	0.0328	mg/kg
T1226-GP-015-010-S	14-JUL-95	NICKEL	11.3		1	mg/kg
T1226-GP-015-010-S	14-JUL-95	POTASSIUM	1240	B	10	mg/kg
T1226-GP-015-010-S	14-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-015-010-S	14-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-015-010-S	14-JUL-95	SODIUM	215	B	10	mg/kg
T1226-GP-015-010-S	14-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-015-010-S	14-JUL-95	VANADIUM	23.3		1	mg/kg
T1226-GP-015-010-S	14-JUL-95	ZINC	22.1	B	2	mg/kg
T1226-GP-016-010-S	14-JUL-95	ALUMINUM	7270	B	5	mg/kg
T1226-GP-016-010-S	14-JUL-95	ANTIMONY	0.156	BJ	1	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-016-010-S	14-JUL-95	ARSENIC	2.56		1	mg/kg
T1226-GP-016-010-S	14-JUL-95	BARIUM	58.9	B	1	mg/kg
T1226-GP-016-010-S	14-JUL-95	BERYLLIUM	0.368	BJ	0.5	mg/kg
T1226-GP-016-010-S	14-JUL-95	CADMIUM	0.161	J	0.5	mg/kg
T1226-GP-016-010-S	14-JUL-95	CALCIUM	19300	B	10	mg/kg
T1226-GP-016-010-S	14-JUL-95	CHROMIUM	9.37	B	1	mg/kg
T1226-GP-016-010-S	14-JUL-95	COBALT	5.97		1	mg/kg
T1226-GP-016-010-S	14-JUL-95	COPPER	6.43		1	mg/kg
T1226-GP-016-010-S	14-JUL-95	IRON	11800		5	mg/kg
T1226-GP-016-010-S	14-JUL-95	LEAD	4.67		0.3	mg/kg
T1226-GP-016-010-S	14-JUL-95	MAGNESIUM	4050	B	1	mg/kg
T1226-GP-016-010-S	14-JUL-95	MANGANESE	185	B	1	mg/kg
T1226-GP-016-010-S	14-JUL-95	MERCURY	0.0264	BJ	0.031	mg/kg
T1226-GP-016-010-S	14-JUL-95	NICKEL	7.77		1	mg/kg
T1226-GP-016-010-S	14-JUL-95	POTASSIUM	1350	B	10	mg/kg
T1226-GP-016-010-S	14-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-016-010-S	14-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-016-010-S	14-JUL-95	SODIUM	215	B	10	mg/kg
T1226-GP-016-010-S	14-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-016-010-S	14-JUL-95	VANADIUM	28.4		1	mg/kg
T1226-GP-016-010-S	14-JUL-95	ZINC	25.6	B	2	mg/kg
T1226-GP-017-010-S	17-JUL-95	ALUMINUM	8410	B	5	mg/kg
T1226-GP-017-010-S	17-JUL-95	ANTIMONY	0.214	BJ	1	mg/kg
T1226-GP-017-010-S	17-JUL-95	ARSENIC	2.5		1	mg/kg
T1226-GP-017-010-S	17-JUL-95	BARIUM	118	B	1	mg/kg
T1226-GP-017-010-S	17-JUL-95	BERYLLIUM	0.412	BJ	0.5	mg/kg
T1226-GP-017-010-S	17-JUL-95	CADMIUM	0.201	J	0.5	mg/kg
T1226-GP-017-010-S	17-JUL-95	CALCIUM	32100	B	10	mg/kg
T1226-GP-017-010-S	17-JUL-95	CHROMIUM	8.04	B	1	mg/kg
T1226-GP-017-010-S	17-JUL-95	CHROMIUM (VI)	0.1	U	0.4	mg/kg
T1226-GP-017-010-S	17-JUL-95	COBALT	4.58		1	mg/kg
T1226-GP-017-010-S	17-JUL-95	COPPER	7.76		1	mg/kg
T1226-GP-017-010-S	17-JUL-95	IRON	12200		5	mg/kg

TABLE 5
ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-017-010-S	17-JUL-95	LEAD	5.66		0.3	mg/kg
T1226-GP-017-010-S	17-JUL-95	MAGNESIUM	4070	B	1	mg/kg
T1226-GP-017-010-S	17-JUL-95	MANGANESE	182	B	1	mg/kg
T1226-GP-017-010-S	17-JUL-95	MERCURY	0.00283	BJ	0.0314	mg/kg
T1226-GP-017-010-S	17-JUL-95	NICKEL	7.61		1	mg/kg
T1226-GP-017-010-S	17-JUL-95	POTASSIUM	1680	B	10	mg/kg
T1226-GP-017-010-S	17-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-017-010-S	17-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-017-010-S	17-JUL-95	SODIUM	214	B	10	mg/kg
T1226-GP-017-010-S	17-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-017-010-S	17-JUL-95	VANADIUM	21.7		1	mg/kg
T1226-GP-017-010-S	17-JUL-95	ZINC	27.7	B	2	mg/kg
T1226-GP-018-010-S	17-JUL-95	ALUMINUM	6350	B	5	mg/kg
T1226-GP-018-010-S	17-JUL-95	ANTIMONY	0.196	BJ	1	mg/kg
T1226-GP-018-010-S	17-JUL-95	ARSENIC	1.85		1	mg/kg
T1226-GP-018-010-S	17-JUL-95	BARIUM	65.3	B	1	mg/kg
T1226-GP-018-010-S	17-JUL-95	BERYLLIUM	0.343	BJ	0.5	mg/kg
T1226-GP-018-010-S	17-JUL-95	CADMIUM	0.194	J	0.5	mg/kg
T1226-GP-018-010-S	17-JUL-95	CALCIUM	34900	B	10	mg/kg
T1226-GP-018-010-S	17-JUL-95	CHROMIUM	7.22	B	1	mg/kg
T1226-GP-018-010-S	17-JUL-95	COBALT	4.97		1	mg/kg
T1226-GP-018-010-S	17-JUL-95	COPPER	9.04		1	mg/kg
T1226-GP-018-010-S	17-JUL-95	IRON	11600		5	mg/kg
T1226-GP-018-010-S	17-JUL-95	LEAD	4.99		0.3	mg/kg
T1226-GP-018-010-S	17-JUL-95	MAGNESIUM	4110	B	1	mg/kg
T1226-GP-018-010-S	17-JUL-95	MANGANESE	241	B	1	mg/kg
T1226-GP-018-010-S	17-JUL-95	MERCURY	0.0025	BJ	0.0312	mg/kg
T1226-GP-018-010-S	17-JUL-95	NICKEL	7.61		1	mg/kg
T1226-GP-018-010-S	17-JUL-95	POTASSIUM	1430	B	10	mg/kg
T1226-GP-018-010-S	17-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-018-010-S	17-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-018-010-S	17-JUL-95	SODIUM	249	B	10	mg/kg
T1226-GP-018-010-S	17-JUL-95	THALLIUM	0.207	U	1	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-018-010-S	17-JUL-95	VANADIUM	21.9		1	mg/kg
T1226-GP-018-010-S	17-JUL-95	ZINC	31.8	B	2	mg/kg
T1226-GP-019-014-S	17-JUL-95	ALUMINUM	9980	B	5	mg/kg
T1226-GP-019-014-S	17-JUL-95	ANTIMONY	0.242	BJ	1	mg/kg
T1226-GP-019-014-S	17-JUL-95	ARSENIC	3.66		1	mg/kg
T1226-GP-019-014-S	17-JUL-95	BARIUM	191	B	1	mg/kg
T1226-GP-019-014-S	17-JUL-95	BERYLLIUM	0.479	BJ	0.5	mg/kg
T1226-GP-019-014-S	17-JUL-95	CADMIUM	0.205	J	0.5	mg/kg
T1226-GP-019-014-S	17-JUL-95	CALCIUM	31500	B	10	mg/kg
T1226-GP-019-014-S	17-JUL-95	CHROMIUM	9.43	B	1	mg/kg
T1226-GP-019-014-S	17-JUL-95	COBALT	4.76		1	mg/kg
T1226-GP-019-014-S	17-JUL-95	COPPER	7.45		1	mg/kg
T1226-GP-019-014-S	17-JUL-95	IRON	13200		5	mg/kg
T1226-GP-019-014-S	17-JUL-95	LEAD	6.24		0.3	mg/kg
T1226-GP-019-014-S	17-JUL-95	MAGNESIUM	4830	B	1	mg/kg
T1226-GP-019-014-S	17-JUL-95	MANGANESE	218	B	1	mg/kg
T1226-GP-019-014-S	17-JUL-95	MERCURY	0.00382	BJ	0.0332	mg/kg
T1226-GP-019-014-S	17-JUL-95	NICKEL	12.3		1	mg/kg
T1226-GP-019-014-S	17-JUL-95	POTASSIUM	1810	B	10	mg/kg
T1226-GP-019-014-S	17-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-019-014-S	17-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-019-014-S	17-JUL-95	SODIUM	313	B	10	mg/kg
T1226-GP-019-014-S	17-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-019-014-S	17-JUL-95	VANADIUM	29.6		1	mg/kg
T1226-GP-019-014-S	17-JUL-95	ZINC	30.2	B	2	mg/kg
T1226-GP-020-009-S	18-JUL-95	ALUMINUM	5070	B	5	mg/kg
T1226-GP-020-009-S	18-JUL-95	ANTIMONY	0.287	J	1	mg/kg
T1226-GP-020-009-S	18-JUL-95	ARSENIC	2.19		1	mg/kg
T1226-GP-020-009-S	18-JUL-95	BARIUM	74.4	B	1	mg/kg
T1226-GP-020-009-S	18-JUL-95	BERYLLIUM	0.32	BJ	0.5	mg/kg
T1226-GP-020-009-S	18-JUL-95	CADMIUM	0.164	J	0.5	mg/kg
T1226-GP-020-009-S	18-JUL-95	CALCIUM	15100	B	10	mg/kg
T1226-GP-020-009-S	18-JUL-95	CHROMIUM	5.2	B	1	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-020-009-S	18-JUL-95	CHROMIUM (VI)	0.22	J	0.4	mg/kg
T1226-GP-020-009-S	18-JUL-95	COBALT	4.32		1	mg/kg
T1226-GP-020-009-S	18-JUL-95	COPPER	7.4	B	1	mg/kg
T1226-GP-020-009-S	18-JUL-95	IRON	10300	B	5	mg/kg
T1226-GP-020-009-S	18-JUL-95	LEAD	5.43		0.3	mg/kg
T1226-GP-020-009-S	18-JUL-95	MAGNESIUM	3730	B	1	mg/kg
T1226-GP-020-009-S	18-JUL-95	MANGANESE	223	B	1	mg/kg
T1226-GP-020-009-S	18-JUL-95	MERCURY	0.0114	BJ	0.0312	mg/kg
T1226-GP-020-009-S	18-JUL-95	NICKEL	6.58	B	1	mg/kg
T1226-GP-020-009-S	18-JUL-95	POTASSIUM	1370	B	10	mg/kg
T1226-GP-020-009-S	18-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-020-009-S	18-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-020-009-S	18-JUL-95	SODIUM	90.3	B	10	mg/kg
T1226-GP-020-009-S	18-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-020-009-S	18-JUL-95	VANADIUM	16.2		1	mg/kg
T1226-GP-020-009-S	18-JUL-95	ZINC	28.4	B	2	mg/kg
T1226-GP-021-007-S	18-JUL-95	ALUMINUM	2200	B	5	mg/kg
T1226-GP-021-007-S	18-JUL-95	ANTIMONY	0.244	J	1	mg/kg
T1226-GP-021-007-S	18-JUL-95	ARSENIC	1.65		1	mg/kg
T1226-GP-021-007-S	18-JUL-95	BARIUM	105	B	1	mg/kg
T1226-GP-021-007-S	18-JUL-95	BERYLLIUM	0.166	BJ	0.5	mg/kg
T1226-GP-021-007-S	18-JUL-95	CADMIUM	0.0711	J	0.5	mg/kg
T1226-GP-021-007-S	18-JUL-95	CALCIUM	62300	B	50	mg/kg
T1226-GP-021-007-S	18-JUL-95	CHROMIUM	2.67	B	1	mg/kg
T1226-GP-021-007-S	18-JUL-95	COBALT	2.36		1	mg/kg
T1226-GP-021-007-S	18-JUL-95	COPPER	4.11	B	1	mg/kg
T1226-GP-021-007-S	18-JUL-95	IRON	4280	B	5	mg/kg
T1226-GP-021-007-S	18-JUL-95	LEAD	2.42		0.3	mg/kg
T1226-GP-021-007-S	18-JUL-95	MAGNESIUM	1910	B	1	mg/kg
T1226-GP-021-007-S	18-JUL-95	MANGANESE	190	B	1	mg/kg
T1226-GP-021-007-S	18-JUL-95	MERCURY	0.00611	BJ	0.0298	mg/kg
T1226-GP-021-007-S	18-JUL-95	NICKEL	8.67	B	1	mg/kg
T1226-GP-021-007-S	18-JUL-95	POTASSIUM	536	B	10	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-021-007-S	18-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-021-007-S	18-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-021-007-S	18-JUL-95	SODIUM	134	B	10	mg/kg
T1226-GP-021-007-S	18-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-021-007-S	18-JUL-95	VANADIUM	9.53		1	mg/kg
T1226-GP-021-007-S	18-JUL-95	ZINC	10.2	B	2	mg/kg
T1226-GP-022-006-S	18-JUL-95	ALUMINUM	3150	B	5	mg/kg
T1226-GP-022-006-S	18-JUL-95	ANTIMONY	0.311	J	1	mg/kg
T1226-GP-022-006-S	18-JUL-95	ARSENIC	1.43		1	mg/kg
T1226-GP-022-006-S	18-JUL-95	BARIUM	96.3	B	1	mg/kg
T1226-GP-022-006-S	18-JUL-95	BERYLLIUM	0.213	BJ	0.5	mg/kg
T1226-GP-022-006-S	18-JUL-95	CADMIUM	0.127	J	0.5	mg/kg
T1226-GP-022-006-S	18-JUL-95	CALCIUM	37200	B	10	mg/kg
T1226-GP-022-006-S	18-JUL-95	CHROMIUM	6.57	B	1	mg/kg
T1226-GP-022-006-S	18-JUL-95	COBALT	2.99		1	mg/kg
T1226-GP-022-006-S	18-JUL-95	COPPER	6.08	B	1	mg/kg
T1226-GP-022-006-S	18-JUL-95	IRON	6980	B	5	mg/kg
T1226-GP-022-006-S	18-JUL-95	LEAD	3.37		0.3	mg/kg
T1226-GP-022-006-S	18-JUL-95	MAGNESIUM	2630	B	1	mg/kg
T1226-GP-022-006-S	18-JUL-95	MANGANESE	257	B	1	mg/kg
T1226-GP-022-006-S	18-JUL-95	MERCURY	0.00244	BU	0.033	mg/kg
T1226-GP-022-006-S	18-JUL-95	NICKEL	5.66	B	1	mg/kg
T1226-GP-022-006-S	18-JUL-95	POTASSIUM	956	B	10	mg/kg
T1226-GP-022-006-S	18-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-022-006-S	18-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-022-006-S	18-JUL-95	SODIUM	142	B	10	mg/kg
T1226-GP-022-006-S	18-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-022-006-S	18-JUL-95	VANADIUM	11.5		1	mg/kg
T1226-GP-022-006-S	18-JUL-95	ZINC	18.7	B	2	mg/kg
T1226-GP-024-014-S	20-JUL-95	ALUMINUM	4910	B	5	mg/kg
T1226-GP-024-014-S	20-JUL-95	ANTIMONY	0.239	BJ	1	mg/kg
T1226-GP-024-014-S	20-JUL-95	ARSENIC	2.72		1	mg/kg
T1226-GP-024-014-S	20-JUL-95	BARIUM	165	B	1	mg/kg

TABLE 5
ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-024-014-S	20-JUL-95	BERYLLIUM	0.247	BJ	0.5	mg/kg
T1226-GP-024-014-S	20-JUL-95	CADMIUM	0.0676	J	0.5	mg/kg
T1226-GP-024-014-S	20-JUL-95	CALCIUM	89100	B	50	mg/kg
T1226-GP-024-014-S	20-JUL-95	CHROMIUM	4.27	B	1	mg/kg
T1226-GP-024-014-S	20-JUL-95	CHROMIUM (VI)	0.1	U	0.4	mg/kg
T1226-GP-024-014-S	20-JUL-95	COBALT	2.23		1	mg/kg
T1226-GP-024-014-S	20-JUL-95	COPPER	2.71		1	mg/kg
T1226-GP-024-014-S	20-JUL-95	IRON	5550		5	mg/kg
T1226-GP-024-014-S	20-JUL-95	LEAD	2.67		0.3	mg/kg
T1226-GP-024-014-S	20-JUL-95	MAGNESIUM	3260	B	1	mg/kg
T1226-GP-024-014-S	20-JUL-95	MANGANESE	65.4	B	1	mg/kg
T1226-GP-024-014-S	20-JUL-95	MERCURY	0.00973	BJ	0.0278	mg/kg
T1226-GP-024-014-S	20-JUL-95	NICKEL	8.61		1	mg/kg
T1226-GP-024-014-S	20-JUL-95	POTASSIUM	600	B	10	mg/kg
T1226-GP-024-014-S	20-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-024-014-S	20-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-024-014-S	20-JUL-95	SODIUM	239	B	10	mg/kg
T1226-GP-024-014-S	20-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-024-014-S	20-JUL-95	VANADIUM	15.9		1	mg/kg
T1226-GP-024-014-S	20-JUL-95	ZINC	9.89	B	2	mg/kg
Duplicate						
T1226-GP-005-007-S	12-JUL-95	ALUMINUM	5180	B	4.9	mg/kg
T1226-GP-005-007-S	12-JUL-95	ANTIMONY	0.0939	U	0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	ARSENIC	2.78		0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	BARIUM	91	B	0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	BERYLLIUM	0.336	BJ	0.49	mg/kg
T1226-GP-005-007-S	12-JUL-95	CADMIUM	0.308	J	0.49	mg/kg
T1226-GP-005-007-S	12-JUL-95	CALCIUM	29000	B	9.8	mg/kg
T1226-GP-005-007-S	12-JUL-95	CHROMIUM	5.01		0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	CHROMIUM (VI)	0.1	U	0.4	mg/kg
T1226-GP-005-007-S	12-JUL-95	COBALT	4.38	B	0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	COPPER	7.4	B	0.98	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-005-007-S	12-JUL-95	IRON	9080		4.9	mg/kg
T1226-GP-005-007-S	12-JUL-95	LEAD	5.69		0.294	mg/kg
T1226-GP-005-007-S	12-JUL-95	MAGNESIUM	4250	B	0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	MANGANESE	240	B	0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	MERCURY	0.0499	B	0.0318	mg/kg
T1226-GP-005-007-S	12-JUL-95	NICKEL	7.45		0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	POTASSIUM	1220		9.8	mg/kg
T1226-GP-005-007-S	12-JUL-95	SELENIUM	0.14	U	0.49	mg/kg
T1226-GP-005-007-S	12-JUL-95	SILVER	0.244	U	0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	SODIUM	105	B	9.8	mg/kg
T1226-GP-005-007-S	12-JUL-95	THALLIUM	0.203	U	0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	VANADIUM	20.2	B	0.98	mg/kg
T1226-GP-005-007-S	12-JUL-95	ZINC	26.8	B	1.96	mg/kg
T1226-GP-023-006-S	18-JUL-95	ALUMINUM	2730	B	5	mg/kg
T1226-GP-023-006-S	18-JUL-95	ANTIMONY	0.107	J	1	mg/kg
T1226-GP-023-006-S	18-JUL-95	ARSENIC	1.5		1	mg/kg
T1226-GP-023-006-S	18-JUL-95	BARIUM	89.1	B	1	mg/kg
T1226-GP-023-006-S	18-JUL-95	BERYLLIUM	0.175	BJ	0.5	mg/kg
T1226-GP-023-006-S	18-JUL-95	CADMIUM	0.146	J	0.5	mg/kg
T1226-GP-023-006-S	18-JUL-95	CALCIUM	49100	B	10	mg/kg
T1226-GP-023-006-S	18-JUL-95	CHROMIUM	2.7	B	1	mg/kg
T1226-GP-023-006-S	18-JUL-95	COBALT	2.22		1	mg/kg
T1226-GP-023-006-S	18-JUL-95	COPPER	4.64	B	1	mg/kg
T1226-GP-023-006-S	18-JUL-95	IRON	4770	B	5	mg/kg
T1226-GP-023-006-S	18-JUL-95	LEAD	4.02		0.3	mg/kg
T1226-GP-023-006-S	18-JUL-95	MAGNESIUM	2190	B	1	mg/kg
T1226-GP-023-006-S	18-JUL-95	MANGANESE	120	B	1	mg/kg
T1226-GP-023-006-S	18-JUL-95	MERCURY	0.0024	BU	0.0324	mg/kg
T1226-GP-023-006-S	18-JUL-95	NICKEL	3.95	B	1	mg/kg
T1226-GP-023-006-S	18-JUL-95	POTASSIUM	700	B	10	mg/kg
T1226-GP-023-006-S	18-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-GP-023-006-S	18-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-GP-023-006-S	18-JUL-95	SODIUM	108	B	10	mg/kg

TABLE 5
ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-023-006-S	18-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-GP-023-006-S	18-JUL-95	VANADIUM	8.78		1	mg/kg
T1226-GP-023-006-S	18-JUL-95	ZINC	14.2	B	2	mg/kg
Sediment						
T1226-SD-001-001-SS	20-JUL-95	ALUMINUM	7960	B	5	mg/kg
T1226-SD-001-001-SS	20-JUL-95	ANTIMONY	0.285	BJ	1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	ARSENIC	3.75		1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	BARIUM	159	B	1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	BERYLLIUM	0.417	BJ	0.5	mg/kg
T1226-SD-001-001-SS	20-JUL-95	CADMIUM	0.737		0.5	mg/kg
T1226-SD-001-001-SS	20-JUL-95	CALCIUM	57300	B	50	mg/kg
T1226-SD-001-001-SS	20-JUL-95	CHROMIUM	8.51	B	1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	CHROMIUM (VI)	1		0.4	mg/kg
T1226-SD-001-001-SS	20-JUL-95	COBALT	4.11		1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	COPPER	9.05		1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	IRON	10900		5	mg/kg
T1226-SD-001-001-SS	20-JUL-95	LEAD	6.12		0.3	mg/kg
T1226-SD-001-001-SS	20-JUL-95	MAGNESIUM	3340	B	1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	MANGANESE	166	B	1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	MERCURY	0.018	BJ	0.0308	mg/kg
T1226-SD-001-001-SS	20-JUL-95	NICKEL	9.65		1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	POTASSIUM	1610	B	10	mg/kg
T1226-SD-001-001-SS	20-JUL-95	SELENIUM	0.143	U	0.5	mg/kg
T1226-SD-001-001-SS	20-JUL-95	SILVER	0.249	U	1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	SODIUM	45.1	B	10	mg/kg
T1226-SD-001-001-SS	20-JUL-95	THALLIUM	0.207	U	1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	VANADIUM	22.5		1	mg/kg
T1226-SD-001-001-SS	20-JUL-95	ZINC	25.1	B	2	mg/kg
T1226-SD-002-000-S	01-AUG-95	ALUMINUM	6080	B	4.63	mg/kg
T1226-SD-002-000-S	01-AUG-95	ANTIMONY	0.0887	BU	0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	ARSENIC	2.42		0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	BARIUM	148	B	0.926	mg/kg

TABLE 5

ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-SD-002-000-S	01-AUG-95	BERYLLIUM	0.234	J	0.463	mg/kg
T1226-SD-002-000-S	01-AUG-95	CADMIUM	0.458	BJ	0.463	mg/kg
T1226-SD-002-000-S	01-AUG-95	CALCIUM	29300		9.26	mg/kg
T1226-SD-002-000-S	01-AUG-95	CHROMIUM	6.26		0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	CHROMIUM (VI)	0.42		0.4	mg/kg
T1226-SD-002-000-S	01-AUG-95	COBALT	3.74		0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	COPPER	10.6		0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	IRON	8610		4.63	mg/kg
T1226-SD-002-000-S	01-AUG-95	LEAD	6.29	B	0.278	mg/kg
T1226-SD-002-000-S	01-AUG-95	MAGNESIUM	3070	B	0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	MANGANESE	140		0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	MERCURY	0.0397	B	0.0316	mg/kg
T1226-SD-002-000-S	01-AUG-95	NICKEL	5.8		0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	POTASSIUM	1310		9.26	mg/kg
T1226-SD-002-000-S	01-AUG-95	SELENIUM	0.132	BU	0.463	mg/kg
T1226-SD-002-000-S	01-AUG-95	SILVER	0.231	U	0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	SODIUM	117		9.26	mg/kg
T1226-SD-002-000-S	01-AUG-95	THALLIUM	0.192	U	0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	VANADIUM	20.7		0.926	mg/kg
T1226-SD-002-000-S	01-AUG-95	ZINC	29		1.85	mg/kg
T1226-SD-003-000-S	01-AUG-95	ALUMINUM	2660	B	4.59	mg/kg
T1226-SD-003-000-S	01-AUG-95	ANTIMONY	0.0879	BU	0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	ARSENIC	0.946		0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	BARIUM	45.8	B	0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	BERYLLIUM	0.0751	J	0.459	mg/kg
T1226-SD-003-000-S	01-AUG-95	CADMIUM	0.333	BJ	0.459	mg/kg
T1226-SD-003-000-S	01-AUG-95	CALCIUM	10100		9.18	mg/kg
T1226-SD-003-000-S	01-AUG-95	CHROMIUM	5.05		0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	COBALT	3.96		0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	COPPER	17.7		0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	IRON	4570		4.59	mg/kg
T1226-SD-003-000-S	01-AUG-95	LEAD	3.99	B	0.275	mg/kg
T1226-SD-003-000-S	01-AUG-95	MAGNESIUM	1800	B	0.918	mg/kg

TABLE 5
ER Site 226: Metal Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	NOTATION	REPORTING LIMIT	UNIT OF MEASURE
T1226-SD-003-000-S	01-AUG-95	MANGANESE	68.2		0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	MERCURY	0.0589	B	0.033	mg/kg
T1226-SD-003-000-S	01-AUG-95	NICKEL	6.05		0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	POTASSIUM	538		9.18	mg/kg
T1226-SD-003-000-S	01-AUG-95	SELENIUM	0.131	BU	0.459	mg/kg
T1226-SD-003-000-S	01-AUG-95	SILVER	0.318	J	0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	SODIUM	111		9.18	mg/kg
T1226-SD-003-000-S	01-AUG-95	THALLIUM	0.19	U	0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	VANADIUM	10.1		0.918	mg/kg
T1226-SD-003-000-S	01-AUG-95	ZINC	10.8		1.84	mg/kg

U = non-detect
J = estimated value
B = found in the method blank

TABLE 6

ER Site 226: Radionuclide Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	ERROR (+/-)	REPORTING LIMIT	UNIT OF MEASURE
Subsurface Soil						
T1226-GP-001-010-S	12-JUL-95	PLUTONIUM-238	-0.00204	0.0103	0.03	pCi/g
T1226-GP-001-010-S	12-JUL-95	PU-239/240	0.00091	0.0055	0.03	pCi/g
T1226-GP-001-010-S	12-JUL-95	TRITIUM	0	190	258	pCi/L
T1226-GP-001-010-S	12-JUL-95	URANIUM-238	0.943	0.141	0.09	pCi/g
T1226-GP-001-010-S	12-JUL-95	URANIUM-233/234	0.955	0.142	0.09	pCi/g
T1226-GP-001-010-S	12-JUL-95	URANIUM-235	0.0448	0.0245	0.09	pCi/g
T1226-GP-002-008-S	12-JUL-95	PLUTONIUM-238	0.00758	0.0106	0.03	pCi/g
T1226-GP-002-008-S	12-JUL-95	PU-239/240	0.00168	0.0054	0.03	pCi/g
T1226-GP-002-008-S	12-JUL-95	TRITIUM	30	200	255	pCi/L
T1226-GP-002-008-S	12-JUL-95	URANIUM-238	0.806	0.1	0.09	pCi/g
T1226-GP-002-008-S	12-JUL-95	URANIUM-233/234	0.831	0.102	0.09	pCi/g
T1226-GP-002-008-S	12-JUL-95	URANIUM-235	0.0368	0.0164	0.09	pCi/g
T1226-GP-003-008-S	12-JUL-95	PLUTONIUM-238	-0.00092	0.0092	0.03	pCi/g
T1226-GP-003-008-S	12-JUL-95	PU-239/240	-0.00002	0.0041	0.03	pCi/g
T1226-GP-003-008-S	12-JUL-95	TRITIUM	90	200	251	pCi/L
T1226-GP-003-008-S	12-JUL-95	URANIUM-238	1.1	0.143	0.09	pCi/g
T1226-GP-003-008-S	12-JUL-95	URANIUM-233/234	1.26	0.158	0.09	pCi/g
T1226-GP-003-008-S	12-JUL-95	URANIUM-235	0.0494	0.0247	0.09	pCi/g
T1226-GP-004-007-S	12-JUL-95	PLUTONIUM-238	0.00886	0.0135	0.03	pCi/g
T1226-GP-004-007-S	12-JUL-95	PU-239/240	0.00087	0.006	0.03	pCi/g
T1226-GP-004-007-S	12-JUL-95	TRITIUM	200	220	258	pCi/L
T1226-GP-004-007-S	12-JUL-95	URANIUM-238	0.933	0.134	0.09	pCi/g
T1226-GP-004-007-S	12-JUL-95	URANIUM-233/234	0.926	0.133	0.09	pCi/g
T1226-GP-004-007-S	12-JUL-95	URANIUM-235	0.0223	0.0172	0.09	pCi/g
T1226-GP-006-006-S	12-JUL-95	PLUTONIUM-238	0.00459	0.0104	0.03	pCi/g
T1226-GP-006-006-S	12-JUL-95	PU-239/240	0.00092	0.0042	0.03	pCi/g
T1226-GP-006-006-S	12-JUL-95	TRITIUM	-10	190	253	pCi/L
T1226-GP-006-006-S	12-JUL-95	URANIUM-238	1.12	0.149	0.09	pCi/g
T1226-GP-006-006-S	12-JUL-95	URANIUM-233/234	1.37	0.172	0.09	pCi/g
T1226-GP-006-006-S	12-JUL-95	URANIUM-235	0.0367	0.0206	0.09	pCi/g
T1226-GP-007-006-S	13-JUL-95	PLUTONIUM-238	0.0125	0.0147	0.03	pCi/g
T1226-GP-007-006-S	13-JUL-95	PU-239/240	-0.0017	0.0024	0.03	pCi/g

TABLE 6
ER Site 226: Radionuclide Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	ERROR (+/-)	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-007-006-S	13-JUL-95	TRITIUM	70	200	259	pCi/L
T1226-GP-007-006-S	13-JUL-95	URANIUM-238	0.994	0.146	0.09	pCi/g
T1226-GP-007-006-S	13-JUL-95	URANIUM-233/234	1.16	0.163	0.09	pCi/g
T1226-GP-007-006-S	13-JUL-95	URANIUM-235	0.0401	0.0226	0.09	pCi/g
T1226-GP-008-007-S	13-JUL-95	PLUTONIUM-238	0.00236	0.0102	0.03	pCi/g
T1226-GP-008-007-S	13-JUL-95	PU-239/240	0.00731	0.0085	0.03	pCi/g
T1226-GP-008-007-S	13-JUL-95	TRITIUM	30	200	254	pCi/L
T1226-GP-008-007-S	13-JUL-95	URANIUM-238	1.17	0.168	0.09	pCi/g
T1226-GP-008-007-S	13-JUL-95	URANIUM-233/234	1.38	0.189	0.09	pCi/g
T1226-GP-008-007-S	13-JUL-95	URANIUM-235	0.063	0.0306	0.09	pCi/g
T1226-GP-009-006-S	13-JUL-95	PLUTONIUM-238	0.00076	0.0112	0.03	pCi/g
T1226-GP-009-006-S	13-JUL-95	PU-239/240	-0.00263	0.0031	0.03	pCi/g
T1226-GP-009-006-S	13-JUL-95	TRITIUM	80	200	252	pCi/L
T1226-GP-009-006-S	13-JUL-95	URANIUM-238	0.939	0.134	0.09	pCi/g
T1226-GP-009-006-S	13-JUL-95	URANIUM-233/234	1.03	0.143	0.09	pCi/g
T1226-GP-009-006-S	13-JUL-95	URANIUM-235	0.0451	0.0229	0.09	pCi/g
T1226-GP-010-007-S	13-JUL-95	PLUTONIUM-238	0.00858	0.0098	0.03	pCi/g
T1226-GP-010-007-S	13-JUL-95	PU-239/240	-0.00087	0.0017	0.03	pCi/g
T1226-GP-010-007-S	13-JUL-95	TRITIUM	60	200	256	pCi/L
T1226-GP-010-007-S	13-JUL-95	URANIUM-238	0.983	0.139	0.09	pCi/g
T1226-GP-010-007-S	13-JUL-95	URANIUM-233/234	0.965	0.137	0.09	pCi/g
T1226-GP-010-007-S	13-JUL-95	URANIUM-235	0.0262	0.0216	0.09	pCi/g
T1226-GP-011-005-S	13-JUL-95	PLUTONIUM-238	0.157	0.0371	0.03	pCi/g
T1226-GP-011-005-S	13-JUL-95	PU-239/240	0.915	0.113	0.03	pCi/g
T1226-GP-011-005-S	13-JUL-95	TRITIUM	-30	190	257	pCi/L
T1226-GP-011-005-S	13-JUL-95	URANIUM-238	1.07	0.15	0.09	pCi/g
T1226-GP-011-005-S	13-JUL-95	URANIUM-233/234	1.19	0.162	0.09	pCi/g
T1226-GP-011-005-S	13-JUL-95	URANIUM-235	0.0495	0.0255	0.09	pCi/g
T1226-GP-012-006-S	13-JUL-95	PLUTONIUM-238	0.0027	0.0107	0.03	pCi/g
T1226-GP-012-006-S	13-JUL-95	PU-239/240	0.00369	0.007	0.03	pCi/g
T1226-GP-012-006-S	13-JUL-95	TRITIUM	110	210	258	pCi/L
T1226-GP-012-006-S	13-JUL-95	URANIUM-238	1.3	0.168	0.09	pCi/g
T1226-GP-012-006-S	13-JUL-95	URANIUM-233/234	1.61	0.197	0.09	pCi/g

TABLE 6

ER Site 226: Radionuclide Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	ERROR (+/-)	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-012-006-S	13-JUL-95	URANIUM-235	0.0835	0.032	0.09	pCi/g
T1226-GP-013-006-S	13-JUL-95	PLUTONIUM-238	0.0063	0.0063	0.03	pCi/g
T1226-GP-013-006-S	13-JUL-95	PU-239/240	0.00157	0.0032	0.03	pCi/g
T1226-GP-013-006-S	13-JUL-95	TRITIUM	-10	190	257	pCi/L
T1226-GP-013-006-S	13-JUL-95	URANIUM-238	1.41	0.191	0.09	pCi/g
T1226-GP-013-006-S	13-JUL-95	URANIUM-233/234	1.36	0.186	0.09	pCi/g
T1226-GP-013-006-S	13-JUL-95	URANIUM-235	0.0514	0.0262	0.09	pCi/g
T1226-GP-014-006-S	13-JUL-95	PLUTONIUM-238	0.0015	0.0101	0.03	pCi/g
T1226-GP-014-006-S	13-JUL-95	PU-239/240	-0.00161	0.0023	0.03	pCi/g
T1226-GP-014-006-S	13-JUL-95	TRITIUM	-10	190	253	pCi/L
T1226-GP-014-006-S	13-JUL-95	URANIUM-238	1.02	0.137	0.09	pCi/g
T1226-GP-014-006-S	13-JUL-95	URANIUM-233/234	1.19	0.153	0.09	pCi/g
T1226-GP-014-006-S	13-JUL-95	URANIUM-235	0.0577	0.0251	0.09	pCi/g
T1226-GP-015-010-S	14-JUL-95	PLUTONIUM-238	0.00574	0.015	0.03	pCi/g
T1226-GP-015-010-S	14-JUL-95	PU-239/240	0.00268	0.0072	0.03	pCi/g
T1226-GP-015-010-S	14-JUL-95	TRITIUM	10	190	250	pCi/L
T1226-GP-015-010-S	14-JUL-95	URANIUM-238	1.22	0.13	0.09	pCi/g
T1226-GP-015-010-S	14-JUL-95	URANIUM-233/234	1.25	0.133	0.09	pCi/g
T1226-GP-015-010-S	14-JUL-95	URANIUM-235	0.0471	0.0195	0.09	pCi/g
T1226-GP-016-010-S	14-JUL-95	PLUTONIUM-238	0.00095	0.0043	0.03	pCi/g
T1226-GP-016-010-S	14-JUL-95	PU-239/240	0	0	0.03	pCi/g
T1226-GP-016-010-S	14-JUL-95	TRITIUM	90	200	246	pCi/L
T1226-GP-016-010-S	14-JUL-95	URANIUM-238	1.01	0.116	0.09	pCi/g
T1226-GP-016-010-S	14-JUL-95	URANIUM-233/234	1.11	0.124	0.09	pCi/g
T1226-GP-016-010-S	14-JUL-95	URANIUM-235	0.0373	0.0167	0.09	pCi/g
T1226-GP-017-010-S	17-JUL-95	PLUTONIUM-238	0.00853	0.0122	0.03	pCi/g
T1226-GP-017-010-S	17-JUL-95	PU-239/240	0.00084	0.0057	0.03	pCi/g
T1226-GP-017-010-S	17-JUL-95	TRITIUM	70	200	258	pCi/L
T1226-GP-017-010-S	17-JUL-95	URANIUM-238	0.905	0.103	0.09	pCi/g
T1226-GP-017-010-S	17-JUL-95	URANIUM-233/234	0.957	0.108	0.09	pCi/g
T1226-GP-017-010-S	17-JUL-95	URANIUM-235	0.0604	0.0209	0.09	pCi/g
T1226-GP-018-010-S	17-JUL-95	PLUTONIUM-238	0.371	0.0875	0.03	pCi/g
T1226-GP-018-010-S	17-JUL-95	PU-239/240	0.00769	0.0109	0.03	pCi/g

TABLE 6

ER Site 226: Radionuclide Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	ERROR (+/-)	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-018-010-S	17-JUL-95	TRITIUM	-120	180	257	pCi/L
T1226-GP-018-010-S	17-JUL-95	URANIUM-238	1.18	0.13	0.09	pCi/g
T1226-GP-018-010-S	17-JUL-95	URANIUM-233/234	1.24	0.136	0.09	pCi/g
T1226-GP-018-010-S	17-JUL-95	URANIUM-235	0.0592	0.0225	0.09	pCi/g
T1226-GP-019-014-S	17-JUL-95	PLUTONIUM-238	0.00325	0.0094	0.03	pCi/g
T1226-GP-019-014-S	17-JUL-95	PU-239/240	-0.00167	0.0024	0.03	pCi/g
T1226-GP-019-014-S	17-JUL-95	TRITIUM	140	210	262	pCi/L
T1226-GP-019-014-S	17-JUL-95	URANIUM-238	0.753	0.0915	0.09	pCi/g
T1226-GP-019-014-S	17-JUL-95	URANIUM-233/234	0.779	0.0938	0.09	pCi/g
T1226-GP-019-014-S	17-JUL-95	URANIUM-235	0.0438	0.0172	0.09	pCi/g
T1226-GP-020-009-S	18-JUL-95	PLUTONIUM-238	0.00829	0.00851	0.03	pCi/g
T1226-GP-020-009-S	18-JUL-95	PU-239/240	0	0	0.03	pCi/g
T1226-GP-020-009-S	18-JUL-95	TRITIUM	90	200	256	pCi/L
T1226-GP-020-009-S	18-JUL-95	URANIUM-238	0.941	0.107	0.09	pCi/g
T1226-GP-020-009-S	18-JUL-95	URANIUM-233/234	0.929	0.106	0.09	pCi/g
T1226-GP-020-009-S	18-JUL-95	URANIUM-235	0.048	0.0176	0.09	pCi/g
T1226-GP-021-007-S	18-JUL-95	PLUTONIUM-238	0.00125	0.00564	0.03	pCi/g
T1226-GP-021-007-S	18-JUL-95	PU-239/240	-0.00127	0.00254	0.03	pCi/g
T1226-GP-021-007-S	18-JUL-95	TRITIUM	20	190	254	pCi/L
T1226-GP-021-007-S	18-JUL-95	URANIUM-238	0.434	0.0611	0.09	pCi/g
T1226-GP-021-007-S	18-JUL-95	URANIUM-233/234	0.495	0.0669	0.09	pCi/g
T1226-GP-021-007-S	18-JUL-95	URANIUM-235	0.0204	0.0117	0.09	pCi/g
T1226-GP-022-006-S	18-JUL-95	PLUTONIUM-238	-0.0055	0.0149	0.03	pCi/g
T1226-GP-022-006-S	18-JUL-95	PU-239/240	-0.00146	0.00292	0.03	pCi/g
T1226-GP-022-006-S	18-JUL-95	TRITIUM	60	200	255	pCi/L
T1226-GP-022-006-S	18-JUL-95	URANIUM-238	1.02	0.108	0.09	pCi/g
T1226-GP-022-006-S	18-JUL-95	URANIUM-233/234	1.08	0.112	0.09	pCi/g
T1226-GP-022-006-S	18-JUL-95	URANIUM-235	0.0454	0.0164	0.09	pCi/g
T1226-GP-024-014-S	20-JUL-95	PLUTONIUM-238	0.01	0.0124	0.03	pCi/g
T1226-GP-024-014-S	20-JUL-95	PU-239/240	0.00587	0.00695	0.03	pCi/g
T1226-GP-024-014-S	20-JUL-95	TRITIUM	40	190	257	pCi/L
T1226-GP-024-014-S	20-JUL-95	URANIUM-238	0.479	0.0632	0.09	pCi/g
T1226-GP-024-014-S	20-JUL-95	URANIUM-233/234	0.551	0.0696	0.09	pCi/g

TABLE 6

ER Site 226: Radionuclide Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	ERROR (+/-)	REPORTING LIMIT	UNIT OF MEASURE
T1226-GP-024-014-S	20-JUL-95	URANIUM-235	0.0116	0.00988	0.09	pCi/g
Duplicate						
T1226-GP-005-007-S	12-JUL-95	PLUTONIUM-238	0	0	0.03	pCi/g
T1226-GP-005-007-S	12-JUL-95	PU-239/240	0.00332	0.0047	0.03	pCi/g
T1226-GP-005-007-S	12-JUL-95	TRITIUM	150	210	256	pCi/L
T1226-GP-005-007-S	12-JUL-95	URANIUM-238	0.827	0.12	0.09	pCi/g
T1226-GP-005-007-S	12-JUL-95	URANIUM-233/234	1.02	0.139	0.09	pCi/g
T1226-GP-005-007-S	12-JUL-95	URANIUM-235	0.0531	0.0267	0.09	pCi/g
T1226-GP-023-006-S	18-JUL-95	PLUTONIUM-238	0.00556	0.00658	0.03	pCi/g
T1226-GP-023-006-S	18-JUL-95	PU-239/240	0.00318	0.00451	0.03	pCi/g
T1226-GP-023-006-S	18-JUL-95	TRITIUM	90	200	261	pCi/L
T1226-GP-023-006-S	18-JUL-95	URANIUM-238	1.03	0.106	0.09	pCi/g
T1226-GP-023-006-S	18-JUL-95	URANIUM-233/234	1.02	0.105	0.09	pCi/g
T1226-GP-023-006-S	18-JUL-95	URANIUM-235	0.0407	0.0168	0.09	pCi/g
Sediment						
T1226-SD-001-001-SS	20-JUL-95	PLUTONIUM-238	0.00865	0.0116	0.03	pCi/g
T1226-SD-001-001-SS	20-JUL-95	PU-239/240	-0.00002	0.00429	0.03	pCi/g
T1226-SD-001-001-SS	20-JUL-95	TRITIUM	-90	170	251	pCi/L
T1226-SD-001-001-SS	20-JUL-95	URANIUM-238	0.665	0.077	0.09	pCi/g
T1226-SD-001-001-SS	20-JUL-95	URANIUM-233/234	0.677	0.0781	0.09	pCi/g
T1226-SD-001-001-SS	20-JUL-95	URANIUM-235	0.0335	0.0136	0.09	pCi/g
T1226-SD-002-000-S	01-AUG-95	PLUTONIUM-238	0.00574	0.0099	0.03	pCi/g
T1226-SD-002-000-S	01-AUG-95	PU-239/240	0.00217	0.0044	0.03	pCi/g
T1226-SD-002-000-S	01-AUG-95	TRITIUM	120	200	258	pCi/L
T1226-SD-002-000-S	01-AUG-95	URANIUM-238	0.809	0.0981	0.09	pCi/g
T1226-SD-002-000-S	01-AUG-95	URANIUM-233/234	0.913	0.107	0.09	pCi/g
T1226-SD-002-000-S	01-AUG-95	URANIUM-235	0.0227	0.0137	0.09	pCi/g
T1226-SD-003-000-S	01-AUG-95	PLUTONIUM-238	-0.00344	0.0105	0.03	pCi/g
T1226-SD-003-000-S	01-AUG-95	PU-239/240	-0.0025	0.0029	0.03	pCi/g
T1226-SD-003-000-S	01-AUG-95	TRITIUM	20	180	252	pCi/L
T1226-SD-003-000-S	01-AUG-95	URANIUM-238	0.784	0.0967	0.09	pCi/g

TABLE 6

ER Site 226: Radionuclide Analytical Results for Subsurface Soil and Sediment Samples

SAMPLE NUMBER	SAMPLE DATE	COMMON NAME	AMOUNT DETECTED	ERROR (+/-)	REPORTING LIMIT	UNIT OF MEASURE
T1226-SD-003-000-S	01-AUG-95	URANIUM-233/234	0.821	0.101	0.09	pCi/g
T1226-SD-003-000-S	01-AUG-95	URANIUM-235	0.0495	0.0228	0.09	pCi/g
Equipment Blank						
T1226-EB-001-000-W	12-JUL-95	PLUTONIUM-238	-0.0407	0.179	0.15	pCi/L
T1226-EB-001-000-W	12-JUL-95	PU-239/240	0	0	0.15	pCi/L
T1226-EB-001-000-W	12-JUL-95	TRITIUM	50	200	260	pCi/L
T1226-EB-001-000-W	12-JUL-95	URANIUM-238	0.0245	0.104	0.15	pCi/L
T1226-EB-001-000-W	12-JUL-95	URANIUM-233/234	0.0437	0.101	0.15	pCi/L
T1226-EB-001-000-W	12-JUL-95	URANIUM-235	0	0	0.15	pCi/L
T1226-EB-002-000-W	18-JUL-95	PLUTONIUM-238	-0.00467	0.00941	0.171	pCi/L
T1226-EB-002-000-W	18-JUL-95	PU-239/240	0.0366	0.0734	0.15	pCi/L
T1226-EB-002-000-W	18-JUL-95	TRITIUM	80	200	256	pCi/L
T1226-EB-002-000-W	18-JUL-95	URANIUM-238	1.1	0.803	0.88	pCi/L
T1226-EB-002-000-W	18-JUL-95	URANIUM-233/234	1.58	0.949	0.88	pCi/L
T1226-EB-002-000-W	18-JUL-95	URANIUM-235	0	0	0.362	pCi/L

TABLE 7

ER Site 226: Metal Data Comparison for Soil Samples with SNL/NM Background Levels and Subpart S Action Levels

Compound	Number of Samples	Site 226 Range of Values (mg/kg)	TA-I Background UTL/95th Percentile (mg/kg)	Site-Wide Background UTL/95th Percentile (mg/kg)	Subpart S Action Level (mg/kg)
Aluminum	22	11000-2200	12055	NA	NA
Antimony	22	0.329-ND	0.49	3.9	30
Arsenic	22	3.75-1.43	7.64	5.6	80
Barium	22	404-58.9	653.89	200	4000
Beryllium	22	0.532-0.166	0.57	0.8	0.2
Cadmium	22	0.737-0.0676	0.84	1.6	40
Calcium	22	89100-15100	87221.64	NA	NA
Chromium, total	22	12.7-2.67	11.73	17.3	NA
Chromium VI	8	1.0-ND	54	<2.5	400
Cobalt	22	6.05-2.23	6.25	7.1	NA
Copper	22	10.5-2.71	9.98	25.5	NA
Iron	22	16000-4280	15428.88	NA	NA
Lead	22	7.96-2.42	17.3	68	400[a]
Magnesium	22	5830-1910	6080	NA	NA
Manganese	22	302-65.4	243	NA	10000[b]
Mercury	22	0.0686-ND	0.14	0.31	20
Nickel	22	12.3-5.1	10.63	25.4	2000
Potassium	22	2120-536	2173	NA	NA
Selenium	22	ND	0.24	<1	400[b]
Silver	22	1.27-ND	NA	2	200
Sodium	22	313-55.4	648.33	NA	NA
Thallium	22	ND	1.16	<1.1	NA
Vanadium	22	33.2-9.53	34.9	47.2	600[b]
Zinc	22	37.9-9.89	50.76	82.4	20000[b]

[a] The action level for lead is provided from U.S. Environmental Protection Agency, 1994, "Revise Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities," PB94-963282, Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

[b] The action levels are provided from "Report of Generic Action Level Assistance for the Sandia National Laboratory/New Mexico Environmental Restoration Program", (IT Corp, 1994).

ND=not detected
NA=not available

TABLE 8

ER Site 226: Isotopic Uranium Data Comparison for Soil Samples with SNL/NM Background Levels

Compound	Site 226 Highest Values (pCi/g)	TA-I Background UTL/95th Percentile (pCi/g)	Site-Wide Background UTL/95th Percentile (pCi/g)
U-235	0.0835+/-0.032	0.1	0.18
U-238	1.41+/-0.191	1.09	1.3
U-233/234	1.61+/- 0.197	1.15	1.6

Appendix D

ER Site 226: Risk Assessment Analysis Report

ER SITE 226: RISK ASSESSMENT ANALYSIS

I. Site Description and History

The acid waste line, Environmental Restoration (ER) Site 226, was installed between 1948 and 1950 and was constructed of 4- and 8-inch diameter vitreous clay pipe. The system extended from three origins in the north central section of Technical Area I (TA-I) south to an outfall north of the Tijeras Arroyo. Lateral lines extended to buildings served by the line. The line remains in place and lies from 4- to 10-feet below ground surface within TA-I and at an average of 8-feet below ground surface south of TA-I.

In the mid- to late-1960s, use of the acid waste line for its original purpose was discontinued. At this time, the line was separated at the intersection of I and 9th Streets. The southern portion was capped at that intersection and was abandoned in place. The portion of the line north of I Street was connected to the sanitary sewer system and remains active. The potential constituents of concern (COCs) are radioactive materials, metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs). These COCs were based on known building activities and processes and historical data.

II. Risk Assessment Analysis

Risk assessment of this site includes a number of steps which culminate in a quantitative evaluation of the potential adverse human health effects caused by constituents located at the site. The steps to be discussed include:

Step 1.	Site data are described which provide information on the potential COCs, as well as the relevant physical characteristics and properties of the site.
Step 2.	Potential pathways by which a representative population might be exposed to the COCs are identified.
Step 3.	The potential intake of these COCs by the representative population is calculated using a tiered approach. The tiered approach includes screening steps, followed by potential intake calculations and a discussion or evaluation of the uncertainty in those calculations. Potential intake calculations are also applied to background screening data.
Step 4.	Data are described on the potential toxicity and cancer effects from exposure to the COCs and associated background constituents and their respective subsequent intake.

Step 5.	Potential toxicity effects (specified as a Hazard Index) and cancer risks are calculated for nonradiological COCs and background. For radiological COCs, the incremental total effective dose equivalent (TEDE) and incremental estimated cancer risk are calculated by subtracting applicable background concentrations directly from maximum on-site contaminant values. This background subtraction only occurs when a radiological COC occurs as contamination and exists as a natural background radionuclide.
Step 6.	These values are compared with standards established by the United States (U.S.) Environmental Protection Agency (USEPA) and U.S. Department of Energy (USDOE) to determine if further evaluation, and potential site clean-up, is required. Nonradiological COC risk values are also compared to background risk so that an incremental risk may be calculated
Step 7.	Discussion of uncertainties in the previous steps.

II.1 Step 1. Site Data

Site history and characterization activities are used to identify potential COCs. The identification of COCs and the sampling to determine the concentration levels of those COCs across the site are described in the ER Site 226 Data Evaluation Report and the No Further Action Proposal. Chemicals that are essential nutrients such as iron, magnesium, calcium, potassium, and sodium were not included in this risk assessment (USEPA 1989a). In order to provide conservatism in this risk assessment, the calculation uses only the maximum concentration value of each COC determined for the entire site. Both radioactive and nonradioactive COCs are evaluated. The nonradioactive COCs evaluated are both metals and organics.

II.2 Step 2. Pathway Identification

ER Site 226 has been designated with a future land-use scenario of industrial (USDOE, 1996)(see Appendix 1 for default exposure pathways and parameters). Because of the location and the characteristics of the potential contaminants, the primary pathway for human exposure is considered to be soil ingestion. The inhalation pathway for both chemicals and radionuclides is included because of the potential to inhale dust and volatiles. Direct gamma exposure is also included in the radioactive contamination risk assessment. No contamination at depth was detected and therefore no water pathways to the groundwater are considered appropriate. Depth to groundwater at Site 226 is approximately 550 feet. Because of the lack of surface water or other significant mechanisms for

dermal contact, the dermal exposure pathway is considered to not be significant. No intake routes through plant, meat, or milk ingestion are considered appropriate for the industrial land-use scenario. However, plant uptake is considered for the residential land-use scenario.

PATHWAY IDENTIFICATION

Chemical Constituents	Radionuclide Constituents
Soil Ingestion	Soil Ingestion
Inhalation (Dust and volatiles)	Inhalation (Dust and volatiles)
Plant uptake (Residential only)	Plant uptake (Residential only)
	Direct Gamma

II.3 Steps 3-5. Calculation of Hazard Indices and Cancer Risks

Steps 3 through 5 are discussed in this section. These steps include the discussion of the tiered approach in eliminating potential COCs from further consideration in the risk assessment process and the calculation of intakes from all identified exposure pathways, the discussion of the toxicity information, and the calculation of the hazard indices and cancer risks.

The risks from the COCs at ER Site 226 were evaluated using a tiered approach. First, the maximum concentrations of COCs were compared to TA-I specific background screening levels using 95th upper tolerance limits (UTLs) or percentile values (Sandia National Laboratories/New Mexico [SNL/NM], 1996). If a maximum concentration of a particular COC exceeded the TA-I specific background screening level, then the COC was compared to the SNL/NM background screening level for this area (IT, 1996). If a SNL/NM-specific screening level was not available for a constituent, then a background value was obtained, when possible, from the U.S. Geological Survey (USGS) National Uranium Resource Evaluation (NURE) program (USGS, 1994). For uranium isotopes, if a maximum concentration exceeded the SNL/NM background screening level, the isotopic ratios of U-238/U-234 and U-238/U-235 were compared to the range of TA-I specific background ratios.

Maximum concentrations of the COCs were used in order to provide a conservative estimate of the associated risk. If any nonradiological COCs were above both the TA-I and SNL/NM background screening levels or the USGS background value, all nonradiological COCs were considered in further risk assessment analyses. For radiological COCs that exceeded both the TA-I or SNL/NM background screening levels and, as applicable, were above the range of uranium isotopic ratios, background values were subtracted from the individual maximum radionuclide concentrations. Those

that did not exceed these background levels were not carried any further in the risk assessment. This approach is consistent with USDOE orders. Radioactive COCs that did not have a background value and were detected above the analytical minimum detectable activity (MDA) were carried through the risk assessment at their maximum levels. This step is performed (rather than carry the below-background radioactive COCs through the risk assessment and then perform a background risk assessment to determine incremental TEDE and estimated cancer risk) to prevent the "masking" of radiological contamination that may occur if on-site background radiological COCs exist in concentrations far enough below the assigned background level. When this "masking" occurs the final incremental TEDE and estimated cancer risk are reduced and, therefore, provide a non-conservative estimate of the potential impact on an on-site receptor. This approach is also consistent with the regulatory approach (40 CFR Part 196, 1994) which sets a TEDE limit to the on-site receptor in excess of background. The resultant radioactive COCs remaining after this step are referred to as background-adjusted radioactive COCs.

Second, if any nonradiological COC failed the initial screening step, the maximum concentration for each nonradiological COC was compared with action levels calculated using methods and equations promulgated in the proposed Resource Conservation and Recovery Act (RCRA) Subpart S (40 CFR Part 264, 1990) and Risk Assessment Guidance for Superfund (RAGS) (USEPA, 1989a) documentation. If there are 10 or fewer COCs and each has a maximum concentration less than one-tenth of the action level, then the site would be judged to pose no significant health hazard to humans. If there are more than 10 COCs, the Subpart S screening procedure was skipped. For the radioactive COCs, the cumulative dose was calculated and the corresponding excess cancer risk estimated.

Third, hazard indices and risk due to carcinogenic effects were calculated using Reasonable Maximum Exposure (RME) methods and equations promulgated in RAGS (USEPA, 1989a). The combined effects of the nonradiological COCs ate their respective background concentrations in the soils were calculated. The combined effects of all associated nonradiological background constituents in the soils were also calculated. The most conservative background concentration between TA-I specific and SNL/NM concentration (minimum value of the 95th UTL or percentile concentration value, as appropriate) was used in the risk calculation. For toxic compounds, the combined effect was calculated by summing the individual hazard quotients for each compound into a total Hazard Index. This Hazard Index is compared to the recommended standard of 1. For potentially carcinogenic compounds, the individual risks were summed. The total risk was compared to the recommended acceptable risk range of 10^{-4}

to 10^{-6}. For the radioactive COCs, the incremental TEDE was calculated and the corresponding incremental cancer risk estimated using USDOE's RESRAD computer code.

II.3.1 Comparison to Background and Action Levels

Nonradioactive ER Site 226 soil sample COCs are listed in Table 1, radioactive COCs are listed in Table 2. Both tables show the 95th percentile or UTL background levels (SNL/NM 1996; IT, 1996). Table 3 shows the isotopic uranium ratio comparison to background. Background levels for plutonium and tritium are not applicable because these radionuclides do not occur naturally, or, when due to fallout, at levels detectable by common laboratory analytical instrumentation.

The TA-I background levels have not yet been approved by the USEPA or the New Mexico Environment Department (NMED), but are the result of statistical analyses of samples collected from background areas within TA-I. USEPA guidance (USEPA, 1989b; 1992a; and 1992b) were followed to arrive at the background levels. The SNL/NM background levels have not yet been approved by the USEPA or the NMED but are the result of a comprehensive study of joint SNL/NM and U.S. Air Force data from the Kirtland Air Force Base (KAFB). The report was submitted for regulatory review in early 1996. The values shown in Table 1 and Table 2 supersede the background values described in an interim background study report (IT, 1994).

The background value for manganese was determined by the USGS as part of the NURE program (USGS, 1994). All inorganics were within background levels. Because organic compounds do not have calculated background values, this screening step was skipped, and all nonradiological COCs (including inorganics) were retained for further analysis with the exception of lead. The maximum concentration value for lead is 7.69 mg/kg. The USEPA intentionally does not provide any toxicological data on lead and therefore no risk parameters can be calculated. However, EPA guidance for the screening value for lead for an industrial land-use scenario is 2000 mg/kg (EPA, 1996a); for a residential land-use scenario, the EPA screening guidance value is 400 mg/kg (EPA, 1994a). The maximum concentration value for lead at this site is less than both of those screening values and therefore lead is eliminated from further consideration in this risk assessment.

Table 1. Nonradioactive COCs at ER Site 226 and Comparison to the Background Screening Values.

COC name	Maximum concentration (mg/kg)	TA-I 95th % or UTL Level (mg/kg)	Is maximum COC concentration less than or equal to the applicable TA-I background screening value?	SNL/NM 95th % or UTL Level (mg/kg)	Is maximum COC concentration less than or equal to the applicable SNL/NM background screening value?
Aluminum	11,000 B	12,055	Yes		
Antimony	0.33 BJ	0.49	Yes		
Arsenic	3.75	7.7	Yes		
Barium	404 B	654	Yes		
Beryllium	0.53 B	0.57	Yes		
Cadmium	0.737	0.84	Yes		
Chromium, total	12.7 B	11.7	No	17.3	Yes
Chromium VI	1.0	54	Yes		
Cobalt	6.05	6.3	Yes		
Copper	10.5 B	10.0	No	25.5	Yes
Lead	7.69	17.3	Yes		
Manganese	302 B	243	No	831+	Yes
Mercury	0.07 B	0.14	Yes		
Nickel	12.3	10.6	No	25.4	Yes
Selenium	<0.143	0.24	Yes		
Silver	1.27	NC	No	2.0	Yes
Thallium	<0.207	1.2	Yes		
Vanadium	33.2	34.9	Yes		
Zinc	37.9 B	50.8	Yes		

NC - not calculated
+ - regional background value from the USGS NURE program (USGS, 1994).
J - estimated value
B - parameter detected in method blank

Table 2. Radioactive COCs at ER Site 226 and Comparison to the Background Screening Values.

COC name	Maximum concentration (pCi/g)	TA-I 95th % or UTL Level (pCi/g)	Is maximum COC concentration less than or equal to the applicable TA-I background screening value?	SNL/NM 95th % or UTL Level (pCi/g)	Is maximum COC concentration less than or equal to the applicable SNL/NM background screening value?
Pu-239/240	0.915	NC	No	NC	No
Pu-238	0.371	NC	No	NC	No
H-3	ND	NC	NA	NC	NA
U-238	1.41	1.03	No	1.3	No
U-235	0.0835	0.1	Yes	0.18	Yes
U233/234	1.61	0.84	No	1.6	No

NC - not calculated
ND - radionuclide not detected above minimum detectable activity
NA - not applicable

Table 3. Isotopic Uranium Ratio Comparison to Background Range

COC name	U-238 to U-234 Ratio	TA-I Background U-238 to U-234 Ratio Range	U-238 to U-235 Ratio	TA-I Background U-238 to U-235 Ratio Range	Are isotopic ratios within the range of TA-I background ratios
U-238	1.04	0.804 - 1.253	27.43	8.277 - 23.947	No
U-233/234	0.807	0.804 - 1.253	15.57	8.277 - 23.947	Yes

Because organic nonradiological COCs do not have a background screening level, the site fails the background screening criteria and all nonradiological COCs proceed to the proposed Subpart S action level screening procedure. However, since there were more than 10 COCs, the proposed Subpart S screening procedure was skipped. Radioactive contamination does not have pre-determined action levels analogous to proposed Subpart S and therefore this step in the screening process is not performed for radionuclides.

II.3.2 Identification of Toxicological Parameters

Tables 4 and 5 show the COCs that have been retained in the risk assessment and the values for the toxicological information available for those COCs. Dose conversion factors (DCFs) used in determining the incremental TEDE values for the individual pathways were the default values provided in the RESRAD computer code as developed in the following:

- For ingestion and inhalation, DCFs are taken from Federal Guidance Report No. 11, *Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion* (USEPA, 1988a).
- The DCFs for surface contamination (contamination on the surface of the site) were taken from USDOE/EH-0070, *External Dose-Rate Conversion Factors for Calculation of Dose to the Public* (USDOE, 1988).
- The DCFs for volume contamination (exposure to contamination deeper than the immediate surface of the site) were calculated using the methods discussed in, *Dose-Rate Conversion Factors for External Exposure to Photon Emitters in Soil* (Health Physics 28:193-205) (Kocher, D.C., 1983), and ANL/EAIS-8, *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil* (Yu, C., et al., 1993a).

II.3.3 Exposure Assessment and Risk Characterization

Section II.3.3.1 describes the exposure assessment for this risk assessment. Section II.3.3.2 provides the risk characterization including the Hazard Index value and the excess cancer risk for both the potential nonradiological COCs and associated background; industrial and residential land-uses. The incremental TEDE and incremental estimated cancer risk are provided for the background-adjusted radiological COCs; industrial and residential land-uses.

II.3.3.1 Exposure Assessment

Appendix 1 shows the equations and parameter values used in the calculation of intake values and the subsequent Hazard Index and excess cancer risk values for the individual exposure pathways. The appendix shows the parameters for both industrial and residential land-use scenarios. The equations are based on RAGS (USEPA, 1989a). The parameter values are based on information from RAGS (USEPA, 1989a) as well as other EPA guidance documents and reflect the RME approach advocated by RAGS (USEPA, 1989a). For radionuclides, the coded equations provided in the RESRAD computer code were used to estimate the excess dose and cancer risk for the individual exposure pathways. Further discussion of this

Table 4. Nonradioactive Toxicological Parameter Values for ER Site 226 COCs

COC name	RfD_o (mg/kg/d)	RfD_{inh} (mg/kg/d)	Confidence	SF_o (kg-d/mg)	Sf_{inh} (kg-d/mg)	Cancer Class ^
Aluminum	1	--	Est.	--	--	--
Antimony	0.0004	--	L	--	--	D
Arsenic	0.0003	--	M	1.5	15.1	A
Barium	0.07	0.000143	M	--	--	D
Beryllium	0.005	--	L	4.3	8.4	B2
Cadmium	0.0005	0.0000571	H	--	6.3	B1
Chromium. total*	1	0.000000571	L	--	--	D
Chromium VI	0.005	--	L	--	42	A
Cobalt	0.06	--	--	--	--	--
Copper	0.04	--	Est.	--	--	D
Manganese	0.005	0.0000143	--	--	--	D
Mercury	0.0003	0.0000857	--	--	--	D
Nickel	0.02	--	--	--	--	D
Selenium	0.005	--	H	--	--	D
Silver	0.005	--	--	--	--	D
Thallium	--	--	--	--	--	D
Vanadium	0.007	--	Heast	--	--	D
Zinc	0.3	--	M	--	--	D
Fluoranthene	0.04	--	L	--	--	D
Pyrene	0.03	--	L	--	--	D
Toluene	0.2	0.14	M	--	--	D
PCBs (total aroclors)	--	--	--	7.7	--	B2

* total chromium assumed to be chromium III because chromium VI is calculated separately

RfD_o - oral chronic reference dose in mg/kg-day

RfD_{inh} - inhalation chronic reference dose in mg/kg-day

Confidence - L = low, M = medium, H = high, Est. = estimated

Heast - Heast Table from USEPA 1996b

SF_o - oral slope factor in $(mg/kg\text{-}day)^{-1}$

SF_{inh} - inhalation slope factor in $(mg/kg\text{-}day)^{-1}$

^ EPA weight-of-evidence classification system for carcinogenicity:

A - human carcinogen

B1 - probable human carcinogen. Limited human data are available

B2 - probable human carcinogen. Indicates sufficient evidence in animals and inadequate or no evidence in humans.
C - possible human carcinogen
D - not classifiable as to human carcinogenicity
E - evidence of noncarcinogenicity for humans
-- information not available

Table 5. Radiological Toxicological Parameter Values for ER Site 226 COCs

COC name	SF_{ev} (g/pCi-yr)	SF_o (1/pCi)	SF_{inh} (1/pCi)	Cancer Class^
Pu-239/240	1.3E-11	3.2E-10	2.8E-08	A
Pu-238	1.9E-11	3.0E-10	2.7E-08	A
U-238	5.7E-08	6.2E-11	1.2E-08	A

Sf_{ev}- external volume exposure slope factor (risk/yr per pCi/g)
SF_o - oral (Ingestion) slope factor (risk/pCi)
SF_{inh} - inhalation slope factor (risk/pCi)
^ EPA weight-of-evidence classification system for carcinogenicity:
A - human carcinogen
B1 - probable human carcinogen. Limited human data are available
B2 - probable human carcinogen. Indicates sufficient evidence in animals and inadequate or no evidence in humans.
C - possible human carcinogen
D - not classifiable as to human carcinogenicity
E - evidence of noncarcinogenicity for humans

process is provided in Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0 (Yu, C., et al., 1993).

Although the designated land-use scenario is industrial for this site, the risk and TEDE values for a residential land-use scenario are also presented. These residential risk and TEDE values are presented only to provide perspective on the potential to risk to human health under the more restrictive land-use scenario.

II.3.3.2 Risk Characterization

Table 6 shows that for the nonradioactive COCs, the Hazard Index value is 0.09 and the excess cancer risk is 3×10^{-6} for the designated industrial land-use scenario. The numbers presented included exposure from soil ingestion and dust and volatile inhalation for the nonradioactive COCs. Table 7 shows that for the ER Site 226 associated nonradiological background

Table 6. Nonradioactive Risk Assessment Values for ER Site 226 COCs.

COC Name	Maximum concentration (mg/kg)	Industrial Land-Use Scenario		Residential Land-Use Scenario	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Aluminum	11,000 B	0.01	--	0.04	--
Antimony	0.33 JB	0.00	--	0.02	--
Arsenic	3.75	0.01	2E-6	0.21	4E-5
Barium	404 B	0.01	--	0.06	--
Beryllium	0.53 B	0.00	1E-6	0.00	4E-6
Cadmium	0.737	0.00	3E-10	0.60	4E-10
Chromium, total*	12.7 B	0.00	--	0.00	--
Chromium VI	1.0	0.00	3E-9	0.00	4E-9
Cobalt	6.05	0.00	--	0.00	--
Copper	10.5 B	0.00	--	0.05	--
Manganese	302 B	0.06	--	2.67	--
Mercury	0.07 B	0.00	--	0.12	--
Nickel	12.3	0.00	--	0.00	--
Selenium	<0.143	0.00	--	0.05	--
Silver	1.27	0.00	--	0.05	--
Thallium	<0.207	--	--	--	--
Vanadium	33.2	0.00	--	0.03	--
Zinc	37.9 B	0.00	--	0.07	--
Fluoranthene	0.178 J	0.00	--	0.00	--
Pyrene	0.178 J	0.00	--	0.00	--
Toluene	0.00868 J	0.00	--	0.00	--
PCBs (total aroclors)**	0.056	0.00	2E-7	0.00	7E-7
TOTAL		0.09	3E-6	4	4E-5

* total chromium assumed to be chromium III because chromium VI is calculated separately

** PCBs are combined maximum concentrations of all aroclors

J - estimated value

B - parameter detected in method blank

-- information not available

Table 7. Nonradioactive Risk Assessment Values for ER Site 226 Background Constituents.

Constituent Name	Background concentration (mg/kg)	Industrial Land-Use Scenario		Residential Land- Use Scenario	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Aluminum	12,055	0.01	--	0.05	--
Antimony	0.49	0.00	--	0.02	--
Arsenic	5.6	0.02	4E-06	0.32	6E-05
Barium	200	0.00	--	0.03	--
Beryllium	0.57	0.00	1E-06	0.00	5E-06
Cadmium	0.84	0.00	3E-10	0.69	5E-10
Chromium, total*	11.7	0.00	--	0.00	--
Chromium VI**	11.7	0.00	3E-8	0.01	4E-8
Cobalt	6.3	0.00	--	0.00	--
Copper	10.0	0.00	--	0.04	--
Manganese	243	0.05	--	2.15	--
Mercury	0.14	0.00	--	0.24	--
Nickel	10.6	0.00	--	0.00	--
Selenium	0.24	0.00	--	0.08	--
Silver	2.0	0.00	--	0.08	--
Thallium	<1.1	--	--	--	--
Vanadium	34.9	0.00	--	0.03	--
Zinc	50.8	0.00	--	0.09	--
TOTAL		0.08	5E-6	4	7E-5

-- information not available

* total chromium assumed to be chromium III because chromium VI is calculated separately

** chromium VI background concentration assumed to be chromium III (most conservative - lowest UTL), risk calculated in terms of chromium VI (consistent with Table 4)

constituents, the Hazard Index is 0.08 and the excess cancer risk is 5×10^{-6} for the designated industrial land-use scenario.

For the radioactive COCs, contribution from the direct gamma exposure pathway is included. The TEDE for industrial land-use is 0.08 mrem/yr. In accordance with proposed USEPA guidance, the standard being utilized is an excess TEDE of 15 mrem/yr (40 CFR Part 196, 1994) for the probable land-use scenario (industrial in this case); the calculated dose values for ER Site 226 for the industrial land-use is well below this standard.

For the residential land-use scenario, the Hazard Index value increases to 4 and the excess cancer risk is 4×10^{-5}. The number presented included exposure from soil ingestion, dust and volatile inhalation and plant uptake. Although USEPA (1991) generally recommends that inhalation not be included in a residential land-use scenario, this pathway is included because of the potential for soil in Albuquerque, NM, to be eroded and, subsequently, for dust to be present even in predominantly residential areas. Because of the nature of the local soil, other exposure pathways are not considered (see Appendix 1). Table 7 shows that for the ER Site 226 associated nonradiological background constituents, the Hazard Index increases to 4 and the excess cancer risk is 7×10^{-5}.

For the radioactive COCs, the TEDE for residential land-use is 0.37 mrem/yr. In accordance with proposed USEPA guidance, the standard being utilized is an excess TEDE of 75 mrem/yr (40 CFR Part 196, 1994) for a complete loss of institutional controls (residential land-use in this case); the calculated dose values for ER Site 226 for the residential land-use is well below this standard. It should also be noted that, consistent with the proposed guidance (40 CFR Part 196, 1994), ER Site 226 should be eligible for unrestricted radiological release as the residential scenario resulted in an incremental TEDE to the on-site receptor of less than 15 mrem/yr.

The excess cancer risk from the nonradioactive COCs and the radioactive COCs is not additive, as noted in RAGS (USEPA, 1989a).

II.4 Step 6 Comparison of Risk Values to Numerical Standards.

The risk assessment analyses considered the evaluation of the potential for adverse health effects for both an industrial land-use scenario, which is the designated land-use scenario for this site, and also a residential land-use scenario.

For the industrial land-use scenario, the Hazard Index calculated is 0.09; this is much less than the numerical standard suggested in RAGS (USEPA,

1989a) of 1. The excess cancer risk is estimated at 3×10^{-6}. In RAGS, the USEPA suggests that a range of values (10^{-6} to 10^{-4}) be used as the numerical standard; the value calculated for this site is in the low end of the suggested acceptable risk range. Therefore, for an industrial land-use scenario, the Hazard Index risk assessment values are significantly less than the established numerical standards and the excess cancer risk is in the low end of the acceptable risk range. This risk assessment also determined risks considering background concentrations of the potential nonradiological COCs for both the industrial and residential land-use scenarios. For the industrial land-use scenario, the Hazard Index is 0.08. The excess cancer risk is estimated at 5×10^{-6}. Incremental risk is determined by subtracting risk associated with background from potential nonradiological COC risk. These numbers are not rounded before the difference is determined and therefore may appear to be inconsistent with numbers presented in tables and discussed within the text. The incremental Hazard Index is 0.01 and there was no incremental cancer risk for the industrial land-use scenario.

For the radioactive components of the industrial land-use scenario, the calculated incremental TEDE is 0.08 mrem/yr, which is significantly less than the numerical standard of 15 mrem/yr suggested in the draft EPA guidance. The incremental cancer risk estimate is 3×10^{-7}.

For the residential land-use scenario, the calculated Hazard Index is 4, which is above the numerical guidance. The excess cancer risk is estimated at 4×10^{-5}; this value is in the middle of the suggested acceptable risk range. For the residential land-use scenario, the Hazard Index is 4 for the associated background concentrations. The excess cancer risk is estimated at 7×10^{-5}. The incremental Hazard Index is 0.14 and there was no incremental cancer risk for the industrial land-use scenario. The potential pathways considered for this calculation includes both soil ingestion, dust inhalation and plant uptake.

The incremental TEDE from the radioactive components is 0.37 mrem/yr, which is significantly less than the numerical standard of 75 mrem/yr suggested in the draft USEPA guidance. The associated incremental cancer risk is 1×10^{-6}.

II.5 Step 7 Uncertainty Discussion

The conclusion from the risk assessment analysis is that the potential effects caused by potential nonradiological COCs on human health are within the acceptable range compared to established numerical standards for the industrial land-use scenario. Calculated incremental risk between potential nonradiological COCs and associated background indicate small

contribution of risk from nonradiological COCs when considering the industrial land-use scenario.

For the radiological COCs the conclusion from the risk assessment is that the potential effects on human health, for the industrial land-use scenario, are well within proposed standards (40 CFR Part 196, 1994) and are a small fraction of the estimated 290 mrem/yr received due to natural background (NCRP, 1987).

The potential effects on human health, for the nonradiological COCs, are greater when considering the residential land-use scenario. However, there was not incremental risk between potential nonradiological COCs and associated background. The potential increased effects on human health are primarily the result of including the plant uptake exposure pathway. Constituents that posed little to no risk considering an industrial land-use scenario (some of which are below background screening levels), contribute a significant portion of the risk associated with the residential land-use scenario. These constituents bioaccumulate in plants. Because TA-I is an industrial site, the likelihood of significant plant uptake in this area is highly unlikely as is the likelihood that this site will be residential in the near future (USDOE, 1996). The uncertainty in this conclusion is also considered to be small.

For the radiological COCs the conclusion from the risk assessment is that the potential effects on human health, for the residential land-use scenario, is well within proposed standards (40 CFR Part 196, 1994) and is a small fraction of the estimated 290 mrem/yr received due to natural background (NCRP, 1987).

Because of the location, history of the site and the future land-use (USDOE, 1996), there is low uncertainty in the land-use scenario and the potentially affected populations that were considered in making the risk assessment analysis. Because the COCs are found in subsurface soils and because of the location and physical characteristics of the site, the exposure pathways relevant to the analysis are conservative. For example, considering the industrial land-use scenario, the soil ingestion pathway results are very conservative as a worker contacting the soil at depth would be likely involved in construction and would contact the soil for only a short time instead of 30 years.

This is particularly applicable in application to the radiological COCs. Although the acid waste line is buried 4 to 10 feet below ground surface, it was assumed that the radiological COCs were uniformly distributed from ground surface to 6 feet below ground surface, thus, not accounting for the 4 feet of clean cover over the acid waste line.

An RME approach was used to calculate the risk assessment values, which means that the parameter values used in the calculations were conservative and that the calculated intakes are likely overestimates. Maximum measured values of the concentrations of the COCs and minimum value of the 95th UTL or percentile background concentration value, as applicable, of background concentrations associated with the COCs were used to provide conservative results.

Table 4 shows the uncertainties (confidence) in the nonradiological toxicological parameter values. There is a mixture of estimated values and values from the Health Effects Assessment Summary Tables (HEAST) (USEPA, 1996b) and Integrated Risk Information System (IRIS) (USEPA, 1988, 1994b) databases. Where values are not provided, information is not available from HEAST, IRIS, or USEPA regions. The constituents without toxicological parameters have low concentrations and are judged to be insignificant contributors to the overall risk. Because of the conservative nature of the RME approach, the uncertainties in the toxicological values are not expected to be of high enough concern to change the conclusion from the risk assessment analysis.

The nonradiological risk assessment values are low for the industrial land-use scenario compared to the established numerical standards .Though the residential land-use Hazard Index is above the numerical standard, there was no incremental risk between the potential COCs and background, and it has been determined that future land-use at this locality will not be residential (USDOE, 1996). The radiological incremental TEDE is a very small fraction of estimated background TEDE for both the industrial and residential land-use scenarios and both are well within proposed standards (40 CFR Part 196, 1994). The overall uncertainty in all of the steps in the risk assessment process is therefore considered to be insignificant with respect to the conclusion reached.

III. Summary

The TA-I Acid Waste Line, ER Site 226, had relatively minor contamination consisting of some inorganic and organic nonradioactive and radioactive compounds. Because of the location of the site on KAFB, the designated industrial land-use scenario (USDOE, 1996) and the nature of the contamination, the potential exposure pathways identified for this site included soil ingestion and dust and volatile inhalation for chemical constituents and soil ingestion, dust and volatile inhalation, and direct gamma exposure for radionuclides. These exposure pathways are very conservative as a worker contacting the soil at depth would likely be

involved in construction and would contact the soil for only a short time instead of 30 years.

The residential land-use scenario includes the soil ingestion, inhalation, and plant uptake exposure pathways. Because the small amount of contamination present is below ground surface, the potential for exposure from soil ingestion and inhalation of surface dust is not significant. Likewise, plant uptake will generally occur near surface. Because the site is designated as industrial (USDOE, 1996) and the residential land-use scenario is presented to only provide perspective, the stated exposure pathways were included but provide a conservative risk assessment.

Using conservative assumptions and employing a RME approach to the risk assessment, the calculations for the nonradiological COCs show that for the industrial land-use scenario the Hazard Index (0.09) is significantly less than the accepted numerical guidance from the USEPA. The estimated cancer risk (3×10^{-6}) is in the low end of the suggested acceptable risk range. The incremental Hazard Index is 0.01 and there was no incremental cancer risk for the industrial land-use scenario. Incremental risk calculations indicate that insignificant contribution to risk from the nonradiological COCs considering an industrial land-use scenario.

The incremental TEDE corresponding estimated cancer risk from the radioactive components are much less than EPA guidance values; the estimated incremental TEDE is 0.08 the industrial land-use scenario. This value is much less than the numerical guidance of 15 mrem/yr, in draft EPA guidance. The corresponding estimated cancer risk value is 3×10^{-7} for the industrial land-use scenario.

The calculations for the nonradiological COCs show that for the residential land-use scenario the Hazard Index (4) is above the accepted numerical guidance from the USEPA. The estimated cancer risk (4×10^{-5}) is in the middle of the suggested acceptable risk range. The majority of the risk is associated with the inclusion of the plant uptake exposure pathway. Nonradiological constituents that posed little to no risk considering an industrial land-use scenario (some of which are below background screening levels), contribute a significant portion of the risk associated with the residential land-use scenario. These constituents bioaccumulate in plants. Because TA-I is an industrial site, the likelihood of significant plant uptake in this area is highly unlikely. Also, the contamination occurs at depth, below typical plant root zones. The incremental Hazard Index is 0.14 and there was no incremental cancer risk for the industrial land-use scenario. Incremental risk calculations indicate that insignificant contribution to risk from the nonradiological COCs considering a residential land-use scenario.

The incremental TEDE corresponding estimated cancer risk from the radioactive components are much less than EPA guidance values; the estimated incremental TEDE is 0.37 mrem/yr for the residential land-use scenario. This value is much less than the numerical guidance of 75 mrem/yr, in draft EPA guidance. The corresponding estimated cancer risk value is 1×10^{-6} for the residential land-use scenario.

The uncertainties associated with the calculations are considered small relative to the conservativeness of the risk assessment analysis. We therefore conclude that this site does not have significant potential to affect human health under either an industrial or a residential land-use scenario.

Ecological Risk Assessment

It is unlikely that activities or COCs at ER Site 226 have or will have significant impact to ecological risk. TA-I is an industrial complex and has been heavily disturbed by humans for over 50 years. Given the amount of known and potential human intrusion, a great diversity or abundance of nonhuman species has not occurred and is unlikely. Much of the relevant ecological information for TA-1 can be found in the National Environmental Policy Act (NEPA) compliance document (SNL/NM, 1992).

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APPENDIX 1.

Sandia National Laboratories Environmental Restoration Program

EXPOSURE PATHWAY DISCUSSION FOR CHEMICAL AND RADIONUCLIDE CONTAMINATION

BACKGROUND

Sandia National Laboratories (SNL) proposes that a default set of exposure routes and associated default parameter values be developed for each future land-use designation being considered for SNL/NM Environmental Restoration (ER) project sites. This default set of exposure scenarios and parameter values would be invoked for risk assessments unless site-specific information suggested other parameter values. Because many SNL/NM ER sites have similar types of contamination and physical settings, SNL believes that the risk assessment analyses at these sites can be similar. A default set of exposure scenarios and parameter values will facilitate the risk assessments and subsequent review.

The default exposure routes and parameter values suggested are those that SNL views as resulting in a Reasonable Maximum Exposure (RME) value. Subject to comments and recommendations by the USEPA Region VI and NMED, SNL proposes that these default exposure routes and parameter values be used in future risk assessments.

At SNL/NM, all Environmental Restoration sites exist within the boundaries of the Kirtland AFB. Approximately 157 potential waste and release sites have been identified where hazardous, radiological, or mixed materials may have been released to the environment. Evaluation and characterization activities have occurred at all of these sites to varying degrees. Among other documents, the SNL/ER draft Environmental Assessment (DOE, 1996) presents a summary of the hydrogeology of the sites, the biological resources present and proposed land use scenarios for the SNL/NM ER sites. At this time, all SNL/NM ER sites have been tentatively designated for either industrial or recreational future land use. The NMED has also requested that risk calculations be performed based on a residential land use scenario. All three land use scenarios will be addressed in this document.

The SNL/NM ER project has screened the potential exposure routes and identified default parameter values to be used for calculating potential intake and subsequent hazard index, risk and dose values. EPA (EPA, 1989a) provides a summary of exposure routes that could potentially be of significance at a specific waste site. These potential exposure routes consist of:

- Ingestion of contaminated drinking water;
- Ingestion of contaminated soil;

- Ingestion of contaminated fish and shell fish;
- Ingestion of contaminated fruits and vegetables;
- Ingestion of contaminated meat, eggs, and dairy products;
- Ingestion of contaminated surface water while swimming;
- Dermal contact with chemicals in water;
- Dermal contact with chemicals in soil;
- Inhalation of airborne compounds (vapor phase or particulate), and;
- External exposure to penetrating radiation (immersion in contaminated air; immersion in contaminated water and exposure from ground surfaces with photon-emitting radionuclides).

Based on the location of the SNL ER sites and the characteristics of the surface and subsurface at the sites, we have evaluated these potential exposure routes for different land use scenarios to determine which should be considered in risk assessment analyses (the last exposure route is pertinent to radionuclides only). At SNL/NM ER sites, there does not presently occur any consumption of fish, shell fish, fruits, vegetables, meat, eggs, or dairy products that originate on-site. Additionally, no potential for swimming in surface water is present due to the high-desert environmental conditions. As documented in the RESRAD computer code manual (ANL, 1993), risks resulting from immersion in contaminated air or water are not significant compared to risks from other radiation exposure routes.

For the industrial and recreational land use scenarios, SNL/NM ER has therefore excluded the following four potential exposure routes from further risk assessment evaluations at any SNL/NM ER site:

- Ingestion of contaminated fish and shell fish;
- Ingestion of contaminated fruits and vegetables;
- Ingestion of contaminated meat, eggs, and dairy products; and
- Ingestion of contaminated surface water while swimming.

That part of the exposure pathway for radionuclides related to immersion in contaminated air or water is also eliminated.

For the residential land-use scenario, we will include ingestion of contaminated fruits and vegetables because of the potential for residential gardening.

Based on this evaluation, for future risk assessments, the exposure routes that will be considered are shown in Table 1. Dermal contact is included as a potential exposure pathway in all land use scenarios. However, the potential for dermal exposure to inorganics is not considered significant and will not be included. In general, the dermal exposure pathway is generally considered to

not be significant relative to water ingestion and soil ingestion pathways but will be considered for organic components. Because of the lack of toxicological parameter values for this pathway, the inclusion of this exposure pathway into risk assessment calculations may not be possible and may be part of the uncertainty analysis for a site where dermal contact is potentially applicable.

Table 1. Exposure Pathways Considered for Various Land Use Scenarios

Industrial	Recreational	Residential
Ingestion of contaminated drinking water	Ingestion of contaminated drinking water	Ingestion of contaminated drinking water
Ingestion of contaminated soil	Ingestion of contaminated soil	Ingestion of contaminated soil
Inhalation of airborne compounds (vapor phase or particulate)	Inhalation of airborne compounds (vapor phase or particulate)	Inhalation of airborne compounds (vapor phase or particulate)
Dermal contact	Dermal contact	Dermal contact
External exposure to penetrating radiation from ground surfaces	External exposure to penetrating radiation from ground surfaces	Ingestion of fruits and vegetables
		External exposure to penetrating radiation from ground surfaces

EQUATIONS AND DEFAULT PARAMETER VALUES FOR IDENTIFIED EXPOSURE ROUTES

In general, SNL/NM expects that ingestion of compounds in drinking water and soil will be the more significant exposure routes for chemicals; external exposure to radiation may also be significant for radionuclides. All of the above routes will, however, be considered for their appropriate land use scenarios. The general equations for calculating potential intakes via these routes are shown below. The equations are from the Risk Assessment Guidance for Superfund (RAGS): Volume 1 (EPA, 1989a and 1991). These general equations also apply to calculating potential intakes for radionuclides. A more in-depth discussion of the equations used in performing radiological pathway analyses with the RESRAD code may be found in the RESRAD Manual (ANL, 1993). Also shown are the default values SNL/NM ER suggests for use in Reasonable Maximum Exposure (RME) risk assessment calculations for industrial, recreational, and residential scenarios, based on EPA and other governmental agency guidance. The pathways and values for chemical contaminants are discussed first, followed by those for radionuclide contaminants. RESRAD input parameters that are left as the default values provided with the code are not discussed. Further information relating to these parameters may be found in the RESRAD Manual (ANL, 1993).

Generic Equation for Calculation of Risk Parameter Values

The equation used to calculate the risk parameter values (i.e., Hazard Quotient/Index, excess cancer risk, or radiation total effective dose equivalent [dose]) is similar for all exposure pathways and is given by:

Risk (or Dose) = Intake x Toxicity Effect (either carcinogenic, noncarcinogenic, or radiological)

$$= C \times (CR \times EFD/BW/AT) \times \text{Toxicity Effect} \quad (1)$$

where

- C = contaminant concentration (site specific);
- CR = contact rate for the exposure pathway;
- EFD = exposure frequency and duration;
- BW = body weight of average exposure individual;
- AT = time over which exposure is averaged.

The total risk/dose (either cancer risk or hazard index) is the sum of the risks/doses for all of the site-specific exposure pathways and contaminants.

The evaluation of the carcinogenic health hazard produces a quantitative estimate for excess cancer risk resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of the quantitative estimate with the potentially acceptable risk range of 10^{-4} to 10^{-6}. The evaluation of the noncarcinogenic health hazard produces a quantitative estimate (i.e., the Hazard Index) for the toxicity resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of this quantitative estimate with the EPA standard Hazard Index of unity (1). The evaluation of the health hazard due to radioactive compounds produces a quantitative estimate of doses resulting from the COCs present at the site.

The specific equations used for the individual exposure pathways can be found in RAGS (EPA, 1989) and the RESRAD Manual (ANL, 1993). Table 2 shows the default parameter values suggested for used by SNL at ER sites, based on the selected land use scenario. References are given at the end of the table indicating the source for the chosen parameter values. The intention of SNL is to use default values that are consistent with regulatory guidance and consistent with the RME approach. Therefore, the values chosen will, in general, provide a conservative estimate of the actual risk parameter. These parameter values are

Table 2. Default Parameter Values for Various Land Use Scenarios

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure frequency (d/y)	***	***	***
Exposure duration (y)	30[a,b]	30[a,b]	30[a,b]
Body weight (kg)	70[a,b]	56[a,b]	70 adult[a,b] 15 child
Averaging Time (days) for carcinogenic compounds (=70 y x 365 d/y) for noncarcinogenic compounds (=ED x 365 d/y)	25550[a] 10950	25550[a] 10950	25550[a] 10950
Soil Ingestion Pathway			
Ingestion rate	100 mg/d[c]	6.24 g/y[d]	114 mg-y/kg-d[a]
Inhalation Pathway			
Inhalation rate (m^3/yr)	5000[a,b]	146[d]	5475[a,b,d]
Volatilization factor (m^3/kg)	chemical specific	chemical specific	chemical specific
Particulate emission factor (m^3/kg)	1.32E9[a]	1.32E9[a]	1.32E9[a]
Water Ingestion Pathway			
Ingestion rate (L/d)	2[a,b]	2[a,b]	2[a,b]
Food Ingestion Pathway			
Ingestion rate (kg/yr)	NA	NA	138[b,d]
Fraction ingested	NA	NA	0.25[b,d]
Dermal Pathway			
Surface area in water (m^2)	2[b,e]	2[b,e]	2[b,e]
Surface area in soil (m^2)	0.53[b,e]	0.53[b,e]	0.53[b,e]
Permeability coefficient	chemical specific	chemical specific	chemical specific

*** The exposure frequencies for the land use scenarios are often integrated into the overall contact rate for specific exposure pathways. When not included, the exposure frequency for the industrial land use scenario is 8 h/d for 250 d/y; for the recreational land use, a value of 2 hr/wk for 52 wk/y is used (EPA, 1989b); for a residential land use, all contact rates are given per day for 350 d/y.

[a] RAGS, Vol 1, Part B (EPA, 1991).

[b] Exposure Factors Handbook (EPA, 1989b)

[c] EPA Region VI guidance.

[d] For radionuclides, RESRAD (ANL, 1993) is used for human health risk calculations; default parameters are consistent with RESRAD guidance.

[e] Dermal Exposure Assessment, 1992.

suggested for use for the various exposure pathways based on the assumption that a particular site has no unusual characteristics that contradict the default assumptions. For sites for which the assumptions are not valid, the parameter values will be modified and documented.

Summary

SNL proposes the described default exposure routes and parameter values for use in risk assessments at sites that have an industrial, recreational or residential future land-use scenario. There are no current residential land-use designations at SNL ER sites, but this scenario has been requested to be considered by the NMED. For sites designated as industrial or recreational land-use, SNL will provide risk parameter values based on a residential land-use scenario to indicate the effects of data uncertainty on risk value calculations or in order to potentially mitigate the need for institutional controls or restrictions on Sandia ER sites. The parameter values are based on EPA guidance and supplemented by information from other government sources. The values are generally consistent with those proposed by Los Alamos National Laboratory, with a few minor variations. If these exposure routes and parameters are acceptable, SNL will use them in risk assessments for all sites where the assumptions are consistent with site-specific conditions. All deviations will be documented.

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ER/FIN/1302

U.S. Department of Energy
Albuquerque Operations Office
Kirtland Area Office
P.O. Box 5400
Albuquerque, NM 87185-5400

JUN 11 1998

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Robert S. (Stu) Dinwiddie, Manager
New Mexico Environment Department
Hazardous and Radioactive Materials Bureau
RCRA Permits Management Program
2044 Galisteo Street
P.O. Box 26110
Santa Fe, NM 87505-2100

Dear Mr. Dinwiddie:

Enclosed is one of two NMED copies of the Department of Energy/Sandia National Laboratories-New Mexico response to your March 17, 1998, Request for Supplemental Information (RSI) concerning three sites included in the seventh submission of No Further Action (NFA) proposals. These three sites were given an expedited review at our request and are listed below:

OU 1302

Site 96 - The Storm Drain System
Site 187 - Sanitary Sewer Lines
Site 226 - Old Acid Waste Line

JUN 15 1998

If you have any questions, please contact John Gould at (505) 845-6089, or Mark Jackson at (505) 845-6288.

Sincerely,

George K. Lasker

for Michael J. Zamorski
Area Manager

Enclosure

cc w/enclosure:
D. Bourne, AL, ERD
S. Hoines, NMED-HRMB
J. Parker, NMED-OB
R. Kennett, NMED-OB
D. Neleigh, EPA, Region 6 (2 copies via certified mail)

cc w/o enclosure:
B. Oms, KAO-AIP
W. Cox, SNL, MS 1147
D. Fate, SNL, MS 1148
F. Nimick, SNL, MS 1147
M. Skelly, SNL, MS 1147
B. Garcia, NMED
S. Kruse, NMED

General Comments

RESPONSES TO NMED COMMENTS ON NO FURTHER ACTION PROPOSALS DATED OCTOBER 3, 1996 (7th ROUND)

GENERAL COMMENTS

1. **Drafts of maps, supporting documents, appendices, and data tables are unfinished products. For the purpose of a NFA proposal, final versions of these and any other types of information must be submitted.**

   Response: To Sandia National Laboratories/Department of Energy's (SNL/DOE's) knowledge, no draft maps or documents were transmitted with the No Further Action (NFA) proposals for Sites 96, 187, and 226. As noted in previous responses to comments on other NFA proposals, some historical reference documents have never been finalized, and only the draft version is available for use (e.g., Comprehensive Environmental Assessment and Response Program [CEARP] Phase I, Preliminary Draft, May 1987).

2. **It is helpful to include analytical results for field and equipment blanks, and duplicates in data tables. QA/QC data should not be mixed with environmental data in the same tables. If applicable, the QA/QC data tables should also include comparisons of offsite and onsite laboratory results (e.g., RPD's).**

   Response: The quality assurance/quality control (QA/QC) data mentioned in this comment (field and equipment blanks) were included in the subject NFA proposals at the end of the relevant data tables. Thus, although they were included in the same tables as the environmental data, they were not intermingled. For these sites, comparisons of on-site and off-site data are not applicable because all data were measured off site.

3. **Data tables for volatile organic compounds (VOC's), semi-volatile organic compounds (SVOC's), and radionuclides list only the constituents that were detected. While summary tables like these are acceptable (and preferred for review purposes), they provide only part of the information needed to fully evaluate a NFA proposal. To complete the data package, additional tables must be submitted listing *all* of the various constituents that were analyzed for and their method detection limits/minimum detectable activities.**

   Please also note that "J-coded" data must be reported as detected constituents.

   Response: The requested tables are included with this package. For the purpose of this set of responses, detailed information is provided later in this package in the responses to Site-Specific Comments.

   Please note that, in the subject NFA proposals, J-coded data were reported as detected constituents.

4. **As presented, sample locations and depths must be inferred from the sample identification numbers in the data tables. Notes describing how such information is encoded in the sample identification numbers must be added to the tables.**

Response: SNL/DOE agree that information about encoding of sample location and depth within sample identification numbers must be available to the New Mexico Environment Department (NMED) and any other potential users of resulting data. Notes pertaining to this topic have been added to tables in later NFA proposals. For the purpose of this set of responses, detailed information is provided later in this package in the responses to Site-Specific Comments.

5. **The NFA proposals contain redundant information, making it more time-consuming than necessary to review. Sections of the TA-1 RFI Work Plan are included with the NFA proposals. The NMED is more interested in what was actually done than what was planned. There is generally no need to include sections of the RFI Work Plans with the NFA proposals; relevant information (such as site history) can be summarized or restated in the text of the NFA proposal.**

Response: The comment is noted. SNL/DOE will try to balance omitting redundant information with the need to make NFA proposals stand-alone documents (per General Comment 10).

6. **HRMB will not review the risk assessments for ER Sites 96, 187, and 226 until the sites have been adequately characterized. Risk assessments must be based on the protocols being developed by the DOE/SNL and the NMED.**

Response: SNL/DOE recognize that NMED has the prerogative of deciding when review of risk assessments is appropriate. In this case, the timing clearly hinges on "adequate characterization," which is the subject of many of the specific comments. Please note that, although additional sampling may delineate concentrations between "hits" (results that were found to be above background but below risk-based action levels) and background, there is no reason to anticipate discovery of values higher than those already found during the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) sampling. Thus, the existing risk assessments are likely to be the most conservative (in terms of showing highest risk), and it may be worth NMED's time to review them at this stage.

7. **QA/QC -- At a meeting held in Santa Fe on December 3, 1996, HRMB staff members expressed concern about SNL's recurring problem regarding the frequent detection of "common laboratory contaminants" (such as acetone and methylene chloride) in various types of blanks. These organic compounds have been and still are widely used at SNL, and in some cases, historically were disposed of onto and into the ground. Thus, the presence of these chemicals in QC samples (such as field and trip blanks) can not be automatically discounted as laboratory contamination.**

Additionally, in this December meeting, HRMB personnel suggested that SNL review its contract laboratory's QA/QC program; and, if it is found deficient, remedy the problem or find other laboratory.

Repeated detections in equipment blanks may indicate improper decontamination practices and/or contaminated wash/rinse water and/or containers or other equipment. SNL should ensure that wash/rinse water, containers, and other equipment is not contaminated prior to their use.

Consistent QC failures are considered by HRMB to be an indication that laboratory data are not reliable. The HRMB will require sampling to be repeated at ER sites where such problems are evident.

Response: The comment is noted by SNL/DOE. SNL's Sample Management Office has an ongoing audit program to evaluate the adequacy of QA/QC problems at the off-site contract laboratories; this program is supplemented by a similar program overseen by DOE's Albuquerque Operations Office. When specific QA/QC concerns arise, the affected laboratory is contacted and corrective actions are defined and implemented. However, laboratory contamination is a sporadic problem at any major commercial laboratory and is a problem that defies universal and permanent correction because several common laboratory contaminants are necessary compounds in sample analytical procedures. This has been recognized by the U.S. Environmental Protection Agency (EPA) and, as NMED is aware, guidance has been available for some time on how to evaluate and use environmental data, despite the presence of laboratory contamination. For completeness, the guidance is included in this package as Attachment A to these general comments.

Because the comment indicates that the Hazardous and Radioactive Materials Bureau (HRMB) may be inclined to require resampling of sites in the event of "consistent QC failures," it is requested that a discussion be held between HRMB and SNL/DOE staff to reach a common understanding on what extent of laboratory contamination is considered to constitute "consistent QC failure."

8. **Breaks/cracks/cross-connections in pipes that are downstream of those determined to have appreciable levels of contamination must be investigated.**

Response: The comment is noted by SNL/DOE. Although there is agreement among the parties on this approach, it is a critical prerequisite to reach consensus on what constitutes "appreciable contamination."

9. **HRMB will not support NFA proposals for active sites. DOE/SNL must investigate active sites within 2 years of decommissioning.**

Response 9: SNL/DOE understand that the HRMB will not support NFA proposals for active sites; however, the comment is only partially germane to the three sites addressed here. Site 187, the sanitary sewer lines, is not an active site because the site is defined as the soils outside the pipe, from the midpoint of the pipe downward. Although water continues to flow within the pipes, modern waste-handling processes prevent the introduction of potential contaminants to that water; therefore, leakage from cracks in the line does not result in active contamination of the site as defined. For the same reasons, Site 226 is not an active site.

Parts of Site 96, the storm-drain system, may need to be considered as active. The enclosed, engineered portions are inactive for the same reasons expressed in the preceding paragraph. However, the unlined surface channels obviously continue to receive flow originating from runoff from streets, parking lots, and miscellaneous exterior surfaces in Technical Area (TA)-I, processes for which environmental controls are less certain than for processes occurring within buildings. It would probably be fruitful to discuss approaches to these portions of Site 96 to ensure a common understanding of future status and timing.

10. **NFA proposals must be self-contained documents. The NFA criteria for a site must be specified in the NFA proposal. It is not adequate to only refer to the list of NFA criteria in the Document of Understanding.**

Response: NFA Criterion 5 was specified in the proposal. See Sections 1.0 and 1.2, page 1-1.

11. **Buildings 810, 814, 824, 838, 839, and 870 are not considered by HRMB to be included in ER Sites 96, 187, or 226. Results of the investigations conducted at and near these buildings by DOE/SNL will be reviewed later by HRMB to determine whether these areas are new solid waste management units. However, DOE/SNL must provide any information from the investigations of these areas that may also be relevant to ER Sites 96, 187, and 226.**

Response: The buildings listed in the NMED comment are not considered by SNL/DOE to be part of the Environmental Restoration (ER) sites. Furthermore, SNL buildings are addressed under a separately funded program (Decontamination and Decommissioning [D&D]) and are not candidates for inclusion as new Solid Waste Management Units. The D&D and ER Projects coordinate activities so that any investigation of soil or piping exterior to a building's slab or basement is conducted with ER goals and requirements in mind. As required by regulation, if contamination is discovered during such an investigation, regulatory authorities are notified. This has been, and will continue to be, SNL/DOE practice.

Results of the above-mentioned investigations will be provided for NMED's review. For the purpose of this set of responses, detailed information is provided later in this package in the responses to Site-Specific Comments. This information is included in this response

because it details the results of work specifically conducted at the storm, sanitary, and acid waste lines that were connected to these buildings and investigated prior to building D&D actions.

Attachment A

Attachment A

EPA Guidance on Laboratory Data Validation

LABORATORY DATA VALIDATION
FUNCTIONAL GUIDELINES FOR EVALUATING ORGANICS ANALYSES

Prepared for the

HAZARDOUS SITE EVALUATION DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

Compiled by

Ruth Bleyler
Sample Management Office

Prepared by

The USEPA Data Review Work Group
Scott Siders - EPA HQ - Co-Chairperson
Jeanne Hankins - EPA Region III - Co-Chairperson
Deborah Szaro - EPA Region I
Leon Lazarus - EPA Region II
Charles Sands - EPA Region III
Charles Hooper - EPA Region IV
Patrick Churilla - EPA Region V
Debra Morey - EPA Region VII
Raleigh Farlow - EPA Region X

February 1, 1988

1) Flag positive results for that compound as estimated (J).

2) Flag non-detects for that compound as unusable (R).

b. If any volatile or semivolatile TCL compound has a % Difference between Initial and Continuing Calibration of greater than 25%:

1) Flag all positive results for that compound as estimated (J).

2) Non-detects may be qualified using professional judgment.

IV. BLANKS

A. Objective

The assessment of blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply to any blank associated with the samples. If problems with any blank exist, all data associated with the Case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the Case, or if the problem is an isolated occurrence not affecting other data.

B. Criteria

No contaminants should be present in the blank(s).

C. Evaluation Procedure

1. Review the results of all associated blank(s), Form I(s) and raw data (chromatograms, reconstructed ion chromatograms, quantitation reports or data system printouts).

2. Verify that Method Blank analysis has been reported per matrix, per concentration level, for each GC/MS system used to analyze VOA samples, and for each extraction batch for semivolatiles. The reviewer can use the Method Blank Summary (Form IV) to assist in identifying samples associated with each Method Blank.

D. Action

Action in the case of unsuitable blank results depends on the circumstances and origin of the blank. No positive sample results should be reported unless the concentration of the compound in the sample exceeds 10 times the amount in any blank for the common contaminants listed below, or 5 times the amount for other compounds. In instances where more than one blank is associated with a given sample, qualification should be based upon a comparison with the associated blank having the highest concentration of a contaminant. The results must not be corrected by subtracting any blank value. Specific actions are as follows:

1. If a compound is found in a blank but not found in the sample, no action is taken.

2. Any compound (other than the five listed below) detected in the sample, which was also detected in any associated blank, must be qualified when the sample concentration is less than five times the blank concentration. For the following five compounds, the results are qualified by elevating the limit of detection when the sample concentration is less than 10 times the blank concentration.

   Common lab contaminants:

   a. Methylene chloride
   b. Acetone
   c. Toluene
   d. 2-butanone
   e. Common phthalate esters

   The reviewer should note that the blank analyses may not involve the same weights, volumes, or dilution factors as the associated samples. These factors must be taken into consideration when applying the 5x and 10x criteria, such that a comparison of the total amount of contamination is actually made.

   Additionally, there may be instances where little or no contamination was present in the associated blanks, but qualification of the sample was deemed necessary. Contamination introduced through dilution water is one example. Although it is not always possible to determine, instances of this occurring can be detected when contaminants are found in the diluted sample result, but are absent in the undiluted sample result. Since both results are not routinely reported, it may be impossible to verify this source of contamination. However, if the reviewer determines that the contamination is from a source other than the sample, he/she should qualify the data. In this case, the 5x or 10x rule does not apply; the sample value should be reported as a non-detect.

3. The following are examples of applying the blank qualification guidelines. Certain circumstances may warrant deviations from these guidelines.

   Case 1: Sample result is greater than the Contract Required Quantitation Limit (CRQL), but is less than the required amount (5x or 10x) from the blank result.

	Rule	
	10x	5x
Blank Result	7	7
CRQL	5	5
Sample Result	60	30
Qualified Sample Result	60U	30U

   In the example for the 10x rule, sample results less than 70 (or 10 x 7) would be qualified as non-detects. In the case of the 5x rule, sample results less than 35 (or 5 x 7) would be qualified as non-detects.

Case 2: Sample result is less than CRQL, and is also less than the required amount (5x or 10x) from the blank result.

	Rule	
	10x	5x
Blank Result	6	6
CRQL	5	5
Sample Result	4J	4J
Qualified Sample Result	5U	5U

Note that data are not reported as 4U, as this would be reported as a detection limit below the CRQL.

Case 3: Sample result is greater than the required amount (5x or 10x) from the blank result.

	Rule	
	10x	5x
Blank Result	10	10
CRQL	5	5
Sample Result	120	60
Qualified Sample Result	120	60

For both the 10x and 5x rules, sample results exceeded the adjusted blank results of 100 (or 10x10) and 50 (or 5x10), respectively.

4. If gross contamination exists (i.e., saturated peaks by GC/MS), all compounds affected should be flagged as unusable (R), due to interference, in all samples affected.

5. If inordinate amounts of other TCL compounds are found at low levels in the blank(s), it may be indicative of a problem at the laboratory and should be noted in the data review comments which are forwarded to the DPO.

6. Similar consideration should be given to TIC compounds which are found in both the sample and associated blank(s). (See Section XI for TIC guidance.)

V. SURROGATE RECOVERY

A. Objective

Laboratory performance on individual samples is established by means of spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The evaluation of the results of these surrogate spikes is not necessarily straightforward. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the review and validation of data based on specific sample results is

Site Specific

ER Site 226, Old Acid-Waste Line

ER Site 226 is not appropriate for NFA petition.

1. **Appendix A, Plate 1-1, Soil-Boring Location Map --**

   A. **See general comment 1.**
   B **The direction of flow should be indicated.**
   C. **The locations of cracks, breaks, and any cross-connections should be shown on the map.**
   C. **The outfall (ER Site 46) should be shown on the map.**

   Response 1A: See response to General Comment 1.

   Response 1B: Flow arrows will be added to Plate 1-1. SNL Facilities plans to upgrade the underground utility system inside TA-I. Based on this latest information, ER/GIS is in the process of upgrading our database. The new plate cannot be upgraded in time for this submittal, but will be provided upon completion of the GIS upgrade.

   Response 1C: The cracks, breaks, and cross-connections have been provided on Plates 5-9 and 5-10 of the "Technical Area I (ADS 1302) RCRA Facility Investigation Work Plan," Volume 2, Plates 5-1 through 5-11.

   Response 1D (C): ER Site 46 will be added to Plate 1-1. SNL Facilities plans to upgrade the underground utility system inside TA-I. Based on this latest information, ER/GIS is in the process of upgrading our database. The new plate cannot be upgraded in time for this submittal, but will be provided upon completion of the GIS upgrade.

2. **The Old Acid-Waste Line (ER Site 226) delivered industrial effluent to the Old Acid-Waste Line Outfall (ER Site 46). Effluent discharged from the pipeline drained into the Tijeras Arroyo, and thus, represents a potential threat to groundwater quality.**

   Groundwater monitor wells must be installed in the outfall area at ER Site 46.

   Response: One monitor well (TJA-3) will be installed this summer at the outfall (ER Site 46). This well is being installed under the Sandia North GIF.

3. **Page 3-1, section 3.4, 1st paragraph -- Results relevant to ER Site 226 for the earlier investigations must be summarized:**

   a. **the radiation screening of the outfall area,**
   b. **sediment sampling of the two manhole locations,**
   c. **sampling at the two branch segments that served Building 839,**

d. soil sampling done at the trench crossing, and
e. the Building 839 VCM.

Data should be summarized in tables for each of the five different investigations. Sample locations should be shown on maps.

Response: These earlier investigations were presented/summarized in the TA-I Work Plan (in Appendix B of this NFA). SNL/DOE believe it would be redundant to further summarize these data.

4. **Page 3-8, section 3.6.2.2, last sentence -- the gamma spectroscopy results must be provided.**

Response: The gamma spectroscopy data are provided in Attachment H.

5. **Appendix B -- See general comment 5.**

Response: See response to General Comment 5.

6. **Appendix D -- See general comment 6.**

Response: See response to General Comment 6.

7. **Appendix C, Table 2 -- See general comments 2, 3, and 4.**

SNL/DOE must return to each location where VOC's were detected and determine the extent of contamination. The source (or sources) of contamination must be determined.

Response: A table showing the list of VOCs analyzed for is provided in Attachment I. This list includes the MDL for each compound.

The DOE has forwarded a letter to NMED requesting that the response due date be extended an additional 60 days. The letter also stated the following: " . . . identified several issues in the RSI with potential programmatic implications that may require extensive discussions with the NMED technical staff." The nature and extent of VOC contamination is one of the issues that will impact the program. The SNL ER Project requests a meeting with the NMED technical staff to resolve this issue.

8. **Appendix C, Table 3 -- See general comments 2, 3, and 4.**

SNL/DOE must return to the location where SVOC's were detected (GP-009) and determine the extent of contamination. The source (or sources) of contamination must be determined.

Response: A table showing the list of SVOCs analyzed for is provided in Attachment I (see response to Comment 7). This list includes the MDL for each compound.

The DOE has forwarded a letter to NMED requesting that the response due date be extended an additional 60 days. The letter also stated the following: " . .... identified several issues in the RSI with potential programmatic implications that may require extensive discussions with the NMED technical staff." The nature and extent of SVOC contamination is one of the issues that will impact the program. The SNL ER Project requests a meeting with the NMED technical staff to resolve this issue.

9. **Appendix C, Table 4 -- SNL/DOE must return to the locations where the PCB detections occurred and determine the extent of contamination. The source (or sources) of PCB contamination must be determined.**

See general comment 4.

Response: A table showing the list of PCBs analyzed for is provided in Attachment I (see response to Comment 7). This list includes the MDL for each compound.

The DOE has forwarded a letter to NMED requesting that the response due date be extended an additional 60 days. The letter also stated the following: " . . . identified several issues in the RSI with potential programmatic implications that may require extensive discussions with the NMED technical staff." The nature and extent of PCB contamination is one of the issues that will impact the program. The SNL ER Project requests a meeting with the NMED technical staff to resolve this issue.

10. **Appendix C, Table 5 -- Analytical results for some samples exceed the approved background concentrations for certain metals:**

Metal	Borehole (GP) Locations
Ba	004, 010, 011
Ag	007
V	011

SNL/DOE must return to each of these locations and determine the extent of contamination. The source (or sources) of each contaminant must be determined.

See general comments 2 and 4.

Response: See response to Specific Comment 6, ER Site 96 (see Attachment J).

11. **Appendix C, Table 6 -- See general comments 2, 3, and 4.**

Analytical results for some samples demonstrate that radioactive contamination is present:

Radionuclide	Borehole (GP) Locations
Plutonium	011, 018

SNL/DOE must return to these two locations and determine the extent of contamination. The source (or sources) of the plutonium contamination must be determined.

Response: A table showing the list of radionuclides analyzed for is provided in Attachment I (see response to Comment 7). This list includes the MDL for each compound.

The DOE has forwarded a letter to NMED requesting that the response due date be extended an additional 60 days. The letter also stated the following: " . . . identified several issues in the RSI with potential programmatic implications that may require extensive discussions with the NMED technical staff." The nature and extent of radiological contamination is one of the issues that will impact the program. The SNL ER Project requests a meeting with the NMED technical staff to resolve this issue.

12. **Appendix C, Table 7 -- See specific comment 15, ER Site 96.**

Response: See response to Specific Comment 15, ER Site 96.

Attachment H

Gamma Spectroscopy Data for ER Site 226

(1)

SMO ANALYTICAL DATA ROUTING FORM

Project Name: TA I Phase I Case Number: 3624400

SNL Task Leader: Miller Org/Mail Stop: 7582/1347

SMO Project Coordinator: Prescott Sample Ship Date: 5/24/95, 8/1/95, 5/25/95, 5/25/95, 7/12/95

ARCOC	Lab	Lab ID
03976	7715	500616
03603	7715	500402
03606	"	500408
03612	"	500413
03787	"	500535

Date Results Received:

Preliminary: 8/3/95 Final: 5/30/95 / 5/30/95 / 5/30/95 / 7/14/95

Corrections Requested From Laboratory: _____ Requestor: _____

Date Corrections Received: _____

Date Assigned to SMO Reviewer: _____ Reviewer: _____

Date Review Complete: _____ Signature: _____

Date of Preliminary Notification: _____ Person Notified: _____

Date of Final Transmittal: 9/22/95 Transmitted To: D. Miller

Transmitted By: [signature] Filed In Record Center: [signature]

Comments: _____

Los Alamos National Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Fo
Page 1 of 1

To be completed by Customer — *Shaded areas are for RPSD use only*

Customer: D Miller / H. Fleck
Organization: 7582
Project Location: TA-1
Phone: 845-0867
Date Results Needed: 7-13-95
Suspect Isotopes:
Other Information: 03787

Hazards/Special Instructions:
Please notify SMO upon completion @ 845-0867

Batch Log Number: 500535
Logged By:

LIMS Login
Results Faxed
Sample Disposal

Analysis Type:
- [x] Gamma Spec
- [ ] H-3
- [ ] Alpha/Beta
- [ ] Alpha Spec
- [ ] Total U
- [ ] Other

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Scan mR/hr	Sample Weight	Remarks
022969-05	S	7/12/95 8:15	500ml	Gamma Spec.	01	<300	714 g	
022970-05		9:20			02		623 g	
022971-05		10:20			03		712 g	
022972-05		11:30			04		672 g	
022973-05		12:50			05		642 g	
022974-05		13:55			06		685 g	
LCS		1-JUN-95			07	NA	NA	

Relinquished by	Date 7-12-95	Time 1558	Received by	Date 7/12/95	Time 1558
Relinquished by	Date 7/14/95	Time 1350	Received by	Date 7/14/95	Time 1350
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time

SF 2001-COC (9-94) 500535

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

AR/COC- 03787

Dept. No./Mail Stop: 7582 / 1347
Project/Task Manager: D Miller / H Fleck
Project Name: TA-I Soil Sampling (Phase I)
Record Center Code: ADS 1202 ER Site 226
Logbook Ref No: 0133
SMO Reference No.: SF0059

Date Samples Shipped: 7-12-95
Carrier/Waybill No.: NC
Lab Contact: Amir M.
Lab Destination: 7715
SMO Contact/Phone: D. "Mac" McLaughlin/845-0567
Send Report to SMO: Deborah McLaughlin

Contract No.: N/A
Case No.: 3626.400
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800, MS 0154
Albuquerque, NM 87185-0154

Location: Tech Area IA
Building 892 Room outside

Reference LOV (available at SMO)

Parameter & Method Requested: Gamma Spec

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Gamma Spec	Lab Sample ID
022969-05	T1226-GP-001-010-S	14'	226	7/12/95 8:15	S	P	500ml	None	G	SA	X	
022970-05	T1226-GP-002-008-S	12'4"	↓	9:20	↓	↓	↓	↓	↓	↓	X	
022971-05	T1226-GP-003-008-S	11'8"	↓	10:20	↓	↓	↓	↓	↓	↓	X	
022972-05	T1226-GP-004-007-S	11'2"	↓	11:30	↓	↓	↓	↓	↓	↓	X	
022973-05	T1226-GP-005-007-S	11'2"	↓	12:50	↓	↓	↓	↓	↓	DU	X	
022974-05	T1226-GP-006-006-S	6'2"	↓	13:55	↓	↓	↓	↓	↓	SA	X	
-												
-												
-												
-												

RMMA ☐ Yes ☒ No Ref. No.

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date

Sample Tracking
Date Entered (mm/dd/yy) 7/20/95
Entered by:
QC inits.

Special Instructions/QC Requirements

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init	Company/Organization
	Matthew Shein	Matthew Shein	MS	IT Corp. / 7582
				/ 7582

	Relinquished/Received by	Org.	Date	Time
1. Relinquished by	Matthew Shein	7582	7/12/95	15:10
1. Received by	D McLaughlin	SMO 7513	7/12/95	15:10
2. Relinquished by	for McLaughlin	SMO 7523	7-12-95	1558
2. Received by	Karen Cole	SNL 7715	7/12/95	1558
3. Relinquished by	for McC	SNL 7715	7/14/95	1350
3. Received by	D McLaughlin	SMO 7513	7/14/95	1350
4. Relinquished by				
4. Received by				
5. Relinquished by				
5. Received by				
6. Relinquished by				
6. Received by				

WHITE - To Accompany Samples, Laboratory Copy BLUE - To Accompany Samples, Return to SMO YELLOW - SMO Suspense Copy PINK - Field Copy

****

Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-13-95 9:52:27 AM

****

Analyzed by: 7/13/95 Reviewed by: 7/13/95

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : 022969-05
Lab Sample ID : 50053501

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 714.000 gram
Sample Date/Time : 7-12-95 8:15:00 AM
Acquire Start Date : 7-13-95 9:18:06 AM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

****

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	6.20
TH-234	1.03	5.64E-01	8.72E-01
U-234	Not Detected	--------	2.16E+01
RA-226	1.55	9.27E-01	1.40
PB-214	7.01E-01	1.39E-01	1.07E-01
BI-214	4.96E-01	1.11E-01	1.03E-01
PB-210	Not Detected	--------	1.53
TH-232	7.15E-01	2.52E-01	3.07E-01
RA-228	7.58E-01	2.63E-01	3.08E-01
AC-228	Not Detected	--------	3.41E-01
TH-228	Not Detected	--------	1.35
RA-224	Not Detected	--------	7.38E-01
PB-212	7.69E-01	1.58E-01	6.90E-02
BI-212	7.93E-01	4.21E-01	5.80E-01
TL-208	6.43E-01	1.47E-01	1.25E-01
U-235	Not Detected	--------	4.09E-01
TH-231	Not Detected	--------	9.96E-01
PA-231	Not Detected	--------	1.88
AC-227	Not Detected	--------	3.02
TH-227	Not Detected	--------	6.30E-01
RA-223	Not Detected	--------	3.41E-01
RN-219	Not Detected	--------	4.77E-01
PB-211	Not Detected	--------	1.05
TL-207	Not Detected	--------	2.25E+01
AM-241	Not Detected	--------	1.00
PU-239	Not Detected	--------	4.77E+02
NP-237	Not Detected	--------	3.99E-01
PA-233	Not Detected	--------	1.01E-01
TH-229	Not Detected	--------	4.56E-01

[Summary Report] - Sample ID: 50053501

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.11E-02
AR-41	Not Detected	--------	9.42E+02
BA-133	Not Detected	--------	1.06E-01
BA-140	Not Detected	--------	2.04E-01
CD-109	Not Detected	--------	1.37
CD-115	Not Detected	--------	1.63E-01
CE-139	Not Detected	--------	5.20E-02
CE-141	Not Detected	--------	9.60E-02
CE-144	Not Detected	--------	4.08E-01
CO-56	Not Detected	--------	6.41E-02
CO-57	Not Detected	--------	5.10E-02
CO-58	Not Detected	--------	5.21E-02
CO-60	Not Detected	--------	6.31E-02
CR-51	Not Detected	--------	4.12E-01
CS-134	Not Detected	--------	8.63E-02
CS-137	Not Detected	--------	6.00E-02
CU-64	Not Detected	--------	6.00E+01
EU-152	Not Detected	--------	4.77E-01
EU-154	Not Detected	--------	3.05E-01
EU-155	Not Detected	--------	2.45E-01
FE-59	Not Detected	--------	1.27E-01
GD-153	Not Detected	--------	1.80E-01
HG-203	Not Detected	--------	4.88E-02
I-131	Not Detected	--------	5.30E-02
IN-115m	Not Detected	--------	5.93
IR-192	Not Detected	--------	4.69E-02
K-40	1.79E+01	2.65	5.97E-01
LA-140	Not Detected	--------	1.03E-01
MN-54	Not Detected	--------	6.45E-02
MN-56	Not Detected	--------	5.76E+01
MO-99	Not Detected	--------	5.99E-01
NA-22	Not Detected	--------	7.19E-02
NA-24	Not Detected	--------	1.80E-01
NB-95	Not Detected	--------	3.47E-01
ND-147	Not Detected	--------	3.71E-01
NI-57	Not Detected	--------	1.35E-01
BE-7	Not Detected	--------	4.36E-01
RU-103	Not Detected	--------	4.93E-02
RU-106	Not Detected	--------	4.99E-01
SB-122	Not Detected	--------	9.29E-02
SB-124	Not Detected	--------	5.57E-02
SB-125	Not Detected	--------	1.34E-01
SC-46	Not Detected	--------	9.21E-02
SR-85	Not Detected	--------	6.52E-02
TA-182	Not Detected	--------	2.66E-01
TA-183	Not Detected	--------	1.00
TE-132	Not Detected	--------	5.64E-02
TL-201	Not Detected	--------	3.37E-01
XE-133	Not Detected	--------	3.11E-01
Y-88	Not Detected	--------	5.08E-02
ZN-65	Not Detected	--------	1.80E-01
ZR-95	Not Detected	--------	1.11E-01

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 7-13-95 10:31:27 AM *
****
*
* Analyzed by: 7/13/95 Reviewed by: 7/13/95 *
****

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : 022970-05
Lab Sample ID : 50053502

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 623.000 gram
Sample Date/Time : 7-12-95 9:20:00 AM
Acquire Start Date : 7-13-95 9:57:23 AM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:
****

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	6.20
TH-234	Not Detected	--------	1.39
U-234	Not Detected	--------	2.24E+01
RA-226	1.35	1.15	1.81
PB-214	7.55E-01	1.55E-01	1.26E-01
BI-214	7.48E-01	1.44E-01	1.05E-01
PB-210	Not Detected	--------	1.59
TH-232	6.45E-01	2.88E-01	3.93E-01
RA-228	4.48E-01	2.82E-01	4.14E-01
AC-228	8.09E-01	2.20E-01	2.16E-01
TH-228	8.11E-01	4.25E-01	8.42E-01
RA-224	2.13	5.70E-01	8.16E-01
PB-212	7.57E-01	1.59E-01	7.09E-02
BI-212	Not Detected	--------	1.05
TL-208	6.24E-01	1.64E-01	1.71E-01
U-235	Not Detected	--------	4.34E-01
TH-231	Not Detected	--------	1.07
PA-231	Not Detected	--------	2.04
AC-227	Not Detected	--------	3.23
TH-227	Not Detected	--------	6.52E-01
RA-223	Not Detected	--------	3.55E-01
RN-219	Not Detected	--------	4.22E-01
PB-211	Not Detected	--------	1.20
TL-207	Not Detected	--------	2.57E+01
AM-241	Not Detected	--------	1.01
PU-239	Not Detected	--------	5.06E+02
NP-237	Not Detected	--------	6.95E-01
PA-233	Not Detected	--------	1.08E-01
TH-229	Not Detected	--------	4.91E-01

[Summary Report] - Sample ID: 50053502

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.60E-02
AR-41	Not Detected	--------	8.91E+02
BA-133	Not Detected	--------	1.16E-01
BA-140	Not Detected	--------	2.22E-01
CD-109	Not Detected	--------	1.39
CD-115	Not Detected	--------	1.64E-01
CE-139	Not Detected	--------	5.62E-02
CE-141	Not Detected	--------	9.77E-02
CE-144	Not Detected	--------	4.60E-01
CO-56	Not Detected	--------	6.45E-02
CO-57	Not Detected	--------	5.69E-02
CO-58	Not Detected	--------	5.81E-02
CO-60	Not Detected	--------	7.86E-02
CR-51	Not Detected	--------	4.17E-01
CS-134	Not Detected	--------	9.97E-02
CS-137	Not Detected	--------	6.48E-02
CU-64	Not Detected	--------	4.84E+01
EU-152	Not Detected	--------	4.55E-01
EU-154	Not Detected	--------	3.37E-01
EU-155	Not Detected	--------	2.56E-01
FE-59	Not Detected	--------	1.31E-01
GD-153	Not Detected	--------	1.99E-01
HG-203	Not Detected	--------	5.65E-02
I-131	Not Detected	--------	5.35E-02
IN-115m	Not Detected	--------	5.61
IR-192	Not Detected	--------	4.98E-02
K-40	1.57E+01	2.38	3.90E-01
LA-140	Not Detected	--------	1.09E-01
MN-54	Not Detected	--------	6.51E-02
MN-56	Not Detected	--------	5.16E+01
MO-99	Not Detected	--------	6.03E-01
NA-22	Not Detected	--------	7.73E-02
NA-24	Not Detected	--------	2.00E-01
NB-95	Not Detected	--------	3.59E-01
ND-147	Not Detected	--------	3.78E-01
NI-57	Not Detected	--------	1.51E-01
BE-7	Not Detected	--------	4.37E-01
RU-103	Not Detected	--------	5.21E-02
RU-106	Not Detected	--------	5.55E-01
SB-122	Not Detected	--------	9.73E-02
SB-124	Not Detected	--------	5.92E-02
SB-125	Not Detected	--------	1.44E-01
SC-46	Not Detected	--------	1.05E-01
SR-85	Not Detected	--------	6.92E-02
TA-182	Not Detected	--------	3.06E-01
TA-183	Not Detected	--------	1.01
TE-132	Not Detected	--------	6.34E-02
TL-201	Not Detected	--------	3.93E-01
XE-133	Not Detected	--------	3.23E-01
Y-88	Not Detected	--------	4.98E-02
ZN-65	Not Detected	--------	2.06E-01
ZR-95	Not Detected	--------	1.05E-01

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-13-95 11:11:32 AM

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Analyzed by: 7/13/95 Reviewed by: 7/13/95

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : 022971-05
Lab Sample ID : 50053503

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 712.000 gram
Sample Date/Time : 7-12-95 10:20:00 AM
Acquire Start Date : 7-13-95 10:37:12 AM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	6.11
TH-234	Not Detected	--------	1.40
U-234	Not Detected	--------	2.28E+01
RA-226	1.55	8.98E-01	1.34
PB-214	6.76E-01	1.32E-01	9.28E-02
BI-214	6.47E-01	1.28E-01	1.01E-01
PB-210	1:10	5.79E-01	5.47E-01
TH-232	6.19E-01	2.10E-01	2.43E-01
RA-228	5.52E-01	2.44E-01	3.23E-01
AC-228	Not Detected	--------	3.46E-01
TH-228	1.04	4.33E-01	8.07E-01
RA-224	Not Detected	--------	7.33E-01
PB-212	7.17E-01	1.51E-01	6.89E-02
BI-212	7.31E-01	4.75E-01	7.00E-01
TL-208	6.78E-01	1.57E-01	1.42E-01
U-235	Not Detected	--------	4.21E-01
TH-231	Not Detected	--------	1.01
PA-231	Not Detected	--------	1.90
AC-227	Not Detected	--------	3.07
TH-227	Not Detected	--------	6.17E-01
RA-223	Not Detected	--------	3.38E-01
RN-219	Not Detected	--------	4.95E-01
PB-211	Not Detected	--------	1.16
TL-207	Not Detected	--------	2.32E+01
AM-241	Not Detected	--------	9.46E-01
PU-239	Not Detected	--------	4.88E+02
NP-237	Not Detected	--------	6.56E-01
PA-233	Not Detected	--------	1.12E-01
TH-229	Not Detected	--------	4.73E-01

[Summary Report] - Sample ID: 50053503

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.76E-02
AR-41	Not Detected	--------	8.01E+02
BA-133	Not Detected	--------	1.09E-01
BA-140	Not Detected	--------	1.92E-01
CD-109	Not Detected	--------	2.27
CD-115	Not Detected	--------	1.56E-01
CE-139	Not Detected	--------	5.47E-02
CE-141	Not Detected	--------	9.83E-02
CE-144	Not Detected	--------	4.21E-01
CO-56	Not Detected	--------	6.68E-02
CO-57	Not Detected	--------	5.52E-02
CO-58	Not Detected	--------	5.90E-02
CO-60	Not Detected	--------	7.14E-02
CR-51	Not Detected	--------	3.98E-01
CS-134	Not Detected	--------	8.86E-02
CS-137	Not Detected	--------	6.66E-02
CU-64	Not Detected	--------	4.85E+01
EU-152	Not Detected	--------	4.60E-01
EU-154	Not Detected	--------	3.11E-01
EU-155	Not Detected	--------	2.48E-01
FE-59	Not Detected	--------	1.19E-01
GD-153	Not Detected	--------	1.89E-01
HG-203	Not Detected	--------	5.19E-02
I-131	Not Detected	--------	5.69E-02
IN-115m	Not Detected	--------	5.09
IR-192	Not Detected	--------	5.03E-02
K-40	2.05E+01	2.99	5.39E-01
LA-140	Not Detected	--------	9.11E-02
MN-54	Not Detected	--------	6.24E-02
MN-56	Not Detected	--------	4.88E+01
MO-99	Not Detected	--------	6.01E-01
NA-22	Not Detected	--------	7.55E-02
NA-24	Not Detected	--------	1.98E-01
NB-95	Not Detected	--------	3.40E-01
ND-147	Not Detected	--------	3.81E-01
NI-57	Not Detected	--------	1.33E-01
BE-7	Not Detected	--------	4.25E-01
RU-103	Not Detected	--------	4.78E-02
RU-106	Not Detected	--------	5.02E-01
SB-122	Not Detected	--------	9.09E-02
SB-124	Not Detected	--------	5.30E-02
SB-125	Not Detected	--------	1.35E-01
SC-46	Not Detected	--------	1.00E-01
SR-85	Not Detected	--------	6.70E-02
TA-182	Not Detected	--------	2.97E-01
TA-183	Not Detected	--------	9.41E-01
TE-132	Not Detected	--------	6.00E-02
TL-201	Not Detected	--------	3.77E-01
XE-133	Not Detected	--------	3.05E-01
Y-88	Not Detected	--------	5.52E-02
ZN-65	Not Detected	--------	1.91E-01
ZR-95	Not Detected	--------	1.05E-01

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
7-13-95 11:49:51 AM

Analyzed by: 7/13/95 Reviewed by: 7/13/95

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : 022972-05
Lab Sample ID : 50053504

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 672.000 gram
Sample Date/Time : 7-12-95 11:30:00 AM
Acquire Start Date : 7-13-95 11:16:51 AM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.76
TH-234	Not Detected	--------	1.35
U-234	Not Detected	--------	2.27E+01
RA-226	1.24	8.31E-01	1.27
PB-214	7.17E-01	1.48E-01	1.26E-01
BI-214	6.89E-01	1.33E-01	9.71E-02
PB-210	Not Detected	--------	1.62
TH-232	4.17E-01	2.49E-01	3.67E-01
RA-228	5.33E-01	2.40E-01	2.35E-01
AC-228	Not Detected	--------	3.59E-01
TH-228	6.87E-01	3.95E-01	8.91E-01
RA-224	Not Detected	--------	7.93E-01
PB-212	7.33E-01	1.69E-01	7.68E-02
BI-212	9.61E-01	4.91E-01	6.76E-01
TL-208	7.20E-01	1.87E-01	2.05E-01
U-235	Not Detected	--------	4.32E-01
TH-231	Not Detected	--------	9.67E-01
PA-231	Not Detected	--------	1.94
AC-227	Not Detected	--------	3.06
TH-227	Not Detected	--------	6.24E-01
RA-223	Not Detected	--------	3.13E-01
RN-219	Not Detected	--------	5.03E-01
PB-211	Not Detected	--------	1.14
TL-207	Not Detected	--------	2.51E+01
AM-241	Not Detected	--------	9.55E-01
PU-239	Not Detected	--------	4.82E+02
NP-237	Not Detected	--------	6.21E-01
PA-233	Not Detected	--------	9.67E-02
TH-229	Not Detected	--------	4.73E-01

[Summary Report] - Sample ID: 50053504

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.42E-02
AR-41	Not Detected	--------	5.81E+02
BA-133	Not Detected	--------	1.11E-01
BA-140	Not Detected	--------	2.00E-01
CD-109	Not Detected	--------	2.11
CD-115	Not Detected	--------	1.52E-01
CE-139	Not Detected	--------	5.28E-02
CE-141	Not Detected	--------	9.54E-02
CE-144	Not Detected	--------	4.14E-01
CO-56	Not Detected	--------	6.09E-02
CO-57	Not Detected	--------	5.20E-02
CO-58	Not Detected	--------	5.81E-02
CO-60	Not Detected	--------	6.81E-02
CR-51	Not Detected	--------	4.16E-01
CS-134	Not Detected	--------	9.46E-02
CS-137	Not Detected	--------	5.88E-02
CU-64	Not Detected	--------	4.54E+01
EU-152	Not Detected	--------	4.09E-01
EU-154	Not Detected	--------	3.35E-01
EU-155	Not Detected	--------	2.55E-01
FE-59	Not Detected	--------	1.31E-01
GD-153	Not Detected	--------	1.86E-01
HG-203	~~1.06E-02~~	~~5.82E-02~~	2.09E-02 Not detected 7/13
I-131	Not Detected	--------	5.81E-02
IN-115m	Not Detected	--------	4.63
IR-192	Not Detected	--------	4.82E-02
K-40	1.52E+01	2.31	6.07E-01
LA-140	Not Detected	--------	9.94E-02
MN-54	Not Detected	--------	5.44E-02
MN-56	Not Detected	--------	3.89E+01
MO-99	Not Detected	--------	5.67E-01
NA-22	Not Detected	--------	8.04E-02
NA-24	Not Detected	--------	1.91E-01
NB-95	Not Detected	--------	3.43E-01
ND-147	Not Detected	--------	3.81E-01
NI-57	Not Detected	--------	1.35E-01
BE-7	Not Detected	--------	4.16E-01
RU-103	Not Detected	--------	4.64E-02
RU-106	Not Detected	--------	4.65E-01
SB-122	Not Detected	--------	9.04E-02
SB-124	Not Detected	--------	5.63E-02
SB-125	Not Detected	--------	1.41E-01
SC-46	Not Detected	--------	9.54E-02
SR-85	Not Detected	--------	6.62E-02
TA-182	Not Detected	--------	2.82E-01
TA-183	Not Detected	--------	9.47E-01
TE-132	Not Detected	--------	5.93E-02
TL-201	Not Detected	--------	3.78E-01
XE-133	Not Detected	--------	2.78E-01
Y-88	Not Detected	--------	5.27E-02
ZN-65	Not Detected	--------	1.87E-01
ZR-95	Not Detected	--------	1.03E-01

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-13-95 12:29:06 PM

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Analyzed by: 7/13/95 Reviewed by: 7/13/95

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : 022973-05
Lab Sample ID : 50053505

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 642.000 gram
Sample Date/Time : 7-12-95 12:50:00 PM
Acquire Start Date : 7-13-95 11:55:18 AM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	6.10
TH-234	Not Detected	--------	1.46
U-234	Not Detected	--------	2.19E+01
RA-226	1.24	1.28	2.03
PB-214	7.41E-01	1.52E-01	1.26E-01
BI-214	6.84E-01	1.37E-01	1.07E-01
PB-210	Not Detected	--------	1.41
TH-232	8.02E-01	3.16E-01	4.15E-01
RA-228	5.68E-01	2.49E-01	3.21E-01
AC-228	Not Detected	--------	3.72E-01
TH-228	9.87E-01	4.43E-01	8.24E-01
RA-224	Not Detected	--------	7.99E-01
PB-212	6.72E-01	1.49E-01	8.14E-02
BI-212	5.18E-01	3.69E-01	5.39E-01
TL-208	6.63E-01	1.52E-01	1.26E-01
U-235	Not Detected	--------	4.33E-01
TH-231	Not Detected	--------	1.06
PA-231	Not Detected	--------	1.97
AC-227	Not Detected	--------	3.07
TH-227	Not Detected	--------	6.62E-01
RA-223	Not Detected	--------	3.54E-01
RN-219	Not Detected	--------	5.14E-01
PB-211	Not Detected	--------	1.12
TL-207	Not Detected	--------	2.57E+01
AM-241	Not Detected	--------	9.72E-01
PU-239	Not Detected	--------	5.16E+02
NP-237	Not Detected	--------	6.81E-01
PA-233	Not Detected	--------	1.07E-01
TH-229	Not Detected	--------	4.92E-01

[Summary Report] - Sample ID: 50053505

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.51E-02
AR-41	Not Detected	--------	5.45E+02
BA-133	Not Detected	--------	1.16E-01
BA-140	Not Detected	--------	2.09E-01
CD-109	Not Detected	--------	2.27
CD-115	Not Detected	--------	1.63E-01
CE-139	Not Detected	--------	5.42E-02
CE-141	Not Detected	--------	9.61E-02
CE-144	Not Detected	--------	4.19E-01
CO-56	Not Detected	--------	6.11E-02
CO-57	Not Detected	--------	5.50E-02
CO-58	Not Detected	--------	6.11E-02
CO-60	Not Detected	--------	6.40E-02
CR-51	Not Detected	--------	4.38E-01
CS-134	Not Detected	--------	9.46E-02
CS-137	Not Detected	--------	6.15E-02
CU-64	Not Detected	--------	5.17E+01
EU-152	Not Detected	--------	4.55E-01
EU-154	Not Detected	--------	2.96E-01
EU-155	Not Detected	--------	2.60E-01
FE-59	Not Detected	--------	1.34E-01
GD-153	Not Detected	--------	2.00E-01
HG-203	Not Detected	--------	5.17E-02
I-131	Not Detected	--------	5.65E-02
IN-115m	Not Detected	--------	4.47
IR-192	Not Detected	--------	5.08E-02
K-40	1.71E+01	2.57	6.06E-01
LA-140	Not Detected	--------	1.11E-01
MN-54	Not Detected	--------	6.64E-02
MN-56	Not Detected	--------	3.24E+01
MO-99	Not Detected	--------	6.08E-01
NA-22	Not Detected	--------	7.64E-02
NA-24	Not Detected	--------	2.02E-01
NB-95	Not Detected	--------	3.58E-01
ND-147	Not Detected	--------	3.98E-01
NI-57	Not Detected	--------	1.60E-01
BE-7	Not Detected	--------	4.30E-01
RU-103	Not Detected	--------	5.22E-02
RU-106	Not Detected	--------	5.65E-01
SB-122	Not Detected	--------	9.76E-02
SB-124	Not Detected	--------	5.58E-02
SB-125	Not Detected	--------	1.45E-01
SC-46	Not Detected	--------	1.04E-01
SR-85	Not Detected	--------	6.58E-02
TA-182	Not Detected	--------	3.08E-01
TA-183	Not Detected	--------	9.60E-01
TE-132	Not Detected	--------	6.05E-02
TL-201	Not Detected	--------	3.78E-01
XE-133	Not Detected	--------	3.09E-01
Y-88	Not Detected	--------	5.39E-02
ZN-65	Not Detected	--------	1.96E-01
ZR-95	Not Detected	--------	1.10E-01

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-13-95 1:09:09 PM

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Analyzed by: 7/13/95 Reviewed by: 7/13/95

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Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : 022974-05
Lab Sample ID : 50053506

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 685.000 gram
Sample Date/Time : 7-12-95 1:55:00 PM
Acquire Start Date : 7-13-95 12:35:18 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.96
TH-234	1.38	7.38E-01	8.90E-01
U-234	Not Detected	--------	2.30E+01
RA-226	1.55	9.10E-01	1.36
PB-214	7.96E-01	1.55E-01	1.16E-01
BI-214	7.02E-01	1.37E-01	1.05E-01
PB-210	6.44E-01	5.98E-01	8.74E-01
TH-232	7.19E-01	2.42E-01	2.84E-01
RA-228	7.76E-01	6.20E-01	2.80E-01
AC-228	9.38E-01	2.31E-01	2.11E-01
TH-228	Not Detected	--------	1.34
RA-224	1.95	5.23E-01	7.45E-01
PB-212	7.40E-01	1.55E-01	7.24E-02
BI-212	Not Detected	--------	9.91E-01
TL-208	7.89E-01	1.61E-01	1.03E-01
U-235	Not Detected	--------	4.44E-01
TH-231	Not Detected	--------	1.07
PA-231	Not Detected	--------	1.87
AC-227	Not Detected	--------	3.07
TH-227	Not Detected	--------	6.36E-01
RA-223	Not Detected	--------	3.56E-01
RN-219	Not Detected	--------	5.52E-01
PB-211	Not Detected	--------	1.13
TL-207	Not Detected	--------	2.46E+01
AM-241	Not Detected	--------	9.95E-01
PU-239	Not Detected	--------	5.03E+02
NP-237	Not Detected	--------	6.64E-01
PA-233	Not Detected	--------	1.05E-01
TH-229	Not Detected	--------	4.78E-01

[Summary Report] - Sample ID: 50053506

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.58E-02
AR-41	Not Detected	--------	4.07E+02
BA-133	Not Detected	--------	1.15E-01
BA-140	Not Detected	--------	1.87E-01
CD-109	Not Detected	--------	2.30
CD-115	Not Detected	--------	1.55E-01
CE-139	Not Detected	--------	5.41E-02
CE-141	Not Detected	--------	1.01E-01
CE-144	Not Detected	--------	4.38E-01
CO-56	Not Detected	--------	6.68E-02
CO-57	Not Detected	--------	5.33E-02
CO-58	Not Detected	--------	5.22E-02
CO-60	Not Detected	--------	7.06E-02
CR-51	Not Detected	--------	4.33E-01
CS-134	Not Detected	--------	9.42E-02
CS-137	Not Detected	--------	6.19E-02
CU-64	Not Detected	--------	3.96E+01
EU-152	Not Detected	--------	4.65E-01
EU-154	Not Detected	--------	3.23E-01
EU-155	Not Detected	--------	2.58E-01
FE-59	Not Detected	--------	1.21E-01
GD-153	Not Detected	--------	1.90E-01
HG-203	Not Detected	--------	5.24E-02
I-131	Not Detected	--------	5.70E-02
IN-115m	Not Detected	--------	4.03
IR-192	Not Detected	--------	5.13E-02
K-40	1.49E+01	2.26	5.35E-01
LA-140	Not Detected	--------	1.08E-01
MN-54	Not Detected	--------	6.39E-02
MN-56	Not Detected	--------	3.17E+01
MO-99	Not Detected	--------	5.60E-01
NA-22	Not Detected	--------	7.73E-02
NA-24	Not Detected	--------	1.70E-01
NB-95	Not Detected	--------	3.44E-01
ND-147	Not Detected	--------	3.52E-01
NI-57	Not Detected	--------	1.42E-01
BE-7	Not Detected	--------	4.28E-01
RU-103	Not Detected	--------	5.08E-02
RU-106	Not Detected	--------	5.07E-01
SB-122	Not Detected	--------	9.05E-02
SB-124	Not Detected	--------	5.65E-02
SB-125	Not Detected	--------	1.37E-01
SC-46	Not Detected	--------	9.77E-02
SR-85	Not Detected	--------	6.87E-02
TA-182	Not Detected	--------	2.95E-01
TA-183	Not Detected	--------	9.80E-01
TE-132	Not Detected	--------	5.69E-02
TL-201	Not Detected	--------	3.60E-01
XE-133	Not Detected	--------	3.08E-01
Y-88	Not Detected	--------	4.38E-02
ZN-65	Not Detected	--------	1.91E-01
ZR-95	Not Detected	--------	9.90E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
7-13-95 1:39:49 PM

Analyzed by: 7/13/95 Reviewed by: 7/13/95

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : LAB CONTROL SAMPLE ANALYSIS #CG134
Lab Sample ID : 50053507

Sample Description : MIXED_GAMMA_STANDARD
Sample Type : Liquid
Sample Geometry : WMAR
Sample Quantity : 1.000 Each
Sample Date/Time : 11-01-90 12:00:00 PM
Acquire Start Date : 7-13-95 1:26:24 PM
Detector Name : LAB02
Elapsed Live Time : 600 seconds
Elapsed Real Time : 606 seconds

Comments:

Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	--------	2.16E+04
TH-234	Not Detected	--------	4.74E+03
U-234	Not Detected	--------	1.19E+05
RA-226	Not Detected	--------	5.97E+03
PB-214	Not Detected	--------	6.89E+02
BI-214	Not Detected	--------	6.39E+02
PB-210	Not Detected	--------	4.63E+03
TH-232	Not Detected	--------	2.04E+03
RA-228	Not Detected	--------	2.75E+03
AC-228	Not Detected	--------	1.79E+03
TH-228	Not Detected	--------	3.67E+04
RA-224	Not Detected	--------	3.16E+04
PB-212	Not Detected	--------	2.91E+03
BI-212	Not Detected	--------	2.54E+04
TL-208	Not Detected	--------	5.25E+03
U-235	Not Detected	--------	1.87E+03
TH-231	Not Detected	--------	3.85E+03
PA-231	Not Detected	--------	9.32E+03
AC-227	Not Detected	--------	1.58E+04
TH-227	Not Detected	--------	2.30E+03
RA-223	Not Detected	--------	1.00E+26
RN-219	Not Detected	--------	2.84E+03
PB-211	Not Detected	--------	8.54E+03
TL-207	Not Detected	--------	2.19E+05
AM-241	9.33E+04	1.66E+04	5.85E+03
PU-239	Not Detected	--------	2.12E+06
NP-237	Not Detected	--------	2.71E+03
PA-233	Not Detected	--------	6.10E+02
TH-229	Not Detected	--------	2.02E+03

[Summary Report] - Sample ID: 50053507

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	--------	1.79E+05
AR-41	Not Detected	--------	1.00E+26
BA-133	Not Detected	--------	5.40E+02
BA-140	Not Detected	--------	1.00E+26
CD-109	3.48E+05	1.05E+05	1.33E+05
CD-115	Not Detected	--------	1.00E+26
CE-139	Not Detected	--------	1.37E+06
CE-141	Not Detected	--------	3.27E+18
CE-144	Not Detected	--------	1.22E+05
CO-56	Not Detected	--------	1.95E+09
CO-57	1.25E+04	8.66E+03	1.34E+04
CO-58	Not Detected	--------	7.08E+09
CO-60	7.36E+04	9.59E+03	5.58E+02
CR-51	Not Detected	--------	1.02E+22
CS-134	Not Detected	--------	1.48E+03
CS-137	6.72E+04	8.67E+03	3.94E+02
CU-64	Not Detected	--------	1.00E+26
EU-152	Not Detected	--------	3.39E+03
EU-154	Not Detected	--------	2.20E+03
EU-155	Not Detected	--------	2.12E+03
FE-59	Not Detected	--------	3.52E+14
GD-153	Not Detected	--------	1.07E+05
HG-203	Not Detected	--------	3.22E+13
I-131	Not Detected	--------	1.00E+26
IN-115m	Not Detected	--------	1.00E+26
IR-192	Not Detected	--------	2.85E+09
K-40	Not Detected	--------	1.62E+03
LA-140	Not Detected	--------	1.00E+26
MN-54	Not Detected	--------	1.76E+04
MN-56	Not Detected	--------	1.00E+26
MO-99	Not Detected	--------	1.00E+26
NA-22	Not Detected	--------	8.30E+02
NA-24	Not Detected	--------	1.00E+26
NB-95	Not Detected	--------	1.00E+26
ND-147	Not Detected	--------	1.00E+26
NI-57	Not Detected	--------	1.00E+26
BE-7	Not Detected	--------	1.60E+13
RU-103	Not Detected	--------	4.74E+15
RU-106	Not Detected	--------	7.86E+04
SB-122	Not Detected	--------	1.00E+26
SB-124	Not Detected	--------	1.13E+11
SB-125	Not Detected	--------	3.24E+03
SC-46	Not Detected	--------	6.69E+08
SR-85	Not Detected	--------	3.25E+10
TA-182	Not Detected	--------	4.07E+07
TA-183	Not Detected	--------	1.00E+26
TE-132	Not Detected	--------	1.00E+26
TL-201	Not Detected	--------	1.00E+26
XE-133	Not Detected	--------	1.00E+26
Y-88	Not Detected	--------	1.23E+07
ZN-65	Not Detected	--------	1.27E+05
ZR-95	Not Detected	--------	7.17E+10

****

* Sandia National Laboratories *

* Radiation Protection Sample Diagnostics Program *

* Quality Assurance Report *

****

Report Date : 7-13-95 1:44:38 PM
QA File : C:\GENIEPC\CAMFILES\LCS2.QAF
Analyst : MEC
Sample ID : 50053507
Sample Quantity : 1.00 Each
Sample Date : 11-01-90 12:00:00 PM
Measurement Date : 7-13-95 1:26:24 PM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 606 seconds

Parameter	Mean	1S Error	New Value	<	LU	SD	UD	BS	>
AM-241 Activity	9.735E-02	3.733E-03	9.335E-02	<		In			>
CS-137 Activity	6.963E-02	2.415E-03	6.715E-02	<		In			>
CO-60 Activity	7.684E-02	2.547E-03	7.338E-02	<		In			>

OK 7/13/95

Flags Key:
LU = Boundary Test (Ab = Above , Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: 7/13/95

ER/1302 226/DAT (2)

SMO ANALYTICAL DATA ROUTING FORM

Project Name: TA I Phase I Case Number: 326400

SNL Task Leader: Miller Org/Mail Stop: 7582-1148

SMO Project Coordinator: Pissart Sample Ship Date: 7/14/95 7/11/95

ARCOC	Lab	Lab ID
03789	7715	500548
03785	"	500533

Date Results Received:

Preliminary: _____ Final: 7/19/95 7/13/95

Corrections Requested From Laboratory: _____ Requestor: _____

Date Corrections Received: _____

Date Assigned to SMO Reviewer: _____ Reviewer: _____

Date Review Complete: _____ Signature: _____

Date of Preliminary Notification: _____ Person Notified: _____

Date of Final Transmittal: 8/16/95 Transmitted To: Miller

Transmitted By: [signature] Filed In Record Center: [signature]

Comments: _____

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

01-COC (9-94) 500548

AR/COC- 03789

Dept. No./Mail Stop: 7582/1347
Project/Task Manager: D. Miller / H. Fleck
Project Name: TA-1 Soil Sampling (Phase I)
Record Center Code: ADS 1302 ER Site 226
Logbook Ref No: 0133
SMO Reference No.: CF0089

Date Samples Shipped: 7/14-15
Carrier/Waybill No: Hc
Lab Contact: Amir. M.
Lab Destination: 7715
SMO Contact/Phone: D. "Mac" McLaughlin - 845-0867
Send Report to SMO: Deborah McLaughlin

Contract No.: N/A
Case No.: 3626.400
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Parameter & Method Requested: Gamma. Spec.

Location — Tech Area: TA-1
Building: 863,840 Room: Outside

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Gamma. Spec.	Lab Sample ID
229780-05	T1226-GP-007-006-S	10'6"	226	7/13/95 - 8:20	S	P	500ml	None	G	SA	X	
229790-05	T1226-GP-008-007-S	10'8"		8:55							X	
229801-05	T1226-GP-009-006-S	10'2"		9:40							X	
229811-05	T1226-GP-010-007-S	10'8"		10:30							X	
229822-05	T1226-GP-011-005-S	8'8"		11:15							X	
229833-05	T1226-GP-012-006-S	9'8"		12:50							X	
229844-05	T1226-GP-013-006-S	5'8"		13:30							X	
229855-05	T1226-GP-014-006-S	10'2"		14:10							X	

MMA ☐ Yes ☒ No Ref. No.

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date

Sample Tracking: Date Entered (mm/dd/yy): 7/11/95; Entered by:; QC Initials:

Special Instructions/QC Requirements: 1

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init	Company/Organization
	Matthew Chain	Matthew Chain	MC	IT Corp /7582
	Cathie Gihar	Cathie Gihar	CG	Sandia/7582

Relinquished by	Matthew Chain	Org. 7582	Date 7/13/95	Time 1440	4. Relinquished by	Org.	Date	Time
Received by		Org. SMO 7523	Date 7-13-95	Time 1440	4. Received by	Org.	Date	Time
Relinquished by		Org. SMO 7523	Date 7-14-95	Time 1350	5. Relinquished by	Org.	Date	Time
Received by		Org. SNL 7715	Date 7/14/95	Time 1350	5. Received by	Org.	Date	Time
Relinquished by		Org. SNL 7715	Date 7/17/95	Time 1540	6. Relinquished by	Org.	Date	Time
Received by		Org. 7523	Date 7/17/95	Time 1540	6. Received by	Org.	Date	Time

WHITE - To Accompany Samples, Laboratory Copy BLUE - To Accompany Samples, Return to SMO YELLOW - SMO Suspense Copy PINK - Field Copy

Radiation Protection Sample Diagnostics

To be completed by Customer — *Shaded areas are for RPSD use only*

Customer: D.Miller / H.Fleck
Organization: 7582
Project Location: TA-1
Phone: 845-0867
Date Results Needed: 7-17-95
Suspect Isotopes:
Other Information: 03789

Hazards/Special Instructions: please notify SMO upon completion @ 845-0867

Batch Log Number: 500548
Logged By: 7ms
LIMS Login
Results Faxed
Sample Disposal

Analysis Type:
- ☒ Gamma Spec
- ☐ H-3
- ☐ Alpha/Beta
- ☐ Alpha Spec
- ☐ Total U
- ☐ Other

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Scan mR/hr	Sample Weight	Remarks
022978-05	S	7/14/95 - 8:20	500ml	Gamma Spec.	01	<300	729g	
022979-05		8:55			02		864g	
022980-05		9:40			03		725g	
022981-05		10:30			04		831g	
022982-05		11:15			05		623g	
022983-05		12:50			06		640g	
022984-05		13:30			07		571g	
022985-05		14:10			08	<300	779g	
LCS		1Nov50		γ Spec	09	n/a	n/a	

Relinquished by	M. [signature]	Date	7/14/95	Time	1350	Received by	[signature]	Date	7/14/95	Time	1350
Relinquished by	[signature]	Date	7/17/95	Time	1540	Received by	[signature]	Date	7/17/95	Time	1540
Relinquished by		Date		Time		Received by		Date		Time	
Relinquished by		Date		Time		Received by		Date		Time	

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

001-COC (9-94) 500548

AR/COC- 03789

Dept. No./Mail Stop: 7582/1347
Project/Task Manager: D. Miller / H. Fleck
Project Name: TA-1 Soil Sampling (Phase I)
Record Center Code: ADS 1302 ER Site 226
Logbook Ref No: 0133
SMO Reference No.: CF0089

Date Samples Shipped: 7-14-95
Carrier/Waybill No.: Hand
Lab Contact: Amir. M.
Lab Destination: 7715
SMO Contact/Phone: D. "Mac" Mclaughlin - 845-0861
Send Report to SMO: Deborah Mclaughlin

Contract No.: N/A
Case No.: 3626.400
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Parameter & Method Requested: Gamma. Spec.

Location — Tech Area: TA-1
Building: 863,840 Room: Outside

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Gamma. Spec.	Lab Sample ID
229785-05	T1226-GP-007-006-S	10'6"	226	7/13/95 - 8:20	S	P	500ml	None	G	SA	X	
229795-05	T1226-GP-008-007-S	10'8"		8:55							X	
229805-05	T1226-GP-009-006-S	10'2"		9:40							X	
229815-05	T1226-GP-010-007-S	10'8"		10:30							X	
229825-05	T1226-GP-011-005-S	8'8"		11:15							X	
229835-05	T1226-GP-012-006-S	9'8"		12:50							X	
229845-05	T1226-GP-013-006-S	5'8"		13:30							X	
229855-05	T1226-GP-014-006-S	10'2"		14:10							X	

MMA ☐ Yes ☒ No Ref. No.

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date

Sample Tracking: Date Entered (mm/dd/yy): 7/17/95 Entered by: AMC QC Units:

Special Instructions/QC Requirements: 1

Abnormal Conditions on Receipt:

Sample Team Members	Name	Signature	Init	Company/Organization
	Matthew Chein	Matthew Chein	MC	IT Corp / 7582
	Cathie Gahar	Cathie Gahar	CG	Sandia / 7582

Relinquished by	Matthew Chein	Org. 7582	Date 7/13/95	Time 1440	4. Relinquished by	Org.	Date	Time
Received by		Org. SMO 7513	Date 7-13-95	Time 1440	4. Received by	Org.	Date	Time
Relinquished by		Org. SMO 7513	Date 7-14-95	Time 1350	5. Relinquished by	Org.	Date	Time
Received by		Org. SNL 7715	Date 7/14/95	Time 1350	5. Received by	Org.	Date	Time
Relinquished by		Org. SNL 7715	Date 7/17/95	Time 1540	6. Relinquished by	Org.	Date	Time
Received by		Org. 7513	Date 7/17/95	Time 1540	6. Received by	Org.	Date	Time

WHITE - To Accompany Samples, Laboratory Copy BLUE - To Accompany Samples, Return to SMO YELLOW - SMO Suspense Copy PINK - Field Copy

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-16-95 6:13:10 PM

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Analyzed by: 7/17/95 Reviewed by: 7/17/95

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Customer : D.MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : 022978-05
Lab Sample ID : 50054801

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 729.000 gram
Sample Date/Time : 7-13-95 8:20:00 AM
Acquire Start Date : 7-16-95 5:38:56 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.87
TH-234	7.53E-01	9.70E-01	1.54
U-234	Not Detected	--------	2.16E+01
RA-226	1.70	9.41E-01	1.40
PB-214	8.35E-01	1.60E-01	1.19E-01
BI-214	6.60E-01	1.34E-01	1.17E-01
PB-210	Not Detected	--------	1.51
TH-232	6.86E-01	2.25E-01	2.57E-01
RA-228	7.67E-01	3.76E-01	2.27E-01
AC-228	Not Detected	--------	3.31E-01
TH-228	7.35E-01	3.80E-01	8.19E-01
RA-224	Not Detected	--------	6.59E-01
PB-212	7.49E-01	1.54E-01	6.68E-02
BI-212	7.19E-01	4.77E-01	7.06E-01
TL-208	7.06E-01	1.69E-01	1.66E-01
U-235	Not Detected	--------	4.12E-01
TH-231	Not Detected	--------	9.94E-01
PA-231	Not Detected	--------	1.92
AC-227	Not Detected	--------	3.01
TH-227	Not Detected	--------	6.01E-01
RA-223	Not Detected	--------	3.84E-01
RN-219	Not Detected	--------	4.69E-01
PB-211	Not Detected	--------	1.11
TL-207	Not Detected	--------	2.36E+01
AM-241	Not Detected	--------	1.00
PU-239	Not Detected	--------	4.73E+02
NP-237	Not Detected	--------	6.51E-01
PA-233	Not Detected	--------	9.91E-02
TH-229	Not Detected	--------	4.55E-01

[Summary Report] - Sample ID: 50054801

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.46E-02
AR-41	Not Detected	--------	1.82E+12
BA-133	Not Detected	--------	1.08E-01
BA-140	Not Detected	--------	2.18E-01
CD-109	Not Detected	--------	2.23
CD-115	Not Detected	--------	3.24E-01
CE-139	Not Detected	--------	5.23E-02
CE-141	Not Detected	--------	9.82E-02
CE-144	Not Detected	--------	4.06E-01
CO-56	Not Detected	--------	5.86E-02
CO-57	Not Detected	--------	5.25E-02
CO-58	Not Detected	--------	5.66E-02
CO-60	Not Detected	--------	6.51E-02
CR-51	Not Detected	--------	4.27E-01
CS-134	Not Detected	--------	8.87E-02
CS-137	Not Detected	--------	6.16E-02
CU-64	Not Detected	--------	1.07E+03
EU-152	Not Detected	--------	4.29E-01
EU-154	Not Detected	--------	3.24E-01
EU-155	Not Detected	--------	2.42E-01
FE-59	Not Detected	--------	1.27E-01
GD-153	Not Detected	--------	1.80E-01
HG-203	Not Detected	--------	4.95E-02
I-131	Not Detected	--------	6.54E-02
IN-115m	Not Detected	--------	3.39E+04
IR-192	Not Detected	--------	4.82E-02
K-40	1.69E+01	2.50	5.15E-01
LA-140	Not Detected	--------	2.25E-01
MN-54	Not Detected	--------	6.28E-02
MN-56	Not Detected	--------	1.90E+08
MO-99	Not Detected	--------	1.04
NA-22	Not Detected	--------	7.75E-02
NA-24	Not Detected	--------	2.48
NB-95	Not Detected	--------	5.23E-01
ND-147	Not Detected	--------	4.00E-01
NI-57	Not Detected	--------	4.50E-01
BE-7	Not Detected	--------	4.12E-01
RU-103	Not Detected	--------	4.87E-02
RU-106	Not Detected	--------	5.13E-01
SB-122	Not Detected	--------	1.69E-01
SB-124	Not Detected	--------	5.65E-02
SB-125	Not Detected	--------	1.30E-01
SC-46	Not Detected	--------	9.79E-02
SR-85	Not Detected	--------	6.50E-02
TA-182	Not Detected	--------	2.88E-01
TA-183	Not Detected	--------	1.37
TE-132	Not Detected	--------	9.48E-02
TL-201	Not Detected	--------	6.20E-01
XE-133	Not Detected	--------	6.42E-01
Y-88	Not Detected	--------	5.05E-02
ZN-65	Not Detected	--------	1.85E-01
ZR-95	Not Detected	--------	1.08E-01

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* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 7-16-95 6:52:37 PM *
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* Analyzed by: 7/17/95 Reviewed by: 7/17/95 *

Customer : D.MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : 022979-05
Lab Sample ID : 50054802

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 864.000 gram
Sample Date/Time : 7-13-95 8:55:00 AM
Acquire Start Date : 7-16-95 6:18:58 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.50
TH-234	Not Detected	--------	7.41E-01
U-234	Not Detected	--------	2.04E+01
RA-226	1.93	9.79E-01	7.60E-01
PB-214	7.61E-01	1.52E-01	1.33E-01
BI-214	6.72E-01	1.28E-01	1.02E-01
PB-210	Not Detected	--------	1.23
TH-232	6.45E-01	2.00E-01	2.21E-01
RA-228	7.60E-01	2.61E-01	2.26E-01
AC-228	8.08E-01	1.88E-01	1.57E-01
TH-228	Not Detected	--------	1.25
RA-224	1.95	4.83E-01	6.59E-01
PB-212	8.15E-01	1.60E-01	6.37E-02
BI-212	1.07	4.46E-01	5.82E-01
TL-208	6.78E-01	1.47E-01	1.25E-01
U-235	Not Detected	--------	3.91E-01
TH-231	Not Detected	--------	9.70E-01
PA-231	Not Detected	--------	1.73
AC-227	Not Detected	--------	2.79
TH-227	Not Detected	--------	5.78E-01
RA-223	Not Detected	--------	3.83E-01
RN-219	Not Detected	--------	4.70E-01
PB-211	Not Detected	--------	1.05
TL-207	Not Detected	--------	2.33E+01
AM-241	Not Detected	--------	8.84E-01
PU-239	Not Detected	--------	4.39E+02
NP-237	Not Detected	--------	6.04E-01
PA-233	Not Detected	--------	9.72E-02
TH-229	Not Detected	--------	4.51E-01

[Summary Report] - Sample ID: 50054802

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.89E-02
AR-41	Not Detected	--------	1.78E+12
BA-133	Not Detected	--------	9.86E-02
BA-140	Not Detected	--------	2.15E-01
CD-109	Not Detected	--------	2.01
CD-115	Not Detected	--------	3.10E-01
CE-139	Not Detected	--------	4.87E-02
CE-141	Not Detected	--------	9.59E-02
CE-144	Not Detected	--------	3.94E-01
CO-56	Not Detected	--------	5.75E-02
CO-57	Not Detected	--------	5.05E-02
CO-58	Not Detected	--------	5.33E-02
CO-60	Not Detected	--------	6.03E-02
CR-51	Not Detected	--------	3.99E-01
CS-134	Not Detected	--------	8.03E-02
CS-137	Not Detected	--------	5.56E-02
CU-64	Not Detected	--------	1.04E+03
EU-152	Not Detected	--------	3.97E-01
EU-154	Not Detected	--------	3.07E-01
EU-155	Not Detected	--------	2.26E-01
FE-59	Not Detected	--------	1.27E-01
GD-153	Not Detected	--------	1.75E-01
HG-203	Not Detected	--------	5.06E-02
I-131	Not Detected	--------	5.80E-02
IN-115m	Not Detected	--------	3.28E+04
IR-192	Not Detected	--------	4.75E-02
K-40	1.87E+01	2.70	4.42E-01
LA-140	Not Detected	--------	2.27E-01
MN-54	Not Detected	--------	5.38E-02
MN-56	Not Detected	--------	1.91E+08
MO-99	Not Detected	--------	9.63E-01
NA-22	Not Detected	--------	7.12E-02
NA-24	Not Detected	--------	2.31
NB-95	Not Detected	--------	5.00E-01
ND-147	Not Detected	--------	4.09E-01
NI-57	Not Detected	--------	3.70E-01
BE-7	Not Detected	--------	4.24E-01
RU-103	Not Detected	--------	4.77E-02
RU-106	Not Detected	--------	4.43E-01
SB-122	Not Detected	--------	1.41E-01
SB-124	Not Detected	--------	4.92E-02
SB-125	Not Detected	--------	1.29E-01
SC-46	Not Detected	--------	8.75E-02
SR-85	Not Detected	--------	6.17E-02
TA-182	Not Detected	--------	2.59E-01
TA-183	Not Detected	--------	1.21
TE-132	Not Detected	--------	8.51E-02
TL-201	Not Detected	--------	5.84E-01
XE-133	Not Detected	--------	6.36E-01
Y-88	Not Detected	--------	4.17E-02
ZN-65	Not Detected	--------	1.71E-01
ZR-95	Not Detected	--------	9.99E-02

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-16-95 7:32:15 PM

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Analyzed by: 7/17/95 Reviewed by: 7/17/95

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Customer : D.MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : 022980-05
Lab Sample ID : 50054803

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 725.000 gram
Sample Date/Time : 7-13-95 9:40:00 AM
Acquire Start Date : 7-16-95 6:58:33 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.77
TH-234	Not Detected	--------	1.33
U-234	Not Detected	--------	2.24E+01
RA-226	1.38	9.25E-01	1.41
PB-214	7.61E-01	1.47E-01	1.06E-01
BI-214	6.65E-01	1.29E-01	9.81E-02
PB-210	Not Detected	--------	1.56
TH-232	6.66E-01	2.77E-01	3.73E-01
RA-228	7.40E-01	2.50E-01	2.85E-01
AC-228	Not Detected	--------	3.36E-01
TH-228	7.97E-01	3.68E-01	7.57E-01
RA-224	Not Detected	--------	6.90E-01
PB-212	6.89E-01	1.44E-01	6.52E-02
BI-212	5.46E-01	4.28E-01	6.50E-01
TL-208	5.96E-01	1.47E-01	1.43E-01
U-235	Not Detected	--------	4.13E-01
TH-231	Not Detected	--------	1.05
PA-231	Not Detected	--------	1.79
AC-227	Not Detected	--------	2.89
TH-227	Not Detected	--------	5.96E-01
RA-223	Not Detected	--------	3.99E-01
RN-219	Not Detected	--------	4.59E-01
PB-211	Not Detected	--------	1.04
TL-207	Not Detected	--------	2.41E+01
AM-241	Not Detected	--------	9.70E-01
PU-239	Not Detected	--------	4.69E+02
NP-237	Not Detected	--------	6.66E-01
PA-233	Not Detected	--------	1.00E-01
TH-229	Not Detected	--------	4.68E-01

[Summary Report] - Sample ID: 50054803

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.06E-02
AR-41	Not Detected	--------	1.95E+12
BA-133	Not Detected	--------	1.11E-01
BA-140	Not Detected	--------	1.92E-01
CD-109	Not Detected	--------	2.25
CD-115	Not Detected	--------	3.10E-01
CE-139	Not Detected	--------	5.43E-02
CE-141	Not Detected	--------	9.94E-02
CE-144	Not Detected	--------	4.09E-01
CO-56	Not Detected	--------	6.38E-02
CO-57	Not Detected	--------	5.30E-02
CO-58	Not Detected	--------	5.89E-02
CO-60	Not Detected	--------	5.78E-02
CR-51	Not Detected	--------	4.20E-01
CS-134	Not Detected	--------	9.15E-02
CS-137	Not Detected	--------	5.55E-02
CU-64	Not Detected	--------	1.14E+03
EU-152	Not Detected	--------	4.23E-01
EU-154	Not Detected	--------	2.91E-01
EU-155	Not Detected	--------	2.47E-01
FE-59	Not Detected	--------	1.28E-01
GD-153	Not Detected	--------	1.81E-01
HG-203	Not Detected	--------	4.90E-02
I-131	Not Detected	--------	6.33E-02
IN-115m	Not Detected	--------	3.24E+04
IR-192	Not Detected	--------	4.82E-02
K-40	1.40E+01	2.13	5.41E-01
LA-140	Not Detected	--------	2.79E-01
MN-54	Not Detected	--------	5.89E-02
MN-56	Not Detected	--------	2.07E+08
MO-99	Not Detected	--------	9.66E-01
NA-22	Not Detected	--------	6.70E-02
NA-24	Not Detected	--------	2.70
NB-95	Not Detected	--------	5.18E-01
ND-147	Not Detected	--------	3.79E-01
NI-57	Not Detected	--------	4.40E-01
BE-7	Not Detected	--------	4.64E-01
RU-103	Not Detected	--------	4.88E-02
RU-106	Not Detected	--------	4.96E-01
SB-122	Not Detected	--------	1.63E-01
SB-124	Not Detected	--------	5.54E-02
SB-125	Not Detected	--------	1.28E-01
SC-46	Not Detected	--------	9.41E-02
SR-85	Not Detected	--------	5.68E-02
TA-182	Not Detected	--------	2.79E-01
TA-183	Not Detected	--------	1.33
TE-132	Not Detected	--------	9.31E-02
TL-201	Not Detected	--------	6.17E-01
XE-133	Not Detected	--------	6.39E-01
Y-88	Not Detected	--------	4.60E-02
ZN-65	Not Detected	--------	1.82E-01
ZR-95	Not Detected	--------	1.06E-01

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-16-95 8:11:52 PM

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Analyzed by: 7/17/95 Reviewed by: 7/17/95

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Customer : D.MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : 022981-05
Lab Sample ID : 50054804

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 831.000 gram
Sample Date/Time : 7-13-95 10:30:00 AM
Acquire Start Date : 7-16-95 7:38:12 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.29
TH-234	Not Detected	--------	1.16
U-234	Not Detected	--------	1.94E+01
RA-226	1.35	7.68E-01	1.15
PB-214	6.77E-01	1.30E-01	9.44E-02
BI-214	5.45E-01	1.13E-01	9.95E-02
PB-210	Not Detected	--------	1.26
TH-232	6.59E-01	2.81E-01	3.86E-01
RA-228	4.97E-01	2.20E-01	2.93E-01
AC-228	5.89E-01	1.74E-01	1.90E-01
TH-228	7.97E-01	3.54E-01	6.80E-01
RA-224	Not Detected	--------	1.71
PB-212	5.78E-01	1.19E-01	9.57E-02
BI-212	8.22E-01	3.80E-01	5.01E-01
TL-208	6.60E-01	1.50E-01	1.37E-01
U-235	Not Detected	--------	3.92E-01
TH-231	Not Detected	--------	9.05E-01
PA-231	Not Detected	--------	1.72
AC-227	Not Detected	--------	2.81
TH-227	Not Detected	--------	5.46E-01
RA-223	Not Detected	--------	3.47E-01
RN-219	Not Detected	--------	4.62E-01
PB-211	Not Detected	--------	1.01
TL-207	Not Detected	--------	2.21E+01
AM-241	Not Detected	--------	8.37E-01
PU-239	Not Detected	--------	4.69E+02
NP-237	Not Detected	--------	5.81E-01
PA-233	Not Detected	--------	9.29E-02
TH-229	Not Detected	--------	4.41E-01

[Summary Report] - Sample ID: 50054804

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.58E-02
AR-41	Not Detected	--------	1.80E+12
BA-133	Not Detected	--------	9.41E-02
BA-140	Not Detected	--------	2.03E-01
CD-109	Not Detected	--------	1.98
CD-115	Not Detected	--------	2.98E-01
CE-139	Not Detected	--------	5.05E-02
CE-141	Not Detected	--------	9.49E-02
CE-144	Not Detected	--------	4.02E-01
CO-56	Not Detected	--------	5.81E-02
CO-57	Not Detected	--------	4.81E-02
CO-58	Not Detected	--------	5.28E-02
CO-60	Not Detected	--------	6.05E-02
CR-51	Not Detected	--------	3.98E-01
CS-134	Not Detected	--------	7.72E-02
CS-137	Not Detected	--------	5.18E-02
CU-64	Not Detected	--------	9.00E+02
EU-152	Not Detected	--------	3.95E-01
EU-154	Not Detected	--------	2.81E-01
EU-155	Not Detected	--------	2.24E-01
FE-59	Not Detected	--------	1.23E-01
GD-153	Not Detected	--------	1.68E-01
HG-203	Not Detected	--------	4.87E-02
I-131	Not Detected	--------	5.75E-02
IN-115m	Not Detected	--------	3.04E+04
IR-192	Not Detected	--------	4.42E-02
K-40	2.03E+01	2.92	5.10E-01
LA-140	Not Detected	--------	2.70E-01
MN-54	Not Detected	--------	5.59E-02
MN-56	Not Detected	--------	1.80E+08
MO-99	Not Detected	--------	9.62E-01
NA-22	Not Detected	--------	6.91E-02
NA-24	Not Detected	--------	2.37
NB-95	Not Detected	--------	4.72E-01
ND-147	Not Detected	--------	3.64E-01
NI-57	Not Detected	--------	3.85E-01
BE-7	Not Detected	--------	4.01E-01
RU-103	Not Detected	--------	4.68E-02
RU-106	Not Detected	--------	4.40E-01
SB-122	Not Detected	--------	1.40E-01
SB-124	Not Detected	--------	4.89E-02
SB-125	Not Detected	--------	1.23E-01
SC-46	Not Detected	--------	9.08E-02
SR-85	Not Detected	--------	6.04E-02
TA-182	Not Detected	--------	2.64E-01
TA-183	Not Detected	--------	1.15
TE-132	Not Detected	--------	8.79E-02
TL-201	Not Detected	--------	5.50E-01
XE-133	Not Detected	--------	5.67E-01
Y-88	Not Detected	--------	3.14E-02
ZN-65	Not Detected	--------	1.73E-01
ZR-95	Not Detected	--------	9.16E-02

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-16-95 8:51:39 PM

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Analyzed by: 7/17/95 Reviewed by: 7/17/95

Customer : D.MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : 022982-05
Lab Sample ID : 50054805

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 623.000 gram
Sample Date/Time : 7-13-95 11:15:00 AM
Acquire Start Date : 7-16-95 8:17:53 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	6.75
TH-234	1.45	7.21E-01	1.01
U-234	Not Detected	--------	2.43E+01
RA-226	1.62	6.56E-01	8.68E-01
PB-214	1.02	1.89E-01	1.27E-01
BI-214	8.07E-01	1.53E-01	1.08E-01
PB-210	1.04	6.57E-01	7.73E-01
TH-232	7.59E-01	2.71E-01	3.31E-01
RA-228	7.93E-01	4.76E-01	2.57E-01
AC-228	8.38E-01	2.14E-01	1.89E-01
TH-228	Not Detected	--------	1.48
RA-224	Not Detected	--------	8.14E-01
PB-212	7.95E-01	1.68E-01	7.21E-02
BI-212	4.24E-01	4.73E-01	7.52E-01
TL-208	7.83E-01	1.77E-01	1.51E-01
U-235	Not Detected	--------	4.46E-01
TH-231	Not Detected	--------	1.07
PA-231	Not Detected	--------	2.05
AC-227	Not Detected	--------	3.34
TH-227	Not Detected	--------	6.84E-01
RA-223	Not Detected	--------	4.21E-01
RN-219	Not Detected	--------	5.24E-01
PB-211	Not Detected	--------	1.26
TL-207	Not Detected	--------	2.48E+01
AM-241	Not Detected	--------	1.05
PU-239	Not Detected	--------	5.32E+02
NP-237	Not Detected	--------	4.29E-01
PA-233	Not Detected	--------	1.12E-01
TH-229	Not Detected	--------	5.16E-01

[Summary Report] - Sample ID: 50054805

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.76E-02
AR-41	Not Detected	--------	1.74E+12
BA-133	Not Detected	--------	1.28E-01
BA-140	Not Detected	--------	2.45E-01
CD-109	Not Detected	--------	1.48
CD-115	Not Detected	--------	3.68E-01
CE-139	Not Detected	--------	5.82E-02
CE-141	Not Detected	--------	1.09E-01
CE-144	Not Detected	--------	4.75E-01
CO-56	Not Detected	--------	6.46E-02
CO-57	Not Detected	--------	5.76E-02
CO-58	Not Detected	--------	6.14E-02
CO-60	Not Detected	--------	7.18E-02
CR-51	Not Detected	--------	4.76E-01
CS-134	Not Detected	--------	1.03E-01
CS-137	Not Detected	--------	6.54E-02
CU-64	Not Detected	--------	1.04E+03
EU-152	Not Detected	--------	4.67E-01
EU-154	Not Detected	--------	3.66E-01
EU-155	Not Detected	--------	2.62E-01
FE-59	Not Detected	--------	1.41E-01
GD-153	Not Detected	--------	2.11E-01
HG-203	Not Detected	--------	6.02E-02
I-131	Not Detected	--------	6.73E-02
IN-115m	Not Detected	--------	3.70E+04
IR-192	Not Detected	--------	5.49E-02
K-40	1.35E+01	2.11	6.00E-01
LA-140	Not Detected	--------	3.20E-01
MN-54	Not Detected	--------	6.68E-02
MN-56	Not Detected	--------	1.95E+08
MO-99	Not Detected	--------	1.07
NA-22	Not Detected	--------	8.39E-02
NA-24	Not Detected	--------	2.79
NB-95	Not Detected	--------	5.89E-01
ND-147	Not Detected	--------	4.69E-01
NI-57	Not Detected	--------	4.81E-01
BE-7	Not Detected	--------	4.56E-01
RU-103	Not Detected	--------	5.24E-02
RU-106	Not Detected	--------	5.64E-01
SB-122	Not Detected	--------	1.81E-01
SB-124	Not Detected	--------	5.92E-02
SB-125	Not Detected	--------	1.50E-01
SC-46	Not Detected	--------	1.02E-01
SR-85	Not Detected	--------	7.89E-02
TA-182	Not Detected	--------	2.96E-01
TA-183	Not Detected	--------	1.44
TE-132	Not Detected	--------	1.03E-01
TL-201	Not Detected	--------	7.24E-01
XE-133	Not Detected	--------	7.10E-01
Y-88	Not Detected	--------	6.16E-02
ZN-65	Not Detected	--------	2.04E-01
ZR-95	Not Detected	--------	1.18E-01

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-16-95 9:31:20 PM

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Analyzed by: 7/17/95 Reviewed by: 7/17/95

Customer : D.MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : 022983-05
Lab Sample ID : 50054806

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 640.000 gram
Sample Date/Time : 7-13-95 12:50:00 PM
Acquire Start Date : 7-16-95 8:57:43 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	6.16
TH-234	7.24E-01	6.47E-01	9.77E-01
U-234	Not Detected	--------	2.23E+01
RA-226	1.54	1.05	1.61
PB-214	8.60E-01	1.77E-01	1.54E-01
BI-214	5.82E-01	1.32E-01	1.29E-01
PB-210	Not Detected	--------	1.68
TH-232	6.65E-01	2.45E-01	3.01E-01
RA-228	5.77E-01	2.28E-01	2.72E-01
AC-228	Not Detected	--------	3.93E-01
TH-228	9.56E-01	4.47E-01	8.68E-01
RA-224	2.14	5.61E-01	7.12E-01
PB-212	7.86E-01	1.63E-01	6.82E-02
BI-212	1.07	4.23E-01	4.91E-01
TL-208	7.22E-01	1.63E-01	1.35E-01
U-235	Not Detected	--------	4.42E-01
TH-231	Not Detected	--------	1.08
PA-231	Not Detected	--------	2.07
AC-227	Not Detected	--------	3.14
TH-227	Not Detected	--------	6.64E-01
RA-223	Not Detected	--------	4.17E-01
RN-219	Not Detected	--------	5.40E-01
PB-211	Not Detected	--------	1.21
TL-207	Not Detected	--------	2.69E+01
AM-241	Not Detected	--------	9.99E-01
PU-239	Not Detected	--------	5.21E+02
NP-237	Not Detected	--------	7.07E-01
PA-233	Not Detected	--------	1.10E-01
TH-229	Not Detected	--------	5.15E-01

[Summary Report] - Sample ID: 50054806

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.78E-02
AR-41	Not Detected	--------	1.16E+12
BA-133	Not Detected	--------	1.23E-01
BA-140	Not Detected	--------	2.33E-01
CD-109	Not Detected	--------	2.41
CD-115	Not Detected	--------	3.46E-01
CE-139	Not Detected	--------	5.39E-02
CE-141	Not Detected	--------	1.06E-01
CE-144	Not Detected	--------	4.36E-01
CO-56	Not Detected	--------	6.93E-02
CO-57	Not Detected	--------	5.47E-02
CO-58	Not Detected	--------	6.24E-02
CO-60	Not Detected	--------	6.72E-02
CR-51	Not Detected	--------	4.72E-01
CS-134	Not Detected	--------	9.62E-02
CS-137	Not Detected	--------	6.52E-02
CU-64	Not Detected	--------	1.08E+03
EU-152	Not Detected	--------	4.85E-01
EU-154	Not Detected	--------	3.24E-01
EU-155	Not Detected	--------	2.62E-01
FE-59	Not Detected	--------	1.35E-01
GD-153	Not Detected	--------	1.99E-01
HG-203	Not Detected	--------	5.91E-02
I-131	Not Detected	--------	6.78E-02
IN-115m	Not Detected	--------	3.05E+04
IR-192	Not Detected	--------	5.39E-02
K-40	1.52E+01	2.33	6.69E-01
LA-140	Not Detected	--------	2.72E-01
MN-54	Not Detected	--------	6.39E-02
MN-56	Not Detected	--------	1.64E+08
MO-99	Not Detected	--------	1.12
NA-22	Not Detected	--------	8.21E-02
NA-24	Not Detected	--------	2.75
NB-95	Not Detected	--------	5.66E-01
ND-147	Not Detected	--------	4.45E-01
NI-57	Not Detected	--------	4.01E-01
BE-7	Not Detected	--------	4.84E-01
RU-103	Not Detected	--------	5.80E-02
RU-106	Not Detected	--------	5.49E-01
SB-122	Not Detected	--------	1.71E-01
SB-124	Not Detected	--------	6.51E-02
SB-125	Not Detected	--------	1.42E-01
SC-46	Not Detected	--------	1.04E-01
SR-85	Not Detected	--------	6.99E-02
TA-182	Not Detected	--------	2.96E-01
TA-183	Not Detected	--------	1.36
TE-132	Not Detected	--------	9.90E-02
TL-201	Not Detected	--------	6.61E-01
XE-133	Not Detected	--------	6.87E-01
Y-88	Not Detected	--------	5.88E-02
ZN-65	Not Detected	--------	1.96E-01
ZR-95	Not Detected	--------	1.19E-01

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-16-95 10:10:49 PM

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Analyzed by: 7/17/95 Reviewed by: 7/17/95

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Customer : D.MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : 022984-05
Lab Sample ID : 50054807

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 571.000 gram
Sample Date/Time : 7-13-95 1:30:00 PM
Acquire Start Date : 7-16-95 9:37:19 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	6.85
TH-234	8.58E-01	1.00	1.58
U-234	Not Detected	--------	2.67E+01
RA-226	2.53	8.51E-01	1.05
PB-214	1.01	1.94E-01	1.45E-01
BI-214	8.88E-01	1.61E-01	9.15E-02
PB-210	Not Detected	--------	1.98
TH-232	8.14E-01	3.15E-01	4.07E-01
RA-228	6.54E-01	3.47E-01	2.67E-01
AC-228	Not Detected	--------	4.24E-01
TH-228	Not Detected	--------	1.62
RA-224	Not Detected	--------	9.43E-01
PB-212	8.30E-01	2.24E-01	8.60E-02
BI-212	1.56	6.29E-01	7.98E-01
TL-208	6.55E-01	1.70E-01	1.70E-01
U-235	Not Detected	--------	4.89E-01
TH-231	Not Detected	--------	1.16
PA-231	Not Detected	--------	2.24
AC-227	Not Detected	--------	3.47
TH-227	Not Detected	--------	7.17E-01
RA-223	Not Detected	--------	4.46E-01
RN-219	Not Detected	--------	5.65E-01
PB-211	Not Detected	--------	1.30
TL-207	Not Detected	--------	2.76E+01
AM-241	Not Detected	--------	1.09
PU-239	Not Detected	--------	5.37E+02
NP-237	Not Detected	--------	7.44E-01
PA-233	Not Detected	--------	1.21E-01
TH-229	Not Detected	--------	5.59E-01

[Summary Report] - Sample ID: 50054807

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.86E-02
AR-41	Not Detected	--------	1.57E+12
BA-133	Not Detected	--------	1.34E-01
BA-140	Not Detected	--------	2.50E-01
CD-109	Not Detected	--------	2.58
CD-115	Not Detected	--------	3.70E-01
CE-139	Not Detected	--------	6.13E-02
CE-141	Not Detected	--------	1.18E-01
CE-144	Not Detected	--------	4.72E-01
CO-56	Not Detected	--------	7.15E-02
CO-57	Not Detected	--------	6.45E-02
CO-58	Not Detected	--------	6.63E-02
CO-60	Not Detected	--------	7.07E-02
CR-51	Not Detected	--------	4.97E-01
CS-134	Not Detected	--------	1.09E-01
CS-137	Not Detected	--------	6.48E-02
CU-64	Not Detected	--------	1.14E+03
EU-152	Not Detected	--------	4.75E-01
EU-154	Not Detected	--------	3.89E-01
EU-155	Not Detected	--------	2.78E-01
FE-59	Not Detected	--------	1.35E-01
GD-153	Not Detected	--------	2.21E-01
HG-203	Not Detected	--------	6.07E-02
I-131	Not Detected	--------	7.73E-02
IN-115m	Not Detected	--------	3.26E+04
IR-192	Not Detected	--------	5.70E-02
K-40	1.56E+01	2.39	4.62E-01
LA-140	Not Detected	--------	3.30E-01
MN-54	Not Detected	--------	6.97E-02
MN-56	Not Detected	--------	1.69E+08
MO-99	Not Detected	--------	1.24
NA-22	Not Detected	--------	8.96E-02
NA-24	Not Detected	--------	2.86
NB-95	Not Detected	--------	6.13E-01
ND-147	Not Detected	--------	4.77E-01
NI-57	Not Detected	--------	5.19E-01
BE-7	Not Detected	--------	5.19E-01
RU-103	Not Detected	--------	5.76E-02
RU-106	Not Detected	--------	6.18E-01
SB-122	Not Detected	--------	1.89E-01
SB-124	Not Detected	--------	6.05E-02
SB-125	Not Detected	--------	1.59E-01
SC-46	Not Detected	--------	1.10E-01
SR-85	Not Detected	--------	7.78E-02
TA-182	Not Detected	--------	3.16E-01
TA-183	Not Detected	--------	1.49
TE-132	Not Detected	--------	1.08E-01
TL-201	Not Detected	--------	6.91E-01
XE-133	Not Detected	--------	7.20E-01
Y-88	Not Detected	--------	7.24E-02
ZN-65	Not Detected	--------	2.11E-01
ZR-95	Not Detected	--------	1.18E-01

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
7-16-95 10:51:02 PM

Analyzed by: 7/17/95 Reviewed by: 7/17/95

Customer : D.MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : 022985-05
Lab Sample ID : 50054808

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 779.000 gram
Sample Date/Time : 7-13-95 2:10:00 PM
Acquire Start Date : 7-16-95 10:16:54 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.28
TH-234	Not Detected	--------	1.23
U-234	Not Detected	--------	1.85E+01
RA-226	1.16	6.58E-01	9.72E-01
PB-214	6.82E-01	1.34E-01	1.01E-01
BI-214	5.49E-01	1.10E-01	8.51E-02
PB-210	Not Detected	--------	1.29
TH-232	5.84E-01	2.29E-01	2.96E-01
RA-228	4.29E-01	2.29E-01	3.24E-01
AC-228	Not Detected	--------	3.37E-01
TH-228	8.36E-01	3.64E-01	6.45E-01
RA-224	Not Detected	--------	7.12E-01
PB-212	6.04E-01	1.02E-01	6.69E-02
BI-212	8.89E-01	4.03E-01	5.27E-01
TL-208	6.52E-01	1.50E-01	1.37E-01
U-235	Not Detected	--------	3.89E-01
TH-231	Not Detected	--------	9.37E-01
PA-231	Not Detected	--------	1.72
AC-227	Not Detected	--------	2.83
TH-227	Not Detected	--------	5.48E-01
RA-223	Not Detected	--------	3.55E-01
RN-219	Not Detected	--------	4.19E-01
PB-211	Not Detected	--------	9.29E-01
TL-207	Not Detected	--------	2.43E+01
AM-241	Not Detected	--------	8.38E-01
PU-239	Not Detected	--------	4.58E+02
NP-237	Not Detected	--------	5.83E-01
PA-233	Not Detected	--------	9.37E-02
TH-229	Not Detected	--------	4.25E-01

[Summary Report] - Sample ID: 50054808

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.77E-02
AR-41	Not Detected	--------	1.14E+12
BA-133	Not Detected	--------	1.01E-01
BA-140	Not Detected	--------	1.97E-01
CD-109	Not Detected	--------	1.99
CD-115	Not Detected	--------	2.84E-01
CE-139	Not Detected	--------	4.79E-02
CE-141	Not Detected	--------	9.45E-02
CE-144	Not Detected	--------	4.03E-01
CO-56	Not Detected	--------	5.78E-02
CO-57	Not Detected	--------	4.76E-02
CO-58	Not Detected	--------	5.06E-02
CO-60	Not Detected	--------	5.92E-02
CR-51	Not Detected	--------	3.98E-01
CS-134	Not Detected	--------	7.96E-02
CS-137	Not Detected	--------	5.46E-02
CU-64	Not Detected	--------	9.41E+02
EU-152	Not Detected	--------	4.02E-01
EU-154	Not Detected	--------	2.83E-01
EU-155	Not Detected	--------	2.22E-01
FE-59	Not Detected	--------	1.25E-01
GD-153	Not Detected	--------	1.70E-01
HG-203	Not Detected	--------	4.93E-02
I-131	Not Detected	--------	5.91E-02
IN-115m	Not Detected	--------	2.50E+04
IR-192	Not Detected	--------	4.43E-02
K-40	1.74E+01	2.55	4.85E-01
LA-140	Not Detected	--------	2.15E-01
MN-54	Not Detected	--------	5.74E-02
MN-56	Not Detected	--------	1.36E+08
MO-99	Not Detected	--------	9.47E-01
NA-22	Not Detected	--------	7.08E-02
NA-24	Not Detected	--------	2.20
NB-95	Not Detected	--------	4.72E-01
ND-147	Not Detected	--------	3.94E-01
NI-57	Not Detected	--------	3.65E-01
BE-7	Not Detected	--------	3.88E-01
RU-103	Not Detected	--------	4.49E-02
RU-106	Not Detected	--------	4.97E-01
SB-122	Not Detected	--------	1.58E-01
SB-124	Not Detected	--------	4.71E-02
SB-125	Not Detected	--------	1.22E-01
SC-46	Not Detected	--------	8.87E-02
SR-85	Not Detected	--------	6.07E-02
TA-182	Not Detected	--------	2.59E-01
TA-183	Not Detected	--------	1.14
TE-132	Not Detected	--------	8.97E-02
TL-201	Not Detected	--------	5.65E-01
XE-133	Not Detected	--------	5.75E-01
Y-88	Not Detected	--------	4.40E-02
ZN-65	Not Detected	--------	1.67E-01
ZR-95	Not Detected	--------	9.65E-02

****
*
* Sandia National Laboratories
* Radiation Protection Sample Diagnostics Program [881 Laboratory]
* 7-17-95 7:03:13 AM
*
****

* Analyzed by: 7/17/95 Reviewed by: 7/17/95 *

Customer : D.MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : LAB CONTROL SAMPLE ANALYSIS #CG134
Lab Sample ID : 50054809

Sample Description : MIXED_GAMMA_STANDARD
Sample Type : Liquid
Sample Geometry : WMAR
Sample Quantity : 1.000 Each
Sample Date/Time : 11-01-90 12:00:00 PM
Acquire Start Date : 7-17-95 6:49:49 AM
Detector Name : LAB02
Elapsed Live Time : 600 seconds
Elapsed Real Time : 606 seconds

Comments:

Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	--------	2.15E+04
TH-234	Not Detected	--------	4.72E+03
U-234	Not Detected	--------	1.17E+05
RA-226	Not Detected	--------	5.89E+03
PB-214	Not Detected	--------	6.85E+02
BI-214	Not Detected	--------	6.45E+02
PB-210	Not Detected	--------	4.53E+03
TH-232	Not Detected	--------	2.06E+03
RA-228	Not Detected	--------	2.82E+03
AC-228	Not Detected	--------	1.78E+03
TH-228	Not Detected	--------	3.66E+04
RA-224	Not Detected	--------	3.13E+04
PB-212	Not Detected	--------	2.87E+03
BI-212	Not Detected	--------	2.61E+04
TL-208	Not Detected	--------	5.33E+03
U-235	Not Detected	--------	1.86E+03
TH-231	Not Detected	--------	3.85E+03
PA-231	Not Detected	--------	9.25E+03
AC-227	Not Detected	--------	1.61E+04
TH-227	Not Detected	--------	2.24E+03
RA-223	Not Detected	--------	1.00E+26
RN-219	Not Detected	--------	2.87E+03
PB-211	Not Detected	--------	8.45E+03
TL-207	Not Detected	--------	2.17E+05
AM-241	9.06E+04	1.62E+04	6.14E+03
PU-239	Not Detected	--------	2.17E+06
NP-237	Not Detected	--------	2.75E+03
PA-233	Not Detected	--------	6.09E+02
TH-229	Not Detected	--------	2.04E+03

[Summary Report] - Sample ID: 50054809

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	--------	1.83E+05
AR-41	Not Detected	--------	1.00E+26
BA-133	Not Detected	--------	5.50E+02
BA-140	Not Detected	--------	1.00E+26
CD-109	4.13E+05	1.14E+05	1.38E+05
CD-115	Not Detected	--------	1.00E+26
CE-139	Not Detected	--------	1.41E+06
CE-141	Not Detected	--------	3.48E+18
CE-144	Not Detected	--------	1.26E+05
CO-56	Not Detected	--------	2.07E+09
CO-57	Not Detected	--------	2.02E+04
CO-58	Not Detected	--------	7.44E+09
CO-60	7.46E+04	9.71E+03	5.01E+02
CR-51	Not Detected	--------	1.11E+22
CS-134	Not Detected	--------	1.48E+03
CS-137	6.83E+04	8.82E+03	5.03E+02
CU-64	Not Detected	--------	1.00E+26
EU-152	Not Detected	--------	3.51E+03
EU-154	Not Detected	--------	2.29E+03
EU-155	Not Detected	--------	2.14E+03
FE-59	Not Detected	--------	3.85E+14
GD-153	Not Detected	--------	1.10E+05
HG-203	Not Detected	--------	3.41E+13
I-131	Not Detected	--------	1.00E+26
IN-115m	Not Detected	--------	1.00E+26
IR-192	Not Detected	--------	2.86E+09
K-40	Not Detected	--------	1.77E+03
LA-140	Not Detected	--------	1.00E+26
MN-54	Not Detected	--------	1.81E+04
MN-56	Not Detected	--------	1.00E+26
MO-99	Not Detected	--------	1.00E+26
NA-22	Not Detected	--------	8.10E+02
NA-24	Not Detected	--------	1.00E+26
NB-95	Not Detected	--------	1.00E+26
ND-147	Not Detected	--------	1.00E+26
NI-57	Not Detected	--------	1.00E+26
BE-7	Not Detected	--------	1.72E+13
RU-103	Not Detected	--------	5.12E+15
RU-106	Not Detected	--------	7.64E+04
SB-122	Not Detected	--------	1.00E+26
SB-124	Not Detected	--------	1.19E+11
SB-125	Not Detected	--------	3.32E+03
SC-46	Not Detected	--------	6.96E+08
SR-85	Not Detected	--------	3.40E+10
TA-182	Not Detected	--------	4.19E+07
TA-183	Not Detected	--------	1.00E+26
TE-132	Not Detected	--------	1.00E+26
TL-201	Not Detected	--------	1.00E+26
XE-133	Not Detected	--------	1.00E+26
Y-88	Not Detected	--------	1.35E+07
ZN-65	Not Detected	--------	1.30E+05
ZR-95	Not Detected	--------	7.48E+10

****
*
Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
Quality Assurance Report
*
****

Report Date : 7-17-95 7:08:01 AM
QA File : C:\GENIEPC\CAMFILES\LCS2.QAF
Analyst : FCD
Sample ID : 50054809
Sample Quantity : 1.00 Each
Sample Date : 11-01-90 12:00:00 PM
Measurement Date : 7-17-95 6:49:49 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 606 seconds

Parameter	Mean	1S Error	New Value	<	LU	SD	UD	BS
AM-241 Activity	9.708E-02	3.809E-03	9.057E-02	<		In		
CS-137 Activity	6.956E-02	2.406E-03	6.828E-02	<				
CO-60 Activity	7.676E-02	2.548E-03	7.410E-02	<		In		

OK 7/17/95

Flags Key: LU = Boundary Test (Ab = Above , Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: 7/17/95

EK/1302 226/DAT (3)

SMO ANALYTICAL DATA ROUTING FORM

Project Name: TAI Phase I Case Number: 3626400

SNL Task Leader: Miller Org/Mail Stop: 7584 | 1148

SMO Project Coordinator: Pierrat Sample Ship Date: 7/18/95
7/14/95
7/10/95

ARCOC	Lab	Lab ID
03795	7715	500560
03791	"	500547
03735	"	500525

Date Results Received:

Preliminary: _____ Final: 7/20/95, 7/17/95, 7/12/95

Corrections Requested From Laboratory: _____ Requestor: _____

Date Corrections Received: _____

Date Assigned to SMO Reviewer: _____ Reviewer: _____

Date Review Complete: _____ Signature: _____

Date of Preliminary Notification: _____ Person Notified: _____

Date of Final Transmittal: 8/16/95 Transmitted To: Miller

Transmitted By: [signature] Filed In Record Center: [signature]

Comments: _____

ANALYSIS REQUEST AND CHAIN OF CUSTODY

01-COC (9-94) 50547

PAGE 1 OF ___

AR/COC- 03791

pt. No./Mail Stop: 7582 / 1347
ect/Task Manager: D. Miller / H. Fleck
Project Name: TA-1 Soil Sampling (Phase I)
cord Center Code: ADS 1302 ER Site 226
Logbook Ref No: 0133
MO Reference No.: CF0089

Date Samples Shipped: 7/14/95
Carrier/Waybill No.: Hand del.
Lab Contact: Amir M.
Lab Destination: 7715
SMO Contact/Phone: D. "Mac" McLaughlin/845-0867
Send Report to SMO: Deborah McLaughlin

Contract No.: N/A
Case No.: 3626.400
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

ocation Tech Area TA-1
ilding 892 Room outside

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested: Gamma. spec.	Lab Sample ID
29887-05	T1226-GP-015-010-S	9'8"	226	7/14/95 - 8:40	S	P	500ml	None	G	SA	X	
29889-05	T1226-GP-016-010-S	13'6"	↓	↓ 9:55	↓	↓	↓	↓	↓	↓	X	
		-										
		-										
		-										
		-										
		-										
		-										
		-										
		-										

MMA ☐ Yes ☒ No Ref. No. ___

Sample Tracking
Date Entered (mm/dd/yy): 7/19/95
Entered by:

mple Disposal ☒ Return to Client ☐ Disposal by lab

rnaround Time ☒ Normal ☐ Rush Required Report Date ___

QC Initls

Special Instructions/QC Requirements
Send as separate report

Abnormal Conditions on Receipt

mple am mbers	Name	Signature	Init	Company/Organization
	Matthew Shain	Matthew Shain	MS	IT Corp/7582
	Cathie Gober	Cathie Gober	CG	Sandia/7582

elinquished by	Matthew Shain	Org. 7582	Date 7/14/95	Time 11:25	4. Relinquished by	Org.	Date	Time
eceived by		Org. 7513	Date 7/14/95	Time 1125	4. Received by	Org.	Date	Time
elinquished by		Org. SMO 7513	Date 7/14/95	Time 1350	5. Relinquished by	Org.	Date	Time
eceived by		Org. SNL 7715	Date 7/14/95	Time 1350	5. Received by	Org.	Date	Time
elinquished by		Org. SNL 7715	Date 7/17/95	Time 1540	6. Relinquished by	Org.	Date	Time
eceived by		Org. 7513	Date 7/17/95	Time 1540	6. Received by	Org.	Date	Time

TE - To Accompany Samples, Laboratory Copy BLUE - To Accompany Samples, Return to SMO YELLOW - SMO Suspense Copy PINK - Field Copy

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

SF 2001-COC (9-94) 500547

AR/COC- 03791

Dept. No./Mail Stop: 7552 /1347
Project/Task Manager: D. Miller / H. Fleck
Project Name: TA-1 Soil Sampling (Phase I)
Record Center Code: ADS 1302 ER Site 226
Logbook Ref No: 0133
SMO Reference No.: CF0059

Date Samples Shipped: 7/14/95
Carrier/Waybill No.: Hand delv
Lab Contact: Amir M.
Lab Destination: 7715
SMO Contact/Phone: D. "Mac" McLaughlin 845-08
Send Report to SMO Deborah McLaughlin

Contract No.: N/A
Case No.: 3626.400
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location Tech Area TA-1
Building 992 Room outside

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested: Gamma Spec	Lab Sample ID
022988-05	T1226-GP-015-010-S	9'8"	226	7/14/95 - 8:4	S	P	500 ml	None	G	SA	X	
022989-05	T1226-GP-016-010-S	13'3"	↓	↓ 9:5	↓	↓	↓	↓	↓	↓	X	

RMMA ☐ Yes ☒ No Ref. No.:

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date

Sample Tracking
Date Entered (mm/dd/yy): 7/14/95
Entered by:
QC Inits.

Special Instructions/QC Requirements
Send as separate report

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init	Company/Organization
	Matthew Shain	Matthew Shain	MS	TT Corp/7532
	Celia Baker	Celia Baker	CB	Sandia/7532

1. Relinquished by	Matthew Shain	Org. 7532	Date 7/14/95	Time 11:25	4. Relinquished by		Org.	Date	Time
1. Received by		Org. 7513	Date 7/14/95	Time 1125	4. Received by		Org.	Date	Time
2. Relinquished by		Org. SNL 7513	Date 7/14/95	Time 1350	5. Relinquished by		Org.	Date	Time
2. Received by		Org. SNL 7711	Date 7/14/95	Time 1350	5. Received by		Org.	Date	Time
3. Relinquished by		Org. SNL 7711	Date 7/17/95	Time 1540	6. Relinquished by		Org.	Date	Time
3. Received by		Org. 7513	Date 7/17/95	Time 1540	6. Received by		Org.	Date	Time

WHITE - To Accompany Samples, Laboratory Copy
BLUE - To Accompany Samples, Return to SMO
YELLOW - SMO Suspense Copy
PINK - Field Copy

Sa[illegible]ational Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Fo[illegible]
Page 1 of 1

o be completed by Customer

Shaded areas are for RPSD use only

Customer: D. Miller/H. Fleck
Organization: 7582
Project Location: TA-1
Phone: 845-0867
Date Results Needed: 7/17/95
Suspect Isotopes:
Other Information: 03791

Hazards/Special Instructions: please notify S.O upon completion @ 845-0867

Batch Log Number: 500547
Logged By: [illegible]

LIMS Login
Results Faxed
Sample Disposal

Analysis Type:
☒ Gamma Spec
☐ H-3
☐ Alpha/Beta
☐ Alpha Spec
☐ Total U
☐ Other

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Scan CPM	Sample Weight	Remarks
022988-05	S	7/14/95-8:40	500ml	Gamma, Spec	01	<300	713g	
022984-05	↓	↓ 8:55	↓	↓	02	<300	778g	
LCS		1 Nov 90		γ spec	03	NA	NA	

Relinquished by [signature] Date 7/14/95 Time 1350 Received by [signature] Date 7/14/95 Time 1350
Relinquished by [signature] Date 7/17/95 Time 1540 Received by [signature] Date 7/17/95 Time 1540
Relinquished by ______ Date ______ Time ______ Received by ______ Date ______ Time ______
Relinquished by ______ Date ______ Time ______ Received by ______ Date ______ Time ______

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 7-15-95 8:25:42 PM *
****

* Analyzed by: 7/16/95 Reviewed by: 7/16/95 *

Customer : MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : 022988-05
Lab Sample ID : 50054701

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 713.000 gram
Sample Date/Time : 7-14-95 8:40:00 AM
Acquire Start Date : 7-15-95 7:51:16 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.09
TH-234	Not Detected	--------	1.27
U-234	Not Detected	--------	2.06E+01
RA-226	8.48E-01	7.68E-01	1.21
PB-214	5.44E-01	1.12E-01	8.24E-02
BI-214	5.26E-01	1.13E-01	9.99E-02
PB-210	4.78E-01	6.34E-01	1.02
TH-232	5.40E-01	2.40E-01	3.26E-01
RA-228	4.95E-01	2.25E-01	2.27E-01
AC-228	Not Detected	--------	3.20E-01
TH-228	Not Detected	--------	1.22
RA-224	1.59	4.48E-01	6.60E-01
PB-212	6.26E-01	1.36E-01	6.34E-02
BI-212	Not Detected	--------	8.58E-01
TL-208	3.93E-01	1.21E-01	1.38E-01
U-235	Not Detected	--------	3.93E-01
TH-231	Not Detected	--------	9.18E-01
PA-231	Not Detected	--------	1.70
AC-227	Not Detected	--------	2.83
TH-227	Not Detected	--------	5.67E-01
RA-223	Not Detected	--------	3.18E-01
RN-219	Not Detected	--------	4.55E-01
PB-211	Not Detected	--------	1.02
TL-207	Not Detected	--------	2.28E+01
AM-241	Not Detected	--------	8.41E-01
PU-239	Not Detected	--------	4.29E+02
NP-237	Not Detected	--------	5.89E-01
PA-233	Not Detected	--------	9.66E-02
TH-229	Not Detected	--------	4.41E-01

[Summary Report] - Sample ID: 50054701

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.50E-02
AR-41	Not Detected	--------	4.69E+04
BA-133	Not Detected	--------	9.67E-02
BA-140	Not Detected	--------	1.76E-01
CD-109	Not Detected	--------	2.05
CD-115	Not Detected	--------	1.65E-01
CE-139	Not Detected	--------	4.76E-02
CE-141	Not Detected	--------	9.11E-02
CE-144	Not Detected	--------	3.83E-01
CO-56	Not Detected	--------	6.11E-02
CO-57	Not Detected	--------	4.93E-02
CO-58	Not Detected	--------	5.58E-02
CO-60	Not Detected	--------	6.07E-02
CR-51	Not Detected	--------	3.71E-01
CS-134	Not Detected	--------	8.31E-02
CS-137	Not Detected	--------	5.47E-02
CU-64	Not Detected	--------	8.70E+01
EU-152	Not Detected	--------	4.50E-01
EU-154	Not Detected	--------	2.81E-01
EU-155	Not Detected	--------	2.39E-01
FE-59	Not Detected	--------	1.16E-01
GD-153	Not Detected	--------	1.67E-01
HG-203	Not Detected	--------	4.84E-02
I-131	Not Detected	--------	5.25E-02
IN-115m	Not Detected	--------	2.51E+01
IR-192	Not Detected	--------	4.47E-02
K-40	1.37E+01	2.10	5.68E-01
LA-140	Not Detected	--------	1.21E-01
MN-54	Not Detected	--------	5.56E-02
MN-56	Not Detected	--------	8.34E+02
MO-99	Not Detected	--------	5.91E-01
NA-22	Not Detected	--------	7.24E-02
NA-24	Not Detected	--------	3.13E-01
NB-95	Not Detected	--------	3.37E-01
ND-147	Not Detected	--------	3.51E-01
NI-57	Not Detected	--------	1.66E-01
BE-7	Not Detected	--------	4.12E-01
RU-103	Not Detected	--------	4.59E-02
RU-106	Not Detected	--------	4.47E-01
SB-122	Not Detected	--------	8.70E-02
SB-124	Not Detected	--------	5.22E-02
SB-125	Not Detected	--------	1.24E-01
SC-46	Not Detected	--------	8.92E-02
SR-85	Not Detected	--------	6.13E-02
TA-182	Not Detected	--------	2.65E-01
TA-183	Not Detected	--------	8.89E-01
TE-132	Not Detected	--------	5.62E-02
TL-201	Not Detected	--------	3.80E-01
XE-133	Not Detected	--------	3.20E-01
Y-88	Not Detected	--------	5.10E-02
ZN-65	Not Detected	--------	1.77E-01
ZR-95	Not Detected	--------	1.03E-01

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
7-15-95 9:05:59 PM

Analyzed by: 7/16/95 Reviewed by: 7/16/95

Customer : MILLER/McLAUGHLIN (7582/SMO)
Customer Sample ID : 022989-05
Lab Sample ID : 50054702

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 778.000 gram
Sample Date/Time : 7-14-95 9:55:00 AM
Acquire Start Date : 7-15-95 8:31:35 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.81
TH-234	Not Detected	--------	1.29
U-234	Not Detected	--------	2.14E+01
RA-226	1.37	9.58E-01	1.48
PB-214	7.02E-01	1.48E-01	1.37E-01
BI-214	6.17E-01	1.30E-01	1.20E-01
PB-210	Not Detected	--------	1.64
TH-232	8.57E-01	2.55E-01	2.79E-01
RA-228	6.35E-01	2.31E-01	2.78E-01
AC-228	Not Detected	--------	3.28E-01
TH-228	Not Detected	--------	1.37
RA-224	1.84	5.07E-01	7.40E-01
PB-212	7.21E-01	1.77E-01	7.00E-02
BI-212	1.11	4.10E-01	4.78E-01
TL-208	7.45E-01	1.70E-01	1.61E-01
U-235	Not Detected	--------	4.01E-01
TH-231	Not Detected	--------	1.01
PA-231	Not Detected	--------	1.90
AC-227	Not Detected	--------	2.82
TH-227	Not Detected	--------	5.91E-01
RA-223	Not Detected	--------	3.45E-01
RN-219	Not Detected	--------	4.45E-01
PB-211	Not Detected	--------	1.13
TL-207	Not Detected	--------	2.54E+01
AM-241	Not Detected	--------	8.86E-01
PU-239	Not Detected	--------	4.61E+02
NP-237	Not Detected	--------	6.41E-01
PA-233	Not Detected	--------	1.00E-01
TH-229	Not Detected	--------	4.56E-01

[Summary Report] - Sample ID: 50054702

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.07E-02
AR-41	Not Detected	--------	4.01E+04
BA-133	Not Detected	--------	1.08E-01
BA-140	Not Detected	--------	1.86E-01
CD-109	Not Detected	--------	2.14
CD-115	Not Detected	--------	1.72E-01
CE-139	Not Detected	--------	5.12E-02
CE-141	Not Detected	--------	9.25E-02
CE-144	Not Detected	--------	4.20E-01
CO-56	Not Detected	--------	6.43E-02
CO-57	Not Detected	--------	5.18E-02
CO-58	Not Detected	--------	5.78E-02
CO-60	Not Detected	--------	6.58E-02
CR-51	Not Detected	--------	3.89E-01
CS-134	Not Detected	--------	8.64E-02
CS-137	Not Detected	--------	5.55E-02
CU-64	Not Detected	--------	8.69E+01
EU-152	Not Detected	--------	4.52E-01
EU-154	Not Detected	--------	3.03E-01
EU-155	Not Detected	--------	2.48E-01
FE-59	Not Detected	--------	1.29E-01
GD-153	Not Detected	--------	1.83E-01
HG-203	Not Detected	--------	4.99E-02
I-131	Not Detected	--------	5.17E-02
IN-115m	Not Detected	--------	2.42E+01
IR-192	Not Detected	--------	4.61E-02
K-40	2.19E+01	3.16	6.50E-01
LA-140	Not Detected	--------	1.16E-01
MN-54	Not Detected	--------	6.28E-02
MN-56	Not Detected	--------	7.51E+02
MO-99	Not Detected	--------	6.01E-01
NA-22	Not Detected	--------	7.75E-02
NA-24	Not Detected	--------	3.09E-01
NB-95	Not Detected	--------	3.51E-01
ND-147	Not Detected	--------	3.63E-01
NI-57	Not Detected	--------	1.52E-01
BE-7	Not Detected	--------	4.02E-01
RU-103	Not Detected	--------	4.77E-02
RU-106	Not Detected	--------	4.90E-01
SB-122	Not Detected	--------	8.92E-02
SB-124	Not Detected	--------	5.47E-02
SB-125	Not Detected	--------	1.35E-01
SC-46	Not Detected	--------	9.64E-02
SR-85	Not Detected	--------	6.29E-02
TA-182	Not Detected	--------	2.85E-01
TA-183	Not Detected	--------	9.34E-01
TE-132	Not Detected	--------	6.09E-02
TL-201	Not Detected	--------	3.87E-01
XE-133	Not Detected	--------	3.39E-01
Y-88	Not Detected	--------	4.35E-02
ZN-65	Not Detected	--------	1.90E-01
ZR-95	Not Detected	--------	9.47E-02

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-16-95 12:52:45 PM

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Analyzed by: 7/16/95 Reviewed by: 7/16/95

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Customer : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID : LAB CONTROL SAMPLE ANALYSIS #CG134
Lab Sample ID : 50054703

Sample Description : MIXED_GAMMA_STANDARD
Sample Type : Liquid
Sample Geometry : WMAR
Sample Quantity : 1.000 Each
Sample Date/Time : 11-01-90 12:00:00 PM
Acquire Start Date : 7-16-95 12:39:17 PM
Detector Name : LAB02
Elapsed Live Time : 600 seconds
Elapsed Real Time : 606 seconds

Comments:

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Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	--------	2.14E+04
TH-234	Not Detected	--------	4.69E+03
U-234	Not Detected	--------	1.18E+05
RA-226	Not Detected	--------	5.84E+03
PB-214	Not Detected	--------	6.94E+02
BI-214	Not Detected	--------	6.34E+02
PB-210	Not Detected	--------	4.21E+03
TH-232	Not Detected	--------	2.02E+03
RA-228	Not Detected	--------	2.81E+03
AC-228	Not Detected	--------	1.75E+03
TH-228	Not Detected	--------	3.68E+04
RA-224	Not Detected	--------	3.10E+04
PB-212	Not Detected	--------	2.87E+03
BI-212	Not Detected	--------	2.58E+04
TL-208	Not Detected	--------	5.47E+03
U-235	Not Detected	--------	1.87E+03
TH-231	Not Detected	--------	3.79E+03
PA-231	Not Detected	--------	9.31E+03
AC-227	Not Detected	--------	1.62E+04
TH-227	Not Detected	--------	2.24E+03
RA-223	Not Detected	--------	1.00E+26
RN-219	Not Detected	--------	2.89E+03
PB-211	Not Detected	--------	8.41E+03
TL-207	Not Detected	--------	2.18E+05
AM-241	9.45E+04	1.68E+04	5.58E+03
PU-239	Not Detected	--------	2.19E+06
NP-237	Not Detected	--------	2.70E+03
PA-233	Not Detected	--------	6.06E+02
TH-229	Not Detected	--------	2.05E+03

[Summary Report] - Sample ID: 50054703

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	--------	1.82E+05
AR-41	Not Detected	--------	1.00E+26
BA-133	Not Detected	--------	5.46E+02
BA-140	Not Detected	--------	1.00E+26
CD-109	3.31E+05	1.20E+05	1.66E+05
CD-115	Not Detected	--------	1.00E+26
CE-139	Not Detected	--------	1.38E+06
CE-141	Not Detected	--------	3.46E+18
CE-144	Not Detected	--------	1.26E+05
CO-56	Not Detected	--------	2.04E+09
CO-57	1.28E+04	9.45E+03	1.47E+04
CO-58	Not Detected	--------	7.34E+09
CO-60	7.45E+04	9.71E+03	5.99E+02
CR-51	Not Detected	--------	1.10E+22
CS-134	Not Detected	--------	1.48E+03
CS-137	6.77E+04	8.75E+03	4.79E+02
CU-64	Not Detected	--------	1.00E+26
EU-152	Not Detected	--------	3.42E+03
EU-154	Not Detected	--------	2.23E+03
EU-155	Not Detected	--------	2.14E+03
FE-59	Not Detected	--------	3.83E+14
GD-153	Not Detected	--------	1.09E+05
HG-203	Not Detected	--------	3.40E+13
I-131	Not Detected	--------	1.00E+26
IN-115m	Not Detected	--------	1.00E+26
IR-192	Not Detected	--------	2.91E+09
K-40	Not Detected	--------	1.71E+03
LA-140	Not Detected	--------	1.00E+26
MN-54	Not Detected	--------	1.74E+04
MN-56	Not Detected	--------	1.00E+26
MO-99	Not Detected	--------	1.00E+26
NA-22	Not Detected	--------	8.03E+02
NA-24	Not Detected	--------	1.00E+26
NB-95	Not Detected	--------	1.00E+26
ND-147	Not Detected	--------	1.00E+26
NI-57	Not Detected	--------	1.00E+26
BE-7	Not Detected	--------	1.69E+13
RU-103	Not Detected	--------	5.10E+15
RU-106	Not Detected	--------	7.69E+04
SB-122	Not Detected	--------	1.00E+26
SB-124	Not Detected	--------	1.18E+11
SB-125	Not Detected	--------	3.38E+03
SC-46	Not Detected	--------	6.90E+08
SR-85	Not Detected	--------	3.28E+10
TA-182	Not Detected	--------	4.21E+07
TA-183	Not Detected	--------	1.00E+26
TE-132	Not Detected	--------	1.00E+26
TL-201	Not Detected	--------	1.00E+26
XE-133	Not Detected	--------	1.00E+26
Y-88	Not Detected	--------	1.46E+07
ZN-65	Not Detected	--------	1.27E+05
ZR-95	Not Detected	--------	7.44E+10

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*
Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
Quality Assurance Report
*
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Report Date : 7-16-95 12:57:34 PM
QA File : C:\GENIEPC\CAMFILES\LCS2.QAF
Analyst : FCD
Sample ID : 50054703
Sample Quantity : 1.00 Each
Sample Date : 11-01-90 12:00:00 PM
Measurement Date : 7-16-95 12:39:17 PM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 606 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS
AM-241 Activity	9.720E-02	3.751E-03	9.448E-02	< : : : >
CS-137 Activity	6.958E-02	2.413E-03	6.771E-02	< : : : >
CO-60 Activity	7.679E-02	2.547E-03	7.445E-02	< : : : >

Flags Key:
LU = Boundary Test (Ab = Above , Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: 7/16/95

ER/1302 226 / DAT

(-)

SMO ANALYTICAL DATA ROUTING FORM

Project Name: TAI Phase I Case Number: 3626400

SNL Task Leader: Miller Org/Mail Stop: 7582/DAT 1148

SMO Project Coordinator: Prescott Sample Ship Date: 7/20/95 7/19/95 7/18/95

ARCOC	Lab	Lab ID
03864	7715	500572
03961	"	500565
03873	"	500561

Date Results Received:

Preliminary: _____ Final: 7/21/95, 7/21/95, 7/20/95

Corrections Requested From Laboratory: _____ Requestor: _____

Date Corrections Received: _____

Date Assigned to SMO Reviewer: _____ Reviewer: _____

Date Review Complete: _____ Signature: _____

Date of Preliminary Notification: _____ Person Notified: _____

Date of Final Transmittal: 8/16/95 Transmitted To: Miller

Transmitted By: DAM Filed In Record Center: DAM

Comments: _____

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

(1-COC (9-94) 500561

AR/COC- 03873

Dpt. No./Mail Stop: 7582/1347
ject/Task Manager: D. Miller / H Fleck
Project Name: TA-1 Soil Sampling (Phase I)
cord Center Code: ADS 1302 ER Site 226
Logbook Ref No: 0133
MO Reference No.: CF0089

Date Samples Shipped: 7/18/95
Carrier/Waybill No.: HC
Lab Contact: Amir M.
Lab Destination: 7715
SMO Contact/Phone: D. "Mac" McLaughlin
Send Report to SMO: Deborah McLaughlin

Contract No.: N/A
Case No.: 3626.400
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Parameter & Method Requested

Gamma Spec.

ocation Tech Area TA-1

ilding 821 Room outside

mple No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO) Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type		Lab Sample ID
229950	T1226-GP-017-010-S	13'	226	7/17/95 -9:30	S	P	500ml	None	G	SA	X	
229960	T1226-GP-018-010-S	13'8"	↓	-10:55	↓	↓	↓	↓	↓	↓	X	
229970	T1226-GP-019-014-S	13'8"	↓	-13:30	↓	↓	↓	↓	↓	↓	X	
229980	T1226-GP-020-011-S										X	

MA ☐ Yes ☒ No Ref. No.

mple Disposal ☒ Return to Client ☐ Disposal by lab

rnaround Time ☒ Normal ☐ Rush Required Report Date

Sample Tracking
Date Entered (mm/dd/yy): 7/21/95
Entered by:
QC Inits

Special Instructions/QC Requirements

Abnormal Conditions on Receipt

mple am embers	Name	Signature	Init	Company/Organization
	Matthew Shain	Matthew Shain	MS	ET corp. 9582
	Cathie Gohad	Cathie Gohad	CG	Sandia/7582

Relinquished by	Matthew Shain	Org. 7582	Date 7/18/95	Time 16:30	4. Relinquished by	Org.	Date	Time
Received by		Org. 7513	Date 7/18/95	Time 1630	4. Received by	Org.	Date	Time
Relinquished by		Org. SMO 7513	Date 7/18/95	Time 1050	5. Relinquished by	Org.	Date	Time
Received by		Org. SNL 7715	Date 7/18/95	Time 1050	5. Received by	Org.	Date	Time
Relinquished by		Org. SNL 7715	Date 7/20/95	Time 1225	6. Relinquished by	Org.	Date	Time
Received by		Org. 7513	Date 7/20/95	Time 1225	6. Received by	Org.	Date	Time

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

SF 2001-COC (9-94) 500576

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

AR/COC- 03873

Dept. No./Mail Stop: 7582/1347
Project/Task Manager: D. Miller / H Fleck
Project Name: TA-1 Soil Sampling (Phase)
Record Center Code: ADS 1301 ER Site 226
Logbook Ref No: 0133
SMO Reference No.: CF0059

Date Samples Shipped: 7/18/95
Carrier/Waybill No.: HC
Lab Contact: Ami M.
Lab Destination: 7715
SMO Contact/Phone: D. Mac McLaughlin
Send Report to SMO: Deborah McLaughlin

Contract No.: N/A
Case No.: 3626.400
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location Tech Area TA-1
Building 521 Room OMS 04

Reference LOV (available at SMO)

Parameter & Method Requested: SPEC Gamma

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Gamma	Lab Sample ID
022995-05	T1226-GP-017-010-S	13'	226	7/17/95 - 9:30	S	P	500ml	None	G	SA	X	
022996-05	T1226-GP-015-010-S	13'8"	↓	-10:5?	↓	↓	↓	↓	↓	↓	X	
022997-05	T1226-GP-019-014-S	13'8"	↓	-13:30	↓	↓	↓	↓	↓	↓	X	
~~022998-05~~	~~T1226-GP-020-011-S~~			~~7/17/95~~							~~X~~	

RMMA ☐ Yes ☒ No Ref. No.
Sample Disposal ☒ Return to Client ☐ Disposal by lab
Turnaround Time ☒ Normal ☐ Rush Required Report Date

Sample Tracking
Date Entered (mm/dd/yy) 7/18/95
Entered by:
QC inits.

Special Instructions/QC Requirements

Abnormal Conditions on Receipt

Sample Team Members: Name	Signature	Init	Company/Organization
Matthew Shain	Matthew Shain	MS	II corp. 7582
Ollie Gibbs	Ollie Gibbs	OG	Sandia / 7582

	Relinquished/Received by	Org.	Date	Time
1. Relinquished by	Matthew Shain	7582	7/17/95	16:30
1. Received by	[signature]	7513	7/17/95	1630
2. Relinquished by	D McLaughlin for DB	SMO 7513	7/18/95	1050
2. Received by	[signature]	SNL 7715	7/18/95	1050
3. Relinquished by	[signature]	SNL 7715	7/20/95	1225
3. Received by	[signature]	7513	7/20/95	1225
4. Relinquished by				
4. Received by				
5. Relinquished by				
5. Received by				
6. Relinquished by				
6. Received by				

WHITE - To Accompany Samples, Laboratory Copy BLUE - To Accompany Samples, Return to SMO YELLOW - SMO Suspense Copy PINK - Field Copy

...ion Protection Sample Diagnostics

To be completed by Customer — *Shaded areas are for RPSD use only*

Customer: D.Miller / H. Fleck
Organization: 7582
Project Location: TA-1
Phone: 845-0867
Date Results Needed: 7/20/95
Suspect Isotopes:
Other Information: 03873

Hazards/Special Instructions: please notify S40 upon completion @ 845-0867

Batch Log Number: 500561
Logged By: [illegible]
LIMS Login:
Results Faxed:
Sample Disposal:

Analysis Type:
- ☒ Gamma Spec
- ☐ H-3
- ☐ Alpha/Beta
- ☐ Alpha Spec
- ☐ Total U
- ☐ Other

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Scan mR/hr	Sample Weight	Remarks
022995-05	S	7/18/95-9:30	500ml	Gamma Spec	01	<300	652g	
022996-05	↓	-10:55	↓	↓	02	↓	779	
022997-05	↓	-13:30	↓	↓	03	↓	542	
~~022998-05~~			~~500ml~~	~~[illegible] 7/18/95~~				
LCS		1NOV90		γ Spec	04	NA	NA	

Relinquished by [signature] Date 7/18/95 Time 1050 Received by [signature] Date 7/18/95 Time 1050
Relinquished by [signature] Date 7/20/95 Time 1225 Received by [signature] Date 7/20/95 Time 1125
Relinquished by ______ Date ______ Time ______ Received by ______ Date ______ Time ______
Relinquished by ______ Date ______ Time ______ Received by ______ Date ______ Time ______

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-18-95 6:19:08 PM

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Analyzed by: 7/19/95 Reviewed by: 7/19/95

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Customer : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID : 022995-05
Lab Sample ID : 50056101

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 652.000 gram
Sample Date/Time : 7-17-95 9:30:00 AM
Acquire Start Date : 7-18-95 5:44:58 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.96
TH-234	Not Detected	--------	1.47
U-234	Not Detected	--------	2.19E+01
RA-226	1.39	9.43E-01	1.44
PB-214	7.12E-01	1.49E-01	1.29E-01
BI-214	7.03E-01	1.38E-01	1.06E-01
PB-210	Not Detected	--------	1.49
TH-232	6.28E-01	2.63E-01	3.49E-01
RA-228	6.23E-01	2.62E-01	2.21E-01
AC-228	Not Detected	--------	3.45E-01
TH-228	8.09E-01	4.14E-01	7.93E-01
RA-224	2.21	5.93E-01	7.54E-01
PB-212	7.41E-01	1.66E-01	7.23E-02
BI-212	Not Detected	--------	9.84E-01
TL-208	5.88E-01	1.88E-01	2.37E-01
U-235	Not Detected	--------	4.38E-01
TH-231	Not Detected	--------	1.05
PA-231	Not Detected	--------	1.97
AC-227	Not Detected	--------	3.02
TH-227	Not Detected	--------	6.28E-01
RA-223	Not Detected	--------	3.54E-01
RN-219	Not Detected	--------	4.91E-01
PB-211	Not Detected	--------	1.09
TL-207	Not Detected	--------	2.45E+01
AM-241	Not Detected	--------	1.02
PU-239	Not Detected	--------	5.03E+02
NP-237	Not Detected	--------	6.86E-01
PA-233	Not Detected	--------	1.05E-01
TH-229	Not Detected	--------	4.75E-01

[Summary Report] - Sample ID: 50056101

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.36E-02
AR-41	Not Detected	--------	1.75E+04
BA-133	Not Detected	--------	1.12E-01
BA-140	Not Detected	--------	2.04E-01
CD-109	Not Detected	--------	2.33
CD-115	Not Detected	--------	1.75E-01
CE-139	Not Detected	--------	5.22E-02
CE-141	Not Detected	--------	9.88E-02
CE-144	Not Detected	--------	4.20E-01
CO-56	Not Detected	--------	6.81E-02
CO-57	Not Detected	--------	5.49E-02
CO-58	Not Detected	--------	5.92E-02
CO-60	Not Detected	--------	7.22E-02
CR-51	Not Detected	--------	4.19E-01
CS-134	Not Detected	--------	9.43E-02
CS-137	Not Detected	--------	6.30E-02
CU-64	Not Detected	--------	7.66E+01
EU-152	Not Detected	--------	4.87E-01
EU-154	Not Detected	--------	3.24E-01
EU-155	Not Detected	--------	2.48E-01
FE-59	Not Detected	--------	1.30E-01
GD-153	Not Detected	--------	1.94E-01
HG-203	Not Detected	--------	5.30E-02
I-131	Not Detected	--------	5.48E-02
IN-115m	Not Detected	--------	1.76E+01
IR-192	Not Detected	--------	4.91E-02
K-40	1.73E+01	2.61	7.00E-01
LA-140	Not Detected	--------	1.10E-01
MN-54	Not Detected	--------	6.52E-02
MN-56	Not Detected	--------	4.22E+02
MO-99	Not Detected	--------	7.11E-01
NA-22	Not Detected	--------	7.66E-02
NA-24	Not Detected	--------	2.80E-01
NB-95	Not Detected	--------	3.68E-01
ND-147	Not Detected	--------	3.49E-01
NI-57	Not Detected	--------	1.80E-01
BE-7	Not Detected	--------	4.08E-01
RU-103	Not Detected	--------	4.85E-02
RU-106	Not Detected	--------	5.49E-01
SB-122	Not Detected	--------	9.13E-02
SB-124	Not Detected	--------	5.89E-02
SB-125	Not Detected	--------	1.53E-01
SC-46	Not Detected	--------	9.32E-02
SR-85	Not Detected	--------	6.83E-02
TA-182	Not Detected	--------	2.78E-01
TA-183	Not Detected	--------	1.06
TE-132	Not Detected	--------	6.37E-02
TL-201	Not Detected	--------	3.81E-01
XE-133	Not Detected	--------	3.44E-01
Y-88	Not Detected	--------	5.05E-02
ZN-65	Not Detected	--------	1.83E-01
ZR-95	Not Detected	--------	1.07E-01

****

* Sandia National Laboratories *

* Radiation Protection Sample Diagnostics Program [881 Laboratory] *

* 7-18-95 6:58:00 PM *

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* *

* Analyzed by: 7/18/95 Reviewed by: 7/18/95 *

****

Customer : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID : 022996-05
Lab Sample ID : 50056102

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 779.000 gram
Sample Date/Time : 7-17-95 10:55:00 AM
Acquire Start Date : 7-18-95 6:24:40 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	5.90
TH-234	Not Detected	--------	1.32
U-234	Not Detected	--------	2.10E+01
RA-226	1.27	7.31E-01	1.09
PB-214	8.03E-01	1.55E-01	1.20E-01
BI-214	7.01E-01	1.37E-01	1.13E-01
PB-210	Not Detected	--------	1.53
TH-232	6.28E-01	2.42E-01	3.14E-01
RA-228	6.73E-01	2.47E-01	3.03E-01
AC-228	Not Detected	--------	3.40E-01
TH-228	9.15E-01	4.04E-01	7.52E-01
RA-224	1.89	5.10E-01	7.51E-01
PB-212	8.61E-01	1.79E-01	6.44E-02
BI-212	1.01	4.59E-01	6.14E-01
TL-208	7.19E-01	1.63E-01	1.50E-01
U-235	Not Detected	--------	4.24E-01
TH-231	Not Detected	--------	1.03
PA-231	Not Detected	--------	1.87
AC-227	Not Detected	--------	2.95
TH-227	Not Detected	--------	6.28E-01
RA-223	Not Detected	--------	3.53E-01
RN-219	Not Detected	--------	4.75E-01
PB-211	Not Detected	--------	1.05
TL-207	Not Detected	--------	2.46E+01
AM-241	Not Detected	--------	9.17E-01
PU-239	Not Detected	--------	4.92E+02
NP-237	Not Detected	--------	6.23E-01
PA-233	Not Detected	--------	9.70E-02
TH-229	Not Detected	--------	4.72E-01

[Summary Report] - Sample ID: 50056102

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.26E-02
AR-41	Not Detected	--------	1.12E+04
BA-133	Not Detected	--------	1.05E-01
BA-140	Not Detected	--------	1.96E-01
CD-109	Not Detected	--------	2.11
CD-115	Not Detected	--------	1.68E-01
CE-139	Not Detected	--------	5.22E-02
CE-141	Not Detected	--------	9.87E-02
CE-144	Not Detected	--------	4.16E-01
CO-56	Not Detected	--------	6.30E-02
CO-57	Not Detected	--------	5.35E-02
CO-58	Not Detected	--------	5.79E-02
CO-60	Not Detected	--------	6.37E-02
CR-51	Not Detected	--------	3.83E-01
CS-134	Not Detected	--------	8.66E-02
CS-137	Not Detected	--------	5.90E-02
CU-64	Not Detected	--------	7.27E+01
EU-152	Not Detected	--------	4.68E-01
EU-154	Not Detected	--------	3.11E-01
EU-155	Not Detected	--------	2.37E-01
FE-59	Not Detected	--------	1.19E-01
GD-153	Not Detected	--------	1.86E-01
HG-203	Not Detected	--------	5.13E-02
I-131	Not Detected	--------	5.32E-02
IN-115m	Not Detected	--------	1.51E+01
IR-192	Not Detected	--------	4.48E-02
K-40	1.81E+01	2.65	5.27E-01
LA-140	Not Detected	--------	9.30E-02
MN-54	Not Detected	--------	6.34E-02
MN-56	Not Detected	--------	3.19E+02
MO-99	Not Detected	--------	6.09E-01
NA-22	Not Detected	--------	7.01E-02
NA-24	Not Detected	--------	2.50E-01
NB-95	Not Detected	--------	3.66E-01
ND-147	Not Detected	--------	3.67E-01
NI-57	Not Detected	--------	1.49E-01
BE-7	Not Detected	--------	4.11E-01
RU-103	Not Detected	--------	4.82E-02
RU-106	Not Detected	--------	4.89E-01
SB-122	Not Detected	--------	9.81E-02
SB-124	Not Detected	--------	4.97E-02
SB-125	Not Detected	--------	1.36E-01
SC-46	Not Detected	--------	9.19E-02
SR-85	Not Detected	--------	6.44E-02
TA-182	Not Detected	--------	2.70E-01
TA-183	Not Detected	--------	9.49E-01
TE-132	Not Detected	--------	6.17E-02
TL-201	Not Detected	--------	3.85E-01
XE-133	Not Detected	--------	3.56E-01
Y-88	Not Detected	--------	5.06E-02
ZN-65	Not Detected	--------	1.72E-01
ZR-95	Not Detected	--------	1.12E-01

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
7-18-95 7:37:45 PM

Analyzed by: 7/19/95 Reviewed by: 7/19/95

Customer : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID : 022997-05
Lab Sample ID : 50056103

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 2SMAR
Sample Quantity : 542.000 gram
Sample Date/Time : 7-17-95 1:30:00 PM
Acquire Start Date : 7-18-95 7:04:05 PM
Detector Name : LAB02
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	6.85
TH-234	Not Detected	--------	1.48
U-234	Not Detected	--------	2.63E+01
RA-226	1.82	1.00	1.48
PB-214	7.09E-01	1.52E-01	1.27E-01
BI-214	6.30E-01	1.33E-01	1.05E-01
PB-210	Not Detected	--------	1.70
TH-232	5.00E-01	2.60E-01	3.65E-01
RA-228	9.15E-01	3.46E-01	4.29E-01
AC-228	Not Detected	--------	4.13E-01
TH-228	8.09E-01	4.27E-01	8.55E-01
RA-224	Not Detected	--------	8.89E-01
PB-212	8.20E-01	1.75E-01	8.30E-02
BI-212	8.14E-01	5.21E-01	7.54E-01
TL-208	6.97E-01	1.70E-01	1.51E-01
U-235	Not Detected	--------	4.83E-01
TH-231	Not Detected	--------	1.14
PA-231	Not Detected	--------	2.03
AC-227	Not Detected	--------	3.48
TH-227	Not Detected	--------	7.31E-01
RA-223	Not Detected	--------	3.83E-01
RN-219	Not Detected	--------	5.53E-01
PB-211	Not Detected	--------	1.24
TL-207	Not Detected	--------	2.69E+01
AM-241	Not Detected	--------	1.16
PU-239	Not Detected	--------	5.89E+02
NP-237	Not Detected	--------	7.14E-01
PA-233	Not Detected	--------	1.12E-01
TH-229	Not Detected	--------	5.11E-01

[Summary Report] - Sample ID: 50056103

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	5.92E-02
AR-41	Not Detected	--------	6.37E+03
BA-133	Not Detected	--------	1.25E-01
BA-140	Not Detected	--------	2.37E-01
CD-109	Not Detected	--------	2.40
CD-115	Not Detected	--------	1.87E-01
CE-139	Not Detected	--------	6.02E-02
CE-141	Not Detected	--------	1.08E-01
CE-144	Not Detected	--------	4.81E-01
CO-56	Not Detected	--------	7.36E-02
CO-57	Not Detected	--------	5.79E-02
CO-58	Not Detected	--------	6.39E-02
CO-60	Not Detected	--------	7.65E-02
CR-51	Not Detected	--------	4.63E-01
CS-134	Not Detected	--------	1.02E-01
CS-137	Not Detected	--------	6.65E-02
CU-64	Not Detected	--------	6.74E+01
EU-152	Not Detected	--------	5.43E-01
EU-154	Not Detected	--------	3.74E-01
EU-155	Not Detected	--------	2.76E-01
FE-59	Not Detected	--------	1.51E-01
GD-153	Not Detected	--------	2.00E-01
HG-203	Not Detected	--------	6.23E-02
I-131	Not Detected	--------	6.05E-02
IN-115m	Not Detected	--------	1.28E+01
IR-192	Not Detected	--------	5.32E-02
K-40	1.56E+01	2.42	5.17E-01
LA-140	Not Detected	--------	1.56E-01
MN-54	Not Detected	--------	7.99E-02
MN-56	Not Detected	--------	2.22E+02
MO-99	Not Detected	--------	7.04E-01
NA-22	Not Detected	--------	8.78E-02
NA-24	Not Detected	--------	2.50E-01
NB-95	Not Detected	--------	4.12E-01
ND-147	Not Detected	--------	4.11E-01
NI-57	Not Detected	--------	1.71E-01
BE-7	Not Detected	--------	4.72E-01
RU-103	Not Detected	--------	5.64E-02
RU-106	Not Detected	--------	6.10E-01
SB-122	Not Detected	--------	1.09E-01
SB-124	Not Detected	--------	6.14E-02
SB-125	Not Detected	--------	1.66E-01
SC-46	Not Detected	--------	1.01E-01
SR-85	Not Detected	--------	7.37E-02
TA-182	Not Detected	--------	2.92E-01
TA-183	Not Detected	--------	1.19
TE-132	Not Detected	--------	6.74E-02
TL-201	Not Detected	--------	4.29E-01
XE-133	Not Detected	--------	3.76E-01
Y-88	Not Detected	--------	6.70E-02
ZN-65	Not Detected	--------	1.97E-01
ZR-95	Not Detected	--------	1.15E-01

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
7-19-95 8:17:31 AM

Analyzed by: 7/19/95 Reviewed by: 7/19/95

Customer : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID : LAB CONTROL SAMPLE ANALYSIS #CG134
Lab Sample ID : 50056104

Sample Description : MIXED_GAMMA_STANDARD
Sample Type : Liquid
Sample Geometry : WMAR
Sample Quantity : 1.000 Each
Sample Date/Time : 11-01-90 12:00:00 PM
Acquire Start Date : 7-19-95 8:05:19 AM
Detector Name : LAB02
Elapsed Live Time : 600 seconds
Elapsed Real Time : 606 seconds

Comments:

Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	--------	2.16E+04
TH-234	Not Detected	--------	4.63E+03
U-234	Not Detected	--------	1.21E+05
RA-226	Not Detected	--------	5.80E+03
PB-214	Not Detected	--------	7.00E+02
BI-214	Not Detected	--------	6.39E+02
PB-210	Not Detected	--------	4.60E+03
TH-232	Not Detected	--------	2.02E+03
RA-228	Not Detected	--------	2.82E+03
AC-228	Not Detected	--------	1.78E+03
TH-228	Not Detected	--------	3.68E+04
RA-224	Not Detected	--------	3.20E+04
PB-212	Not Detected	--------	2.92E+03
BI-212	Not Detected	--------	2.58E+04
TL-208	Not Detected	--------	5.39E+03
U-235	Not Detected	--------	1.88E+03
TH-231	Not Detected	--------	3.88E+03
PA-231	Not Detected	--------	9.29E+03
AC-227	Not Detected	--------	1.61E+04
TH-227	Not Detected	--------	2.32E+03
RA-223	Not Detected	--------	1.00E+26
RN-219	Not Detected	--------	2.90E+03
PB-211	Not Detected	--------	8.60E+03
TL-207	Not Detected	--------	2.20E+05
AM-241	9.29E+04	1.68E+04	7.12E+03
PU-239	Not Detected	--------	2.15E+06
NP-237	Not Detected	--------	2.70E+03
PA-233	Not Detected	--------	6.13E+02
TH-229	Not Detected	--------	2.04E+03

[Summary Report] - Sample ID: 50056104

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	--------	1.83E+05
AR-41	Not Detected	--------	1.00E+26
BA-133	Not Detected	--------	5.49E+02
BA-140	Not Detected	--------	1.00E+26
CD-109	3.34E+05	1.07E+05	1.41E+05
CD-115	Not Detected	--------	1.00E+26
CE-139	Not Detected	--------	1.41E+06
CE-141	Not Detected	--------	3.68E+18
CE-144	Not Detected	--------	1.26E+05
CO-56	Not Detected	--------	2.11E+09
CO-57	1.35E+04	8.61E+03	1.30E+04
CO-58	Not Detected	--------	7.56E+09
CO-60	7.53E+04	9.80E+03	5.73E+02
CR-51	Not Detected	--------	1.18E+22
CS-134	Not Detected	--------	1.52E+03
CS-137	6.75E+04	8.72E+03	5.06E+02
CU-64	Not Detected	--------	1.00E+26
EU-152	Not Detected	--------	3.55E+03
EU-154	Not Detected	--------	2.28E+03
EU-155	Not Detected	--------	2.14E+03
FE-59	Not Detected	--------	3.88E+14
GD-153	Not Detected	--------	1.09E+05
HG-203	Not Detected	--------	3.54E+13
I-131	Not Detected	--------	1.00E+26
IN-115m	Not Detected	--------	1.00E+26
IR-192	Not Detected	--------	2.98E+09
K-40	Not Detected	--------	1.81E+03
LA-140	Not Detected	--------	1.00E+26
MN-54	Not Detected	--------	1.79E+04
MN-56	Not Detected	--------	1.00E+26
MO-99	Not Detected	--------	1.00E+26
NA-22	Not Detected	--------	7.82E+02
NA-24	Not Detected	--------	1.00E+26
NB-95	Not Detected	--------	1.00E+26
ND-147	Not Detected	--------	1.00E+26
NI-57	Not Detected	--------	1.00E+26
BE-7	Not Detected	--------	1.75E+13
RU-103	Not Detected	--------	5.37E+15
RU-106	Not Detected	--------	7.97E+04
SB-122	Not Detected	--------	1.00E+26
SB-124	Not Detected	--------	1.25E+11
SB-125	Not Detected	--------	3.31E+03
SC-46	Not Detected	--------	6.95E+08
SR-85	Not Detected	--------	3.43E+10
TA-182	Not Detected	--------	4.23E+07
TA-183	Not Detected	--------	1.00E+26
TE-132	Not Detected	--------	1.00E+26
TL-201	Not Detected	--------	1.00E+26
XE-133	Not Detected	--------	1.00E+26
Y-88	Not Detected	--------	1.30E+07
ZN-65	Not Detected	--------	1.28E+05
ZR-95	Not Detected	--------	7.83E+10

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* Sandia National Laboratories *

* Radiation Protection Sample Diagnostics Program *

* Quality Assurance Report *

****

Report Date : 7-19-95 8:20:23 AM
QA File : C:\GENIEPC\CAMFILES\LCS2.QAF
Analyst : FCD
Sample ID : 50056104
Sample Quantity : 1.00 Each
Sample Date : 11-01-90 12:00:00 PM
Measurement Date : 7-19-95 8:05:19 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 606 seconds

Parameter	Mean	1S Error	New Value	<	LU	SD	UD	BS
AM-241 Activity	9.698E-02	3.832E-03	9.286E-02	<	In	:	:	
CS-137 Activity	6.953E-02	2.392E-03	6.752E-02	<	:	:	:	
CO-60 Activity	7.671E-02	2.550E-03	7.487E-02	<	:	:	:	

OK 7/19/

Flags Key:
LU = Boundary Test (Ab = Above , Be = Below
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action
BS = Measurement Bias Test (In = Investigate, Ac = Action

Reviewed by: 7/19/95

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******************************************************************************
*                      Sandia National Laboratories                           *
*              Radiation Protection Sample Diagnostics Program                *
*                            881 Laboratory                                   *
*                         7-19-95 11:25:29 PM                                 *
******************************************************************************
*                                                                             *
*                                                                             *
*                                                                             *
* Analyzed by: ______________________  Reviewed by: ________________________  *
*                                                                             *
******************************************************************************

Customer            : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID  : 022998-05
Lab Sample ID       : 50056501

Sample Description  : MARINELLI SOIL SAMPLE
Sample Type         : Solid
Sample Geometry     : 1SMAR
Sample Quantity     :   713.000  gram
Sample Date/Time    :  7-18-95   8:35:00 AM
Acquire Start Date  :  7-19-95  10:54:55 PM
Detector Name       : LAB01
Elapsed Live Time   :   1800 seconds
Elapsed Real Time   :   1801 seconds

Analyst             : FCD
Standard Geometry?  : YES
Nuclide Library     : C:\GENIEPC\CAMFILES\RPSD.NLB
Background File     : C:\GENIEPC\CAMFILES\BKGND1.CNF

Geniepc Version 2.1
Errors quoted at  2.000 sigma

Peak Search Sensitivity          :   2.75
Gaussian Sensitivity             :  10.00
Peak Fit Iterations Limit        :  10.00
Variable Tolerance (FWHM)        :   1.00
Peak Search Range (channels)     :   1- 8192
MDA Confidence Level             :   5.00%
NID Confidence Index Threshold   :   0.30

Energy Calibration Date :  6-02-95  10:46:59 AM
Energy (KeV)     =  -0.110 +   0.36610*CH +   0.00000000*CH^2
FWHM   (KeV)     =   1.055 +   0.03179*SQRT(E)
Low Energy Tail  =   1.617 +  -0.00018*E

Efficiency Calibration Date:  7-03-95   4:12:46 PM
Log(Eff) = ( -1.433E-04*E)   + ( -1.849E+00)     + (  2.940E+02/E)   +
           ( -4.496E+04/E^2) + (  2.910E+06/E^3) + ( -7.23E+07/E^4)  +
           (  0.000E+00/E^5) + (  0.000E+00/E^6) + (  0.00E+00/E^7)  +
           (  0.000E+00/E^9)


Comments:
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****
* Peak Search Report *
****

M = First peak in a multiplet region
m = Other peak in a multiplet region

	Peak No.	Energy (KeV)	Peak centroid	FWHM (KeV)	Continuum Counts	Net Peak Area	Net Area Error
M	1	75.38	206.2	1.3	452	245	71
	2	77.69	212.5	1.3	467	400	148
M	3	87.76	240.0	1.1	376	112	46
	4	90.38	247.2	1.1	345	74	37
	5	93.39	255.4	1.1	310	129	48
	6	186.32	509.3	1.4	325	142	66
M	7	239.10	653.4	1.5	271	922	128
	8	242.20	661.9	1.5	235	193	44
M	9	295.70	808.0	1.5	138	270	62
	10	300.66	821.6	1.5	152	32	24
	11	338.66	925.4	1.6	144	136	47
	12	352.27	962.5	1.6	155	481	62
	13	463.49	1266.3	1.9	82	53	33
	14	511.04	1396.2	2.2	141	153	54
	15	583.53	1594.2	1.8	62	264	41
	16	609.50	1665.2	2.0	81	353	50
	17	727.90	1988.6	1.3	32	76	26
	18	795.08	2172.1	1.0	44	35	25
	19	860.03	2349.5	0.4	48	40	28
	20	911.24	2489.4	2.3	42	194	36
	21	934.23	2552.2	2.4	31	24	20
	22	968.94	2647.0	2.0	60	75	31
	23	1120.21	3060.2	2.4	46	65	28
	24	1460.58	3989.9	2.2	27	1003	67
	25	1729.35	4724.1	1.5	3	16	10
	26	1763.90	4818.5	1.4	5	82	20
	27	1847.17	5045.9	1.5	0	23	10
	28	2614.18	7141.0	1.4	4	84	20

****
* Background Subtraction Report
****

Energy tolerance: 1.000 FWHM

M = First peak in a multiplet region
m = Other peak in a multiplet region

	Peak No.	Energy (keV)	Original Area	Shield Background	Background Error	Subtracted Area	Subtracted Area Error
M	1	75.38	245	0	0	245	71
m	2	77.69	400	0	0	400	148
M	3	87.76	112	0	0	112	46
m	4	90.38	74	0	0	74	37
m	5	93.39	129	0	0	129	48
	6	186.32	142	0	0	142	66
M	7	239.10	922	0	0	922	128
m	8	242.20	193	0	0	193	44
M	9	295.70	270	4	2	266	62
m	10	300.66	32	0	0	32	24
	11	338.66	136	0	0	136	47
	12	352.27	481	10	2	471	62
	13	463.49	53	0	0	53	33
	14	511.04	153	75	3	78	55
	15	583.53	264	0	0	264	41
	16	609.50	353	6	1	348	50
	17	727.90	76	0	0	76	26
	18	795.08	35	0	0	35	
	19	860.03	40	0	0	40	
	20	911.24	194	2	1	192	36
	21	934.23	24	0	0	24	20
	22	968.94	75	0	0	75	31
	23	1120.21	65	0	0	65	28
	24	1460.58	1003	7	1	996	67
	25	1729.35	16	0	0	16	10
	26	1763.90	82	2	1	81	20
	27	1847.17	23	0	0	23	10
	28	2614.18	84	4	1	80	20

****
* Nuclide Activity Report *
****

* = Primary line
Energy tolerance: 1.000 FWHM

Nuclide Name	Id Confid.	Energy (keV)	Eff. (Absolute)	Yield (%)	Activity (pCi/gram)	Activity Error
K-40	0.999	1460.75*	1.33E-02	10.67	1.48E+01	2.22E+00
TL-208	0.866	74.97	4.80E-02	1.23	8.75E+00	3.49E+00
		277.36	5.13E-02	2.27		
		510.80	3.17E-02	1.00	5.21E+00	3.93E+00
		583.19*	2.84E-02	30.40	6.46E-01	1.39E-01
		860.56	2.05E-02	4.47	9.17E-01	6.61E-01
		2614.53	7.62E-03	35.17	6.30E-01	2.11E-01
BI-212	0.591	727.18*	2.36E-02	6.65	1.02E+00	3.90E-01
		785.42	2.21E-02	1.11		
		1078.62	1.71E-02	0.54		
		1620.56	1.21E-02	1.51		
PB-212	0.992	74.81	4.80E-02	10.50	1.03E+00	3.72E-01
		77.11	4.96E-02	17.60	9.66E-01	4.16E-01
		87.30	5.45E-02	7.90	5.50E-01	2.54E-01
		238.63*	5.63E-02	43.60	7.93E-01	1.71E-01
BI-214	0.655	609.31*	2.73E-02	46.90	5.71E-01	1.15E-01
		665.45	2.54E-02	1.59		
		768.36	2.25E-02	5.00		
		806.17	2.17E-02	1.25		
		934.06	1.92E-02	3.25	8.07E-01	6.95E-01
		1120.29	1.65E-02	15.30	5.42E-01	2.56E-01
		1155.19	1.61E-02	1.72		
		1238.11	1.52E-02	6.05		
		1280.96	1.48E-02	1.50		
		1377.67	1.39E-02	4.12		
		1401.50	1.37E-02	1.41		
		1407.98	1.37E-02	2.52		
		1509.23	1.29E-02	2.23		
		1661.28	1.19E-02	1.17		
		1729.60	1.14E-02	3.03	9.81E-01	6.27E-01
		1764.50	1.12E-02	16.10	9.38E-01	2.76E-01
		1847.42	1.08E-02	2.14	2.10E+00	9.58E-01
		2118.55	9.46E-03	1.21		
		2447.86	8.18E-03	1.57		
PB-214	0.989	53.23	1.21E-02	1.11		
		74.81	4.80E-02	5.90	1.82E+00	6.73E-01
		77.11	4.96E-02	9.90	1.71E+00	7.46E-01
		87.30	5.45E-02	4.41	9.84E-01	4.54E-01
		241.98	5.59E-02	7.50	9.69E-01	2.72E-01
		295.21	4.91E-02	18.50	6.16E-01	1.76E-01
		351.92*	4.31E-02	35.80	6.43E-01	1.29E-01
RA-224	0.846	81.07	5.15E-02	0.12		
		83.78	5.28E-02	0.20		

Nuclide Name	Id Confid.	Energy (keV)	Eff. (Absolute)	Yield (%)	Activity (pCi/gram)	Activity Error
RA-224	0.846	240.99*	5.59E-02	3.97	1.83E+00	5.13E-01
RA-226	0.835	81.07	5.15E-02	0.18		
		83.78	5.28E-02	0.30		
		186.10*	6.26E-02	3.50	1.36E+00	6.86E-01
RA-228	1.000	968.90*	1.86E-02	17.50	4.81E-01	2.17E-01
TH-228	0.417	84.37	5.31E-02	1.27		
		131.61	6.39E-02	0.14		
		215.99	5.92E-02	0.26		
		300.09*	4.85E-02	3.34	4.15E-01	3.22E-01
TH-232	0.497	59.00	2.57E-02	0.19		
		328.00	4.55E-02	3.36		
		338.32*	4.44E-02	12.00	5.35E-01	2.12E-01
		409.40	3.82E-02	2.23		
TH-234	0.729	62.86	3.34E-02	0.18		
		83.30	5.26E-02	0.70		
		92.60*	5.65E-02	5.40	8.90E-01	4.17E-01
		112.81	6.14E-02	0.24		

****
* Interference Corrected Report *
****

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty	Activity at Primary line	Uncertainty at Primary Line
	K-40	1.0	1.48E+01	2.22E+00	1.48E+01	2.22E+00
X	CD-109	1.0				
	TL-208	0.9	6.50E-01	1.25E-01	6.46E-01	1.39E-01
	BI-212	0.6	1.02E+00	3.90E-01	1.02E+00	3.90E-01
	PB-212	1.0	6.55E-01	1.34E-01	7.93E-01	1.71E-01
	BI-214	0.7	6.24E-01	1.11E-01	5.71E-01	1.15E-01
	PB-214	1.0	6.04E-01	1.11E-01	6.43E-01	1.29E-01
	RA-224	0.8	6.90E-01	4.80E-01	1.83E+00	5.13E-01
	RA-226	0.8	1.36E+00	6.86E-01	1.36E+00	6.86E-01
	RA-228	1.0	4.81E-01	2.17E-01	4.81E-01	2.17E-01
	TH-228	0.4	4.15E-01	3.22E-01	4.15E-01	3.22E-01
	TH-232	0.5	5.35E-01	2.12E-01	5.35E-01	2.12E-01
	TH-234	0.7	8.90E-01	4.17E-01	8.90E-01	4.17E-01
X	NP-237	0.5				

********** U N I D E N T I F I E D P E A K S **********

Peak Number	Energy (keV)	Peak Size (CPS)	Peak %Error	Possible ID(s)
4	90.38	4.1050E-02	25.16	AC 228 X Ray
13	463.49	2.9355E-02	31.60	AC 228
20	911.24	1.0667E-01	9.26	AC 228

mw 7/20,

ER/1302 226 / DAT (5)

SMO ANALYTICAL DATA ROUTING FORM

Project Name: TA I Phase I Case Number: 3626400

SNL Task Leader: Miller Org/Mail Stop: 7582/~~1347~~ 1148

SMO Project Coordinator: Pierson Sample Ship Date: 7/20/95

ARCOC	Lab	Lab ID	7/19/95 7/18/95
03864	7715	500572	
03961	"	500565	
03873	"	500561	

Date Results Received:

Preliminary: _____ Final: 7/21/95, 7/21/95, 7/20/95

Corrections Requested From Laboratory: _____ Requestor: _____

Date Corrections Received: _____

Date Assigned to SMO Reviewer: _____ Reviewer: _____

Date Review Complete: _____ Signature: _____

Date of Preliminary Notification: _____ Person Notified: _____

Date of Final Transmittal: 8/16/95 Transmitted To: Miller

Transmitted By: DJM Filed In Record Center: DJM

Comments: _____

5005.3

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

2001-COC (9-94)

AR/COC- 03961

Dept. No./Mail Stop: 7582/1347
Project/Task Manager: D. Miller/H. Fleck
Project Name: TA-1 Soil Sampling (Phase I)
Record Center Code: ADS 1302 ER Site 226
Logbook Ref No: 0133
SMO Reference No.: CF0089

Date Samples Shipped: 7/19/95
Carrier/Waybill No.: UPS
Lab Contact: Amir M.
Lab Destination: 7715
SMO Contact/Phone: D. "Mac" McLaughlin/844-0867
Send Report to SMO: Deborah McLaughlin

Contract No.: N/A
Case No.: 3626400
SMO Authorization:
Bill to: Sandia National Laboratories, Supplier Services Department, P.O. Box 5800 MS 0154, Albuquerque, NM 87185-0154

Location Tech Area N/A (Outside TA-1) Building 821 Room Outside

Parameter & Method Requested

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	GAMMA SPEC	Lab Sample ID
229980-05	T1226-GP-020-009-S	13'3"	226	7/18/95 8:30	S	P	500ml	None	G	SA	X	
230000-05	T1226-GP-021-007-S	10'8"		9:45							X	
247190-05	T1226-GP-022-006-S	9'8"		10:20							X	
247200-05	T1226-GP-023-006-S	9'8"		10:45						DU	X	

MMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☑ Return to Client ☐ Disposal by lab

Turnaround Time ☑ Normal ☐ Rush Required Report Date

Sample Tracking: Date Entered (mm/dd/yy): 7/24/95 Entered by: Amc QC Inits.

Special Instructions/QC Requirements

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init	Company/Organization
	Matthew Shain	Matthew Shain	MS	IT Corp/7582
	Cathie Gohar	Cathie Gohar	CG	Sandia/7582

Relinquished by	Matthew Shain	Org. 7582	Date 7/18/95	Time 16:20	4. Relinquished by	Org.	Date	Time
Received by	[signature]	Org. 2513	Date 7/18/95	Time 1620	4. Received by	Org.	Date	Time
Relinquished by	[signature]	Org. 7513	Date 7/19/95	Time 1152	5. Relinquished by	Org.	Date	Time
Received by	[signature]	Org. 7715	Date 7/19/95	Time 1152	5. Received by	Org.	Date	Time
Relinquished by	[signature]	Org. SNL7715	Date 7/21/95	Time 1125	6. Relinquished by	Org.	Date	Time
Received by	[signature]	Org. 7513	Date 7/21/95	Time 1125	6. Received by	Org.	Date	Time

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

5 (0 0 3 1

SF 2001-COC (9-91)

ANALYSIS REQUEST AND CHAIN OF CUSTODY

AR/COC- 03961

Dept. No./Mail Stop: 7582/1147
Project/Task Manager: D Miller/H Fleck
Project Name: TA 1 Soil Sampling (Phase)
Record Center Code: ADS 1302 ER Site 226
Logbook Ref No: 0122
SMO Reference No.: SF0031

Date Samples Shipped: 7/19/95
Carrier/Waybill No.: HC
Lab Contact:
Lab Destination: 7715
SMO Contact/Phone: D. "Mac" McLaughlin/84
Send Report to SMO: Deborah McLaughlin

Contract No.: N/A
Case No.: 7620400
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location — Tech Area: N/A (outside TA-1)
Building: 821 Room: Outside

Reference LOV (available at SMO)

Parameter & Method Requested: GAMMA SPEC

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	GAMMA SPEC	Lab Sample ID
022998-05	T1226-GP-020-009-S	13'3"	226	7/15/95 - 9:30	S	P	500ml	None	G	SA	X	
023000-05	T1226-GP-021-007-S	10'8"	↓	9:45	↓	↓	↓	↓	↓	↓	X	
024719-05	T1226-GP-022-006-S	9'8"	↓	10:20	↓	↓	↓	↓	↓	↓	X	
024720-05	T1226-GP-023-006-S	9'8"	↓	10:45	↓	↓	↓	↓	↓	DU	X	

RMMA ☐ Yes ☒ No Ref. No.

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date

Sample Tracking
Date Entered (mm/dd/yy) 7/24/95
Entered by:
QC inits.

Special Instructions/QC Requirements

Abnormal Conditions on Receipt

Sample Team Members — Name	Signature	Init	Company/Organization
Matthew Shain	Matthew Shain	MS	IT corp/7582
Colline Gelhar	Colline Gelhar	CG	Sandia/7582

	Org.	Date	Time
1. Relinquished by Matthew Shain	7582	7/18/95	16:20
1. Received by	7513	7/18/95	1620
2. Relinquished by	7513	7/19/95	1152
2. Received by	7715	7/19/95	1152
3. Relinquished by	SNL 7715	7/21/95	1125
3. Received by	7513	7/21/95	1125
4. Relinquished by			
4. Received by			
5. Relinquished by			
5. Received by			
6. Relinquished by			
6. Received by			

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

Sandia National Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Form
Page 1 of 1

To be completed by Customer

Shaded areas are for RPSD use only

Customer: D. Miller / H. Flock
Organization: 7582
Project Location: TA-1
Phone: 845-0867
Date Results Needed:
Suspect Isotopes:
Other Information: 03961

Hazards/Special Instructions:
Please notify SHO upon completion @ 845-0867

Batch Log Number: 500565
Logged By: Pearl

Analysis Type:
- [x] Gamma Spec
- [ ] H-3
- [ ] Alpha/Beta
- [ ] Alpha Spec
- [ ] Total U
- [ ] Other

LIMS Login
Results Faxed
Sample Disposal

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Scan CPM	Sample Weight	Remarks
022998-05	S	7/18/95-8:38	500ml	Gamma. Spec	01	<300	713 g	
~~023300-05~~	~~S~~	~~7/19/95~~						
023000-05	S	7/19/95-9:45	500 ml	Gamma Spec	02		621 g	
024719-05	↓	10:20	↓	↓	03		847 g	
024720-05	↓	10:45	↓	↓	04	↓	782 g	
LCS					05			

Relinquished by D.M. Miller Date 7/19/95 Time 1152 Received by [signature] Date 7/19/95 Time 1152
Relinquished by [signature] Date 7/21/95 Time 1125 Received by [signature] Date 7/21/95 Time 1125
Relinquished by _____ Date _____ Time _____ Received by _____ Date _____ Time _____
Relinquished by _____ Date _____ Time _____ Received by _____ Date _____ Time _____

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
7-19-95 11:29:41 PM

Analyzed by: 7/20/95 Reviewed by: 7/20/95

Customer : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID : 022998-05
Lab Sample ID : 50056501

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 1SMAR
Sample Quantity : 713.000 gram
Sample Date/Time : 7-18-95 8:35:00 AM
Acquire Start Date : 7-19-95 10:54:55 PM
Detector Name : LAB01
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	2.10
TH-234	8.90E-01	4.17E-01	5.84E-01
U-234	Not Detected	--------	2.08E+01
RA-226	1.36	6.86E-01	9.97E-01
PB-214	6.43E-01	1.29E-01	1.04E-01
BI-214	5.71E-01	1.15E-01	9.45E-02
PB-210	Not Detected	--------	1.26
TH-232	5.35E-01	2.12E-01	2.76E-01
RA-228	4.81E-01	2.17E-01	2.87E-01
AC-228	Not Detected	--------	3.36E-01
TH-228	4.15E-01	3.22E-01	7.81E-01
RA-224	1.83	5.13E-01	7.04E-01
PB-212	7.93E-01	1.71E-01	6.82E-02
BI-212	1.02	3.90E-01	4.63E-01
TL-208	6.46E-01	1.39E-01	1.09E-01
U-235	Not Detected	--------	3.76E-01
TH-231	Not Detected	--------	7.40E-01
PA-231	Not Detected	--------	2.17
AC-227	Not Detected	--------	2.67
TH-227	Not Detected	--------	5.97E-01
RA-223	Not Detected	--------	2.60E-01
RN-219	Not Detected	--------	4.51E-01
PB-211	Not Detected	--------	1.14
TL-207	Not Detected	--------	2.20E+01
AM-241	Not Detected	--------	2.69E-01
PU-239	Not Detected	--------	4.18E+02
NP-237	Not Detected	--------	2.90E-01
PA-233	Not Detected	--------	1.02E-01
TH-229	Not Detected	--------	3.82E-01

[Summary Report] - Sample ID: 50056501

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.73E-02
AR-41	Not Detected	--------	1.41E+05
BA-133	Not Detected	--------	1.03E-01
BA-140	Not Detected	--------	1.94E-01
CD-109	Not Detected	--------	9.97E-01
CD-115	Not Detected	--------	1.69E-01
CE-139	Not Detected	--------	5.12E-02
CE-141	Not Detected	--------	8.83E-02
CE-144	Not Detected	--------	3.77E-01
CO-56	Not Detected	--------	5.79E-02
CO-57	Not Detected	--------	4.90E-02
CO-58	Not Detected	--------	5.44E-02
CO-60	Not Detected	--------	6.17E-02
CR-51	Not Detected	--------	3.96E-01
CS-134	Not Detected	--------	8.46E-02
CS-137	Not Detected	--------	5.65E-02
CU-64	Not Detected	--------	9.56E+01
EU-152	Not Detected	--------	4.14E-01
EU-154	Not Detected	--------	2.95E-01
EU-155	Not Detected	--------	1.94E-01
FE-59	Not Detected	--------	1.20E-01
GD-153	Not Detected	--------	1.64E-01
HG-203	Not Detected	--------	4.79E-02
I-131	Not Detected	--------	5.18E-02
IN-115m	Not Detected	--------	4.03E+01
IR-192	Not Detected	--------	4.75E-02
K-40	1.48E+01	2.22	5.67E-01
LA-140	Not Detected	--------	1.24E-01
MN-54	Not Detected	--------	5.82E-02
MN-56	Not Detected	--------	1.84E+03
MO-99	Not Detected	--------	5.88E-01
NA-22	Not Detected	--------	6.72E-02
NA-24	Not Detected	--------	3.32E-01
NB-95	Not Detected	--------	3.78E-01
ND-147	Not Detected	--------	3.95E-01
NI-57	Not Detected	--------	1.78E-01
BE-7	Not Detected	--------	3.81E-01
RU-103	Not Detected	--------	4.61E-02
RU-106	Not Detected	--------	4.66E-01
SB-122	Not Detected	--------	1.01E-01
SB-124	Not Detected	--------	6.05E-02
SB-125	Not Detected	--------	1.34E-01
SC-46	Not Detected	--------	8.29E-02
SR-85	Not Detected	--------	6.21E-02
TA-182	Not Detected	--------	2.51E-01
TA-183	Not Detected	--------	2.85E-01
TE-132	Not Detected	--------	6.39E-02
TL-201	Not Detected	--------	2.12E-01
XE-133	Not Detected	--------	2.97E-01
Y-88	Not Detected	--------	4.11E-02
ZN-65	Not Detected	--------	1.63E-01
ZR-95	Not Detected	--------	1.00E-01

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 7-20-95 12:09:45 AM *
****

* Analyzed by: 7/20/95 Reviewed by: 7/20/95 *

Customer : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID : 023000-05
Lab Sample ID : 50056502

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 1SMAR
Sample Quantity : 621.000 gram
Sample Date/Time : 7-18-95 9:45:00 AM
Acquire Start Date : 7-19-95 11:36:14 PM
Detector Name : LAB01
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	1.79
TH-234	Not Detected	--------	9.01E-01
U-234	Not Detected	--------	1.78E+01
RA-226	1.90	9.34E-01	1.36
PB-214	4.36E-01	9.92E-02	8.85E-02
BI-214	3.49E-01	8.98E-02	9.13E-02
PB-210	Not Detected	--------	1.28
TH-232	3.41E-01	1.78E-01	2.48E-01
RA-228	Not Detected	--------	4.01E-01
AC-228	Not Detected	--------	2.91E-01
TH-228	4.84E-01	3.20E-01	7.19E-01
RA-224	Not Detected	--------	1.47
PB-212	2.88E-01	8.62E-02	1.03E-01
BI-212	5.19E-01	3.21E-01	4.47E-01
TL-208	3.05E-01	9.89E-02	1.10E-01
U-235	Not Detected	--------	3.43E-01
TH-231	Not Detected	--------	6.21E-01
PA-231	Not Detected	--------	1.93
AC-227	Not Detected	--------	2.46
TH-227	Not Detected	--------	4.90E-01
RA-223	Not Detected	--------	2.18E-01
RN-219	Not Detected	--------	4.18E-01
PB-211	Not Detected	--------	1.02
TL-207	Not Detected	--------	2.13E+01
AM-241	Not Detected	--------	2.26E-01
PU-239	Not Detected	--------	3.81E+02
NP-237	Not Detected	--------	4.02E-01
PA-233	Not Detected	--------	8.84E-02
TH-229	Not Detected	--------	3.37E-01

[Summary Report] - Sample ID: 50056502

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.86E-02
AR-41	Not Detected	--------	1.08E+05
BA-133	Not Detected	--------	9.23E-02
BA-140	Not Detected	--------	1.89E-01
CD-109	Not Detected	--------	1.37
CD-115	Not Detected	--------	1.59E-01
CE-139	Not Detected	--------	4.72E-02
CE-141	Not Detected	--------	7.98E-02
CE-144	Not Detected	--------	3.38E-01
CO-56	Not Detected	--------	5.61E-02
CO-57	Not Detected	--------	4.35E-02
CO-58	Not Detected	--------	5.13E-02
CO-60	Not Detected	--------	4.97E-02
CR-51	Not Detected	--------	3.78E-01
CS-134	Not Detected	--------	7.86E-02
CS-137	Not Detected	--------	5.18E-02
CU-64	Not Detected	--------	8.76E+01
EU-152	Not Detected	--------	4.23E-01
EU-154	Not Detected	--------	2.74E-01
EU-155	Not Detected	--------	1.73E-01
FE-59	Not Detected	--------	9.88E-02
GD-153	Not Detected	--------	1.45E-01
HG-203	Not Detected	--------	4.53E-02
I-131	Not Detected	--------	5.06E-02
IN-115m	Not Detected	--------	3.53E+01
IR-192	Not Detected	--------	4.42E-02
K-40	9.83	1.60	5.79E-01
LA-140	Not Detected	--------	1.07E-01
MN-54	Not Detected	--------	5.96E-02
MN-56	Not Detected	--------	1.57E+03
MO-99	Not Detected	--------	5.50E-01
NA-22	Not Detected	--------	6.41E-02
NA-24	Not Detected	--------	2.99E-01
NB-95	Not Detected	--------	3.08E-01
ND-147	Not Detected	--------	3.42E-01
NI-57	Not Detected	--------	1.45E-01
BE-7	Not Detected	--------	3.54E-01
RU-103	Not Detected	--------	4.11E-02
RU-106	Not Detected	--------	4.63E-01
SB-122	Not Detected	--------	9.80E-02
SB-124	Not Detected	--------	5.36E-02
SB-125	Not Detected	--------	1.30E-01
SC-46	Not Detected	--------	8.23E-02
SR-85	Not Detected	--------	5.65E-02
TA-182	Not Detected	--------	2.39E-01
TA-183	Not Detected	--------	2.39E-01
TE-132	Not Detected	--------	5.64E-02
TL-201	Not Detected	--------	1.81E-01
XE-133	Not Detected	--------	2.55E-01
Y-88	Not Detected	--------	4.43E-02
ZN-65	Not Detected	--------	1.60E-01
ZR-95	Not Detected	--------	8.01E-02

****

Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-20-95 12:50:04 AM

****

Analyzed by: 7/20/95 Reviewed by: 7/20/95

Customer : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID : 024719-05
Lab Sample ID : 50056503

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 1SMAR
Sample Quantity : 847.000 gram
Sample Date/Time : 7-18-95 10:20:00 AM
Acquire Start Date : 7-20-95 12:16:07 AM
Detector Name : LAB01
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

****

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	1.92
TH-234	9.57E-01	2.86E-01	5.69E-01
U-234	Not Detected	--------	1.81E+01
RA-226	1.05	5.41E-01	7.87E-01
PB-214	6.45E-01	1.21E-01	8.48E-02
BI-214	6.20E-01	1.17E-01	9.22E-02
PB-210	Not Detected	--------	1.25
TH-232	6.06E-01	1.96E-01	2.30E-01
RA-228	6.43E-01	2.04E-01	2.14E-01
AC-228	8.19E-01	1.98E-01	1.87E-01
TH-228	6.89E-01	3.45E-01	8.32E-01
RA-224	1.92	4.92E-01	6.26E-01
PB-212	7.23E-01	1.51E-01	5.79E-02
BI-212	6.55E-01	4.23E-01	6.30E-01
TL-208	6.98E-01	1.43E-01	1.12E-01
U-235	Not Detected	--------	3.44E-01
TH-231	Not Detected	--------	6.99E-01
PA-231	Not Detected	--------	2.02
AC-227	Not Detected	--------	2.62
TH-227	Not Detected	--------	5.24E-01
RA-223	Not Detected	--------	2.45E-01
RN-219	Not Detected	--------	4.98E-01
PB-211	Not Detected	--------	9.78E-01
TL-207	Not Detected	--------	2.24E+01
AM-241	Not Detected	--------	2.39E-01
PU-239	Not Detected	--------	4.05E+02
NP-237	Not Detected	--------	2.78E-01
PA-233	Not Detected	--------	8.71E-02
TH-229	Not Detected	--------	3.73E-01

[Summary Report] - Sample ID: 50056503

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.43E-02
AR-41	Not Detected	--------	1.32E+05
BA-133	Not Detected	--------	9.38E-02
BA-140	Not Detected	--------	1.87E-01
CD-109	Not Detected	--------	9.59E-01
CD-115	Not Detected	--------	1.60E-01
CE-139	Not Detected	--------	4.93E-02
CE-141	Not Detected	--------	7.97E-02
CE-144	Not Detected	--------	3.60E-01
CO-56	Not Detected	--------	5.71E-02
CO-57	Not Detected	--------	4.44E-02
CO-58	Not Detected	--------	5.14E-02
CO-60	Not Detected	--------	5.98E-02
CR-51	Not Detected	--------	3.74E-01
CS-134	Not Detected	--------	7.88E-02
CS-137	Not Detected	--------	5.12E-02
CU-64	Not Detected	--------	1.07E+02
EU-152	Not Detected	--------	4.00E-01
EU-154	Not Detected	--------	2.81E-01
EU-155	Not Detected	--------	1.87E-01
FE-59	Not Detected	--------	1.20E-01
GD-153	Not Detected	--------	1.55E-01
HG-203	Not Detected	--------	4.73E-02
I-131	Not Detected	--------	4.68E-02
IN-115m	Not Detected	--------	3.61E+01
IR-192	Not Detected	--------	4.38E-02
K-40	1.93E+01	2.77	5.22E-01
LA-140	Not Detected	--------	1.10E-01
MN-54	Not Detected	--------	5.58E-02
MN-56	Not Detected	--------	1.63E+03
MO-99	Not Detected	--------	5.86E-01
NA-22	Not Detected	--------	6.95E-02
NA-24	Not Detected	--------	3.15E-01
NB-95	Not Detected	--------	3.30E-01
ND-147	Not Detected	--------	3.41E-01
NI-57	Not Detected	--------	1.68E-01
BE-7	Not Detected	--------	3.70E-01
RU-103	Not Detected	--------	4.40E-02
RU-106	Not Detected	--------	4.27E-01
SB-122	Not Detected	--------	9.40E-02
SB-124	Not Detected	--------	5.51E-02
SB-125	Not Detected	--------	1.29E-01
SC-46	Not Detected	--------	8.67E-02
SR-85	Not Detected	--------	5.82E-02
TA-182	Not Detected	--------	2.54E-01
TA-183	Not Detected	--------	2.53E-01
TE-132	Not Detected	--------	5.93E-02
TL-201	Not Detected	--------	1.94E-01
XE-133	Not Detected	--------	2.79E-01
Y-88	Not Detected	--------	4.01E-02
ZN-65	Not Detected	--------	1.67E-01
ZR-95	Not Detected	--------	9.08E-02

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

7-20-95 1:30:22 AM

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Analyzed by: 7/20/95 Reviewed by: 7/20/95

Customer : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID : 024720-05
Lab Sample ID : 50056504

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 1SMAR
Sample Quantity : 782.000 gram
Sample Date/Time : 7-18-95 10:45:00 AM
Acquire Start Date : 7-20-95 12:56:29 AM
Detector Name : LAB01
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

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Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	1.83
TH-234	9.47E-01	4.19E-01	5.59E-01
U-234	Not Detected	--------	1.82E+01
RA-226	1.33	6.50E-01	9.41E-01
PB-214	6.18E-01	1.20E-01	8.98E-02
BI-214	4.71E-01	7.41E-02	6.44E-02
PB-210	Not Detected	--------	1.22
TH-232	6.07E-01	2.05E-01	2.45E-01
RA-228	4.95E-01	1.87E-01	2.25E-01
AC-228	7.07E-01	1.83E-01	1.80E-01
TH-228	6.20E-01	3.01E-01	6.37E-01
RA-224	1.76	4.54E-01	6.59E-01
PB-212	5.54E-01	1.24E-01	6.20E-02
BI-212	4.96E-01	3.40E-01	5.02E-01
TL-208	4.79E-01	1.17E-01	1.10E-01
U-235	Not Detected	--------	3.35E-01
TH-231	Not Detected	--------	6.54E-01
PA-231	Not Detected	--------	1.94
AC-227	Not Detected	--------	2.53
TH-227	Not Detected	--------	4.88E-01
RA-223	Not Detected	--------	2.30E-01
RN-219	Not Detected	--------	3.04E-01
PB-211	Not Detected	--------	9.44E-01
TL-207	Not Detected	--------	2.15E+01
AM-241	Not Detected	--------	2.35E-01
PU-239	Not Detected	--------	3.93E+02
NP-237	Not Detected	--------	2.40E-01
PA-233	Not Detected	--------	8.88E-02
TH-229	Not Detected	--------	3.47E-01

[Summary Report] - Sample ID: 50056504

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.65E-02
AR-41	Not Detected	--------	1.39E+05
BA-133	Not Detected	--------	9.32E-02
BA-140	Not Detected	--------	1.64E-01
CD-109	Not Detected	--------	8.25E-01
CD-115	Not Detected	--------	1.56E-01
CE-139	Not Detected	--------	4.56E-02
CE-141	Not Detected	--------	7.63E-02
CE-144	Not Detected	--------	3.45E-01
CO-56	Not Detected	--------	5.61E-02
CO-57	Not Detected	--------	4.22E-02
CO-58	Not Detected	--------	4.58E-02
CO-60	Not Detected	--------	6.01E-02
CR-51	Not Detected	--------	3.56E-01
CS-134	Not Detected	--------	7.50E-02
CS-137	Not Detected	--------	5.32E-02
CU-64	Not Detected	--------	9.36E+01
EU-152	Not Detected	--------	3.86E-01
EU-154	Not Detected	--------	2.86E-01
EU-155	Not Detected	--------	1.83E-01
FE-59	Not Detected	--------	1.10E-01
GD-153	Not Detected	--------	1.46E-01
HG-203	Not Detected	--------	4.39E-02
I-131	Not Detected	--------	4.99E-02
IN-115m	Not Detected	--------	3.64E+01
IR-192	Not Detected	--------	4.36E-02
K-40	1.70E+01	2.47	3.91E-01
LA-140	Not Detected	--------	8.82E-02
MN-54	Not Detected	--------	5.27E-02
MN-56	Not Detected	--------	1.71E+03
MO-99	Not Detected	--------	6.05E-01
NA-22	Not Detected	--------	6.34E-02
NA-24	Not Detected	--------	3.03E-01
NB-95	Not Detected	--------	3.09E-01
ND-147	Not Detected	--------	3.10E-01
NI-57	Not Detected	--------	1.48E-01
BE-7	Not Detected	--------	3.57E-01
RU-103	Not Detected	--------	4.37E-02
RU-106	Not Detected	--------	4.59E-01
SB-122	Not Detected	--------	9.31E-02
SB-124	Not Detected	--------	5.37E-02
SB-125	Not Detected	--------	1.22E-01
SC-46	Not Detected	--------	7.86E-02
SR-85	Not Detected	--------	5.72E-02
TA-182	Not Detected	--------	2.34E-01
TA-183	Not Detected	--------	2.49E-01
TE-132	Not Detected	--------	5.62E-02
TL-201	Not Detected	--------	1.80E-01
XE-133	Not Detected	--------	2.61E-01
Y-88	Not Detected	--------	3.52E-02
ZN-65	Not Detected	--------	1.51E-01
ZR-95	Not Detected	--------	8.82E-02

```
*******************************************************************************
*                    Sandia National Laboratories                             *
*    Radiation Protection Sample Diagnostics Program [881 Laboratory]         *
*                        7-20-95 10:00:56 AM                                  *
*******************************************************************************
*                                                                             *
* Analyzed by: [signature] 7/20/95        Reviewed by: [signature] 7/20/95    *
*******************************************************************************
```

Customer : D.MILLER/D.McLAUGHLIN (7582/SMO)
Customer Sample ID : LAB CONTROL SAMPLE ANALYSIS #CG134
Lab Sample ID : 50056505

Sample Description : MIXED_GAMMA_STANDARD
Sample Type : Liquid
Sample Geometry : WMAR
Sample Quantity : 1.000 Each
Sample Date/Time : 11-01-90 12:00:00 PM
Acquire Start Date : 7-20-95 9:42:48 AM
Detector Name : LAB01
Elapsed Live Time : 600 seconds
Elapsed Real Time : 608 seconds

Comments:

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Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	--------	2.07E+04
TH-234	Not Detected	--------	3.86E+03
U-234	Not Detected	--------	1.14E+05
RA-226	Not Detected	--------	5.94E+03
PB-214	Not Detected	--------	6.84E+02
BI-214	Not Detected	--------	6.11E+02
PB-210	Not Detected	--------	4.62E+03
TH-232	Not Detected	--------	2.01E+03
RA-228	Not Detected	--------	2.70E+03
AC-228	Not Detected	--------	1.72E+03
TH-228	Not Detected	--------	3.66E+04
RA-224	Not Detected	--------	3.14E+04
PB-212	Not Detected	--------	2.86E+03
BI-212	Not Detected	--------	2.55E+04
TL-208	Not Detected	--------	5.22E+03
U-235	Not Detected	--------	1.64E+03
TH-231	Not Detected	--------	2.64E+03
PA-231	Not Detected	--------	9.23E+03
AC-227	Not Detected	--------	1.47E+04
TH-227	Not Detected	--------	2.35E+03
RA-223	Not Detected	--------	1.00E+26
RN-219	Not Detected	--------	2.85E+03
PB-211	Not Detected	--------	8.72E+03
TL-207	Not Detected	--------	2.15E+05
AM-241	8.82E+04	1.39E-04	1.01E+03
PU-239	Not Detected	--------	1.82E+06
NP-237	Not Detected	--------	1.76E+03
PA-233	Not Detected	--------	6.01E+02
TH-229	Not Detected	--------	1.59E+03

[Summary Report] - Sample ID: 50056505

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	--------	1.74E+05
AR-41	Not Detected	--------	1.00E+26
BA-133	Not Detected	--------	5.47E+02
BA-140	Not Detected	--------	1.00E+26
CD-109	3.03E+05	6.96E+04	7.32E+04
CD-115	Not Detected	--------	1.00E+26
CE-139	Not Detected	--------	1.40E+06
CE-141	Not Detected	--------	3.29E+18
CE-144	Not Detected	--------	1.08E+05
CO-56	Not Detected	--------	2.09E+09
CO-57	1.48E+04	3.81E+03	1.44E+04
CO-58	Not Detected	--------	7.54E+09
CO-60	7.41E+04	9.63E+03	4.47E+02
CR-51	Not Detected	--------	1.17E+22
CS-134	Not Detected	--------	1.43E+03
CS-137	6.84E+04	8.82E+03	5.30E+02
CU-64	Not Detected	--------	1.00E+26
EU-152	Not Detected	--------	3.38E+03
EU-154	Not Detected	--------	2.23E+03
EU-155	Not Detected	--------	1.67E+03
FE-59	Not Detected	--------	3.85E+14
GD-153	Not Detected	--------	8.28E+04
HG-203	Not Detected	--------	3.54E+13
I-131	Not Detected	--------	1.00E+26
IN-115m	Not Detected	--------	1.00E+26
IR-192	Not Detected	--------	2.94E+09
K-40	Not Detected	--------	1.70E+03
LA-140	Not Detected	--------	1.00E+26
MN-54	Not Detected	--------	1.76E+04
MN-56	Not Detected	--------	1.00E+26
MO-99	Not Detected	--------	1.00E+26
NA-22	Not Detected	--------	8.13E+02
NA-24	Not Detected	--------	1.00E+26
NB-95	Not Detected	--------	1.00E+26
ND-147	Not Detected	--------	1.00E+26
NI-57	Not Detected	--------	1.00E+26
BE-7	Not Detected	--------	1.73E+13
RU-103	Not Detected	--------	5.50E+15
RU-106	Not Detected	--------	7.67E+04
SB-122	Not Detected	--------	1.00E+26
SB-124	Not Detected	--------	1.20E+11
SB-125	Not Detected	--------	3.52E+03
SC-46	Not Detected	--------	6.89E+08
SR-85	Not Detected	--------	3.48E+10
TA-182	Not Detected	--------	4.19E+07
TA-183	Not Detected	--------	1.00E+26
TE-132	Not Detected	--------	1.00E+26
TL-201	Not Detected	--------	1.00E+26
XE-133	Not Detected	--------	1.00E+26
Y-88	Not Detected	--------	1.35E+07
ZN-65	Not Detected	--------	1.26E+05
ZR-95	Not Detected	--------	7.34E+10

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program

Quality Assurance Report

****

Report Date	:	7-20-95 10:07:41 AM
QA File	:	C:\GENIEPC\CAMFILES\LCS1.QAF
Analyst	:	FCD
Sample ID	:	50056505
Sample Quantity	:	1.00 Each
Sample Date	:	11-01-90 12:00:00 PM
Measurement Date	:	7-20-95 9:42:48 AM
Elapsed Live Time	:	600 seconds
Elapsed Real Time	:	608 seconds

Parameter	Mean	1S Error	New Value	< LU	: SD	: UD	: BS
AM-241 Activity	8.652E-02	7.876E-03	8.817E-02	<	:	:	:
CS-137 Activity	6.973E-02	5.266E-03	6.836E-02	<	:	:	:
CO-60 Activity	7.883E-02	6.153E-03	7.440E-02	<	:	:	:

Flags Key:
- LU = Boundary Test (Ab = Above , Be = Below)
- SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
- UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
- BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: _____ 7/20/95

ER/1302 226 / DAT (6)

SMO ANALYTICAL DATA ROUTING FORM

Project Name: TAT Phase I Case Number: 3626400

SNL Task Leader: Miller Org/Mail Stop: 7582/~~DAT~~ 1148

SMO Project Coordinator: Princent Sample Ship Date: 7/20/95

ARCOC	Lab	Lab ID	7/19/95 7/18/95
03964	7715	500572	
03961	"	500565	
03873	"	500561	

Date Results Received:

Preliminary: _____ Final: 7/21/95, 7/21/95, 7/20/95

Corrections Requested From Laboratory: _____ Requestor: _____

Date Corrections Received: _____

Date Assigned to SMO Reviewer: _____ Reviewer: _____

Date Review Complete: _____ Signature: _____

Date of Preliminary Notification: _____ Person Notified: _____

Date of Final Transmittal: 8/16/95 Transmitted To: Miller

Transmitted By: DJM Filed In Record Center: DJM

Comments: _____

SF 2001-COC 500572

ANALYSIS REQUES CHAIN OF CUSTODY

PAGE 1

AR/COC- 03964

Dept. No./Mail Stop: 7582/1347
Project/Task Manager: D. Miller / H. Fleck
Project Name: TA-1 Soil Sampling (Phase I)
Record Center Code: ADS 1302 ER Site 226
Logbook Ref No: 0133
SMO Reference No.: CF0089

Date Samples Shipped: 7/20/95
Carrier/Waybill No: HC
Lab Contact: Amir M.
Lab Destination: 7715
SMO Contact/Phone: D. "Moe" McLaughlin / 845-0867
Send Report to SMO: Deborah McLaughlin

Contract No.: N/A
Case No.: 3026.400
SMO Authorization:
Bill to: Sandia National Laboratories, Supplier Services Department, P.O. Box 5800 MS 0154, Albuquerque, NM 87185-0154

Location Tech Area: Outside TA-1
Building: N/A Room: N/A

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	GAMMA SPEC	Lab Sample ID
024726-05	T1226-SD-001-001-SS	1'	226	7/20/95-9:45	S	P	500ml	None	G	SA	X	

Reference LOV (available at SMO)

Parameter & Method Requested: GAMMA SPEC

RMMA ☐ Yes ☑ No Ref. No. ______

Sample Disposal ☑ Return to Client ☐ Disposal by lab

Turnaround Time ☑ Normal ☐ Rush Required Report Date ______

Sample Tracking
Date Entered (mm/dd/yy) 7/25/95
Entered by: Am
QC inits.

Special Instructions/QC Requirements

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init	Company/Organization
	Matthew Shain	Matthew Shain	MS	IT Corp / 7582
	Cathie Gohar	Cathie Gohar	CG	Sandia 7582

	Org.	Date	Time
1. Relinquished by Matthew Shain	7582	7/20/95	10:55
1. Received by	7513	7/20/95	10:55
2. Relinquished by	7513	7/20/95	11:20
2. Received by	7513	7/20/95	11:30
3. Relinquished by	7513	7/20/95	12:15
3. Received by	SNL 7715	7/20/95	12:15
4. Relinquished by	SNL 7715	7/21/95	210
4. Received by	7513	7/21/95	210
5. Relinquished by			
5. Received by			
6. Relinquished by			
6. Received by			

WHITE - To Accompany Samples, Laboratory Copy BLUE - To Accompany Samples, Return to SMO YELLOW - SMO Suspense Copy PINK - Field Copy

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SF 2001-COC (9-91) 500572

PAGE 1 OF 1

AR/COC- 03964

Dept. No./Mail Stop: [illegible]
Project/Task Manager: [illegible]
Project Name: [illegible]
Record Center Code: [illegible]
Logbook Ref No: [illegible]
SMO Reference No.: [illegible]

Date Samples Shipped: [illegible]
Carrier/Waybill No.: [illegible]
Lab Contact: [illegible]
Lab Destination: [illegible]
SMO Contact/Phone: [illegible]
Send Report to SMO [illegible]

Contract No.: N/A
Case No.: [illegible]
SMO Authorization: [illegible]
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Parameter & Method Requested

Location Tech Area Double TA-1
Building N/A Room N/A

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO) Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type		Lab Sample ID
0 2 1 7 2 6 - 0 5	[illegible]	1'	[illegible]	7/15/95	S	P	500ml	None	G	SA	X	

RMMA ☐ Yes ☑ No Ref. No. ____

Sample Disposal ☑ Return to Client ☐ Disposal by lab

Turnaround Time ☑ Normal ☐ Rush Required Report Date ____

Sample Tracking
Date Entered (mm/dd/yy) 7/25/95
Entered by: [illegible]
QC Inits. ____

Special Instructions/QC Requirements

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init	Company/Organization
	Matthew Strain	Matthew Strain	MS	EI Corp/ 7582
	[illegible]	[illegible]	[illegible]	[illegible]

1. Relinquished by	Matthew Strain	Org. 7582	Date 7/20/95	Time 10:55	4. Relinquished by	[illegible]	Org. SNL 7113	Date 7/21/95	Time 210
1. Received by	[illegible]	Org. 7513	Date 7/20/95	Time 10 55	4. Received by	[illegible]	Org. 7513	Date 7/21/95	Time 210
2. Relinquished by	[illegible]	Org. 7513	Date 7/20/95	Time 1130	5. Relinquished by		Org.	Date	Time
2. Received by	[illegible]	Org. 7513	Date 7/20/95	Time 1130	5. Received by		Org.	Date	Time
3. Relinquished by	[illegible]	Org. 7513	Date 7/20/95	Time 1215	6. Relinquished by		Org.	Date	Time
3. Received by	[illegible]	Org. SNL 7113	Date 7/20/95	Time 1215	6. Received by		Org.	Date	Time

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

Sandia National Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Form
Page 1 of 1

To be completed by Customer

Shaded areas are for RPSD use only

Customer: D. Miller / H. Meek
Organization: 7582
Project Location: TA-I
Phone: 845-0867
Date Results Needed:
Suspect Isotopes:
Other Information: 03964

Hazards/Special Instructions:
please notify 540
upon completion
@ 845-0867

Batch Log Number: 500572
Logged By: [illegible]

LIMS Login
Results Faxed
Sample Disposal

Analysis Type:
- [X] Gamma Spec
- [ ] H-3
- [ ] Alpha/Beta
- [ ] Alpha Spec
- [ ] Total U
- [ ] Other

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Scan CPM	Sample Weight	Remarks
024726-05	S	7/20/95-9:45	500ml	Gamma Spec	01	< 300	75g	
LCS		1200/50		Y Spec	02	NA	NA	

Relinquished by [signature] Date 7/20/95 Time 1215 Received by [signature] Date 7/20/95 Time 1215
Relinquished by [signature] Date 7/21/95 Time 0710 Received by [signature] Date 7/21/95 Time 0710
Relinquished by _____ Date _____ Time _____ Received by _____ Date _____ Time _____
Relinquished by _____ Date _____ Time _____ Received by _____ Date _____ Time _____

****
*
Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
7-21-95 12:04:56 AM
*
****

Analyzed by: Shawn Cole 7/21/95 Reviewed by: 7/21/95

Customer : D.MILLER/D.BISWELL (7582/SMO)
Customer Sample ID : 024726-05
Lab Sample ID : 50057201

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 1SMAR
Sample Quantity : 759.000 gram
Sample Date/Time : 7-20-95 9:45:00 AM
Acquire Start Date : 7-20-95 11:30:56 PM
Detector Name : LAB01
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	1.95
TH-234	Not Detected	--------	1.00
U-234	Not Detected	--------	1.95E+01
RA-226	9.10E-01	6.52E-01	1.00
PB-214	6.53E-01	1.36E-01	1.24E-01
BI-214	4.97E-01	1.07E-01	9.85E-02
PB-210	Not Detected	--------	1.31
TH-232	4.80E-01	2.39E-01	3.42E-01
RA-228	5.36E-01	2.06E-01	2.54E-01
AC-228	6.94E-01	1.80E-01	1.75E-01
TH-228	Not Detected	--------	1.49
RA-224	Not Detected	--------	6.36E-01
PB-212	7.27E-01	1.45E-01	6.16E-02
BI-212	3.30E-01	3.86E-01	6.18E-01
TL-208	6.52E-01	1.53E-01	1.51E-01
U-235	Not Detected	--------	3.68E-01
TH-231	Not Detected	--------	7.12E-01
PA-231	Not Detected	--------	2.07
AC-227	Not Detected	--------	2.64
TH-227	Not Detected	--------	5.58E-01
RA-223	Not Detected	--------	2.34E-01
RN-219	Not Detected	--------	4.25E-01
PB-211	Not Detected	--------	1.04
TL-207	Not Detected	--------	2.36E+01
AM-241	Not Detected	--------	2.41E-01
PU-239	Not Detected	--------	3.85E+02
NP-237	Not Detected	--------	2.94E-01
PA-233	Not Detected	--------	9.18E-02
TH-229	Not Detected	--------	3.68E-01

[Summary Report] - Sample ID: 50057201

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.86E-02
AR-41	Not Detected	--------	1.28E+01
BA-133	Not Detected	--------	1.01E-01
BA-140	Not Detected	--------	1.71E-01
CD-109	Not Detected	--------	1.01
CD-115	Not Detected	--------	1.23E-01
CE-139	Not Detected	--------	4.77E-02
CE-141	Not Detected	--------	8.37E-02
CE-144	Not Detected	--------	3.61E-01
CO-56	Not Detected	--------	5.67E-02
CO-57	Not Detected	--------	4.43E-02
CO-58	Not Detected	--------	5.04E-02
CO-60	Not Detected	--------	5.75E-02
CR-51	Not Detected	--------	3.64E-01
CS-134	Not Detected	--------	7.80E-02
CS-137	Not Detected	--------	5.43E-02
CU-64	Not Detected	--------	2.63E+01
EU-152	Not Detected	--------	4.01E-01
EU-154	Not Detected	--------	2.76E-01
EU-155	Not Detected	--------	1.90E-01
FE-59	Not Detected	--------	1.18E-01
GD-153	Not Detected	--------	1.53E-01
HG-203	Not Detected	--------	4.52E-02
I-131	Not Detected	--------	4.78E-02
IN-115m	Not Detected	--------	9.04E-01
IR-192	Not Detected	--------	4.39E-02
K-40	1.55E+01	2.30	5.44E-01
LA-140	Not Detected	--------	7.87E-02
MN-54	Not Detected	--------	5.45E-02
MN-56	Not Detected	--------	2.46
MO-99	Not Detected	--------	4.66E-01
NA-22	Not Detected	--------	7.01E-02
NA-24	Not Detected	--------	1.07E-01
NB-95	Not Detected	--------	2.90E-01
ND-147	Not Detected	--------	3.19E-01
NI-57	Not Detected	--------	1.04E-01
BE-7	Not Detected	--------	3.81E-01
RU-103	Not Detected	--------	4.42E-02
RU-106	Not Detected	--------	4.42E-01
SB-122	Not Detected	--------	7.75E-02
SB-124	Not Detected	--------	5.55E-02
SB-125	Not Detected	--------	1.29E-01
SC-46	Not Detected	--------	8.15E-02
SR-85	Not Detected	--------	5.67E-02
TA-182	Not Detected	--------	2.42E-01
TA-183	Not Detected	--------	2.22E-01
TE-132	Not Detected	--------	4.79E-02
TL-201	Not Detected	--------	1.57E-01
V-48	Not Detected	--------	6.10E-02
XE-133	Not Detected	--------	2.05E-01
Y-88	Not Detected	--------	4.62E-02
ZN-65	Not Detected	--------	1.66E-01
ZR-95	Not Detected	--------	9.21E-02

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 7-21-95 9:01:20 AM *
****
*
* Analyzed by: 7/21/95 Reviewed by: 7/21/95 *
****

Customer : D.MILLER/D.BISWELL (7582/SM0)
Customer Sample ID : LAB CONTROL SAMPLE ANALYSIS #CG134
Lab Sample ID : 50057202

Sample Description : MIXED_GAMMA_STANDARD
Sample Type : Liquid
Sample Geometry : WMAR
Sample Quantity : 1.000 Each
Sample Date/Time : 11-01-90 12:00:00 PM
Acquire Start Date : 7-21-95 8:47:33 AM
Detector Name : LAB01
Elapsed Live Time : 600 seconds
Elapsed Real Time : 608 seconds

Comments:
****

Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	--------	2.07E+04
TH-234	Not Detected	--------	3.91E+03
U-234	Not Detected	--------	1.12E+05
RA-226	Not Detected	--------	5.95E+03
PB-214	Not Detected	--------	6.91E+02
BI-214	Not Detected	--------	6.27E+02
PB-210	Not Detected	--------	4.59E+03
TH-232	Not Detected	--------	2.00E+03
RA-228	Not Detected	--------	2.71E+03
AC-228	Not Detected	--------	1.75E+03
TH-228	Not Detected	--------	3.66E+04
RA-224	Not Detected	--------	3.10E+04
PB-212	Not Detected	--------	2.80E+03
BI-212	Not Detected	--------	2.58E+04
TL-208	Not Detected	--------	5.11E+03
U-235	Not Detected	--------	1.67E+03
TH-231	Not Detected	--------	2.64E+03
PA-231	Not Detected	--------	9.21E+03
AC-227	Not Detected	--------	1.47E+04
TH-227	Not Detected	--------	2.31E+03
RA-223	Not Detected	--------	1.00E+26
RN-219	Not Detected	--------	2.79E+03
PB-211	Not Detected	--------	8.45E+03
TL-207	Not Detected	--------	2.16E+05
AM-241	8.84E+04	1.41E+04	2.18E+03
PU-239	Not Detected	--------	1.80E+06
NP-237	Not Detected	--------	1.78E+03
PA-233	Not Detected	--------	6.02E+02
TH-229	Not Detected	--------	1.59E+03

[Summary Report] - Sample ID: 50057202

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	--------	1.74E+05
AR-41	Not Detected	--------	1.00E+26
BA-133	Not Detected	--------	5.45E+02
BA-140	Not Detected	--------	1.00E+26
CD-109	2.85E+05	6.53E+04	6.84E+04
CD-115	Not Detected	--------	1.00E+26
CE-139	Not Detected	--------	1.40E+06
CE-141	Not Detected	--------	3.36E+18
CE-144	Not Detected	--------	1.08E+05
CO-56	Not Detected	--------	2.14E+09
CO-57	1.50E+04	1.27E+04	2.01E+04
CO-58	Not Detected	--------	7.69E+09
CO-60	7.50E+04	9.75E+03	4.84E+02
CR-51	Not Detected	--------	1.20E+22
CS-134	Not Detected	--------	1.45E+03
CS-137	6.81E+04	8.79E+03	4.40E+02
CU-64	Not Detected	--------	1.00E+26
EU-152	Not Detected	--------	3.43E+03
EU-154	Not Detected	--------	2.25E+03
EU-155	Not Detected	--------	1.66E+03
FE-59	Not Detected	--------	3.96E+14
GD-153	Not Detected	--------	8.32E+04
HG-203	Not Detected	--------	3.62E+13
I-131	Not Detected	--------	1.00E+26
IN-115m	Not Detected	--------	1.00E+26
IR-192	Not Detected	--------	2.94E+09
K-40	Not Detected	--------	1.62E+03
LA-140	Not Detected	--------	1.00E+26
MN-54	Not Detected	--------	1.77E+04
MN-56	Not Detected	--------	1.00E+26
MO-99	Not Detected	--------	1.00E+26
NA-22	Not Detected	--------	7.94E+02
NA-24	Not Detected	--------	1.00E+26
NB-95	Not Detected	--------	1.00E+26
ND-147	Not Detected	--------	1.00E+26
NI-57	Not Detected	--------	1.00E+26
BE-7	Not Detected	--------	1.77E+13
RU-103	Not Detected	--------	5.50E+15
RU-106	Not Detected	--------	7.64E+04
SB-122	Not Detected	--------	1.00E+26
SB-124	Not Detected	--------	1.22E+11
SB-125	Not Detected	--------	3.56E+03
SC-46	Not Detected	--------	6.93E+08
SR-85	Not Detected	--------	3.53E+10
TA-182	Not Detected	--------	4.18E+07
TA-183	Not Detected	--------	1.00E+26
TE-132	Not Detected	--------	1.00E+26
TL-201	Not Detected	--------	1.00E+26
V-48	Not Detected	--------	1.00E+26
XE-133	Not Detected	--------	1.00E+26
Y-88	Not Detected	--------	1.39E+07
ZN-65	Not Detected	--------	1.25E+05
ZR-95	Not Detected	--------	7.48E+10

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program

Quality Assurance Report

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Report Date : 7-21-95 9:08:13 AM
QA File : C:\GENIEPC\CAMFILES\LCS1.QAF
Analyst : MEC
Sample ID : 50057202
Sample Quantity : 1.00 Each
Sample Date : 11-01-90 12:00:00 PM
Measurement Date : 7-21-95 8:47:33 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 608 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS
AM-241 Activity	8.595E-02	1.072E-02	8.838E-02	< : : : >
CS-137 Activity	6.935E-02	7.201E-03	6.810E-02	< : : : >
CO-60 Activity	7.832E-02	8.399E-03	7.419E-02	< : : : >

Flags Key:
LU = Boundary Test (Ab = Above , Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: Stanley Cole 7/21/95

(7)

SMO ANALYTICAL DATA ROUTING FORM

Project Name: TAI Phase I Case Number: 3626400

SNL Task Leader: Miller Org/Mail Stop: 7582/1347

SMO Project Coordinator: Prescott Sample Ship Date: 5/24/95, 5/25/95, 5/25/95, 8/1/95

ARCOC	Lab	Lab ID
03976	7715	500616
03603	7715	500402
03606	"	500408
03612	"	500413
03787	"	500535

Date Results Received:

Preliminary: 8/3/95 Final: 5/30/95 / 5/30/95 / 5/30/95 / 7/14/95 / 7/12/95

Corrections Requested From Laboratory: _____ Requestor: _____

Date Corrections Received: _____

Date Assigned to SMO Reviewer: _____ Reviewer: _____

Date Review Complete: _____ Signature: _____

Date of Preliminary Notification: _____ Person Notified: _____

Date of Final Transmittal: 9/22/95 Transmitted To: D. Miller

Transmitted By: [signature] Filed In Record Center: [signature]

Comments: _____

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 OF 1

2001-COC (9-94) 500616

AR/COC- 03976

Dept. No./Mail Stop: 7582/1347
Project/Task Manager: D. Miller / H. Flecu
Project Name: TA-1 Soil Sampling (Phase I)
Record Center Code: ADS 1302 ER Site 226
Logbook Ref No: 0133
SMO Reference No.: CF0089

Date Samples Shipped: 8/1/95
Carrier/Waybill No.: H&C
Lab Contact: Amir M.
Lab Destination: 7715
SMO Contact/Phone: D. "Mac" McLaughlin/845-0867
Send Report to SMO: Deborah McLaughlin

Contract No.: N/A
Case No.: 3626.400
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location Tech Area: TA-1
Building: 891 Room: outside

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested: Gamma Spec.	Lab Sample ID
247890-05	T1226-SD-002-000-S	0.25	226	8/1/95-8:50	S	P	500ml	None	G	SA	X	
247900-05	T1226-SD-003-000-S	0	↓	↓ 11:00	↓	↓	↓	↓	↓	↓	X	

MMA ☐ Yes ☒ No Ref. No.

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date

Sample Tracking
Date Entered (mm/dd/yy): 8/3/95
Entered by:
QC initial:

Special Instructions/QC Requirements

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init	Company/Organization
	Matthew Shain	Matthew Shain	MS	IT Corp / 7582
	Nelson Capitan		NC	SNL / 7584

Relinquished by	Matthew Shain	Org. 7582	Date 8/1/95	Time 14:10	4. Relinquished by	Org.	Date	Time
Received by		Org. SNL7513	Date 8/1/95	Time 1410	4. Received by	Org.	Date	Time
Relinquished by		Org. SNL7513	Date 8-1-95	Time 1620	5. Relinquished by	Org.	Date	Time
Received by		Org. SNL7715	Date 8/1/95	Time 1620	5. Received by	Org.	Date	Time
Relinquished by		Org. SNL7715	Date 8/3/95	Time 1245	6. Relinquished by	Org.	Date	Time
Received by		Org. SNL 7513	Date 8-3-95	Time 1245	6. Received by	Org.	Date	Time

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

SF 2001-COC (9-94) 500616

ANALYSIS REQUEST AND CHAIN OF CUSTODY

AR/COC- 03976

Dept. No./Mail Stop:	7582/1347
Project/Task Manager:	D. Miller / H. Fleck
Project Name:	TA-1 Soil Sampling (Phase I)
Record Center Code:	ADS 1302 ER Site 226
Logbook Ref No:	0133
SMO Reference No.:	CF0089
Date Samples Shipped:	8-1-95
Carrier/Waybill No.:	HC
Lab Contact:	Amir M.
Lab Destination:	7715
SMO Contact/Phone:	D "Mac" McLaughlin/845-0567
Send Report to SMO	Deborah McLaughlin
Contract No.:	N/A
Case No.:	3626.400
SMO Authorization:	[signature]

Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location — Tech Area TA-1; Building 891; Room outside

Reference LOV (available at SMO)

Parameter & Method Requested: Gamma Spec

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Gamma Spec	Lab Sample ID
024789-05	T1226-SD-002-000-S	0.25	226	8/1/95-8:50	S	P	500ml	None	G	SA	x	
024790-05	T1226-SD-003-006-S	0	↓	↓ 11:00	↓	↓	↓	↓	↓	↓	x	

RMMA ☐ Yes ☒ No Ref. No.

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date

Sample Tracking
Date Entered (mm/dd/yy) 8/7/95
Entered By: Am
QC inits.

Special Instructions/QC Requirements

Abnormal Conditions on Receipt

Sample Team Members Name	Signature	Init	Company/Organization
Matthew Shain	Matthew Shain	MS	IT Corp / 7582
Delia Carpenter	[signature]	DC	[illegible] 7582

		Org.	Date	Time
1. Relinquished by	Matthew Shain	7582	8/1/95	14:10
1. Received by	Daniel McLaughlin	SMO 7513	8/1/95	1410
2. Relinquished by	[signature]	SMO 7513	8-1-95	1620
2. Received by	[signature]	SNL 7715	8/1/95	1620
3. Relinquished by	[signature]	SNL 7715	8/3/95	1245
3. Received by	[signature]	SMO 7513	8-3-95	1245
4. Relinquished by				
4. Received by				
5. Relinquished by				
5. Received by				
6. Relinquished by				
6. Received by				

WHITE - To Accompany Samples, Laboratory Copy BLUE - To Accompany Samples, Return to SMO YELLOW - SMO Suspense Copy PINK - Field Copy

Sandia [illegible]onal Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Form
Page 1 of 1

be completed by Customer — *Shaded areas are for RPSD use only*

Customer: D. Miller / H. Fleck
Organization: 7582
Project Location: TA-1
Phone: 845-0867
Date Results Needed: 8-4-95
Suspect Isotopes:
Other Information: 03976

Hazards/Special Instructions: Please notify S. Miller upon completion @ 845-0867

Batch Log Number: 500616
Logged By: [illegible]
LIMS Login
Results Faxed
Sample Disposal

Analysis Type:
☒ Gamma Spec
☐ H-3
☐ Alpha/Beta
☐ Alpha Spec
☐ Total U
☐ Other

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Scan CPM	Sample Weight	Remarks
24789-05	S	8/1/95 8:50	500ml	Gamma Spec.	01	<300	978.4g	
24790-05	↓	↓ -11:00	↓	↓	02	<300	967.8g	
LCS		1130v90		γ Spec.	03			

Relinquished by [signature] Date 8-1-95 Time 1620 Received by [signature] Date 8/1/95 Time 1620
Relinquished by [signature] Date 8/3/95 Time 1245 Received by [signature] Date 8-3-95 Time 1245
Relinquished by ______ Date ______ Time ______ Received by ______ Date ______ Time ______
Relinquished by ______ Date ______ Time ______ Received by ______ Date ______ Time ______

****

Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

8-03-95 12:25:43 AM

****

Analyzed by: [signature] 8/2/95 Reviewed by: [signature] 8/3/95

****

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : 024789-05
Lab Sample ID : 50061601

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 1SMAR
Sample Quantity : 978.000 gram
Sample Date/Time : 8-01-95 8:50:00 AM
Acquire Start Date : 8-02-95 11:51:35 PM
Detector Name : LAB01
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

****

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	1.70
TH-234	7.22E-01	3.46E-01	4.92E-01
U-234	Not Detected	--------	1.54E+01
RA-226	1.03	6.54E-01	9.96E-01
PB-214	6.04E-01	1.16E-01	9.26E-02
BI-214	5.03E-01	9.70E-02	7.82E-02
PB-210	Not Detected	--------	1.10
TH-232	3.97E-01	1.70E-01	2.29E-01
RA-228	6.40E-01	2.12E-01	1.61E-01
AC-228	6.11E-01	1.52E-01	1.45E-01
TH-228	7.85E-01	1.79E-01	6.75E-01
RA-224	5.88E-01	3.24E-01	5.66E-01
PB-212	5.98E-01	1.17E-01	4.83E-02
BI-212	7.12E-01	3.23E-01	4.30E-01
TL-208	5.23E-01	1.23E-01	1.22E-01
U-235	Not Detected	--------	2.96E-01
TH-231	Not Detected	--------	5.74E-01
PA-231	Not Detected	--------	1.74
AC-227	Not Detected	--------	2.21
TH-227	Not Detected	--------	4.49E-01
RA-223	Not Detected	--------	2.02E-01
RN-219	~~3.18E-01~~	~~1.71E-01~~	~~2.41E-01~~ DOT detected once ?
PB-211	Not Detected	--------	9.01E-01
TL-207	Not Detected	--------	1.97E+01
AM-241	Not Detected	--------	2.07E-01
PU-239	Not Detected	--------	3.32E+02
NP-237	Not Detected	--------	2.19E-01
PA-233	Not Detected	--------	7.76E-02
TH-229	Not Detected	--------	3.22E-01

[Summary Report] - Sample ID: 50061601

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.07E-02
AR-41	Not Detected	--------	1.71E+05
BA-133	Not Detected	--------	8.33E-02
BA-140	Not Detected	--------	1.60E-01
CD-109	Not Detected	--------	7.53E-01
CD-115	Not Detected	--------	1.39E-01
CE-139	Not Detected	--------	4.13E-02
CE-141	Not Detected	--------	6.76E-02
CE-144	Not Detected	--------	3.00E-01
CO-56	Not Detected	--------	4.89E-02
CO-57	~~2.13E-02~~	~~2.49E-02~~	~~4.00E-02~~ N.D. KJM 8/3/9
CO-58	Not Detected	--------	4.41E-02
CO-60	Not Detected	--------	4.67E-02
CR-51	Not Detected	--------	3.05E-01
CS-134	Not Detected	--------	6.89E-02
CS-137	Not Detected	--------	4.84E-02
CU-64	Not Detected	--------	8.17E+01
EU-152	Not Detected	--------	3.40E-01
EU-154	Not Detected	--------	2.37E-01
EU-155	Not Detected	--------	1.64E-01
FE-59	Not Detected	--------	9.90E-02
GD-153	Not Detected	--------	1.36E-01
HG-203	Not Detected	--------	4.00E-02
I-131	Not Detected	--------	4.11E-02
IN-115m	Not Detected	--------	3.64E+01
IR-192	Not Detected	--------	3.69E-02
K-40	1.51E+01	2.18	3.68E-01
LA-140	Not Detected	--------	9.51E-02
MN-54	Not Detected	--------	4.84E-02
MN-56	Not Detected	--------	1.87E+03
MO-99	Not Detected	--------	5.22E-01
NA-22	Not Detected	--------	5.87E-02
NA-24	Not Detected	--------	2.78E-01
NB-95	Not Detected	--------	2.85E-01
ND-147	Not Detected	--------	2.93E-01
NI-57	Not Detected	--------	1.35E-01
BE-7	Not Detected	--------	3.13E-01
RU-103	Not Detected	--------	3.79E-02
RU-106	Not Detected	--------	3.81E-01
SB-122	Not Detected	--------	8.25E-02
SB-124	Not Detected	--------	4.50E-02
SB-125	Not Detected	--------	1.10E-01
SC-46	Not Detected	--------	7.01E-02
SR-85	Not Detected	--------	4.80E-02
TA-182	Not Detected	--------	2.05E-01
TA-183	Not Detected	--------	2.20E-01
TE-132	Not Detected	--------	5.16E-02
TL-201	Not Detected	--------	1.72E-01
V-48	Not Detected	--------	5.42E-02
XE-133	Not Detected	--------	2.39E-01
Y-88	Not Detected	--------	2.99E-02
ZN-65	Not Detected	--------	1.39E-01
ZR-95	Not Detected	--------	8.05E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-03-95 1:05:47 AM

Analyzed by: [signature] 8/2/95 Reviewed by: [signature] 8/3/95

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : 024790-05
Lab Sample ID : 50061602

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 1SMAR
Sample Quantity : 907.000 gram
Sample Date/Time : 8-01-95 11:00:00 AM
Acquire Start Date : 8-03-95 12:32:13 AM
Detector Name : LAB01
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	1.69
TH-234	6.19E-01	3.15E-01	4.73E-01
U-234	Not Detected	--------	1.48E+01
RA-226	9.84E-01	5.02E-01	7.30E-01
PB-214	4.93E-01	9.87E-02	7.91E-02
BI-214	4.23E-01	9.01E-02	8.23E-02
PB-210	Not Detected	--------	1.02
TH-232	4.18E-01	1.95E-01	2.73E-01
RA-228	5.46E-01	2.03E-01	1.65E-01
AC-228	Not Detected	--------	2.75E-01
TH-228	5.38E-01	3.08E-01	6.98E-01
RA-224	4.53E-01	3.11E-01	6.04E-01
PB-212	5.66E-01	1.14E-01	5.12E-02
BI-212	5.05E-01	3.37E-01	4.99E-01
TL-208	4.93E-01	1.11E-01	9.53E-02
U-235	Not Detected	--------	2.98E-01
TH-231	Not Detected	--------	5.92E-01
PA-231	Not Detected	--------	1.76
AC-227	Not Detected	--------	2.24
TH-227	Not Detected	--------	4.56E-01
RA-223	Not Detected	--------	2.07E-01
RN-219	Not Detected	--------	3.58E-01
PB-211	Not Detected	--------	8.77E-01
TL-207	Not Detected	--------	1.99E+01
AM-241	Not Detected	--------	2.11E-01
PU-239	Not Detected	--------	3.45E+02
NP-237	Not Detected	--------	2.34E-01
PA-233	Not Detected	--------	7.73E-02
TH-229	Not Detected	--------	3.19E-01

[Summary Report] - Sample ID: 50061602

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.05E-02
AR-41	Not Detected	--------	9.45E+04
BA-133	Not Detected	--------	7.86E-02
BA-140	Not Detected	--------	1.56E-01
CD-109	Not Detected	--------	8.05E-01
CD-115	Not Detected	--------	1.40E-01
CE-139	Not Detected	--------	4.23E-02
CE-141	Not Detected	--------	6.86E-02
CE-144	Not Detected	--------	3.04E-01
CO-56	Not Detected	--------	4.61E-02
CO-57	Not Detected	--------	3.91E-02
CO-58	Not Detected	--------	4.66E-02
CO-60	Not Detected	--------	4.94E-02
CR-51	Not Detected	--------	3.07E-01
CS-134	Not Detected	--------	6.56E-02
CS-137	Not Detected	--------	4.43E-02
CU-64	Not Detected	--------	8.23E+01
EU-152	Not Detected	--------	3.57E-01
EU-154	Not Detected	--------	2.42E-01
EU-155	Not Detected	--------	1.63E-01
FE-59	Not Detected	--------	9.96E-02
GD-153	Not Detected	--------	1.31E-01
HG-203	Not Detected	--------	3.80E-02
I-131	Not Detected	--------	4.38E-02
IN-115m	Not Detected	--------	2.97E+01
IR-192	Not Detected	--------	3.68E-02
K-40	1.44E+01	2.10	3.94E-01
LA-140	Not Detected	--------	1.03E-01
MN-54	Not Detected	--------	4.92E-02
MN-56	Not Detected	--------	1.18E+03
MO-99	Not Detected	--------	4.75E-01
NA-22	Not Detected	--------	5.79E-02
NA-24	Not Detected	--------	2.66E-01
NB-95	Not Detected	--------	2.86E-01
ND-147	Not Detected	--------	2.98E-01
NI-57	Not Detected	--------	1.31E-01
BE-7	Not Detected	--------	3.53E-01
RU-103	Not Detected	--------	3.92E-02
RU-106	Not Detected	--------	4.02E-01
SB-122	Not Detected	--------	8.32E-02
SB-124	Not Detected	--------	4.40E-02
SB-125	Not Detected	--------	1.11E-01
SC-46	Not Detected	--------	7.29E-02
SR-85	Not Detected	--------	4.73E-02
TA-182	Not Detected	--------	2.15E-01
TA-183	Not Detected	--------	2.23E-01
TE-132	Not Detected	--------	5.15E-02
TL-201	Not Detected	--------	1.67E-01
V-48	Not Detected	--------	4.87E-02
XE-133	Not Detected	--------	2.34E-01
Y-88	Not Detected	--------	3.58E-02
ZN-65	Not Detected	--------	1.41E-01
ZR-95	Not Detected	--------	7.95E-02

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 8-03-95 8:37:37 AM *
****

* Analyzed by: Shawna Cole 8/3/95 Reviewed by: RJM 8/3/95 *

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : LAB CONTROL SAMPLE ANALYSIS #CG134
Lab Sample ID : 50061603

Sample Description : MIXED_GAMMA_STANDARD
Sample Type : Liquid
Sample Geometry : WMAR
Sample Quantity : 1.000 Each
Sample Date/Time : 11-01-90 12:00:00 PM
Acquire Start Date : 8-03-95 8:24:05 AM
Detector Name : LAB01
Elapsed Live Time : 600 seconds
Elapsed Real Time : 608 seconds

Comments:

Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	--------	2.05E+04
TH-234	Not Detected	--------	3.88E+03
U-234	Not Detected	--------	1.16E+05
RA-226	Not Detected	--------	5.99E+03
PB-214	Not Detected	--------	6.92E+02
BI-214	Not Detected	--------	6.16E+02
PB-210	Not Detected	--------	5.22E+03
TH-232	Not Detected	--------	2.02E+03
RA-228	Not Detected	--------	2.70E+03
AC-228	Not Detected	--------	1.77E+03
TH-228	Not Detected	--------	3.66E+04
RA-224	Not Detected	--------	5.33E+04
PB-212	Not Detected	--------	2.85E+03
BI-212	Not Detected	--------	2.59E+04
TL-208	Not Detected	--------	5.29E+03
U-235	Not Detected	--------	1.67E+03
TH-231	Not Detected	--------	2.61E+03
PA-231	Not Detected	--------	9.09E+03
AC-227	Not Detected	--------	1.48E+04
TH-227	Not Detected	--------	2.33E+03
RA-223	Not Detected	--------	1.00E+26
RN-219	Not Detected	--------	2.83E+03
PB-211	Not Detected	--------	8.58E+03
TL-207	Not Detected	--------	2.14E+05
AM-241	8.72E+04	1.39E+04	2.01E+03
PU-239	Not Detected	--------	1.81E+06
NP-237	Not Detected	--------	1.76E+03
PA-233	Not Detected	--------	6.00E+02
TH-229	Not Detected	--------	1.57E+03

[Summary Report] - Sample ID: 50061603

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	--------	1.80E+05
AR-41	Not Detected	--------	1.00E+26
BA-133	Not Detected	--------	5.49E+02
BA-140	Not Detected	--------	1.00E+26
CD-109	3.24E+05	5.19E+04	5.19E+04
CD-115	Not Detected	--------	1.00E+26
CE-139	Not Detected	--------	1.50E+06
CE-141	Not Detected	--------	4.51E+18
CE-144	Not Detected	--------	1.10E+05
CO-56	Not Detected	--------	2.41E+09
CO-57	1.25E+04	1.58E+04	2.54E+04
CO-58	Not Detected	--------	8.57E+09
CO-60	7.48E+04	9.73E+03	5.09E+02
CR-51	Not Detected	--------	1.70E+22
CS-134	Not Detected	--------	1.44E+03
CS-137	6.82E+04	8.80E+03	4.49E+02
CU-64	Not Detected	--------	1.00E+26
EU-152	Not Detected	--------	3.51E+03
EU-154	Not Detected	--------	2.23E+03
EU-155	Not Detected	--------	1.67E+03
FE-59	Not Detected	--------	4.74E+14
GD-153	Not Detected	--------	8.59E+04
HG-203	Not Detected	--------	4.34E+13
I-131	Not Detected	--------	1.00E+26
IN-115m	Not Detected	--------	1.00E+26
IR-192	Not Detected	--------	3.40E+09
K-40	Not Detected	--------	1.69E+03
LA-140	Not Detected	--------	1.00E+26
MN-54	Not Detected	--------	1.85E+04
MN-56	Not Detected	--------	1.00E+26
MO-99	Not Detected	--------	1.00E+26
NA-22	Not Detected	--------	7.84E+02
NA-24	Not Detected	--------	1.00E+26
NB-95	Not Detected	--------	1.00E+26
ND-147	Not Detected	--------	1.00E+26
NI-57	Not Detected	--------	1.00E+26
BE-7	Not Detected	--------	2.08E+13
RU-103	Not Detected	--------	6.91E+15
RU-106	Not Detected	--------	7.79E+04
SB-122	Not Detected	--------	1.00E+26
SB-124	Not Detected	--------	1.39E+11
SB-125	Not Detected	--------	3.59E+03
SC-46	Not Detected	--------	7.77E+08
SR-85	Not Detected	--------	4.03E+10
TA-182	Not Detected	--------	4.54E+07
TA-183	Not Detected	--------	1.00E+26
TE-132	Not Detected	--------	1.00E+26
TL-201	Not Detected	--------	1.00E+26
V-48	Not Detected	--------	1.00E+26
XE-133	Not Detected	--------	1.00E+26
Y-88	Not Detected	--------	1.42E+07
ZN-65	Not Detected	--------	1.30E+05
ZR-95	Not Detected	--------	8.46E+10

****

Sandia National Laboratories

Radiation Protection Sample Diagnostics Program

Quality Assurance Report

****

Report Date : 8-03-95 8:42:31 AM
QA File : C:\GENIEPC\CAMFILES\LCS1.QAF
Analyst : MEC
Sample ID : 50061603
Sample Quantity : 1.00 Each
Sample Date : 11-01-90 12:00:00 PM
Measurement Date : 8-03-95 8:24:05 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 608 seconds

Parameter	Mean	1S Error	New Value	<	LU	SD	UD	BS
AM-241 Activity	8.624E-02	1.011E-02	8.716E-02	<				
CS-137 Activity	6.925E-02	6.899E-03	6.822E-02	<				
CO-60 Activity	7.798E-02	8.094E-03	7.469E-02	<				

Flags Key:
LU = Boundary Test (Ab = Above , Be = Below
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action
BS = Measurement Bias Test (In = Investigate, Ac = Action

Reviewed by: _____ 8/3/95

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 8-03-95 12:25:43 AM *
****
* *
* Analyzed by: 8/2/95 Reviewed by: 8/3/95 *
****

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : 024789-05
Lab Sample ID : 50061601

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 1SMAR
Sample Quantity : 978.000 gram
Sample Date/Time : 8-01-95 8:50:00 AM
Acquire Start Date : 8-02-95 11:51:35 PM
Detector Name : LAB01
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:
****

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	1.70
TH-234	7.22E-01	3.46E-01	4.92E-01
U-234	Not Detected	--------	1.54E+01
RA-226	1.03	6.54E-01	9.96E-01
PB-214	6.04E-01	1.16E-01	9.26E-02
BI-214	5.03E-01	9.70E-02	7.82E-02
PB-210	Not Detected	--------	1.10
TH-232	3.97E-01	1.70E-01	2.29E-01
RA-228	6.40E-01	2.12E-01	1.61E-01
AC-228	6.11E-01	1.52E-01	1.45E-01
TH-228	7.85E-01	1.79E-01	6.75E-01
RA-224	5.88E-01	3.24E-01	5.66E-01
PB-212	5.98E-01	1.17E-01	4.83E-02
BI-212	7.12E-01	3.23E-01	4.30E-01
TL-208	5.23E-01	1.23E-01	1.22E-01
U-235	Not Detected	--------	2.96E-01
TH-231	Not Detected	--------	5.74E-01
PA-231	Not Detected	--------	1.74
AC-227	Not Detected	--------	2.21
TH-227	Not Detected	--------	4.49E-01
RA-223	Not Detected	--------	2.02E-01
RN-219	~~3.18E-01~~	~~1.71E-01~~	~~2.41E-01~~ NOT detected mec 8/3
PB-211	Not Detected	--------	9.01E-01
TL-207	Not Detected	--------	1.97E+01
AM-241	Not Detected	--------	2.07E-01
PU-239	Not Detected	--------	3.32E+02
NP-237	Not Detected	--------	2.19E-01
PA-233	Not Detected	--------	7.76E-02
TH-229	Not Detected	--------	3.22E-01

[Summary Report] - Sample ID: 50061601

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.07E-02
AR-41	Not Detected	--------	1.71E+05
BA-133	Not Detected	--------	8.33E-02
BA-140	Not Detected	--------	1.60E-01
CD-109	Not Detected	--------	7.53E-01
CD-115	Not Detected	--------	1.39E-01
CE-139	Not Detected	--------	4.13E-02
CE-141	Not Detected	--------	6.76E-02
CE-144	Not Detected	--------	3.00E-01
CO-56	Not Detected	--------	4.89E-02
CO-57	~~2.13E-02~~	~~2.49E-02~~	~~4.00E-02~~ N.D. KJM 8/3/95
CO-58	Not Detected	--------	4.41E-02
CO-60	Not Detected	--------	4.67E-02
CR-51	Not Detected	--------	3.05E-01
CS-134	Not Detected	--------	6.89E-02
CS-137	Not Detected	--------	4.84E-02
CU-64	Not Detected	--------	8.17E+01
EU-152	Not Detected	--------	3.40E-01
EU-154	Not Detected	--------	2.37E-01
EU-155	Not Detected	--------	1.64E-01
FE-59	Not Detected	--------	9.90E-02
GD-153	Not Detected	--------	1.36E-01
HG-203	Not Detected	--------	4.00E-02
I-131	Not Detected	--------	4.11E-02
IN-115m	Not Detected	--------	3.64E+01
IR-192	Not Detected	--------	3.69E-02
K-40	1.51E+01	2.18	3.68E-01
LA-140	Not Detected	--------	9.51E-02
MN-54	Not Detected	--------	4.84E-02
MN-56	Not Detected	--------	1.87E+03
MO-99	Not Detected	--------	5.22E-01
NA-22	Not Detected	--------	5.87E-02
NA-24	Not Detected	--------	2.78E-01
NB-95	Not Detected	--------	2.85E-01
ND-147	Not Detected	--------	2.93E-01
NI-57	Not Detected	--------	1.35E-01
BE-7	Not Detected	--------	3.13E-01
RU-103	Not Detected	--------	3.79E-02
RU-106	Not Detected	--------	3.81E-01
SB-122	Not Detected	--------	8.25E-02
SB-124	Not Detected	--------	4.50E-02
SB-125	Not Detected	--------	1.10E-01
SC-46	Not Detected	--------	7.01E-02
SR-85	Not Detected	--------	4.80E-02
TA-182	Not Detected	--------	2.05E-01
TA-183	Not Detected	--------	2.20E-01
TE-132	Not Detected	--------	5.16E-02
TL-201	Not Detected	--------	1.72E-01
V-48	Not Detected	--------	5.42E-02
XE-133	Not Detected	--------	2.39E-01
Y-88	Not Detected	--------	2.99E-02
ZN-65	Not Detected	--------	1.39E-01
ZR-95	Not Detected	--------	8.05E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-03-95 1:05:47 AM

Analyzed by: [signature] 8/2/95 Reviewed by: [signature] 8/3/95

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : 024790-05
Lab Sample ID : 50061602

Sample Description : MARINELLI SOIL SAMPLE
Sample Type : Solid
Sample Geometry : 1SMAR
Sample Quantity : 907.000 gram
Sample Date/Time : 8-01-95 11:00:00 AM
Acquire Start Date : 8-03-95 12:32:13 AM
Detector Name : LAB01
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/gram)	2S Error	MDA
U-238	Not Detected	--------	1.69
TH-234	6.19E-01	3.15E-01	4.73E-01
U-234	Not Detected	--------	1.48E+01
RA-226	9.84E-01	5.02E-01	7.30E-01
PB-214	4.93E-01	9.87E-02	7.91E-02
BI-214	4.23E-01	9.01E-02	8.23E-02
PB-210	Not Detected	--------	1.02
TH-232	4.18E-01	1.95E-01	2.73E-01
RA-228	5.46E-01	2.03E-01	1.65E-01
AC-228	Not Detected	--------	2.75E-01
TH-228	5.38E-01	3.08E-01	6.98E-01
RA-224	4.53E-01	3.11E-01	6.04E-01
PB-212	5.66E-01	1.14E-01	5.12E-02
BI-212	5.05E-01	3.37E-01	4.99E-01
TL-208	4.93E-01	1.11E-01	9.53E-02
U-235	Not Detected	--------	2.98E-01
TH-231	Not Detected	--------	5.92E-01
PA-231	Not Detected	--------	1.76
AC-227	Not Detected	--------	2.24
TH-227	Not Detected	--------	4.56E-01
RA-223	Not Detected	--------	2.07E-01
RN-219	Not Detected	--------	3.58E-01
PB-211	Not Detected	--------	8.77E-01
TL-207	Not Detected	--------	1.99E+01
AM-241	Not Detected	--------	2.11E-01
PU-239	Not Detected	--------	3.45E+02
NP-237	Not Detected	--------	2.34E-01
PA-233	Not Detected	--------	7.73E-02
TH-229	Not Detected	--------	3.19E-01

[Summary Report] - Sample ID: 50061602

Nuclide	Activity (pCi/gram)	2S Error	MDA
AG-110m	Not Detected	--------	4.05E-02
AR-41	Not Detected	--------	9.45E+04
BA-133	Not Detected	--------	7.86E-02
BA-140	Not Detected	--------	1.56E-01
CD-109	Not Detected	--------	8.05E-01
CD-115	Not Detected	--------	1.40E-01
CE-139	Not Detected	--------	4.23E-02
CE-141	Not Detected	--------	6.86E-02
CE-144	Not Detected	--------	3.04E-01
CO-56	Not Detected	--------	4.61E-02
CO-57	Not Detected	--------	3.91E-02
CO-58	Not Detected	--------	4.66E-02
CO-60	Not Detected	--------	4.94E-02
CR-51	Not Detected	--------	3.07E-01
CS-134	Not Detected	--------	6.56E-02
CS-137	Not Detected	--------	4.43E-02
CU-64	Not Detected	--------	8.23E+01
EU-152	Not Detected	--------	3.57E-01
EU-154	Not Detected	--------	2.42E-01
EU-155	Not Detected	--------	1.63E-01
FE-59	Not Detected	--------	9.96E-02
GD-153	Not Detected	--------	1.31E-01
HG-203	Not Detected	--------	3.80E-02
I-131	Not Detected	--------	4.38E-02
IN-115m	Not Detected	--------	2.97E+01
IR-192	Not Detected	--------	3.68E-02
K-40	1.44E+01	2.10	3.94E-01
LA-140	Not Detected	--------	1.03E-01
MN-54	Not Detected	--------	4.92E-02
MN-56	Not Detected	--------	1.18E+03
MO-99	Not Detected	--------	4.75E-01
NA-22	Not Detected	--------	5.79E-02
NA-24	Not Detected	--------	2.66E-01
NB-95	Not Detected	--------	2.86E-01
ND-147	Not Detected	--------	2.98E-01
NI-57	Not Detected	--------	1.31E-01
BE-7	Not Detected	--------	3.53E-01
RU-103	Not Detected	--------	3.92E-02
RU-106	Not Detected	--------	4.02E-01
SB-122	Not Detected	--------	8.32E-02
SB-124	Not Detected	--------	4.40E-02
SB-125	Not Detected	--------	1.11E-01
SC-46	Not Detected	--------	7.29E-02
SR-85	Not Detected	--------	4.73E-02
TA-182	Not Detected	--------	2.15E-01
TA-183	Not Detected	--------	2.23E-01
TE-132	Not Detected	--------	5.15E-02
TL-201	Not Detected	--------	1.67E-01
V-48	Not Detected	--------	4.87E-02
XE-133	Not Detected	--------	2.34E-01
Y-88	Not Detected	--------	3.58E-02
ZN-65	Not Detected	--------	1.41E-01
ZR-95	Not Detected	--------	7.95E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-03-95 8:37:37 AM

Analyzed by: Steven Cole 8/3/95 Reviewed by: [illegible] 8/3/95

Customer : D.MILLER/E.RANKIN (7582/SMO)
Customer Sample ID : LAB CONTROL SAMPLE ANALYSIS #CG134
Lab Sample ID : 50061603

Sample Description : MIXED_GAMMA_STANDARD
Sample Type : Liquid
Sample Geometry : WMAR
Sample Quantity : 1.000 Each
Sample Date/Time : 11-01-90 12:00:00 PM
Acquire Start Date : 8-03-95 8:24:05 AM
Detector Name : LAB01
Elapsed Live Time : 600 seconds
Elapsed Real Time : 608 seconds

Comments:

Nuclide	Activity (pCi/Each)	2S Error	MDA
U-238	Not Detected	--------	2.05E+04
TH-234	Not Detected	--------	3.88E+03
U-234	Not Detected	--------	1.16E+05
RA-226	Not Detected	--------	5.99E+03
PB-214	Not Detected	--------	6.92E+02
BI-214	Not Detected	--------	6.16E+02
PB-210	Not Detected	--------	5.22E+03
TH-232	Not Detected	--------	2.02E+03
RA-228	Not Detected	--------	2.70E+03
AC-228	Not Detected	--------	1.77E+03
TH-228	Not Detected	--------	3.66E+04
RA-224	Not Detected	--------	5.33E+04
PB-212	Not Detected	--------	2.85E+03
BI-212	Not Detected	--------	2.59E+04
TL-208	Not Detected	--------	5.29E+03
U-235	Not Detected	--------	1.67E+03
TH-231	Not Detected	--------	2.61E+03
PA-231	Not Detected	--------	9.09E+03
AC-227	Not Detected	--------	1.48E+04
TH-227	Not Detected	--------	2.33E+03
RA-223	Not Detected	--------	1.00E+26
RN-219	Not Detected	--------	2.83E+03
PB-211	Not Detected	--------	8.58E+03
TL-207	Not Detected	--------	2.14E+05
AM-241	8.72E+04	1.39E+04	2.01E+03
PU-239	Not Detected	--------	1.81E+06
NP-237	Not Detected	--------	1.76E+03
PA-233	Not Detected	--------	6.00E+02
TH-229	Not Detected	--------	1.57E+03

[Summary Report] - Sample ID: 50061603

Nuclide	Activity (pCi/Each)	2S Error	MDA
AG-110m	Not Detected	--------	1.80E+05
AR-41	Not Detected	--------	1.00E+26
BA-133	Not Detected	--------	5.49E+02
BA-140	Not Detected	--------	1.00E+26
CD-109	3.24E+05	5.19E+04	5.19E+04
CD-115	Not Detected	--------	1.00E+26
CE-139	Not Detected	--------	1.50E+06
CE-141	Not Detected	--------	4.51E+18
CE-144	Not Detected	--------	1.10E+05
CO-56	Not Detected	--------	2.41E+09
CO-57	1.25E+04	1.58E+04	2.54E+04
CO-58	Not Detected	--------	8.57E+09
CO-60	7.48E+04	9.73E+03	5.09E+02
CR-51	Not Detected	--------	1.70E+22
CS-134	Not Detected	--------	1.44E+03
CS-137	6.82E+04	8.80E+03	4.49E+02
CU-64	Not Detected	--------	1.00E+26
EU-152	Not Detected	--------	3.51E+03
EU-154	Not Detected	--------	2.23E+03
EU-155	Not Detected	--------	1.67E+03
FE-59	Not Detected	--------	4.74E+14
GD-153	Not Detected	--------	8.59E+04
HG-203	Not Detected	--------	4.34E+13
I-131	Not Detected	--------	1.00E+26
IN-115m	Not Detected	--------	1.00E+26
IR-192	Not Detected	--------	3.40E+09
K-40	Not Detected	--------	1.69E+03
LA-140	Not Detected	--------	1.00E+26
MN-54	Not Detected	--------	1.85E+04
MN-56	Not Detected	--------	1.00E+26
MO-99	Not Detected	--------	1.00E+26
NA-22	Not Detected	--------	7.84E+02
NA-24	Not Detected	--------	1.00E+26
NB-95	Not Detected	--------	1.00E+26
ND-147	Not Detected	--------	1.00E+26
NI-57	Not Detected	--------	1.00E+26
BE-7	Not Detected	--------	2.08E+13
RU-103	Not Detected	--------	6.91E+15
RU-106	Not Detected	--------	7.79E+04
SB-122	Not Detected	--------	1.00E+26
SB-124	Not Detected	--------	1.39E+11
SB-125	Not Detected	--------	3.59E+03
SC-46	Not Detected	--------	7.77E+08
SR-85	Not Detected	--------	4.03E+10
TA-182	Not Detected	--------	4.54E+07
TA-183	Not Detected	--------	1.00E+26
TE-132	Not Detected	--------	1.00E+26
TL-201	Not Detected	--------	1.00E+26
V-48	Not Detected	--------	1.00E+26
XE-133	Not Detected	--------	1.00E+26
Y-88	Not Detected	--------	1.42E+07
ZN-65	Not Detected	--------	1.30E+05
ZR-95	Not Detected	--------	8.46E+10

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Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
Quality Assurance Report

Report Date : 8-03-95 8:42:31 AM
QA File : C:\GENIEPC\CAMFILES\LCS1.QAF
Analyst : MEC
Sample ID : 50061603
Sample Quantity : 1.00 Each
Sample Date : 11-01-90 12:00:00 PM
Measurement Date : 8-03-95 8:24:05 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 608 seconds

Parameter	Mean	1S Error	New Value	<	LU	:	SD	:	UD	:	BS
AM-241 Activity	8.624E-02	1.011E-02	8.716E-02	<		:		:		:	
CS-137 Activity	6.925E-02	6.899E-03	6.822E-02	<		:		:		:	
CO-60 Activity	7.798E-02	8.094E-03	7.469E-02	<		:		:		:	

Flags Key: LU = Boundary Test (Ab = Above , Be = Below
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action
BS = Measurement Bias Test (In = Investigate, Ac = Action

Reviewed by: Nancy Cole 8/3/95

Attachment I

Attachment I

List of VOCs, SVOCs, and PCBs Analyzed for At ER Site 226

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: August 09, 1995

Sample ID	: 024726-01 T1226-SD-001-001-SS
Lab ID	: 9507402-01
Matrix	: SOIL
Date Collected	: 07/20/95
Date Received	: 07/21/95
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
[redacted]le Organics											
[redacted]t Compound List Volatiles - 35 items											
[redacted]-Trichloroethane	U	ND	2.00	10.0	ug/kg	1.0	TLD	07/31/95	1735	70142	1
[redacted].2,2-Tetrachloroethane	U	ND	2.00	10.0	ug/kg	1.0					
1,1,2-Trichloroethane	U	ND	2.00	10.0	ug/kg	1.0					
1,1-Dichloroethane	U	ND	2.00	10.0	ug/kg	1.0					
1,1-Dichloroethylene	U	ND	2.00	10.0	ug/kg	1.0					
1,2-Dichloroethane	U	ND	2.00	10.0	ug/kg	1.0					
1,2-Dichloropropane	U	ND	2.00	10.0	ug/kg	1.0					
1,2-cis-Dichloroethylene	U	ND	10.0	10.0	ug/kg	1.0					
1,2-trans-Dichloroethylene	U	ND	2.00	10.0	ug/kg	1.0					
2-Butanone	U	ND	10.0	50.0	ug/kg	1.0					
2-Hexanone	U	ND	10.0	20.0	ug/kg	1.0					
4-Methyl-2-pentanone	U	ND	10.0	20.0	ug/kg	1.0					
Acetone	J	17.7	10.0	50.0	ug/kg	1.0					
Benzene	U	ND	2.00	10.0	ug/kg	1.0					
Bromoform	U	ND	2.00	10.0	ug/kg	1.0					
Carbon Disulfide	U	ND	2.00	20.0	ug/kg	1.0					
Carbon Tetrachloride	U	ND	2.00	10.0	ug/kg	1.0					
Chlorobenzene	U	ND	2.00	10.0	ug/kg	1.0					
Chlorodibromomethane	U	ND	2.00	10.0	ug/kg	1.0					
Chloroethane	U	ND	2.00	10.0	ug/kg	1.0					
Chloroform	U	ND	2.00	10.0	ug/kg	1.0					
Dichlorobromomethane	U	ND	2.00	10.0	ug/kg	1.0					
Ethylbenzene	U	ND	2.00	10.0	ug/kg	1.0					
[redacted]l Bromide	U	ND	2.00	10.0	ug/kg	1.0					
[redacted] Chloride	U	ND	2.00	10.0	ug/kg	1.0					
[redacted]ylene Chloride	U	3.03	2.00	25.0	ug/kg	1.0					
[redacted]ne	U	ND	2.00	10.0	ug/kg	1.0					

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CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: August 09, 1995

Sample ID : 024726-01 T1226-SD-001-001-SS

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Tetrachloroethylene	U	ND	2.00	10.0	ug/kg	1.0					
Toluene	U	ND	2.00	10.0	ug/kg	1.0	TLD	07/31/95	1735	70142	1
Trichloroethylene	U	ND	2.00	10.0	ug/kg	1.0					
Vinyl Acetate	U	ND	10.0	20.0	ug/kg	1.0					
Vinyl chloride	U	ND	2.00	10.0	ug/kg	1.0					
Xylenes (TOTAL)	U	ND	4.00	40.0	ug/kg	1.0					
cis-1,3-Dichloropropylene	U	ND	2.00	10.0	ug/kg	1.0					
trans-1,3-Dichloropropylene	U	ND	2.00	10.0	ug/kg	1.0					

Surrogate Recovery	Test	Percent%	Acceptable Limits
1,2-Dichloroethane-d4	TCL VOLATILES	96.1	(71.9 - 131.)
Bromofluorobenzene	TCL VOLATILES	97.3	(74.0 - 112.)
Toluene-d8	TCL VOLATILES	105.	(82.3 - 117.)

M = Method	Method-Description
M 1	EPA 8240 extended

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: August 09, 1995

Sample ID : 024726-01 T1226-SD-001-001-SS

M = Method	Method-Description

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct questions to your Project Manager, Edie Kent at (803) 769-7385.

Analytical Report Specialist

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: September 01, 1995

Sample ID : 024726-02 T1226-SD-001-001-SS
Lab ID : 9507402-02
Matrix : SOIL
Date Collected : 07/20/95
Date Received : 07/21/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Target Compound List B/N/A Compounds - 65 items											
1,2,4-Trichlorobenzene	U	ND	166	332	ug/kg	1.0	JCB	08/04/95	1631	70116	1
1,2-Dichlorobenzene	U	ND	166	332	ug/kg	1.0					
1,3-Dichlorobenzene	U	ND	166	332	ug/kg	1.0					
1,4-Dichlorobenzene	U	ND	166	332	ug/kg	1.0					
2,4,5-Trichlorophenol	U	ND	166	332	ug/kg	1.0					
2,4,6-Trichlorophenol	U	ND	166	332	ug/kg	1.0					
2,4-Dichlorophenol	U	ND	166	332	ug/kg	1.0					
2,4-Dimethylphenol	U	ND	166	332	ug/kg	1.0					
2,4-Dinitrophenol	U	ND	332	1490	ug/kg	1.0					
2,4-Dinitrotoluene	U	ND	166	332	ug/kg	1.0					
2,6-Dinitrotoluene	U	ND	166	332	ug/kg	1.0					
2-Chloronaphthalene	U	ND	166	332	ug/kg	1.0					
2-Chlorophenol	U	ND	166	332	ug/kg	1.0					
2-Methylnaphthalene	U	ND	166	332	ug/kg	1.0					
2-Nitrophenol	U	ND	166	332	ug/kg	1.0					
2-methyl-4,6-dinitrophenol	U	ND	98.3	1650	ug/kg	1.0					
3,3'-Dichlorobenzidine	U	ND	1660	4150	ug/kg	1.0					
4-Bromophenyl phenyl ether	U	ND	199	332	ug/kg	1.0					
4-Chloroaniline	U	ND	166	332	ug/kg	1.0					
4-Chlorophenyl phenyl ether	U	ND	166	332	ug/kg	1.0					
4-Nitrophenol	U	ND	332	664	ug/kg	1.0					
4-chloro-3-methyl phenol	U	ND	166	332	ug/kg	1.0					
Acenaphthene	U	ND	166	332	ug/kg	1.0					
Acenaphthylene	U	ND	166	332	ug/kg	1.0					
Anthracene	U	ND	166	332	ug/kg	1.0					
Benzo(a)anthracene	U	ND	166	332	ug/kg	1.0					
Benzo(a)pyrene	U	ND	166	332	ug/kg	1.0					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	999827 79	

CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: September 01, 1995

Sample ID : 024726-02 T1226-SD-001-001-SS

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Benzo(b)fluoranthene	U	ND	166	332	ug/kg	1.0					
Benzo(ghi)perylene	U	ND	166	332	ug/kg	1.0	JCB	08/04/95	1631	70116	1
Benzo(k)fluoranthene	U	ND	166	332	ug/kg	1.0					
Benzoic Acid	U	ND	332	664	ug/kg	1.0					
Benzyl Alcohol	U	ND	166	332	ug/kg	1.0					
Butyl benzyl phthalate	U	ND	166	332	ug/kg	1.0					
rysene	U	ND	166	332	ug/kg	1.0					
n-butyl phthalate	U	ND	166	332	ug/kg	1.0					
i-n-octyl phthalate	U	ND	166	332	ug/kg	1.0					
ibenzo(a,h)anthracene	U	ND	166	332	ug/kg	1.0					
Dibenzofuran	U	ND	166	332	ug/kg	1.0					
Diethyl phthalate	U	ND	129	332	ug/kg	1.0					
Dimethyl phthalate	U	ND	166	332	ug/kg	1.0					
Fluoranthene	U	ND	166	332	ug/kg	1.0					
Fluorene	U	ND	166	332	ug/kg	1.0					
Hexachlorobenzene	U	ND	199	332	ug/kg	1.0					
Hexachlorobutadiene	U	ND	166	332	ug/kg	1.0					
Hexachlorocyclopentadiene	U	ND	232	332	ug/kg	1.0					
Hexachloroethane	U	ND	166	332	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	ND	166	332	ug/kg	1.0					
Isophorone	U	ND	166	332	ug/kg	1.0					
N-Nitrosodiphenylamine	U	ND	166	332	ug/kg	1.0					
N-Nitrosodipropylamine	U	ND	166	332	ug/kg	1.0					
Naphthalene	U	ND	166	332	ug/kg	1.0					
Nitrobenzene	U	ND	166	332	ug/kg	1.0					
Pentachlorophenol	U	ND	266	332	ug/kg	1.0					
Phenanthrene	U	ND	166	332	ug/kg	1.0					
Phenol	U	ND	166	332	ug/kg	1.0					
Pyrene	U	ND	166	332	ug/kg	1.0					
bis(2-Chloroethoxy)methane	U	ND	166	332	ug/kg	1.0					
bis(2-Chloroethyl) ether	U	ND	166	332	ug/kg	1.0					
bis(2-Chloroisopropyl)ether	U	ND	166	332	ug/kg	1.0					
(2-Ethylhexyl)phthalate	U	ND	166	332	ug/kg	1.0					
p-Cresol	U	ND	116	332	ug/kg	1.0					
Nitroaniline	U	ND	259	332	ug/kg	1.0					

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: August 09, 1995

Sample ID : 024726-03 T1226-SD-001-001-SS
Lab ID : 9507402-03
Matrix : SOIL
Date Collected : 07/20/95
Date Received : 07/21/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Plutonium - 2 items												
Plutonium-238	U	ND	+/- 0.0116	0.0215	0.0300	pCi/g	1.0	TLN	08/02/95	1106	69748	1
Plutonium-239/240	U	ND	+/- 0.00429	0.0134	0.0300	pCi/g	1.0					
Alpha Spectroscopy Uranium - 3 items												
Uranium-233/234		0.677	+/- 0.0781	0.0146	0.0900	pCi/g	1.0	PEM	08/05/95	1514	69760	2
Uranium-235	J	0.0335	+/- 0.0136	0.00402	0.0900	pCi/g	1.0					
Uranium-238	B	0.665	+/- 0.077	0.0101	0.0900	pCi/g	1.0					

M = Method	Method-Description
M 1	EPI A-012B
M 2	EPI A-011B

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GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: August 09, 1995

Sample ID : 024726-03 T1226-SD-001-001-SS

M = Method	Method-Description

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct questions to your Project Manager, Edie Kent at (803) 769-7385.

Analytical Report Specialist

LOCKHEED ANALYTICAL SERVICES

RAD DATA REPORT (ra01)

General Eng. Laboratories, Inc. *Char.SC

projects indicated for a normal TAT (Project SANDIA '95-30)

Client Sample ID: 024726-04 T1226-SD-001-001-SS — LAL Sample ID: L4981-1

Date Collected: 20-JUL-95 — Date Received: 24-JUL-95

Matrix: Sci. — Login Number: L4981

Constituent	Analyzed	Batch	Activity	Error	MDA	DataQual	Units
% Moisture		RAD PERCENT SOLIDS_26322	5.6				%
% Solids		RAD PERCENT SOLIDS_26322	94.				%
Gross Dry Wt.		RAD PERCENT SOLIDS_26322	850				g
Gross Wet Wt.		RAD PERCENT SOLIDS_26322	880				g
Tare Wt.		RAD PERCENT SOLIDS_26322	270				g
H-3	22-AUG-95	TRITIUM(H3) LAL-0067_26320	-90	170	250		pCi/L

INFORMATION ONLY

Attachment J

Attachment J

Equipment Blank Metals Data for ER Site 226

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: September 29, 1995

Sample ID : 022975-03 T1226-EB-001-000-W
Lab ID : 9507257-21
Matrix : AQUEOUS
Date Collected : 07/12/95
Date Received : 07/14/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury	JB	0.0000580	0.0000148	0.000200	mg/l	1.0	ADF	07/26/95	2141	69543	1
Silver	U	ND	0.00249	0.0100	mg/l	1.0	NRM	07/22/95	0129	69183	2
Aluminum	U	ND	0.0119	0.0500	mg/l	1.0					
Arsenic	U	ND	0.00186	0.0100	mg/l	1.0					
Barium	JB	0.00100	0.0000663	0.0100	mg/l	1.0					
Beryllium	U	ND	0.0000114	0.00500	mg/l	1.0					
Calcium		0.435	0.0200	0.100	mg/l	1.0					
Cadmium	U	ND	0.0000970	0.00500	mg/l	1.0					
Cobalt	U	ND	0.000176	0.0100	mg/l	1.0					
Chromium	U	ND	0.000596	0.0100	mg/l	1.0					
Copper	J	0.000847	0.000539	0.0100	mg/l	1.0					
Iron		0.0703	0.0101	0.0500	mg/l	1.0					
Potassium	J	0.0320	0.00643	0.100	mg/l	1.0					
Magnesium		0.0185	0.00235	0.0100	mg/l	1.0					
Manganese	J	0.00115	0.0000962	0.0100	mg/l	1.0					
Sodium		1.23	0.0156	0.100	mg/l	1.0					
Nickel		0.0101	0.000807	0.0100	mg/l	1.0					
Lead	U	ND	0.00113	0.00300	mg/l	1.0					
Antimony	UB	ND	0.000958	0.0100	mg/l	1.0					
Selenium	U	ND	0.00143	0.00500	mg/l	1.0					
Thallium	U	ND	0.00207	0.0100	mg/l	1.0					
Vanadium	U	ND	0.000234	0.0100	mg/l	1.0					
Zinc	JB	0.0124	0.00270	0.0200	mg/l	1.0					

The following prep procedures were performed:

Mercury	ADF	07/24/95	1700	69543	1
TRACE	BBJ	07/19/95	1730	69183	3

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Laboratory Certifications

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FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: September 29, 1995

Sample ID : 022975-03 T1226-EB-001-000-W

M = Method	Method-Description
M 1	EPA 7470
M 2	EPA 6010A
M 3	EPA 3005

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Edie Kent at (803) 769-7385.

Analytical Report Specialist

P O Box 30712 • Charleston, SC 29417 • (803) 556-8171 • Fax (803) 766-1178 *9507257-21*

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: August 15, 1995

Sample ID : 024722-03 T1226-EB-002-000-W
Lab ID : 9507375-15
Matrix : AQUEOUS
Date Collected : 07/18/95
Date Received : 07/20/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Metals Analysis											
Mercury	J	0.000151	0.0000148	0.000500	mg/l	1.0	BBJ	08/10/95	2249	70782	1
Silver	U	ND	0.00249	0.0100	mg/l	1.0	NRM	08/02/95	1941	70233	2
Aluminum	J	0.0214	0.0119	0.0500	mg/l	1.0					
Arsenic	UB	ND	0.00186	0.0100	mg/l	1.0					
Barium	JB	0.000986	0.0000663	0.0100	mg/l	1.0					
Beryllium	JB	0.0000523	0.0000114	0.00500	mg/l	1.0					
Calcium		0.189	0.0200	0.100	mg/l	1.0					
Cadmium	JB	0.000224	0.0000970	0.00500	mg/l	1.0					
Cobalt	JB	0.000233	0.000176	0.0100	mg/l	1.0					
Chromium	U	ND	0.000596	0.0100	mg/l	1.0					
Copper	U	ND	0.000539	0.0100	mg/l	1.0					
Iron	J	0.0498	0.0101	0.0500	mg/l	1.0					
Potassium	J	0.0206	0.00643	0.100	mg/l	1.0					
Magnesium	B	0.0176	0.00235	0.0100	mg/l	1.0					
Manganese	JB	0.000713	0.0000962	0.0100	mg/l	1.0					
Sodium	JB	0.0959	0.0156	0.100	mg/l	1.0					
Nickel	J	0.00439	0.000807	0.0100	mg/l	1.0					
Lead	U	ND	0.00113	0.00300	mg/l	1.0					
Antimony	U	ND	0.000958	0.0100	mg/l	1.0					
Selenium	UB	ND	0.00143	0.00500	mg/l	1.0					
Thallium	U	ND	0.00207	0.0100	mg/l	1.0					
Vanadium	J	0.000264	0.000234	0.0100	mg/l	1.0					
Zinc	UB	ND	0.00270	0.0200	mg/l	1.0					

The following prep procedures were performed:

Mercury	BBJ	08/10/95	1500	70782 1
SPACE	DVW	08/01/95	2145	70233 3

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

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NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Sandia National Laboratories
PO Box 5800
Albuquerque, New Mexico 87185-1331
Contact: Ms. Pamela Puissant
Project Description: RFP #AJ2480A

cc: SNLS00295 Report Date: August 15, 1995

Sample ID : 024722-03 T1226-EB-002-000-W

M = Method	Method-Description
M 1	EPA 7470
M 2	EPA 6010A
M 3	EPA 3005

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Edie Kent at (803) 769-7385.

Analytical Report Specialist

P O Box 30712 • Charleston, SC 29417 • (803) 556-8171 • Fax (803) 766-1178

National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

DEC 9 2003

cc. Records Center

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. John E. Kieling, Manager
Permits Management Program
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Rd., Building E
Santa Fe, NM 87505

Dear Mr. Kieling,

Enclosed is one of two NMED copies of the "Expanded Responses to NMED's 1998 Technical Comments on No Further Action (NFA) Proposals for Solid Waste Management Units (SWMUs) 96, 187 and 226." Per our verbal agreement, the second NMED copy is being sent directly to the Albuquerque Group Manager.

This submittal includes descriptions and results of recent site sampling work that was conducted in response to NMED/HWB's request. With a minor, approved exception, the sampling completed was that documented in the December 2001 document, "Sampling and Analysis Plan for Supplemental Investigations at Solid Waste Management Units 96, 187 and 226." Revised risk assessments are also included.

The risk assessments conclude that for these sites (1) there is no significant risk to human health under both the industrial and residential land-use scenarios, and (2) that there are no ecological risks associated with these sites.

The Department of Energy and Sandia National Laboratories/New Mexico are requesting a determination that these sites are acceptable for No Further Action.

If you have any questions, please contact John Gould at (505) 845-6089.

Sincerely,

Karen L. Boardman
Manager

Enclosure

cc w/enclosure:
L. King, EPA, Region 6 (2 copies Via Certified Mail)
W. Moats, NMED-HWB (Via Certified Mail)
M. Gardipe, ERD
C. Voorhess, NMED-OB
D. Bierley, NMED-OB

cc w/o enclosure:
K. Thomas, EPA, Region 6
S. Martin, NMED-HWB
F. Nimick, SNL, MS 1089
D. Stockham, SNL, MS 1087
P. Freshour, SNL, MS 87
B. Langkopf, SNL, MS 1087
M. Skelly, SNL, MS 1087
D. Fate, SNL, MS 1089
M.J. Davis, SNL, MS 1089
A. Blumberg, SNL, MS 0141

Sandia National Laboratories
Albuquerque, New Mexico
November 2003

Environmental Restoration Project
Expanded Responses to NMED's 1998 Technical Comments on No Further Action Proposals for Solid Waste Management Units 96, 187, and 226 Dated May 1997

INTRODUCTION

Sandia National Laboratories/New Mexico (SNL/NM) is submitting this expanded response to technical comments for Solid Waste Management Units (SWMUs) 96, 187, and 226, which are managed by the Technical Area (TA)-I, Operable Unit (OU) 1302. This document expands on responses to technical comments received in a letter from the New Mexico Environment Department (NMED) to the U.S. Department of Energy (DOE) (Dinwiddie March 1998) documenting the review of three SWMUs submitted with the seventh round of Proposals for No Further Action (NFA) in May 1997 (SNL/NM May 1997a, 1997b, and 1997c). The original NFA proposals refer to these potentially contaminated sites as "Environmental Restoration (ER) Sites." Even though the terms are equivalent, "SWMU," which is the current terminology, will be used in this document. The three SWMUs discussed in this expanded response include:

- SWMU 96—Storm Drain System
- SWMU 187—Sanitary Sewer System
- SWMU 226—Old Acid Waste Line

During the past ten years, these three SWMUs have been subjected to numerous investigations and have been discussed on numerous occasions with the NMED. The breadth of work completed at these SWMUs is shown in Table 1. This is the second response submitted by SNL/NM to technical comments for SWMUs 96, 187, and 226. In June 1998, an original response to NMED's Technical Comments was submitted by SNL/NM and DOE to NMED (SNL/NM June 1998). However, this response was not complete, but resulted in a need for more discussions with NMED, and identified more investigations to resolve outstanding issues. This expanded response includes the results of soil and sediment sampling completed after the

submittal of the NFA proposals in May 1997; it also addresses the NMED request for organizing the analytical data into an approved table format. Revised human health and ecological risk assessments that use the analytical results from numerous soil sampling events conducted by the ER Project at each site are also provided in this response. In addition, relevant information from the Tijeras Arroyo Groundwater (TAG) Investigation (SNL/NM November 2002) is included.

Table 1
Historical Timeline for Events Related to SWMUs 96, 187, and 226
NFA Proposals

Month	Year	Event	Reference
May	1997	SNL/NM submits NFA Proposals for SWMUs 96, 187, and 226.	SNL/NM May 1997a, 1997b, and 1997c
March	1998	NMED submits Technical Comments on the NFA Proposals.	Dinwiddie March 1998
June	1998	SNL/NM submits original response to NMED's Request for Supplemental Information/Technical Comments. The response was incomplete, called for more discussions with the NMED, and identified supplemental investigations required to resolve issues.	SNL/NM June 1998
August–September	1998	Due to impending construction activities in the TA-I Storm Water System, SNL/NM performs additional sampling at SWMU 96.	SNL/NM March 2003
March	1999	NMED and SNL/NM meet to discuss deficiencies in SNL/NM's Response to NMED's Request for Supplemental Information/Technical Comments.	Fleck March 1999
July	1999	SNL/NM collects several soil samples at SWMU 98 (Building 863 TCA and photochemical release) that pertain to SWMU 226.	SNL/NM September 2000 Skelly March 2003
September	2001	SNL/NM and NMED meet to discuss requirements for a SAP to complete characterization of the three SWMUs.	Lyon September 2001
December	2001	SNL/NM submits the SAP for Supplemental Sampling at the three SWMUs.	SNL/NM December 2001
February	2002	NMED approves the SAP for Supplemental Sampling at the three SWMUs.	Moats February 2002a
January–June	2002	SNL/NM implements the SAP for Supplemental Sampling.	SNL/NM June 2002 SNL/NM April 2003

NFA = No Further Action.
NMED = New Mexico Environment Department.
SAP = Sampling and Analysis Plan.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.
TA = Technical Area.
TCA = Trichloroethane.

This expanded response addresses the most current correspondence from the NMED by providing the requested information for the general and site-specific comments (discussed in numerical order). Each section provides NMED technical comments repeated in **bold** and arranged by comment number in the original order. The DOE and SNL/NM response is written in normal font style on a separate line under "Response." For clarity, the original responses (SNL/NM June 1998) are restated in this document and identified as "Original Response." Additional language added since the June 1998 document (such as presentation of additional data and further explanations of the conclusions) are identified as "Expanded Response." In a few instances, the original response sufficiently addressed the technical comment, and no expanded response was deemed necessary. Responses to general technical comments begin on page 8, and responses to site-specific technical comments begin on page 14.

Additional supporting information for the general and site-specific comments is appended to this document. The original response included eleven attachments comprised of documentation that supported SNL/NM's responses to NMED's technical comments. In order to keep this expanded response document to a manageable size, the original attachments are not included with this submittal. The supporting documentation to the original response was referred to as "Attachments," and the supporting documentation to the NFA proposal was referred to as "Appendices." To prevent confusion, the supporting documentation to the expanded response is referred to as "Addenda." The list of addenda for the expanded response is presented in Table 2; the list of attachments to the original response is presented in Table 3.

Table 2
List of Addenda to the Expanded Response

Addendum A	SWMU 96 Human Health and Ecological Risk Assessment
Addendum B	SWMU 187 Human Health and Ecological Risk Assessment
Addendum C	SWMU 226 Human Health and Ecological Risk Assessment
Addendum D	"Field Report for Supplemental Investigations at Solid Waste Management Units 96, 187, and 226 Completed June 2002" (SNL/NM April 2003)
Addendum E	Results of Investigations Conducted at Miscellaneous Buildings in TA-I and Surrounding Areas
Addendum F	Plates Showing the Storm Water Drain System and the Sanitary Sewer System
Addendum G	"Solid Waste Management Unit 96—TA-I Storm Drain System, August/September 1998 Supplemental Investigation—Field Report" (SNL/NM March 2003)
Addendum H	Analytical Data Tables for SWMU 96—Method Detection Limit Tables for all SWMUs
Addendum I	Analytical Data Tables for SWMU 187
Addendum J	Figure Showing the Relationship of SWMU 226 to SWMU 46 and other Tijeras Arroyo Operable Unit 1309 SWMUs
Addendum K	Summary of SWMU 226 Confirmatory Soil Sampling Data Collected from Below Building 863 (SWMU 98), July 1999
Addendum L	Analytical Data Tables for SWMU 226

SWMU = Solid Waste Management Unit.
TA = Technical Area.

Table 3
List of Attachments to the Original Response (SNL/NM June 1998)

Attachment A	Approval Letter for Sandia North GIP and Transmittal Letter for Sandia North GIP Annual Report, Fiscal Year 1997
Attachment B	List of VOCs, SVOCs, and Radionuclides Analyzed for at ER Site 96
Attachment C	Equipment Blank Metals Data for ER Site 96
Attachment D	Gamma Spectroscopy Data for ER Site 96
Attachment E	Gamma Spectroscopy Data for ER Site 187
Attachment F	List of VOCs, SVOCs, and PCBs Analyzed for at ER Site 187
Attachment G	Equipment Blank Metals Data for ER Site 187
Attachment H	Gamma Spectroscopy Data for ER Site 226
Attachment I	List of VOCs, SVOCs, and PCBs Analyzed for at ER Site 226
Attachment J	Equipment Blank Metals Data for ER Site 226
Attachment K	EPA Guidance on Laboratory Data Validation

EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
GIP = Groundwater Investigation Plan.
PCB = Polychlorinated biphenyl.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

TABLE OF CONTENTS

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Addendum Tables

LIST OF TABLES (Concluded)

RESPONSES TO NMED TECHNICAL COMMENTS ON NO FURTHER ACTION PROPOSALS DATED OCTOBER 3, 1996 (7th ROUND)

GENERAL COMMENTS

1. **Drafts of maps, supporting documents, appendices, and data tables are unfinished products. For the purpose of a NFA proposal, final versions of these and any other types of information must be submitted.**

   Original Response: To Sandia National Laboratories/Department of Energy's (SNL/DOE's) knowledge, no draft maps or documents were transmitted with the No Further Action (NFA) proposals for Sites 96, 187, and 226. As noted in previous responses to comments on other NFA proposals, some historical reference documents have never been finalized, and only the draft version is available for use (e.g., Comprehensive Environmental Assessment and Response Program [CEARP] Phase I, Preliminary Draft, May 1987).

   Expanded Response: Maps, supporting documents, addenda, and data tables included with this submittal are final versions.

2. **It is helpful to include analytical results for field and equipment blanks, and duplicates in data tables. QA/QC data should not be mixed with environmental data in the same tables. If applicable, the QA/QC data tables should also include comparisons of offsite and onsite laboratory results (e.g., RPD's).**

   Original Response: The quality assurance/quality control (QA/QC) data mentioned in this comment (field and equipment blanks) were included in the subject NFA proposals at the end of the relevant data tables. Thus, although they were included in the same tables as the environmental data, they were not intermingled. For these sites, comparisons of on-site and off-site data are not applicable because all data were measured off site.

   Expanded Response: Data tables included with this submittal contain the results of quality assurance (QA)/quality control (QC) samples.

3. **Data tables for volatile organic compounds (VOC's), semi-volatile organic compounds (SVOC's), and radionuclides list only the constituents that were detected. While summary tables like these are acceptable (and preferred for review purposes), they provide only part of the information needed to fully evaluate a NFA proposal. To complete the data package, additional tables must be submitted listing *all* of the various constituents that were analyzed for and their method detection limits/minimum detectable activities.**

   Please also note that "J-coded" data must be reported as detected constituents.

Original Response: The requested tables are included with this package. For the purpose of this set of responses, detailed information is provided later in this package in the responses to Site-Specific Comments.

Please note that, in the subject NFA proposals, J-coded data were reported as detected constituents.

Expanded Response: For all data acquired since the original response to NMED's technical comments, tables are included that list all of the constituents for which samples were analyzed and the corresponding method detection limits (MDLs)/minimum detectable activity values. Also in this submittal, all "J-coded" data from recent sampling efforts are reported as detected constituents.

4. **As presented, sample locations and depths must be inferred from the sample identification numbers in the data tables. Notes describing how such information is encoded in the sample identification numbers must be added to the tables.**

Original Response: SNL/DOE agree that information about encoding of sample location and depth within sample identification numbers must be available to the New Mexico Environment Department (NMED) and any other potential users of resulting data. Notes pertaining to this topic have been added to tables in later NFA proposals. For the purpose of this set of responses, detailed information is provided later in this package in the responses to Site-Specific Comments.

Expanded Response: For the data tables included with this submittal, all sample location and depth information is provided.

5. **The NFA proposals contain redundant information, making it more time-consuming than necessary to review. Sections of the TA-1 RFI Work Plan are included with the NFA proposals. The NMED is more interested in what was actually done than what was planned. There is generally no need to include sections of the RFI Work Plans with the NFA proposals; relevant information (such as site history) can be summarized or restated in the text of the NFA proposal.**

Original Response: The comment is noted. SNL/DOE will try to balance omitting redundant information with the need to make NFA proposals stand-alone documents (per General Comment 10).

6. **HRMB will not review the risk assessments for ER Sites 96, 187, and 226 until the sites have been adequately characterized. Risk assessments must be based on the protocols being developed by the DOE/SNL and the NMED.**

Original Response: SNL/DOE recognize that NMED has the prerogative of deciding when review of risk assessments is appropriate. In this case, the timing clearly hinges on

"adequate characterization," which is the subject of many of the specific comments. Please note that, although additional sampling may delineate concentrations between "hits" (results that were found to be above background but below risk-based action levels) and background, there is no reason to anticipate discovery of values higher than those already found during the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) sampling. Thus, the existing risk assessments are likely to be the most conservative (in terms of showing highest risk), and it may be worth NMED's time to review them at this stage.

Expanded Response: Based upon the implementation of the NMED-approved Sampling and Analysis Plan (SAP) (SNL/NM December 2001), SNL/NM believes that SWMUs 96, 187, and 226 have been adequately characterized. Risk assessments developed using the most recent (2003) assessment guidance, NMED-approved protocols, and recent characterization data are included in Addenda A through C.

7. **QA/QC -- At a meeting held in Santa Fe on December 3, 1996, HRMB staff members expressed concern about SNL's recurring problem regarding the frequent detection of "common laboratory contaminants" (such as acetone and methylene chloride) in various types of blanks. These organic compounds have been and still are widely used at SNL, and in some cases, historically were disposed of onto and into the ground. Thus, the presence of these chemicals in QC samples (such as field and trip blanks) can not be automatically discounted as laboratory contamination.**

Additionally, in this December meeting, HRMB personnel suggested that SNL review its contract laboratory's QA/QC program; and, if it is found deficient, remedy the problem or find other laboratory.

Repeated detections in equipment blanks may indicate improper decontamination practices and/or contaminated wash/rinse water and/or containers or other equipment. SNL should ensure that wash/rinse water, containers, and other equipment is not contaminated prior to their use.

Consistent QC failures are considered by HRMB to be an indication that laboratory data are not reliable. The HRMB will require sampling to be repeated at ER sites where such problems are evident.

Original Response: The comment is noted by SNL/DOE. SNL's Sample Management Office has an ongoing audit program to evaluate the adequacy of QA/QC problems at the off-site contract laboratories; this program is supplemented by a similar program overseen by DOE's Albuquerque Operations Office. When specific QA/QC concerns arise, the affected laboratory is contacted and corrective actions are defined and implemented. However, laboratory contamination is a sporadic problem at any major commercial laboratory and is a problem that defies universal and permanent correction because several common laboratory contaminants are necessary compounds in sample analytical procedures. This has been recognized by the U.S. Environmental Protection Agency

(EPA) and, as NMED is aware, guidance has been available for some time on how to evaluate and use environmental data, despite the presence of laboratory contamination. For completeness, the guidance is included in this package as Attachment A to these general comments.

Because the comment indicates that the Hazardous and Radioactive Materials Bureau (HRMB) may be inclined to require resampling of sites in the event of "consistent QC failures," it is requested that a discussion be held between HRMB and SNL/DOE staff to reach a common understanding on what extent of laboratory contamination is considered to constitute "consistent QC failure."

Expanded Response: Based upon the implementation of the NMED-approved SAP (SNL/NM December 2001), specific locations have been resampled to alleviate concerns about VOC detections in QA/QC samples. All QA/QC sample analytical data are provided in the tables included with this submittal. SNL/NM believes that the current contract laboratory QA/QC program is sufficiently rigorous to provide quality analytical data.

8. **Breaks/cracks/cross-connections in pipes that are downstream of those determined to have appreciable levels of contamination must be investigated.**

Original Response: The comment is noted by SNL/DOE. Although there is agreement among the parties on this approach, it is a critical prerequisite to reach consensus on what constitutes "appreciable contamination."

Expanded Response: Additional site characterization requested by the NMED was completed in June 2002. The activities were performed in accordance with the "Sampling and Analysis Plan for Supplemental Investigations at Solid Waste Management Units 96, 187, and 226" (SNL/NM December 2001) as approved by the NMED (Moats February 2002a). The sampling event is documented in a field report included as Addendum D, and data are provided in tables in various addenda as cited in the expanded responses for the site-specific comments. The significance of the analytical results is discussed by individual SWMU.

9. **HRMB will not support NFA proposals for active sites. DOE/SNL must investigate active sites within 2 years of decommissioning.**

Original Response: SNL/DOE understand that the HRMB will not support NFA proposals for active sites; however, the comment is only partially germane to the three sites addressed here. Site 187, the sanitary sewer lines, is not an active site because the site is defined as the soils outside the pipe, from the midpoint of the pipe downward. Although water continues to flow within the pipes, modern waste-handling processes prevent the introduction of potential contaminants to that water; therefore, leakage from cracks in the line does not result in active contamination of the site as defined. For the same reasons, Site 226 is not an active site.

Parts of Site 96, the storm-drain system, may need to be considered as active. The enclosed, engineered portions are inactive for the same reasons expressed in the preceding paragraph. However, the unlined surface channels obviously continue to receive flow originating from runoff from streets, parking lots, and miscellaneous exterior surfaces in Technical Area (TA)-I, processes for which environmental controls are less certain than for processes occurring within buildings. It would probably be fruitful to discuss approaches to these portions of Site 96 to ensure a common understanding of future status and timing.

Expanded Response: Currently these three SWMUs are not on the "active" site list. Only sites that currently conduct tests or implement procedures that may introduce potential contaminants into the environment are considered active. In a letter dated April 26, 2001, from William Moats (NMED Hazardous Waste Bureau [HWB]) to Michael Zamorski (DOE Kirtland Area Office) and Peter Davies (SNL/NM), the Permits Management Program of the NMED HWB had determined that sites that were at one time considered to be active could be petitioned for NFA on a case-by-case basis (Moats April 2001).

As with other SWMUs that were at one time considered to be active, the processes that led to contamination of the environment at SWMUs 96, 187, and 226 are no longer employed. In accordance with the requirements of the SNL/NM Environmental, Safety, and Health Program (which, in turn, are based on numerous state and federal requirements), SNL/NM no longer allows for the disposal of hazardous materials to these systems. The sanitary sewer and storm water effluent is monitored by the Water Quality Program as part of SNL/NM's Environmental Management Group (Department 3121). Although pollution prevention is the emphasis of the Water Quality Program, if an incident should result in the release of contaminants to the environment, the program procedures are designed to mitigate the spread of contamination. If required, the program procedures would require an investigation of the nature and extent of the release and implementation of any necessary removal action and remediation.

10. **NFA proposals must be self-contained documents. The NFA criteria for a site must be specified in the NFA proposal. It is not adequate to only refer to the list of NFA criteria in the Document of Understanding.**

Original Response: NFA Criterion 5 was specified in the proposal. See Sections 1.0 and 1.2, page 1-1.

11. **Buildings 810, 814, 824, 838, 839, and 870 are not considered by HRMB to be included in ER Sites 96, 187, or 226. Results of the investigations conducted at and near these buildings by DOE/SNL will be reviewed later by HRMB to determine whether these areas are new solid waste management units. However, DOE/SNL must provide any information from the investigations of these areas that may also be relevant to ER Sites 96, 187, and 226.**

Original Response: The buildings listed in the NMED comment are not considered by SNL/DOE to be part of the Environmental Restoration (ER) sites. Furthermore, SNL buildings are addressed under a separately funded program (Decontamination and Decommissioning [D&D]) and are not candidates for inclusion as new Solid Waste Management Units. The D&D and ER Projects coordinate activities so that any investigation of soil or piping exterior to a building's slab or basement is conducted with ER goals and requirements in mind. As required by regulation, if contamination is discovered during such an investigation, regulatory authorities are notified. This has been, and will continue to be, SNL/DOE practice.

Results of the above-mentioned investigations will be provided for NMED's review. For the purpose of this set of responses, detailed information is provided later in this package in the responses to Site-Specific Comments. This information is included in this response because it details the results of work specifically conducted at the storm, sanitary, and acid waste lines that were connected to these buildings and investigated prior to building D&D actions.

Expanded Response: Results of sampling at or in the vicinity of these buildings are included in Addendum E. When applicable, the significance of the analytical results is discussed by individual SWMU (primarily in the expanded response to Site-Specific Technical Comment Number 3 for SWMU 187). The data are provided in tables in various addenda as cited in the expanded responses for the site-specific comments.

ER Site 226, Old Acid-Waste Line

ER Site 226 is not appropriate for NFA petition.

1. Appendix A, Plate 1-1, Soil-Boring Location Map --

A. See general comment 1.
B The direction of flow should be indicated.
C. The locations of cracks, breaks, and any cross-connections should be shown on the map.
C. The outfall (ER Site 46) should be shown on the map.

Original Response 1A: See response to General Comment 1.

Expanded Response 1A: Maps, supporting documents, addenda, and data tables included with this submittal are final versions.

Original Response 1B: Flow arrows will be added to Plate 1-1. SNL Facilities plans to upgrade the underground utility system inside TA-I. Based on this latest information, ER/GIS is in the process of upgrading our database. The new plate cannot be upgraded in time for this submittal, but will be provided upon completion of the GIS upgrade.

Expanded Response 1B: SWMU 226 is a north-south trending pipeline with a southerly flow direction. The flow direction is due south on Plate 1-1 of the SWMU 226 NFA Proposal (SNL/NM May 1997c).

Original Response 1C: The cracks, breaks, and cross-connections have been provided on Plates 5-9 and 5-10 of the "Technical Area I (ADS 1302) RCRA Facility Investigation Work Plan," Volume 2, Plates 5-1 through 5-11 (SNL/NM February 1995).

Original Response 1D (C): ER Site 46 will be added to Plate 1-1. SNL Facilities plans to upgrade the underground utility system inside TA-I. Based on this latest information, ER/GIS is in the process of upgrading our database. The new plate cannot be upgraded in time for this submittal, but will be provided upon completion of the GIS upgrade.

Expanded Response 1D (C): SWMU 46 is 4,000 feet south of TA-I. The relationship of SWMU 226 to SWMU 46 and other Tijeras Arroyo SWMUs is shown on the figure in Addendum J.

2. The Old Acid-Waste Line (ER Site 226) delivered industrial effluent to the Old Acid-Waste Line Outfall (ER Site 46). Effluent discharged from the pipeline drained into the Tijeras Arroyo, and thus, represents a potential threat to groundwater quality.

Groundwater monitor wells must be installed in the outfall area at ER Site 46.

Original Response: One monitor well (TJA-3) will be installed this summer at the outfall (ER Site 46). This well is being installed under the Sandia North GIF.

Expanded Response: As stated in the TA-I RFI Work Plan (SNL/NM February 1995) the Old Acid Waste Line Outfall was listed as SWMU 46 during the CEARP Phase 1. The Old Acid Waste Line was distinguished from the Outfall and was designated SWMU 226 in October 1992. The outfall (SWMU 46) continues to be investigated under OU 1309, with supplemental fieldwork having been completed in August 2003, and an NOD/Request for Supplemental Information Response due for submission in Fiscal Year (FY) 2005.

Three groundwater monitoring wells (TJA-3, TJA-6, and TJA-7) are located at SWMU 46, immediately south of where the SWMU 226 pipeline daylights. Monitoring wells TJA-3 and TJA-6 are completed in the regional aquifer at approximately 450 to 500 feet below ground surface (bgs). Monitoring well TJA-7 is completed in the perched system at approximately 300 feet bgs; the perched zone does not extend as far as the southeastern end of SWMU 46.

The last available groundwater analyses for SWMU 46 are for March 2002 (SNL/NM November 2002). Sampling of TAG monitoring wells was suspended in April 2002 with NMED approval. The constituents of concern for the TAG study area are trichloroethene (TCE) and nitrate. At SWMU 46, groundwater samples from the perched system have not contained detectable concentrations of TCE. However, groundwater samples from the perched system have contained a maximum nitrate concentration of 41 mg/liter (L), which exceeds the federal maximum contaminant limit (MCL) of 10 mg/L. Regional aquifer samples have contained a maximum TCE concentration of 1.39 µg/L in TJA-3, which is below the MCL of 5 µg/L, and a maximum nitrate concentration of 3.7 mg/L (SNL/NM November 2002).

In addition to the three groundwater monitoring wells, two soil-vapor monitoring wells (46-VW-01 and 46-VW-02) were installed in or near SWMU 46. Soil-vapor samples were collected from monitoring wells 46-VW-01 and 46-VW-02 for five quarterly events from April 2001 through March 2002. For the five quarters, the maximum TCE concentration from monitoring well 46-VW-01 was 46,000 parts per billion on a volume/volume ratio (ppbv), which was collected from a depth of 115 feet bgs. The 265-foot-bgs sampling port at monitoring well 46-VW-01 yielded a maximum TCE concentration of 350 ppbv. For the five quarters, the maximum TCE concentration from monitoring well 46-VW-02 was 650 ppbv, which was collected from a depth of 96 feet bgs. The 246-foot-bgs sampling port at monitoring well 46-VW-02 yielded a maximum TCE concentration of 480 ppbv (SNL/NM November 2002).

Twenty-two VOCs were detected in soil-vapor samples collected from the two monitoring wells, but most are single-digit "J" values ("J" signifies that the analyte was detected below the practical quantitation limit but above the MDL). The maximum total-VOC concentrations at monitoring wells 46-VW-01 and 46-VW-02 were 48,380 and 703 ppbv, respectively. The significance of these soil-vapor concentrations and the groundwater monitoring analytical results are further discussed in the TAG Continuing Investigation Report (SNL/NM November 2002). Future soil-vapor sampling is a requirement of the TAG Work Plan (SNL/NM June 2003). Results of these future soil vapor studies will be reported in the TAG Final Report to be completed in FY 2006.

3. **Page 3-1, section 3.4, 1st paragraph -- Results relevant to ER Site 226 for the earlier investigations must be summarized:**

   a. the radiation screening of the outfall area,
   b. sediment sampling of the two manhole locations,
   c. sampling at the two branch segments that served Building 839,
   d. soil sampling done at the trench crossing, and
   e. the Building 839 VCM.

   Data should be summarized in tables for each of the five different investigations. Sample locations should be shown on maps.

   Original Response: These earlier investigations were presented/summarized in the TA-I Work Plan (in Appendix B of this NFA). SNL/DOE believe it would be redundant to further summarize these data.

   Expanded Response: In addition to the five investigations listed in NMED Comment 3 and discussed in this response, an investigation near Former Building 863 supplemented the information about SWMU 226 (Skelly March 2003), which is included as Addendum K. Several soil samples were collected in July 1999 that were originally associated with the SWMU 98 (Building 863 trichloroethane [TCA] and photochemical release) supplemental field investigation. The SWMU 98 NFA proposal (SNL/NM September 2000) discussed other data collected from the site during the 1999 investigation but deferred discussion of the results of three samples because it was assumed these would "be included in the Acid Waste Line (SWMU 226) investigation" (SNL/NM September 2000).

   As reported in the SWMU 98 NFA proposal, "these samples were collected along a lateral pipe connected to the Old Acid Waste Line" at a depth of 3 feet bgs using a Geoprobe™ sampling rig. The samples were collected on July 29, 1999, from the northwest corner of SWMU 98 (Figure 1, Addendum K) and shipped for off-site analyses including SVOCs (U.S. Environmental Protection Agency [EPA] Method 8270), Target Analyte List metals (EPA Method 6010A/7471), and VOCs (EPA Method 8260).

The analytical results showed that four metals (arsenic, barium, mercury, and vanadium) exceeded the NMED-approved background concentrations (Table 1, Addendum K), and methylene chloride was the only VOC detected (Table 2, Addendum K). No other SVOC or VOCs were detected above the corresponding MDLs. The analyte-specific MDLs for this round of analyses are provided in Tables 2.4.5-3, 2.4.5-4 and 2.4.5-5 of Addendum K.

Expanded Response 3a: The radiation screening of the outfall area (SWMU 46) is provided in Addendum E in the section labeled "SWMU 46."

Expanded Response 3b: The sediment sample data from the two manhole locations is provided in Addendum E in the section labeled "SDAA/OAWL."

Expanded Response 3c: The sampling results from the two branch segments that served Building 839 is provided in Addendum E in the sections labeled "Bldg 838/839" and "Bldg 838/839 (II)."

Expanded Response 3d: The sampling results for the trench crossing is provided in Addendum E in the section labeled "Communications Duct."

Expanded Response 3e: The sampling results for the Voluntary Corrective Measure (VCM) performed at Building 839 is provided in Appendix E in the section labeled "838/839 VCM."

4. **Page 3-8, section 3.6.2.2, last sentence -- the gamma spectroscopy results must be provided.**

Original Response: The gamma spectroscopy data are provided in Attachment H.

5. **Appendix B -- See general comment 5.**

Original Response: See response to General Comment 5.

6. **Appendix D -- See general comment 6.**

Original Response: See response to General Comment 6.

Expanded Response: Based on implementation of the NMED-approved SAP (SNL/NM December 2001), SNL/NM believes that SWMU 226 has been adequately characterized. A risk assessment developed for SWMU 226 using the most recent assessment guidance, NMED-approved protocols, and recent characterization data is included in Addendum C.

7. **Appendix C, Table 2 -- See general comments 2, 3, and 4.**

SNL/DOE must return to each location where VOC's were detected and determine the extent of contamination. The source (or sources) of contamination must be determined.

Original Response: A table showing the list of VOCs analyzed for is provided in Attachment I. This list includes the MDL for each compound.

The DOE has forwarded a letter to NMED requesting that the response due date be extended an additional 60 days. The letter also stated the following: " . . . identified several issues in the RSI with potential programmatic implications that may require extensive discussions with the NMED technical staff." The nature and extent of VOC contamination is one of the issues that will impact the program. The SNL ER Project requests a meeting with the NMED technical staff to resolve this issue.

Expanded Response: Additional site characterization requested by the NMED was completed in June 2002. The characterization was performed according to the SAP (SNL/NM December 2001), with the sampling activities documented in a field report (Addendum D). All environmental samples were nondetections.

Based upon the data acquired from the supplemental investigations, SNL/NM has determined the extent of contamination at each of the locations requested by NMED. These investigations have confirmed that the sources of contamination (if any) are the original locations of the underground pipe break and deficiencies that were specified for characterization sampling in the RFI Work Plan (SNL/NM February 1995).

8. **Appendix C, Table 3 -- See general comments 2, 3, and 4.**

SNL/DOE must return to the location where SVOC's were detected (GP-009) and determine the extent of contamination. The source (or sources) of contamination must be determined.

Original Response: A table showing the list of SVOCs analyzed for is provided in Attachment I (see response to Comment 7). This list includes the MDL for each compound.

The DOE has forwarded a letter to NMED requesting that the response due date be extended an additional 60 days. The letter also stated the following: " . . . identified several issues in the RSI with potential programmatic implications that may require extensive discussions with the NMED technical staff." The nature and extent of SVOC contamination is one of the issues that will impact the program. The SNL ER Project requests a meeting with the NMED technical staff to resolve this issue.

Expanded Response: Additional site characterization requested by the NMED was completed in June 2002. The characterization was performed according to the SAP (SNL/NM December 2001), with the sampling activities documented in a field report (Addendum D). The analytical data tables are presented in Addendum L. Table L-1 presents the SVOC analytical results. Fourteen SVOCs were detected with most of the concentrations near or below the MDL. The maximum SVOC detected was 340 µg/kg of phenol.

Based upon the data acquired from the supplemental investigations, SNL/NM has determined the extent of contamination at each of the locations requested by NMED. These investigations have confirmed that the sources of contamination (if any) are the original locations of the underground pipe break and deficiencies that were specified for characterization sampling in the RFI Work Plan (SNL/NM February 1995).

9. **Appendix C, Table 4 -- SNL/DOE must return to the locations where the PCB detections occurred and determine the extent of contamination. The source (or sources) of PCB contamination must be determined.**

See general comment 4.

Original Response: A table showing the list of PCBs analyzed for is provided in Attachment I (see response to Comment 7). This list includes the MDL for each compound.

The DOE has forwarded a letter to NMED requesting that the response due date be extended an additional 60 days. The letter also stated the following: " . . . identified several issues in the RSI with potential programmatic implications that may require extensive discussions with the NMED technical staff." The nature and extent of PCB contamination is one of the issues that will impact the program. The SNL ER Project requests a meeting with the NMED technical staff to resolve this issue.

Expanded Response: The PCB characterization was performed in association with the SWMU 96 investigation, according to the SAP (SNL/NM December 2001), with the sampling activities documented in a field report (Addendum D).

Based upon the data acquired from the supplemental investigations, SNL/NM has determined the extent of contamination at each of the locations requested by NMED. These investigations have confirmed that the sources of contamination (if any) are the original locations of the underground pipe break and deficiencies that were specified for characterization sampling in the RFI Work Plan (SNL/NM February 1995).

10. Appendix C, Table 5 -- Analytical results for some samples exceed the approved background concentrations for certain metals:

Metal	Borehole (GP) Locations
Ba	004, 010, 011
Ag	007
V	011

SNL/DOE must return to each of these locations and determine the extent of contamination. The source (or sources) of each contaminant must be determined.

See general comments 2 and 4.

Original Response: See response to Specific Comment 6, ER Site 96 (see Attachment J).

Expanded Response 10: The metals characterization was performed in association with the SWMU 96 and SWMU 187 investigations, according to the SAP (SNL/NM December 2001), with the sampling activities documented in a field report (Addendum D). The metals analytical data tables are presented in Addenda H and I. Tables H3-1 and I-3 present the metals analytical results.

[Regarding general comments 2 and 4] Data tables included with this submittal contain the results of QA/QC samples. All sample location and depth information is provided in the data tables included with this submittal.

Based upon the data acquired from the supplemental investigations, SNL/NM has determined the extent of contamination at each of the locations requested by NMED. These investigations have confirmed that the sources of contamination (if any) are the original locations of the underground pipe break and deficiencies that were specified for characterization sampling in the RFI Work Plan (SNL/NM February 1995).

11. Appendix C, Table 6 -- See general comments 2, 3, and 4.

Analytical results for some samples demonstrate that radioactive contamination is present:

Radionuclide	Borehole (GP) Locations
Plutonium	011, 018

SNL/DOE must return to these two locations and determine the extent of contamination. The source (or sources) of the plutonium contamination must be determined.

Original Response: A table showing the list of radionuclides analyzed for is provided in Attachment I (see response to Comment 7). This list includes the MDL for each compound.

The DOE has forwarded a letter to NMED requesting that the response due date be extended an additional 60 days. The letter also stated the following: " . . . identified several issues in the RSI with potential programmatic implications that may require extensive discussions with the NMED technical staff." The nature and extent of radiological contamination is one of the issues that will impact the program. The SNL ER Project requests a meeting with the NMED technical staff to resolve this issue.

Expanded Response: Additional site characterization requested by the NMED was completed in June 2002. The characterization was performed according to the SAP (SNL/NM December 2001), with the sampling activities documented in a field report (Addendum D). The analytical data tables are presented in Addendum L. All the radiochemistry analytical results were nondetections.

Based upon the data acquired from the supplemental investigations, SNL/NM has determined the extent of contamination at each of the locations requested by NMED. These investigations have confirmed that the sources of contamination (if any) are the original locations of the underground pipe break and deficiencies that were specified for characterization sampling in the RFI Work Plan (SNL/NM February 1995).

12. Appendix C, Table 7 -- See specific comment 15, ER Site 96.

Original Response: See response to Specific Comment 15, ER Site 96.

Expanded Response: All tables containing metals analytical data provided in the addenda to this response include NMED-approved background concentrations (Dinwiddie September 1997) for comparison.

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Addendum C

ADDENDUM C

SWMU 226 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

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SWMU 226: RISK ASSESSMENT REPORT

I. Site Description and History

Solid Waste Management Unit (SWMU) 226 is the Old Acid Waste Line. The old acid waste line outfall was listed as SWMU 46 based upon information obtained during the Comprehensive Environmental Assessment and Response Program Phase I interviews. The old acid waste line was distinguished from the acid waste line outfall and was designated SWMU 226 in October 1992. The outfall is being investigated under Activity Data Sheet (ADS) 1309, Tijeras Arroyo; the line has been investigated under ADS 1302, Technical Area (TA)-I. The original SWMU name was the Acid Waste Line (TA-I). The SWMU name was changed to the Old Acid Waste Line during the development of the TA-I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan (WP).

SWMU 226 includes all of the abandoned line and soil near the abandoned line where potential constituents of concern (COCs) have been detected, as well as soil near those portions of the active line where breaks have been identified and potential COCs have been detected.

The acid waste line was constructed of 4- to 8-inch-diameter vitreous clay pipe and installed between 1948 and 1950. The system extended from three origins in the north-central section of TA-I toward the south, to an outfall north of the Tijeras Arroyo. Lateral lines extended to buildings served by the line. The line remains in place and lies from 4 to 10 feet below ground surface (bgs) overall and an average of 8 feet bgs south of TA-I.

Based on a review of architectural and mechanical drawings of TA-I buildings and interviews with current and former Sandia National Laboratories/New Mexico (SNL/NM) employees, it is known that waste was discharged into the acid line from the following buildings:

- Building 839 (instrument repair and general research laboratory)
- Building 840 (machine and ceramics shops)
- Building 841 (a foundry and plating and coating shop)
- Building 860 (environmental testing)
- Building 863 (motion picture film processing)
- Building 892 (weapons production)

Although the actual date that discharges from the acid waste line ceased is unknown, it is assumed that discharges ceased after 1967. Discharge from the line is evident in aerial photographs taken from 1964 to 1967.

Reportedly, the acid waste line received about 130,000 gallons per day of discharge comprising primarily cooling water blowdown as well as chromates; ferric chloride; and liquids from etching, plating, and photographic film developing processes. An estimated 200 gallons per day of spent chromic acid were discharged to the acid waste line. The exact duration of system use is unknown, but lasted for a period of at least 17 years.

The line was separated at the intersection of I Street and 9th Street. The southern portion was capped at that intersection and was abandoned in place; all discharges to the line south of the

intersection were discontinued. The portion of the line north of I Street was connected to the sanitary sewer system near the intersection.

Additional site history and data are provided in the TA-I RFI WP, submitted to the Environmental Protection Agency (EPA) in February 1995 (SNL/NM February 1995). Field activities outlined in the WP were completed in July 1995. Site characterization included collection of surface (0 to 2 feet bgs) and near-surface (2 to 17 feet bgs) soil samples to assess the potential for contaminated soils at this site.

Based upon the analysis of soil samples collected near the acid waste line, a proposal for no further action (NFA) with risk assessment justification was prepared and submitted to the New Mexico Environment Department (NMED) for review in May 1997 (SNL/NM May 1997). The NMED reviewed the NFA and returned technical comments to SNL/NM in March 1998 (NMED March 1998); SNL/NM responded to these comments in June 1998 (SNL/NM June 1998). The NMED requested that additional sampling be done to further determine the nature and extent of contamination.

The NMED's technical comments also required additional sampling at SWMUs 96 and 187. Due to the proximity of these SWMUs to SWMU 226 (as well as similarities in the nature of contamination), SNL/NM decided to investigate these sites together. In September 2001, SNL/NM met with the NMED to define specifically what additional sampling was required to fully characterize SWMUs 96, 187, and 226. Based upon these discussions, a Sampling and Analysis Plan (SAP) was completed in December 2001 that specified locations and discussed strategies for each SWMU. Although samples were collected at the same time for all sites, only those designated as related to SWMU 226 are included in the risk. The analytical suite included metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), radionuclides, and polychlorinated biphenyls (PCBs). The soil samples required by the SAP were collected in June 2002. In the SAP, SNL/NM agreed to resample two original (1995) locations and collect soil samples from eight locations in the vicinity of three original (1995) sample locations and six samples at locations offset from the original (1995) sample locations.

SWMU 226 rests on a partially dissected bajada formed by coalescing, multiple, alluvial fan complexes that originate in the mountain ranges to the east. The Holocene and Pleistocene deposits on the surface are composed of alluvial fan deposits shed from the eastern uplifts that interfinger with valley alluvium west of the site. The thickness of these Holocene and Pleistocene deposits is thought to be less than 10 feet. Surficial deposits derived from the Tijeras Arroyo drainage contain granitic and sedimentary lithologies from the Sandia Mountains and sedimentary and metamorphic lithologies from the Manzanita Mountains. The surficial deposits are underlain by the upper unit of the Tertiary Santa Fe Group, which consists of coarse- to fine-grained alluvial fan/piedmont veneer facies that extend westward from the Sandia and Manzanita Mountains. The upper Santa Fe unit is approximately 1,200 feet in thickness in the vicinity of the site.

The soil at the site is part of the Embudo-Tijeras complex, which consists of deep, well-drained, moderately alkaline soil (pH of 7.9 to 8.4) that formed in decomposed granitic alluvium on old alluvial fans. Permeability of this soil is moderate (0.6 to 2.0 inches per hour).

Groundwater monitoring for the area surrounding SWMU 226 is conducted as part of the Tijeras Arroyo (formerly Sandia North) Groundwater (TAG) Investigation. Two water-bearing

zones, the perched groundwater system and the regional aquifer, underlie SWMU 226. There are 26 groundwater monitoring wells located around the TAG Investigation Study Area. The perched groundwater system is not used for water supply. The depth to the groundwater system is approximately 275 feet bgs and the depth to the regional aquifer is approximately 535 feet bgs. Both the City of Albuquerque and Kirtland Air Force Base (KAFB) use the regional aquifer for water supply, and pumping of city wells has created a cone of depression in the northern portion of SNL/NM that affects groundwater flow in the vicinity of the site. The nearest water supply well is KAFB-1, located within 1/2 mile west of the site.

The climatic conditions are those normally associated with the high desert plateau: low precipitation, sunny days, and wide temperature ranges. Precipitation for the SNL/NM and KAFB area averages 8.1 inches per year (NOAA 1990). The weather is typically sunny and clear, with an average of 169 sunny days per year. The average diurnal temperature range is 28 degrees Fahrenheit (°F). Winter daily low temperatures normally fall to 23 to 27°F, and normal high temperature during the summer months range from 82 to 91°F. Winds are typically out of the east with an average speed of 9 miles per hour. Evapotranspiration has been estimated at 95 percent of the annual rainfall. (Thomson and Smith 1985, SNL/NM March 1996).

The site has been heavily disturbed by human activity for more than 50 years, and plants are not currently allowed to grow within the site boundaries. Generally, the diversity and abundance of animal species in areas in and around TA-I varies at given locations, depending on the quantity and quality of necessary habitats. Given the amount of known human intrusion at the site, a large diversity or abundance of animal species is unlikely, although the site-specific species have not been quantified. No suitable habitat remains within the site boundaries to sustain a viable ecological system.

Natural areas outside the site boundaries are dominated by grassland vegetation; black grama, blue grama, and western wheatgrass compose 30 to 40 percent of the vegetative mass. Indigenous wildlife includes amphibians, reptiles, birds, and small mammals. Thirteen species of concern have been identified at SNL/NM and KAFB locations. However, no threatened or endangered species and no species of concern have been identified within TA-I. There are no permanent wetlands identified in TA-I.

II. Data Quality Objectives

The Data Quality Objectives (DQOs) presented in the TA-I RFI Plan and subsequent SAP for SWMU 226 (SNL/NM December 2001) identified the site-specific characterization sample locations, sample depths, sampling procedures, and analytical requirements. The DQOs outlined the Quality Assurance (QA)/Quality Control (QC) requirements necessary for producing defensible analytical data suitable for risk-assessment purposes. The characterization sampling conducted at SWMU 226 was designed to:

- Determine whether any VOCs, SVOCs, metals, PCBs, and/or radionuclides have been released to the soil within 18 inches laterally of an identified line break.
- Produce data of adequate quality (Level III) for all shallow subsurface samples at each break location under investigation so that risk calculations may be performed.

- Characterize the vertical extent of any COCs detected above action levels near the acid waste line by collecting samples from deep soil borings for analysis (Level II and Level III).

- Produce data of adequate quality (Level III) for 20 percent of deep borehole samples so that risk calculations may be performed and corrective measures may be evaluated.

The characterization samples were collected at 36 locations across SWMU 226 (Table 1). The sample numbers, and sample dates are identified in the data tables presented in the associated expanded response to the NMED's technical comments. Surface soil samples were collected using a hand auger or Geoprobe™ from a depth of 0 to 2 feet bgs; subsurface samples were collected to a maximum depth of 17 feet bgs. The soil samples were collected using the sampling procedures detailed in the TA-I WP and subsequent SAP (SNL/NM December 2001).

The number of characterization samples by analyte are shown in Table 2. The soil samples were collected using the sampling procedures detailed in the TA-I RFI WP and the SAP. Samples were analyzed for metals, VOCs, SVOCs, radionuclides, and PCBs by General Engineering Laboratories, Inc./Environmental Physics, Inc. and the on-site SNL/NM Radiation Protection Sample Diagnostics (RPSD) Laboratory. Table 3 summarizes the analytical methods and some of the data quality requirements from the SWMU 226 characterization sampling.

A total of 18 QA/QC samples were collected during the characterization sampling effort according to the Environmental Restoration (ER) Project Quality Assurance Project Plan. The QA/QC samples consisted of 2 duplicates, 10 trip blanks, 3 equipment blanks, and 3 field blanks. Trip blanks accompanied the soil samples requiring VOC analyses. No significant QA/QC problems were identified in the QA/QC samples.

The characterization sample results were verified/validated by SNL/NM. The off-site laboratory results were reviewed according to "Data Validation Procedure for Chemical and

Table 1
Summary of Sampling Performed to Meet DQOs

SWMU 226 Sampling	Potential COC Source	Number of Sampling Locations	Sampling Location Rationale
All locations	Releases to the storm drain system	36	Confirm that no significant levels of COCs are contained in the soils beneath the storm drain system

COC = Constituent of concern.
DQO = Data quality objective.
SWMU = Solid Waste Management Unit.

Table 2
Number of Characterization Soil Samples Collected During the SWMU 226 RFI[a]

Sample Type	Number of Samples	Radionuclides	Radionuclides	Metals	VOCs	SVOCs	PCBs
Characterization	36	27	25	30	33	34	27
Duplicates	2	2	–	2	2	2	2
VOC TBs	10	–	–	–	10	–	–
EBs	3	3	–	3	3	3	3
FBs	3	–	–	–	3	–	–
Total Samples	54	32	25	35	51	39	32
Analytical laboratory		GEL/EPI and LAS	RPSD	GEL/EPI and QARV	GEL/EPI and QARV	GEL/EPI and QARV	GEL/EPI and QARV

Note: Samples are from chain of custody forms 3786, 3788, 3790, 3872, 3874, 3963, 3974, 602198, and 605536.
[a]Sampling dates: July 12, 1995 through June 11, 2002.

EB = Equipment blank.
EPI = Environmental Physics, Inc.
FB = Field blank.
GEL = General Engineering Laboratories Inc.
LAS = Lockheed Analytical Services.
PCB = Polychlorinated biphenyl.
QARV = Quanterra Laboratories—Arvada, Colorado.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
VOC = Volatile organic compound.
– = Information not available.

Table 3
Summary of Data Quality Requirements

Analytical Method	Data Quality Level	GEL/EPI	RPSD Laboratory
Gamma Spectroscopy EPA Method 901.1[a]	Defensible	NA	25 samples
Isotopic Plutonium EPI Methods A-012 and A-012B	Defensible	27 samples	na
Isotopic Thorium EPI Methods A-012 and A-012B	Defensible	27 samples	na
Isotopic Uranium EPI Methods A-011 and A-011B	Defensible	27 samples	na
Metals EPA Methods 6000/7000 Series[a]	Defensible	30 samples	na
PCBs EPA Methods 8080 and 8082[a]	Defensible	27 samples	na
SVOCs EPA Methods 8270 and 8270C[a]	Defensible	34 samples	na
H-3 LAL Methods –0066 and –0067	Defensible	27 samples	na
VOCs EPA Methods 8240, 8260, 8260A, and 8260B[a]	Defensible	33 samples	na

Note: The number of samples does not include QA/QC samples such as duplicates, trip blanks, and equipment blanks.
[a]EPA November 1986.
EPA = U.S. Environmental Protection Agency.
EPI = Environmental Physics, Inc.
GEL = General Engineering Laboratories Inc.
LAL = Lockheed Analytical Laboratories.
na = Not analyzed.
NA = Not applicable.
PCB = Polychlorinated biphenyl.
QA = Quality assurance.
QC = Quality control.
RPSD = Radiation Protection Sample Diagnostics.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

Radiochemical Data" SNL/NM ER Project Data Validation Procedure for Chemical and Radiochemical Data, AOP [Administrative Operating Procedure] 00-003, Rev. 0 (SNL/NM January 2000)." The gamma spectroscopy data from the RPSD Laboratory were reviewed according to "Laboratory Data Review Guidelines," Procedure No. RPSD-02-11, Issue No. 02 (SNL/NM July 1996). The RPSD Laboratory gamma-spectroscopy results were provided in the original technical comment response. The reviews confirmed that the analytical data are defensible and therefore acceptable for use in the risk assessment. Therefore, the DQOs have been fulfilled.

III. Determination of Nature, Rate, and Extent of Contamination

III.1 Introduction

The determination of the nature, migration rate, and extent of contamination at SWMU 226 was based upon an initial conceptual model validated with sampling at the site. The initial conceptual model was developed from archival research, video camera survey results, and soil sampling. The DQOs contained in the TA-I RFI WP and subsequent SAP identified the sample locations, sample depth, and analytical requirements. The sample data were then used to develop the final conceptual model for SWMU 226. The quality of the data specifically used to determine the nature, migration rate, and extent of contamination are described below.

III.2 Nature of Contamination

Both the nature of contamination and the potential for the degradation of COCs at SWMU 226 were evaluated using laboratory analyses of the soil samples. The analytical requirements included analyses for radionuclides, metals, VOCs, SVOCs, and PCBs. The analytes and methods listed in Tables 2 and 3 are appropriate to characterize the COCs and any potential degradation products at SWMU 226.

III.3 Rate of Contaminant Migration

SWMU 226 is a site where all primary sources of COCs have been eliminated by compliance with the National Pollutant Discharge Elimination System amendments to the Clean Water Act, RCRA requirements, and SNL/NM best management practices. As a result, only secondary sources of COCs potentially remain in soil in the form of adsorbed COCs (radionuclides, metals, VOCs, SVOCs, and PCBs); therefore the rate of COC migration from surficial soil is predominantly dependent upon precipitation and occasional surface-water flow. Data available from the TAG Investigation; numerous SNL/NM monitoring programs for air, water, and radionuclides; various biological surveys; and meteorological monitoring are adequate to characterize the rate of COC migration at SWMU 226.

III.4 Extent of Contamination

Surface and subsurface characterization soil samples were collected from SWMU 226 to assess the extent of contamination. The soil samples were collected from the ground surface to a maximum depth of 17 feet. The soil samples are considered to be representative of the soil potentially contaminated with the COCs and sufficient to determine any vertical extent of COCs. In summary, the design of the characterization sampling was appropriate and adequate to determine the nature, migration rate, and extent of residual COCs in surface and subsurface soil at SWMU 226.

IV. Comparison of COCs to Background Screening Levels

Site history and characterization activities are used to identify potential COCs. The SWMU 226 NFA proposal describes the identification of COCs and the sampling that was conducted in order to determine the concentration levels of those COCs across the site. Generally, COCs that were evaluated in this risk assessment included all detected organic compounds and all inorganic and radiological COCs for which samples were analyzed. If the detection limit of an organic compound was too high (i.e., could possibly cause an adverse effect to human health or the environment), the compound was retained. Nondetected organic compounds not included in this assessment were determined to have detection limits low enough to ensure protection of human health and the environment. In order to provide conservatism in this risk assessment, the calculation used only the maximum concentration value of each COC found for the entire site. The SNL/NM maximum background concentration (Dinwiddie September 1997) was selected to provide the background screening value listed in Tables 4 through 7.

Nonradiological inorganic compounds that are essential nutrients, such as iron, magnesium, calcium, potassium, and sodium, were not included in this risk assessment (EPA 1989). Both radiological and nonradiological COCs were evaluated. The nonradiological COCs evaluated included inorganic and organic compounds.

Tables 4 and 5 list the nonradiological COCs for the human health and ecological risk assessments at SWMU 226, respectively. Tables 6 and 7 list radiological COCs for the human health and ecological risk assessments, respectively. All tables show the associated SNL/NM maximum background concentration values (Dinwiddie September 1997). Section VI.4 provides discussion of Tables 4 and 6 while Sections VII.2 and VII.3 provide discussion of Tables 5 and 7.

V. Fate and Transport

The primary releases of COCs at SWMU 226 were to the surface and subsurface soil resulting from the discharge of waste water from Buildings 839, 840, 841, 860, 863, and 892 in TA-I to the old acid waste line. Wind, water, and biota are natural mechanisms of COC transport from the primary release point. Because the COCs are primarily associated with subsurface soil, wind and surface-water erosion are expected to be of low significance as transport mechanisms for COCs at this site.

Water at SWMU 226 is received as precipitation (approximately 8.1 inches annually, as recorded at nearby Albuquerque International Sunport [NOAA 1990]). Infiltration of precipitation into the soil is enhanced by the sandy texture of the soil at this site. The soil in the area of the site is primarily fine sandy loams of the Embudo-Tijeras Complex (USDA 1977). Although the percolation of water through the soil may leach COCs deeper into the subsurface soil, evapotranspiration accounts for approximately 95 percent of the annual precipitation in this area (Thomson and Smith 1985, SNL/NM March 1996). Therefore, the potential for significant downward movement of COCs through leaching is very limited. Because perched groundwater at this site is located at a depth of greater than 275 feet bgs, the potential for COCs to reach groundwater through the unsaturated zone above the water table is extremely small.

COCs can enter the food chain through uptake by plant roots. COCs taken up by plant roots can be transported to aboveground tissues where they can be consumed by herbivores, which

Table 4
Nonradiological COCs for Human Health Risk Assessment at SWMU 226 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

COC	Maximum Concentration (mg/kg)	SNL/NM Background Concentration (mg/kg)[a]	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Log K_{ow} (for organic COCs)	Bioaccumulator?[b] (BCF>40, Log K_{ow}>4)
Inorganic						
Aluminum	11,000	69,957[c]	Yes	1,305[d]	NA	**Yes**
Antimony	0.634 J	3.9	Yes	16,000[e]	NA	**Yes**
Arsenic	6.69	4.4	**No**	44[f]	NA	**Yes**
Barium	436	200	**No**	170[g]	NA	**Yes**
Beryllium	0.532	0.80	Yes	19[f]	NA	No
Cadmium	0.737	<1	**Unknown**	64[f]	NA	**Yes**
Chromium, total	12.7	12.8	Yes	16[f]	NA	No
Chromium VI	1	NC	**Unknown**	16[f]	NA	No
Cobalt	6.53	7.1	Yes	10,000[h]	NA	**Yes**
Copper	17.7	17	**No**	6[f]	NA	No
Lead	8.02	11.2	Yes	49[f]	NA	**Yes**
Manganese	302	831[c]	Yes	100,000[h]	NA	**Yes**
Mercury	0.369	<0.1	**No**	5500[f]	NA	**Yes**
Nickel	12.3	25.4	Yes	47[f]	NA	**Yes**
Selenium	0.132	<1	**Unknown**	800[e]	NA	**Yes**
Silver	1.27	<1	**No**	0.5[f]	NA	No
Vanadium	59.9	33	**No**	3,000[g]	NA	**Yes**
Zinc	40.3	76	Yes	47[f]	NA	**Yes**
Organic						
Acenaphthene	0.00911 J	NA	**NA**	389[i]	3.92[i]	**Yes**
Acetone	0.0567	NA	**NA**	0.69[i]	-0.24[i]	No
Benzo(a)pyrene	0.124	NA	**NA**	3,000[f]	6.04[f]	**Yes**
Benzo(b)fluoranthene	0.134	NA	**NA**	–	6.124[i]	**Yes**
Benzo(g,h,i)perylene	0.147	NA	**NA**	58,884[i]	6.58[i]	**Yes**
2-Butanone	0.01 B	NA	**NA**	1[i]	0.29[i]	No
Chrysene	0.0723	NA	**NA**	18,000[i]	5.91[i]	**Yes**

Refer to footnotes at end of table.

Table 4 (Concluded)
Nonradiological COCs for Human Health Risk Assessment at SWMU 226 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

COC	Maximum Concentration (mg/kg)	SNL/NM Background Concentration (mg/kg)[a]	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Log K_{ow} (for organic COCs)	Bioaccumulator?[b] (BCF>40, Log K_{ow}>4)
1,4-Dichlorobenzene	0.0313 J	NA	NA	55.6[f]	3.52[f]	Yes
Fluoranthene	0.178 J	NA	NA	12,302[i]	4.90[i]	Yes
Fluorene	0.00649 J	NA	NA	2,239[i]	4.18[i]	Yes
Indeno(1,2,3-c,d)pyrene	0.148	NA	NA	59,407[i]	6.58[i]	Yes
Methylene chloride	0.127	NA	NA	5[j]	1.25[j]	No
Pentachlorophenol	0.182 J	NA	NA	776[k]	5.09[i]	Yes
Phenanthrene	0.0629	NA	NA	23,800[f]	4.63[f]	Yes
Phenol	0.34	NA	NA	277[l]	1.46[l]	Yes
Pyrene	0.178 J	NA	NA	36,300[f]	5.32[i]	Yes
Toluene	0.00868 J	NA	NA	10.7[f]	2.69[f]	No
PCBs, total	0.0851	NA	NA	31,200[f]	6.72[f]	Yes

Note: **Bold** indicates COCs that exceed background values and/or are bioaccumulators.

[a]Dinwiddie September 1997, North Supergroup Soils.
[b]NMED March 1998.
[c]NURE Data Program (USGS 1994).
[d]Wren and Stephenson 1991.
[e]Callahan et al. 1979.
[f]Yanicak March 1997.
[g]Neumann 1976.
[h]Vanderploeg et al. 1975.
[i]Micromedex 1998.
[j]Howard 1990.
[k]Howard 1991.
[l]Howard 1989.
B = Analyte detected in an associated blank.
BCF = Bioconcentration factor.
COC = Constituent of concern.
J = Estimated value.
K_{ow} = Octanol-water partition coefficient.
Log = Logarithm (base 10).
mg/kg = Milligram(s) per kilogram.
NA = Not applicable.
NC = Not calculated.
NMED = New Mexico Environment Department.
NURE = National Uranium Resource Evaluation.
PCB = Polychlorinated biphenyl.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.
– = Information not available.

Table 5
Nonradiological COCs for Ecological Risk Assessment at SWMU 226 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

COC	Maximum Concentration (mg/kg)	SNL/NM Background Concentration (mg/kg)[a]	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Log K_{ow} (for organic COCs)	Bioaccumulator?[b] (BCF>40, Log K_{ow}>4)
Inorganic						
Aluminum	10,200	69,957[c]	Yes	1,305[d]	NA	**Yes**
Antimony	0.634 J	3.9	Yes	16,000[e]	NA	**Yes**
Arsenic	6.69	4.4	**No**	44[f]	NA	**Yes**
Barium	436	200	**No**	170[g]	NA	**Yes**
Beryllium	0.497	0.80	Yes	19[f]	NA	No
Cadmium	0.737	<1	**Unknown**	64[f]	NA	**Yes**
Chromium, total	10.4	12.8	Yes	16[f]	NA	No
Chromium VI	1	NC	**Unknown**	16[f]	NA	No
Cobalt	6.53	7.1	Yes	10,000[h]	NA	**Yes**
Copper	17.7	17	**No**	6[f]	NA	No
Lead	8.02	11.2	Yes	49[f]	NA	**Yes**
Manganese	279	831[c]	Yes	100,000[h]	NA	**Yes**
Mercury	0.369	<0.1	**No**	5500[f]	NA	**Yes**
Nickel	11.3	25.4	Yes	47[f]	NA	**Yes**
Selenium	0.132	<1	**Unknown**	800[e]	NA	**Yes**
Silver	0.428 J	<1	**Unknown**	0.5[f]	NA	No
Vanadium	59.9	33	**No**	3,000[g]	NA	**Yes**
Zinc	40.3	76	Yes	47[f]	NA	**Yes**
Organic						
Acetone	0.0177 J	NA	**NA**	0.69[i]	-0.24[i]	No
Methylene chloride	0.00428 BJ	NA	**NA**	5[i]	1.25[i]	No
PCBs, total	0.0851	NA	**NA**	31,200[f]	6.72[f]	**Yes**

Refer to footnotes at end of table.

Table 5 (Concluded)
Nonradiological COCs for Ecological Risk Assessment at SWMU 226 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

Note: **Bold** indicates the COCs that failed the background and/or are bioaccumulators.
[a]Dinwiddie September 1997, North Supergroup Soils.
[b]NMED March 1998.
[c]NURE Data Program (USGS 1994).
[d]Wren and Stephenson 1991.
[e]Callahan et al. 1979.
[f]Yanicak March 1997.
[g]Neumann 1976.
[h]Vanderploeg et al. 1975.
[i]Howard 1990.

B = Analyte detected in an associated blank.
BCF = Bioconcentration factor.
COC = Constituent of concern.
J = Estimated value.
K_{ow} = Octanol-water partition coefficient.
Log = Logarithm (base 10).
mg/kg = Milligram(s) per kilogram.
NA = Not applicable.
NC = Not calculated.
NMED = New Mexico Environment Department.
NURE = National Uranium Resource Evaluation.
PCB = Polychlorinated biphenyl.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

Table 6
Radiological COCs for Human Health Risk Assessment at SWMU 226 with Comparison to the Associated SNL/NM Background Screening Value and BCF

COC	Maximum Concentration (pCi/g)	SNL/NM Background Concentration (pCi/g)[a]	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Is COC a Bioaccumulator?[b] (BCF >40)
H-3	1.0E-2	0.021[c]	Yes	NA	No
Pu-238	**0.371**	NA	**No**	2,000[d]	**Yes**
Pu-239	**0.915**	NA	**No**	2,000[d]	**Yes**
U-234	**1.61**	1.6	**No**	900[e]	**Yes**
U-238	**1.41**	1.3	**No**	900[e]	**Yes**

Note: **Bold** indicates COCs that exceed background screening values and/or are bioaccumulators.
[a]Dinwiddie September 1997, North Supergroup.
[b]NMED March 1998.
[c]Tharp 1999.
[d]Yanicak 1997.
[e]Baker and Soldat 1992.
BCF = Bioconcentration factor.
COC = Constituent of concern.
NA = Not applicable.
NMED = New Mexico Environment Department.
pCi/g = Picocurie(s) per gram.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

Table 7
Radiological COCs for Ecological Risk Assessment at SWMU 226 with Comparison to the Associated SNL/NM Background Screening Value and BCF

COC	Maximum Concentration (pCi/g)	SNL/NM Background Concentration (pCi/g)[a]	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Is COC a Bioaccumulator?[b] (BCF >40)
H-3	1.0E-3	0.021[c]	Yes	NA	No
Pu-239	**0.0046**	NA	**No**	2,000[d]	**Yes**
U-234	0.91	1.6	Yes	900[e]	**Yes**
U-235	0.05	0.18	Yes	900[e]	**Yes**
U-238	0.81	1.3	Yes	900[e]	**Yes**

Note: **Bold** indicates COCs that exceed background screening values and/or are bioaccumulators.
[a]Dinwiddie September 1997, North Supergroup.
[b]NMED March 1998.
[c]Tharp 1999.
[d]Yanicak 1997.
[e]Baker and Soldat 1992.
BCF = Bioconcentration factor.
COC = Constituent of concern.
NA = Not applicable.
NMED = New Mexico Environment Department.
pCi/g = Picocurie(s) per gram.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

can in turn be eaten by predators. Once in the food web, COCs can be transported from the site by the movements of these organisms or by other surficial transport mechanisms. However, because SWMU 226 occupies only a small area (4.4 acres) with limited vegetative cover, food chain transport is expected to be of low significance at this site.

The COCs at SWMU 226 include both inorganic and organic analytes. The nonradiological inorganic COCs are elemental in form, and are not considered to be degradable. Transformations of these inorganic COCs could include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). Radiological COCs will undergo decay to stable isotopes or radioactive daughter elements. However, because of the long half-lives of the radionuclides, the aridity of the environment at this site, and the lack of potential contact with biota, none of these mechanisms is expected to result in significant losses or transformations of the inorganic COCs.

The organic COCs at SWMU 226 may be degraded through photolysis, hydrolysis, and biotransformation. Photolysis requires light, and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water, and may occur in the soil solution. Biotransformation (i.e., transformation due to plants, animals, and microorganisms) may occur; however, biological activity may be limited by the aridity of the

environment at this site. Some organic COCs (acetone, 1,4-dichlorobenzene, 2-butanone, methylene chloride, and toluene) may be lost through volatilization, with subsequent degradation in the air.

Table 8 summarizes the fate and transport processes that can occur at SWMU 226. COCs at this site include organic and radiological and nonradiological inorganic analytes. For the reasons detailed above, wind, surface water, and biota are considered to be of low significance as potential transport mechanisms at this site. Significant leaching into the subsurface soil is unlikely and leaching into the groundwater at this site is highly unlikely. The

Table 8
Summary of Fate and Transport at SWMU 226

Fate and Transport Mechanism	Existence at Site	Significance
Wind	Yes	Low
Surface runoff	Yes	Low
Migration to groundwater	No	None
Food chain uptake	Yes	Low
Transformation/degradation	Yes	Moderate to low

SWMU = Solid Waste Management Unit

potential for transformation of inorganic compounds is low and loss through decay of radiological COCs is insignificant because of their long half-lives. For some organic COCs, loss through volatilization and eventual degradation may be of moderate to low significance.

VI. Human Health Risk Assessment

VI.1 Introduction

The human health risk assessment of this site includes a number of steps that culminate in a quantitative evaluation of the potential adverse human health effects caused by constituents located at the site. The steps to be discussed include the following:

Step 1.	Site data are described that provide information on the potential COCs, as well as the relevant physical characteristics and properties of the site.
Step 2.	Potential pathways are identified by which a representative population might be exposed to the COCs.
Step 3.	The potential intake of these COCs by the representative population is calculated using a tiered approach. The first component of the tiered approach is a screening procedure that compares the maximum concentration of the COC to an SNL/NM maximum background screening value. COCs that are not eliminated during the first screening procedure are carried forward in the risk assessment process.
Step 4.	Toxicological parameters are identified and referenced for COCs that were not eliminated during the screening procedure.

Step 5.	Potential toxicity effects (specified as a hazard index [HI]) and estimated excess cancer risks are calculated for nonradiological COCs and background. For radiological COCs, the incremental total effective dose equivalent (TEDE) and incremental estimated cancer risk are calculated by subtracting applicable background concentrations directly from maximum on-site contaminant values. This background subtraction applies only when a radiological COC occurs as contamination and exists as a natural background radionuclide.
Step 6.	These values are compared with guidelines established by the EPA, NMED, and U.S. Department of Energy (DOE) to determine whether further evaluation and potential site cleanup are required. Nonradiological COC risk values also are compared to background risk so that an incremental risk can be calculated.
Step 7.	Uncertainties of the above steps are addressed.

VI.2 Step 1. Site Data

Section I of this risk assessment provides the site description and history of SWMU 226. Section II presents a comparison of results to DQOs. Section III discusses the nature, rate, and extent of contamination.

VI.3 Step 2. Pathway Identification

SWMU 226 has been designated with a future land use scenario of industrial (DOE et al. September 1995) (see Appendix 1 for default exposure pathways and parameters). However, the residential land use scenario is also considered within the pathway analysis. Because of the location and the characteristics of the potential contaminants, the primary pathway for human exposure is considered to be soil ingestion for the nonradiological COCs and direct gamma exposure for the radiological COCs. The inhalation pathway for both nonradiological and radiological COCs is included because of the potential for inhalation of dust and volatiles. Soil ingestion is included for the radiological COCs as well. The dermal pathway is included for the nonradiological COCs because of the potential for the receptor to be exposed to contaminated soil. No water pathways to groundwater are considered. Depth to perched groundwater at SWMU 226 is approximately 275 feet bgs. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the industrial or residential land use scenario. Figure 1 shows the conceptual site model flow diagram for SWMU 226.

Pathway Identification

Nonradiological Constituents	Radiological Constituents
Soil ingestion	Soil ingestion
Inhalation (dust and volatiles)	Inhalation (dust and volatiles)
Dermal contact	Direct gamma

VI.4 Step 3. Background Screening Procedure

This section discusses Step 3, the background screening procedure which compares the maximum COC concentration to the background screening level. The methodology and results are described below.

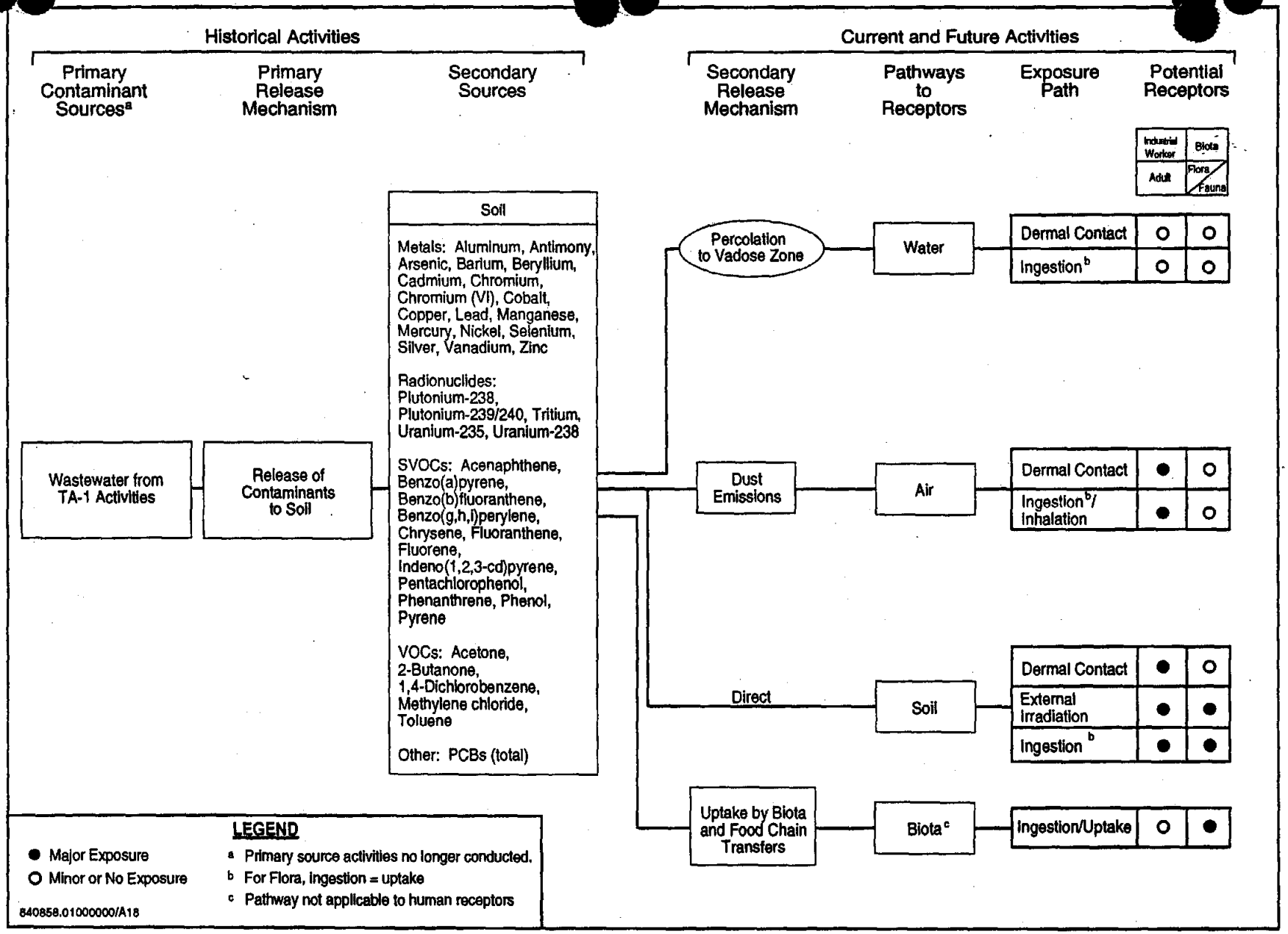

Figure 1

Conceptual Site Model Flow Diagram for SWMU 226

VI.4.1 Methodology

Maximum concentrations of nonradiological COCs were compared to the approved SNL/NM maximum screening level for this area (Dinwiddie September 1997). The SNL/NM maximum background concentration was selected to provide the background screening value in Table 4 and was used to calculate risk attributable to background in Section VI.6.2. Only the COCs that were detected above their respective SNL/NM maximum background screening levels or do not have either a quantifiable or a calculated background screening level were considered in further risk assessment analyses.

For radiological COCs that exceeded the SNL/NM background screening levels, background values were subtracted from the individual maximum radionuclide concentrations. Those that do not exceed these background levels were not carried any further in the risk assessment. This approach is consistent with DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (DOE 1993). Radiological COCs that do not have a background value and were detected above the analytical minimum detectable activity (MDA) were carried through the risk assessment at their maximum levels. The resultant radiological COCs remaining after this step are referred to as background-adjusted radiological COCs.

VI.4.2 Results

Tables 4 and 6 show the SWMU 226 maximum COC concentrations that were compared to the SNL/NM maximum background values (Dinwiddie September 1997) for human health risk assessment. For the nonradiological COCs, six constituents were measured at concentrations greater than their respective background screening values. Three constituents did not have quantified background screening concentrations; therefore, it is unknown if these COCs exceeded background values. Eighteen nonradiological COCs were organic compounds and did not have corresponding background screening values.

The maximum concentration value for total PCBs is 0.0851 milligrams (mg)/kilogram (kg). This concentration is lower than the EPA screening level of 1 mg/kg (40 CFR 761). Because the maximum concentration for PCBs at this site is less than the screening value, PCBs are eliminated from further consideration in the human health risk assessment.

For the radiological COCs, four constituents had constituent had MDA values greater than their respective backgrounds (Pu-238, Pu-239, U-234, and U-238).

VI.5 Step 4. Identification of Toxicological Parameters

Tables 9 and 10 list the COCs retained in the risk assessment and the values for the available toxicological information. The toxicological values used for nonradiological COCs in Table 9 are from the Integrated Risk Information System (IRIS) (EPA 2003), the Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), the Technical Background Document for Development of Soil Screening Levels (NMED December 2000), and the EPA Region 6 (EPA 2002a) and Risk Assessment Information System (ORNL 2003) electronic databases. Dose conversion factors (DCF) used in determining the excess TEDE values for radiological COCs for the individual pathways were the default values provided in the RESRAD computer code (Yu et al. 1993a) as developed in the following documents:

Table 9
Toxicological Parameter Values for SWMU 226 Nonradiological COCs

COC	RfD_o (mg/kg-d)	Confidence[a]	RfD_{inh} (mg/kg-d)	Confidence[a]	SF_o $(mg/kg\text{-}day)^{-1}$	SF_{inh} $(mg/kg\text{-}day)^{-1}$	Cancer Class[b]	ABS
Inorganic								
Arsenic	3E-4[c]	M	–	–	1.5E+0[c]	1.5E+1[c]	A	0.03[d]
Barium	7E-2[c]	M	1.4E-4[e]	–	–	–	D	0.01[d]
Cadmium	5E-4[c]	H	5.7E-5[f]	–	–	6.3E+0[c]	B1	0.001[d]
Chromium VI	3E-3[c]	L	2.3E-6[c]	L	–	4.2E+1[c]	A	0.01[d]
Copper	3.7E-2[f]	–	–	–	–	–	D	0.01[d]
Mercury	3E-4[e]	–	8.6E-5[c]	M	–	–	D	0.01[d]
Selenium	5E-3[c]	H	–	–	–	–	D	0.01[d]
Silver	5E-3[c]	L	–	–	–	–	D	0.01[d]
Vanadium	7E-3[e]	–	–	–	–	–	–	0.01[d]
Organic								
Acenaphthene	6E-2[c]	L	6E-2[f]	–	–	–	–	0.13[d]
Acetone	1E-1[c]	L	1E-1[f]	–	–	–	D	0.01[g]
Benzo(a)pyrene	–	–	–	–	7.3E+0[c]	3.1E+0[f]	B2	0.13[d]
Benzo(b)fluoranthene	–	–	–	–	7.3E-1[f]	3.1E-1[f]	B2	0.13[d]
Benzo(g,h,i) perylene[h]	–	–	–	–	7.3E+0[f]	3.1E+0[f]	B2	0.13[d]
2-Butanone	6E-1[c]	L	2.9E-1[c]	L	–	–	D	0.1[d]
Chrysene	–	–	–	–	7.3E-3[f]	3.1E-3[f]	B2	0.13[d]
1,4-Dichlorobenzene	3E-2[f]	–	2.3E-1[c]	M	2.4E-2[e]	2.4E-2[f]	C	0.1[d]
Fluoranthene	4E-2[c]	L	4E-2[f]	–	–	–	D	0.13[d]
Fluorene	4E-2[c]	L	4E-2[f]	–	–	–	D	0.1[d]
Indeno(1,2,3-c,d) pyrene	–	–	–	–	7.3E-1[f]	3.1E-1[f]	B2	0.13[d]
Methylene chloride	6E-2[c]	M	8.6E-1[e]	–	7.5E-3[c]	1.6E-3[c]	B2	0.1[d]
Pentachlorophenol	3E-2[c]	M	3E-2[f]	–	1.2E-1[c]	1.2E-1[f]	B2	0.01[g]
Phenanthrene[i]	3E-1[c]	L	3E-1[f]	–	–	–	D	0.1[d]
Phenol	3E-1[c]	M/H	6E-1[j]	–	–	–	D	0.1[d]
Pyrene	3E-2[c]	L	3E-2[f]	–	–	–	D	0.1[d]
Toluene	2E-1[c]	M	1.1E-1[c]	M	–	–	D	0.1[d]

Refer to footnotes at end of table.

Table 9 (Concluded)
Toxicological Parameter Values for SWMU 226 Nonradiological COCs

[a]Confidence associated with IRIS (EPA 2003) database values. Confidence: L = low, M = medium, H = high.
[b]EPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 2003):

- A = Human carcinogen.
- B1 = Probable human carcinogen. Limited human data are available.
- B2 = Probable human carcinogen. Sufficient evidence in animals and inadequate or no evidence in humans.
- C = Possible human carcinogen.
- D = Not classifiable as to human carcinogenicity.

[c]Toxicological parameter values from IRIS electronic database (EPA 2003).
[d]Toxicological parameter values from NMED December 2000.
[e]Toxicological parameter values from HEAST (EPA 1997a).
[f]Toxicological parameter values from EPA Region 6 electronic database (EPA 2002a).
[g]Toxicological parameter values from ORNL (2003).
[h]Toxicological parameter values for benzo(g,h,i)perylene could not be found. Dibenz(a,h)anthracene was used as a surrogate.
[i]Toxicological parameter values for phenanthrene could not be found. Anthracene was used as a surrogate.
[j]Toxicological parameter values from EPA Region 9 electronic database (EPA 2002b).

ABS = Gastrointestinal adsorption coefficient.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
HEAST = Health Effects Assessment Summary Tables.
IRIS = Integrated Risk Information System.
mg/kg-d = Milligram(s) per kilogram per day.
$(mg/kg\text{-}day)^{-1}$ = Per milligram per kilogram per day.
ORNL = Oak Ridge National Laboratory.
RfD_{inh} = Inhalation chronic reference dose.
RfD_o = Oral chronic reference dose.
SF_{inh} = Inhalation slope factor.
SF_o = Oral slope factor.
SWMU = Solid Waste Management Unit.
– = Information not available.

Table 10
Radiological Toxicological Parameter Values for SWMU 226 COCs Obtained from RESRAD Risk Coefficients[a]

COC	SF_o (1/pCi)	SF_{inh} (1/pCi)	SF_{ev} (g/pCi-yr)	Cancer Class[b]
Pu-238	1.30E-10	4.40E-8	4.53E-11	A
Pu-239	1.34E-10	4.66E-8	1.34E-10	A
U-234	6.14E-11	2.64E-08	1.68E-10	A
U-238	6.20E-11	1.20E-08	6.60E-08	A

[a]Yu et al. (1993a).
[b]EPA weight-of-evidence classification system for carcinogenicity (EPA 1989): A = Human carcinogen for high dose and high dose rate (i.e., greater than 50 rem per year). For low-level environmental exposures, the carcinogenic effect has not been observed and documented.
1/pCi = One per picocurie.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
g/pCi-yr = Gram(s) per picocurie per year.
SF_{ev} = External volume exposure slope factor.
SF_{inh} = Inhalation slope factor.
SF_o = Oral (ingestion) slope factor.
SWMU = Solid Waste Management Unit.

- DCFs for ingestion and inhalation were taken from "Federal Guidance Report No. 11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion" (EPA 1988).

- DCFs for surface contamination were taken from DOE/EH-0070, "External Dose-Rate Conversion Factors for Calculation of Dose to the Public" (DOE 1988).

- DCFs for volume contamination (exposure to contamination deeper than the immediate surface of the site) were calculated using the methods discussed in "Dose-Rate Conversion Factors for External Exposure to Photon Emitters in Soil" (Kocher 1983) and in ANL/EAIS-8, "Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil" (Yu et al. 1993b).

VI.6 Step 5. Exposure Assessment and Risk Characterization

Section VI.6.1 describes the exposure assessment for this risk assessment. Section VI.6.2 provides the risk characterization, including the HI and excess cancer risk for both the potential nonradiological COCs and associated background for industrial and residential land use scenarios. The incremental TEDE and incremental estimated cancer risk are provided for the background-adjusted radiological COCs for both industrial and residential land use scenarios.

VI.6.1 Exposure Assessment

Appendix 1 provides the equations and parameter input values used in calculating intake values and subsequent HI and excess cancer risk values for the individual exposure pathways. The appendix shows parameters for both industrial and residential land use scenarios. The equations for nonradiological COCs are based upon the Risk Assessment Guidance for Superfund (RAGS) (EPA 1989). Parameters are based upon information from the RAGS (EPA 1989), the Technical Background Document for Development of Soil Screening Levels (NMED December 2000), and other EPA and NMED guidance documents, and reflect the reasonable maximum exposure (RME) approach advocated by the RAGS (EPA 1989). For radiological COCs, the coded equations provided in RESRAD computer code are used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of this process is provided in the "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD" (Yu et al. 1993a).

Although the designated land use scenario for this site is industrial, risk and TEDE values for a residential land use scenario are also presented.

VI.6.2 Risk Characterization

Table 11 shows an HI of 0.07 for the SWMU 226 nonradiological COCs and an estimated excess cancer risk of 6E-6 for the designated industrial land use scenario. The numbers presented include exposure from soil ingestion, dermal contact, and dust and volatile inhalation for nonradiological COCs. Table 12 shows that for SWMU 226 associated background constituents, the HI is 0.02 and an estimated excess cancer risk is 3E-6 for the designated industrial land use scenario.

For the radiological COCs, contribution from the direct gamma exposure pathway is included. For the industrial land use scenario, a TEDE was calculated that resulted in an incremental TEDE of 4.0E-2 millirem (mrem)/year (yr). In accordance with EPA guidance found in Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-18 (EPA 1997b), an incremental TEDE of 15 mrem/yr is used as the cleanup level for the probable land use scenario (industrial in this case); the calculated dose value for SWMU 226 for the industrial land use is well below this guideline. The estimated excess cancer risk is 2.6E-8.

For the residential land use scenario nonradiological COCs, the HI is 0.63 and the estimated excess cancer risk is 3E-5 (Table 11). The numbers in the table include exposure from soil ingestion, dermal contact, and dust and volatile inhalation. Although the EPA (1991) generally recommends that inhalation not be included in a residential land use scenario, this pathway is included because of the potential for soil in Albuquerque, New Mexico, to be eroded and, subsequently, for dust to be present in predominantly residential areas. Because of the nature of the local soil, other exposure pathways are not considered (see Appendix 1). Table 12 shows that for the SWMU 226 associated background constituents, the HI is 0.31 and the estimated excess cancer risk is 1E-5.

For the radiological COCs, the incremental TEDE for the residential land use scenario is 1.4E-1 mrem/yr. The guideline being used is an excess TEDE of 75 mrem/yr (SNL/NM February 1998) for a complete loss of institutional controls (residential land use in this case); the calculated dose value for SWMU 226 under the residential land use scenario is well below this guideline.

Table 11
Risk Assessment Values for SWMU 226 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land Use Scenario[a]		Residential Land Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	6.69	0.03	4E-6	0.31	2E-5
Barium	436	0.01	–	0.08	–
Cadmium	0.737	0.00	2E-10	0.02	5E-10
Chromium VI	1	0.00	2E-9	0.00	5E-9
Copper	17.7	0.00	–	0.01	–
Mercury	0.369	0.00	–	0.02	–
Selenium	0.132	0.00	–	0.00	–
Silver	1.27	0.00	–	0.00	–
Vanadium	59.9	0.01	–	0.11	–
Organic					
Acenaphthene	0.00911 J	0.00	–	0.00	–
Acetone	0.0567	0.00	–	0.00	–
Benzo(a)pyrene	0.124	0.00	6E-7	0.00	2E-6
Benzo(b)fluoranthene	0.134	0.00	6E-8	0.00	2E-7
Benzo(g,h,i)perylene	0.147	0.00	7E-7	0.00	2E-6
2-Butanone	0.01 B	0.00	–	0.00	–
Chrysene	0.0723	0.00	3E-10	0.00	1E-9
1,4-Dichlorobenzene	0.0313 J	0.00	5E-9	0.00	1E-8
Fluoranthene	0.178 J	0.00	–	0.00	–
Fluorene	0.00649 J	0.00	–	0.00	–
Indeno(1,2,3-c,d) pyrene	0.148	0.00	7E-8	0.00	2E-7
Methylene chloride	0.127	0.00	8E-7	0.01	2E-6
Pentachlorophenol	0.182 J	0.00	8E-9	0.00	4E-8
Phenanthrene	0.0629	0.02	–	0.07	–
Phenol	0.34	0.00	–	0.00	–
Pyrene	0.178 J	0.00	–	0.00	–
Toluene	0.00868 J	0.00	–	0.00	–
Total		**0.07**	**6E-6**	**0.63**	**3E-5**

[a]EPA 1989.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
– = Information not available.

Table 12
Risk Assessment Values for SWMU 226 Nonradiological Background Constituents

COC	Background Concentration[a] (mg/kg)	Industrial Land Use Scenario[b]		Residential Land Use Scenario[b]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Arsenic	4.4	0.02	3E-6	0.20	1E-5
Barium	200	0.00	–	0.04	–
Cadmium	<1	–	–	–	–
Chromium VI	NC	–	–	–	–
Copper	17	0.00	–	0.01	–
Mercury	<0.1	–	–	–	–
Selenium	<1	–	–	–	–
Silver	<1	–	–	–	–
Vanadium	33	0.00	–	0.06	–
Total		**0.02**	**3E-6**	**0.31**	**1E-5**

[a]Dinwiddie September 1997, North Supergroup.
[b]EPA 1989.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
mg/kg = Milligram(s) per kilogram.
NC = Not calculated.
SWMU = Solid Waste Management Unit.
– = Information not available.

Consequently, SWMU 226 is eligible for unrestricted radiological release as the residential land use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is 1.1E-7. The excess cancer risk from the nonradiological COCs and the radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18, "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," (EPA 1997b). This summation is tabulated in Section VI.9, "Summary."

VI.7 Step 6. Comparison of Risk Values to Numerical Guidelines

The human health risk assessment analysis evaluated the potential for adverse health effects for both the industrial land use scenario (the designated land use scenario for this site) and the residential land use scenario.

For the nonradiological COCs under the industrial land use scenario, the HI is 0.07, which is lower than the numerical guideline of 1 suggested in the RAGS (EPA 1989). Excess cancer risk is estimated at 6E-6. NMED guidance states that cumulative excess lifetime cancer risk must be lower than 1E-5 (Bearzi January 2001), thus the excess cancer risk for this site is below the suggested acceptable risk value. This assessment also determined risks considering background concentrations of the potential nonradiological COCs for both the industrial and residential land use scenarios. Assuming the industrial land use scenario, the HI for nonradiological background COCs is 0.02 and the excess cancer risk is 3E-6. Incremental risk is determined by subtracting risk associated with background from potential COC risk. These

numbers are not rounded before the difference is determined and may therefore appear to be inconsistent with numbers presented in tables and within the text. For conservatism, the background constituents that do not have quantified background screening concentrations are assumed to have a hazard quotient (HQ) of 0.00. Incremental HI is 0.05 and the estimated incremental cancer risk is 3.25E-6 for the industrial land use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs considering an industrial land use scenario.

For radiological COCs under the industrial land use scenario, incremental TEDE is 4.0E-2 mrem/yr, which is significantly lower than the EPA's numerical guideline of 15 mrem/yr. Incremental estimated cancer risk is 2.6E-8.

The calculated HI for nonradiological COCs under the residential land use scenario is 0.63, which is below numerical guidance. The excess cancer risk is estimated to be 3E-5. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001), thus the excess cancer risk for this site is above the suggested acceptable risk value. The HI for associated background for the residential land use scenario is 0.31; the estimated excess cancer risk is 1E-5. The incremental HI is 0.32 and the estimated incremental cancer risk is 1.65E-5. The incremental excess cancer risk calculation was slightly above NMED guidelines considering a residential land use scenario.

The incremental TEDE for a residential land use scenario from the radiological components is 1.4E-1 mrem/yr, which is significantly lower than the numerical guideline of 75 mrem/yr suggested in the SNL/NM RESRAD Input Parameter Assumptions and Justification (SNL/NM February 1998). The incremental estimated cancer risk is 1.1E-7.

VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at SWMU 226 was based upon an initial conceptual model that was validated with sampling conducted across the site. The sampling was implemented in accordance with the TA-I RFI Work Plan (SNL/NM February 1995) and the SAP for Supplemental Investigation at SWMU 226 (SNL/NM December 2001). The DQOs contained in the WP and the SAP are appropriate for use in risk assessments. The data collected are representative of the site, based upon sample location, density, and depth. The analytical requirements and results satisfy the DQOs. Data quality was verified/validated in accordance with SNL/NM procedures (January 2000, July 1996). Therefore, there is no uncertainty associated with the data quality used to perform the risk assessment at SWMU 226.

Because of the location, history of the site, and future land use (DOE et al. September 1995), there is low uncertainty in the land use scenario and the potentially affected populations that were considered in performing the risk assessment analysis. Because the COCs are found in surface and near-surface soil, and because of the location and physical characteristics of the site, there is little uncertainty in the exposure pathways relevant to the analysis.

An RME approach was used to calculate the risk assessment values. This means that the parameter values in the calculations are conservative and that calculated intakes are probably overestimated. Maximum measured values of COC concentrations are used to provide conservative results.

Table 9 shows the uncertainties in nonradiological toxicological parameter values. There is a combination of estimated values and values from the IRIS (EPA 2003), HEAST (EPA 1997a), Technical Background Document for Development of Soil Screening Levels (NMED December 2000), and Risk Assessment Information System (ORNL 2003) and EPA Region 6 (EPA 2002a) electronic database. Where values are not provided, information is not available from the HEAST (EPA 1997a), IRIS (EPA 2003), Technical Background Document for Development of Soil Screening Levels (NMED December 2000), Risk Assessment Information System (ORNL 2003), or EPA regions (EPA 2002a, EPA 2002b, EPA 2002c). Because of the conservative nature of the RME approach, uncertainties in toxicological values are not expected to change the conclusion from the risk assessment analysis.

Risk assessment values for nonradiological COCs are within the acceptable range for human health under the industrial land use scenario in established numerical guidance.

Though the estimated excess cancer risk is slightly above the NMED guideline for the residential land use scenario, maximum concentrations were used in the risk calculation. The site has been adequately characterized; therefore, average concentrations are more representative of actual site conditions. The 95% upper confidence limit (UCL) of the average concentration for the main contributor to excess cancer risk, arsenic (3.3 mg/kg) (Appendix 2), is below background and therefore removed from further consideration in the risk assessment. With the removal of arsenic, the total estimated excess cancer risk is reduced to 7E-6 and the incremental excess cancer risk is reduced to 6.46E-6. Thus, using more realistic concentrations in the risk calculations that more accurately depict actual site conditions, the incremental estimated excess cancer risk is below NMED guidelines.

For radiological COCs, the conclusion of the risk assessment is that potential effects on human health under both the industrial and residential land use scenario are within guidelines and represent only a small fraction of the estimated 360 mrem/yr received by the average U.S. population (NCRP 1987).

The overall uncertainty in all of the steps in the risk assessment process is not considered to be significant with respect to the conclusion reached.

VI.9 Summary

SWMU 226 contains identified COCs consisting of some inorganic, organic, and radiological compounds. Because of the location of the site, the designated industrial land use scenario, and the nature of contamination, potential exposure pathways identified for this site included soil ingestion, dermal contact, and dust and volatile inhalation for chemical COCs, and soil ingestion, dust inhalation, and direct gamma exposure for radionuclides. The same exposure pathways were applied to the residential land use scenario.

Using conservative assumptions and an RME approach to risk assessment, calculations for nonradiological COCs show that the HI under the industrial land use scenario (0.07) is significantly lower than the accepted numerical guidance from the EPA. Estimated excess cancer risk is 6E-6; thus, excess cancer risk is also below the acceptable risk value provided by the NMED for an industrial land use scenario (Bearzi January 2001). The incremental HI is 0.05, and the incremental excess cancer risk is 3.25E-6 for the industrial land use scenario.

Incremental risk calculations indicate insignificant risk to human health for the industrial land use scenario.

Using conservative assumptions and an RME approach to risk assessment, calculations for nonradiological COCs show that the HI under the residential land use scenario (0.63) is also below accepted numerical guidance from the EPA. Estimated excess cancer risk is 3E-5; thus, excess cancer risk is above the acceptable risk value provided by the NMED for a residential land use scenario (Bearzi January 2001). The incremental HI is 0.32, and the incremental excess cancer risk is 1.65E-5 for the residential land use scenario.

Though the estimated excess cancer risk is slightly above the NMED guideline for the residential land use scenario, maximum concentrations were used in the risk calculation. The site has been adequately characterized, therefore average concentrations are more representative of actual site conditions. The 95% UCL of the average concentration for the main contributor to excess cancer risk, arsenic (3.3 mg/kg) (Appendix 2), is below background and therefore removed from further consideration in the risk assessment. With the removal of arsenic, the total estimated excess cancer risk is reduced to 7E-6 and the incremental excess cancer risk is reduced to 6.46E-6. Thus, using more realistic concentrations in the risk calculations that more accurately depict actual site conditions, the incremental estimated excess cancer risk is below NMED guidelines.

Incremental TEDE and corresponding estimated cancer risk from radiological COCs are much lower than EPA guidance values. The estimated TEDE is 4.0E-2 mrem/yr for the industrial land use scenario; this value is much lower than the EPA's numerical guidance of 15 mrem/yr (EPA 1997b). The corresponding incremental estimated cancer risk value is 2.6E-8 for the industrial land use scenario. Furthermore, the incremental TEDE for the residential land use scenario that results from a complete loss of institutional controls is 1.4E-1 mrem/yr with an associated cancer risk of 1.1E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, SWMU 226 is eligible for unrestricted radiological release.

The summation of the nonradiological and radiological carcinogenic risks are tabulated in Table 13.

Table 13
Summation of Radiological and Nonradiological Risks from Site Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	3.2E-6	2.6E-8	3.2E-6
Residential	6.5E-6	1.1E-7	6.6E-6

Uncertainties associated with the calculations are considered small relative to the conservatism of risk assessment analysis. Therefore, it is concluded that this site poses insignificant risk to human health under both the industrial and residential land use scenarios.

VII. Ecological Risk Assessment

VII.1 Introduction

This section addresses the ecological risks associated with exposure to constituents of potential ecological concern (COPECs) in soils at SWMU 226. A component of the NMED Risk-Based Decision Tree (NMED March 1998) is to conduct an ecological risk assessment that corresponds with that presented in EPA's Ecological RAGS (EPA 1997c). The current methodology is tiered and contains an initial scoping assessment followed by a more detailed risk assessment. Initial components of NMED's decision tree (a discussion of DQOs, a data assessment, and evaluations of bioaccumulation as well as fate and transport potential) are addressed in previous sections of this report. Following the completion of the scoping assessment, a determination is made as to whether a more detailed examination of potential ecological risk is necessary. If deemed necessary, the scoping assessment proceeds to a risk assessment, whereby a more quantitative estimation of ecological risk is conducted. Although this assessment incorporates conservatisms in the estimation of ecological risks, ecological relevance and professional judgment are also used as recommended by the EPA (1998) to ensure that predicted exposures of selected ecological receptors reflect those reasonably expected to occur at the site.

VII.2 Scoping Assessment

The scoping assessment focuses primarily on the likelihood of biota at or adjacent to the site being exposed to constituents associated with site activities. Included in this section are an evaluation of existing data and a comparison of maximum detected concentrations to background concentrations, examination of bioaccumulation potential, and fate and transport potential. A scoping risk-management decision (Section VII.2.4) involves summarizing the scoping results and determining whether further examination of potential ecological impacts is necessary.

VII.2.1 Data Assessment

As indicated in Section IV (Tables 5 and 7), inorganic constituents in soil within the 0- to 5-foot depth interval that were not determined to be within background concentrations were as follows:

- Arsenic
- Barium
- Copper
- Mercury
- Vanadium
- Pu-239

For five inorganic constituents, comparisons to background screening values could not be made. These are:

- Cadmium
- Chromium VI
- Selenium
- Silver
- Pu-239

In the cases of chromium VI and Pu-239, no background screening levels have been determined. For the others (cadmium, selenium, and silver), the maximum detected concentrations were lower than the upper limit of the background screening values (1 mg/kg in all three cases); however, because the screening values are expressed as being fewer than this upper limit, it cannot be determined whether the constituents exceed background. For this reason, none of these constituents were screened out based upon the comparison to background.

Organic analytes that were detected in soil samples from the upper 5 feet of soil at this site were as follows:

- Acetone
- Methylene chloride
- PCBs, total

VII.2.2 Bioaccumulation

Among the COPECs listed in Section VII.2.1, the following are considered to have bioaccumulation potential in aquatic environments (Section IV, Tables 5 and 7):

- Arsenic
- Barium
- Cadmium
- Mercury
- Selenium
- Vanadium
- Pu-239
- PCBs, total

However, it should be noted that, as directed by the NMED (NMED March 1998), bioaccumulation for inorganic COCs is assessed exclusively based upon maximum reported bioconcentration factors (BCFs) for aquatic species. Because only aquatic BCFs are used to evaluate the bioaccumulation potential for metals, bioaccumulation in terrestrial species is likely to be overpredicted.

VII.2.3 Fate and Transport Potential

The potential for the COPECs to move from the source of contamination to other media or biota is discussed in Section V. As noted in Table 8 (Section V), wind, surface water, and food chain uptake are expected to be of low significance as transport mechanisms for COPECs at this site

and migration to groundwater is not anticipated. Degradation and/or transformation for the inorganic COPECs and radionuclides is expected to be of low significance.

VII.2.4 Scoping Risk-Management Decision

Based upon information gathered through the scoping assessment, it was concluded that complete ecological pathways may be associated with SWMU 226 and that COPECs exist at the site. As a consequence, a risk assessment was deemed necessary to predict the potential level of ecological risk associated with the site.

VII.3 Risk Assessment

As concluded in Section VII.2.4, complete ecological pathways and COPECs are associated with SWMU 226. The risk assessment performed for the site involves a quantitative estimation of current ecological risks using exposure models in association with exposure parameters and toxicity information obtained from the literature. The estimation of potential ecological risks is conservative in order to ensure that ecological risks are not underpredicted.

Components within the risk assessment include the following:

- Problem Formulation—sets the stage for the evaluation of potential exposure and risk.
- Exposure Estimation—provides a quantitative estimate of potential exposure.
- Ecological Effects Evaluation—presents benchmarks used to gauge the toxicity of COPECs to specific receptors.
- Risk Characterization—characterizes the ecological risk associated with exposure of the receptors to environmental media at the site.
- Uncertainty Assessment—discusses uncertainties associated with the estimation of exposure and risk.
- Risk Interpretation—evaluates ecological risk in terms of HQs and ecological significance.
- Risk Assessment Scientific/Management Decision Point—presents the decision to risk managers based upon the results of the risk assessment.

VII.3.1 Problem Formulation

Problem formulation is the initial stage of the risk assessment that provides the introduction to the risk evaluation process. Components that are addressed in this section include a discussion of ecological pathways and the ecological setting, identification of COPECs, and selection of ecological receptors. The conceptual model, ecological food webs, and ecological

endpoints (other components commonly addressed in a risk assessment) are presented in the "Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico" (IT July 1998) and are not duplicated here.

VII.3.1.1 Ecological Pathways and Setting

SWMU 226 is estimated to include approximately 4.4 acres. The original habitat of this area was grassland; however, much of the original habitat has been disturbed and altered. The site is open to wildlife use, but the small size and disturbed nature of the site make significant transfers of COPECs through the food chain unlikely. No sensitive species are known to occur in this area.

Complete ecological pathways may exist at this site through the exposure of plants and wildlife to COPECs in soil. It is assumed that direct uptake of COPECs from soil is the major route of exposure for plants and that exposure of plants to wind-blown soil is minor. Exposure modeling for the wildlife receptors is limited to the food and soil ingestion pathways and external radiation. Because of the lack of surface water at this site, exposure to COPECs through the ingestion of surface water is considered to be of low significance. Inhalation and dermal contact are also considered pathways of low significance with respect to ingestion (Sample and Suter 1994). Groundwater is not expected to be affected by COCs at this site.

VII.3.1.2 COPECs

The old acid waste line is considered to be the source of COPECs at SWMU 226. COPECs for this site are listed in Section VII.2.1. These COPECs include both inorganic and organic constituents. Inorganic constituents include both radiological (Pu-239) and nonradiological analytes. The concentrations of inorganic analytes detected at this site were screened against background concentrations (see Section IV) and those that exceeded the approved SNL/NM background screening levels (Dinwiddie September 1997) for the area were considered to be COPECs. All organic analytes that were detected within the upper 5 feet of soil were identified as COPECs. Nonradiological inorganic constituents that are essential nutrients, such as iron, magnesium, calcium, potassium, and sodium, were not included in this risk assessment as set forth by the EPA (1989). In order to provide conservatism, this ecological risk assessment was based upon the maximum soil concentrations of the COPECs measured in the surface soil. Tables 5 and 7 present maximum concentrations for the COPECs.

VII.3.1.3 Ecological Receptors

A nonspecific perennial plant was selected as the receptor to represent plant species at the site (IT July 1998). Vascular plants are the principal primary producers at the site and are key to the diversity and productivity of the wildlife community associated with the site. The deer mouse (*Peromyscus maniculatus*) and the burrowing owl (*Speotyto cunicularia*) were used to represent wildlife use. Because of its opportunistic food habits, the deer mouse was used to represent a mammalian herbivore, omnivore, and insectivore; the burrowing owl was selected to represent a top predator at this site. The burrowing owl is present at SNL/NM and is designated a species of management concern by the U.S. Fish and Wildlife Service in Region 2, which includes the state of New Mexico (USFWS September 1995).

VII.3.2 Exposure Estimation

For nonradiological COPECs, direct uptake from the soil was considered the only significant route of exposure for terrestrial plants. Exposure modeling for the wildlife receptors was limited to food and soil ingestion pathways. Inhalation and dermal contact were considered insignificant pathways with respect to ingestion (Sample and Suter 1994). Drinking water was also considered a low significance pathway because of the lack of surface water at this site. The deer mouse was modeled under three dietary regimes: as an herbivore (100 percent of its diet as plant material), as an omnivore (50 percent of its diet as plants and 50 percent as soil invertebrates), and as an insectivore (100 percent of its diet as soil invertebrates). The burrowing owl was modeled as a strict predator on small mammals (100 percent of its diet as deer mice). Because exposure in the burrowing owl from a diet consisting of equal parts of herbivorous, omnivorous, and insectivorous mice is equivalent to exposure from a diet consisting of only omnivorous mice, the diet of the burrowing owl was modeled with intake of omnivorous mice only. Both species were modeled with soil ingestion comprising 2 percent of total dietary intake. Table 14 presents the species-specific factors used in modeling exposures in the wildlife receptors. Justification for use of the factors presented in this table is described in the ecological risk assessment methodology document (IT July 1998).

Although home range is also included in Table 14, exposures for this risk assessment were modeled using an area use factor of 1, implying that all food items and soil ingested are from the site being investigated. The maximum measured COPEC concentrations from surface soil samples were used to conservatively estimate potential exposures and risks to plants and wildlife at this site.

For the radiological dose-rate calculations, the deer mouse was modeled as an herbivore (100 percent of its diet as plants) and the burrowing owl was modeled as a strict predator on small mammals (100 percent of its diet as deer mice). Both were modeled with soil ingestion comprising 2 percent of total dietary intake. Receptors are exposed to radiation both internally and externally from Pu-239. Internal and external dose rates to the deer mouse and the burrowing owl are approximated using modified dose-rate models from the DOE (1995), as presented in the ecological risk assessment methodology document for the SNL/NM ER Project (IT July 1998). Radionuclide-dependent data for the dose-rate calculations were obtained from Baker and Soldat (1992). The external dose-rate model examines the total-body dose-rate to a receptor residing in soil exposed to radionuclides. The soil surrounding the receptor is assumed to be an infinite medium uniformly contaminated with gamma-emitting radionuclides. The external dose-rate model is the same for both the deer mouse and the burrowing owl. The internal total-body dose-rate model assumes that a fraction of the radionuclide concentration ingested by a receptor is absorbed by the body and concentrated at the center of a spherical body shape. This provides a conservative estimate for absorbed dose. This concentrated radiation source at the center of the body of the receptor is assumed to be a "point" source. Radiation emitted from this point source is absorbed by the body tissues to contribute to the absorbed dose. Alpha and beta emitters are assumed to transfer 100 percent of their energy to the receptor as they pass through tissues. Gamma-emitting radionuclides only transfer a fraction of their energy to the tissues because gamma rays interact less with matter than alpha or beta emitters do. The external and internal dose-rate results are summed to calculate a total dose rate from exposure to Pu-239 in soil.

Table 14
Exposure Factors for Ecological Receptors at SWMU 226

Receptor Species	Class/Order	Trophic Level	Body Weight (kg)[a]	Food Intake Rate (kg/day)[b]	Dietary Composition[c]	Home Range (acres)
Deer Mouse (*Peromyscus maniculatus*)	Mammalia/ Rodentia	Herbivore	2.39E-2[d]	3.72E-3	Plants: 100% (+ Soil at 2% of intake)	2.7E-1[e]
Deer Mouse (*Peromyscus maniculatus*)	Mammalia/ Rodentia	Omnivore	2.39E-2[d]	3.72E-3	Plants: 50% Invertebrates: 50% (+ Soil at 2% of intake)	2.7E-1[e]
Deer Mouse (*Peromyscus maniculatus*)	Mammalia/ Rodentia	Insectivore	2.39E-2[d]	3.72E-3	Invertebrates: 100% (+ Soil at 2% of intake)	2.7E-1[e]
Burrowing owl (*Speotyto cunicularia*)	Aves/ Strigiformes	Carnivore	1.55E-1[f]	1.73E-2	Rodents: 100% (+ Soil at 2% of intake)	3.5E+1[g]

[a]Body weights are in kg wet weight.
[b]Food intake rates are estimated from the allometric equations presented in Nagy (1987). Units are kg dry weight per day.
[c]Dietary compositions are generalized for modeling purposes. Default soil intake value of 2% of food intake.
[d]Silva and Downing 1995.
[e]EPA 1993, based upon the average home range measured in semiarid shrubland in Idaho.
[f]Dunning 1993.
[g]Haug et al. 1993.
EPA = U.S. Environmental Protection Agency.
kg = Kilogram(s).
kg/day = Kilogram(s) per day.
SWMU = Solid Waste Management Unit.

Table 15 presents the transfer factors used to model the concentrations of COPECs through the food chain. Table 16 presents maximum concentrations in soil and derived concentrations in tissues of the various food chain elements that are used to model dietary exposures for each of the wildlife receptors.

VII.3.3 Ecological Effects Evaluation

Table 17 shows benchmark toxicity values for the plant and wildlife receptors. For plants, the benchmark soil concentrations are based upon the lowest-observed-adverse-effect level. For wildlife, the toxicity benchmarks are based upon the no-observed-adverse-effect level (NOAEL) for chronic oral exposure in a taxonomically similar test species. For the wildlife receptors, toxicity benchmarks for total PCBs are based upon toxicity of Aroclor-1254. Insufficient plant toxicity information was found to estimate the plant toxicity benchmarks for acetone and methylene chloride. For the burrowing owl, insufficient toxicity information was found to estimate the NOAELs for chromium VI, silver, acetone, and methylene chloride.

The benchmark used for exposure of terrestrial receptors to radiation was 0.1 rad/day. This value has been recommended by the International Atomic Energy Agency (IAEA 1992) for the protection of terrestrial populations. Because plants and insects are less sensitive to radiation than vertebrates (Whicker and Schultz 1982), the dose of 0.1 rad/day should also offer sufficient protection to other components within the terrestrial habitat of SWMU 226.

VII.3.4 Risk Characterization

For the nonradiological COPECs, maximum concentrations in soil and estimated dietary exposures were compared to plant and wildlife benchmark values, respectively. Table 18 presents results of these comparisons. HQs are used to quantify the comparison with benchmarks for plants and wildlife exposure.

For plants, only mercury and vanadium resulted in HQs greater than unity, although HQs for plants could not be determined for acetone and methylene chloride due to the lack of sufficient toxicity information for that receptor. Barium resulted in HQs greater than unity for all three dietary regimes of the deer mice. Arsenic, vanadium, and total PCBs resulted in HQs greater than unity for the omnivorous and insectivorous deer mice. Mercury resulted in an HQ greater than unity for the burrowing owl when it was assumed to be entirely in organic form. HQs for the burrowing owl could not be determined for chromium VI, silver, acetone, and methylene chloride. As directed by the NMED, HIs were calculated for each of the receptors (the HI is the sum of chemical-specific HQs for all pathways for a given receptor). All HIs except that for the burrowing owl exceeded unity. The maximum HI was 46, which was for the insectivorous deer mouse.

Tables 19 and 20 summarize the internal and external dose-rate model results for Pu-239. The total radiation dose rates to the deer mouse and burrowing owl are predicted to be 3.7E-9 rad/day and 9.1E-9 rad/day, respectively. The dose rates for the deer mouse and the burrowing owl are considerably lower than the benchmark of 0.1 rad/day.

Table 15
Transfer Factors Used in Exposure Models for COPECs at SWMU 226

COPEC	Soil-to-Plant Transfer Factor	Soil-to-Invertebrate Transfer Factor	Food-to-Muscle Transfer Factor
Inorganic			
Arsenic	4.0E-2[a]	1.0E+0[b]	2.0E-3[a]
Barium	1.5E-1[a]	1.0E+0[b]	2.0E-4[c]
Cadmium	5.5E-1[a]	6.0E-1[d]	5.5E-4[a]
Chromium VI	4.0E-2[c]	1.3E-1[e]	3.0E-2[c]
Copper	8.0E-1[f]	2.5E-1[d]	1.0E-2[a]
Mercury	1.0E+0[c]	1.0E+0[b]	2.5E-1[a]
Selenium	5.0E-1[c]	1.0E+0[b]	1.0E-1[c]
Silver	1.0E+0[c]	2.5E-1[d]	5.0E-3[c]
Vanadium	5.5E-3[a]	1.0E+0[b]	2.5E-3[a]
Organic[g]			
Acetone	5.3E+1	1.3E+1	1.0E-8
Methylene chloride	7.3E+0	1.5E+1	3.6E-7
PCBs, total	1.2E-2	2.6E+1	3.2E-2

[a]Baes et al. 1984.
[b]Default value.
[c]Stafford et al. 1991.
[d]NCRP January 1989.
[e]Ma 1982.
[f]IAEA 1994.
[g]Soil-to-plant and food-to-muscle transfer factors from equations developed in Travis and Arms (1988). Soil-to-invertebrate transfer factors from equations developed in Connell and Markwell (1990). All three equations based upon relationship of the transfer factor to the log K_{ow} value of compound.

COPEC = Constituent of potential ecological concern.
IAEA = International Atomic Energy Agency.
K_{ow} = Octanol-water partition coefficient.
Log = Logarithm (base 10).
NCRP = National Council on Radiation Protection and Measurements.
PCB = Polychlorinated biphenyl.
SWMU = Solid Waste Management Unit.

Table 16
Media Concentrations[a] for COPECs at SWMU 226

COPEC	Soil (maximum)[a]	Plant Foliage[b]	Soil Invertebrate[b]	Deer Mouse Tissues[c]
Inorganic				
Arsenic	6.7E+0	2.7E-1	6.7E+0	2.3E-2
Barium	4.4E+2	6.5E+1	4.4E+2	1.6E-1
Cadmium	7.4E-1	4.1E-1	4.4E-1	7.5E-4
Chromium VI	1.0E+0	4.0E-2	1.3E-1	9.8E-3
Copper	1.8E+1	1.4E+1	4.4E+0	3.0E-1
Mercury	3.7E-1	3.7E-1	3.7E-1	2.9E-1
Selenium	1.3E-1	6.6E-2	1.3E-1	3.2E-2
Silver	4.3E-1[d]	4.3E-1	1.1E-1	4.3E-3
Vanadium	6.0E+1	3.3E-1	6.0E+1	2.4E-1
Organic				
Acetone	1.8E-2[d]	9.4E-1	2.3E-1	1.9E-8
Methylene chloride	4.3E-3[d]	3.1E-2	6.5E-2	5.4E-8
PCBs, total	8.5E-2	1.1E-3	2.2E+0	1.1E-1

[a]In mg/kg. All biotic media are based upon dry weight of the media. Soil concentration measurements are assumed to have been based upon dry weight. Values have been rounded to two significant digits after calculation.
[b]Product of the soil concentration and the corresponding transfer factor.
[c]Based upon the deer mouse with an omnivorous diet. Product of the average concentration ingested in food and soil times the food-to-muscle transfer factor times a wet weight-dry weight conversion factor of 3.125 (EPA 1993).
[d]Estimated value.
COPEC = Constituent of potential ecological concern.
mg/kg = Milligram(s) per kilogram.
PCB = Polychlorinated biphenyl.
SWMU = Solid Waste Management Unit.

Table 17
Toxicity Benchmarks for Ecological Receptors at SWMU 226

COPEC	Plant Benchmark[a,b]	Mammalian NOAELs			Avian NOAELs		
		Mammalian Test Species[c,d]	Test Species NOAEL[d,e]	Deer Mouse NOAEL[e,f]	Avian Test Species[d]	Test Species NOAEL[d,e]	Burrowing Owl NOAEL[e,g]
Inorganic							
Arsenic	10	mouse	0.126	0.133	mallard	5.14	5.14
Barium	500	rat[h]	5.1	10.5	chicken	20.8	20.8
Cadmium	3	rat[i]	1.0	1.89	mallard	1.45	1.45
Chromium VI	1	rat	3.28	6.42	–	–	–
Copper	100	mink	11.7	29.8	chicken	47	47
Mercury (organic)	0.3	rat	0.03	0.06	mallard	0.0064	0.0064
Mercury (inorganic)	0.3	mouse	13.2	14.0	Japanese quail	0.45	0.45
Selenium	1	rat	0.2	0.391	screech owl	0.44	0.44
Silver	2	rat	17.8[j]	34.8	–	–	–
Vanadium	2	rat	0.21	0.38	mallard	11.4	11.4
Organic							
Acetone	–	rat	10	19.6	–	–	–
Methylene chloride	–	rat	5.85	11.4	–	–	–
PCB (based upon Aroclor-1254)	40	oldfield mouse	0.068	0.059	ring-necked pheasant	0.18	0.18

[a]In mg/kg soil dry weight.
[b]Efroymson et al. 1997.
[c]Body weights (in kg) for the NOAEL conversion are as follows: lab mouse, 0.030; lab rat, 0.350; mink, 1.0; oldfield mouse, 0.014 (except where noted).
[d]Sample et al. 1996.
[e]In mg/kg body weight per day.
[f]Based upon NOAEL conversion methodology presented in Sample et al. (1996), using a deer mouse body weight of 0.0239 kg and a mammalian scaling factor of 0.25.
[g]Based upon NOAEL conversion methodology presented in Sample et al. (1996). The avian scaling factor of 0.0 was used, making the NOAEL independent of body weight.
[h]Body weight: 0.435 kg.
[i]Body weight: 0.303 kg.
[j]Based upon a rat LOAEL of 89 mg/kg body weight per day (EPA 2003) and an uncertainty factor of 0.2.

COPEC = Constituent of potential ecological concern.
kg = Kilogram(s).
LOAEL = Lowest-observed-adverse-effect level.
mg/kg = Milligram(s) per kilogram.
NOAEL = No-observed-adverse-effect level.
PCB = Polychlorinated biphenyl.
SWMU = Solid Waste Management Unit.
– = Insufficient toxicity data.

Table 18
HQs for Ecological Receptors at SWMU 226

COPEC	Plant HQ	Deer Mouse HQ (Herbivorous)	Deer Mouse HQ (Omnivorous)	Deer Mouse HQ (Insectivorous)	Burrowing Owl HQ
Inorganic					
Arsenic	6.7E-1	4.7E-1	**4.2E+0**	**8.0E+0**	3.4E-3
Barium	8.7E-1	**1.1E+0**	**3.8E+0**	**6.6E+0**	4.8E-2
Cadmium	2.5E-1	3.5E-2	3.6E-2	3.8E-2	1.2E-3
Chromium VI	1.0E+0	1.5E-3	2.5E-3	3.6E-3	–
Copper	1.8E-1	7.6E-2	5.0E-2	2.5E-2	1.6E-3
Mercury (organic)	**1.2E+0**	9.4E-1	9.4E-1	9.4E-1	**5.2E+0**
Mercury (inorganic)	**1.2E+0**	4.2E-3	4.2E-3	4.2E-3	7.5E-2
Selenium	1.3E-1	2.7E-2	4.0E-2	5.4E-2	8.7E-3
Silver	2.1E-1	2.0E-3	1.2E-3	5.2E-4	–
Vanadium	**3.0E+1**	6.2E-1	**1.3E+1**	**2.5E+1**	1.4E-2
Organic					
Acetone	–	7.5E-3	4.7E-3	1.8E-3	–
Methylene chloride	–	4.3E-4	6.6E-4	8.9E-4	–
PCB (based upon Aroclor-1254)	2.1E-3	7.2E-3	**2.9E+0**	**5.9E+0**	7.1E-2
HI[a]	**3.4E+1**	**3.3E+0**	**2.5E+1**	**4.6E+1**	**5.4E+0**

Note: **Bold** text indicates HQ or HI exceeds unity.
[a]The HI is the sum of individual HQs.
COPEC = Constituent of potential ecological concern.
HI = Hazard index.
HQ = Hazard quotient.
PCB = Polychlorinated biphenyl.
SWMU = Solid Waste Management Unit.
– = Insufficient toxicity data available for risk estimation purposes.

Table 19
Total Dose Rates for the Deer Mouse
Exposed to Radionuclides at SWMU 226

Radionuclide	Maximum Concentration (pCi/g)	Total Dose (rad/day)
Pu-239	0.0046	3.7E-9
Total Dose		3.7E-9

pCi/g = Picocurie(s) per gram.
SWMU = Solid Waste Management Unit.

Table 20
Total Dose Rates for the Burrowing Owl
Exposed to Radionuclides at SWMU 226

Radionuclide	Maximum Concentration (pCi/g)	Total Dose (rad/day)
Pu-239	0.0046	9.1E-9
Total Dose		9.1E-9

pCi/g = Picocurie(s) per gram.
SWMU = Solid Waste Management Unit.

VII.3.5 Uncertainty Assessment

Many uncertainties are associated with the characterization of ecological risks at SWMU 226. These uncertainties result from assumptions used in calculating risk that could overestimate or underestimate true risk presented at a site. For this risk assessment, assumptions are made that are more likely to overestimate exposures and risk than to underestimate them. These conservative assumptions are used to be more protective of the ecological resources potentially affected by the site. Conservatisms incorporated into this risk assessment include the use of maximum measured analyte concentrations in soil to evaluate risk, the use of wildlife toxicity benchmarks based upon NOAEL values, the incorporation of strict herbivorous and strict insectivorous diets for predicting the extreme HQ values for the deer mouse, and the use of 1.0 as the area use factor for wildlife receptors regardless of seasonal use or home range size. These uncertainties, which are consistent among each of the SWMU-specific ecological risk assessments, are each discussed in greater detail in the uncertainty section of the ecological risk assessment methodology document for the SNL/NM ER Program (IT July 1998).

Uncertainties associated with the estimation of risk to ecological receptors following exposure to Pu-239 are primarily related to those inherent in the radionuclide-specific data. Radionuclide-dependent data are measured values that have associated errors. The dose-rate models used for these calculations are based upon conservative estimates on receptor shape, radiation absorption by body tissues, and intake parameters. The goal is to provide a realistic but conservative estimate of a receptor's internal and external exposure to radionuclides in soil.

The assumption of an area use factor of 1.0 is a source of uncertainty for the burrowing owl at this site. Because SWMU 226 is approximately 4.4 acres in size and the home range of the burrowing owl is 35 acres, an area use factor of approximately 0.13 would be justified for this receptor. This is sufficient to reduce the burrowing owl HQ for mercury (assumed to be in organic form) from 5.2 to 0.68. Therefore, inclusion of a more realistic area use factor in the estimation of exposure for the burrowing owl results in no predictions of potential risk, regardless of the form of mercury that may be present.

In the estimation of ecological risk, background concentrations are included as a component of maximum on-site concentrations. For some inorganic COPECs, conservatisms in the modeling of exposure and risk result in the prediction of risk to ecological receptors when exposed at background concentrations. As shown in Table 21, the HQs for one or more ecological receptors associated with exposure to background concentrations are greater than unity for arsenic, barium, and vanadium. Background concentrations of arsenic, barium, and vanadium may account for as much as 66, 46, and 55 percent of the maximum measured concentrations for these COPECs, respectively, indicating that a significant proportion of the estimated exposures for these COPECs is from background concentrations.

A further source of uncertainty associated with the prediction of ecological risks at this site is the use of the maximum measured concentrations to estimate exposure. This results in a conservative exposure scenario that does not necessarily reflect actual site conditions. For example, the 95% UCLs of the mean soil concentrations for arsenic and vanadium (4.2 and 32.7 mg/kg, respectively) are lower than their respective background screening values (4.4 and 33 mg/kg, respectively). Therefore, it is likely that the actual exposures to these two elements at SWMU 226 are within background levels, and risks from these exposures are within the background levels shown in Table 21. For barium, the 95% UCL (235 mg/kg) was only marginally above the background screening value (200 mg/kg). Exposures based upon the 95% UCL result in an HQ lower than unity for the herbivorous deer mouse and HQs of 2.0 and 3.6 for the omnivorous and insectivorous deer mice, respectively. These HQs are only slightly greater than the background HQs shown in Table 21. For mercury, the 95% UCL (0.14) is less than one-half the plant toxicity benchmark (0.3 mg/kg), indicating that, in general, the HQ for mercury exposure in plants, as based upon the maximum concentration, significantly overestimates the potential for risk to plants at this site.

PCB exposures were based upon total PCBs and risk was conservatively based upon toxicity values for Aroclor-1254. However, Aroclor-specific detections were limited to Aroclor-1254 and Aroclor-1260. The 95% UCLs for these analytes are 0.03 and 0.04 mg/kg, respectively. Based upon these values, the Aroclor-specific HQs for the omnivorous and insectivorous deer mice are 1.0 and 1.1 for Aroclor-1254, respectively, and 2.1 for Aroclor-1260 (HQs being equal for both dietary regimes). Therefore, risk to the deer mouse from PCB exposure at SWMU 226 is generally low.

Based upon this uncertainty analysis, ecological risks at SWMU 226 are expected to be low. HQs as high as 25 were initially predicted; however, closer examination of the exposure assumptions and toxicity benchmarks revealed an overestimation of risk primarily attributed to conservatism in the area use and exposure-point concentrations, and the contribution of background risk.

Table 21
HQs for Ecological Receptors Exposed to Background Concentrations at SWMU 226

COPEC	Plant HQ	Deer Mouse HQ (Herbivorous)	Deer Mouse HQ (Omnivorous)	Deer Mouse HQ (Insectivorous)	Burrowing Owl HQ
Arsenic	4.4E-1	3.1E-1	**2.8E+0**	**5.2E+0**	2.2E-3
Barium	4.0E-1	5.0E-1	**1.8E+0**	**3.0E+0**	2.2E-2
Cadmium	1.7E-1	2.4E-2	2.5E-2	2.6E-2	8.1E-4
Chromium VI	NA	NA	NA	NA	NA
Copper	1.7E-1	7.3E-2	4.8E-2	2.4E-2	1.5E-3
Mercury (organic)	1.7E-1	1.3E-1	1.3E-1	1.3E-1	7.1E-1
Mercury (inorganic)	1.7E-1	5.7E-4	5.7E-4	5.7E-4	1.0E-2
Selenium	5.0E-1	1.0E-1	1.5E-1	2.0E-1	3.3E-2
Silver	2.5E-1	2.3E-3	1.4E-3	6.0E-4	–
Vanadium	**1.7E+1**	3.4E-1	**7.0E+0**	**1.4E+1**	7.8E-3
HI[a]	**1.9E+1**	**1.5E+0**	**1.2E+1**	**2.2E+1**	7.8E-1

Note: **Bold** text indicates HQ or HI exceeds unity.
[a]The HI is the sum of individual HQs.
COPEC = Constituent of potential ecological concern.
HI = Hazard index.
HQ = Hazard quotient.
NA = Not applicable (background value not determined).
SWMU = Solid Waste Management Unit.
– = Insufficient toxicity data available for risk estimation purposes.

VII.3.6 Risk Interpretation

Ecological risks associated with SWMU 226 were estimated through a risk assessment that incorporated site-specific information when available. Initially predicted risks to ecological receptors from exposures to arsenic, barium, mercury, vanadium, and PCBs were attributed to the use of maximum detected values and area use factors. The average arsenic and vanadium concentrations were found to be within the background range for this COPEC and the average concentrations of barium, mercury, and PCBs (as specific Aroclors) at this site resulted in low HQs. Background concentrations contributed significantly to the predicted HQs for arsenic, barium, and vanadium. Doses to the deer mouse and burrowing owl from exposure to radiological COPECs (Pu-239) were well below the risk benchmark of 0.1 rad/day. Based upon this final analysis, ecological risks associated with SWMU 226 are expected to be low.

VII.3.7 Risk Assessment Scientific/Management Decision Point

After potential ecological risks associated with the site have been assessed, a decision is made regarding whether the site should be recommended for NFA or whether additional data should be collected to assess actual ecological risk at the site more thoroughly. With respect to this site, ecological risks are predicted to be low. The scientific/management decision is to recommend this site for NFA.

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APPENDIX 1
EXPOSURE PATHWAY DISCUSSION FOR CHEMICAL AND RADIONUCLIDE CONTAMINATION

Introduction

Sandia National Laboratories/New Mexico (SNL/NM) uses a default set of exposure routes and associated default parameter values developed for each future land-use designation being considered for SNL/NM Environmental Restoration (ER) Project sites. This default set of exposure scenarios and parameter values are invoked for risk assessments unless site-specific information suggests other parameter values. Because many SNL/NM solid waste management units (SWMUs) have similar types of contamination and physical settings, SNL/NM believes that the risk assessment analyses at these sites can be similar. A default set of exposure scenarios and parameter values facilitates the risk assessments and subsequent review.

The default exposure routes and parameter values used are those that SNL/NM views as resulting in a Reasonable Maximum Exposure (RME) value. Subject to comments and recommendations by the U.S. Environmental Protection Agency (EPA) Region VI and New Mexico Environment Department (NMED), SNL/NM will use these default exposure routes and parameter values in future risk assessments.

At SNL/NM, all SWMUs exist within the boundaries of the Kirtland Air Force Base. Approximately 240 potential waste and release sites have been identified where hazardous, radiological, or mixed materials may have been released to the environment. Evaluation and characterization activities have occurred at all of these sites to varying degrees. Among other documents, the SNL/NM ER draft Environmental Assessment (DOE 1996) presents a summary of the hydrogeology of the sites and the biological resources present. When evaluating potential human health risk the current or reasonably foreseeable land use negotiated and approved for the specific SWMU/AOC, aggregate, or watershed will be used. The following references generally document these land uses: *Workbook: Future Use Management Area 2 (DOE et al. September 1995); Workbook: Future Use Management Area 1 (DOE et al. October 1995); Workbook: Future Use Management Areas 3, 4, 5, and 6 (DOE and USAF January 1996); Workbook: Future Use Management Area 7 (DOE and USAF March 1996).* At this time, all SNL/NM SWMUs have been tentatively designated for either industrial or recreational future land use. The NMED has also requested that risk calculations be performed based upon a residential land-use scenario. Therefore, all three land-use scenarios will be addressed in this document.

The SNL/NM ER Project has screened the potential exposure routes and identified default parameter values to be used for calculating potential intake and subsequent hazard index (HI), excess cancer risk and dose values. The EPA (EPA 1989) provides a summary of exposure routes that could potentially be of significance at a specific waste site. These potential exposure routes consist of:

- Ingestion of contaminated drinking water
- Ingestion of contaminated soil

- Ingestion of contaminated fish and shellfish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming
- Dermal contact with chemicals in water
- Dermal contact with chemicals in soil
- Inhalation of airborne compounds (vapor phase or particulate)
- External exposure to penetrating radiation (immersion in contaminated air; immersion in contaminated water; and exposure from ground surfaces with photon-emitting radionuclides)

Based upon the location of the SNL/NM SWMUs and the characteristics of the surface and subsurface at the sites, we have evaluated these potential exposure routes for different land-use scenarios to determine which should be considered in risk assessment analyses (the last exposure route is pertinent to radionuclides only). At SNL/NM SWMUs, there is currently no consumption of fish, shellfish, fruits, vegetables, meat, eggs, or dairy products that originate on site. Additionally, no potential for swimming in surface water is present due to the high-desert environmental conditions. As documented in the RESRAD computer code manual (ANL 1993), risks resulting from immersion in contaminated air or water are not significant compared to risks from other radiation exposure routes.

For the industrial and recreational land-use scenarios, SNL/NM ER has, therefore, excluded the following four potential exposure routes from further risk assessment evaluations at any SNL/NM SWMU:

- Ingestion of contaminated fish and shellfish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming
- Dermal contact with chemicals in water

That part of the exposure pathway for radionuclides related to immersion in contaminated air or water is also eliminated.

Based upon this evaluation, for future risk assessments the exposure routes that will be considered are shown in Table 1.

Table 1
Exposure Pathways Considered for Various Land-Use scenarios

Industrial	Recreational	Residential
Ingestion of contaminated drinking water	Ingestion of contaminated drinking water	Ingestion of contaminated drinking water
Ingestion of contaminated soil	Ingestion of contaminated soil	Ingestion of contaminated soil
Inhalation of airborne compounds (vapor phase or particulate)	Inhalation of airborne compounds (vapor phase or particulate)	Inhalation of airborne compounds (vapor phase or particulate)
Dermal contact (nonradiological constituents only) soil only	Dermal contact (nonradiological constituents only) soil only	Dermal contact (nonradiological constituents only) soil only
External exposure to penetrating radiation from ground surfaces	External exposure to penetrating radiation from ground surfaces	External exposure to penetrating radiation from ground surfaces

Equations and Default Parameter Values for Identified Exposure Routes

In general, SNL/NM expects that ingestion of compounds in drinking water and soil will be the more significant exposure routes for chemicals; external exposure to radiation may also be significant for radionuclides. All of the above routes will, however, be considered for their appropriate land-use scenarios. The general equation for calculating potential intakes via these routes is shown below. The equations are taken from "Assessing Human Health Risks Posed by Chemicals: Screening-Level Risk Assessment" (NMED March 2000) and "Technical Background Document for Development of Soil Screening Levels" (NMED December 2000). Equations from both documents are based upon the "Risk Assessment Guidance for Superfund" (RAGS): Volume 1 (EPA 1989, 1991). These general equations also apply to calculating potential intakes for radionuclides. A more in-depth discussion of the equations used in performing radiological pathway analyses with the RESRAD code may be found in the RESRAD Manual (ANL 1993). RESRAD is the only code designated by the U.S. Department of Energy (DOE) in DOE Order 5400.5 for the evaluation of radioactively contaminated sites (DOE 1993). The Nuclear Regulatory Commission (NRC) has approved the use of RESRAD for dose evaluation by licensees involved in decommissioning, NRC staff evaluation of waste disposal requests, and dose evaluation of sites being reviewed by NRC staff. EPA Science Advisory Board reviewed the RESRAD model. EPA used RESRAD in their rulemaking on radiation site cleanup regulations. RESRAD code has been verified, undergone several benchmarking analyses, and been included in the International Atomic Energy Agency's VAMP and BIOMOVS II projects to compare environmental transport models.

Also shown are the default values SNL/NM ER will use in RME risk assessment calculations for industrial, recreational, and residential land-use scenarios, based upon EPA and other governmental agency guidance. The pathways and values for chemical contaminants are discussed first, followed by those for radionuclide contaminants. RESRAD input parameters that are left as the default values provided with the code are not discussed. Further information relating to these parameters may be found in the RESRAD Manual (ANL 1993) or by directly accessing the RESRAD websites at: http://web.ead.anl.gov/resrad/home2/ or http://web.ead.anl.gov/resrad/documents/.

Generic Equation for Calculation of Risk Parameter Values

The equation used to calculate the risk parameter values (i.e., hazard quotients/HI, excess cancer risk, or radiation total effective dose equivalent [TEDE] [dose]) is similar for all exposure pathways and is given by:

Risk (or Dose) = Intake x Toxicity Effect (either carcinogenic, noncarcinogenic, or radiological)

$$= C \times (CR \times EFD/BW/AT) \times \text{Toxicity Effect} \quad (1)$$

where;

C = contaminant concentration (site specific)
CR = contact rate for the exposure pathway
EFD= exposure frequency and duration
BW = body weight of average exposure individual
AT = time over which exposure is averaged.

For nonradiological constituents of concern (COCs), the total risk/dose (either cancer risk or HI) is the sum of the risks/doses for all of the site-specific exposure pathways and contaminants. For radionuclides, the calculated radiation exposure, expressed as TEDE is compared directly to the exposure guidelines of 15 millirem per year (mrem/year) for industrial and recreational future use and 75 mrem/year for the unlikely event that institutional control of the site is lost and the site is used for residential purposes (EPA 1997).

The evaluation of the carcinogenic health hazard produces a quantitative estimate for excess cancer risk resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of the quantitative estimate with the potentially acceptable risk of 1E-5 for nonradiological carcinogens. The evaluation of the noncarcinogenic health hazard produces a quantitative estimate (i.e., the HI) for the toxicity resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of this quantitative estimate with the EPA standard HI of unity (1). The evaluation of the health hazard from radioactive compounds produces a quantitative estimate of doses resulting from the COCs present at the site. This estimated dose is used to calculate an assumed risk. However, this calculated risk is presented for illustration purposes only, not to determine compliance with regulations.

The specific equations used for the individual exposure pathways can be found in RAGS (EPA 1989) and are outlined below. The RESRAD Manual (ANL 1993) describes similar equations for the calculation of radiological exposures.

Soil Ingestion

A receptor can ingest soil or dust directly by working in the contaminated soil. Indirect ingestion can occur from sources such as unwashed hands introducing contaminated soil to food that is then eaten. An estimate of intake from ingesting soil will be calculated as follows:

$$I_s = \frac{C_s * IR * CF * EF * ED}{BW * AT}$$

where:

I_s = Intake of contaminant from soil ingestion (milligrams [mg]/kilogram [kg]-day)
C_s = Chemical concentration in soil (mg/kg)
IR = Ingestion rate (mg soil/day)
CF = Conversion factor (1E-6 kg/mg)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

It should be noted that it is conservatively assumed that the receptor only ingests soil from the contaminated source.

Soil Inhalation

A receptor can inhale soil or dust directly by working in the contaminated soil. An estimate of intake from inhaling soil will be calculated as follows (EPA August 1997):

$$I_s = \frac{C_s * IR * EF * ED * \left(1/VF \text{ or } 1/PEF\right)}{BW * AT}$$

where:

I_s = Intake of contaminant from soil inhalation (mg/kg-day)
C_s = Chemical concentration in soil (mg/kg)
IR = Inhalation rate (cubic meters [m^3]/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
VF = soil-to-air volatilization factor (m^3/kg)
PEF = particulate emission factor (m^3/kg)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

Soil Dermal Contact

$$D_a = \frac{C_s * CF * SA * AF * ABS * EF * ED}{BW * AT}$$

where:

D_a = Absorbed dose (mg/kg-day)
C_s = Chemical concentration in soil (mg/kg)
CF = Conversion factor (1E-6 kg/mg)
SA = Skin surface area available for contact (cm^2/event)
AF = Soil to skin adherence factor (mg/cm^2)
ABS = Absorption factor (unitless)
EF = Exposure frequency (events/year)

ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

Groundwater Ingestion

A receptor can ingest water by drinking it or through using household water for cooking. An estimate of intake from ingesting water will be calculated as follows (EPA August 1997):

$$I_w = \frac{C_w * IR * EF * ED}{BW * AT}$$

where:

I_w = Intake of contaminant from water ingestion (mg/kg/day)
C_w = Chemical concentration in water (mg/liter [L])
IR = Ingestion rate (L/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

Groundwater Inhalation

The amount of a constituent taken into the body via exposure to volatilization from showering or other household water uses will be evaluated using the concentration of the constituent in the water source (EPA 1991 and 1992). An estimate of intake from volatile inhalation from groundwater will be calculated as follows (EPA 1991):

$$I_w = \frac{C_w * K * IR_i * EF * ED}{BW * AT}$$

where:

I_w = Intake of volatile in water from inhalation (mg/kg/day)
C_w = Chemical concentration in water (mg/L)
K = volatilization factor (0.5 L/m^3)
IR_i = Inhalation rate (m^3/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged—days)

For volatile compounds, volatilization from groundwater can be an important exposure pathway from showering and other household uses of groundwater. This exposure pathway will only be evaluated for organic chemicals with a Henry's Law constant greater than $1x10^{-5}$ and with a molecular weight of 200 grams/mole or less (EPA 1991).

Tables 2 and 3 show the default parameter values suggested for use by SNL/NM at SWMUs, based upon the selected land-use scenarios for nonradiological and radiological COCs,

respectively. References are given at the end of the table indicating the source for the chosen parameter values. SNL/NM uses default values that are consistent with both regulatory guidance and the RME approach. Therefore, the values chosen will, in general, provide a conservative estimate of the actual risk parameter. These parameter values are suggested for use for the various exposure pathways, based upon the assumption that a particular site has no unusual characteristics that contradict the default assumptions. For sites for which the assumptions are not valid, the parameter values will be modified and documented.

Summary

SNL/NM will use the described default exposure routes and parameter values in risk assessments at sites that have an industrial, recreational, or residential future land-use scenario. There are no current residential land-use designations at SNL/NM ER sites, but NMED has requested this scenario to be considered to provide perspective of the risk under the more restrictive land-use scenario. For sites designated as industrial or recreational land use, SNL/NM will provide risk parameter values based upon a residential land-use scenario to indicate the effects of data uncertainty on risk value calculations or in order to potentially mitigate the need for institutional controls or restrictions on SNL/NM ER sites. The parameter values are based upon EPA guidance and supplemented by information from other government sources. If these exposure routes and parameters are acceptable, SNL/NM will use them in risk assessments for all sites where the assumptions are consistent with site-specific conditions. All deviations will be documented.

Table 2
Default Nonradiological Exposure Parameter Values for Various Land-Use scenarios

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure Frequency (day/yr)	250[a,b]	8.7 (4 hr/wk for 52 wk/yr)[a,b]	350[a,b]
Exposure Duration (yr)	25[a,b,c]	30[a,b,c]	30[a,b,c]
Body Weight (kg)	70[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]
Averaging Time (days) for Carcinogenic Compounds (= 70 yr x 365 day/yr) for Noncarcinogenic Compounds (= ED x 365 day/yr)	25,550[a,b] 9,125[a,b]	25,550[a,b] 10,950[a,b]	25,550[a,b] 10,950[a,b]
Soil Ingestion Pathway			
Ingestion Rate (mg/day)	100[a,b]	200 Child[a,b] 100 Adult[a,b]	200 Child[a,b] 100 Adult[a,b]
Inhalation Pathway			
Inhalation Rate (m^3/day)	20[a,b]	15 Child[a] 30 Adult[a]	10 Child[a] 20 Adult[a]
Volatilization Factor (m^3/kg)	Chemical Specific	Chemical Specific	Chemical Specific
Particulate Emission Factor (m^3/kg)	1.36E9[a]	1.36E9[a]	1.36E9[a]
Water Ingestion Pathway			
Ingestion Rate (liter/day)	2.4[a]	2.4[a]	2.4[a]
Dermal Pathway			
Skin Adherence Factor (mg/cm^2)	0.2[a]	0.2 Child[a] 0.07 Adult[a]	0.2 Child[a] 0.07 Adult[a]
Exposed Surface Area for Soil/Dust (cm^2/day)	3,300[a]	2,800 Child[a] 5,700 Adult[a]	2,800 Child[a] 5,700 Adult[a]
Skin Adsorption Factor	Chemical Specific	Chemical Specific	Chemical Specific

[a]Technical Background Document for Development of Soil Screening Levels (NMED 2000).
[b]Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).
[c]Exposure Factors Handbook (EPA August 1997).
ED = Exposure duration.
EPA = U.S. Environmental Protection Agency.
hr = Hour(s).
kg = Kilogram(s).
m = Meter(s).
mg = Milligram(s).
NA = Not available.
wk = Week(s).
yr = Year(s).

Table 3
Default Radiological Exposure Parameter Values for Various Land-Use scenarios

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure Frequency	8 hr/day for 250 day/yr	4 hr/wk for 52 wk/yr	365 day/yr
Exposure Duration (yr)	25[a,b]	30[a,b]	30[a,b]
Body Weight (kg)	70 Adult[a,b]	70 Adult[a,b]	70 Adult[a,b]
Soil Ingestion Pathway			
Ingestion Rate	100 mg/day[c]	100 mg/day[c]	100 mg/day[c]
Averaging Time (days) (= 30 yr x 365 day/yr)	10,950[d]	10,950[d]	10,950[d]
Inhalation Pathway			
Inhalation Rate (m^3/yr)	7,300[d,e]	10,950[e]	7,300[d,e]
Mass Loading for Inhalation g/m^3	1.36 E-5[d]	1.36 E-5[d]	1.36 E-5[d]
Food Ingestion Pathway			
Ingestion Rate, Leafy Vegetables (kg/yr)	NA	NA	16.5[c]
Ingestion Rate, Fruits, Non-Leafy Vegetables & Grain (kg/yr)	NA	NA	101.8[b]
Fraction Ingested	NA	NA	0.25[b,d]

[a]Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).
[b]Exposure Factors Handbook (EPA August 1997).
[c]EPA Region VI guidance (EPA 1996).
[d]For radionuclides, RESRAD (ANL 1993).
[e]SNL/NM (February 1998).
EPA = U.S. Environmental Protection Agency.
g = Gram(s)
hr = Hour(s).
kg = Kilogram(s).
m = Meter(s).
mg = Milligram(s).
NA = Not applicable.
wk = Week(s).
yr = Year(s).

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APPENDIX 2
CALCULATION OF THE UPPER CONFIDENCE LIMITS OF MEAN CONCENTRATIONS

For conservatism, Sandia National Laboratories/New Mexico uses the maximum concentration of the constituents of concern (COCs) for initial risk calculation. If the maximum concentrations produce risk above New Mexico Environment Department (NMED) guidelines, conservatism with this approach is evaluated and, if appropriate, a more realistic approach is applied. When the site has been adequately characterized, an estimate of the mean concentration of the COCs is more representative of actual site conditions. The NMED has proposed the use of the 95% upper confidence limit (UCL) of the mean to represent average concentrations at a site (NMED December 2000). The 95% UCL is calculated according to NMED guidance (Tharp June 2002) using the U.S. Environmental Protection Agency ProUCL program (EPA April 2002). Attached are the outputs from that program and the calculated UCLs used in the risk analysis.

References

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SWMU 226 - HH					
Summary Statistics for		Arsenic		Summary Statistics for	ln(Arsenic)
Number of Samples		30		Minimum	-0.055513
Minimum		0.946		Maximum	1.900614
Maximum		6.69		Mean	0.958277
Mean		2.859533		Standard Deviation	0.436072
Median		2.675		Variance	0.190159
Standard Deviation		1.318685			
Variance		1.738931		Shapiro-Wilk Test Statisitic	0.966167
Coefficient of Variation		0.461154		Shapiro-Wilk 5% Critical Value	0.927
Skewness		1.46171		Data are Lognormal at 5% Significance Leve	
95 % UCL (Assuming Normal Data)				Estimates Assuming Lognormal Distribution	
Student's-t		3.268611		MLE Mean	2.867258
				MLE Standard Deviation	1.312194
95 % UCL (Adjusted for Skewness)				MLE Coefficient of Variation	0.457648
Adjusted-CLT		3.324198		MLE Skewness	1.468793
Modified-t		3.27932		MLE Median	2.6072
				MLE 80% Quantile	3.768804
95 % Non-parametric UCL				MLE 90% Quantile	4.565962
CLT		3.255545		MLE 95% Quantile	5.34208
Jackknife		3.268611		MLE 99% Quantile	7.1892
Standard Bootstrap		3.248968			
Bootstrap-t		3.381762		MVU Estimate of Median	2.59895
Chebyshev (Mean, Std)		3.908973		MVU Estimate of Mean	2.857412
				MVU Estimate of Std. Dev.	1.291045
				MVU Estimate of SE of Mean	0.235219
				UCL Assuming Lognormal Distribution	
				95% H-UCL	3.340421
				95% Chebyshev (MVUE) UCL	3.882707
				99% Chebyshev (MVUE) UCL	5.19781
				Recommended UCL to use:	
				Student's-t or H-UCL	

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SWMU 226 - ECO	
Summary Statistics for	Aroclor 1254
Number of Samples	11
Minimum	0.01555
Maximum	0.0446
Mean	0.0189363636
Median	0.01655
Standard Deviation	0.0085179543
Variance	7.25555E-005
Coefficient of Variation	0.4498199582
Skewness	3.307556375
Shapiro-Wilk Test Statisitic	0.3791464117
Shapiro-Wilk 5% Critical Value	0.85
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	0.0235912347
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	0.0258974947
Modified-t	0.0240181076
95 % Non-parametric UCL	
CLT	0.0231607752
Jackknife	0.0235912347
Standard Bootstrap	0.0228887225
Bootstrap-t	0.1295149
Chebyshev (Mean, Std)	0.0301311488

SWMU 226 -ECO		
Summary Statistics for		Aroclor 1260
Number of Samples		11
Minimum		0.01555
Maximum		0.056
Mean		0.02215
Median		0.0166
Standard Deviation		0.0133654031
Variance		0.000178634
Coefficient of Variation		0.6034042031
Skewness		2.211017667
Shapiro-Wilk Test Statisitic		0.5339684785
Shapiro-Wilk 5% Critical Value		0.85
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		0.0294538931
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		0.0316489946
Modified-t		0.0299016377
95 % Non-parametric UCL		
CLT		0.0287784651
Jackknife		0.0294538931
Standard Bootstrap		0.02844439
Bootstrap-t		0.2493975862
Chebyshev (Mean, Std)		0.039715581

SWMU 226 - ECO			
Summary Statistics for		Arsenic	
Number of Samples		14	
Minimum		0.946	
Maximum		6.69	
Mean		3.369714	
Median		3.2	
Standard Deviation		1.697636	
Variance		2.881967	
Coefficient of Variation		0.503792	
Skewness		0.742746	
Shapiro-Wilk Test Statisitic		0.912993	
Shapiro-Wilk 5% Critical Value		0.874	
Data are Normal at 5% Significance Level			
Recommended UCL to use		Student's-t	
95 % UCL (Assuming Normal Data)			
Student's-t		4.173208	
95 % UCL (Adjusted for Skewness)			
Adjusted-CLT		4.21224	
Modified-t		4.188219	
95 % Non-parametric UCL			
CLT		4.116005	
Jackknife		4.173208	
Standard Bootstrap		4.072105	
Bootstrap-t		4.315338	
Chebyshev (Mean, Std)		5.3474	

General Statistics

SWMU 226 - ECO					
Summary Statistics for		Barium		Summary Statistics for	ln(Barium)
Number of Samples		14		Minimum	3.824284
Minimum		45.8		Maximum	6.077642
Maximum		436		Mean	4.999577
Mean		169.1571		Standard Deviation	0.536365
Median		149.5		Variance	0.287688
Standard Deviation		95.38392			
Variance		9098.092		Shapiro-Wilk Test Statisitic	0.963496
Coefficient of Variation		0.563878		Shapiro-Wilk 5% Critical Value	0.874
Skewness		1.745232		Data are Lognormal at 5% Significance Leve	
95 % UCL (Assuming Normal Data)				Estimates Assuming Lognormal Distribution	
Student's-t		214.3025		MLE Mean	171.3008
				MLE Standard Deviation	98.90168
95 % UCL (Adjusted for Skewness)				MLE Coefficient of Variation	0.577357
Adjusted-CLT		223.7936		MLE Skewness	1.924527
Modified-t		216.2843		MLE Median	148.3504
				MLE 80% Quantile	233.4122
95 % Non-parametric UCL				MLE 90% Quantile	295.5407
CLT		211.0884		MLE 95% Quantile	358.489
Jackknife		214.3025		MLE 99% Quantile	516.5452
Standard Bootstrap		209.2161			
Bootstrap-t		235.2613		MVU Estimate of Median	146.833
Chebyshev (Mean, Std)		280.276		MVU Estimate of Mean	169.3523
				MVU Estimate of Std. Dev.	94.03575
				MVU Estimate of SE of Mean	25.0506
				UCL Assuming Lognormal Distribution	
				95% H-UCL	235.3004
				95% Chebyshev (MVUE) UCL	278.5454
				99% Chebyshev (MVUE) UCL	418.6027
				Recommended UCL to use:	
				H-UCL	

SWMU 226 - ECO	
Summary Statistics for	Mercury
Number of Samples	16
Minimum	0.00225
Maximum	0.369
Mean	0.043749
Median	0.0222
Standard Deviation	0.087876
Variance	0.007722
Coefficient of Variation	2.008634
Skewness	3.827823
Shapiro-Wilk Test Statisitic	0.409346
Shapiro-Wilk 5% Critical Value	0.887
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	0.082262
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	0.102349
Modified-t	0.085766
95 % Non-parametric UCL	
CLT	0.079885
Jackknife	0.082262
Standard Bootstrap	0.079365
Bootstrap-t	0.252419
Chebyshev (Mean, Std)	0.139511

SWMU 226 - ECO	
Summary Statistics for	Vanadium
Number of Samples	14
Minimum	8.78
Maximum	59.9
Mean	26.22714
Median	24.35
Standard Deviation	13.65117
Variance	186.3543
Coefficient of Variation	0.520498
Skewness	1.060119
Shapiro-Wilk Test Statisitic	0.921366
Shapiro-Wilk 5% Critical Value	0.874
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	32.68826
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	33.3328
Modified-t	32.86055
95 % Non-parametric UCL	
CLT	32.22827
Jackknife	32.68826
Standard Bootstrap	32.06974
Bootstrap-t	34.59147
Chebyshev (Mean, Std)	42.13027

SWMU 226 - ECO	
Summary Statistics for	Aroclor 1254
Number of Samples	11
Minimum	0.01555
Maximum	0.0446
Mean	0.0189363636
Median	0.01655
Standard Deviation	0.0085179543
Variance	7.25555E-005
Coefficient of Variation	0.4498199582
Skewness	3.307556375
Shapiro-Wilk Test Statisitic	0.3791464117
Shapiro-Wilk 5% Critical Value	0.85
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	0.0235912347
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	0.0258974947
Modified-t	0.0240181076
95 % Non-parametric UCL	
CLT	0.0231607752
Jackknife	0.0235912347
Standard Bootstrap	0.0228887225
Bootstrap-t	0.1295149
Chebyshev (Mean, Std)	0.0301311488

SWMU 226 -ECO		
Summary Statistics for	Aroclor 1260	
Number of Samples	11	
Minimum	0.01555	
Maximum	0.056	
Mean	0.02215	
Median	0.0166	
Standard Deviation	0.0133654031	
Variance	0.000178634	
Coefficient of Variation	0.6034042031	
Skewness	2.211017667	
Shapiro-Wilk Test Statisitic	0.5339684785	
Shapiro-Wilk 5% Critical Value	0.85	
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t	0.0294538931	
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT	0.0316489946	
Modified-t	0.0299016377	
95 % Non-parametric UCL		
CLT	0.0287784651	
Jackknife	0.0294538931	
Standard Bootstrap	0.02844439	
Bootstrap-t	0.2493975862	
Chebyshev (Mean, Std)	0.039715581	

SWMU 226 - ECO			
Summary Statistics for		Arsenic	
Number of Samples		14	
Minimum		0.946	
Maximum		6.69	
Mean		3.369714	
Median		3.2	
Standard Deviation		1.697636	
Variance		2.881967	
Coefficient of Variation		0.503792	
Skewness		0.742746	
Shapiro-Wilk Test Statisitic		0.912993	
Shapiro-Wilk 5% Critical Value		0.874	
Data are Normal at 5% Significance Level			
Recommended UCL to use		Student's-t	
95 % UCL (Assuming Normal Data)			
Student's-t		4.173208	
95 % UCL (Adjusted for Skewness)			
Adjusted-CLT		4.21224	
Modified-t		4.188219	
95 % Non-parametric UCL			
CLT		4.116005	
Jackknife		4.173208	
Standard Bootstrap		4.072105	
Bootstrap-t		4.315338	
Chebyshev (Mean, Std)		5.3474	

General Statistics

SWMU 226 - ECO						
Summary Statistics for		Barium		Summary Statistics for		ln(Barium)
Number of Samples		14		Minimum		3.824284
Minimum		45.8		Maximum		6.077642
Maximum		436		Mean		4.999577
Mean		169.1571		Standard Deviation		0.536365
Median		149.5		Variance		0.287688
Standard Deviation		95.38392				
Variance		9098.092		Shapiro-Wilk Test Statisitic		0.963496
Coefficient of Variation		0.563878		Shapiro-Wilk 5% Critical Value		0.874
Skewness		1.745232		Data are Lognormal at 5% Significance Leve		
95	% UCL (Assuming Normal Data)			Estimates Assuming Lognormal Distribution		
Student's-t		214.3025		MLE Mean		171.3008
				MLE Standard Deviation		98.90168
95	% UCL (Adjusted for Skewness)			MLE Coefficient of Variation		0.577357
Adjusted-CLT		223.7936		MLE Skewness		1.924527
Modified-t		216.2843		MLE Median		148.3504
				MLE 80% Quantile		233.4122
95	% Non-parametric UCL			MLE 90% Quantile		295.5407
CLT		211.0884		MLE 95% Quantile		358.489
Jackknife		214.3025		MLE 99% Quantile		516.5452
Standard Bootstrap		209.2161				
Bootstrap-t		235.2613		MVU Estimate of Median		146.833
Chebyshev (Mean, Std)		280.276		MVU Estimate of Mean		169.3523
				MVU Estimate of Std. Dev.		94.03575
				MVU Estimate of SE of Mean		25.0506
				UCL Assuming Lognormal Distribution		
				95% H-UCL		235.3004
				95% Chebyshev (MVUE) UCL		278.5454
				99% Chebyshev (MVUE) UCL		418.6027
				Recommended UCL to use:		
				H-UCL		

SWMU 226 - ECO		
Summary Statistics for		Mercury
Number of Samples		16
Minimum		0.00225
Maximum		0.369
Mean		0.043749
Median		0.0222
Standard Deviation		0.087876
Variance		0.007722
Coefficient of Variation		2.008634
Skewness		3.827823
Shapiro-Wilk Test Statisitic		0.409346
Shapiro-Wilk 5% Critical Value		0.887
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		0.082262
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		0.102349
Modified-t		0.085766
95 % Non-parametric UCL		
CLT		0.079885
Jackknife		0.082262
Standard Bootstrap		0.079365
Bootstrap-t		0.252419
Chebyshev (Mean, Std)		0.139511

SWMU 226 - ECO		
Summary Statistics for		Vanadium
Number of Samples		14
Minimum		8.78
Maximum		59.9
Mean		26.22714
Median		24.35
Standard Deviation		13.65117
Variance		186.3543
Coefficient of Variation		0.520498
Skewness		1.060119
Shapiro-Wilk Test Statisitic		0.921366
Shapiro-Wilk 5% Critical Value		0.874
Data are Normal at 5% Significance Level		
Recommended UCL to use		Student's-t
95 % UCL (Assuming Normal Data)		
Student's-t		32.68826
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		33.3328
Modified-t		32.86055
95 % Non-parametric UCL		
CLT		32.22827
Jackknife		32.68826
Standard Bootstrap		32.06974
Bootstrap-t		34.59147
Chebyshev (Mean, Std)		42.13027

Addendum D

ADDENDUM D

FIELD REPORT FOR SUPPLEMENTAL INVESTIGATIONS AT SOLID WASTE MANAGEMENT UNITS 96, 187, AND 226 COMPLETED JUNE 2002 (SNL/NM APRIL 2003)

Sandia National Laboratories/New Mexico

FIELD REPORT FOR SUPPLEMENTAL INVESTIGATIONS AT SOLID WASTE MANAGEMENT UNITS 96, 187, AND 226 COMPLETED JUNE 2002

April 2003

Environmental
Restoration
Project

United States Department of Energy
Albuquerque Operations Office

ACRONYMS AND ABBREVIATIONS

ADS	activity data sheet
ARCOC	Analysis Request and Chain of Custody
bgs	below ground surface
BH	borehole
BSI	background soils investigation
CEARP	Comprehensive Environmental Assessment and Response Program
COC	constituent of concern
CVR	Contract Verification Review (form)
DOE	U. S. Department of Energy
DQO	data quality objective
EB	equipment rinsate blank
EGIS	Environmental Geographic Information System
EPA	U. S. Environmental Protection Agency
ER	environmental restoration
FB	field blank
FOP	field operating procedure
g	gram
GP	Geoprobe™
GPS	global positioning system
^3H	tritium
HWB	Hazardous Waste Bureau
ISS	Integrated Safety and Security (Records Center)
KAFB	Kirtland Air Force Base
L_c	critical level
MDA	minimum detectable activity
MDL	method detection limit
NFA	no further action
NMED	New Mexico Environment Department
PCB	polychlorinated biphenyl
PGS	plutonium grid sample
Pu	plutonium
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RL	reporting limit
RSI	Request for Supplemental Information
SAP	sampling and analysis plan
SD	sediment
SMO	sample management office
SNL/NM	Sandia National Laboratories, New Mexico
SVOC	semi-volatile organic compound
SWMU	solid waste management unit
TA	Technical Area
TAL	Target Analyte List (metals)
TB	trip blank
U	uranium
VOC	volatile organic compound

1.0 INTRODUCTION

This Field Report documents the procedures implemented for the additional site characterization at Sandia National Laboratories/New Mexico (SNL/NM) Environmental Restoration (ER) Solid Waste Management Units (SWMUs) 96, 187, and 226. Additional characterization was deemed necessary to support the proposals for No Further Action (NFA) decisions for SWMUs 96, 187, and 226 that were originally submitted to the New Mexico Environment Department (NMED) in May 1997 (SNL/NM May 1997a, 1997b, and 1997c). The characterization requirements were outlined in the *Sampling and Analysis Plan (SAP) for Supplemental Investigations at SWMUs 96, 187, and 226* (SNL/NM December 2001). The SAP provides details of the project background, outputs from the data-quality-objective (DQO) process for this sampling and analysis activity, the required field, analytical, and quality control (QC) procedures, methods, and requirements.

The operational and regulatory histories of these SWMUs are summarized below. The SWMUs have many commonalties in location, operations, and construction. Therefore, it was considered expedient to perform additional site characterization activities for all three SWMUs and to discuss these activities in a single field report. This field report is limited to describing activities associated with the collection of samples. The analytical results and significance of these results are not discussed in the report but instead will be presented in the Response to NMED's Technical Comments (NMED March 1998) that is currently being prepared.

1.1 Project Description--Background

SWMUs 96, 187, and 226 were first listed as SWMUs in the, "Comprehensive Environmental Assessment and Response Program (CEARP), Phase 1: Installation Assessment, Sandia National Laboratories, Albuquerque, New Mexico," (DOE September 1987). SWMU 96 is associated with the storm drain system in Technical Area (TA) I, SWMU 187 is associated with the sanitary sewer system in TA-I. SWMU 226 is associated with the Acid Waste (drain) Line originating in TA-I and extending south to an outfall just north of Tijeras Arroyo near TA-IV (SWMU 46). All three SWMUs, and their historical backgrounds, are described in detail in the "Technical Area I (ADS 1302), RCRA Facility Investigation Work Plan," (SNL/NM February 1995).

The TA-I storm drain system consists of underground pipe, open ditches, and culverts that collect storm runoff and convey it outside TA-I onto Kirtland Air Force Base (KAFB) property or to the Tijeras Arroyo. It was listed as SWMU 96 in the CEARP following the Phase 1 informational interviews because of reports that the system may have received contaminants from various point and non-point sources. SWMU 96 boundaries include the soils adjacent to the storm drain underground pipe in particular near pipe segments where significant cracks, breaks, or separated joints occur; and the sediments deposited in the open ditches. SWMU 96 does not include the storm water actually conveyed during precipitation events.

The TA-I sanitary sewer system is constructed of underground, vitrified clay pipe which collects and conveys sanitary and industrial effluents to the KAFB sanitary sewer or to the City of Albuquerque's Tijeras Arroyo interceptor sewer main and wastewater treatment works. The system was listed as SWMU 187 in the CEARP following the Phase 1 informational interviews because of the potential for small quantities of solvents, or other hazardous or radioactive

chemicals, to have been disposed in sewer drains. SWMU 187 is limited in extent to the soils adjacent to the sanitary sewer lines where there have been pipe breaks, cracks, or loose joints where contaminants could have been released. Wastewater or solid materials carried by the system are not included in SWMU 187.

The acid waste line is a buried, vitrified clay pipe running from TA-I south to a surface discharge point just southwest of TA-IV. The line is a relic structure from the 1950s that used to carry liquid wastes from buildings in TA-I to a discharge point on the edge of the mesa above Tijeras Arroyo. The use of the line was discontinued in the mid- to late-1960's. Sometime after discontinuance the northern portions of the line were isolated and incorporated into the sanitary sewer system. The remaining portions of the line were abandoned in place. The acid waste line was designated SWMU 226 after the CEARP Phase 1 interviews. North of I Street (in the center of TA-I), SWMU 226 is limited to soils adjacent to the pipeline, particularly those areas where pipe breaks, cracks, or loose joints exist. From I Street south to the pipeline outfall (SWMU 46), SWMU 226 includes all the abandoned line, sediments within the pipe, and soil near the abandoned line where the potential COCs have been detected. Soils at the discharge point are not part of SWMU 226 but rather are designated and being investigated as SWMU 46.

The U.S. Department of Energy (DOE) and SNL/NM submitted a work plan to the NMED in February 1995 (SNL/NM February 1995) detailing the programs and plans for investigating these SWMUs as well as all other designated SWMUs in TA-I. SNL/NM Facilities Departments had been, and continue to be, involved with infrastructure upgrades and new construction within TA-I, including removal, repair, and/or replacement of sewer and drain lines. Working from video camera surveys of the underground line interiors obtained by SNL/NM Facilities, SNL/NM ER located significant breaks and cracks in the lines and developed a sampling and analysis program to characterize any contaminants that may have been released. A conceptual model was developed and samples were collected adjacent to the pipe deficiencies and at or below the pipe depth. The sampling strategy, approved by NMED prior to implementation, assumed that any materials escaping the pipe from breaks or cracks would spread downward and outward and be detectable in a conical plume beneath and adjacent to the pipe. Samples were collected using either a bucket-type soil hand-auger or a hydraulically powered Geoprobe™ push-type sampler.

Investigatory sampling and analysis were completed at the SWMUs during the spring and summer of 1995. Samples from all three SWMUs were collected using similar strategies, procedures, and analyzed for the same list of parameters (volatile organic compounds [VOCs], semi-volatile organic compounds [SVOCs], polychlorinated biphenyls [PCBs], the Environmental Protection Agency's [EPA] Target Analyte List [TAL] metals, gamma-emitting radionuclides, isotopic uranium [U] and plutonium [Pu], and tritium [^{3}H]). Field quality control samples were also collected in accordance with the TA-I work plan (SNL/NM February 1995). In summary the 1995 sampling event consisted of:

- Fifty-five subsurface soil samples were collected adjacent to the underground storm-drain pipes in SWMU 96. Additionally, 29 sediment samples were collected from surfaces at two storm-drain inlets and five storm-drain outfall areas. These locations were where the storm drain system transitioned from open ditch to underground pipe, and vice-versa.
- Eighty-six subsurface soil samples were collected in SWMU 187.

- Twenty-four subsurface soil samples were collected in SWMU 226 and analyzed.
- Three sediment samples collected from within the acid waste line itself (SWMU 226) were collected and analyzed.

Sample locations were plotted on maps and the laboratory analyses results were compiled and reviewed. In May 1997, site characterization data and risk assessment calculations for all three SWMUs were provided to NMED in the 7th round submission of proposals for NFA (SNL/NM May 1997a, 1997b, and 1997c).

The NMED responded to the specific NFA proposals for these three SWMUs with a Request for Supplemental Information (RSI) in a letter dated March 17, 1998, (NMED March 1998). In the letter, NMED identified numerous general shortcomings in the NFA submittal and identified specific deficiencies relative to the characterization data reported from all three SWMUs. The comments and concerns expressed by NMED were substantial. Based upon the information reviewed, NMED indicated that, in general, there appeared to be:

- metals (inorganics) concentrations in the subsurface soil samples exceeding background values, and
- low but detectable VOCs, PCBs, Pu, and ^{3}H at many of the sampling locations.

Even though the soil concentrations of these constituents of concern (COC) were low and the risk assessment conclusions were favorable for NFA status, NMED indicated that the analytical detection limits for many samples were too high and that the sources of contamination had not been determined. (The NMED review of the NFA proposals did not include evaluation of the risk assessment calculations.)

In September 1998, SNL/NM ER voluntarily returned to the five previously sampled storm drain outfall locations (SWMU 96) and collected additional sediment and subsurface soil samples. Sampling was performed to better define the nature and extent of possible contaminants. This action by SNL/NM ER was partially driven by the NMED RSI but also necessary because SNL/NM Facilities planned construction in the area that would change the ditch configurations for the storm drain. Samples were collected at the original surface soil locations, at other surface locations offset from the original locations, and at subsurface depths down to 20 feet below ground surface (bgs). A total of 113 additional samples were collected during the September 1998 field investigation.

The data obtained from the additional investigation of the SWMU 96 storm drain sediments were informally provided to NMED in a working meeting on March 3, 1999 (Fleck March 1999). NMED could not comment on those data at that time. However, SNL/NM ER and NMED did work toward resolving differences with regard to the RSI for these SWMUs.

SNL/NM ER Project personnel met with NMED Hazardous Waste Bureau (HWB) in July and September 2001, and further discussed the site characterizations and NFA recommendations for SWMUs 96, 187, and 226. SNL/NM provided NMED with revised site maps and data tabulations, as requested. In a working meeting on September 21, 2001 (Lyon September 2001), and after completing additional data and document reviews, NMED/HWB requested SNL/NM complete several specific site characterization tasks prior to re-submitting the NFA recommendations. The NMED/HWB requirements communicated in the September 21, 2001 meeting supercede NMED's March 17, 1998 RSI and technical comments (NMED March 1998) to the original NFA recommendations. It should be noted that there is a discrepancy between the number of samples originally requested in the NMED's 1998 technical comments and the

number of samples agreed upon in the September 2001 meeting. NMED's 1998 technical comments had requested re-sampling at 134 locations in the three SWMUs, and NMED had agreed to sample 54 locations in the September 2001 meeting. NMED's new requirements included: 1) re-sampling and additional offset sampling at specified locations for specific constituents, and 2) systematic grid sampling for plutonium in surface soils in TA-I. These new NMED requirements for additional site characterization sampling in TA-I lead to the current DQOs and development of the SAP (SNL/NM December 2001).

1.2 Supplemental Investigation Objective

The NMED required additional site characterization prior to accepting SWMUs 96, 187, and 226 for NFA status. The objective of the supplemental investigation was to collect and provide the requested additional information detailed in the September 21, 2001 meeting with SNL/NM ER and NMED (Lyon September 2001).

The SAP (SNL/NM December 2001) provided details for the specific requirements to be followed for collecting and analyzing the additional soil samples. COCs included VOCs, SVOCs, PCBs, metals, Pu, and ^{3}H. The sampling and analysis activities were designed to meet the following objectives:

- Resample those locations specified by NMED where analytical results showed VOCs or SVOCs at levels of concern. In most instances a level of concern was prompted by unusually high laboratory reporting limits or method detection limits.
- Collect and analyze additional soil samples offset from the original sampling locations. Offset samples were collected to document the COC source.
- Complete a systematic surface soil survey of plutonium concentrations in TA-I. This survey was to aid in interpreting the original plutonium concentration data.

2.0 DATA QUALITY OBJECTIVES

As described in the SAP, additional sampling and analysis was conducted at SWMUs 96, 187, and 226 to provide the supplemental information requested by NMED/HWB and bolster the SNL/NM proposals for NFA. The additional site characterization data has increased our knowledge of the SWMUs and has better defined the nature, extent, and source of any suspected contamination. Sample analysis data collected during this investigation had sufficiently low detection levels and is of sufficient quality (e.g., free of inadvertent laboratory contamination or other field or laboratory quality control errors) for use in justifying an NFA Proposal.

The supplemental investigations were limited in scope to SWMUs 96, 187, and 226 as delineated in the TA-I (ADS 1302) RCRA Facility Investigation Work Plan (SNL/NM February 1995). In general terms, the project scope was limited to those soils adjacent to significant cracks and breaks in the storm drain pipes, the sanitary sewer, and the acid waste line, principally in TA-I. Soils at the outlets of the storm drainpipe are also included in this project scope. Additionally, at the request of NMED, a surface soil survey of plutonium radioactivity

concentrations in surface soil throughout TA-I was included as part of this investigation. For the plutonium survey, the geographical scope described herein encompasses all of the surface soils lying within the main portion of TA-I. Although the plutonium survey samples were not specifically collected at or near pipelines or ditches associated with SWMU 96, 187, or 226, these samples are commonly referred to in records and in the database as the "SWMU 96, 187, and 226 plutonium grid samples".

All the soil and sediment samples originally collected and reported in the NFA proposals (SNL/NM May 1997a, 1997b, and 1997c) were analyzed for a comprehensive suite of constituents. These included VOC, SVOC, PCB, TAL metals, gamma spectrometry, isotopic U, isotopic Pu, and ^{3}H. Based upon earlier sampling and analysis results, and NMED/HWB guidance, COCs for analysis varied with re-sampling and offset sampling locations. NMED selected the constituents and locations for the additional investigation on the basis of the following:

1. Earlier sampling indicated possible contamination,
2. Analytical reporting limits were too high, or
3. Contaminant source was not determined.

These samples were collected by sampling original locations and offset sampling locations in accordance with guidance from NMED (Lyon September 2001). Samples collected under this investigation were analyzed at an off-site laboratory. The parameters that were analyzed varied by locations and were those specified in the SAP (SNL/NM December 2001). The parameters included:

- VOCs—EPA Method 8260B
- SVOCs—EPA Method 8270C
- PCBs—EPA Method 8082
- Metals—EPA Methods 6010B, or 6020, and/or 7000 series
- Isotopic plutonium
- Tritium

Measurement sensitivities (Method Detection Limit [MDL], Reporting Limit [RL], Minimum Detectable Activity [MDA], and Critical Level [L_c]), analytical accuracy, and analytical precision reported by the laboratories are in accordance with contract requirements issued by the Sample Management Office (SMO). SMO requirements for these quality measurement parameters were sufficient for the resulting data to meet project requirements.

In addition to quality control measurements generated in the laboratories, field quality control samples were collected and analyzed. Field quality control samples included field duplicate (or co-located samples) and equipment rinsate blanks, field blanks, and trip blanks for VOC analysis. Frequency requirements for field quality control sample collection followed specifications in the "Technical Area I (ADS 1302) RCRA Facility Investigation Work Plan" (SNL/NM February 1995).

3.0 SAMPLING STRATEGIES AND LOCATIONS

3.1 Sampling Strategy

Sampling strategies used in this investigation follow earlier investigations performed at SWMUs 96, 187, and 226, that assumed models of contaminant migration based upon the design flows

within the sanitary or storm drains. Contaminants may have migrated from significant cracks or breaks in the underground piping downward and outward at 45-degree angles from the pipe deficiencies. Contaminants would not be expected in the soils above the flow line of the deficiencies in the underground pipe. Earlier investigations utilized field screening tests to guide sampling depths for characterizing possible contaminant releases from cracks or breaks in the underground piping. Samples were collected within 18-inches lateral to, and at or below significant pipe breaks or cracks. If field-screening methods indicated any contamination then samples were collected from deeper zones in order to characterize the vertical extent of contamination. Additionally, where pipe breaks or cracks were found to be "clustered," instead of sampling adjacent to all the observed pipe faults only the downstream or largest breach was sampled in order to obtain data for the local "worst case" scenario.

The sampling strategies for this investigation addressed the NMED requirements so as to provide the requested information in further support of the NFA recommendations. Sample locations were selected by the NMED and presented to SNL/NM ER Project during a September 21, 2001 meeting (Lyon September 2001). During the 2002 sampling, selected locations determined by the 1995 investigation with detections of organic compounds were resampled at the original (1995) sampling location and depth and were analyzed for organic compounds, only. At many of the VOC locations concern was prompted by unusually high laboratory reporting limits or method detection limits. Offset samples were located at 20- to 40-feet away from the original (1995) sampling points, perpendicular to the underground pipe axis, and at the same depth as the original (1995) sample and analyzed for location-specific COCs. In summary, when the COCs included organic compounds there were three samples collected: 1) a resample of the original (1995) soil boring, 2) an offset sample located to one side of the original location, and 3) an offset sample located to the opposite side of the original location. When metals or radionuclides were the COC of interest then only two offset samples (on opposite sides of the original sample location) were collected. Offset samples were collected from the same depths as the original (1995) samples.

In some instances the offset samples could not be located at 20-feet from the original sample point because of aboveground or underground obstructions. In most of these instances the sampling location was moved along the same perpendicular line at a distance of 9 to 37 ft. from the original (1995) sample point. For several locations, NMED/HWB personnel inspected the location and selected an appropriate offset sampling point.

The plutonium survey sampling was designed to determine the statistical significance of plutonium concentrations in surface soil in the main portion of TA-I. First, a regular grid was constructed over a map of TA-I. The portion of TA-I to be covered by the grid was mutually agreed upon by SNL ER and NMED/HWB. The grid consisted of 36 rectangles. TA-I surface soils have been highly disturbed by construction activities, i.e. the ground is nearly covered with buildings, roads, walkways, parking lots, etc. Therefore, individual sampling points within each grid element were located by the field team using professional judgment and approved by the NMED/HWB. Sampling points were selected from areas where surface soils are present and preference was given to locations appearing to be natural or less disturbed than others.

The majority of the sampling was performed in May and June of 2002 (SNL/NM June 2002). However, four SWMU 96 locations were sampled in January 2002 due to storm-water drain improvements that impacted the sampling locations. Sampling methods used included both manual and machine-power assisted methods. Surface and near sub-surface soils were manually sampled using a scoop or spade, or a bucket-type hand auger. Subsurface soils were collected using the Geoprobe™ push-tool technology.

Quality control samples were collected or generated both in the field and laboratory. As part of the data validation process, analytical results from QC samples or QC spike analyses were compared to established acceptance criteria thereby providing internal quality control checks. Field QC samples were initiated in the field and sent to the off-site laboratory for analysis along with the environmental samples.

4.0 SAMPLE DOCUMENTATION AND CUSTODY

Following standard procedures, sample collection, custody, and shipping were thoroughly documented to ensure the integrity of the samples from the time of collection until analysis. The SMO provided unique sample identification numbers (field numbers) for each sample collected. These numbers were generated by computer, and tracked, in order to eliminate any duplication. A sample number is assigned to all sample containers and fractions of the same environmental media collected from the same location during the same sampling event. The SNL/NM ER Project also assigned a coded sample identifier for each sample collected. ER Project sample identifiers take the form of:

TIAAA-BBB-CCC-DDD

In this format, TI refers to TA-I to distinguish which ADS is being investigated.

AAA refers to the SWMU number:

096	Storm Drain System
187	Sanitary Sewer System
226	Old Acid Waste Line
BSI	Background Soil Investigation (used for the plutonium grid samples)

BBB refers to a description of the type of location:

BH	boreholes (drilled or hand augered)
EB	equipment rinsate blank
FB	field blank
GP	Geoprobe™ sample
PGS	plutonium grid samples
SD	sediment
TB	trip blank

CCC refers to the location number, assigned sequentially. Several previously sampled locations were resampled as described in the SAP. Resampling locations retained their original location number assignment, but the suffix "R" was added. For example, a previously sampled location was designated "042" for the CCC location code. The same location resampled was designated "42R". New sample locations offset from previously established locations were assigned new sequential location number codes.

DDD refers to the sample depth in feet.

The Analysis Request and Chain of Custody form (ARCOC) is controlled by the SMO. Sampling team members entered sample description information on the ARCOC form immediately after collection and established the documented chain of custody. The unique control number for the ARCOC was obtained from the SMO and entered on the ARCOC. Upon completion of the ARCOC, the samples were transported to the SMO Shipping Facility in Building 928. The ARCOC was checked at the shipping facility for accuracy and completeness. A member of the sampling team relinquished custody of the samples to the Shipping Facility manager when they signed and dated the ARCOC. The AR/COC numbers used for the supplemental investigation are listed in Table 1, along with the other sampling summary information. The details for the resamples and offset samples from SWMU 96, 187, and 226 are provided in Table 2; and the details for the plutonium grid samples are provided in Table 3.

In summary, Tables 1 through 3 show that 22 locations were sampled in SWMU 96 (Figure 1); 21 locations were sampled in SWMU 187 (Figure 2); and 8 locations were sampled in SWMU 226 (Figure 2). Additionally, 33 locations were sampled as part of the plutonium grid survey (Figure 3).

Two types of field measurements were made--sample location survey and field sample screening. A location survey was required to:

- Navigate to previously sampled locations for re-sampling,
- Document and record new sampling locations, and
- Establish the surface soil grid for the plutonium survey in TA-I.

Navigation to previously sampled points was accomplished with support from Environmental Geographic Information System (EGIS). EGIS retrieved New Mexico State Plane coordinates for previously sampled locations from the EGIS database. The previously sampled coordinate locations were electronically loaded into the EGIS Global Positioning System (GPS). Sample locations were marked for reference with stakes, pin flags, nails, or paint.

All new sample locations (including samples collected from the plutonium survey grid) were surveyed using the EGIS GPS. As the sampling crew moved from location to location, the EGIS personnel followed them to new sampling locations with the GPS and took readings to obtain the coordinates. These locations were converted to New Mexico State Plane coordinates and downloaded to the EGIS database and are presented in Tables 2 and 3.

Field screening measurements were collected at each soil boring location in accordance with the TA-I Site Health and Safety Plan to monitor for worker health and safety. A photoionization detector was used to monitor VOCs in and around the boreholes, in soil retrieved by the sampling device, and in the workers' breathing zones. Ambient air background measurements, periodic measurements of soil vapors, and breathing zone air measurements were recorded on field forms or in field logbooks. Although VOCs were monitored, none were detected (SNL/NM June 2002).

Sampling equipment was decontaminated before use and between sampling locations. Equipment decontamination generally involved dry brushing to remove soil and debris, a wet wash with detergent solution, wet rinses with deionized water, followed by air-drying. Equipment decontamination followed the field operating procedure, "General Equipment Decontamination," FOP 94-26, and "Decontaminating Drilling and other Field Equipment," FOP 94-57. Disposable

protective clothing and supplies was not decontaminated after use but was bagged and disposed of following SNL/NM waste management procedures.

Surface and near sub-surface soil sampling were performed in accordance with documented procedures. The following SNL/NM ER Project procedures were followed, as appropriate.

- Hand Auger and Thin-Wall Tube Sampler, FOP 94-23,
- Spade and Scoop Method for Collection of Soil Samples, FOP 94-52,
- Shallow Subsurface Drilling and Soil Sampling Using Mechanized Hydraulic Augers or the Geoprobe™ Soil Core Sampler, FOP 95-23.

As samples were collected they were labeled, entered on the ARCOC, and temporarily stored with "blue-ice" in picnic-type ice chests, or coolers. Each day, at the end of field activities, the collected samples were transported to the SMO sample shipping facility for shipment to the off-site laboratory.

The quantities of waste generated by this sampling task were minimal and included borehole spoils, personal protective clothing, decontamination solutions, common solid waste (trash). All waste was handled per the waste management plan submitted to the SNL/NM ER Project, Department 6133, waste management coordinator. For the hand auger or Geoprobe™ hydraulic push tool locations, the borehole cuttings were returned to the borehole after sampling so there was no soils to manage as waste. Because of the small quantities of decontamination fluids that were generated, all aqueous detergent solutions and rinse waters were disposed of on the ground surface.

The off-site laboratories analyzing samples for this task followed documented analytical methods and procedures. Chemical analysis methods were EPA methods published by the Office of Solid Waste in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846" (EPA 1986).

Verification and validation of laboratory analytical data reports followed procedures established by the SMO and the ER Project. After the analytical laboratory completed sample analysis and generated the analytical report, the laboratory report was forwarded to the SMO. SMO then verified that information contained in the report was in compliance with contract requirements. Verification is documented on the "Contract Verification Review Form" (CVR) (SMO-05-03). After the CVR was completed, the analytical data report was sent to a third party for independent data validation. Data validation qualifiers were assigned to individual analytical results, as necessary in accordance with "Data Validation Procedure for Chemical and Radiochemical Data" (AOP 00-03). After analytical data verification and validation were completed, the analytical data with laboratory assigned data flags and qualifiers, and data validation qualifiers, were electronically uploaded into the ERDMS database.

All original field records and forms, field notebooks, analytical reports, data validation reports, Chain of Custody Records, etc. generated during execution of this sampling and analysis project were submitted to the Integrated Safety and Security (ISS) Records Center for cataloging and storage. The ISS Records Center has cataloged and entered all documents into the Safety, Health, and Environment Automated Records System database.

In summary, the sampling and analysis procedures outlined in the NMED-approved SAP (SNL/NM December 2001; NMED February 2002) were followed during the field implementation. The quality of the data generated by the sampling event is sufficient to meet the DQOs identified in the SAP. Analytical data will be posted in summary tables for presentation and transmittal to NMED as a response to their Technical Comments on the SWMU 96, 187, and 226 NFA Proposal (NMED March 1998). Data will be reported in table formats following reporting conventions developed by the ER Project.

5.0 REFERENCES

DOE, see U. S. Department of Energy

EPA, see U. S. Environmental Protection Agency

Fleck, H., March 3, 1999. Meeting Notes in Memorandum to B. Langkopf, March 3, 1999, Sandia National Laboratories, Albuquerque, New Mexico.

Lyon, M., September 21, 2001. Meeting Notes in Memorandum to B. Langkopf, September 21, 2001, Sandia National Laboratories/New Mexico, Albuquerque, New Mexico.

NMED, see New Mexico Environment Department

New Mexico Environment Department (NMED), March 1998. NMED Technical Comments: SNL SWMUs 96, 187, 226, Proposals for NFA, 7th Round, May 1997." Letter from Robert S. Dinwiddie, NMED to Michael Zamorski, U. S. Department of Energy Albuquerque Operations Office, dated March 17, 1998, Santa Fe, New Mexico.

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Sandia National Laboratories/New Mexico (SNL/NM), February 1995. "Technical Area I (ADS 1302), RCRA Facility Investigation Work Plan, Volumes 1 and 2." U.S. Department of Energy, Albuquerque Operations Office and Sandia National Laboratories, Environmental Restoration Project, Albuquerque, New Mexico.

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Sandia National Laboratories/New Mexico (SNL/NM), May 1997b. "Proposal for Risk-Based No Further Action Environmental Restoration Site 187, Sanitary Sewer System, Operable Unit 1302." Environmental Restoration Project, Sandia National Laboratories, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), May 1997c. "Proposal for Risk-Based No Further Action Environmental Restoration Site 226, Acid Waste Line, Operable Unit 1302." Environmental Restoration Project, Sandia National Laboratories, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), December 2001. "Sampling and Analysis Plan for Supplemental Investigations at Solid Waste Management Units 96, 187, and 226." Environmental Restoration Project, Sandia National Laboratories, New Mexico. December 17, 2001.

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Table 1 May – June 2002 Supplemental Investigation Sampling Summary

ARCOC Number	SWMU	Ship Date	Number of Samples	Analytes
605198	96	10-JAN-02	2	Iso-Pu
			4	RCRA Metals
			1	RCRA Metals (dup)
			1	RCRA Metals (EB)
			3	SVOCs
			1	SVOCs (EB)
605533	96	23-May-02	6	Iso-Pu
			1	Iso-Pu (dup)
			3	PCBs
			1	PCBs (EB)
			4	RCRA Metals
			1	RCRA Metals (dup)
			1	RCRA Metals (EB)
			6	VOCs
			1	VOCs (dup)
			1	VOCs (TB)
			1	VOCs (EB)
605534	187	30-MAY-02	4	Iso-Pu
			1	Iso-Pu (dup)
			2	RCRA Metals+Ni
			1	RCRA Metals (EB)
			3	SVOCs
			1	SVOCs (EB)
			4	Tritium
			3	VOCs
			1	VOCs (TB)
			1	VOCs (FB)
605535	187	13-JUN-02	1	Iso-Pu
			7	Tritium
			3	VOCs
			1	VOCs (dup)
			1	VOCs (TB)
			1	VOCs (EB)
605536	226	12-JUN-02	4	Iso-Pu
			4	SVOCs
			1	SVOCs (EB)
			3	VOCs
			1	VOCs (TB)
			1	VOCs (FB)
605537	Plutonium Grid Samples	19-JUN-02	33	Iso-Pu
			2	Iso-Pu (dup)

Notes:
All Samples sent to General Engineering Laboratories (GEL), Charleston SC.

ARCOC	=	Analysis Request and Chain of Custody.
dup	=	Duplicate sample.
EB	=	Equipment blank.
FB	=	Field blank.
Iso-Pu	=	Isotopic plutonium.
PCBs	=	Polychlorinated biphenyls.
RCRA	=	Resource Conservation and Recovery Act.
SVOCs	=	Semivolatile organic compounds.
TB	=	Trip blank.
VOCs	=	Volatile organic compounds.

Table 2. SWMU 96, 187, and 226 Resampling and Offset Samples for Off-Site Laboratory Analyses

AR-COC/ SMO Sample Number	Previous Sample ID (or associated sample)	ER Sample ID	Remarks[b]	Sample Type	Sample Depth[a] (ft)	Northing	Easting	VOC (8260B)	SVOC (8270C)	PCB (8082)	RCRA Metals	Isotopic Plutonium	Tritium
605533/ 059185	T1096-GP-001	T1096-GP-01R	3.7 ft east of original point	Soil	9	1475242.00	410433.03	X					
605533/ 059186	T1096-GP-001	T1096-GP-090	Offset 19 ft east of original point	Soil	9	1475241.88	410448.56	X				X	
605533/ 059186	T1096-GP-001	T1096-GP-090	Offset 19 ft east of original point	Duplicate	9	1475241.88	410448.56					X	
605533/ 059187	T1096-GP-001	T1096-GP-091	Offset 20 ft west of original point	Soil	9	1475241.88	410409.84	X				X	
	T1096-GP-011		Original Point			1474895.00	410910.69						
605533/ 059188	T1096-GP-011	T1096-GP-092	Offset 19 ft east of original point	Soil	6	1474894.88	410929.22				X	X	
605533/ 059189	T1096-GP-011	T1096-GP-093	Offset 18 ft west of original point	Soil	6	1474893.75	410892.41				X	X	
605533/ 059189	T1096-GP-011	T1096-GP-093	Offset 18 ft west of original point	Duplicate	6	1474893.75	410892.41				X		
	T1096-GP-018		Original Point			1474900.63	411687.50						
605533/ 059190	T1096-GP-018	T1096-GP-094	Offset 20 ft east of original point	Soil	5	1474900.38	411707.09					X	
605533/ 059191	T1096-GP-018	T1096-GP-095	Offset 12 ft west of original point	Soil	5	1474902.13	411675.31					X	
605533/ 059192	T1096-GP-047	T1096-GP-47R	Resampled at original point	Soil	6	1472898.63	412958.88	X					
605533/ 059192	T1096-GP-047	T1096-GP-47R	Resampled at original point	Duplicate	6	1472898.63	412958.88	X					
605533/ 059193	T1096-GP-047	T1096-GP-096	Offset 20 ft north of original point	Soil	6	1472918.38	412958.97	X					
605533/ 059194	T1096-GP-047	T1096-GP-097	Offset 20 ft south of original point	Soil	6	1472879.13	412956.16	X					
605533/ 059195	T1096-SD-002	T1096-SD-02R	Resampled original point	Sediment	0	1471716.25	411596.25			X			
605533/ 059196	T1096-SD-002	T1096-SD-030	Offset 20 ft east of original point	Sediment	0	1471716.50	411616.13			X	X		
605533/ 059197	T1096-SD-002	T1096-SD-031	Offset 19 ft west of original point	Sediment	0	1471718.00	411577.09			X	X		
605533/ 059198		T1096-GP-00-TB	Trip Blank	TB	NA	NA	NA	X					
605533/ 059199		T1096-GP-00-FB	Field Blank	FB	NA	NA	NA	X					
605533/ 059200		T1096-GP-00-EB	Equipment Blank	EB	NA	NA	NA				X		
605533/ 059201		T1096-GP-00-EB	Equipment Blank	EB	NA	NA	NA			X			
605198/ 058576	T1096-SD-015	T1096-SD-15R	Resampled original point	Sediment	0	1472517.25	413778.28		X				
605198/ 058577	T1096-SD-015	T1096-SD-032	Offset 19 ft east of original point	Sediment	0	1472516.38	413797.22		X				
605198/ 058578	T1096-SD-015	T1096-SD-033	Offset 21 ft west of original point	Sediment	0	1472519.25	413757.09		X				
	T1096-SD-023		Original Point			1471890.13	414110.66						
605198/ 058579	T1096-SD-023	T1096-SD-034	Offset 21 ft north of original point	Sediment	0	1471911.63	414109.63				X		
605198/ 058587	T1096-SD-023	T1096-SD-034	Offset 21 ft north of original point	Duplicate	0	1471911.63	414109.63				X		
605198/ 058580	T1096-SD-023	T1096-SD-035	Offset 20 ft south of original point	Sediment	0	1471869.63	414109.78				X		
	T1096-GP-063		Original Point			1472205.25	413194.63						

Refer to footnotes at end of table.

Table 2. SWMU 96, 187, and 226 Resampling and Offset Samples for Off-Site Laboratory Analyses (Continued)

AR-COC/ SMO Sample Number	Previous Sample ID (or associated sample)	ER Sample ID	Remarks[b]	Sample Type	Sample Depth[a] (ft)	Northing	Easting	VOC (8260B)	SVOC (8270C)	PCB (8082)	RCRA Metals	Isotopic Plutonium	Tritium
605198/ 058574	T1096-GP-063	T1096-GP-098	Offset 16 ft east of original point	Soil	10	1472201.38	413210.75				X		
605198/ 058575	T1096-GP-063	T1096-GP-099	Offset 12 ft west of original point	Soil	10	1472205.63	413182.72				X		
	T1096-GP-079		Original Point			1471872.63	414099.72						
605198/ 058581	T1096-GP-079	T1096-SD-036	Offset 20 ft north of original point	Sediment	0	1471893.00	414099.72					X	
605198/ 058582	T1096-GP-079	T1096-SD-037	Offset 20 ft south of original point	Sediment	0	1471852.63	414101.63					X	
605198/ 058585		T1096-EB	Equipment Blank	EB	NA	NA	NA				X		
605198/ 058586		T1096-EB	Equipment Blank	EB	NA	NA	NA		X				
	T1187-BH-032		Original Point			1475152.13	411222.56						
605534/ 059247	T1187-BH-032	T1187-BH-088	Offset 26 ft east of original point	Soil	7	1475154.00	411248.94					X	
605534/ 059248	T1187-BH-032	T1187-BH-089	Offset 29 ft west of original point	Soil	7	1475152.38	411195.00					X	
605534/ 059248	T1187-BH-032	T1187-BH-089	Offset 29 ft west of original point	Duplicate	7	1475152.38	411195.00					X	
	T1187-BH-034		Original Point			1475132.13	410924.38						
605534/ 059249	T1187-BH-034	T1187-BH-090	Offset 20 ft southeast of original	Soil	4	1475120.25	410937.13						X
605534/ 059250	T1187-BH-034	T1187-BH-091	Offset 20 ft northwest of original	Soil	4	1475149.13	410912.72						X
	T1187-BH-044		Original Point			1474515.75	411102.88						
605534/ 059251	T1187-BH-044	T1187-BH-092	Offset 20 ft north of original point	Soil	7	1474535.88	411103.28					X	
605534/ 059252	T1187-BH-044	T1187-BH-093	Offset 24.5 ft south of original	Soil	7	1474490.63	411102.84					X	
	T1187-BH-049		Original Point			1474012.38	410579.94						
605535/ 059267	T1187-BH-049	T1187-BH-094	Offset 25 ft north of original point	Soil	7	1474037.50	410579.97					X	X
	T1187-BH-049	T1187-BH-095	2nd Offset Sample Not Collected; Location on KAFB Property										
605534/ 059255	T1187-BH-056	T1187-BH-56R	Resampled original point	Soil	9	1473478.50	411753.47		X				
605534/ 059256	T1187-BH-056	T1187-BH-096	Offset 11 ft east of original point	Soil	9	1473478.38	411763.81		X				
605534/ 059257	T1187-BH-056	T1187-BH-097	Offset 20 ft west of original point	Soil	9	1473475.75	411733.09		X				
605534/ 059258	T1187-BH-060	T1187-BH-60R	Resampled original point	Soil	5	1472935.88	411887.94	X					
605534/ 059259	T1187-BH-060	T1187-BH-098	Offset 9.8 ft north of original point	Soil	5	1472946.63	411887.88	X					X
605534/ 059260	T1187-BH-060	T1187-BH-099	Offset 20 ft south of original point	Soil	5	1472915.38	411886.75	X					X
	T1187-BH-061		Original Point			1473573.00	411388.47						
605534/ 059261	T1187-BH-061	T1187-BH-100	21 ft east of original point	Soil	8	1473573.00	411408.84				X		
605534/ 059262	T1187-BH-061	T1187-BH-101	Offset 20 ft west of original point	Soil	8	1473573.00	411369.28				X		
605534/ 059263		T1187-BH-00-TB	Trip Blank	TB	NA	NA	NA	X					
605534/ 059264		T1187-BH-00-FB	Field Blank	FB	NA	NA	NA	X					

Refer to footnotes at end of table.

Table 2. SWMU 96, 187, and 226 Resampling and Offset Samples for Off-Site Laboratory Analyses (Concluded)

AR-COC/ SMO Sample Number	Previous Sample ID (or associated sample)	ER Sample ID	Remarks[b]	Sample Type	Sample Depth[a] (ft)	Northing	Easting	VOC (8260B)	SVOC (8270C)	PCB (8082)	RCRA Metals	Isotopic Plutonium	Tritium
605534/ 059265		T1187-BH-00-EB	Equipment Blank	EB	NA	NA	NA		X				
605534/ 059266		T1187-BH-00-EB	Equipment Blank	EB	NA	NA	NA				X		
	T1187-BH-065		Original Point			1474128.75	411637.97						
605535/ 059268	T1187-BH-065	T1187-BH-102	Offset 20.7 ft east of original pt.	Soil	11	1474127.50	411658.59						X
605535/ 059269	T1187-BH-065	T1187-BH-103	Offset 20 ft west of original point	Soil	11	1474129.38	411619.78						X
605535/ 059270	T1187-BH-071	T1187-BH-71R	Resampled original point	Soil	16	1473741.13	412926.06	X					
605535/ 059270	T1187-BH-071	T1187-BH-71R	Resampled original point	Duplicate	16	1473741.13	412926.06	X					
605535/ 059271	T1187-BH-071	T1187-BH-104	Offset 22.5 ft east of original pt.	Soil	16	1473741.63	412949.09	X					
605535/ 059272	T1187-BH-071	T1187-BH-105	Offset 22 ft west of original point	Soil	16	1473736.50	412903.84	X					
605535/ 059273	T1187-BH-090	T1187-BH-090R	Offset Sample/Redo, same event	Soil	4	1475120.25	410937.13						X
605535/ 059274	T1187-BH-091	T1187-BH-091R	Offset Sample/Redo, same event	Soil	4	1475149.13	410912.72						X
605535/ 059275	T1187-BH-098	T1187-BH-098R	Offset Sample/Redo, same event	Soil	5	1472946.63	411887.88						X
605535/ 059276	T1187-BH-099	T1187-BH-099R	Offset Sample/Redo, same event	Soil	5	1472915.38	411886.75						X
605535/ 059277		T1187-BH-00-TB	Trip Blank	TB	NA	NA	NA	X					
605535/ 059278		T1187-BH-00-FB	Field Blank	FB	NA	NA	NA	X					
605536/ 059320	T1226-GP-009	T1226-GP-09R	Resampled original point	Soil	6	1474551.50	411681.00		X				
605536/ 059321	T1226-GP-009	T1226-GP-025	Offset 37 ft east of original point	Soil	6	1474550.88	411716.59		X				
605536/ 059322	T1226-GP-009	T1226-GP-026	Offset 20 ft west of original point	Soil	6	1474550.25	411661.22		X				
	T1226-GP-011		Original Point			1474587.88	411907.16						
605536/ 059323	T1226-GP-011	T1226-GP-027	Offset 15.5 ft east of original pt.	Soil	5	1474585.88	411928.19					X	
605536/ 059324	T1226-GP-011	T1226-GP-028	Offset 11.7 ft west of original pt.	Soil	5	1474587.88	411896.13					X	
605536/ 059325	T1226-GP-018	T1226-GP-18R	Resampled original point	Soil	10	1471709.00	411690.28	X	X				
605536/ 059326	T1226-GP-018	T1226-GP-029	Offset 20 ft east of original point	Soil	10	1471708.50	411710.66	X				X	
605536/ 059327	T1226-GP-018	T1226-GP-030	Offset 30 ft west of original point	Soil	10	1471709.00	411660.25	X				X	
605536/ 059328		T1226-GP-00-TB	Trip Blank	TB	NA	NA	NA	X					
605536/ 059329		T1226-GP-00-FB	Field Blank	FB	NA	NA	NA	X					
605536/ 059330		T1226-GP-00-EB	Equipment Blank	EB	NA	NA	NA		X				

[a] Sample depth of zero indicates a surface soil or sediment sample collected from zero to six inches depth.

[b] Offset samples collected greater than 20 ft away due to utilities; less than 20 ft away due to building encroachment.

Note: Shaded cells indicate samples were not collected at the original location.

AR-COC = Analysis Request, Chain of Custody.
BH = Borehole.
EB = Equipment blank.
ER = Environmental Restoration.
FB = Field blank.
ft = Foot (feet).
GP = Geoprobe™.
ID = Identification.
NA = Not applicable.
PCB = Polychlorinated biphenyls.
RCRA = Resource Conservation and Recovery Act.
SD = Sediment.
SMO = Sample Management Office.
SVOC = Semivolatile organic compounds.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
VOC = Volatile organic compound.

Table 3. SWMU 96, 187, and 226 Plutonium Grid Samples for Off-Site Laboratory Analyses

AR-COC/ SMO Sample Number	ER Sample ID	Sample Type	Sample Depth[a] (ft)	Northing	Easting	VOC (8260B)	SVOC (8270C)	PCB (8082)	RCRA Metals	Isotopic Plutonium	Tritium
605537/ 059448	T1BSI-PGS-001	Surface Soil	0	410566.28	1475072.50					X	
605537/ 059449	T1BSI-PGS-002	Surface Soil	0	411315.81	1475167.13					X	
605537/ 059450	T1BSI-PGS-003	Surface Soil	0	412097.94	1474985.75					X	
605537/ 059451	T1BSI-PGS-004	Surface Soil	0	412869.28	1474931.25					X	
605537/ 059452	T1BSI-PGS-005	Surface Soil	0	413624.88	1475043.88					X	
605537/ 059453	T1BSI-PGS-006	Surface Soil	0	414358.72	1475123.25					X	
605537/ 059454	T1BSI-PGS-007	Surface Soil	0	414426.75	1474443.50					X	
605537/ 059455	T1BSI-PGS-008	Surface Soil	0	413641.44	1474450.50					X	
605537/ 059456	T1BSI-PGS-009	Surface Soil	0	412830.53	1474432.75					X	
605537/ 059457	T1BSI-PGS-010	Surface Soil	0	412129.16	1474466.13					X	
605537/ 059458	T1BSI-PGS-011	Surface Soil	0	411346.81	1474478.50					X	
605537/ 059459	T1BSI-PGS-012	Surface Soil	0	410582.59	1474470.75					X	
605537/ 059460	T1BSI-PGS-013	Surface Soil	0	410721.72	1473936.38					X	
605537/ 059461	T1BSI-PGS-014	Surface Soil	0	411312.31	1473840.88					X	
605537/ 059462	T1BSI-PGS-015	Surface Soil	0	412127.88	1473887.88					X	
605537/ 059463	T1BSI-PGS-016	Surface Soil	0	412830.63	1473840.38					X	
605537/ 059464	T1BSI-PGS-017	Surface Soil	0	413601.41	1473783.75					X	
605537/ 059465	T1BSI-PGS-018	Surface Soil	0	414386.78	1473844.38					X	
605537/ 059466	T1BSI-PGS-019	Surface Soil	0	414333.19	1473152.88					X	
605537/ 059467	T1BSI-PGS-020	Surface Soil	0	413539.53	1473257.00					X	
605537/ 059468	T1BSI-PGS-021	Surface Soil	0	412885.78	1473282.63					X	
605537/ 059469	T1BSI-PGS-022	Surface Soil	0	412141.56	1473332.13					X	
605537/ 059470	T1BSI-PGS-023	Surface Soil	0	411330.22	1473359.13					X	
605537/ 059471	T1BSI-PGS-024	Surface Soil	0	412138.25	1471907.13					X	

Refer to footnotes at end of table.

Table 3. SWMU 96, 187, and 226 Plutonium Grid Samples for Off-Site Laboratory Analyses (Concluded)

AR-COC/ SMO Sample Number	ER Sample ID	Sample Type	Sample Depth[a] (ft)	Northing	Easting	VOC (8260B)	SVOC (8270C)	PCB (8082)	RCRA Metals	Isotopic Plutonium	Tritium
605537/ 059472	T1BSI-PGS-025	Surface Soil	0	411423.78	1472076.75					X	
605537/ 059473	T1BSI-PGS-026	Surface Soil	0	411426.56	1472682.50					X	
605537/ 059474	T1BSI-PGS-027	Surface Soil	0	412078.03	1472760.25					X	
605537/ 059475	T1BSI-PGS-028	Surface Soil	0	412867.19	1472741.88					X	
605537/ 059476	T1BSI-PGS-029	Surface Soil	0	413472.38	1472689.13					X	
605537/ 059477	T1BSI-PGS-030	Surface Soil	0	414455.28	1472669.88					X	
605537/ 059478	T1BSI-PGS-031	Surface Soil	0	414605.91	1472046.38					X	
605537/ 059479	T1BSI-PGS-032	Surface Soil	0	413745.34	1472155.88					X	
605537/ 059480	T1BSI-PGS-033	Surface Soil	0	412875.66	1472094.25					X	
605537/ 059481	T1BSI-PGS-034	Duplicate[b]	0	413745.34	1472155.88					X	
605537/ 059482	T1BSI-PGS-035	Duplicate[c]	0	414386.78	1473844.38					X	

[a]Sample depth of zero indicates a surface soil or sediment sample to be collected from zero to six inches depth.

[b]T1BSI-PGS-034 is a duplicate of T1BSI-PGS-032.

[c]T1BSI-PGS-035 is a duplicate of T1BSI-PGS-018.

AR-COC = Analysis Request, Chain of Custody.
BSI = Background soil investigation.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
PCB = Polychlorinated biphenyls.
PGS = Plutonium Grid Sample (sample type location code).
RCRA = Resource Conservation and Recovery Act.
SMO = Sample Management Office.
SVOC = Semivolatile organic compounds.
SWMU = Solid Waste Management Unit.
VOC = Volatile organic compound.

411000 412500 414000 415500

1474500

1473000

T1096-GP-091
T1096-GP-01R
T1096-GP-090
T1096-GP-011
T1096-GP-092
T1096-GP-093
T1096-GP-094
T1096-GP-095
T1096-GP-018
892
880
821
823
T1096-GP-096
T1096-GP-47R
T1096-GP-097
T1096-SD-033
T1096-SD-15R
T1096-SD-032
T1096-GP-063
T1096-GP-098
T1096-GP-099
T1096-SD-034
T1096-SD-023
T1096-SD-036
T1096-SD-035
T1096-GP-079
T1096-SD-037
T1096-SD-031
T1096-SD-02R
T1096-SD-030

Legend

Geoprobe™ and Sediment Sample Location
GP = Geoprobe™
SD = Sediment
R = Resampled

Road / Parking

Technical Area I Boundary

Building / Structure

0 500 1000
Scale in Feet

0 120 240
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Figure 1
Original, Resampled, and Offset Sample Locations SWMU 96 January and May, 2002

Transverse Mercator Projection, New Mexico State Plane Coordinate System, Central Zone, 1927 North American Horizontal Datum, 1929 North American Vertical Datum

	1:6000	MAPID=030282
		SNL EGIS ORG. 6135
DHelfrich	dh030282.aml	03/14/03

Mapid=030281 03/14/03 SNL EGIS ORG. 6135 DHelfrich dh030281.aml

411000 412000 413000

1475000 1474000 1473000 1472000

T1187-BH-091
T1187-BH-034
T1187-BH-088
T1187-BH-090
T1187-BH-032
T1187-BH-089
T1226-GP-028
T1226-GP-025
T1226-GP-09R
T1226-GP-027
T1187-BH-092
T1187-BH-093
T1187-BH-044
T1226-GP-026
T1226-GP-011
T1187-BH-102
T1187-BH-094
T1187-BH-103
T1187-BH-065
T1187-BH-049
T1187-BH-104
T1187-BH-105
T1187-BH-71R
T1187-BH-100
T1187-BH-097
T1187-BH-56R
T1187-BH-061
T1187-BH-096
T1187-BH-101
880
892
T1187-BH-098
T1187-BH-60R
T1187-BH-099
821
823
T1226-GP-029
T1226-GP-18R
T1226-GP-030

411000 412000 413000

Legend

Geoprobe™ and Borehole Sample Location
GP = Geoprobe™
BH = Borehole
R = Resampled

Road / Parking

SNL Technical Area Boundary

Building / Structure

Figure 2
Original, Resampled, and Offset Sample Locations
SWMUs 187 and 226
May and June, 2002

0 400 800
Scale in Feet

0 96 192
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

411000 412500 414000 415500

1474600

1473000

T1BSI-PGS-001 T1BSI-PGS-002 T1BSI-PGS-003 T1BSI-PGS-004 T1BSI-PGS-005 T1BSI-PGS-006 T1BSI-PGS-007 T1BSI-PGS-008 T1BSI-PGS-009 T1BSI-PGS-010 T1BSI-PGS-011 T1BSI-PGS-012 T1BSI-PGS-013 T1BSI-PGS-014 T1BSI-PGS-015 T1BSI-PGS-016 T1BSI-PGS-017 T1BSI-PGS-018 T1BSI-PGS-019 T1BSI-PGS-020 T1BSI-PGS-021 T1BSI-PGS-022 T1BSI-PGS-023 T1BSI-PGS-024 T1BSI-PGS-025 T1BSI-PGS-026 T1BSI-PGS-027 T1BSI-PGS-028 T1BSI-PGS-029 T1BSI-PGS-030 T1BSI-PGS-031 T1BSI-PGS-032 T1BSI-PGS-033

802 840 894 892 808 821 823

411000 412500 414000 415500

Legend

- Road / Parking / Walkway
- Technical Area I Boundary
- Building / Structure
- Surface Soil Sample Location

BSI = Background Soil Investigation
PGS = Plutonium Grid Sample

0 500 1000
Scale in Feet
0 120 240
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Figure 3
Plutonium Survey Sample Locations, SWMUs 96, 187, and 226, June 2002

Transverse Mercator Projection, New Mexico State Plane Coordinate System, Central Zone, 1927 North American Horizontal Datum, 1929 North American Vertical Datum

	1:6000	MAPID=030280
		SNL EGIS ORG. 6135
DHelfrich	dh030280.aml	03/14/03

Addendum E

Bldg. 838/839 Phase 1

BUILDINGS 838 AND 839: PHASE I

Shaw Environmental, Inc.

5301 Central Avenue NE, Suite 700
Albuquerque, NM 87108-1513
505.262.8800
Fax: 505.262.8855

Shaw™ Shaw Environmental, Inc.

October 24, 2003

Project No. 842717.01

Brenda Langkopf
Sandia National Laboratories/New Mexico
P.O. Box 5800, M/S 1087
Albuquerque, NM 87185-1087

Buildings 838 and 839 Contamination Assessment Sampling Summary,
Sandia National Laboratories/New Mexico
Task Order CPA56064, Purchase Order 107802

Miss Langkopf:

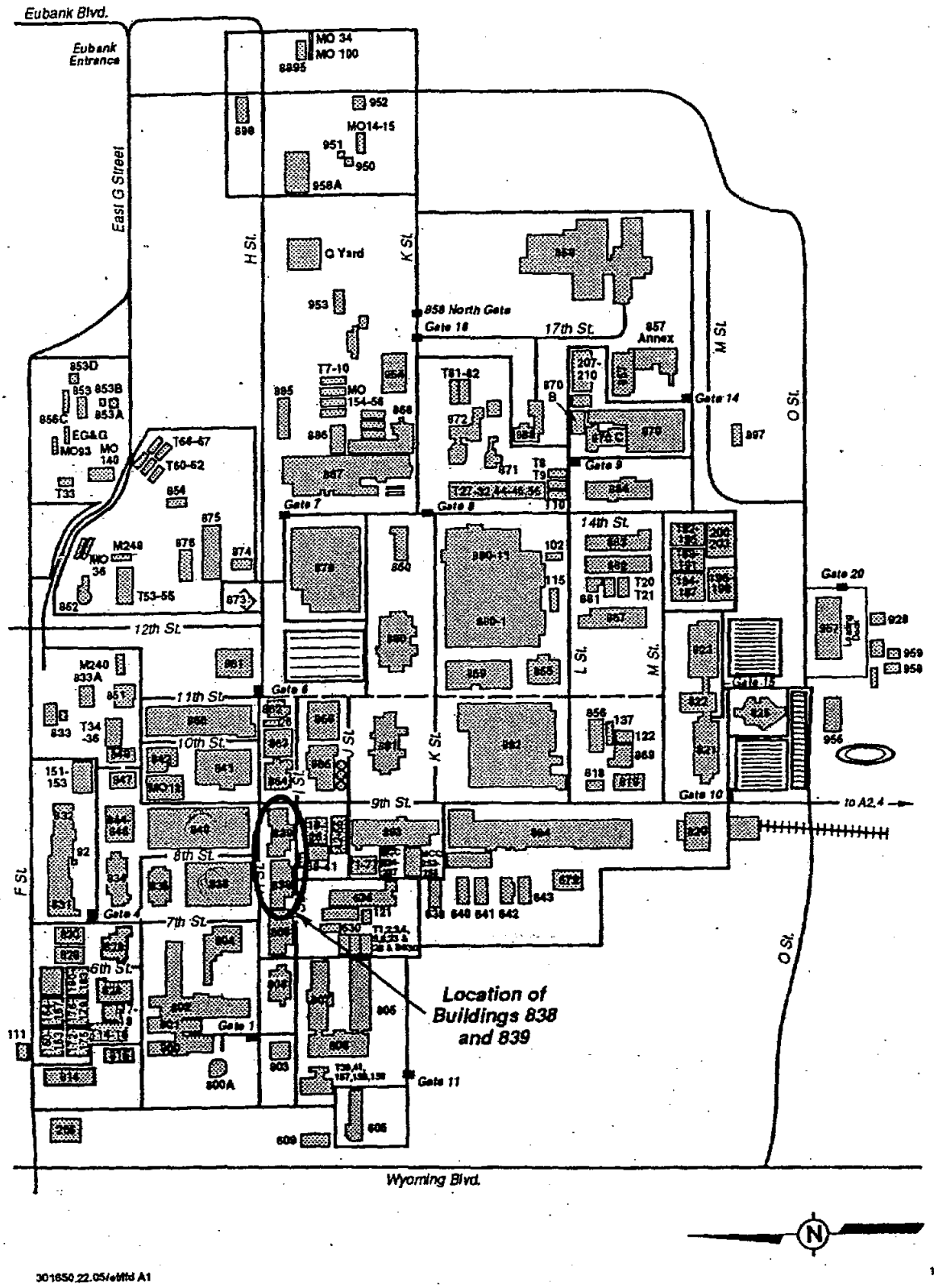
Soil, sediment, and building material sampling results for sampling conducted at the Buildings 838 and 839 Contamination Assessment are presented in "Contamination Assessment Report for Buildings 838 and 839" (IT, 1994, SHEARS # 27170, 27104, 27106, 27105 and 27108). IT Corporation collected samples during the periods of December 13-22, 1993 and January 6-7, 1994. The samples are documented on chain of custody numbers: 508141, 508143 through 508148, 508150, 508153, and 508168. A total of 26 soil samples, 12 building material samples, 7 composite soil samples, 5 sediment samples, 2 wipes of drains, 14 duplicate soil samples, 4 equipment rinsate samples, 6 field blank samples, 10 trip blank samples, and 5 matrix spike samples were collected. The soil samples were collected from soils adjacent to dry wells, loading docks, and suspected sewer line breaks to determine whether hazardous and/or radioactive wastes have been released into the surrounding soils. The sediment samples were collected from sewer line sediments to determine the presence of hazardous and/or radioactive wastes within the lines. The location of Buildings 838 and 839 as well as the sample locations are depicted in Figures 1-1, 1-2 and 1-3. Summaries of the samples collected are presented in Tables 2-1, 2-2 and 2-3. Soil and sediment results are summarized in Tables 3-3 and 3-4.

Respectfully submitted,

SHAW ENVIRONMENTAL, INC.

Lara Beasley

cc: M. Skelly, SNL/NM (w/ enclosures)
M. Goodrich, Shaw Environmental, Inc. (w/o enclosures)
Project File (w/ enclosures)



301650.22.05/eltfld A1

1/24/94

Figure 1-1

Location of Buildings 838 and 839 in Technical Area 1
Sandia National Laboratories/New Mexico

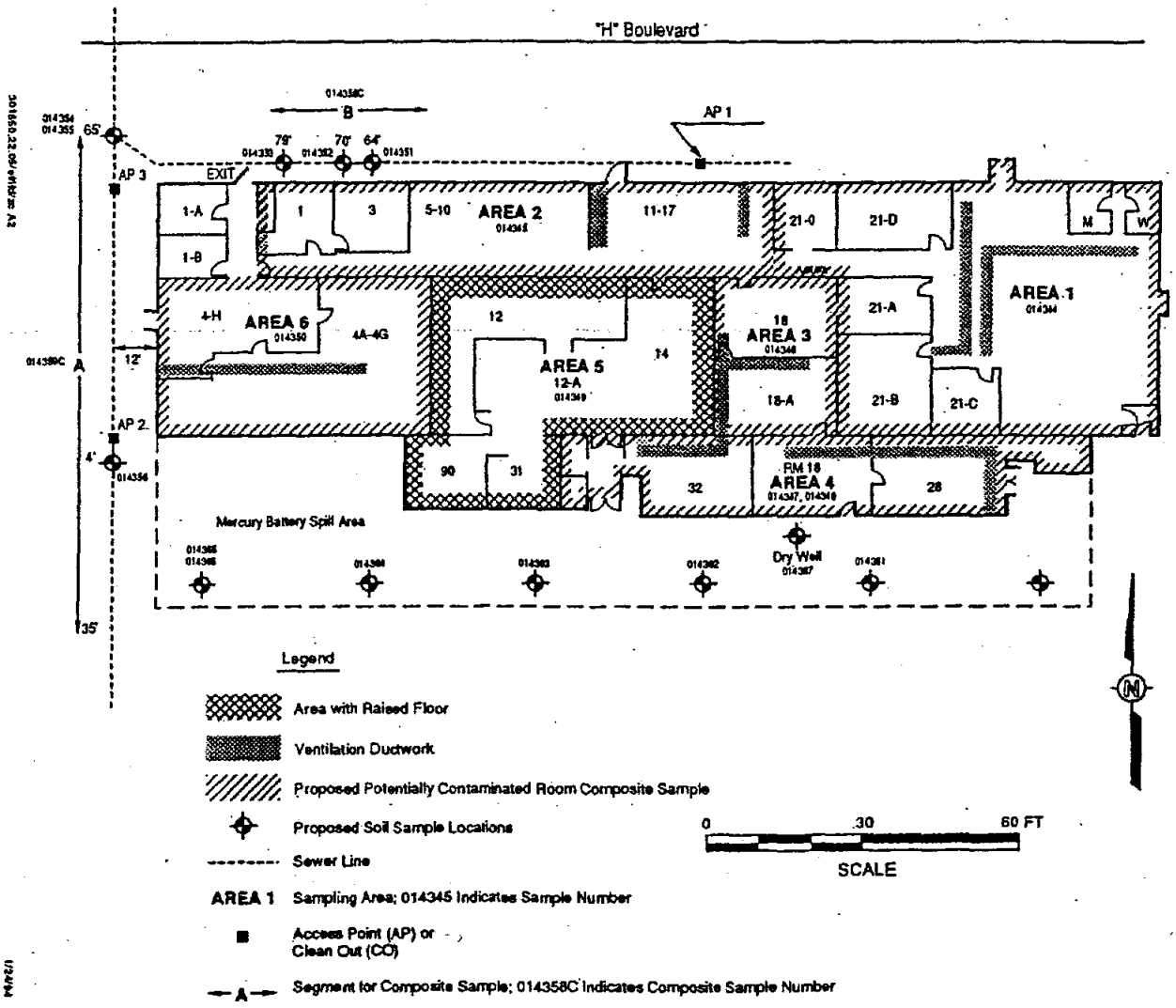


Figure 1-2 2

Sandia National Laboratories/New Mexico Building 838
Showing Soil Sampling Locations

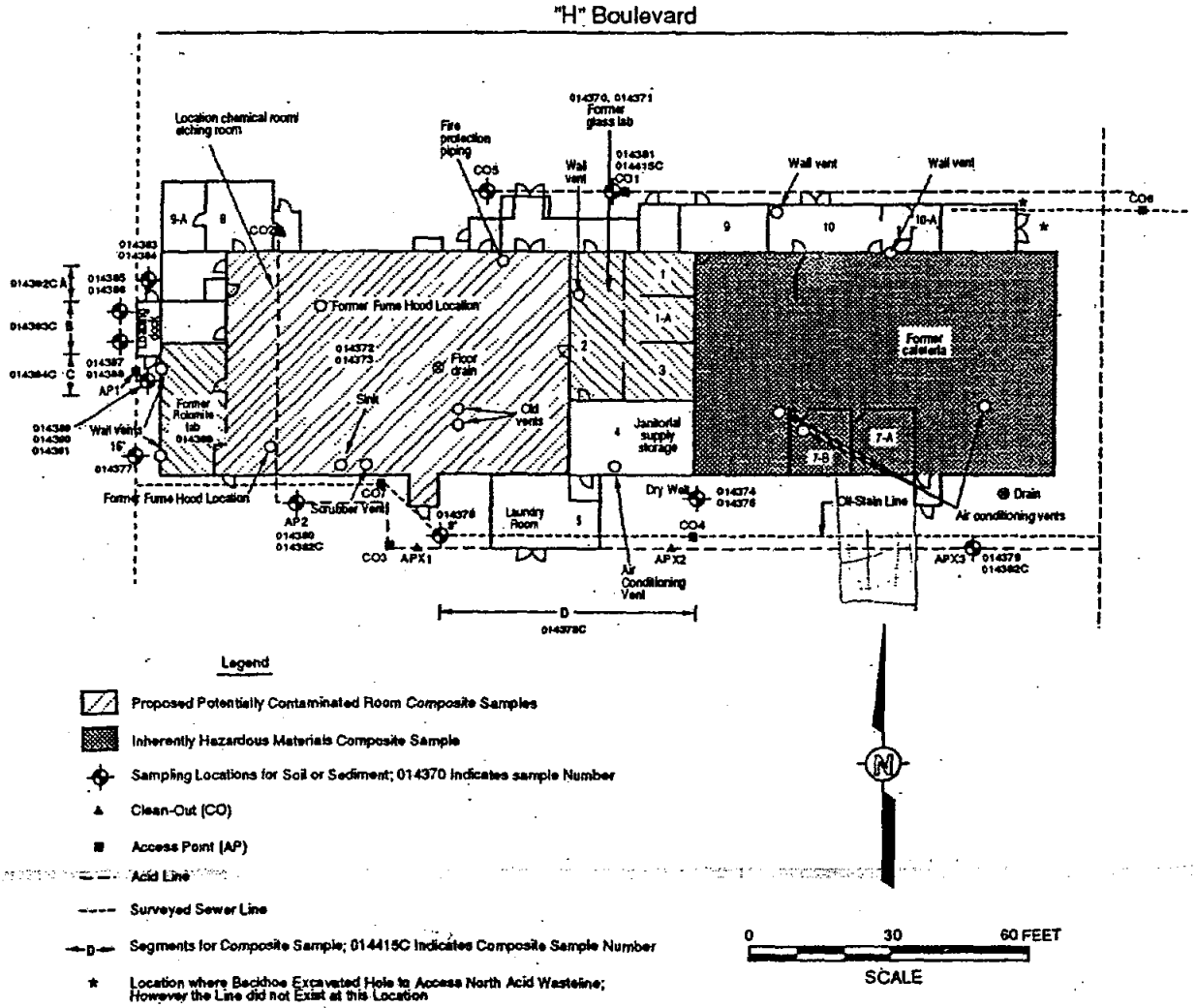


Figure 1-3
Sandia National Laboratories/New Mexico Building 839
Showing Soil/Acid Line Sampling Locations

2.0 Sampling Activities

Building material, soil, and acid line sediment sampling was carried out at Buildings 838 and 839, in accordance with the SAP, on December 13-22, 1993, and January 6-7, 1994. Sample identification numbers, sampling locations, sample matrix, and analyses performed for environmental and associated quality control (QC) samples collected are summarized in Tables 2-1 through 2-3.

Table 2-1
List of Samples Collected at Building 838
Sandia National Laboratories/New Mexico

Sample No. SNLA-	Sample Site Description	Sample Matrix[a]	Analyses Requested[b]
014344	Area 1, eastern end of building (Rooms 21, 21-A, 21-B, 21-C, and 21-D) Matrix spike sample	Building materials	TCLP for metals, VOCs, SVOCs; and gamma spectrum
014345	Area 2, northern section of building (Rooms 1 and 3; Partitions 5-10 and 11-17)	Building materials	TCLP for metals, VOCs, SVOCs; and gamma spectrum
014346	Area 3, east-central section of building (Rooms 18 and 18A)	Building materials	TCLP for metals, VOCs, SVOCs; and gamma spectrum
014347	Area 4, southern section of building (Rooms 32, Rm18, and 28)	Building materials	TCLP for metals, VOCs, SVOCs; and gamma spectrum
014350	Area 4, southern section of building (Rooms 32, Rm18, and 28), duplicate	Building materials	TCLP for metals, VOCs, and SVOCs
014348	Area 5, west-central section of building (Rooms 12, 12-A, 14, 31, and 90)	Building materials	TCLP for metals, VOCs, SVOCs; and gamma spectrum
014349	Area 6, western end of building (Partitions 4A-4G and Room 4H)	Building materials	TCLP for metals, VOCs, SVOCs; and gamma spectrum
014351	Crack in north sewer line 64 feet west of AP1, below level of line and within 18 inches laterally	Soil	Total metals, VOCs, and SVOCs; gamma spectrum, and tritium
014352	Crack in north sewer line 70 feet west of AP1, below level of line and within 18 inches laterally	Soil	Total metals, VOCs, and SVOCs; gamma spectrum, and tritium
014353	Separated joint in north sewer line 79 feet west of AP1, below level of line and within 18 inches laterally	Soil	Total metals, VOCs, and SVOCs; gamma spectrum, and tritium
014354	Crack and offset joint in west sewer line 65 feet north of AP2, below level of line and within 18 inches laterally	Soil	Total metals, VOCs, and SVOCs; gamma spectrum, and tritium
014355	Crack and offset joint in west sewer line 65 feet north of AP2, below level of line and within 18 inches laterally, duplicate	Soil	Total metals, VOCs, and SVOCs; gamma spectrum, and tritium
014356 & 014357	Offset joint and crack in west sewer line 4 feet south of AP2, below level of line and within 18 inches laterally, matrix spike/matrix spike duplicate sample	Soil	Total metals, VOCs, and SVOCs; gamma spectrum, and tritium; TCLP for TC metals
Not collected	Crack in west sewer line 35 feet south of AP2, below level of line and within 18 inches laterally	Soil	Total metals, VOCs, and SVOCs; gamma spectrum, and tritium

Refer to footnotes at end of table.

Table 2-1 *(Continued)*

List of Samples Collected at Building 838
Sandia National Laboratories/New Mexico

Sample No. SNLA-	Sample Site Description	Sample Matrix[a]	Analyses Requested[b]
014358	Composite of soil samples 014351, 014352, and 014353	Soil for waste disposal purposes	TCLP metals
014359	Composite of soil samples 014354 and 014355	Soil for waste disposal purposes	TCLP metals
014360-014366	Six evenly-spaced samples south of building, 0 to 6 inches bgs, and 1 duplicate	Soil	Mercury
014367	Dry well south of building, below gravel or 3 to 4 feet bgs	Soil	Total metals, VOCs, and SVOCs; gamma spectrum, and tritium

[a]All soil samples collected at various depths.
[b]Specific analytes listed in Tables 1-3 and 1-4 and analytical reports.
ACRONYMS:
SVOC = semivolatile organic compound
TCLP = toxicity characteristic leaching procedure
VOC = volatile organic compounds
TAL = target analyte list
bgs = below ground surface.

Table 2-2
List of Samples Collected at Building 839
Sandia National Laboratories/New Mexico

Sample No. SNLA-	Sample Site Description	Sample Matrix[a]	Analyses Requested[b]
014372	Former cafeteria, east end of building, matrix spike sample	Building materials for inherent composition	TCLP for metals, VOCs, and SVOCs; and gamma spectrum
014370	Former rolomite laboratory	Building materials for contamination assessment	TCLP for metals, VOCs, and SVOCs; and gamma spectrum
014368	Former glass laboratory (Rooms 1, 1-A, 2, and 3)	Building materials for contamination assessment	TCLP for metals, VOCs, and SVOCs; and gamma spectrum and field pH
014369	Former glass laboratory (Rooms 1, 1-A, 2, and 3), duplicate	Building materials for contamination assessment	TCLP for metals, VOCs, and SVOCs; and field pH
014371	Former general laboratory area in western section of building	Building materials for contamination assessment	TCLP for metals, VOCs, and SVOCs; and gamma spectrum and field Ph
014373 & 007021	Former general laboratory area in western section of building	Wipe of drain	TCLP metals and SVOCs
014412 & 007022	Former general laboratory area in western section of building, duplicate	Wipe of drain	TCLP metals and SVOCs
014374	Dry well south of building, 0-6 inches bgs	Soil	Total metals, VOCs, SVOCs; gamma spectrum, tritium, and PCBs
014375	Dry well south of building, directly below lower limit of gravel fill	Soil	Total metals, VOCs, SVOCs; gamma spectrum, tritium, and PCBs
014376	Joint of steel and clay lines, 9 feet east of C07, below level of line and within 18 inches laterally; matrix spike/matrix spike duplicate sample	Soil	Total metals, VOCs, SVOCs; gamma spectrum, tritium, and PCBs
014377	Crack and offset joint in west sewer line, 16 feet south of AP1, below level of line and within 18 inches laterally	Soil for ER and waste disposal purposes	Total metals, VOCs, SVOCs; gamma spectrum; tritium, and TCLP metals
014378	Composite of samples 014374, 014375, and 014376	Soil for waste disposal purposes	TCLP metals and PCBs
014379	From interior of south acid waste line at APX3	Sediment	Total metals, VOCs, SVOCs; gamma spectrum, tritium, and Ph
014380	From interior of south acid waste line at AP2	Sediment	Total metals, VOCs, SVOCs; gamma spectrum, tritium, and Ph
014381	From interior of north acid waste line between C05 and C01	Sediment	Total metals, VOCs, SVOCs; gamma spectrum, tritium, pH, and PCBs
014415	Composite of sample 014381	Sediment	TCLP metals
014382	Composite of Samples 014379 and 014380	Sediment	TCLP metals, total VOCs, and SVOCs
014383	North of loading dock, 0-6 in bgs	Soil	Total metals, VOCs, SVOCs; gamma spectrum; and tritium
014384	North of loading dock, 2–2.5 ft. bgs	Soil	Total metals, VOCs, SVOCs; gamma spectrum; and tritium
014385	West of loading dock, north end, 0–6 in. bgs	Soil	Total metals, VOCs, SVOCs; gamma spectrum; and tritium
014386	West of loading dock, north end, 2–2.5 ft bgs	Soil	Total metals, VOCs, SVOCs; gamma spectrum; and tritium
014387	West of loading dock, south end, 0–6 in. bgs	Soil	Total metals, VOCs, SVOCs; gamma spectrum; and tritium
014388	West of loading dock, south end, 2–2.5 ft bgs	Soil	Total metals, VOCs, SVOCs; gamma spectrum; and tritium

Refer to footnotes at end of table.

Table 2-2

List of Samples Collected at Building 839 *(Continued)*
Sandia National Laboratories/New Mexico

Sample No. SNLA-	Sample Site Description	Sample Matrix[a]	Analyses Requested[b]
014389	South of loading dock, 0–6 in. bgs	Soil	Total metals, VOCs, SVOCs; gamma spectrum; and tritium
014390	South of loading dock, 2–2.5 ft.bgs	Soil	Total metals, VOCs, SVOCs; gamma spectrum; and tritium
014391	South of loading dock, 2–2.5 ft. bgs, duplicate	Soil	Total metals, VOCs, SVOCs; gamma spectrum; and tritium
014392	Composite of samples 014383 and 014384	Soil for waste disposal purposes	TCLP metals
014393	Composite of samples 014385 to 014388, inclusive	Soil for waste disposal purposes	TCLP metals
014394	Composite of samples 014389, 014390, and 014391	Soil for waste disposal purposes	TCLP metals

[a]All soil samples collected at various depths.
[b]Specific analytes listed in Tables 1-3 and 1-4 and analytical reports.

ACRONYMS:
CO = cleanout
PCBs = polychlorinated biphenyls
SVOC =semivolatile organic compound
TCLP = toxicity characteristic leaching procedure
VOC = volatile organic compounds
TAL = target analyte list
bgs = below ground surface.
ER = Environmental Restoration

Table 2-3

Quality Control Samples Collected at Buildings 838 and 839 Sandia National Laboratories/New Mexico

Quality Control Sample Type	Sample Number SNLA-	Sample Description	Analyses Requested
Field duplicates	014368 & -69, 014347 & -50,	Potentially contaminated building materials at Buildings 838 and 839	TCLP for metals, VOCs, SVOCs; gamma spectrum and pH
	014373 & -412, 007021 and 007022	Wipe sample	TCLP for metals and SVOCs
	014354 & -55, 014365 & -66,	Soils from near sewers and soils for mercury analysis at Building 838	Total metals, VOCs, SVOCs, gamma spectrum, tritium, and mercury
	014390 & -91	Building 839 loading dock soils	Total metals, VOCs, SVOCs, gamma spectrum, and tritium
Equipment rinsate blanks	014397, 014398	Building material sampling equipment at Buildings 838 and 839	Total metals, VOCs, SVOCs; gamma spectrum, tritium, and PCBs
	014396, 014395	Soil sampling equipment at Buildings 838 and 839	Total metals, VOCs, SVOCs, gamma spectrum, and tritium
Field blanks	014413	Wipe sample at Building 839	SVOCs
	014402, 014403	Interior at Buildings 838 and 839	Total metals, VOCs, SVOCs, gamma spectrum, tritium and PCBs
	014401		
	014400	Near sewer lines at Building 838	Total metals, VOCs, SVOCs, gamma spectrum, tritium and PCBs
	007023	Near loading dock at Building 839	Total metals, VOCs, SVOCs, gamma spectrum, tritium and PCBs
		Wipe sample at Building 839	Total metals
Trip blanks	014404	12/14/93; soil blank with soil samples	VOCs
	014405	12/15/93; aqueous blank with Building 839 soil field and equipment blanks	VOCs
	014406	12/15/93; soil blank with soil samples	VOCs
	014407	12/18/93; soil blank with building materials	VOCs
	014408	12/17/93; aqueous blank with Building 838 soil field and equipment blanks	VOCs
	014409	12/20/93; soil blank with soil samples	VOCs
	014410	12/20/93; aqueous blank with Building 838 building material field and equipment blanks	VOCs
	014411	12/21/93; aqueous blank with Building 839 building material field and equipment blanks	VOCs
	014414	12/22/93; soil blank with building materials	VOCs
	014399	01/07/94; soil blank with sediment sample	VOCs

Table 2-3 *(Continued)*

Quality Control Samples Collected at Buildings 838 and 839 Sandia National Laboratories/New Mexico

Quality Control Sample Type	Sample Number SNLA-	Sample Description	Analyses Requested
Matrix spike/ matrix spike duplicates	014344, 014372	Building material samples for Buildings 838 and 839 (only matrix spike for each sample)	TCLP for metals, VOCs, SVOCs; gamma spectrum
	014378	Soil samples submitted for TCLP	Total metals and PCBs
	014356, 014376	Soils submitted for total analysis for Buildings 838 and 839	Total metals, VOCs, SVOCs; gamma spectrum and tritium; TCLP for TC metals; PCBs

ACRONYMS:
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound
VOC = volatile organic compound
TAL = target analyte list
TC = toxicity characteristic
TLCP = toxicity characteristic leaching procedure

Table 3-3

Sandia National Laboratories/New Mexico, Building 838
Contamination Assessment Soil Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]									
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds			Inorganics		
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)
SNLA014351, crack in north sewer line 64 feet west of API; 4–5 feet below ground surface (bgs)	RA-226	0.538 ± .087	Acetone	4.4 J, B, U	8×10^6	Diethyl phthalate	37 J	6×10^7	Arsenic	7.7	80
	PB-214	0.572 ± .097	Methylene chloride	3.9 J, B, U	9×10^4	bis (2-Ethylhexyl) phthalate	83 J	5×10^4	Barium	384	4,000
	BI-214	0.562 ± .091							Chromium	5.9	400
	TH-232	0.668 ± .143							Nickel	7.1	2,000
	RA-228	0.668 ± .143									
	AC-228	0.603 ± .129									
	TH-228	0.571 ± .059									
	PB-212	0.573 ± .059									
	BI-212	0.434 ± .362									
	TL-208	0.480 ± .119									
	K-40	12.7 ± .864									
	Tritium	U (260)									
SNLA014352, crack in north sewer line 70 feet west of AP1; 4–5 feet bgs	RA-226	0.593 ± .108	Acetone	3.1 J, B, U	8×10^6	Diethyl phthalate	34 J	6×10^7	Arsenic	6.4	80
	PB-214	0.657 ± .097	Methylene chloride	3.3 J, B, U	9×10^4	bis (2-Ethylhexyl) phthalate	48 J	5×10^4	Barium	313	4,000
	BI-214	0.619 ± .113							Beryllium	0.20	0.2
	TH-232	0.648 ± .178							Chromium	6.6	400
	RA-228	0.648 ± .178							Lead	4.3	8.1[e]
	AC-228	0.584 ± .160							Nickel	5.9	2,000

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Sandia National Laboratories/New Mexico, Building 838
Contamination Assessment Soil Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]									
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds			Inorganics		
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)
	TH-228	0.564 ± .060									
	PB-212	0.567 ± .061									
	BI-212	0.530 ± .349									
	TL-208	0.536 ± .128									
	K-40	12.6 ± .938									
	Tritium	U (250)									
SNLA014353, separated joint in north sewer line 79 feet west of AP1; 4–5 feet bgs	RA-226	0.607 ± .096	Acetone	5.5 J, B, U	8×10^6	None detected			Arsenic	6.9	80
	PB-214	0.598 ± .096	Methylene chloride	3.6 J, B, U	9×10^4				Barium	527	4,000
	BI-214	0.635 ± .100							Beryllium	0.41	0.2
	TH-232	0.565 ± .170							Chromium	5.5	400
	RA-228	0.565 ± .170							Lead	3.3	8.1[e]
	AC-228	0.510 ± .154							Nickel	6.8	2,000
	TH-228	0.509 ± .063									
	RA-224	0.875 ± .958									
	PB-212	0.511 ± .063									
	BI-212	0.373 ± .234									
	TL-208	0.474 ± .127									
	K-40	9.26 ± .831									
	Tritium	U (250)									

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Sandia National Laboratories/New Mexico, Building 838
Contamination Assessment Soil Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]									
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds			Inorganics		
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)
SNLA014354, crack and offset joint in west sewer line 65 feet north of AP2; 7–8 feet bgs	RA-226	0.916 ± .106	Acetone	1.8 J, B, U	8×10^5	bis (2-Ethylhexyl) phthalate	39 J	5×10^4	Arsenic	1.4	80
	PB-214	1.05 ± .105	2-Butanone (MEK)	1.3 J	—				Barium	31.1	4,000
	BI-214	0.957 ± .111	Methylene chloride	1.4 J, B, U	9×10^4				Beryllium	0.33	0.2
	TH-232	0.933 ± .172							Chromium	4.9	400
	RA-228	0.933 ± .172							Lead	6.3	8.1[e]
	AC-228	0.842 ± .155							Nickel	5.3	2,000
	TH-228	0.767 ± .059									
	RA-224	0.869 ± .836									
	PB-212	0.770 ± .059									
	BI-212	0.605 ± .271									
	TL-208	0.618 ± .139									
	K-40	21.3 ± 1.06									
	Tritium	U (250)									
SNLA014355, crack and offset joint in west sewer line 65 feet north of AP2; 7–8 feet bgs	U-238	0.837 ± .532	Acetone	2.5 J, B, U	8×10^5	None detected			Arsenic	1.5	80
	TH-234	0.838 ± .533	Methylene chloride	2.1 J, B, U	9×10^4				Barium	42.3	4,000
	RA-226	0.802 ± .092							Beryllium	0.33	0.2
	PB-214	0.926 ± .099							Chromium	5.0	400
	BI-214	0.839 ± .096							Lead	5.5	8.1[e]
	TH-232	0.943 ± .174							Nickel	5.1	2,000
	RA-228	0.943 ± .174									

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Sandia National Laboratories/New Mexico, Building 838
Contamination Assessment Soil Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]									
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds			Inorganics		
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)
	AC-228	0.851 ± .157									
	TH-228	0.814 ± .064									
	RA-224	1.05 ± .799									
	PB-212	0.817 ± .064									
	BI-212	0.467 ± .257									
	TL-208	0.748 ± .112									
	K-40	23.0 ± 1.06									
	Tritium	U (250)									
SNLA014356, offset joint and crack in west sewer line 4 feet south of AP2; 7–8 feet bgs	RA-226	0.852 ± .109	Acetone	2.6 J	8×10^6	None detected			Arsenic	3.6	80
	PB-214	1.05 ± .108	Methylene chloride	2.5 J, B, U	9×10^4				Barium	156	4,000
	BI-214	0.890 ± .114							Beryllium	0.44	0.2
	TH-232	0.881 ± .196							Chromium	7.2	400
	RA-228	0.881 ± .196							Lead	5.4	8.1[e]
	AC-228	0.795 ± .177							Nickel	8.2	2,000
	TH-228	0.763 ± .073									
	PB-212	0.766 ± .074									
	BI-212	0.715 ± .264									
	TL-208	0.767 ± .151									
	K-40	13.3 ± .965									
	Tritium	U (250)									

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Sandia National Laboratories/New Mexico, Building 838
Contamination Assessment Soil Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]										
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds			Inorganics		
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)
SNLA014360, surface sample south of building; 2–6 inches bgs	NA		NA			NA			Mercury not detected		
SNLA014361, surface sample south of building; 2–6 inches bgs	NA		NA			NA			Mercury not detected		
SNLA014362, surface sample south of building; 2–6 inches bgs	NA		NA			NA			Mercury not detected		
SNLA014363, surface sample south of building; 2–4 inches bgs	NA		NA			NA			Mercury not detected		
SNLA014364, surface sample south of building; 2–4 inches bgs	NA		NA			NA			Mercury not detected		
SNLA014365, surface sample south of building; 2–6 inches bgs	NA		NA			NA			Mercury not detected		
SNLA014366, surface sample south of building; 2–6 inches bgs; duplicate	NA		NA			NA			Mercury not detected		

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Sandia National Laboratories/New Mexico, Building 838
Contamination Assessment Soil Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]										
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds			Inorganics		
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)
SNLA014367, dry well south of building; 2.5–3.5 feet bgs	RA-226	0.618 ± .0963	Acetone	2.6 J, B, U	8×10^6	None detected			Arsenic	4.7	80
	PB-214	0.693 ± .110	Methylene chloride	3.8 J, B, U	9×10^4				Barium	557	4,000
	BI-214	0.642 ± .101							Beryllium	0.35	0.2
	TH-232	0.629 ± .200							Chromium	4.7	400
	RA-228	0.629 ± .200							Lead	5.0	8.1[e]
	AC-228	0.568 ± .180							Nickel	5.4	2,000
	TH-228	0.458 ± .061									
	PB-212	0.460 ± .061									
	BI-212	0.554 ± .251									
	TL-208	0.511 ± .129									
	K-40	10.7 ± .924									
	Tritium	U (250)									

pCi/g = Picocurie per gram; µg/kg = microgram per kilogram; mg/kg = milligram per kilogram; bgs = below ground surface.
NA = Not applicable; not analyzed this sample.
U (MDA) = Undetected (minimum detectable activity).
[a]Only constituents listed in 40 CFR 264, Subpart S (proposed rule), published in the Federal Register, Volume 55, Number 145, July 27, 1990, are presented in this table and are considered as a concern under the Environmental Restoration Program.
[b]Tritium results are given in picocuries per liter (pCi/L).
[c]Results denoted by a "J" flag indicate that the value lies between the instrument detection limit and quantitation limit and is therefore an estimated concentration. Results denoted by a "B" flag indicate that the compound was also detected in the method blank. Results denoted by a "U" flag indicate that the environmental sample result was less than or equal to 10X the associated method blank value for common laboratory contaminants (i.e., methylene chloride, acetone, 2-butanone, toluene, and phthalates).
[d]Action levels are from the "Site-Specific Sampling Plan for Contamination Assessment of Buildings 838 and 839," which are based on the levels defined in 40 CFR 264, Subpart S (proposed rule), published in the Federal Register, Volume 55, Number 145, July 27, 1990. Dashes denote constituents for which Subpart S does not provide action level guidance.
[e]The action level for lead is based on a statistical analysis of lead (background) concentration data at SNL/NM (SNL/NM, 1993f).
Radionuclides:
AC = actinium
BI = bismuth
K = potassium
PB = lead
RA = radium
TH = thorium
TL = thallium
U = uranium

Table 3-4

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
SNLA014374, dry well south of building; 0–6 inches bgs	RA-226	0.498 ± .082	Acetone	25	8×10^6	Fluoranthene	230 J	—	Arsenic	3.0	80	NA
	PB-214	0.575 ± .090	Methylene chloride	2.2 J, B, U	9×10^4	Pyrene	280 J	—	Barium	293	4,000	
	BI-214	0.521 ± .085				bis (2-Ethylhexyl) phthalate	250 J	5×10^4	Beryllium	0.20	0.20	
	TH-232	0.785 ± .147				PCBs (Aroclor 1254)	110	90	Chromium	6.2	400	
	RA-228	0.785 ± .147							Lead	37.2	8.1[e]	
	AC-228	0.709 ± .132							Mercury	0.12	20	
	TH-228	0.629 ± .058							Nickel	7.0	2,000	
	RA-224	0.734 ± .740							Silver	0.63	200	
	PB-212	0.632 ± .058										
	BI-212	0.246 ± .233										
	TL-208	0.611 ± .127										
	CS-137	0.101 ± .043										
	K-40	15.0 ± .895										
	Tritium	350 ± 190										
SNLA014375, dry well south of building; 2.5–3 feet bgs	RA-226	0.475 ± .104	Acetone	11	8×10^6	Diethyl phthalate	58 J	6×10^7	Arsenic	5.0	80	NA
	PB-214	0.491 ± .087	Methylene chloride	2.1 J, B, U	9×10^4				Barium	610	4,000	
	BI-214	0.497 ± .109							Beryllium	0.32	0.2	
	TH-232	0.706 ± .219							Chromium	5.0	400	

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
	RA-228	0.706 ± .219							Lead	3.4	8.1[e]	
	AC-228	0.637 ± .197							Nickel	6.3	2,000	
	TH-228	0.571 ± .065										
	RA-224	0.711 ± .827										
	PB-212	0.573 ± .065										
	BI-212	0.547 ± .0300										
	TL-208	0.511 ± .123										
	K-40	12.2 ± .926										
	Tritium	U (260)										
SNLA014376, joint of steel and clay lines, 9 feet east of Cleanout 7, 2–3 feet bgs	RA-226	0.486 ± .081	Acetone	7.2 J	8×10^6	Diethyl phthalate	270 J	6×10^7	Arsenic	3.8	80	NA
	PB-214	0.526 ± .081	Methylene chloride	2.0 J, B, U	9×10^4				Barium	179	4,000	
	BI-214	0.508 ± .085							Chromium	6.0	400	
	TH-232	0.766 ± .174							Lead	5.1	8.1[e]	
	RA-228	0.766 ± .174							Silver	0.61	200	
	AC-228	0.691 ± .157										
	TH-228	0.569 ± .061										
	PB-212	0.572 ± .062										
	BI-212	0.422 ± .283										
	TL-208	0.556 ± .117										
	CS-137	0.031 ± .025										

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
	K-40	11.3 ± .854										
	Tritium	U (270)										
SNLA014377, crank and offset joint in west sewer line, 16 feet south of AP1; 2–3 feet bgs	RA-226	0.472 ± .095	Acetone	4.0 J	8×10^6	None detected			Arsenic	4.5	80	NA
	PB-214	0.484 ± .088	Methylene chloride	1.6 J, B, U	9×10^4				Barium	574	4,000	
	BI-214	0.493 ± .099							Chromium	4.1	400	
	PB-210	4.56 ± 4.27							Lead	2.7	8.1[e]	
	TH-232	0.602 ± .150							Nickel	4.1	2,000	
	RA-228	0.602 ± .150										
	AC-228	0.543 ± .135										
	TH-228	0.499 ± .061										
	PB-212	0.501 ± .062										
	BI-212	0.369 ± .329										
	K-40	12.9 ± .932										
	Tritium	U (260)										
SNLA014379, from interior of south acid waste line at APX3; 4 feet bgs	RA-226	0.684 ± .101	Acetone	110 B	8×10^6	Benzoic acid	50 J	—	Arsenic	5.4	80	7.7
	PB-214	0.728 ± .101	2-Butanone (MEK)	8.7 J	—	Phenanthrene	36 J	—	Barium	370	4,000	
	BI-214	0.715 ± .105	2-Hexanone	1.3 J	—	Fluoranthene	43 J	—	Beryllium	0.30	0.2	
	TH-232	0.658 ± .183	Methylene chloride	1.8 J	9×10^4	Pyrene	72 J	—	Chromium	17.8	400	
	RA-228	0.658 ± .183				bis (2-Ethylhexyl) phthalate	520	5×10^4	Lead	19.0	8.1[e]	

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
	AC-228	0.594 ± .165				Chrysene	40 J	—	Mercury	0.25	20	
	TH-228	0.614 ± .066				Benzo(b)fluoranthene	46 J	—	Nickel	5.8	2,000	
	RA-224	0.586 ± .701							Silver	1.2	200	
	PB-212	0.616 ± .066										
	BI-212	0.440 ± .302										
	TL-208	0.510 ± .118										
	CS-137	0.024 ± .027										
	K-40	12.1 ± .968										
	Tritium	U (260)										
SNLA014380-1, from soils adjacent to south acid waste line at AP2; 18–24 inches bgs	U-238	0.549 ± .529	Acetone	9.7 J, B, U	8×10^6	Benzoic acid	95 J	—	Arsenic	3.2	80	7.8
	TH-234	0.550 ± .530				Phenanthrene	140 J	—	Barium	195	4,000	
	RA-226	0.685 ± .090				Di-n-butyl phthalate	44 J	8×10^6	Beryllium	0.43	0.2	
	PB-214	0.731 ± .086				Fluoranthene	190 J	—	Chromium	7.5	400	
	BI-214	0.716 ± .095				Pyrene	210 J	—	Lead	17.0	8.1[e]	
	TH-232	0.788 ± .183				Butyl benzyl phthalate	42 J	2×10^7	Nickel	6.1	2,000	
	RA-228	0.788 ± .183				Benzo(a)anthracene	84 J	—	Silver	36.5	200	
	AC-228	0.711 ± .165				bis(2-Ethylhexyl) phthalate	170 J	5×10^4				
	TH-228	0.749 ± .063				Chrysene	130 J	—				

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]												
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
	RA-224	0.871 ± .884				Benzo(b)fluoranthene	160 J	—				
	PB-212	0.753 ± .063										
	BI-212	0.418 ± .241										
	TL-208	0.729 ± .106										
	CS-137	0.036 ± .029										
	K-40	14.9 ± .914										
	Tritium	2,000 ± 370										
SNLA014380-5, from interior of south acid waste line at AP2; 18–24 inches bgs	NA		Acetone	110 B	8×10^6	1,2-Dichlorobenzene	55 J	—	Arsenic	13.9	80	8.7
			Benzene	1.5 J	—	Benzoic acid	73 J	—	Barium	134	4,000	
			2-Butanone (MEK)	9.5 J	—	Phenanthrene	70 J	—	Beryllium	1.2	0.2	
			Carbon disulfide	1.9 J	8×10^6	Di-n-butyl phthalate	50 J	8×10^6	Chromium	50	400	
			Ethylbenzene	4.1 J	8×10^6	Fluoranthene	120 J	—	Mercury	0.98	20	
			Methylene chloride	12	9×10^4	Pyrene	95 J	—	Nickel	45.3	2,000	
			Styrene	2.0 J	2×10^7	Benzo(a)anthracene	48 J	—	Silver	39.8	200	
			Toluene	2.5 J	2×10^7	bis(2-Ethylhexyl) phthalate	1.2×10^3	5×10^4				
			Trichloroethene	26	6×10^4	Chrysene	76 J	—				
			Xylenes (total)	27	2×10^8	Di-n-octyl phthalate	100 J	—				
						Benzo(b)fluoranthene	100 J	—				

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
SNLA014381, from interior of north acid waste line between Cleanout 5 and Cleanout 1; 4 feet bgs	RA-226	0.293 ± .063	Acetone	28 B, U	8×10^6	Di-n-butyl-phthalate	1,200	8×10^6	Arsenic	1.1	80	6.6
	PB-214	0.324 ± .069	2-Butanone (MEK)	5.1 J, B, U	—	bis(2-Ethylhexyl) phthalate	17,000	5×10^4	Barium	125	4,000	
	BI-214	0.306 ± .066	Carbon disulfide	1.5 J	8×10^6	PCBs (Aroclor 1242)	27,000	90	Beryllium	0.55	0.2	
	TH-232	2.27 ± .181	1,2-Dichloroethene (total)	34	—				Cadmium	0.73	4×10^4	
	RA-228	2.27 ± .181	Ethylbenzene	1.4 J	8×10^6				Chromium	97.7	400	
	AC-228	2.05 ± .163	Methylene chloride	2.2 J	9×10^4				Lead	118	8.1[e]	
	TH-228	1.90 ± .074	4-Methyl-2-pentanone (MIBK)	1.2 J	—				Nickel	44.7	2,000	
	RA-224	3.71 ± .975	Toluene	1.8 J	2×10^7				Silver	99.0	200	
	PB-212	1.91 ± .074	Xylenes (total)	5.5	2×10^8							
	BI-212	1.37 ± .290										
	TL-208	1.76 ± .126										
	EU-155	0.106 ± .093										
	K-40	3.14 ± .380										
	MN-154	0.037 ± .017										
	Tritium	920 ± 200										
SNLA014383, north of loading dock, 0–6 inches bgs	RA-226	0.523 ± .099	Methylene chloride	1.8 J, B, U	9×10^4	Phenanthrene	42 J	—	Arsenic	3.3	80	NA
	PB-214	0.695 ± .108				Fluoranthene	66 J	—	Barium	157	4,000	
	BI-214	0.547 ± .104				Pyrene	69 J	—	Beryllium	0.32	0.2	

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
	TH-232	0.890 ± .249				Benzo(b)fluoranthene	37 J	—	Chromium	5.3	400	
	RA-228	0.890 ± .249							Lead	12.1	8.1[e]	
	AC-228	0.803 ± .225							Nickel	5.9	2,000	
	TH-228	0.733 ± .072							Silver	0.31	200	
	PB-212	0.736 ± .072										
	BI-212	0.331 ± .242										
	TL-208	0.617 ± .142										
	CS-137	0.062 ± .038										
	K-40	18.8 ± 1.15										
	Tritium	410 ± 180										
SNLA014384, north of loading dock; 2–2.5 feet bgs	RA-226	0.511 ± .119	Acetone	5.3 J	8×10^6	None detected			Arsenic	9.0	80	NA
	PB-214	0.606 ± .094	Methylene chloride	3.4 J, B, U	9×10^4				Barium	347	4,000	
	BI-214	0.534 ± .124	Toluene	1.1 J	2×10^7				Beryllium	0.24	0.2	
	TH-232	0.683 ± .203							Chromium	3.8	400	
	RA-228	0.683 ± .203							Lead	3.6	8.1[e]	
	AC-228	0.616 ± .183							Nickel	5.5	2,000	
	TH-228	0.573 ± .066										
	PB-112	0.575 ± .066										
	BI-212	0.418 ± .267										
	TL-208	0.469 ± .132										

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
	K-40	14.5 ± 1.03										
	Tritium	U (250)										
SNLA014385, west of loading dock, north end; 0–6 inches bgs	U-238	0.722 ± .593	Acetone	2.2 J	8×10^6	Phenanthrene	130 J	—	Arsenic	3.2	80	NA
	TH-234	0.723 ± .594	Methylene chloride	2.2 J, B, U	9×10^4	Fluoranthene	190 J	—	Barium	168	4,000	
	RA-226	0.535 ± .099				Pyrene	190 J	—	Beryllium	0.33	0.2	
	PB-214	0.657 ± .093				Benzo(a)anthracene	65 J	—	Chromium	240	400	
	BI-214	0.559 ± .104				bis(2-Ethylhexyl) phthalate	140 J	5×10^4	Lead	1,360	8.1[e]	
	TH-232	0.814 ± .148				Chrysene	92 J	—	Nickel	5.9	2,000	
	RA-228	0.814 ± .148				Benzo(b)fluoranthene	300 J	—	Silver	0.51	200	
	AC-228	0.734 ± .133										
	TH-228	0.702 ± .063										
	PB-212	0.705 ± .063										
	BI-212	0.484 ± .236										
	TL-208	0.611 ± .105										
	K-40	16.3 ± .993										
	Tritium	U (380)										
SNLA014386, west of loading dock, north end; 2–2.5 feet bgs	RA-226	0.591 ± 0.091	Methylene chloride	1.4 J, B, U	9×10^4	None detected			Arsenic	4.6	80	NA

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
	PB-214	0.592 ± .095							Barium	272	4,000	
	BI-214	0.618 ± .096							Chromium	8.9	400	
	TH-232	0.874 ± .176							Lead	9.0	8.1[e]	
	RA-228	0.874 ± .176							Nickel	6.8	2,000	
	AC-228	0.789 ± .159										
	TH-228	0.623 ± .066										
	PB-212	0.626 ± .066										
	BI-212	0.609 ± .315										
	TL-208	0.648 ± .125										
	PA-231	1.28 ± .811										
	CS-137	0.044 ± .029										
	K-40	13.5 ± .969										
	Tritium	U (250)										
SNLA014387, west of loading dock, south end; 0–6 inches bgs	RA-226	0.622 ± .084	Acetone	6.3 J	8×10^6	Phenanthrene	120 J	—	Arsenic	3.1	80	NA
	PB-214	0.718 ± .078	Methylene chloride	1.7 J, B, U	9×10^4	Fluoranthene	220 J	—	Barium	217	4,000	
	BI-214	0.650 ± .088	Toluene	3.9 J	2×10^7	Pyrene	290 J	—	Beryllium	0.34	0.2	
	TH-232	0.771 ± .151				Benzo(a)anthracene	90 J	—	Chromium	7.1	400	
	RA-228	0.771 ± .151				bis(2-Ethylhexyl) phthalate	150 J	5×10^4	Lead	17.8	8.1[e]	
	AC-228	0.696 ± .137				Chrysene	140 J	—	Nickel	7.2	2,000	

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
	TH-228	0.689 ± .057				Benzo(b)fluoranthene	170 J	—	Silver	1.4	200	
	RA-224	0.772 ± .822										
	PB-212	0.692 ± .057										
	BI-212	0.441 ± .196										
	TL-208	0.724 ± .124										
	CS-137	0.065 ± .032										
	K-40	17.2 ± .882										
	Tritium	1000 ± 250										
SNLA014388, west of loading dock, south end; 2–2.5 feet bgs	RA-226	0.471 ± .085	Acetone	10	8×10^6	None detected			Arsenic	4.4	80	NA
	PB-214	0.508 ± .107	Methylene chloride	1.4 J, B, U	9×10^4				Barium	319	4,000	
	BI-214	0.493 ± .088							Beryllium	0.26	0.2	
	TH-232	0.651 ± .187							Chromium	3.7	400	
	RA-228	0.651 ± .187							Lead	3.3	8.1[e]	
	AC-228	0.588 ± .169							Nickel	4.9	2,000	
	TH-228	0.610 ± .066										
	PB-212	0.613 ± .066										
	BI-212	0.580 ± .492										
	TL-208	0.582 ± .129										
	K-40	12.7 ± .916										
	Tritium	350 ± 170										

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
SNLA014389, south of loading dock; 0–6 inches bgs	U-238	1.35 ± .602	Acetone	12	8×10^6	Fluoranthene	42 J	—	Arsenic	3.0	80	NA
	TH-234	1.35 ± .603	2-Butanone (MEK)	1.6 J	—	Pyrene	50 J	—	Barium	146	4,000	
	RA-226	0.615 ± .078	Methylene chloride	1.3 J, B, U	9×10^4				Beryllium	0.32	0.0	
	PB-214	0.651 ± .097							Chromium	6.9	400	
	BI-214	0.643 ± .082							Lead	12.4	8.1[e]	
	TH-232	0.760 ± .186							Nickel	7.7	2,000	
	RA-228	0.760 ± .186							Silver	0.84	200	
	AC-228	0.686 ± .168										
	TH-228	0.631 ± .055										
	PB-212	0.633 ± .055										
	BI-212	0.507 ± .215										
	TL-208	0.652 ± .113										
	K-40	19.8 ± .923										
	Tritium	U (260)										
SNLA014390, south of loading dock; 2–2.5 feet bgs	RA-226	0.470 ± 0.91	Acetone	14	8×10^6	None detected			Arsenic	4.3	80	NA
	PB-214	0.469 ± .105	2-Butanone (MEK)	1.8 J	—				Barium	174	4,000	
	BI-214	0.492 ± .095	Methylene chloride	2.1 J, B, U	9×10^4				Beryllium	0.29	0.2	
	TH-232	0.628 ± .150							Chromium	4.5	400	
	RA-228	0.628 ± .150							Lead	3.5	8.1[e]	
	AC-228	0.567 ± .136							Nickel	5.3	2,000	

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]											
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
	TH-228	0.512 ± .058										
	PB-212	0.514 ± .059										
	BI-212	0.285 ± .294										
	TL-208	0.574 ± .113										
	K-40	13.0 ± .905										
	Tritium	430 ± 180										
SNLA014391, south of loading dock; 2–2.5 feet bgs, duplicate	RA-226	0.414 ± .091	Methylene chloride	1.8 J, B, U	9×10^4	None detected			Arsenic	4.8	80	NA
	PB-214	0.519 ± .102							Barium	192	4,000	
	BI-214	0.433 ± .095							Beryllium	0.32	0.2	
	TH-232	0.676 ± .187							Chromium	5.1	400	
	RA-228	0.676 ± .187							Lead	3.6	8.1[e]	
	AC-228	0.610 ± 0.169							Nickel	5.5	2,000	
	TH--33.00	0.514 ± .061										
	PB-212	0.516 ± .061										
	BI-212	0.328 ± .274										
	TL-208	0.571 ± .126										

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Sandia National Laboratories/New Mexico, Building 839
Contamination Assessment Soil and Sediment Sample Results

SNL/NM Sample No. and Location	Constituents of Concern Detected[a]												
	Radionuclides		Volatile Organic Compounds			Semivolatile Organic Compounds/PCBs			Inorganics			pH	
	Identity	Result[b] ±2-sigma uncertainty (pCi/g)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (µg/kg)	Action Level[d] (µg/kg)	Identity	Result[c] (mg/kg)	Action Level[d] (mg/kg)	Result
	K-40	13.3 ± .944											
	Tritium	590 ± 190											

pCi/g = Picocurie per gram; µg/kg = microgram per kilogram; mg/kg = milligram per kilogram; bgs = below ground surface.
NA = Not applicable; not analyzed this sample.
U (MDA) = Undetected (minimum detectable activity).
[a]Only constituents listed in 40 CFR 264, Subpart S (proposed rule), published in the Federal Register, Volume 55, Number 145, July 27, 1990, are presented in this table and are considered as a concern under the Environmental Restoration Program.
[b]Tritium results are given in picocuries per liter (pCi/L).
[c]Results denoted by a "J" flag indicate that the value lies between the instrument detection limit and quantitation limit and is therefore an estimated concentration. Results denoted by a "B" flag indicate that the compound was also detected in the method blank. Results denoted by a "U" flag indicate that the environmental sample result was less than or equal to 10X the associated method blank value for common laboratory contaminants (i.e., methylene chloride, acetone, 2-Butanone, toluene, and phthalates).
[d]Action levels are from the "Site-Specific Sampling Plan for Contamination Assessment of Buildings 838 and 839," which are based on the levels defined in 40 CFR 264, Subpart S (proposed rule), published in the Federal Register, Volume 55, Number 145, July 27, 1990. Dashes denote constituents for which Subpart S does not provide action level guidance.
[e]The action level for lead is based on a statistical analysis of lead (background) concentration data at SNL/NM (SNL/NM, 1993f).

Radionuclides:

AC = actinium
BI = bismuth
K = potassium
PB = lead
RA = radium
TH = thorium
TL = thallium
U = uranium

Bldg. 838/839 Phase 2

BUILDINGS 838 AND 839: PHASE II

Shaw Environmental, Inc.

5301 Central Avenue NE, Suite 700
Albuquerque, NM 87108-1513
505.262.8800
Fax: 505.262.8855

Shaw™ Shaw Environmental, Inc.

October 24, 2003

Project No. 842717.01

Brenda Langkopf
Sandia National Laboratories/New Mexico
P.O. Box 5800, M/S 1087
Albuquerque, NM 87185-1087

Buildings 838 and 839 Phase II Contamination Assessment Sampling Summary,
Sandia National Laboratories/New Mexico
Task Order CPA56064, Purchase Order 107802

Miss Langkopf:

Soil and sediment sampling results for sampling conducted at the Buildings 838 and 839 Phase II Contamination Assessment are presented in "Report on Phase II Contamination Assessment at Buildings 838 and 839" (IT, 1994, SHEARS # 27099, 27103, 27102, and 27100). IT Corporation collected samples during the period of April 12 through May 3, 1994. The samples are documented on chain of custody numbers: 00001 through 00004, 00007 through 00020, 00027 through 00030, 00032, 508152, 508154, 508155, and 508164 through 508167. A total of 81 soil samples, 11 composite soil samples, 6 duplicate soil samples, 1 sediment sample, 1 wipe of the interior of the Building 839 acid line, 4 equipment rinsate samples, 6 field blank samples, and 11 trip blank samples were collected. The soil samples were collected to further characterize the nature and extent of contamination identified in the Phase I Contamination Assessment. The sediment sample was collected from Building 839's acid line sediments to determine the presence of hazardous and/or radioactive wastes within the line. The location of Buildings 838 and 839 as well as the sample locations are depicted in Figures 1-1, 2-1, 2-2, 2-3, and 2-4. A summary of the sample locations is presented in Table 2-1. Analytical methods and method detection limits are summarized in Table 3-1. Detected compounds are summarized in Tables 3-2 through 3-12.

Respectfully submitted,

SHAW ENVIRONMENTAL, INC.

Lara Beasley

cc: M. Skelly, SNL/NM (w/ enclosures)
M. Goodrich, Shaw Environmental, Inc. (w/o enclosures)
Project File (w/ enclosures)

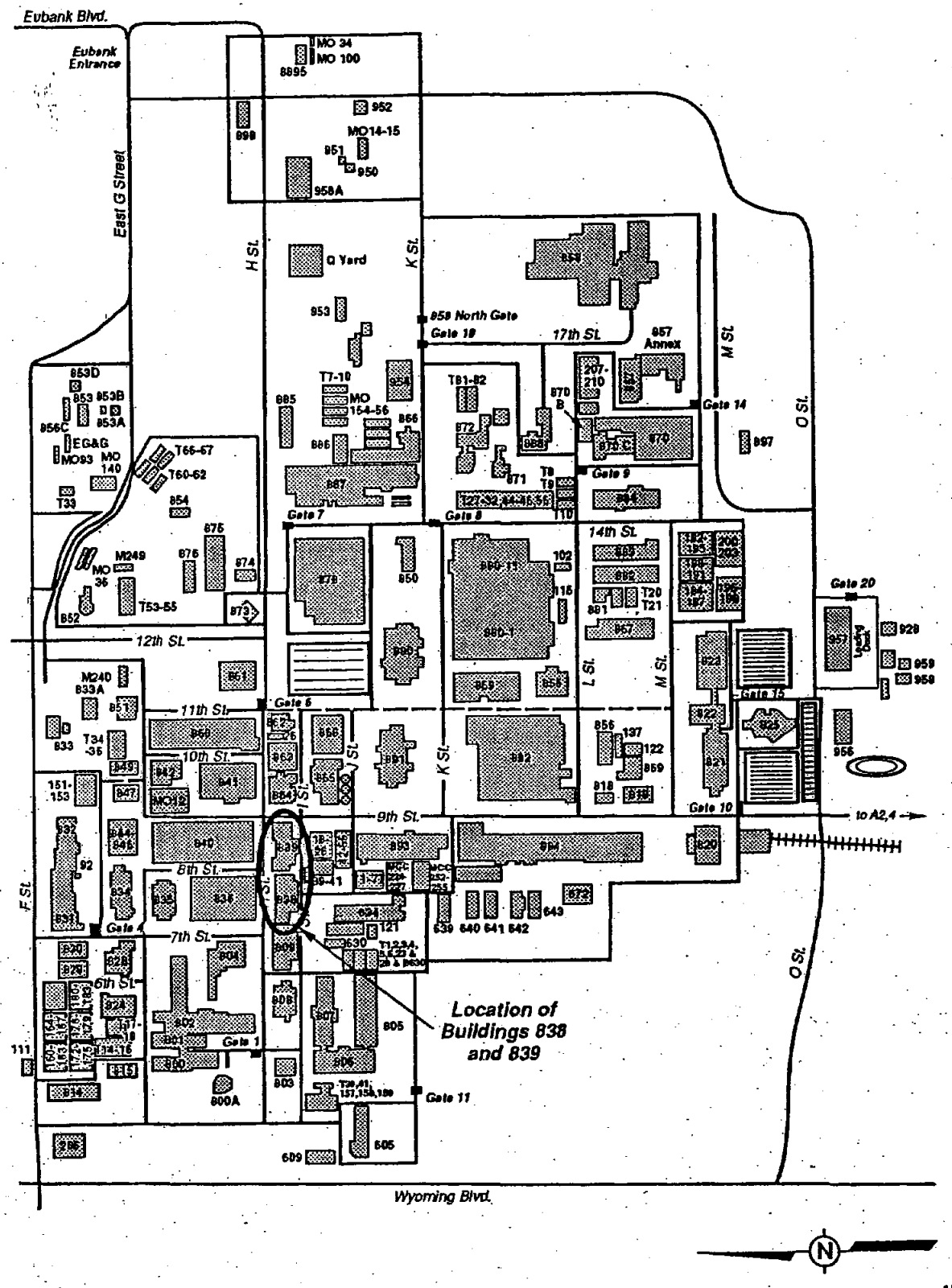


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Figure 1-1

Location of Buildings 838 and 839 in Technical Area 1
Sandia National Laboratories/New Mexico

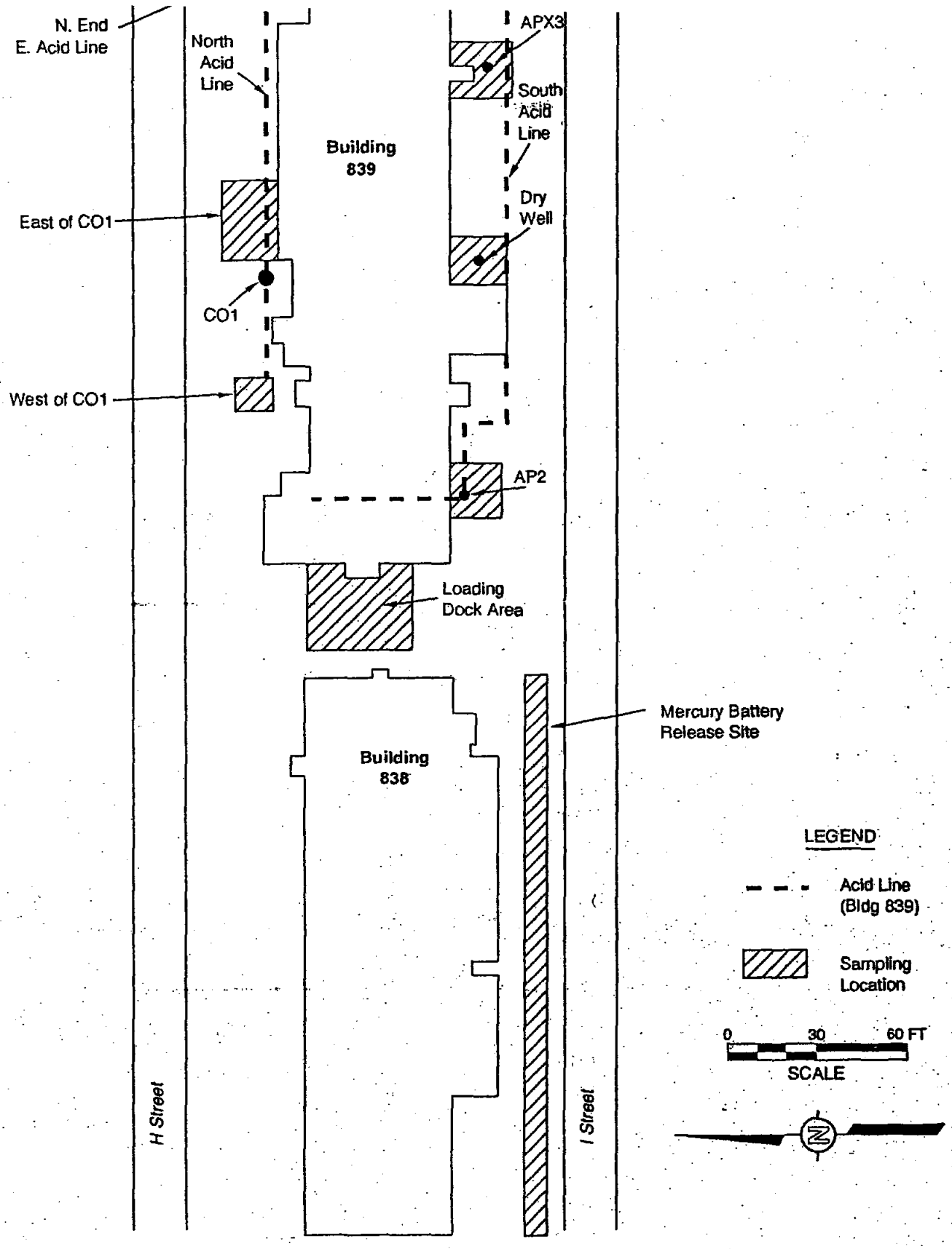


Figure 2-1
Phase II Soil Sampling Locations at Buildings 838 and 839, Sandia National Laboratories/New Mexico

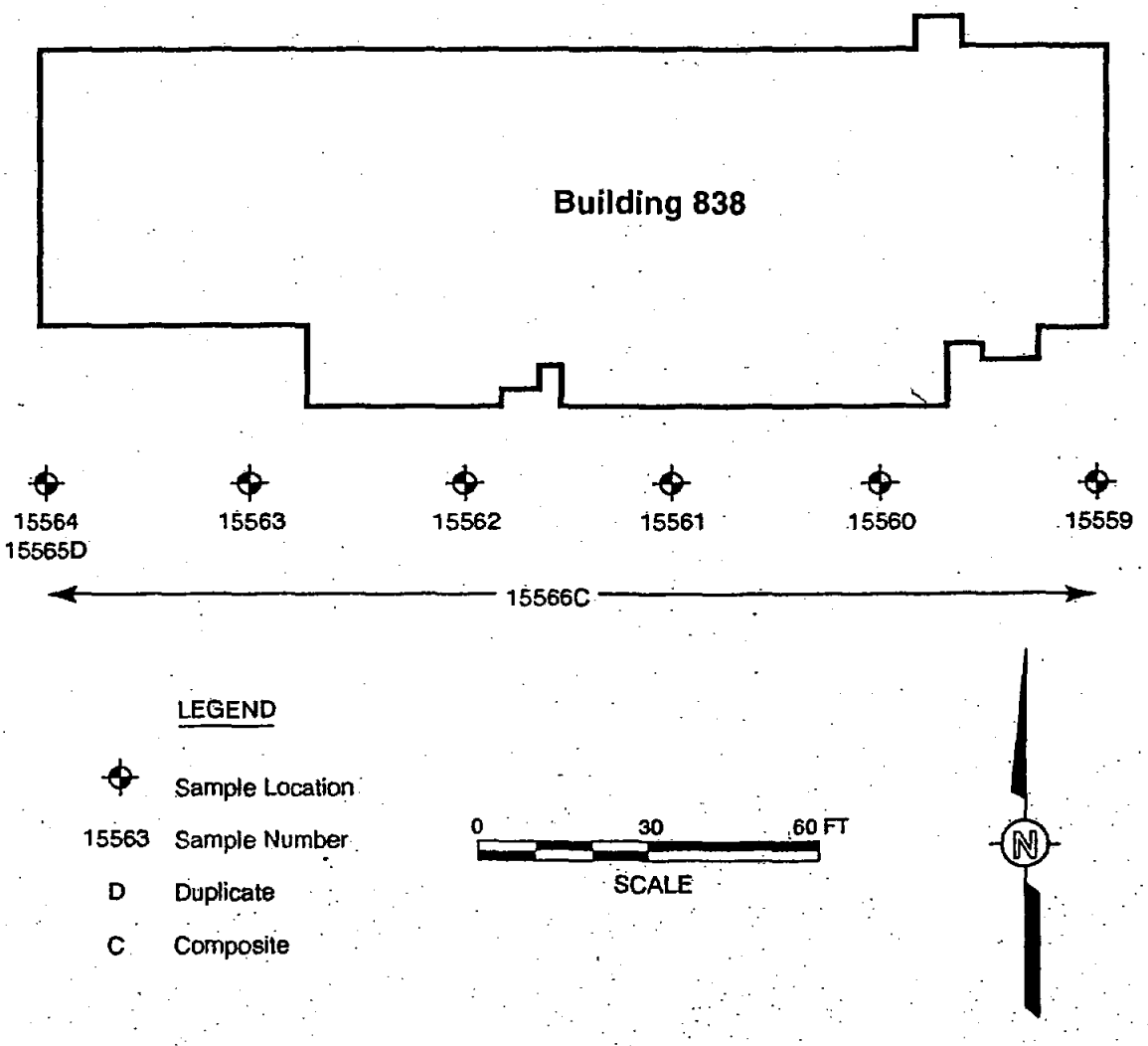


Figure 2-2
Phase II Soil Sampling Locations at Building 838 Suspected Mercury Battery Release Site
Sandia National Laboratories/New Mexico

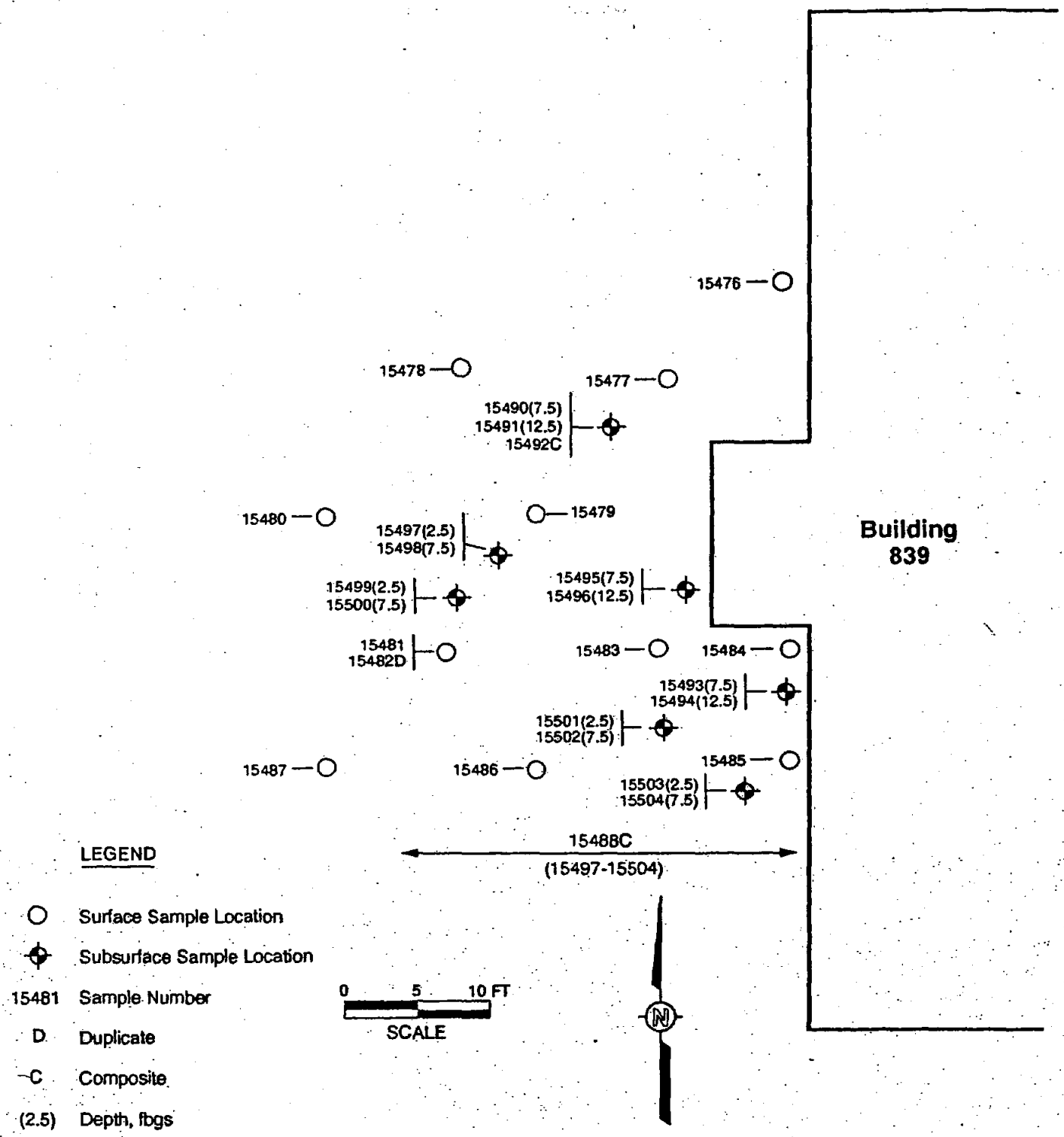


Figure 2-3
Phase II Soil Sampling Locations at Building 839 Loading Dock Area, Sandia National Laboratories/New Mexico

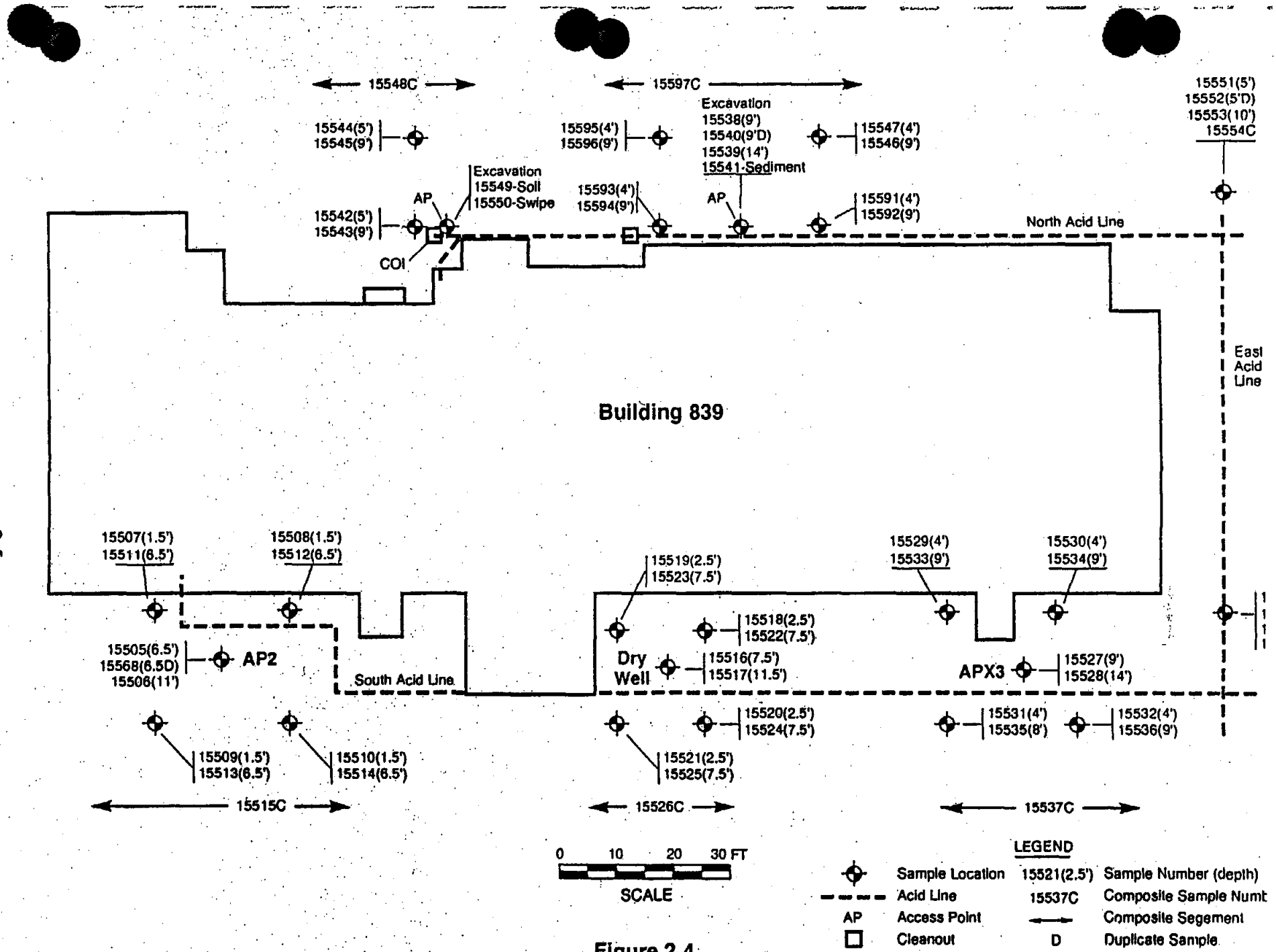


Figure 2-4
Phase II Soil Sampling Locations Adjacent to Building 839, Sandia National Laboratories/New Mexico

2.0 Sampling Activities

Phase II sampling of soils and the interiors of the acid lines at Buildings 838 and 839 was performed from April 12 through May 3, 1994, in accordance with the SAP. Sampling was performed at the general locations and for the constituents listed in Table 2-1. Locations are shown in Figures 2-1 through 2-4.

Table 2-1

List of Sampling Locations and Parameters for Phase II Sampling at Buildings 838 and 839 Sandia National Laboratories/New Mexico

Location	Analyses Required
Suspected mercury battery release site, south side of Building 838	Mercury
Loading dock area, west end of Building 839	Tritium, gamma radiation, VOCs, and metals
Access point 2 (AP2), south acid waste line, Building 839	Tritium, gamma radiation, VOCs, and metals
Dry well, south side of Building 839	VOCs, PCBs, and metals
APX3, south acid waste line, Building 839	Metals
East and west of clean-out 1 (CO1), north acid waste line, Building 839	Tritium, gamma radiation, VOCs, PCBs, and metals
North and south end, east acid waste line, Building 839	Tritium, gamma radiation, VOCs, SVOCs, PCBs, and metals
Sediments from interior of north acid waste line, Building 839	PCBs

2.1 Sample Summary

Two classes of environmental samples were collected for the Phase II contamination assessment. Samples were collected for SNL/NM ER Project site evaluation and waste characterization purposes. In addition, quality control (QC) samples were collected at each location. The types of environmental and QC samples collected are described below.

2.1.1 Building 838 Suspected Mercury Battery Release Site

Phase II soil assessment at the suspected mercury battery release site involved collection of seven soil samples (including one field duplicate) for laboratory analysis of total mercury. Figure 2-2 shows the location of environmental samples collected at this site. One composite soil sample was collected for toxicity characteristic leaching procedure (TCLP) preparation

Table 3-1

Analytical Methods, Action Levels, and Detection Limits for Phase II Assessment of Potentially Contaminated Soils, Buildings 838 and 839, Sandia National Laboratories/New Mexico

Analyte	CAS No.[a]	Test Method[b]	Action Levels for Soils[c]	Background Values[d]	Laboratory Reporting Limit[e]
Metals			(mg/kg)	(mg/kg)	(mg/kg)
Arsenic	7440-38-2	6010	80	–	1.0
Beryllium	7440-41-7	6010	0.2	0.785	0.20
Barium	7440-39-3	6010	4,000	407.94	1.0
Cadmium	7440-43-9	6010	40	3.51	0.50
Chromium, total	7440-47-3	6010	400	22.9	1.0
Lead	7439-92-1	6010	–	15.0	0.30
Mercury	7439-97-6	7471	20	–	0.10
Nickel	7440-02-0	6010	2,000	15.39	4.0
Selenium	7782-49-2	6010	–	–	0.50
Silver	7440-22-4	6010	200	4.0	1.0
TCLP Metals			(mg/L)		(mg/L)
Arsenic	7440-38-2	1311/6010	5.0	–	0.2
Barium	7440-39-3	1311/6010	100.0	–	0.020
Cadmium	7440-43-9	1311/6010	1.0	–	0.010
Chromium, Total	7440-47-3	1311/6010	5.0	–	0.020
Lead	7439-92-1	1311/6010	5.0	–	0.10
Mercury	7439-97-6	1311/7470	0.2	–	0.00020
Selenium	7782-49-2	1311/6010	1.0	–	0.010
Silver	7440-22-4	1311/6010	5.0	–	0.020
Semivolatile Organics			(µg/kg)		(µg/kg)
Acenaphthene	83-32-9	8270	–	–	330
Acenaphthylene	208-96-8	8270	–	–	330
Anthracene	120-12-7	8270	–	–	330
Benz(a)anthracene	56-55-3	8270	–	–	330
Benz(b)fluoranthene	205-99-2	8270	–	–	330
Benz(k)fluoranthene	207-08-9	8270	–	–	330
Benzo(g,h,i)perylene	191-24-2	8270	–	–	330
Benzo(a)pyrene	50-32-8	8270	–	–	330
Benzoic acid	65-85-0	8270	–	–	1600
Benzyl alcohol	100-51-6	8270	–	–	330

Refer to footnotes at end of table.

Table 3-1 *(Continued)*

Analytical Methods, Action Levels, and Detection Limits for Phase II Assessment of Potentially Contaminated Soils, Buildings 838 and 839, Sandia National Laboratories/New Mexico

Analyte	CAS No.[a]	Test Method[b]	Action Levels for Soils[c]	Background Values[d]	Laboratory Reporting Limit[e]
Semivolatile Organics (continued)			(µg/kg)		(µg/kg)
bis(2-Chlorethyl)ether	111-44-4	8270	600	–	330
bis(2-Chloroethoxy)methane	111-91-1	8270	–	–	330
bis(2-Chloroisopropyl)ether	108-60-1	8270	–	–	330
4-Chloro-3-methylphenol	59-50-7	8270	–	–	330
bis(2-Ethylhexyl)phthalate	117-81-7	8270	50,000	–	330
4-Bromophenyl phenyl ether	101-55-3	8270	–	–	330
Butyl benzyl phthalate	85-68-7	8270	20,000,000	–	330
4-Chloroaniline	106-47-8	8270	–	–	330
2-Chloronaphthalene	91-58-7	8270	–	–	330
2-Chlorophenol	95-57-8	8270	400,000	–	330
4-Chlorophenyl phenyl ether	7005-72-3	8270	–	–	330
Chrysene	218-01-9	8270	–	–	330
Dibenz(a,h)anthracene	53-70-3	8270	–	–	330
Di-n-butylphthalate	84-74-2	8270	8,000,000	–	330
Di-n-octyl phthalate	117-84-0	8270	–	–	330
Dibenzofuran	132-64-9	8270	–	–	330
1,2-Dichlorobenzene	95-50-1	8270	–	–	330
1,3-Dichlorobenzene	541-73-1	8270	–	–	330
1,4-Dichlorobenzene	106-46-7	8270	–	–	330
3,3-Dichlorobenzidine	91-94-1	8270	2,000	–	660
2,4-Dichlorophenol	120-83-2	8270	200,000	–	330
Diethyl phthalate	84-66-2	8270	60,000,000	–	330
2,4-Dimethylphenol	105-67-9	8270	–	–	330
Dimethyl phthalate	131-11-3	8270	–	–	330
4,6-Dinitro-2-methylphenol	534-52-1	8270	–	–	1600
2,4-Dinitrophenol	51-28-5	8270	200,000	–	1600
2,4-Dinitrotoluene	121-14-2	8270	–	–	330
2,6-Dinitrotoluene	606-20-2	8270	1,000	–	330
Fluoranthene	206-44-0	8270	–	–	330
Fluorene	86-73-7	8270	–	–	330

Refer to footnotes at end of table.

Table 3-1 *(Continued)*

Analytical Methods, Action Levels, and Detection Limits for Phase II Assessment of Potentially Contaminated Soils, Buildings 838 and 839, Sandia National Laboratories/New Mexico

Analyte	CAS No.[a]	Test Method[b]	Action Levels for Soils[c]	Background Values[d]	Laboratory Reporting Limit[e]
Semivolatile Organics (Continued)			(µg/kg)		(µg/kg)
Hexachlorobenzene	118-74-1	8270	–	–	330
Hexachlorobutadiene	87-68-3	8270	90,000	–	330
Hexachlorocyclopentadiene	77-47-4	8270	600,000	–	330
Hexachloroethane	67-72-1	8270	80,000	–	330
Indeno (1,2,3-cd)pyrene	193-39-5	8270	–	–	330
Isophorone	78-59-1	8270	2,000,000	–	330
2-Methylnaphthalene	91-57-6	8270	–	–	330
2-Methylphenol	95-48-7	8270	–	–	330
4-Methylphenol	106-44-5	8270	–	–	330
Methylphenol (total)	NA	8270	–	–	330
Nitrobenzene	98-95-3	8270	–	–	330
2-Nitroaniline	88-74-4	8270	–	–	1600
3-Nitroaniline	99-09-2	8270	–	–	1600
4-Nitroaniline	100-01-6	8270	–	–	1600
2-Nitrophenol	88-75-5	8270	–	–	330
4-Nitrophenol	100-02-7	8270	–	–	1600
N-nitroso-dipropylamine	621-64-7	8270	100	–	330
N-nitrosodiphenylamine	86-30-6	8270	100,000	–	330
Naphthalene	91-20-3	8270	–	–	330
Pentachlorophenol	87-86-5	8270	2,000,000	–	1600
Phenanthrene	85-01-8	8270	–	–	330
Phenol	108-95-2	8270	50,000,000	–	330
Pyrene	129-00-0	8270	–	–	330
1,2,4-Trichlorobenzene	120-82-1	8270	2,000,000	–	330
2,4,5-Trichlorophenol	95-95-4	8270	8,000,000	–	1,600
2,4,6-Trichlorophenol	88-06-2	8270	40,000	–	330
Volatile Organics			(µg/kg)		(µg/kg)
Acetone	67-64-1	8240	8,000,000	–	10
Benzene	71-43-2	8240	–	–	5.0
Bromodichloromethane	75-27-4	8240	500	–	5.0
Bromoform	75-25-2	8240	2,000,000	–	5.0

Refer to footnotes at end of table.

Table 3-1 *(Continued)*

Analytical Methods, Action Levels, and Detection Limits for Phase II Assessment of Potentially Contaminated Soils, Buildings 838 and 839, Sandia National Laboratories/New Mexico

Analyte	CAS No.[a]	Test Method[b]	Action Levels for Soils[c]	Background Values[d]	Laboratory Reporting Limit[e]
Volatile Organics (Continued)			(µg/kg)		(µg/kg)
Bromomethane	74-83-9	8240	100,000	–	10
2-Butanone (MEK)	78-93-3	8240	4,000,000	–	10
Carbon disulfide	75-15-0	8240	8,000,000	–	5.0
Carbon tetrachloride	56-23-5	8240	5,000	–	5.0
Chlorobenzene	108-90-7	8240	2,000,000	–	5.0
Chloroethane	75-00-3	8240	–	–	10
Chloroform	67-66-3	8240	100,000	–	5.0
Chloromethane	74-87-3	8240	–	–	10
cis-1,3-Dichloropropene	10061-01-5	8240	20,000	–	5.0
Dibromochloromethane	124-48-1	8240	–	–	5.0
1,1-Dichloroethane	75-34-3	8240	–	–	5.0
1,2-Dichloroethane	107-06-2	8240	8,000	–	5.0
1,1-Dichloroethylene	75-35-4	8240	10,000	–	5.0
2-Dichloroethylene (total)	NA	8240	–	–	5.0
1,2-Dichloropropane	78-87-5	8240	–	–	5.0
trans-1,3-Dichloropropene	10061-02-6	8240	20,000	–	5.0
Ethylbenzene	100-41-4	8240	8,000,000	–	5.0
2-Hexanone	591-78-6	8240	–	–	10
4-Methyl-2-pentanone	108-10-1	8240	–	–	10
Methylene chloride	75-09-2	8240	90,000	–	5.0
Styrene	100-42-5	8240	20,000,000	–	5.0
1,1,2,2-Tetrachloroethane	79-34-5	8240	40,000	–	5.0
Tetrachloroethylene	127-18-4	8240	10,000	–	5.0
Toluene	108-88-3	8240	20,000,000	–	5.0
1,1,1-Trichloroethane	71-55-6	8240	7,000,000	–	5.0
1,1,2-Trichloroethane	79-00-5	8240	100,000	–	5.0
Trichloroethylene	79-01-6	8240	60,000	–	5.0
Vinyl acetate	108-05-4	8240	–	–	10
Vinyl chloride	75-01-4	8240	–	–	10
Xylenes (Total)	1330-20-7	8240	200,000,000	–	5.0

Refer to footnotes at end of table.

Table 3-1 *(Continued)*

Analytical Methods, Action Levels, and Detection Limits for Phase II Assessment of Potentially Contaminated Soils, Buildings 838 and 839, Sandia National Laboratories/New Mexico

Analyte	CAS No.[a]	Test Method[b]	Action Levels for Soils[c]	Background Values[d]	Laboratory Reporting Limit[e]
Polychlorinated Biphenyls			(µg/kg)		(µg/kg)
Soil	Vary	8080	25,000	–	33
Radiological			(pCi/g)	(pCi/g)	(pCi/g)
Gamma Spectrum	NA	f	0.03	–	–
Bismuth-212	NA	NA	–	2.7	–
Bismuth-214	NA	NA	–	0.8	–
Cesium-137 (surface)	NA	NA	–	0.92	–
Cesium-137 (subsurface)	NA	NA	–	0.068	–
Lead-210	NA	NA	–	6.8	–
Lead-212	NA	NA	–	1.08	–
Potassium-40	NA	NA	–	25.34	–
Radium-224	NA	NA	–	0.968	–
Radium-226	NA	NA	–	2.09	–
Radium-228	NA	NA	–	1.05	–
Thorium-234	NA	NA	–	2.89	–
Uranium-235	NA	NA	–	0.168	–
Uranium-238	NA	NA	–	1.1	–
Tritium	NA	906.0	250 pCi/L	–	250 pCi/L

µg/kg = Microgram(s) per kilogram.
mg/kg = Milligram(s) per kilogram.
mg/L = Milligram(s) per liter.
pCi/g = Picocurie(s) per gram.
pCi/L = Picocurie(s) per liter.
ppm = Part(s) per million.
NA = Not applicable
NE = Not established.

[a]Chemical Abstract Service Number.

[b]U.S. Environmental Protection Agency (EPA), 1986, "Test Methods for Evaluating Solid Waste Physical/Chemical Methods," SW 846, 3rd ed.

[c]Action levels (except Toxicity Characteristic Leaching Procedure [TCLP] and radiological) obtained from 40 CFR Part 264, proposed Subpart S. TCLP action levels for metals in waste from Table 1, 40 CFR 261.24 "Maximum Concentrations of Contaminants for the Toxicity Characteristic." Radiological action levels are obtained from SNL/NM "Program Plan for Management of Radioactive Materials Management Areas." PCB action level from 40 CFR 761 Subpart G.

[d]Background values obtained from "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Restoration Project" (IT, 1994b).

[e]The detection limits shown (except radiological) are those reported by the analyzing laboratory. Values are highly matrix-dependent. Radiological detection limits are obtained from SNL/NM "Program Plan for Management of Radioactive Materials Management Areas" (SNL/NM, 1994f).

[f]Method is laboratory-specific.

[g]Radionuclide background activity levels are determined for the individual radionuclide.

Table 3-2
Analytical Results for Soil Samples at Suspected Mercury Battery Release Site
Building 838 Phase II Contamination Assessment
Sandia National Laboratories/New Mexico

SNL/NM Sample No. and Location	Identity	Result (mg/L)
SNL/NM015559 South of SE corner of Building 838	Total Mercury	ND
SNL/NM015560 Approximately 30 ft west of 15559	Total Mercury	ND
SNL/NM015561 Approximately 30 ft west of 15560	Total Mercury	ND
SNL/NM015562 Approximately 30 ft west of 15561	Total Mercury	ND
SNL/NM015563 Approximately 30 ft west of 15562	Total Mercury	ND
SNL/NM015564 Approximately 30 ft west of 15563, at SW corner of Building 838	Total Mercury	ND
SNL/NM015565 Duplicate of 15564	Total Mercury	ND

ND = Not detected
mg/L = Milligrams per liter

Table 3-3

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	Radionuclides		TAL Metals		VOCs	
	Identity[a]	Result ± 2-sigma (pCi/g)	Identity	Result (mg/kg)	Identity	Result (µg/kg)
SNLA015476 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	Ra-226	1.32 ± 0.539	NA	NA	NA	NA
	Pb-214	0.717 ± 0.0611				
	Bi-214	0.643 ± 0.0771				
	Th-232	0.836 ± 0.124				
	Ra-228	0.836 ± 0.124				
	Ac-228	0.754 ± 0.112				
	Th-228	0.700 ± 0.0460				
	Ra-224	0.576 ± 0.543				
	Pb-212	0.703 ± 0.0462				
	Bi-212	0.682 ± 0.219				
	Tl-208	0.228 ± 0.0312				
	Cs-137	0.0816 ± 0.0316				
	K-40	17.0 ± 0.703				
	Tritium[b]	**520 ± 170 pCi/L**				
SNLA015477 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	Ra-226	1.78 ± 0.606	NA	NA	NA	NA
	Pb-214	0.660 ± 0.0659				
	Bi-214	0.627 ± 0.0748				
	Th-232	0.886 ± 0.152				
	Ra-228	0.886 ± 0.152				
	Ac-228	0.800 ± 0.137				
	Th-228	0.755 ± 0.0466				
	Ra-224	0.885 ± 0.623				
	Pb-212	0.759 ± 0.0468				
	Bi-212	0.473 ± 0.214				
	Tl-208	0.242 ± 0.0371				
	Cs-137	0.0855 ± 0.0215				
	K-40	18.8 ± 0.773				
	Tritium	**620 ± 170 pCi/L**				
SNLA015478 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	Ra-226	2.03 ± 0.585	NA	NA	NA	NA
	Pb-214	0.791 ± 0.0704				
	Bi-214	0.718 ± 0.0744				
	Th-232	0.924 ± 0.125				
	Ra-228	0.924 ± 0.125				
	Ac-228	0.834 ± 0.113				
	Th-228	0.720 ± 0.0483				
	Ra-224	0.895 ± 0.737				
	Pb-212	0.723 ± 0.0485				
	Bi-212	0.296 ± 0.216				
	Tl-208	0.275 ± 0.0383				
	K-40	18.2 ± 0.833				
	Tritium	**380 ± 150 pCi/L**				

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	Radionuclides		TAL Metals		VOCs	
	Identity[a]	Result ± 2-sigma (pCi/g)	Identity	Result (mg/kg)	Identity	Result (µg/kg)
SNLA015479 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 **Ra-224** Pb-212 Bi-212 Tl-208 Cs-137 K-40 **Tritium**	1.51 ± 0.494 0.769 ± 0.0687 0.662 ± 0.0682 0.787 ± 0.161 0.787 ± 0.161 0.711 ± 0.145 0.700 ± 0.0469 **1.36 ± 0.611** 0.703 ± 0.0471 0.410 ± 0.174 0.230 ± 0.0329 0.0303 ± 0.0225 15.8 ± 0.677 **490 ± 160 pCi/L**	NA	NA	NA	NA
SNLA015480 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	**U-238** Th-234 Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Pb-212 Bi-212 Tl-208 K-40 Tritium	1.22 ± 0.395 1.22 ± 0.395 1.61 ± 0.458 0.718 ± 0.0701 0.652 ± 0.0670 0.859 ± 0.128 0.859 ± 0.128 0.776 ± 0.116 0.701 ± 0.0463 0.705 ± 0.0465 0.545 ± 0.176 0.222 ± 0.0283 17.6 ± 0.765 ND (50 ± 140 pCi/L)	NA	NA	NA	NA
SNLA015481 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 **Ra-224** Pb-212 Bi-212 Tl-208 Cs-137 K-40 **Tritium**	1.50 ± 0.475 0.605 ± 0.0626 0.635 ± 0.0647 0.782 ± 0.114 0.782 ± 0.114 0.706 ± 0.103 0.669 ± 0.0447 **1.10 ± 0.672** 0.672 ± 0.0449 0.639 ± 0.235 0.223 ± 0.0286 0.0370 ± 0.0194 18.0 ± 0.706 **360 ± 160 pCi/L**	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	Radionuclides		TAL Metals		VOCs	
	Identity[a]	Result ± 2-sigma (pCi/g)	Identity	Result (mg/kg)	Identity	Result (µg/kg)
SNLA015482 Former loading dock area west of Building 839; duplicate of 15481; surface sample, 0-6" bgs.	**U-238**	**1.62 ± 0.533**	NA	NA	NA	NA
	Th-234	1.62 ± 0.534				
	Ra-226	2.00 ± 0.576				
	Pb-214	0.766 ± 0.0771				
	Bi-214	0.712 ± 0.0691				
	Th-232	0.747 ± 0.145				
	Ra-228	0.747 ± 0.145				
	Ac-228	0.674 ± 0.131				
	Th-228	0.717 ± 0.0479				
	Ra-224	1.06 ± 0.749				
	Pb-212	0.720 ± 0.0482				
	Bi-212	0.404 ± 0.195				
	Tl-208	0.247 ± 0.0347				
	Th-231	0.362 ± 0.191				
	K-40	19.6 ± 0.789				
	Tritium	**530 ± 160 pCi/L**				
SNLA015483 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	U-238	0.800 ± 0.293	NA	NA	NA	NA
	Th-234	0.802 ± 0.293				
	Ra-226	1.31 ± 0.499				
	Pb-214	0.613 ± 0.0526				
	Bi-214	0.603 ± 0.0540				
	Th-232	0.690 ± 0.109				
	Ra-228	0.690 ± 0.109				
	Ac-228	0.623 ± 0.0988				
	Th-228	0.603 ± 0.0407				
	Ra-224	**1.25 ± 0.570**				
	Pb-212	0.606 ± 0.0409				
	Bi-212	0.462 ± 0.175				
	Tl-208	0.253 ± 0.0337				
	Cs-137	0.0881 ± 0.0269				
	K-40	18.0 ± 0.672				
	Tritium	**2100 ± 350 pCi/L**				

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	Radionuclides		TAL Metals		VOCs	
	Identity[a]	Result ± 2-sigma (pCi/g)	Identity	Result (mg/kg)	Identity	Result (µg/kg)
SNLA015484 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	U-238 Th-234 Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 Cs-137 K-40 Tritium	1.49 ± 0.402 1.49 ± 0.403 1.94 ± 0.611 0.755 ± 0.0565 0.717 ± 0.0606 1.03 ± 0.131 1.03 ± 0.131 0.929 ± 0.118 0.852 ± 0.0440 0.780 ± 0.576 0.856 ± 0.0442 0.554 ± 0.198 0.269 ± 0.0340 0.0354 ± 0.0165 18.5 ± 0.701 1800 ± 430 pCi/L	NA	NA	NA	NA
SNLA015485 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 Th-231 Cs-137 K-40 Tritium	2.07 ± 0.574 0.794 ± 0.0686 0.631 ± 0.0680 0.839 ± 0.111 0.839 ± 0.111 0.757 ± 0.100 0.757 ± 0.0456 0.810 ± 0.596 0.761 ± 0.0458 0.446 ± 0.212 0.242 ± 0.0302 0.414 ± 0.242 0.0465 ± 0.0221 17.6 ± 0.697 ND (140 ± 180 pCi/L)	NA	NA	NA	NA

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	Radionuclides		TAL Metals		VOCs	
	Identity[a]	Result ± 2-sigma (pCi/g)	Identity	Result (mg/kg)	Identity	Result (µg/kg)
SNLA015486 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	U-238	1.10 ± 0.359	NA	NA	NA	NA
	Th-234	1.10 ± 0.360				
	Ra-226	1.91 ± 0.576				
	Pb-214	0.733 ± 0.0651				
	Bi-214	0.634 ± 0.0708				
	Th-232	0.729 ± 0.118				
	Ra-228	0.729 ± 0.118				
	Ac-228	0.658 ± 0.106				
	Th-228	0.679 ± 0.0442				
	Ra-224	1.32 ± 0.642				
	Pb-212	0.682 ± 0.0444				
	Bi-212	0.532 ± 0.175				
	Tl-208	0.230 ± 0.0341				
	K-40	16.4 ± 0.704				
	Tritium	600 ± 190 pCi/L				
SNLA015487 Former loading dock area west of Building 839; surface sample, 0-6" bgs.	Ra-226	1.49 ± 0.459	NA	NA	NA	NA
	Pb-214	0.700 ± 0.0639				
	Bi-214	0.656 ± 0.0701				
	Th-232	0.838 ± 0.132				
	Ra-228	0.838 ± 0.132				
	Ac-228	0.757 ± 0.119				
	Th-228	0.683 ± 0.0447				
	Ra-224	2.69 ± 0.637				
	Pb-212	0.686 ± 0.0449				
	Bi-212	0.602 ± 0.215				
	Tl-208	0.229 ± 0.0323				
	Cs-137	0.0818 ± 0.0284				
	K-40	16.9 ± 0.697				
	Tritium	780 ± 190 pCi/L				

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	Radionuclides		TAL Metals		VOCs	
	Identity[a]	Result ± 2-sigma (pCi/g)	Identity	Result (mg/kg)	Identity	Result (µg/kg)
SNLA015490 Former loading dock area west of Building 839. Sample collected 7.5 fbgs.	NA	NA	Aluminum Arsenic Barium **Beryllium** Cadmium Calcium Chromium Cobalt Copper Iron **Lead** Magnesium Manganese Nickel Potassium Sodium Vanadium Zinc	4950 0.99 J 102 **0.35** 1.3 27400 9.7 5.7 12.4 12600 **19.2 B (0.32)** 4060 270 5.5 1860 207 J 21.9 35.9	NA	NA
SNLA015491 Former loading dock area west of Building 839. Sample collected 12.5 fbgs.	NA	NA	Aluminum Arsenic Barium **Beryllium** Calcium Chromium Cobalt Copper Iron **Lead** Magnesium Manganese Nickel Potassium Sodium Thallium Vanadium Zinc	5140 1.1 69.0 **0.35** 19000 8.2 6.3 10.0 13400 **15.8 B (0.32)** 3820 246 5.4 2140 234 J 0.38 J 22.5 35.9	NA	NA

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	Radionuclides		TAL Metals		VOCs	
	Identity[a]	Result ± 2-sigma (pCi/g)	Identity	Result (mg/kg)	Identity	Result (µg/kg)
SNLA015493 Former loading dock area west of Building 839. "Old S," 7.5 fbgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Pb-212 Bi-212 Tl-208 K-40 **Tritium**	1.64 ± 0.621 0.708 ± 0.0738 0.534 ± 0.0749 0.677 ± 0.128 0.677 ± 0.128 0.611 ± 0.116 0.641 ± 0.0520 0.644 ± 0.0523 0.666 ± 0.201 0.226 ± 0.0417 17.7 ± 0.823 **470 ± 170 pCi/L**	NA	NA	Acetone	5.4 J
SNLA015494 Former loading dock area west of Building 839. "Old S," 12.5 fbgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 Th-231 K-40 **Tritium**	1.37 ± 0.610 0.693 ± 0.0748 0.535 ± 0.0688 0.747 ± 0.164 0.747 ± 0.164 0.674 ± 0.148 0.664 ± 0.0509 0.816 ± 0.627 0.667 ± 0.0511 0.567 ± 0.200 0.219 ± 0.0356 0.563 ± 0.191 21.1 ± 0.794 **470 ± 200 pCi/L**	NA	NA	ND	ND
SNLA015495 Former loading dock area west of Building 839. "old SW," 7.5 fbgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 **Tritium**	1.73 ± 0.537 0.715 ± 0.0671 0.702 ± 0.0694 0.903 ± 0.123 0.903 ± 0.123 0.815 ± 0.111 0.684 ± 0.0510 0.591 ± 0.548 0.687 ± 0.0512 0.376 ± 0.233 0.249 ± 0.0368 20.8 ± 0.771 **860 ± 210 pCi/L**	NA	NA	ND	ND

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	Radionuclides		TAL Metals		VOCs	
	Identity[a]	Result ± 2-sigma (pCi/g)	Identity	Result (mg/kg)	Identity	Result (µg/kg)
SNLA015496 Former loading dock area west of Building 839. "old SW," 12.5 fbgs.	U-238 Th-234 Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 Tritium	1.20 ± 0.615 1.20 ± 0.616 1.60 ± 0.620 0.679 ± 0.0642 0.657 ± 0.0699 0.961 ± 0.135 0.961 ± 0.135 0.867 ± 0.122 0.722 ± 0.0481 1.61 ± 0.640 0.725 ± 0.0483 0.475 ± 0.182 0.231 ± 0.0370 20.2 ± 0.781 740 ± 190 pCi/L	NA	NA	ND	ND
SNLA015497 Former loading dock area west of Building 839. Acetone-N—2.5 fbgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 Tritium	1.46 ± 0.517 0.596 ± 0.0742 0.605 ± 0.0709 0.777 ± 0.152 0.777 ± 0.152 0.701 ± 0.137 0.627 ± 0.0479 0.968 ± 0.748 0.629 ± 0.0481 0.610 ± 0.227 0.183 ± 0.0328 15.1 ± 0.700 400 ± 170 pCi/L	NA	NA	Acetone Methylene chloride Tetrachloro-ethene	9.4 BJ (9.0) 2.0 J 2.0 J
SNLA015498 Former loading dock area west of Building 839. "Acetone-N" 7.5 fbgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 Tritium	2.22 ± 0.620 0.789 ± 0.0732 0.755 ± 0.0812 0.709 ± 0.167 0.709 ± 0.167 0.640 ± 0.151 0.705 ± 0.0536 0.788 ± 0.595 0.708 ± 0.0538 0.637 ± 0.241 0.232 ± 0.0402 18.2 ± 0.808 400 ± 160 pCi/L	NA	NA	Acetone	11 B (9.0)

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	Radionuclides		TAL Metals		VOCs	
	Identity[a]	Result ± 2-sigma (pCi/g)	Identity	Result (mg/kg)	Identity	Result (µg/kg)
SNLA015499 Former loading dock area west of Building 839. "Acetone-W" 2.5 fbgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 **Tritium**	1.80 ± 0.593 0.703 ± 0.0732 0.643 ± 0.0706 0.760 ± 0.116 0.760 ± 0.116 0.686 ± 0.105 0.636 ± 0.0507 0.832 ± 0.600 0.639 ± 0.0509 0.498 ± 0.200 0.213 ± 0.0355 16.6 ± 0.751 **510 ± 170 pCi/L**	NA	NA	Acetone Methylene chloride	14 B (9.0) 2.0 J
SNLA015500 Former loading dock area west of Building 839. "Acetone-W" 7.5 fbgs.	U-238 Th-234 Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 **Tritium**	1.25 ± 0.649 1.26 ± 0.650 1.55 ± 0.666 0.594 ± 0.0697 0.543 ± 0.0677 0.705 ± 0.151 0.705 ± 0.151 0.637 ± 0.136 0.586 ± 0.0498 1.14 ± 0.504 0.588 ± 0.0500 0.518 ± 0.259 0.194 ± 0.0380 16.8 ± 0.787 **430 ± 170 pCi/L**	NA	NA	Acetone Methylene chloride	18 B (9.0) 2.3 J
SNLA015501 Former loading dock area west of Building 839. "Acetone-SW" 2.5 fbgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 **Tritium**	1.14 ± 0.541 0.648 ± 0.0834 0.496 ± 0.0787 0.631 ± 0.139 0.631 ± 0.139 0.569 ± 0.126 0.582 ± 0.0526 0.612 ± 0.713 0.584 ± 0.0528 0.439 ± 0.268 0.207 ± 0.0370 13.7 ± 0.752 **380 ± 170 pCi/L**	NA	NA	Acetone Methylene chloride	3.2 BJ (9.0) 2.4 J

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	Radionuclides		TAL Metals		VOCs	
	Identity[a]	Result ± 2-sigma (pCi/g)	Identity	Result (mg/kg)	Identity	Result (µg/kg)
SNLA015502 Former loading dock area west of Building 839. Acetone-SW—7.5 fbgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Pb-212 Bi-212 Tl-208 K-40 Tritium	1.81 ± 0.605 0.666 ± 0.0746 0.672 ± 0.0866 0.815 ± 0.143 0.815 ± 0.143 0.736 ± 0.129 0.562 ± 0.0557 0.565 ± 0.0560 0.324 ± 0.195 0.195 ± 0.0306 18.0 ± 0.781 650 ± 180 pCi/L	NA	NA	ND	ND
SNLA015503 Former loading dock area west of Building 839. Acetone-S—2.5 fbgs.	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 Tritium	1.65 ± 0.620 0.650 ± 0.0723 0.522 ± 0.0736 0.754 ± 0.124 0.754 ± 0.124 0.681 ± 0.112 0.667 ± 0.0508 1.29 ± 0.616 0.670 ± 0.0510 0.482 ± 0.182 0.265 ± 0.0305 14.9 ± 0.719 510 ± 180 pCi/L	NA	NA	Methylene chloride Tetrachloro-ethene Toluene	2.6 J 1.1 J 20
SNLA015504 Former loading dock area west of Building 839. Acetone-S—2.5 fbgs.	U-238 Th-234 Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 Tritium	1.18 ± 0.459 1.18 ± 0.460 1.65 ± 0.567 0.626 ± 0.0745 0.527 ± 0.0720 0.661 ± 0.128 0.661 ± 0.128 0.596 ± 0.116 0.528 ± 0.0501 0.737 ± 0.745 0.530 ± 0.0503 0.422 ± 0.228 0.205 ± 0.0363 15.5 ± 0.791 610 ± 170 pCi/L	NA	NA	Methylene chloride	2.1 J

Table 3-3 *(Continued)*

Compounds Detected in Soil Samples from Loading Dock Area Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

B = Also found in blank sample. Value of the method blank is shown in parentheses.
J = Concentration below reporting limit or estimated concentration.
µg/kg = Microgram per kilogram.
µg/L = Microgram per liter.
mg/kg = milligram per kilogram.
mg/L = milligram per liter.
NA = Not analyzed or not applicable.
ND = Not detected.
TAL = Target analyte list
VOC = Volatile organic compound
bgs = below ground surface
fbgs= feet below ground surface
pCi/g = Picocuries per gram.
pCi/L = picocuries per liter.
[a] Radionuclides: Ac = actinium; Bi = bismuth; Cs = cesium; K = potassium; Pb = lead; Ra = radium; Th = thorium; Tl = thallium; U = uranium
[b] Bold type indicates values exceeding action levels or geochemical background as listed on Table 3-1 and discussed in Section 3.2.2.

Table 3-4

Compounds Detected in Soil Samples from AP2 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNLA015505	**Acetone**[b]	**15**	Aluminum	5660	**U-238**	**1.94 ± 0.555**
AP2, next to	Methylene chloride	2.4 J	Arsenic	3.0	Th-234	1.94 ± 0.556
south acid line,	Tetrachloroethene	1.6 J	Barium	152	Ra-226	0.795 ± 0.0657
6.5 fbgs.			**Beryllium**	**0.62**	Pb-214	0.931 ± 0.0686
			Calcium	31800 B (26.3)	**Bi-214**	**0.832 ± 0.0687**
			Chromium	5.6	Th-232	0.963 ± 0.140
			Cobalt	4.9	Ra-228	0.963 ± 0.140
			Copper	6.9	Ac-228	0.869 ± 0.126
			Iron	10700	Th-228	0.756 ± 0.0422
			Lead	5.8	**Ra-224**	**1.01 ± 0.568**
			Magnesium	4570	Pb-212	0.760 ± 0.0424
			Manganese	191	Bi-212	0.607 ± 0.181
			Mercury	0.086 J	Tl-208	0.270 ± 0.0365
			Nickel	6.5	Th-231	0.618 ± 0.336
			Potassium	1360	K-40	17.7 ± 0.749
			Silver	0.32 J		
			Sodium	292 J	**Tritium**	**910 ± 190 pCi/L**
			Vanadium	28.8		
			Zinc	29.3		
SNLA015568	Acetone	9.8 J	Aluminum	5590	**U-238**	**1.56 ± 0.495**
Duplicate of	Methylene chloride	2.1 J	Arsenic	3.1	Th-234	1.57 ± 0.497
15505.			Barium	156	Ra-226	0.749 ± 0.0549
			Beryllium	**0.61**	Pb-214	0.792 ± 0.0570
			Cadmium	0.60 B (0.58)	Bi-214	0.784 ± 0.0573
			Calcium	38000 B (26.3)	Th-232	0.846 ± 0.120
			Chromium	4.5	Ra-228	0.846 ± 0.120
			Cobalt	3.8	Ac-228	0.765 ± 0.108
			Copper	5.6	Th-228	0.719 ± 0.0411
			Iron	10100	Ra-224	0.722 ± 0.562
			Lead	5.7	Pb-212	0.722 ± 0.0414
			Magnesium	4500	Bi-212	0.457 ± 0.194
			Manganese	200	Tl-208	0.249 ± 0.0341
			Nickel	5.4	K-40	17.5 ± 0.700
			Potassium	1230		
			Sodium	180 J	**Tritium**	**970 ± 190 pCi/L**
			Vanadium	30.5		
			Zinc	28.1		

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Compounds Detected in Soil Samples from AP2 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNLA015506 AP2, next to line, 11.0 fbgs.	Acetone	6.9 J	Aluminum	5810	Ra-226	0.655 ± 0.0545
	Methylene chloride	1.7 J	Arsenic	2.0	Pb-214	0.786 ± 0.0599
			Barium	96.8	Bi-214	0.684 ± 0.0569
			Beryllium	**0.36**	Th-232	0.923 ± 0.139
			Calcium	21700 B (26.3)	Ra-228	0.923 ± 0.139
			Chromium	4.8	Ac-228	0.833 ± 0.126
			Cobalt	5.0	Th-228	0.699 ± 0.0378
			Copper	6.9	Ra-224	0.904 ± 0.478
			Iron	12100	Pb-212	0.702 ± 0.0380
			Lead	5.1	Bi-212	0.527 ± 0.191
			Magnesium	4890	Tl-208	0.272 ± 0.0306
			Manganese	292	Th-231	0.750 ± 0.240
			Nickel	5.8	K-40	22.5 ± 0.730
			Potassium	1350		
			Sodium	88.4 J	**Tritium**	**1100 ± 210 pCi/L**
			Vanadium	19.5		
			Zinc	36.0		
SNLA015507 NW of AP2, 1.5 fbgs.	ND	ND	Aluminum	4730	U-238	0.632 ± 0.295
			Arsenic	4.3	Th-234	0.633 ± 0.296
			Barium	**676**	Ra-226	1.11 ± 0.518
			Cadmium	1.8	Pb-214	0.521 ± 0.0763
			Calcium	134000	Bi-214	0.458 ± 0.0766
			Chromium	2.5	Pb-210	0.479 ± 0.615
			Cobalt	2.7	Th-232	0.400 ± 0.120
			Copper	5.3	Ra-228	0.400 ± 0.120
			Iron	5800	Ac-228	0.361 ± 0.108
			Lead	3.4	Th-228	0.458 ± 0.0530
			Magnesium	5260	Pb-212	0.460 ± 0.0532
			Manganese	81.4	Bi-212	0.377 ± 0.195
			Nickel	3.8 J	Tl-208	0.142 ± 0.0366
			Potassium	887 J	K-40	9.60 ± 0.688
			Sodium	180 J		
			Vanadium	18.3	**Tritium**	**380 ± 180 pCi/L**
			Zinc	15.5		

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Compounds Detected in Soil Samples from AP2 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNLA015508 NE of AP2, 1.5 fbgs.	Acetone Methylene chloride Tetrachloroethene	19 B (7.6) 1.7 BJ (1.6) 1.0 BJ (1.7)	Aluminum Arsenic **Barium** **Beryllium** Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Selenium Sodium Vanadium Zinc	4830 3.8 539 0.63 107000 B (26.3) 2.2 2.3 5.1 6940 5.0 3530 126 3.3 J 1080 0.72 198 J 12.2 20.5	U-238 Th-234 Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 **Tritium**	0.768 ± 0.346 0.770 ± 0.347 0.536 ± 0.0585 0.520 ± 0.0476 0.560 ± 0.0612 0.670 ± 0.106 0.670 ± 0.106 0.604 ± 0.0957 0.544 ± 0.0352 1.05 ± 0.461 0.546 ± 0.0354 0.317 ± 0.166 0.194 ± 0.0280 13.5 ± 0.621 530 ± 170 pCi/L
SNLA015509 SW of AP2, 1.5 fbgs.	**Acetone** Methylene chloride	14 2.7 J	Aluminum Arsenic Barium **Beryllium** Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Selenium Vanadium Zinc	5320 3.6 167 0.63 106000 B (26.3) 2.4 3.4 5.8 6950 4.3 3350 113 4.4 J 1160 0.84 12.8 18.6	**U-238** Th-234 Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 **Tritium**	1.28 ± 0.501 1.28 ± 0.502 0.578 ± 0.0675 0.593 ± 0.0645 0.604 ± 0.0706 0.810 ± 0.132 0.810 ± 0.132 0.731 ± 0.119 0.582 ± 0.0432 0.672 ± 0.578 0.585 ± 0.0434 0.434 ± 0.226 0.219 ± 0.0291 13.5 ± 0.746 380 ± 160 pCi/L

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Compounds Detected in Soil Samples from AP2 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNLA015510 SE of AP2, 1.5 fbgs. MS/MSD.	Acetone Methylene chloride Tetrachloroethene	32 B (7.6) 1.2 BJ (1.6) 1.3 BJ (1.7)	Aluminum Arsenic **Barium** **Beryllium** Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Sodium Vanadium Zinc	4350 5.1 862 0.49 133000 B (26.3) 2.3 2.3 4.8 5650 4.4 4130 80.5 4.0 J 762 J 250 J 11.8 16.9	Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 Th-231 K-40 **Tritium**	0.567 ± 0.0579 0.545 ± 0.0532 0.592 ± 0.0605 0.624 ± 0.0952 0.624 ± 0.0952 0.563 ± 0.0860 0.627 ± 0.0382 0.843 ± 0.565 0.630 ± 0.0384 0.632 ± 0.162 0.209 ± 0.0277 0.266 ± 0.260 14.4 ± 0.610 **930 ± 200 pCi/L**
SNLA015511 NW of AP2, 6.5 fbgs.	ND	ND	Aluminum Arsenic Barium **Beryllium** Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Sodium Vanadium Zinc	6760 2.3 124 0.61 0.83 32600 6.8 4.4 7.8 11400 4.6 4870 172 6.5 1490 180 J 27.2 27.0	U-238 Th-234 Ra-226 Pb-214 Bi-214 Pb-210 Th-232 Ra-228 Ac-228 Th-228 Pb-212 Bi-212 Tl-208 K-40 **Tritium**	1.16 ± 0.439 1.16 ± 0.440 1.85 ± 0.662 0.712 ± 0.0823 0.644 ± 0.0982 1.13 ± 0.652 0.661 ± 0.140 0.661 ± 0.140 0.597 ± 0.127 0.708 ± 0.0627 0.711 ± 0.0630 0.448 ± 0.251 0.235 ± 0.0402 19.8 ± 0.951 **210 ± 170 pCi/L**

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Compounds Detected in Soil Samples from AP2 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNLA015512 NE of AP2, 6.5 fbgs.	Acetone Methylene chloride	15 B (7.6) 1.2 BJ (1.7)	Aluminum Arsenic Barium **Beryllium** Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Sodium Vanadium Zinc	4430 2.3 98.6 0.36 23500 B (26.3) 3.8 3.5 4.5 8790 4.0 3900 155 4.5 1140 125 J 21.5 23.8	**U-238** Th-234 Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 Th-231 K-40 **Tritium**	**1.78 ± 0.508** 1.78 ± 0.509 0.753 ± 0.0718 0.874 ± 0.0646 0.787 ± 0.0751 0.799 ± 0.146 0.799 ± 0.146 0.721 ± 0.132 0.695 ± 0.0424 0.827 ± 0.504 0.698 ± 0.0426 0.641 ± 0.182 0.261 ± 0.0291 0.506 ± 0.298 19.2 ± 0.759 **610 ± 170 pCi/L**
SNLA015513 SW of AP2, 6.5 fbgs.	Acetone Methylene chloride	4.4 J 1.7 J	Aluminum Arsenic Barium **Beryllium** Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Sodium Vanadium Zinc	6940 3.2 120 0.48 32600 B (26.3) 6.2 5.2 6.5 12000 5.8 5370 246 7.0 1770 197 J 30.4 33.0	**U-238** Th-234 Ra-226 Pb-214 **Bi-214** Th-232 Ra-228 Ac-228 Th-228 Pb-212 Bi-212 Tl-208 Th-231 K-40 Tritium	**1.98 ± 0.509** 1.98 ± 0.510 0.905 ± 0.0706 0.923 ± 0.0682 **0.946 ± 0.0738** 0.870 ± 0.132 0.870 ± 0.132 0.785 ± 0.119 0.616 ± 0.0501 0.619 ± 0.0503 0.480 ± 0.201 0.236 ± 0.0282 0.664 ± 0.378 16.2 ± 0.716 210 ± 150 pCi/L

Refer to footnotes at end of table.

Table 3-4 *(Continued)*

Compounds Detected in Soil Samples from AP2 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNLA015514 SE of AP2, 6.5 fbgs.	Acetone	6.1 J	Aluminum	5010	**U-238**	**1.32 ± 0.510**
	Methylene chloride	2.1 J	Arsenic	3.2	Th-234	1.32 ± 0.511
			Barium	126	Ra-226	0.746 ± 0.0590
			Beryllium	**0.39**	Pb-214	0.807 ± 0.0600
			Cadmium	0.78 B (0.58)	Bi-214	0.780 ± 0.0616
			Calcium	59600 B (26.3)	Th-232	0.795 ± 0.128
			Chromium	3.6	Ra-228	0.795 ± 0.128
			Cobalt	4.4	Ac-228	0.717 ± 0.115
			Copper	4.5	Th-228	0.663 ± 0.0391
			Iron	8250	**Ra-224**	**1.13 ± 0.526**
			Lead	4.3	Pb-212	0.666 ± 0.0392
			Magnesium	4540	Bi-212	0.486 ± 0.163
			Manganese	155	Tl-208	0.215 ± 0.0303
			Mercury	0.056 J	Th-231	0.237 ± 0.287
			Nickel	5.0	K-40	16.3 ± 0.687
			Potassium	929		
			Selenium	0.49 J	**Tritium**	**670 ± 180 pCi/L**
			Sodium	295 J		
			Vanadium	22.7		
			Zinc	21.4		

[a]Radionuclides: Ac = actinium; Bi = bismuth; K = potassium; Pb = lead; Ra = radium; Th = thorium; Tl = thallium; U = uranium.
[b]Bold type indicates value is greater than action levels or geochemical background as listed in Table 3-1 and discussed in Section 3.2.2.
B = compound also detected in associated blank. Value of the method blank shown in parentheses.
J = value lies between the instrument detection limit and quantitation limit and is therefore an estimated concentration.
µg/kg = micrograms per kilogram.
mg/kg = milligrams per kilogram.
NA = Not applicable or not analyzed this sample.
pCi/g = Picocuries per gram (radionuclides except tritium).
pCi/L = Picocuries per liter (tritium only).
TAL = Target analyte list.
fbgs = Feet below ground surface.
MS/MSD = matrix spike/matrix spike duplicate.

Table 3-5

Compounds Detected in Soil Samples from Dry Well Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals	
	Identity	Result (µg/kg)	Identity	Results (mg/kg)
SNL/NM015516	VOCs	ND	Aluminum	4940
At dry well, 7.5 fbgs.			Arsenic	2.4
	PCBs	ND	Barium	130
			Beryllium[a]	**0.38**
			Calcium	27700
			Chromium	4.8
			Cobalt	4.2
			Copper	3.2
			Iron	8660
			Lead	4.1
			Magnesium	3380
			Manganese	146
			Nickel	3.9 J
			Potassium	1130
			Sodium	205 J
			Vanadium	22.2
			Zinc	28.4
SNL/NM015517	VOCs:		Aluminum	4100
At dry well, 11.5 fbgs.	Toluene	2.5 J	Arsenic	2.2
			Barium	92.7
	PCBs	ND	**Beryllium**	**0.38**
			Calcium	37600
			Chromium	4.2
			Cobalt	3.7
			Copper	5.3
			Iron	9230
			Lead	4.5
			Magnesium	3110
			Manganese	215
			Nickel	4.3
			Potassium	1020
			Sodium	213 J
			Vanadium	20.1
			Zinc	32.6

Table 3-5 *(Continued)*

Compounds Detected in Soil Samples from Dry Well Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals	
	Identity	Result (µg/kg)	Identity	Results (mg/kg)
SNL/NM015518	VOCs:		Aluminum	4020
NE of dry well, 2.5 fbgs.	Acetone	5.9 J	Arsenic	5.2
	Methylene chloride	7.1 B (1.5)	Barium	503
			Beryllium	**0.50**
	PCBs	ND	Calcium	140000
			Cobalt	2.4
			Copper	3.6 J
			Iron	6010
			Lead	4.8
			Magnesium	4150
			Manganese	87.9
			Nickel	3.7 J
			Potassium	648 J
			Silver	0.64 J
			Sodium	269 J
			Vanadium	16.8
			Zinc	16.1
SNL/NM015519	VOCs:		Aluminum	4060
NW of dry well, 2.5 fbgs.	**Acetone**	**31**	Arsenic	6.0
			Barium	**891**
	PCBs	ND	**Beryllium**	**0.53**
			Calcium	145000
			Chromium	0.63 J
			Cobalt	3.1
			Copper	2.7 J
			Iron	5150
			Lead	4.0
			Magnesium	4920
			Manganese	64.8
			Nickel	2.6 J
			Potassium	480 J
			Sodium	284 J
			Vanadium	15.7
			Zinc	12.2

Refer to footnotes at end of table.

Table 3-5 *(Continued)*

Compounds Detected in Soil Samples from Dry Well
Building 839 Phase II Contamination Assessment
Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals	
	Identity	Result (µg/kg)	Identity	Results (mg/kg)
SNL/NM015520	VOCs:		Aluminum	7290
SE of dry well, 2.5 fbgs.	Acetone	3.4 BJ (6.4)	Arsenic	7.7
	Methylene chloride	1.6 J	**Barium**	**625**
			Beryllium	**0.42**
	PCBs	ND	Calcium	112000
			Chromium	4.8
			Cobalt	5.4
			Copper	4.0
			Iron	8720
			Lead	4.8
			Magnesium	6800
			Manganese	128
			Nickel	6.1 J
			Potassium	1160
			Silver	0.71 J
			Sodium	431 J
			Vanadium	35.3
			Zinc	18.7
SNL/NM015521	VOCs:		Aluminum	4380
SW of dry well, 2.5 fbgs.	Acetone	5.7 J	Antimony	8.4 J
	Methylene chloride	4.4 BJ (4.9)	Arsenic	4.9
			Barium	**1100**
	PCBs	ND	**Beryllium**	**0.45**
			Cadmium	1.2
			Calcium	153000
			Chromium	1.1 J
			Cobalt	3.8
			Copper	3.2 J
			Iron	4890
			Lead	3.3
			Magnesium	5660
			Manganese	60.4
			Nickel	3.8 J
			Potassium	654 J
			Silver	0.65 J
			Sodium	268 J
			Vanadium	19.6
			Zinc	11.4

Refer to footnotes at end of table.

Table 3-5 *(Continued)*

Compounds Detected in Soil Samples from Dry Well Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals	
	Identity	Result (µg/kg)	Identity	Results (mg/kg)
SNL/NM015522 NE of dry well, 7.5 fbgs.	VOCs: Methylene chloride PCBs	 3.4 BJ (1.4) ND	Aluminum Arsenic Barium **Beryllium** Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Sodium Vanadium Zinc	5680 2.6 143 **0.58** 42900 5.2 3.8 4.4 11000 5.6 4640 176 5.2 1270 146 J 22.2 30.3
SNL/NM015523 NW of dry well, 7.5 fbgs.	VOCs PCBs	ND ND	Aluminum Arsenic Barium **Beryllium** Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Sodium Vanadium Zinc	6050 3.4 184 **0.60** 51400 8.3 3.9 5.8 11400 5.9 5340 207 7.4 1510 136 J 30.2 41.8

Refer to footnotes at end of table.

Table 3-5 *(Continued)*

Compounds Detected in Soil Samples from Dry Well Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals	
	Identity	Result (µg/kg)	Identity	Results (mg/kg)
SNL/NM015524 SE of dry well, 7.5 fbgs.	VOCs	ND	Aluminum	7520
			Arsenic	2.4
	PCBs	ND	Barium	149
			Beryllium	**0.70**
			Cadmium	1.6
			Calcium	30700
			Chromium	8.2
			Cobalt	6.3
			Copper	8.7
			Iron	14500
			Lead	5.0
			Magnesium	6110
			Manganese	271
			Nickel	8.1
			Potassium	2710
			Silver	0.38 J
			Sodium	337 J
			Vanadium	29.5
			Zinc	35.5
SNL/NM015525 SW of dry well, 7.5 fbgs.	VOCs	ND	Aluminum	5820
			Arsenic	2.0
	PCBs	ND	Barium	113
			Beryllium	**0.46**
			Cadmium	0.72
			Calcium	24200
			Chromium	6.0
			Cobalt	5.3
			Copper	8.2
			Iron	11200
			Lead	5.1
			Magnesium	5160
			Manganese	265
			Nickel	7.4
			Potassium	2070
			Sodium	198 J
			Vanadium	21.9
			Zinc	32.7

Table 3-5 *(Continued)*

Compounds Detected in Soil Samples from Dry Well Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

[a]Bold type indicates the value exceeds action levels or geochemical background values as listed in Table 3-1 and discussed in Section 3.2.2.
B = Compound is also detected in the blank. Value of the method blank shown in parentheses.
fbgs = feet below ground surface.
J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not detected.
TAL = Target analyte list.
VOC = Volatile organic compound.
PCB = Poly chlorinated biphenyls.
µg/kg = Micrograms per kilogram.

Table 3-6

Compounds Detected in Soil Samples from APX3 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	TAL Metals	Result (mg/kg)
SNL/NM015527 At APX3, 9 fbgs.	Aluminum	3390
	Arsenic	1.5
	Barium	61.1
	Beryllium[a]	**0.34**
	Cadmium	0.72
	Calcium	19200
	Chromium	4.2
	Cobalt	2.6
	Copper	4.6
	Iron	7970
	Lead	3.9
	Magnesium	2580
	Manganese	154
	Nickel	3.4 J
	Potassium	1030
	Sodium	297 J
	Vanadium	15.5
	Zinc	20.7
SNL/NM015528 At APX3, 14 fbgs.	Aluminum	5130
	Arsenic	2.5
	Barium	76.4
	Beryllium	**0.42**
	Calcium	24500
	Chromium	6.1
	Cobalt	4.2
	Copper	6.0
	Iron	10200
	Lead	6.9
	Magnesium	3520
	Manganese	197
	Nickel	6.3
	Potassium	1380
	Sodium	258 J
	Vanadium	18.4
	Zinc	27.5

Refer to footnotes at end of table.

Table 3-6 *(Continued)*

Compounds Detected in Soil Samples from APX3 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	TAL Metals	Result (mg/kg)
SNL/NM015529 NW of APX3, 4 fbgs.	Aluminum	6520
	Arsenic	5.6
	Barium	303
	Beryllium	**0.56**
	Calcium	70500
	Chromium	5.0
	Cobalt	4.5
	Copper	4.0
	Iron	9410
	Lead	6.7
	Magnesium	6270
	Manganese	178
	Nickel	6.6
	Potassium	1370
	Sodium	155 J
	Vanadium	40.6
	Zinc	32.0
SNL/NM015530 NE of APX3, 4 fbgs.	Aluminum	6620
	Arsenic	5.8
	Barium	249
	Beryllium	**0.48**
	Calcium	58000
	Chromium	5.6
	Cobalt	5.2
	Copper	4.6
	Iron	11100
	Lead	5.2
	Magnesium	6980
	Manganese	238
	Nickel	6.8
	Potassium	1450
	Sodium	221 J
	Vanadium	60.9
	Zinc	28.7

Refer to footnotes at end of table.

Table 3-6 *(Continued)*

Compounds Detected in Soil Samples from APX3 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	TAL Metals	Result (mg/kg)
SNL/NM015531 SW of APX3, 4 fbgs.	Aluminum	8280
	Antimony	4.4 J
	Arsenic	7.0
	Barium	275
	Beryllium	**0.55**
	Cadmium	0.77
	Calcium	82900
	Chromium	6.8
	Cobalt	8.0
	Copper	6.9
	Iron	10300
	Lead	4.8
	Magnesium	8150
	Manganese	184
	Nickel	8.1
	Potassium	1550
	Sodium	529
	Vanadium	56.1
	Zinc	26.9
SNL/NM015532 SE of APX3, 4 fbgs.	Aluminum	6100
	Arsenic	7.4
	Barium	372
	Beryllium	**0.49**
	Cadmium	0.51
	Calcium	80900
	Chromium	4.4
	Cobalt	3.7
	Copper	3.7
	Iron	8230
	Lead	4.4
	Magnesium	6640
	Manganese	151
	Nickel	6.2
	Potassium	1030
	Sodium	424 J
	Vanadium	39.0
	Zinc	22.5

Refer to footnotes at end of table.

Table 3-6 *(Continued)*

Compounds Detected in Soil Samples from APX3 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	TAL Metals	Result (mg/kg)
SNL/NM015533 NW of APX3, 9 fbgs.	Aluminum	3400
	Arsenic	1.7
	Barium	69.8
	Beryllium	**0.25**
	Calcium	15100
	Chromium	3.8
	Cobalt	2.6
	Copper	4.1
	Iron	7260
	Lead	6.5
	Magnesium	2470
	Manganese	167
	Nickel	3.2 J
	Potassium	1160
	Sodium	76.4 J
	Vanadium	11.5
	Zinc	30.6
SNL/NM015534 NE of APX3, 9 fbgs.	Aluminum	2760
	Arsenic	1.2
	Barium	60.7
	Beryllium	**0.32**
	Calcium	18400
	Chromium	2.5
	Cobalt	2.4
	Copper	4.3
	Iron	6350
	Lead	3.3
	Magnesium	2270
	Manganese	161
	Nickel	2.3 J
	Potassium	809
	Vanadium	13.4
	Zinc	16.7

Refer to footnotes at end of table.

Table 3-6 *(Continued)*

Compounds Detected in Soil Samples from APX3 Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	TAL Metals	Result (mg/kg)
SNL/NM015535 SW of APX3, 8 fbgs.	Aluminum	8380
	Arsenic	2.6
	Barium	133
	Beryllium	**0.61**
	Calcium	36800
	Chromium	9.2
	Cobalt	6.8
	Copper	8.5
	Iron	13000
	Lead	5.3
	Magnesium	6230
	Manganese	248
	Nickel	9.1
	Potassium	1910
	Sodium	523
	Vanadium	30.5
	Zinc	31.3
SNL/NM015536 SE of APX3, 9 fbgs.	Aluminum	5860
	Arsenic	2.8
	Barium	143
	Beryllium	**0.65**
	Calcium	31500
	Chromium	5.7
	Cobalt	4.5
	Copper	5.4
	Iron	10100
	Lead	4.9
	Magnesium	4440
	Manganese	299
	Nickel	6.3
	Potassium	1290
	Sodium	240 J
	Vanadium	19.6
	Zinc	28.7

[a]Bold type indicates value is greater than the action level or the background value listed in Table 3-1.
fbgs = feet below ground surface.
J = Result is detected below the reporting limit or is an estimated concentration.
mg/kg = milligrams per kilogram.
TAL = Target analyte list.

Table 3-7

Compounds Detected in Soil Samples from North Acid Line Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNL/NM015538	VOCs:		Aluminum	5620	U-238	1.48 ± 0.440
North acid line	Acetone[b]	30 B (2.3)	Arsenic	1.4	Th-234	1.49 ± 0.441
at eastern AP	2-Butanone	4.0 J	Barium	103	Ra-226	2.45 ± 0.659
9 fbgs.	Methylene chloride	1.6 J	Beryllium	0.42	Pb-214	0.789 ± 0.0709
	Tetrachloroethene	1.8 J	Calcium	24400	Bi-214	0.747 ± 0.0822
			Chromium	6.5	Th-232	0.960 ± 0.149
	PCBs	ND	Cobalt	5.3	Ra-228	0.960 ± 0.149
			Copper	6.9	Ac-228	0.867 ± 0.134
			Iron	13200	Th-228	0.840 ± 0.0503
			Lead	3.8	Ra-224	1.03 ± 0.776
			Magnesium	4280	Pb-212	0.843 ± 0.0505
			Manganese	231	Bi-212	0.419 ± 0.202
			Nickel	5.1	Tl-208	0.250 ± 0.0361
			Potassium	1760	Th-231	0.409 ± 0.299
			Silver	0.36 J	K-40	20.9 ± 0.818
			Sodium	183 J		
			Vanadium	22.9	Tritium	ND (41 ± 150 pCi/L)
			Zinc	28.0		
SNL/NM015539	VOCs:		Aluminum	4670	U-238	1.27 ± 0.449
North acid line	Acetone	5.3 BJ (2.3)	Antimony	2.5 J	Th-234	1.27 ± 0.450
at eastern AP	Methylene chloride	1.4 J	Arsenic	1.9	Ra-226	1.65 ± 0.482
14 fbgs.	Tetrachloroethene	2.6 J	Barium	71.6	Pb-214	0.732 ± 0.0665
			Beryllium	0.26	Bi-214	0.708 ± 0.0730
	PCBs	ND	Calcium	25300 B	Th-232	0.848 ± 0.142
			Chromium	5.2	Ra-228	0.848 ± 0.142
			Cobalt	4.0	Ac-228	0.765 ± 0.128
			Copper	6.9	Th-228	0.700 ± 0.0452
			Iron	9430	Ra-224	0.624 ± 0.604
			Lead	4.0	Pb-212	0.703 ± 0.0454
			Magnesium	3990	Bi-212	0.509 ± 0.194
			Manganese	215	Tl-208	0.194 ± 0.0358
			Nickel	6.0	K-40	21.3 ± 0.800
			Potassium	1420		
			Silver	0.43 J	Tritium	ND (200 ± 160 pCi/L)
			Vanadium	16.7		
			Zinc	34.5		

Refer to footnotes at end of table.

Table 3-7 *(Continued)*

Compounds Detected in Soil Samples from North Acid Line Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNL/NM015540	VOCs:		Aluminum	4760	**U-238**	**1.63 ± 0.550**
North acid line	Acetone	8.6 BJ (2.3)	Antimony	5.4 J	Th-234	1.63 ± 0.551
at eastern AP,	Methylene chloride	1.1 J	Arsenic	1.8	**Ra-226**	**2.32 ± 0.612**
9 fbgs.	**Tetrachloroethene**	**20**	Barium	56.0	Pb-214	0.942 ± 0.0881
Duplicate of 15538.			**Beryllium**	**0.31**	**Bi-214**	**0.921 ± 0.0836**
	PCBs	ND	Calcium	19200	Th-232	1.13 ± 0.172
			Chromium	5.6	**Ra-228**	**1.13 ± 0.172**
			Cobalt	4.7	Ac-228	1.02 ± 0.155
			Copper	6.5	Th-228	0.890 ± 0.0559
			Iron	11100	**Ra-224**	**1.00 ± 0.673**
			Lead	4.1	Pb-212	0.894 ± 0.0561
			Magnesium	3930	Bi-212	0.804 ± 0.280
			Manganese	270	Tl-208	0.293 ± 0.0401
			Nickel	5.3	K-40	21.0 ± 0.888
			Potassium	1540		
			Sodium	85.5 J	Tritium	200 ± 160 pCi/L
			Vanadium	19.2		
			Zinc	25.4		
SNL/NM015542	VOCs:		Aluminum	5500	**U-238**	**1.26 ± 0.528**
North acid line,	Acetone	7.4 J	Antimony	3.7 J	Th-234	1.26 ± 0.529
at western AP,	Bromomethane	1.2 J	Arsenic	7.9	**Ra-226**	**2.18 ± 0.592**
west of AP 4 fbgs.	Methylene chloride	2.0 BJ (1.4)	Barium	214	Pb-214	0.835 ± 0.0750
			Beryllium	**0.54**	Bi-214	0.752 ± 0.0846
	PCBs	ND	Calcium	66600	Th-232	0.885 ± 0.133
			Chromium	3.6	Ra-228	0.885 ± 0.133
			Cobalt	4.8	Ac-228	0.798 ± 0.120
			Copper	5.4	Th-228	0.692 ± 0.0539
			Iron	9020	Ra-224	0.546 ± 0.643
			Lead	4.9	Pb-212	0.695 ± 0.0542
			Magnesium	6560	Bi-212	0.584 ± 0.221
			Manganese	205	Tl-208	0.246 ± 0.0455
			Nickel	8.0	K-40	16.1 ± 0.791
			Potassium	1270		
			Sodium	178 J	**Tritium**	**290 ± 150 pCi/L**
			Vanadium	62.4		
			Zinc	27.5		

Refer to footnotes at end of table.

Table 3-7 *(Continued)*

Compounds Detected in Soil Samples from North Acid Line
Building 839 Phase II Contamination Assessment
Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNL/NM015543	VOCs:		Aluminum	2370	**U-238**	**1.26 ± 0.468**
North acid line,	Methylene chloride	2.6 BJ (3.6)	Arsenic	1.3	Th-234	1.27 ± 0.469
at western AP,			Barium	39.9	**Ra-226**	**2.23 ± 0.556**
west of AP 9 fbgs.	PCBs	ND	**Beryllium**	**0.23**	Pb-214	0.827 ± 0.0776
			Calcium	15000	Bi-214	0.741 ± 0.0730
			Chromium	2.0	Th-232	0.990 ± 0.164
			Cobalt	2.5	Ra-228	0.990 ± 0.164
			Copper	3.6	Ac-228	0.893 ± 0.148
			Iron	6230	Th-228	0.766 ± 0.0491
			Lead	2.9	**Ra-224**	**1.21 ± 0.740**
			Magnesium	2150	Pb-212	0.769 ± 0.0493
			Manganese	168	Bi-212	0.527 ± 0.208
			Nickel	3.5 J	Tl-208	0.230 ± 0.0353
			Potassium	1060	K-40	23.7 ± 0.850
			Sodium	119 J		
			Vanadium	10.7	Tritium	240 ± 150 pCi/L
			Zinc	18.7		
SNL/NM015544	VOCs:		Aluminum	4240	Ra-226	1.27 ± 0.470
North acid line,	Acetone	7.0 J	Arsenic	5.6	Pb-214	0.569 ± 0.0614
at western AP, northwest	Methylene chloride	3.5 BJ (3.6)	Barium	168	Bi-214	0.495 ± 0.0612
of AP, 4 fbgs.			**Beryllium**	**0.50**	Th-232	0.547 ± 0.114
	PCBs	ND	Calcium	49600	Ra-228	0.547 ± 0.114
			Chromium	2.5	Ac-228	0.494 ± 0.103
			Cobalt	3.5	Th-228	0.515 ± 0.0408
			Copper	3.3	Ra-224	0.908 ± 0.540
			Iron	6650	Pb-212	0.517 ± 0.0410
			Lead	4.3	Bi-212	0.359 ± 0.174
			Magnesium	4960	Tl-208	0.177 ± 0.0276
			Manganese	143	K-40	12.6 ± 0.666
			Nickel	5.6		
			Potassium	1100	**Tritium**	**430 ± 160 pCi/L**
			Sodium	263 J		
			Vanadium	44.3		
			Zinc	20.1		

Refer to footnotes at end of table.

Table 3-7 *(Continued)*

Compounds Detected in Soil Samples from North Acid Line Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNL/NM015545	VOCs:		Aluminum	3370	**U-238**	**1.58 ± 0.515**
North acid line,	Acetone	4.8 J	Arsenic	1.3	Th-234	1.58 ± 0.516
at western AP, northwest	Methylene chloride	2.8 BJ (3.6)	Barium	59.8	**Ra-226**	**2.52 ± 0.628**
of AP 9 fbgs.			Calcium	20100	Pb-214	0.897 ± 0.0728
	PCBs	ND	Chromium	4.9	**Bi-214**	**0.839 ± 0.0768**
			Cobalt	3.7	Th-232	1.03 ± 0.137
			Copper	7.1	Ra-228	1.03 ± 0.137
			Iron	8880	Ac-228	0.927 ± 0.124
			Lead	3.8	Th-228	0.850 ± 0.0548
			Magnesium	3310	Ra-224	0.908 ± 0.693
			Manganese	196	Pb-212	0.853 ± 0.0550
			Nickel	5.1	Bi-212	0.531 ± 0.181
			Potassium	1360	Tl-208	0.298 ± 0.0362
			Sodium	175 J	Th-231	0.329 ± 0.281
			Vanadium	15.8	K-40	21.6 ± 0.815
			Zinc	26.3		
					Tritium	**440 ± 220 pCi/L**
SNL/NM015546	VOCs:		Aluminum	6980	Ra-226	2.04 ± 0.540
North acid line,	**Acetone**	39	Antimony	2.5 J	Pb-214	0.959 ± 0.0797
at eastern AP, northeast	Methylene chloride	2.5 J	Arsenic	3.2	**Bi-214**	**0.867 ± 0.0728**
of AP 9 fbgs.			Barium	129	Th-232	0.781 ± 0.145
	PCBs	ND	**Beryllium**	**0.40**	Ra-228	0.781 ± 0.145
			Calcium	38900	Ac-228	0.705 ± 0.131
			Chromium	7.5	Th-228	0.744 ± 0.0487
			Cobalt	5.1	Ra-224	0.915 ± 0.628
			Copper	7.4	Pb-212	0.747 ± 0.0489
			Iron	12500	Bi-212	0.579 ± 0.212
			Lead	5.5	Tl-208	0.252 ± 0.0340
			Magnesium	5340	Th-231	0.935 ± 0.269
			Manganese	230	K-40	15.9 ± 0.713
			Nickel	6.6		
			Potassium	1980	Tritium	ND (210 ± 160 pCi/L)
			Sodium	199 J		
			Vanadium	29.5		
			Zinc	27.2		

Refer to footnotes at end of table.

Table 3-7 *(Continued)*

Compounds Detected in Soil Samples from North Acid Line Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNL/NM015547	VOCs:		Aluminum	10200	**U-238**	**1.46 ± 0.648**
North acid line,	**Acetone**	110	Arsenic	5.7	Th-234	1.46 ± 0.649
at eastern AP,	Toluene	2.3 J	Barium	196	**Ra-226**	**2.49 ± 0.753**
northeast of AP,			**Beryllium**	**0.61**	Pb-214	0.984 ± 0.0708
4 fbgs.	PCBs	ND	Calcium	54700	Bi-214	0.847 ± 0.0668
			Chromium	9.5	Th-232	0.775 ± 0.149
			Cobalt	6.6	Ra-228	0.775 ± 0.149
			Copper	8.8	Ac-228	0.700 ± 0.135
			Iron	14200	Th-228	0.774 ± 0.0488
			Lead	5.8	**Ra-224**	**2.78 ± 0.570**
			Magnesium	8490	Pb-212	0.778 ± 0.0491
			Manganese	286	Bi-212	0.501 ± 0.197
			Nickel	8.3	Tl-208	0.266 ± 0.0352
			Potassium	3210	K-40	14.4 ± 0.716
			Sodium	172 J		
			Vanadium	58.9	**Tritium**	**260 ± 160 pCi/L**
			Zinc	35.1		
SNL/NM015549	VOCs	NA	Aluminum	4010	NA	NA
North acid line,			Arsenic	3.9		
at western AP, soil from	PCBs	ND	Barium	285		
line blockage and directly			**Beryllium**	**0.30**		
below line.			Calcium	86000		
			Chromium	1.8		
			Cobalt	3.3		
			Copper	9.8		
			Iron	7030		
			Lead	5.6		
			Magnesium	3590		
			Manganese	136		
			Nickel	5.5		
			Potassium	1300		
			Sodium	193 J		
			Vanadium	16.0		
			Zinc	21.6		

Refer to footnotes at end of table.

Table 3-7 *(Continued)*

Compounds Detected in Soil Samples from North Acid Line
Building 839 Phase II Contamination Assessment
Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNL/NM015591	VOCs:		Aluminum	643	**U-238**	**1.74 ± 0.451**
North acid line,	Acetone	6.6 J	Arsenic	5.3	Th-234	1.74 ± 0.452
at eastern AP, east of AP,			Barium	63.5	Ra-226	0.863 ± 0.0582
4 fbgs.	PCBs	ND	**Beryllium**	**0.37**	Pb-214	0.981 ± 0.0622
			Calcium	23200 B	**Bi-214**	**0.902 ± 0.0609**
			Chromium	3.9	Th-232	0.868 ± 0.118
			Cobalt	4.2	Ra-228	0.868 ± 0.118
			Copper	6.2	Ac-228	0.784 ± 0.106
			Iron	8790	Th-228	0.691 ± 0.0381
			Lead	5.4	**Ra-224**	**2.85 ± 0.527**
			Magnesium	3710	Pb-212	0.694 ± 0.0383
			Manganese	227	Bi-212	0.536 ± 0.144
			Nickel	4.4	Tl-208	0.275 ± 0.0326
			Potassium	1570	Th-231	0.332 ± 0.231
			Silver	0.41 J	K-40	16.1 ± 0.653
			Thallium	0.64 J		
			Vanadium	13.4	**Tritium**	**400 ± 160 pCi/L**
			Zinc	32.0		
SNL/NM015592	VOCs	ND	Aluminum	7230	Ra-226	0.660 ± 0.0538
North acid line,			Antimony	3.1 J	Pb-214	0.748 ± 0.0492
at eastern AP,	PCBs	ND	Arsenic	3.0	Bi-214	0.690 ± 0.0562
east of AP			Barium	163	Th-232	0.988 ± 0.113
9 fbgs.			**Beryllium**	**0.56**	Ra-228	0.988 ± 0.113
			Calcium	46600 B	Ac-228	0.892 ± 0.102
			Chromium	11.2	Th-228	0.671 ± 0.0349
			Cobalt	5.6	Ra-224	0.846 ± 0.507
			Copper	7.7	Pb-212	0.674 ± 0.0351
			Iron	17800	Bi-212	0.393 ± 0.133
			Lead	6.0	Tl-208	0.221 ± 0.0253
			Magnesium	5390	Th-231	0.380 ± 0.279
			Manganese	236	K-40	18.6 ± 0.628
			Nickel	7.5		
			Potassium	1730	**Tritium**	**470 ± 160 pCi/L**
			Silver	0.32 J		
			Sodium	95.9 J		
			Vanadium	39.3		
			Zinc	33.7		

Refer to footnotes at end of table.

Table 3-7 *(Continued)*

Compounds Detected in Soil Samples from North Acid Line Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNL/NM015593	VOCs:		Aluminum	6270	**U-238**	**1.35 ± 0.435**
North acid line,	Acetone	3.6 J	Antimony	5.8 J	Th-234	1.35 ± 0.436
at eastern AP, west of AP	Methylene chloride	3.6 J	Arsenic	4.2	Ra-226	0.766 ± 0.0628
4 fbgs.	Toluene	2.8 J	Barium	175	Pb-214	0.862 ± 0.0645
			Beryllium	**0.25**	**Bi-214**	**0.800 ± 0.0657**
	PCBs	ND	Calcium	45900 B	Ac-228	0.695 ± 0.110
			Chromium	6.4	Th-228	0.640 ± 0.0393
			Cobalt	6.1	**Ra-224**	**1.01 ± 0.497**
			Copper	4.7	Pb-212	0.643 ± 0.0394
			Iron	7530	Bi-212	0.596 ± 0.200
			Lead	4.6	Tl-208	0.230 ± 0.0316
			Magnesium	5340	Th-231	0.652 ± 0.298
			Manganese	146	K-40	15.4 ± 0.682
			Nickel	5.9		
			Potassium	1650	**Tritium**	**310 ± 150 pCi/L**
			Sodium	88.5 J		
			Thallium	0.45 J		
			Vanadium	42.2		
			Zinc	24.2		
SNL/NM015594	VOCs	ND	Aluminum	9090	**U-238**	**2.06 ± 0.527**
North acid line,			Antimony	2.8 J	Th-234	2.06 ± 0.528
at eastern AP, west of	PCBs	ND	Arsenic	1.1	Ra-226	0.652 ± 0.0493
AP, 9 fbgs.			Barium	205	Pb-214	0.741 ± 0.0523
			Beryllium	**0.68**	Bi-214	0.682 ± 0.0516
			Calcium	62100	Th-232	0.853 ± 0.103
			Chromium	8.0	Ra-228	0.853 ± 0.103
			Cobalt	6.4	Ac-228	0.770 ± 0.0930
			Copper	8.0	Th-228	0.653 ± 0.0354
			Iron	11200	**Ra-224**	**2.41 ± 0.442**
			Lead	4.1	Pb-212	0.656 ± 0.0355
			Magnesium	8200	Bi-212	0.553 ± 0.183
			Manganese	244	Tl-208	0.240 ± 0.0271
			Nickel	8.0	Th-231	0.455 ± 0.204
			Potassium	1940	K-40	19.6 ± 0.659
			Silver	0.32 J		
			Sodium	205 J	**Tritium**	**270 ± 150 pCi/L**
			Vanadium	52.8		
			Zinc	37.6		

Refer to footnotes at end of table.

Table 3-7 *(Continued)*

Compounds Detected in Soil Samples from North Acid Line Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNL/NM015595	VOCs:		Aluminum	8600	**U-238**	**1.86 ± 0.463**
North acid line,	**Acetone**	**19**	Arsenic	3.8	Th-234	1.87 ± 0.464
at eastern AP, northwest	Methylene chloride	2.6 J	Barium	148	Ra-226	0.682 ± 0.0594
of AP, 4 fbgs.	Toluene	2.5 J	**Beryllium**	**0.47**	Pb-214	0.837 ± 0.0606
MS/MSD.			Calcium	47000 B	Bi-214	0.713 ± 0.0621
	PCBs	ND	Chromium	8.5	Th-232	0.838 ± 0.127
			Cobalt	5.2	Ra-228	0.838 ± 0.127
			Copper	6.9	Ac-228	0.756 ± 0.115
			Iron	10800	Th-228	0.697 ± 0.0391
			Lead	5.5	Ra-224	0.869 ± 0.536
			Magnesium	6190	Pb-212	0.700 ± 0.0392
			Manganese	223	Bi-212	0.558 ± 0.168
			Nickel	7.8	Tl-208	0.272 ± 0.0325
			Potassium	2540	Th-231	0.688 ± 0.370
			Thallium	0.52 J	K-40	16.3 ± 0.682
			Vanadium	45.6		
			Zinc	32.2	**Tritium**	**270 ± 150 pCi/L**
SNL/NM015596	VOCs	ND	Aluminum	3800	**U-238**	**1.17 ± 0.309**
North acid line,			Antimony	2.5 J	Th-234	1.17 ± 0.310
at eastern AP, northeast	PCBs	ND	Arsenic	0.91 J	Ra-226	0.501 ± 0.0443
of AP, 9 fbgs.			Barium	57.4	Pb-214	0.617 ± 0.0488
			Beryllium	**0.21**	Bi-214	0.524 ± 0.0463
			Calcium	25000 B	Th-232	0.696 ± 0.111
			Chromium	3.6	Ra-228	0.696 ± 0.111
			Cobalt	3.5	Ac-228	0.628 ± 0.100
			Copper	6.0	Th-228	0.547 ± 0.0306
			Iron	7270	**Ra-224**	**2.11 ± 0.422**
			Lead	3.6	Pb-212	0.550 ± 0.0307
			Magnesium	3210	Bi-212	0.478 ± 0.148
			Manganese	204	Tl-208	0.195 ± 0.0259
			Mercury	0.066 J	K-40	20.1 ± 0.613
			Nickel	4.0		
			Potassium	1350	**Tritium**	**280 ± 150 pCi/L**
			Sodium	78.0 J		
			Vanadium	11.3		
			Zinc	30.6		

[a]Radionuclides: Ac = actinium; Bi = bismuth; K = potassium; Pb = lead; Ra = radium; Th = thorium; Tl = thallium; U = uranium.
[b]Bold type indicates values exceeding the action levels or the background geochemical values listed in Table 3-1 and discussed in Section 3.2.2.
B = Compound also detected in blank sample.
J = Compound detected below reporting limit, or an estimated concentration. Value of the method blank shown in parentheses.
NA = Not analyzed or not applicable.
ND = Not detected.
PCBs = Polychlorinated biphenyls.
VOCs = Volatile organic compounds.
AP = Access point.
fbgs = Feet below ground surface.
TAL = Target analyte list.
MS/MSD = Matrix spike/matrix spike duplicate.
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
pCi/g = picocuries per gram
pCi/L = picocuries per liter

Table 3-8

Compounds Detected in Wipe and Sediment Samples from North Acid Line Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs and PCBs[a]		TAL Metals		Radionuclides	
	Identity	Result (µg/kg)	Identity	Result (mg/kg)	Identity	Result ± 2-sigma (pCi/g)
SNLA015541 Sediment sample from interior of north acid line at eastern AP.	VOCs Aroclor-1248	NA 37000	NA	NA	NA	NA
SNLA015550 Wipe sample from interior of north acid line at western AP.	VOCs PCBs	NA ND	NA	NA	NA	NA

[a]Bold type indicates value is greater than the action level of Table 3-1.
µg/kg = Micrograms per kilogram.
mg/kg = Milligrams per kilogram.
NA = Not analyzed or not applicable.
ND = Not detected.
pCi/g = Picocuries per gram.
PCBs = Polychlorinated biphenyls.
VOCs = Volatile organic compounds.
AP = Access point.
TAL = Target analyte list.

Table 3-9

Compounds Detected in Soil Samples from East Acid Line Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs, SVOCs, and PCBs		TAL Metals		Radionuclides	
	Identity	Result	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNLA015551 East acid line, north end, 5 fbgs.	TCLP VOCs: **2-Butanone**[b] Benzene SVOCs: Pentachlorophenol **bis(2-Ethylhexyl) phthalate** PCBs	(mg/L) **0.052** 0.0082 J (µg/kg) 49 J **1100** ND	Aluminum Antimony Arsenic Barium **Beryllium** Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Sodium Vanadium Zinc	7790 3.6 J 4.2 191 **0.65** 0.56 84300 6.3 5.0 7.7 10700 5.3 6710 204 7.6 1710 173 J 44.6 27.1	**U-238** Th-234 **Ra-226** Pb-214 **Bi-214** Th-232 Ra-228 Ac-228 Th-228 **Ra-224** Pb-212 Bi-212 Tl-208 K-40 Tritium	**1.58 ± 0.548** 1.59 ± 0.549 **2.69 ± 0.611** 1.11 ± 0.0915 **0.996 ± 0.0850** 0.957 ± 0.149 0.957 ± 0.149 0.864 ± 0.135 0.824 ± 0.0513 **1.06 ± 0.800** 0.828 ± 0.0516 0.727 ± 0.255 0.272 ± 0.0459 13.0 ± 0.806 ND (220 ± 150 pCi/L)
SNLA015552 East acid line, north end, 5 fbgs. Duplicate of 15551	TCLP VOCs: **2-Butanone** SVOCs: bis(2-Ethylhexyl) phthalate PCBs	(mg/L) **0.37** (µg/kg) 310 J ND	Aluminum Antimony Arsenic Barium **Beryllium** Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Sodium Vanadium Zinc	9500 2.8 J 4.4 234 **0.64** 52800 9.3 5.8 8.4 13200 6.1 5990 257 7.9 1950 184 J 44.1 31.7	**U-238** Th-234 Ra-226 Pb-214 **Bi-214** Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 Tritium	**1.62 ± 0.562** 1.62 ± 0.563 2.01 ± 0.649 0.978 ± 0.0897 **0.850 ± 0.0835** 0.862 ± 0.161 0.862 ± 0.161 0.778 ± 0.145 0.776 ± 0.0560 0.902 ± 0.678 0.780 ± 0.0563 0.647 ± 0.327 0.273 ± 0.0355 15.3 ± 0.821 ND (220 ± 150 pCi/L)

Table 3-9 *(Continued)*

Compounds Detected in Soil Samples from East Acid Line Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs, SVOCs, and PCBs		TAL Metals		Radionuclides	
	Identity	Result	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNLA015553 East acid line, north end, 10 fbgs.	TCLP VOCs: ND SVOCs: bis(2-Ethylhexyl) phthalate PCBs	(mg/L) ND (µg/kg) 170 J ND	Aluminum Antimony Arsenic Barium **Beryllium** Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Silver Sodium Vanadium Zinc	6200 4.7 J 2.5 122 **0.36** 45900 7.3 5.4 8.0 12000 5.6 4290 262 6.6 1730 0.42 139 24.6 28.8	**U-238** Th-234 Ra-226 Pb-214 Bi-214 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 Th-231 K-40 **Tritium**	**1.38 ± 0.468** 1.38 ± 0.469 2.07 ± 0.717 0.720 ± 0.0718 0.633 ± 0.0722 0.825 ± 0.131 0.825 ± 0.131 0.745 ± 0.118 0.708 ± 0.0493 0.895 ± 0.621 0.711 ± 0.0495 0.622 ± 0.247 0.238 ± 0.0360 0.378 ± 0.234 23.2 ± 0.864 **420 ± 160 pCi/L**
SNLA015555 East acid line, south end, 5 fbgs.	VOCs: Acetone **Carbon Tetrachloride** 1,1-Dichloroethane 1,2-Dichloroethane 1,2-Dichloropropane Methylene chloride **1,1,2,2-Tetrachloroethane** **Tetrachloroethene** **1,1,2-Trichloroethane** Trichloroethene SVOCs PCBs: Aroclor 1254	(µg/kg) 34 B (7.6) 14 2.4 J 2.4 J 3.4 J 1.2 BJ (1.6) 33 B (3.0) 130 B (1.7) 16 4.4 J ND (µg/kg) 35	Aluminum Antimony Arsenic Barium **Beryllium** Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Silver Sodium Vanadium Zinc	6570 4.3 J 4.3 278 **0.29** 84800 8.4 3.6 6.3 8570 6.2 5390 159 6.5 1310 0.40 J 375 J 23.9 21.8	U-238 Th-234 Ra-226 Pb-214 Bi-214 Pb-210 Th-232 Ra-228 Ac-228 Th-228 Ra-224 Pb-212 Bi-212 Tl-208 K-40 **Tritium**	0.949 ± 0.347 0.951 ± 0.348 1.43 ± 0.633 0.703 ± 0.0718 0.579 ± 0.0831 0.592 ± 0.622 0.717 ± 0.156 0.717 ± 0.156 0.647 ± 0.141 0.649 ± 0.0537 0.639 ± 0.595 0.652 ± 0.0539 0.534 ± 0.200 0.221 ± 0.0458 13.3 ± 0.754 **330 ± 160 pCi/L**

Refer to footnotes at end of table.

Table 3-9 *(Continued)*

Compounds Detected in Soil Samples from East Acid Line Building 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs, SVOCs, and PCBs		TAL Metals		Radionuclides	
	Identity	Result	Identity	Result (mg/kg)	Identity[a]	Result ± 2-sigma (pCi/g)
SNLA015556	VOCs:	(µg/kg)	Aluminum	3190	**U-238**	**1.63 ± 0.444**
East acid line, south end, 10 fbgs.	Acetone	12 B (7.6)	Antimony	2.5 J	Th-234	1.63 ± 0.444
	Methylene chloride	1.0 BJ (1.6)	Arsenic	1.1	Ra-226	1.84 ± 0.535
			Barium	44.4	Pb-214	0.791 ± 0.0849
	SVOCs:	(µg/kg)	**Beryllium**	**0.21**	Bi-214	0.737 ± 0.0775
	bis(2-Ethylhexyl)		Calcium	14600	Pb-210	0.372 ± 0.424
	phthalate	39 J	Chromium	4.6	Th-232	0.795 ± 0.158
			Cobalt	4.1	Ra-228	0.795 ± 0.158
	PCBs	ND	Copper	4.8	Ac-228	0.718 ± 0.142
			Iron	8910	Th-228	0.766 ± 0.0559
			Lead	3.3	**Ra-224**	**1.08 ± 0.746**
			Magnesium	2300	Pb-212	0.770 ± 0.0562
			Manganese	173	Bi-212	0.535 ± 0.189
			Nickel	4.1	Tl-208	0.371 ± 0.0409
			Potassium	908	Th-231	0.366 ± 0.169
			Sodium	126 J	K-40	21.4 ± 0.919
			Vanadium	15.1		
			Zinc	16.6	**Tritium**	**330 pCi/L ± 190**

[a]Radionuclides: Ac = actinium; Bi = bismuth; Cs = cesium; K = potassium; Pb = lead; Ra = radium; Th = thorium; Tl = thallium; U = uranium.

[b]Bold type indicates value is greater than action level or geochemical background value listed in Table 3-1 and discussed in Section 3.2.2.

B = Compound also detected in blank sample. Value of the method blank shown in parentheses.

J = Compound detected below reporting limit, or is an estimated concentration.

ND = Not detected.

PCB = Polychlorinated biphenyls.

VOC = Volatile organic compounds.

SVOC = Semi-volatile organic compound.

TAL = Target analyte list.

fbgs = feet below ground surface.

TCLP = Toxicity characteristic leaching procedure.

mg/kg = Milligrams per kilogram.

µg/kg = micrograms per kilogram.

pCi/g = picocuries per gram.

pCi/L = picocuries per liter.

Table 3-10

Compounds Detected in Waste Characterization Soil Samples Buildings 838 and 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Number and Location	TC Metals		Radionuclides		TC VOCs and SVOCs	
	Identity	Result (mg/L)	Identity	Result ± 2-sigma (pCi/g)	Identity	Result (µg/L)
SNLA015488 Composite loading dock west of Building 839	Barium	0.45 B (0.12)	NA	NA	VOCS	ND
SNLA015492 Composite of 15490 + 15491, Loading dock west of Building 839	Barium Chromium Lead Selenium	0.61 B (0.12) 0.11 0.25 0.23 J	NA	NA	NA	NA
SNLA015515 AP2, Building 839	Barium	0.54 B (0.12)	NA	NA	NA	NA
SNLA015526 Dry Well, Building 839	Barium	0.62 B (0.12)	NA	NA	NA	NA
SNLA015537 APX3, Building 839	Barium Silver	0.54 B (0.12) 0.0066 J	NA	NA	NA	NA
SNLA015548 North acid line, west of CO1	Barium Silver	0.57 0.0061 J	NA	NA	NA	NA
SNLA015554 East acid line, north end	Barium Selenium Silver	0.63 0.017 0.013 J	NA	NA	NA	NA
SNLA015557 East acid line, south end	Barium Mercury	0.55 B (0.12) 0.00012 J	NA	NA	NA	NA
SNLA015558 East acid line, south end. Duplicate sample.	Barium Mercury Selenium	0.45 B (0.12) 0.00012 J 0.22 J	NA	NA	NA	NA
SNLA015597 North acid line, east of CO1	Barium	0.56 B (0.12)	NA	NA	NA	NA
SNLA015566 Battery spill area south of Building 838	Barium Lead Silver	1.4 0.11 0.010	NA	NA	NA	NA

B = Compound also detected in blank sample. Value of method blank shown in parentheses.
J = Compound detected below reporting limit, or is an estimated concentration.
NA = Not analyzed or not applicable.
ND = Not detected.
TC = Toxicity Characteristic.
VOC = Volatile organic compound.
SVOC = Semi-volatile organic compound.
mg/L = milligrams per liter.
µg/L = micrograms per liter.
pCi/g = picocuries per gram.
pCi/L = picocuries per liter.

Table 3-11
Compounds Detected in Field Quality Control Samples
Buildings 838 and 839 Phase II Contamination Assessment
Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs, SVOCs, PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/L)	Identity	Result (mg/L)	Identity[a]	Result (pCi/L)
SNLA015489 Aqueous Equip Blank Loading Dock	VOCs: Bromomethane Methylene chloride	2.1 J 2.5 BJ (1.3)	NA	NA	Tritium	ND (180 ± 150)
SNLA015569 Aqueous Field Blank Loading Dock	VOCs: Bromomethane Methylene chloride	1.7 J 2.7 BJ (1.3)	NA	NA	K-40 Tritium	0.389 ± 0.218 270 ± 150
SNLA015570 Aqueous Field Blank Loading Dock	NA	NA	NA	NA	Pb-214 Ra-224 Tritium	0.113 ± 0.0410 0.346 ± 0.314 ND (99 ± 150)
SNLA015571 Aqueous Field Blank, east acid line, north end	VOCs: Bromomethane Methylene chloride SVOCs: bis(2-Ethylhexyl) phthalate PCBs	2.4 J 1.5 J 1.6 J ND	Antimony Copper Potassium Silver Vanadium Zinc	0.033 J 0.0038 J 0.10 J 0.0047 J 0.0034 J 0.20	Ra-226 Tritium	0.406 ± 0.319 160 ± 150
SNLA015572 Aqueous Field Blank north acid line, east of CO1	VOCs PCBs	ND ND	Iron Silver	0.032 J 0.0039 J	Ra-226 Pb-214 Bi-214 Tritium	0.0567 ± 0.0336 0.0362 ± 0.0246 0.0593 ± 0.0351 250 ± 130
SNLA015573 Aqueous Field Blank S of Building 838	NA	NA	Mercury	ND	NA	NA
SNLA015574 Wipe Field Blank, north acid line, west of CO1	PCBs	ND	NA	NA	NA	NA

Table 3-11 *(Continued)*

Compounds Detected in Field Quality Control Samples
Buildings 838 and 839 Phase II Contamination Assessment
Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs, SVOCs, PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/L)	Identity	Result (mg/L)	Identity[a]	Result (pCi/L)
SNLA015575 Aqueous Equip Blank, north acid line, east of CO1	VOCs: Acetone Methylene chloride PCBs	 3.0 J 2.1 BJ (1.4) ND	Barium Calcium Chromium Iron Magnesium Manganese Mercury Potassium Silver	0.0049 J 0.40 0.0052 J 0.043 J 0.12 J 0.0035 J ND 0.17 J 0.0055 J	Tritium	340 ± 130
SNLA015576 Aqueous Equip Blank, east acid line north end	VOCs: Acetone Methylene chloride SVOCs PCBs	 5.5 J 1.3 J ND ND	Antimony Barium Calcium Magnesium Potassium Zinc	0.029 J 0.0045 J 1.8 0.15 J 0.072 J 0.063	Tritium	180 ± 150
SNLA015577 Aqueous Equip Blank S of Building 838	NA	NA	Mercury	ND	NA	NA
SNLA015578 Aqueous Trip Blank, north acid line east of CO1	VOCs: Methylene chloride PCBs	 3.9 J ND	NA	NA	NA	NA
SNLA015579 Soil Trip Blank, north acid line east of CO1	VOCs PCBs	ND ND	NA	NA	NA	NA
SNLA015580 Soil Trip Blank, dry well	VOCs: Methylene chloride	(µg/kg) 2.3 BJ (0.14)	NA	NA	NA	NA
SNLA015581 Soil Trip Blank, dry well	VOCs: Tetrachloroethene	(µg/kg) 1.7 J	NA	NA	NA	NA
SNLA015582 Aqueous Trip Blank, north acid line east of CO1	VOCs: Acetone Methylene chloride PCBs	(µg/L) 5.6 J 3.6 BJ (1.4) ND	NA	NA	NA	NA

Table 3-11 *(Continued)*

Compounds Detected in Field Quality Control Samples
Buildings 838 and 839 Phase II Contamination Assessment
Sandia National Laboratories/New Mexico

Sample Number and Location	VOCs, SVOCs, PCBs		TAL Metals		Radionuclides	
	Identity	Result (µg/L)	Identity	Result (mg/L)	Identity[a]	Result (pCi/L)
SNLA015583 Soil Trip Blank, east acid line, north end	TC VOCs: 2-Butanone	(mg/L) 0.018 J	NA	NA	NA	NA
SNLA015584 Aqueous Trip Blank, east acid line, north end	VOCs: Acetone Methylene chloride	(µg/L) 3.0 J 3.6 J	NA	NA	NA	NA
SNLA015585 Soil Trip Blank, AP2, Building 839	VOCs: Methylene chloride Tetrachloroethene	(µg/kg) 1.4 J 1.6 J	NA	NA	NA	NA
SNLA015586 Soil Trip Blank, east acid line south end	VOCs: Acetone Methylene chloride Tetrachloroethene	(µg/kg) 7.1 BJ (7.6) 1.2 BJ (1.6) 1.1 BJ (1.7)	NA	NA	NA	NA
SNLA015587 Soil Trip Blank, North acid line east of CO1	VOCs: Methylene chloride Tetrachloroethene Toluene PCBs	(µg/kg) 2.2 J 3.4 J 5.6 ND	NA	NA	NA	NA
SNLA015590 Soil Trip Blank Loading Dock	VOCs: Acetone	(µg/kg) 3.8 J	NA	NA	NA	NA

[a]Radionuclides: Bi = bismuth; K = potassium; Pb = lead; Ra = radium.
B = Compound also detected in blank sample. Value of method blank shown in parentheses.
J = Compound detected below reporting limit, or is an estimated concentration.
NA = Not analyzed or not applicable.
ND = Not detected.
PCB = Polychlorinated biphenyls.
SVOC = Semivolatile organic compound.
TC = Toxicity characteristic.
VOC = Volatile organic compound.
TAL = Target analyte list.
mg/L = milligrams per liter.
µg/L = micrograms per liter.
µg/kg = micrograms per kilogram.
pCi/L = picocuries per liter.

Table 3-12

Results of RPD Calculations for Field Duplicate Samples Buildings 838 and 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Location and Parameters	Sample Number and Results	Duplicate Result	Calculated RPD, %
Building 839, AP2	SNL/NM015505	SNL/NM015568	
Aluminum	5660	5590	1.24
Arsenic	3.0	3.1	3.3
Barium	152	156	2.6
Beryllium	0.62	0.61	1.6
Cadmium	ND	0.60 B (0.58)	NC
Calcium	31800 B (26.3)	38000 B (26.3)	17.77
Chromium	5.6	4.5	21.78
Cobalt	4.9	3.8	25.29
Copper	6.9	5.6	20.8
Iron	10700	10100	5.77
Lead	5.8	5.7	1.74
Magnesium	4570	4500	1.54
Manganese	191	200	4.60
Mercury	0.086 J	ND	NC
Nickel	6.5	5.4	18.49
Potassium	1360	1230	10.04
Silver	0.32 J	ND	NC
Sodium	292 J	180 J	47.46
Vanadium	28.8	30.5	5.73
Zinc	29.3	28.1	4.18
Tritium	910	970	6.38
North Acid Line	SNL/NM015538	SNL/NM015540	
Aluminum	5620	4760	16.57
Antimony	ND	5.4 J	NC
Arsenic	1.4	1.8	25.00
Barium	103	56	59.12
Beryllium	0.42	0.31	30.14
Calcium	24400	19200	23.85
Chromium	6.5	5.6	14.88
Cobalt	5.3	4.7	12.0
Copper	6.9	6.5	5.97
Iron	13200	11100	17.28
Lead	3.8	4.1	7.59
Magnesium	4280	3930	8.53
Manganese	231	270	15.57
Nickel	5.1	5.3	3.85
Potassium	1760	1540	13.33
Silver	0.36 J	ND	NC
Sodium	183 J	85.5 J	72.63
Vanadium	22.9	19.2	17.58
Zinc	28.0	25.4	9.74

Table 3-12 *(Continued)*

Results of RPD Calculations for Field Duplicate Samples Buildings 838 and 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Location and Parameters	Sample Number and Results	Duplicate Result	Calculated RPD, %
AP 2	SNLA015505	SNLA015568	
U-238	1.94 (pCi/g)	1.56 (pCi/g)	21.71
Th-234	1.94	1.57	21.08
Ra-226	0.795	0.749	5.96
Pb-214	0.931	0.792	16.13
Bi-214	0.832	0.784	5.94
Th-232	0.963	0.846	12.94
Ra-228	0.963	0.846	12.94
Ac-228	0.869	0.765	12.73
Th-228	0.756	0.719	5.02
Ra-224	1.01	0.722	33.26
Pb-212	0.760	0.722	5.13
Bi-212	0.607	0.457	28.20
Tl-208	0.270	0.249	8.09
Th-231	0.618	ND	NC
K-40	17.7	17.5	1.14
Tritium	910 (pCi/L)	970	6.38
East Acid Line	SNLA015551	SNLA015552	
U-238	1.58 (pCi/g)	1.62 (pCi/g)	2.50
Th-234	1.59	1.62	1.87
Ra-226	2.69	2.01	28.94
Pb-214	1.11	0.978	12.64
Bi-214	0.996	0.850	15.82
Th-232	0.957	0.862	10.45
Ra-228	0.957	0.862	10.45
Ac-228	0.864	0.778	10.48
Th-228	0.824	0.776	6.00
Ra-224	1.06	0.902	16.11
Pb-212	0.828	0.780	5.97
Bi-212	0.727	0.640	12.73
Tl-208	0.272	0.273	0.37
K-40	13.0	15.3	16.25
Tritium	ND (pCi/L)	ND (pCi/L)	NC

Table 3-12 *(Continued)*

Results of RPD Calculations for Field Duplicate Samples Buildings 838 and 839 Phase II Contamination Assessment Sandia National Laboratories/New Mexico

Sample Location and Parameters	Sample Number and Results	Duplicate Result	Calculated RPD, %
East Acid Line	SNL/NM015551	SNL/NM015552	
Aluminum	7790	9500	19.78
Antimony	3.6 J	2.8 J	25.00
Arsenic	4.2	4.4	4.65
Barium	191	234	20.24
Beryllium	0.65	0.64	1.55
Cadmium	0.56	ND	NC
Calcium	84300	52800	45.95
Chromium	6.3	9.3	38.46
Cobalt	5.0	5.8	14.81
Copper	7.7	8.4	8.70
Iron	10700	13200	20.92
Lead	5.3	6.1	14.04
Magnesium	6710	5990	11.34
Manganese	204	257	22.99
Nickel	7.6	7.9	3.87
Potassium	1710	1950	13.11
Sodium	173 J	184 J	6.16
Vanadium	44.6	44.1	1.13
Zinc	27.1	31.7	15.65
2-Butanone	0.052	0.37	150.71
East Acid Line	SNL/NM015557	SNL/NM015558	
TC Barium	0.55 B (0.12)	0.45 B (0.12)	20.00
TC Mercury	0.00012 J	0.00012 J	-0-
TC Selenium	ND	0.22 J	NC
Building 839 Loading Dock	SNL/NM015481	SNL/NM015482	
Tritium	360 ± 160	530 ± 160	38.20
Building 838 Battery Spill Area	SNL/NM015564	SNL/NM015565	
Mercury	ND	ND	NC

B = Compound also detected in blank sample. Value of method blank shown in parentheses.
J = Compound detected below reporting limit but greater than instrument detection limit.
NC = Not calculable.
ND = Not detected.
RPD = Relative percent difference = {(|sample 1 - sample 2|)/[(sample 1 + sample 2)/2]} X 100.
TC = Toxicity characteristic.

BUILDINGS 838 AND 839 ACID WASTE AND SANITARY SEWER SYSTEM LINES

Shaw Environmental, Inc.

5301 Central Avenue NE, Suite 700
Albuquerque, NM 87108-1513
505.262.8800
Fax: 505.262.8855

Shaw™ Shaw Environmental, Inc.

October 22, 2003

Project No. 842717.01

Brenda Langkopf
Sandia National Laboratories/New Mexico
P.O. Box 5800, M/S 1087
Albuquerque, NM 87185-1087

Buildings 838 and 839 Acid Waste and Sanitary Sewer System Lines
Voluntary Corrective Measure Report Sampling Summary,
Sandia National Laboratories/New Mexico
Task Order CPA56064, Purchase Order 107802

Miss Langkopf:

Soil sampling results for sampling conducted at Buildings 838 and 839 are presented in "Voluntary Corrective Measure Report Environmental Restoration Sites No. 226 and 187, Former Buildings 838 and 839 Acid Waste and Sanitary Sewer System Lines" (IT, December 1995, SHEARS # 114355). In March and April, 1995, IT Corporation performed a voluntary corrective measure to remove portions of the sanitary sewer system and the acid waste line in the vicinity of the former buildings. Soil samples to confirm adequate cleanup were collected at regular intervals beneath the former locations of the excavated lines. The chain-of-custody numbers for the samples were not documented in the report. A total of 16 soil samples, 17 waste composite samples, 1 duplicate sample, 12 aqueous trip blanks and 12 soil trip blanks were collected. The soil samples were collected from soils adjacent to sewer line breaks to determine whether hazardous and/or radioactive wastes have been released into the surrounding soils. The locations of Buildings 838 and 839 as well as sample locations are depicted in Figures 2, 3, and 4. Summaries of the samples collected are presented in Tables 1 and 2. Soil sample analytical results are summarized in Table 4, 5, 6, 8, 10, and 12.

Respectfully submitted,

SHAW ENVIRONMENTAL, INC.

Lara Beasley

cc: M. Skelly, SNL/NM (w/ enclosures)
M. Goodrich, Shaw Environmental, Inc. (w/o enclosures)
Project File (w/ enclosures)

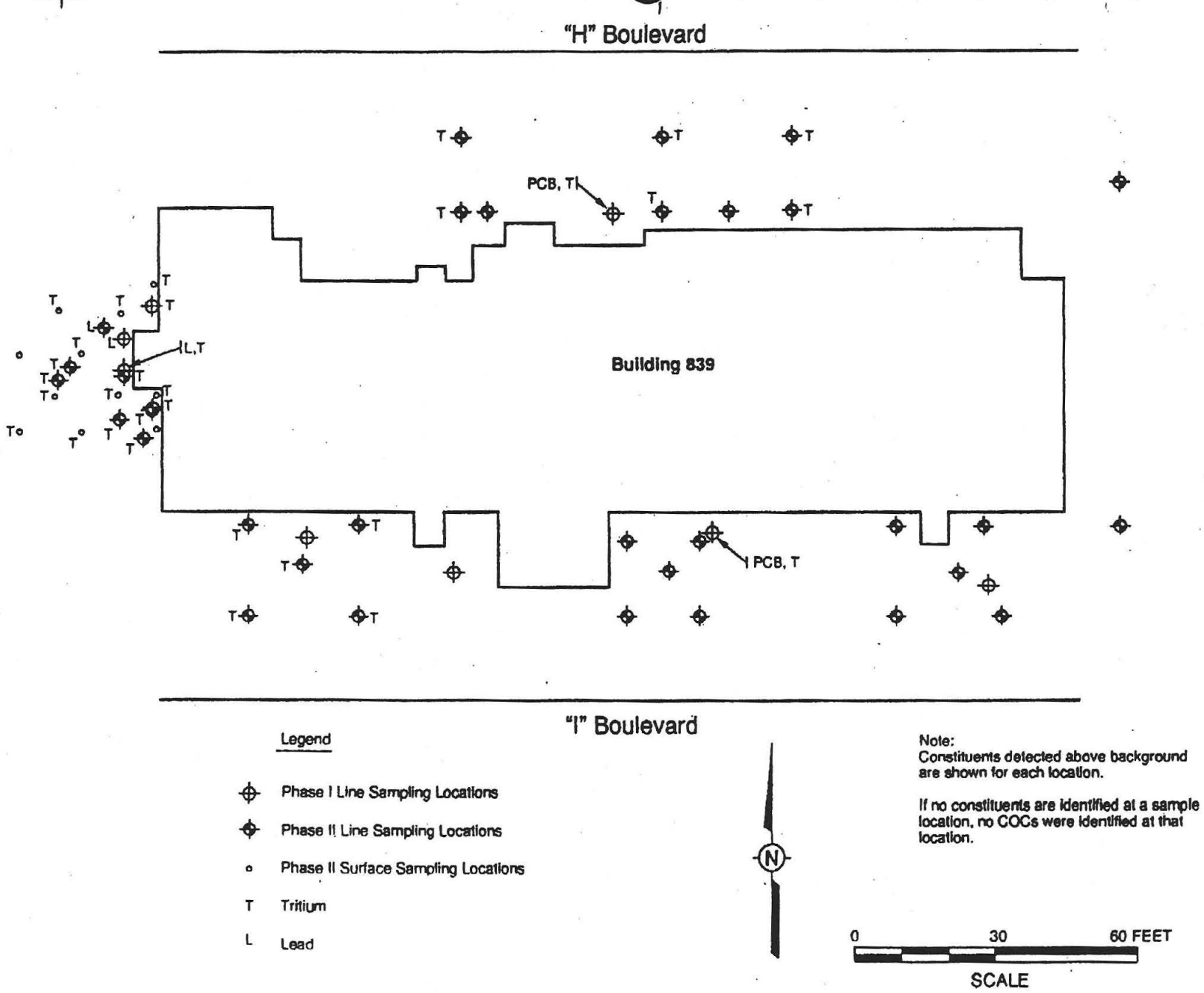


Figure 2

Building 839, Sandia National Laboratories/New Mexico, Showing Phase I and Phase II Sample Locations

11/17/95

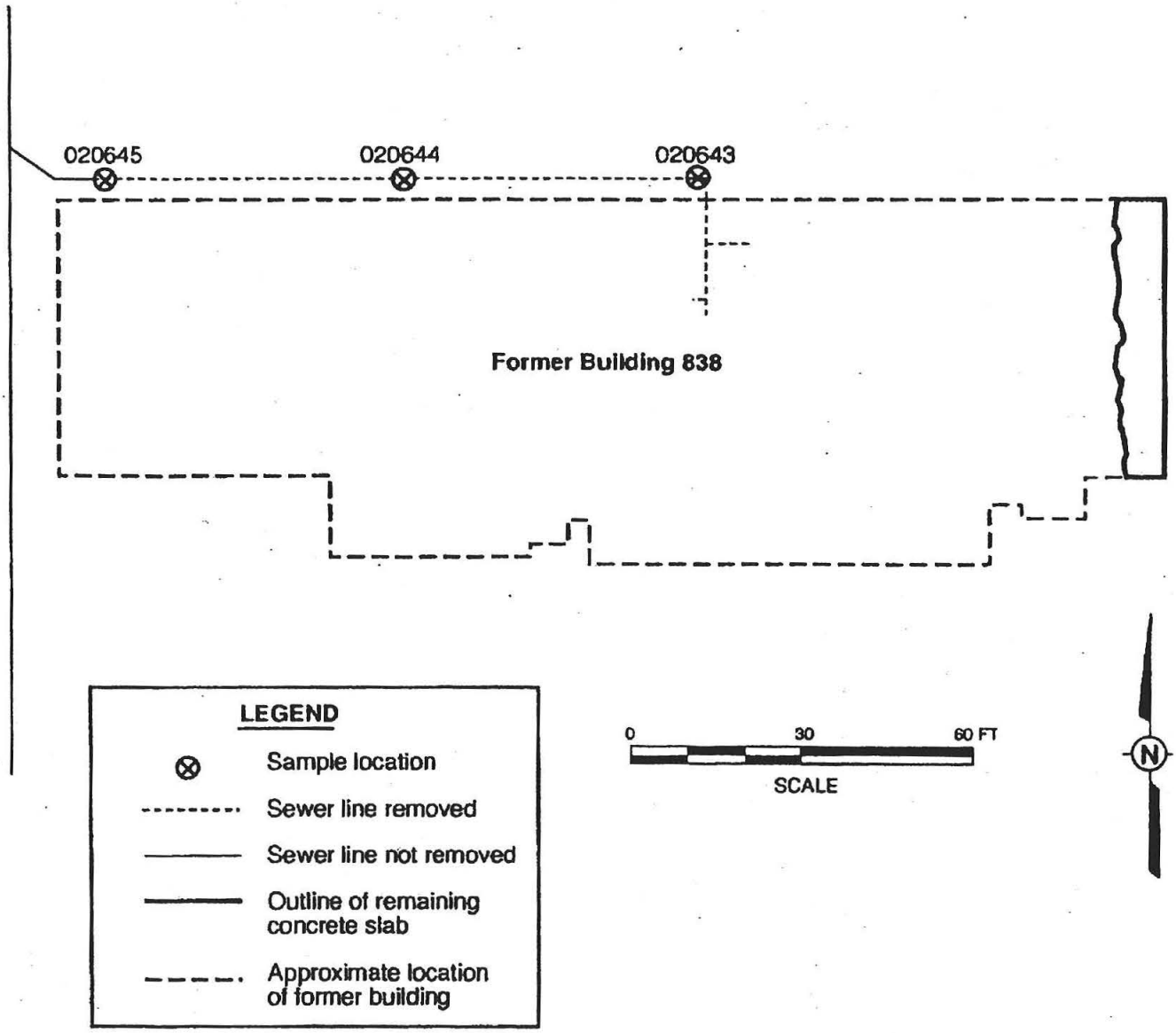


Figure 3
Sanitary Sewer Lines Removed During Voluntary Corrective Measure at Former Building 838, Technical Area I, Sandia National Laboratories/New Mexico

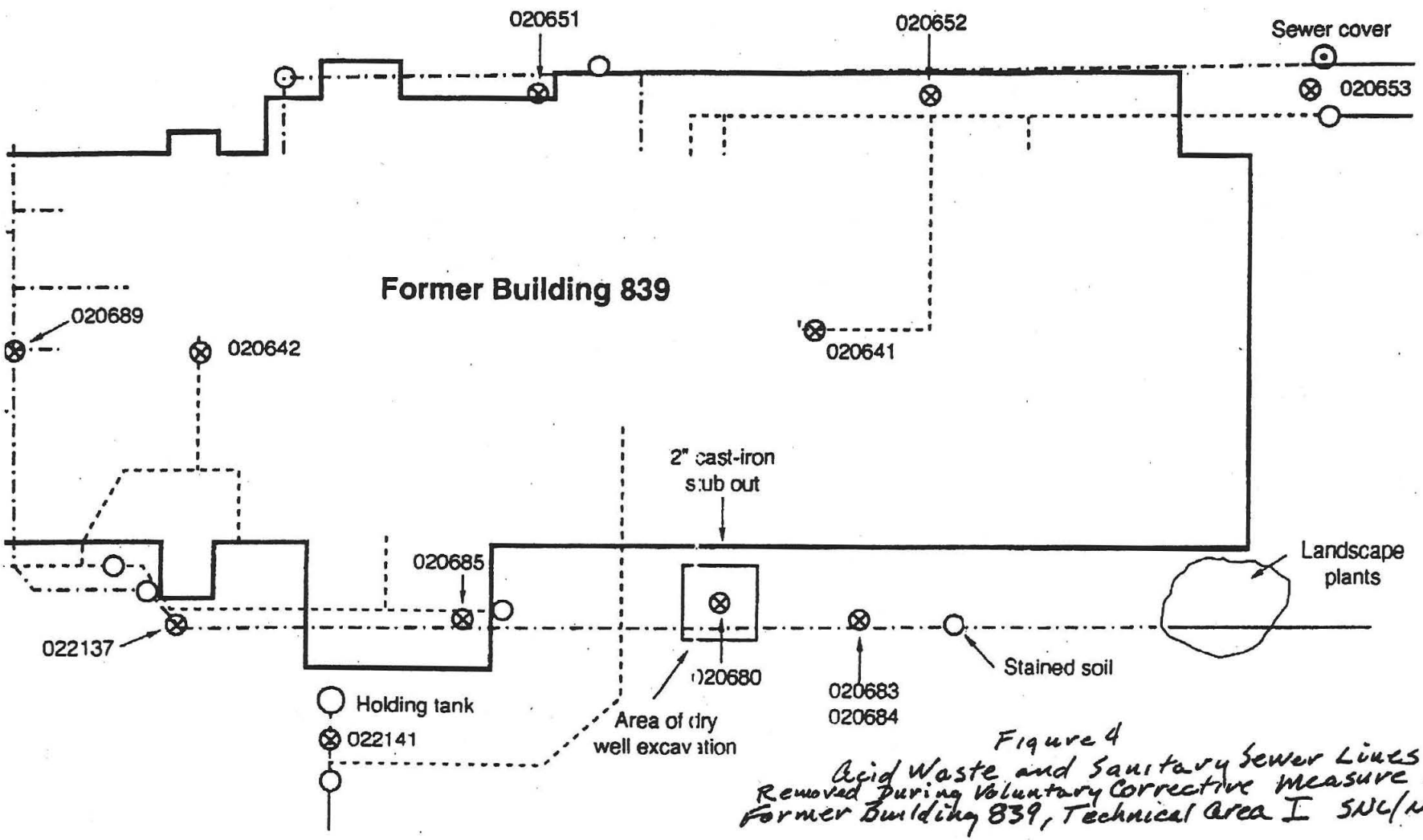


Figure 4
Acid Waste and Sanitary Sewer Lines
Removed During Voluntary Corrective Measure at
Former Building 839, Technical Area I SNL/NM

2.1 Confirmation Soil Samples

Confirmation soil samples were collected from the excavation beneath the removed line, and from the center of the dry well excavation. Figures 3 and 4 show sample locations. Samples were collected and submitted for analysis in accordance with the VCM plan.

2.2 Waste Characterization Samples

Samples were collected to determine the hazardous waste characteristics of removed materials produced during the VCM. These materials included vitreous clay pipe, cast-iron pipe, contents of the pipe, soil from the dry well excavation, and fluids produced during equipment decontamination. One composite sample of representative material was collected from each waste container and submitted for analysis in accordance with the VCM plan and the site-specific waste management plan (SNL/NM, 1995b), with the exception of the waste container which held the asbestos-containing pipe. Because of the hazards involved with handling crushed asbestos-containing material, it was determined that data from waste characterization samples collected from an adjacent sewer line would be used to characterize the asbestos-containing pipe. In the case of waste containers which contained mostly cast-iron pipe and its contents, the representative composite sample consisted of pipe contents, soil and rust which adhered to the pipe, and any accompanying soil discharged into the container from the backhoe bucket.

2.3 Field Quality Control Samples

Four types of field QC samples were shipped for analysis during the VCM activities:

- Field duplicate soil sample
- Equipment rinsate sample
- Soil trip blank samples
- Aqueous trip blank samples.

In addition, one soil sample was designated for matrix spike/matrix spike duplicate (MS/MSD) analysis.

2.3.1 Field Duplicate Sample

In order to assess the overall sampling and analysis system precision, one field duplicate soil sample (sample number 20684) was collected and analyzed for the same parameters as the corresponding soil sample (sample number 20683). The original/duplicate soil sample was collected from the acid line excavation south of former Building 839, and consisted of

Table 1

Soil Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample No.	Sample Description	Analyses Requested
20643	North of former Building 838, 4.5 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20644	North of former Building 838, 4.5 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20645	North of former Building 838, 6 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20641	East center of concrete slab, former Building 839, 1 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20642	West center of concrete slab, former Building 839, 1 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20689	West center of concrete slab, former Building 839, 1 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20651	North of former Building 839, 4 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20652	North rim of concrete slab, former Building 839, 5 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20653	Northeast of former Building 839, 5 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20680	Center of dry well excavation, 2.5 fbgs	PCBs, Isotopic Uranium, Isotopic Plutonium, Isotopic Thorium, Gamma Spectroscopy, Tritium
20683	South of former Building 839, 2.5 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20685	South rim of concrete slab, former Building 839, 2.5 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
22137	South of former Building 839, 2.5 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
22141	South of former Building 839, 2.5 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
22142	Southwest of former Building 839, 6 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
21614	West of former Building 839, 7 fbgs	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium

fbgs = Feet below ground surface
PCB = Polychlorinated biphenyls
SVOC = Semivolatile organic compounds
TAL = Target analyte list
VOC = Volatile organic compounds

Table 2

Field Quality Control Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample No.	Sample Description	Analyses Requested
20684	Duplicate of sample no. 20683	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20683	MS/MSD requested	VOC, SVOC, TAL Metals, PCBs
20685	MS/MSD requested	Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20661	Equipment rinsate blank	VOC, SVOC, TAL Metals, PCBs, Isotopic Uranium, Isotopic Thorium, Isotopic Plutonium, Gamma Spectroscopy, Tritium
20778/20777	Aqueous/soil trip blank (3/28/95)	VOC
20647/20646	Aqueous/soil trip blank (3/29/95)	VOC
20649/20650	Aqueous/soil trip blank (3/30/95)	VOC
20654/20655	Aqueous/soil trip blank (4/4/95)	VOC
20659/20660	Aqueous/soil trip blank (4/5/95)	VOC
20662/20667	Aqueous/soil trip blank (4/6/95)	VOC
20677/20678	Aqueous/soil trip blank (4/7/95)	VOC
20681/20682	Aqueous/soil trip blank (4/10/95)	VOC
20686/20687	Aqueous/soil trip blank (4/11/95)	VOC
22140/22139	Aqueous/soil trip blank (4/12/95)	VOC
22143/22144	Aqueous/soil trip blank (4/13/95)	VOC
21615/21616	Aqueous/soil trip blank (4/14/95)	VOC

MS/MSD = Matrix spike/matrix spike duplicate
PCB = Polychlorinated biphenyls
SVOC = Semivolatile organic compounds
TAL = Target analyte list
VOC = Volatile organic compounds

Table 4

Summary of Organic Compounds Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]
Soil Samples			
20643 North of former Building 838 4.5 fbgs	VOC	ND	NA
	SVOC	µg/kg	µg/kg
	Pyrene	40 J	NE
	Butyl benzyl phthalate	35 J	2e+07
	Benzol(a)anthracene	37 J	NE
	bis(2-Ethylhexyl)phthalate	990	5e+04
	Chrysene	48 J	NE
	Di-n-octal phthalate	43 J	NE
	Benzol(b)fluoranthene	61 J	NE
	Benzol(k)fluoranthene	84 J	NE
	Indeno(1,2,3-cd)pyrene	47 J	NE
	Dibenz(a,h)anthracene	37 J	NE
	Benzol(g,h,i)perylene	42 J	NE
20644 North of former Building 838 4.5 fbgs	VOC	ND	NA
	SVOC	ND	NA
20645 North of former Building 838 6 fbgs	VOC	ND	NA
	SVOC	ND	NA
20641 East center of concrete slab, former Building 839 1 fbgs	VOC	µg/kg	µg/kg
	Acetone	1.5 J	8e+06
	SVOC		
	bis(2-Ethylhexyl)phthalate	360	5e+04
20642 West center of concrete slab, former Building 839 1 fbgs	VOC	µg/kg	µg/kg
	Acetone	2.1 J	8e+06
	SVOC	ND	NA
20689 West center of concrete slab, former Building 839 1 fbgs	VOC	µg/kg	µg/kg
	Methylene chloride	3.4 J	9e+04
	SVOC	ND	NA
20651 North of former Building 839 4 fbgs	VOC	µg/kg	µg/kg
	Methylene chloride	3.3 J	9e+04
	SVOC	ND	NA
20652 North rim of concrete slab, former Building 839 5 fbgs	VOC	ND	NA
	SVOC	ND	NA

Refer to footnotes at end of table.

Table 4 *(Continued)*

Summary of Organic Compounds Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]
20653 Northeast of former Building 839 5 fbgs	VOC	ND	NA
	SVOC	µg/kg	µg/kg
	Phenanthrene	220 J	NE
	Carbazole	34 J	NE
	Fluoranthene	350	NE
	Pyrene	280 J	NE
	Benzo(a)anthracene	100 J	NE
	bis(2-Ethylhexyl)phthalate	130 J	5e+04
	Chrysene	160 J	NE
	Benzo(b)fluoranthene	210 J	NE
	Benzo(a)pyrene	110 J	NE
	Indeno(1,2,3-cd)pyrene	61 J	NE
	Benzo(g,h,i)perylene	75 J	NE
20683 South of former Building 839 2.5 fbgs	VOC	µg/kg	µg/kg
	Acetone	40 B	8e+06
	SVOC	ND	NA
20684 (duplicate of 20683) South of former Building 839 2.5 fbgs	VOC	ND	NA
	SVOC	ND	NA
20685 South rim of concrete slab, former Building 839 2.5 fbgs	VOC	ND	NA
	SVOC	ND	NA
22137 South of former Building 839 2.5 fbgs	VOC	µg/kg	µg/kg
	Methylene chloride	4.2 J	9e+04
	SVOC	ND	NA
22141 South of former Building 839 2.5 fbgs	VOC	µg/kg	µg/kg
	Methylene chloride	1.6 J	9e+04
	SVOC	ND	NA
22142 Southwest of former Building 839 6 fbgs	VOC	µg/kg	µg/kg
	Methylene chloride	1.2 J	9e+04
	SVOC	ND	NA
21614 West of former Building 839 7 fbgs	VOC	µg/kg	µg/kg
	Acetone	2.3 J	8e+06
	SVOC	ND	NA

Refer to footnotes at end of table.

Table 4 *(Continued)*

Summary of Organic Compounds Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[B]
	Field Quality Control Samples		
20661 Equipment rinsate blank	VOC Acetone	µg/L 10	NA
	SVOC	ND	NA
20778 Aqueous trip blank (3/28/95)	VOC Methylene chloride	µg/L 1.1 J	NA
20777 Soil trip blank (3/28/95)	VOC Acetone 2-Butanone Chloroform Methylene chloride Toluene xylenes	µg/kg 63 9.0 J 1.9 J 20 B 1.9 J 1.7 J	NA NA NA NA NA NA
20647 Aqueous trip blank (3/29/95)	VOC Methylene chloride	µg/L 1.0 J	NA
20646 Soil trip blank (3/29/95)	VOC Ethylbenzene	µg/kg 1.4 J	NA
20649 Aqueous trip blank (3/30/95)	VOC Methylene chloride	µg/L 1.2 J	NA
20650 Soil trip blank (3/30/95)	VOC Acetone 2-Butanone Methylene chloride Toluene xylenes	µg/kg 81 B 23 13 3.4 J 1.5 J	NA NA NA NA NA
20654 Aqueous trip blank (4/4/95)	VOC	ND	NA
20655 Soil trip blank (4/4/95)	VOC	ND	NA
20659 Aqueous trip blank (4/5/95)	VOC	ND	NA
20660 Soil trip blank (4/5/95)	VOC Methylene chloride	µg/kg 1.4 J	NA
20662 Aqueous trip blank (4/6/95)	VOC	ND	NA
20667 Soil trip blank (4/6/95)	VOC Methylene chloride	µg/kg 1.1 J	NA
20677 Aqueous trip blank (4/7/95)	VOC	ND	NA

Refer to footnotes at end of table.

Table 4 *(Concluded)*

Summary of Organic Compounds Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]
20678 Soil trip blank (4/7/95)	VOC Methylene chloride	µg/kg 2.0 J	NA
20681 Aqueous trip blank (4/10/95)	VOC Acetone	µg/L 3.8 J	NA
20682 Soil trip blank (4/10/95)	VOC	ND	NA
20686 Aqueous trip blank (4/11/95)	VOC	ND	NA
20687 Soil trip blank (4/11/95)	VOC Acetone	µg/kg 30 B	NA
22140 Aqueous trip blank (4/12/95)	VOC	ND	NA
22139 Soil trip blank (4/12/95)	VOC Methylene chloride	µg/kg 4.3 J	NA
22143 Aqueous trip blank (4/13/95)	VOC	ND	NA
22144 Soil trip blank (4/13/95)	VOC Methylene chloride	µg/kg 1.5 J	NA
21615 Aqueous trip blank (4/14/95)	VOC	ND	NA
21616 Soil trip blank (4/14/95)	VOC	ND	NA

[a]Action levels obtained from 40 CFR 264.521 (a)(2)(i-iv), RCRA Proposed Subpart S.

B = Compound also detected in laboratory method blank
fbgs = Feet below ground surface
J = Compound detected below the contract-required quantitation limit (the value given is an estimate)
NA = Not applicable
ND = Not detected
NE = Not established in source cited
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds
µg/kg = Microgram per kilogram
µg/L = Microgram per liter

Table 5

Summary of Organic Compounds Detected in Waste Characterization Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Regulatory Limit[a]
20640 Composite of waste container S1014 (SNL/NM 0065)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA
20648 Composite of waste container S1128 (SNL/NM 0060)	TCLP VOC Carbon tetrachloride	mg/L 0.0039 J	mg/L 0.5
	TCLP SVOC	ND	NA
20656 Composite of waste container S1153 (SNL/NM 0061)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA
20657 Composite of waste container S1082 (SNL/NM 0067)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA
20658 Composite of waste container S1010 (SNL/NM 0057)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA
20663 Composite of waste container S1069 (SNL/NM 0069)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA
20664 Composite of waste container S1141 (SNL/NM 0068)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA
20665 Composite of waste container S1175 (SNL/NM 0075)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA
20666 Composite of waste container S-214 (SNL/NM 0074)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA
20668 Composite of waste container S1150 (SNL/NM 0070)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA
20669 Composite of waste container S-215 (SNL/NM 0071)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA
20670 Composite of waste container S1027 (SNL/NM 0080)	TCLP VOC	ND	NA
	TCLP SVOC	ND	NA

Refer to footnotes at end of table.

Table 6

Summary of Metals Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]	Background[b]
	Soil Samples			
20643 North of former Building 838 4.5 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	3.3	80	NE
	Barium	163	4000	398.1
	Beryllium	0.13 J	0.20	0.785
	Chromium	6.9	400[c]	22.90
	Lead	4.3 J	NE	15.0
	Nickel	6.6	2000	15.39
	Silver	0.44 J	200	NE
20644 North of former Building 838 4.5 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	4.0	80	NE
	Barium	123	4000	398.1
	Beryllium	0.22	0.20	0.785
	Chromium	5.8	400[c]	22.90
	Lead	5.2	NE	15.0
	Nickel	7.5	2000	15.39
	Thallium	0.734	NE	NE
20645 North of former Building 838 6 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	3.6	80	NE
	Barium	192	4000	398.1
	Beryllium	0.35	0.20	0.785
	Chromium	6.0	400[c]	22.90
	Lead	4.2	NE	15.0
	Nickel	6.9	2000	15.39
20641 East center of concrete slab, former Building 839 1 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	1.6	80	NE
	Barium	72.9	4000	398.1
	Chromium	3.8	400[c]	22.90
	Nickel	4.8	2000	15.39
20642 West center of concrete slab, former Building 839 1 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	1.7	80	NE
	Barium	98.6	4000	398.1
	Beryllium	0.17 J	0.20	0.785
	Chromium	4.7	400[c]	22.90
	Lead	40.6	NE	15.0
	Mercury	0.058 J	20	NE
	Nickel	5.0	2000	15.39
	Silver	0.49	200	NE

Refer to footnotes at end of table.

Table 6 *(Continued)*

Summary of Metals Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]	Background[b]
20689 West center of concrete slab, former Building 839 1 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	2.6	80	NE
	Barium	131	4000	398.1
	Beryllium	0.40	0.20	0.785
	Chromium	5.6	400[c]	22.90
	Lead	4.0	NE	15.0
	Nickel	6.3	2000	15.39
20651 North of former Building 839, 4 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	8.2	80	NE
	Barium	261	4000	398.1
	Beryllium	0.52	0.20	0.785
	Chromium	7.5	400[c]	22.90
	Lead	6.0	NE	15.0
	Nickel	9.8	2000	15.39
20652 North rim of concrete slab, former Building 839, 5 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	3.7	80	NE
	Barium	139	4000	398.1
	Beryllium	0.41	0.20	0.785
	Chromium	4.7	400[c]	22.90
	Nickel	8.1	2000	15.0
20653 North of former Building 839, 5 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	7.0	80	NE
	Barium	424	4000	398.1
	Beryllium	0.48	0.20	0.785
	Chromium	7.7	400[c]	22.90
	Lead	17.8	NE	15.0
	Nickel	9.1	2000	15.39
20683 South of former Building 839, 2.5 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	11.4	80	NE
	Barium	619	4000	398.1
	Beryllium	0.51	0.20	0.785
	Chromium	7.2	400[c]	22.90
	Lead	6.7	NE	15.0
	Mercury	0.052	20	NE
	Nickel	7.6	2000	15.39
20684 (duplicate of 20683) South of former Building 839, 2.5 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	11.7	80	NE
	Barium	447	4000	398.1
	Beryllium	0.37	0.20	0.785
	Chromium	6.5	400[c]	22.90
	Nickel	6.4	2000	15.39

Refer to footnotes at end of table.

Table 6 *(Continued)*

Summary of Metals Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]	Background[b]
20685 South rim of concrete slab, former Building 839, 2.5 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	4.3	80	NE
	Barium	663	4000	398.1
	Chromium	2.5	400[c]	22.90
	Nickel	3.3 J	2000	15.39
22137 South of former Building 839, 2.5 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	4.5	80	NE
	Barium	626	4000	398.1
	Beryllium	0.35 J	0.20	0.785
	Chromium	6.8	400[c]	22.90
	Nickel	6.9 J	2000	15.39
22141 South of former Building 839, 2.5 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	6.5	80	NE
	Barium	1310	4000	398.1
	Beryllium	0.39	0.20	0.785
	Chromium	3.8	400[c]	22.90
	Nickel	4.8	2000	15.39
	Thallium	1.4	NE	NE
22142 Southwest of former Building 839, 6 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	2.5	80	NE
	Barium	83.0	4000	398.1
	Beryllium	0.46	0.20	0.785
	Chromium	4.6	400[c]	22.90
	Lead	4.9	NE	15.0
	Nickel	6.3	2000	15.39
	Thallium	1.3	NE	NE
21614 West of former Building 839, 7 fbgs	TAL Metals	mg/kg	mg/kg	mg/kg
	Arsenic	1.8	80	NE
	Barium	81.8	4000	398.1
	Beryllium	0.14 J	0.20	0.785
	Chromium	3.3	400[c]	22.90
	Lead	4.2	NE	15.0
	Nickel	3.6	2000	15.39
	Thallium	1.8	NE	NE

Refer to footnotes at end of table.

Table 6 *(Concluded)*

Summary of Metals Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]	Background[b]
20661	TAL Metals	mg/L	mg/L	mg/L
Equipment rinsate blank	Arsenic	0.0062 J	NA	NA
	Silver	0.0048J	NA	NA

[a]Action levels obtained from 40 CFR 264.521 (a)(2)(i-iv), RCRA proposed Subpart S.
[b]95th Upper Tolerance Limit or 95th Percentile from Table 7-1, Summary of Background Concentrations for Metals in Soils, in Sandia National Laboratories/New Mexico, October 1994, draft, "Background Concentration of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project," Sandia National Laboratories, Albuquerque, New Mexico.
[c]Hexavalent chromium only.

fbgs = Feet below ground surface
J = Compound detected but below the contract-required quantitation limit (the value given is an estimate)
mg/kg = Milligram per kilogram
mg/L = Milligram per liter
NA = Not applicable
NE = Not established in source cited
TAL = Target analyte list

Table 8

Summary of PCB Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]
20643 North of former Building 838, 4.5 fbgs	PCB	ND	NA
20644 North of former Building 838, 4.5 fbgs	PCB	ND	NA
20645 North of former Building 838, 6 fbgs	PCB	ND	NA
20641 East center of concrete slab, former Building 839, 1 fbgs	PCB	ND	NA
20642 West center of concrete slab, former Building 839, 1 fbgs	PCB	ND	NA
20689 West center of concrete slab, former Building 839, 1 fbgs	PCB	ND	NA
20651 North of former Building 839, 4 fbgs	PCB	ND	NA
20652 North rim of concrete slab, former Building 839, 5 fbgs	PCB	ND	NA
20653 North of former Building 839, 5 fbgs	PCB Aroclor 1254	µg/kg 53	µg/kg 90
20680 Center of dry well excavation, 2.5 fbgs	PCB	ND	NA
20683 South of former Building 839, 2.5 fbgs	PCB	ND	NA
20684 (duplicate of 20683) South of former Building 839, 2.5 fbgs	PCB	ND	NA
20685 South rim of concrete slab, former Building 839, 2.5 fbgs	PCB	ND	NA
22137 South of former Building 839, 2.5 fbgs	PCB	ND	NA

Refer to footnotes at end of table.

Table 8 *(Concluded)*

Summary of PCB Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]
22141 South of former Building 839, 2.5 fbgs	PCB	ND	NA
22142 Southwest of former Building 839, 6 fbgs	PCB	ND	NA
21614 West of former Building 839, 7 fbgs	PCB	ND	NA
20661 Equipment rinsate blank	PCB	ND	NA

[a]Action levels obtained from 40 CFR 264.521 (a)(2)(i-iv), RCRA proposed Subpart S.

fbgs = Feet below ground surface
NA = Not applicable
ND = Not detected
PCB = Polychlorinated biphenyl
µg/kg = Microgram per kilogram

Table 10

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
20643 North of former Building 838, 4.5 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Th-234[c]	1.49 ± 0.673	2.89 (0.324–3.0)[d]
	Ra-226	1.39 ± 0.613	1.94 (0.50–2.09)
	Pb-214	0.715 ± 0.202	0.90 (0.29–1.13)
	Bi-214	0.750 ± 0.146	0.8 (0.27–1.4)
	Th-232	0.703 ± 0.272	1.258 (0.23–1.20)
	Ra-228	0.724 ± 0.336	1.05 (0.45–1.05)
	Ac-228	0.749 ± 0.185	NE
	Th-226	0.694 ± 0.321	NE
	Pb-212	0.632 ± 0.202	1.0795 (0.1–1.4)
	Tl-208	0.586 ± 0.138	NE
	K-40	15.1 ± 2.31	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-230	1.7 ± 0.21	NE
	Th-232	1.2 ± 0.17	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	1.7 ± 0.26	1.0[e] (0.8–1.0)
	U-235	0.086 ± 0.045	0.168 (0.05–0.18)
	U-238	1.6 ± 0.25	1.1 (0.003–2.06)
	Tritium	ND	NA
20644 North of former Building 838, 4.5 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Th-234	0.926 ± 0.648	2.89 (0.324–3.0)
	Pb-214	0.671± 0.193	0.90 (0.29–1.13)
	Bi-214	0.745 ± 0.147	0.8 (0.27–1.4)
	Th-232	0.509 ± 0.227	1.258 (0.23–1.20)
	Ra-228	0.494 ± 0.284	1.05 (0.45–1.05)
	Pb-212	0.600 ± 0.192	1.0795 (0.1–1.4)
	K-40	16.6 ± 2.53	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-230	1.3± 0.18	NE
	Th-232	1.0± 0.16	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	1.6 ± 0.24	1.0 (0.8–1.0)
	U-235	0.089 ± 0.046	0.168 (0.05–0.18)
	U-238	1.3 ± 0.22	1.1 (0.003–2.06)
	Tritium	ND	NA

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
20645 North of former Building 838, 6 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Th-234	1.06 ± 0.622	2.89 (0.324–3.0)
	Ra-226	1.30 ± 0.581	1.94 (0.50–2.09)
	Pb-214	0.641 ± 0.185	0.90 (0.29–1.13)
	Bi-214	0.667 ± 0.135	0.8 (0.27–1.4)
	Th-232	0.477 ± 0.216	1.258 (0.23–1.20)
	Pb-212	0.521 ± 0.171	1.0795 (0.1–1.4)
	Tl-208	0.567 ± 0.149	NE
	K-40	15.5 ± 2.40	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-230	1.2± 0.18	NE
	Th-232	0.92± 0.14	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	1.2 ± 0.19	1.0 (0.8–1.0)
	U-235	0.054 ± 0.032	0.168 (0.05–0.18)
	U-238	1.1 ± 0.18	1.1 (0.003–2.06)
	Tritium	ND	NA
20641 East center of concrete slab, former Building 839, 1 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Th-234	0.854 ± 0.562	2.89 (0.324–3.0)
	Ra-226	1.04 ± 0.503	1.94 (0.50–2.09)
	Pb-214	0.444 ± 0.131	0.90 (0.29–1.13)
	Th-232	0.473 ± 0.189	1.258 (0.23–1.20)
	Ra-228	0.639 ± 0.268	1.05 (0.45–1.05)
	Pb-212	0.499 ± 0.162	1.0795 (0.1–1.4)
	K-40	17.8 ± 2.67	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-230	0.98 ± 0.16	NE
	Th-232	1.1 ± 0.18	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	0.87 ± 0.16	1.0 (0.8–1.0)
	U-235	0.044 ± 0.030	0.168 (0.05–0.18)
	U-238	1.0 ± 0.18	1.1 (0.003–2.06)
	Tritium	ND	NA

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
20642 West center of concrete slab, former Building 839, 1 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Ra-226	1.16 ± 0.623	1.94 (0.50–2.09)
	Pb-214	0.675 ± 0.191	0.90 (0.29–1.13)
	Bi-214	0.623 ± 0.127	0.8 (0.27–1.4)
	Th-232	0.658 ± 0.305	1.258 (0.23–1.20)
	Ra-228	0.951 ± 0.326	1.05 (0.45–1.05)
	Pb-212	0.662 ± 0.211	1.0795 (0.1–1.4)
	Bi-212	0.905 ± 0.505	2.7 (0.4–2.7)
	Tl-208	0.605 ± 0.153	NE
	K-40	20.4 ± 3.02	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-230	1.0 ± 0.17	NE
	Th-232	1.0 ± 0.17	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	1.0 ± 0.19	1.0 (0.8–1.0)
	U-235	ND	NA
	U-238	0.90 ± 0.17	1.1 (0.003–2.06)
	Tritium	ND	NA

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
20689	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
West center of concrete slab, former	Ra-226	1.25 ± 0.666	1.94 (0.50–2.09)
Building 839, 1 fbgs	Pb-214	0.596 ± 0.172	0.90 (0.29–1.13)
	Bi-214	0.608 ± 0.125	0.8 (0.27–1.4)
	Th-232	0.636 ± 0.260	1.258 (0.23–1.20)
	Ra-228	0.495 ± 0.273	1.05 (0.45–1.05)
	Pb-212	0.557 ± 0.180	1.0795 (0.1–1.4)
	Bi-212	0.782 ± 0.437	2.7 (0.4–2.7)
	Tl-208	0.556 ± 0.143	NE
	K-40	17.8 ± 2.68	25.34 (0.19–31.0)
	Iso-Plutonium		
	Pu-238	ND	NA
	Pu-239/Pu-240	0.024 ± 0.013	NE
	Iso-Thorium		
	Th-228	1.08 ± 0.12	NE
	Th-230	1.21 ± 0.12	NE
	Th-232	1.17 ± 0.12	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	0.686 ± 0.099	1.0 (0.8–1.0)
	U-235	0.062 ± 0.029	0.168 (0.05–0.18)
	U-238	0.766 ± 0.10	1.1 (0.003–2.06)
	Tritium	ND	NA

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
20651 North of former Building 839, 4 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Th-234	1.33 ± 0.673	2.89 (0.324–3.0)
	Ra-226	1.79 ± 0.741	1.94 (0.50–2.09)
	Pb-214	0.817 ± 0.228	0.90 (0.29–1.13)
	Bi-214	0.827 ± 0.159	0.8 (0.27–1.4)
	Th-232	0.629 ± 0.254	1.258 (0.23–1.20)
	Ra-228	0.574 ± 0.293	1.05 (0.45–1.05)
	Pb-212	0.566 ± 0.188	1.0795 (0.1–1.4)
	Bi-212	0.638 ± 0.414	2.7 (0.4–2.7)
	K-40	14.3 ± 2.22	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-228	0.643 ± 0.081	NE
	Th-230	0.795 ± 0.088 B	NE
	Th-232	0.604 ± 0.074	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	0.69 ± 0.14 J	1.0 (0.8–1.0)
	U-235	0.066 ± 0.052 J	0.168 (0.05–0.18)
	U-238	0.59 ± 0.13 J	1.1 (0.003–2.06)
	Tritium	ND	NA

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
20652 North rim of concrete slab, former Building 839, 5 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Th-234	1.37 ± 0.713	2.89 (0.324–3.0)
	Ra-226	2.08 ± 0.772	1.94 (0.50–2.09)
	Pb-214	0.791 ± 0.223	0.90 (0.29–1.13)
	Bi-214	0.896 ± 0.166	0.8 (0.27–1.4)
	Th-232	0.659 ± 0.253	1.258 (0.23–1.20)
	Ra-228	0.921 ± 0.341	1.05 (0.45–1.05)
	Pb-212	0.651 ± 0.209	1.0795 (0.1–1.4)
	Tl-208	0.720 ± 0.170	NE
	K-40	19.2 ± 2.89	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-228	0.616 ± 0.074	NE
	Th-230	0.693 ± 0.071 B	NE
	Th-232	0.593 ± 0.066	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	1.67 ± 0.22 J	1.0 (0.8–1.0)
	U-235	0.115 ± 0.064 J	0.168 (0.05–0.18)
	U-238	1.46 ± 0.21 J	1.1 (0.003–2.06)
	Tritium	ND	NA

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
20653 North of former Building 839, 5 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Th-234	1.02 ± 0.575	2.89 (0.324–3.0)
	Ra-226	0.959 ± 0.521	1.94 (0.50–2.09)
	Pb-214	0.526 ± 0.153	0.90 (0.29–1.13)
	Bi-214	0.631 ± 0.128	0.8 (0.27–1.4)
	Th-232	0.319 ± 0.174	1.258 (0.23–1.20)
	Ra-228	0.526 ± 0.255	1.05 (0.45–1.05)
	Pb-212	0.508 ± 0.164	1.0795 (0.1–1.4)
	Tl-208	4.87 ± 0.129	NE
	K-40	13.5 ± 2.09	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-228	2.21 ± 0.16	NE
	Th-230	1.012 ± 0.088 B	NE
	Th-232	2.32 ± 0.16	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	1.00 ± 0.14 J	1.0 (0.8–1.0)
	U-235	0.114 ± 0.047 J	0.168 (0.05–0.18)
	U-238	0.94 ± 0.14 J	1.1 (0.003–2.06)
	Tritium	ND	NA
20680 Center of dry well excavation, 2.5 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Ra-226	0.983 ± 0.525	1.94 (0.50–2.09)
	Pb-214	0.451 ± 0.137	0.90 (0.29–1.13)
	Bi-214	0.438 ± 0.106	0.8 (0.27–1.4)
	Th-232	0.438 ± 0.191	1.258 (0.23–1.20)
	Ra-228	0.498 ± 0.247	1.05 (0.45–1.05)
	Pb-212	0.387 ± 0.131	1.0795 (0.1–1.4)
	K-40	11.0 ± 1.81	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-228	0.589 ± 0.073	NE
	Th-230	0.824 ± 0.082 B	NE
	Th-232	0.550 ± 0.064	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	0.75 ± 0.13 J	1.0 (0.8–1.0)
	U-235	0.082 ± 0.040 J	0.168 (0.05–0.18)
	U-238	0.67 ± 0.11 J	1.1 (0.003–2.06)
	Tritium	ND	NA

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
20683 South of former Building 839, 2.5 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Ra-226	1.79 ± 0.894	1.94 (0.50–2.09)
	Pb-214	0.633 ± 0.139	0.90 (0.29–1.13)
	Bi-214	0.491 ± 0.118	0.8 (0.27–1.4)
	Th-232	0.790 ± 0.315	1.258 (0.23–1.20)
	Ra-228	0.383 ± 0.269	1.05 (0.45–1.05)
	K-40	9.31 ± 1.67	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-228	0.650 ± 0.082	NE
	Th-230	0.956 ± 0.092 B	NE
	Th-232	0.572 ± 0.067	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	1.14 ± 0.15	1.0 (0.8–1.0)
	U-235	0.150 ± 0.056	0.168 (0.05–0.18)
	U-238	1.03 ± 0.14	1.1 (0.003–2.6)
	Tritium	ND	NA
20684 (duplicate of 20683) South of former Building 839, 2.5 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Th-234	1.16 ± 0.983	2.89 (0.324–3.0)
	Pb-214	0.611 ± 0.132	0.90 (0.29–1.13)
	Bi-214	0.540 ± 0.125	0.8 (0.27–1.4)
	Ra-224	1.62 ± 0.522	0.968 (0.43–0.97)
	Pb-212	0.530 ± 0.139	1.0795 (0.1–1.4)
	K-40	9.41 ± 1.69	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-228	1.66 ± 0.18	NE
	Th-230	2.37 ± 0.20 B	NE
	Th-232	1.62 ± 0.16	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	0.99 ± 0.16 J	1.0 (0.8–1.0)
	U-235	ND	NA
	U-238	0.80 ± 0.15 J	1.1 (0.003–2.06)
	Tritium	ND	NA

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
20685 South rim of concrete slab, former Building 839, 2.5 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Ra-226	1.58 ± 0.863	1.94 (0.50–2.09)
	Pb-214	0.510 ± 0.127	0.90 (0.29–1.13)
	Bi-214	0.431 ± 0.111	0.8 (0.27–1.4)
	Th-232	0.558 ± 0.291	1.258 (0.23–1.20)
	Pb-212	0.428 ± 0.107	1.0795 (0.1–1.4)
	K-40	11.5 ± 1.96	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-228	0.567 ± 0.080	NE
	Th-230	0.724 ± 0.079 B	NE
	Th-232	0.558 ± 0.068	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	0.640 ± 0.10	1.0 (0.8–1.0)
	U-235	0.143 ± 0.046	0.168 (0.05–0.18)
	U-238	0.494 ± 0.092	1.1 (0.003–2.06)
	Tritium	ND	NA
22137 South of former Building 839, 2.5 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Ra-226	0.603 ± 0.397	1.94 (0.50–2.09)
	Pb-214	0.324 ± 0.103	0.90 (0.29–1.13)
	Th-232	0.356 ± 0.182	1.258 (0.23–1.20)
	Ra-228	0.491 ± 0.225	1.05 (0.45–1.05)
	Pb-212	0.320 ± 0.110	1.0795 (0.1–1.4)
	K-40	10.4 ± 1.69	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-228	0.85 ± 0.16	NE
	Th-230	1.06 ± 0.15	NE
	Th-232	0.78 ± 0.13	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	0.596 ± 0.094	1.0 (0.8–1.0)
	U-235	0.050 ± 0.028	0.168 (0.05–0.18)
	U-238	0.644 ± 0.099	1.1 (0.003–2.06)
	Tritium	ND	NA

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
22141 South of former Building 839, 2.5 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Th-234	0.896 ± 0.528	2.89 (0.324–3.0)
	Ra-226	1.19 ± 0.605	1.94 (0.50–2.09)
	Pb-214	0.486 ± 0.142	0.90 (0.29–1.13)
	Th-232	0.458 ± 0.207	1.258 (0.23–1.20)
	Ra-228	0.387 ± 0.221	1.05 (0.45–1.05)
	Pb-212	0.359 ± 0.122	1.0795 (0.1–1.4)
	Tl-208	0.408 ± 0.118	NE
	K-40	12.0 ± 1.91	25.34 (0.19–31.0)
	Iso-Plutonium		
	Pu-238	ND	NE
	Pu-239/Pu-240	0.0110 ± 0.0082 J	NE
	Iso-Thorium		
	Th-228	0.64 ± 0.11	NE
	Th-230	1.24 ± 0.14	NE
	Th-232	0.700 ± 0.10	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	0.677 ± 0.095	1.0 (0.8–1.0)
	U-235	0.053 ± 0.026	0.168 (0.05–0.18)
	U-238	0.645 ± 0.091	1.1 (0.003–2.06)
		pCi/L ± 2-sigma[b]	
	Tritium	970 ± 240	NE

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
22142 Southwest of former Building 839, 6 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Ra-226	1.55 ± 0.674	1.94 (0.50–2.09)
	Pb-214	0.709 ± 0.201	0.90 (0.29–1.13)
	Bi-214	0.728 ± 0.141	0.8 (0.27–1.4)
	Th-232	0.735 ± 0.272	1.258 (0.23–1.20)
	Ra-228	0.768 ± 0.302	1.05 (0.45–1.05
	Pb-212	0.638 ± 0.204	1.0795 (0.1–1.4)
	Bi-212	0.831 ± 0.482	2.7 (0.4–2.7)
	Tl-208	0.648 ± 0.159	NE
	K-40	19.8 ± 2.93	25.34 (0.19–31.0)
	Iso-Plutonium		
	Pu-238	0.0121 ± 0.0084 J	NE
	Pu-239/Pu-240	ND	NE
	Iso-Thorium		
	Th-228	0.79 ± 0.15	NE
	Th-230	1.18 ± 0.16	NE
	Th-232	0.87 ± 0.13	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/U-234	1.10 ± 0.13	1.0 (0.8–1.0)
	U-235	0.107 ± 0.037	0.168 (0.05–0.18)
	U-238	1.0 ± 0.12	1.1 (0.003–2.06)
	Tritium	ND	NE

Refer to footnotes at end of table.

Table 10 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
21614 West of former Building 839, 7 fbgs	Gamma Spec	pCi/g ± 2-sigma[b]	pCi/g
	Th-234	1.24 ± 0.676	2.89 (0.324–3.0)
	Ra-226	1.07 ± 0.829	1.94 (0.50–2.09)
	Pb-214	0.770 ± 0.215	0.90 (0.29–1.13)
	Bi-214	0.844 ± 0.159	0.8 (0.27–1.4)
	Th-232	0.544 ± 0.231	1.258 (0.23–1.20)
	Ra-228	0.757 ± 0.336	1.05 (0.45–1.05)
	Pb-212	0.627 ± 0.201	1.0795 (0.1–1.4)
	Tl-208	0.648 ± 0.160	NE
	K-40	22.9 ± 3.35	25.34 (0.19–31.0)
	Iso-Plutonium	ND	NA
	Iso-Thorium		
	Th-228	1.06 ± 0.14	NE
	Th-230	1.70 ± 0.17	NE
	Th-232	1.0 ± 0.12	1.258 (0.23–1.20)
	Iso-Uranium		
	U-233/234	1.36 ± 0.14	1.0 (0.8–1.0)
	U-235	0.068 ± 0.027	0.168 (0.05–0.18)
	U-238	1.25 ± 0.13	1.1 (0.003–2.06)
	Tritium	ND	NA

Refer to footnotes at end of table.

Table 10 *(Concluded)*

Summary of Radionuclides Detected in Soil and Field QC Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
20661 Equipment Rinsate Blank	Gamma Spec	ND	NA
	Iso-Plutonium	ND	NA
	Iso-Thorium	pCi/L ± 2-sigma[b]	
	Th-228	ND	NA
	Th-230	0.190 ± 0.058 J	NE
	Th-232	0.043 ± 0.029	NE
	Iso-Uranium	ND	NA
	Tritium	ND	NA

[a]95th Upper Tolerance Limit or 95th Percentile from Table 7-2, Summary of Background Concentrations for Radionuclides in Soils, in Sandia National Laboratories/New Mexico, October 1994, draft, "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project," Sandia National Laboratories, Albuquerque, New Mexico.

[b]± counting error

[c]Radionuclides: Ac = actinium, Bi = bismuth, K = potassium, Pb = lead, Pu = plutonium, Ra = radium, Th = thorium, Tl = thallium, U = uranium.

[d]Range in background, in Sandia National Laboratories/New Mexico, October 1994, draft, "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project," Sandia National Laboratories/New Mexico, Albuquerque, New Mexico.

[e]Background value established for U-234 only.

fbgs = Feet below ground surface
NA = Not applicable
ND = Not detected at the associated minimal detectable activity
NE = Not established in source cited
pCi/L = Picocuries per liter
pCi/g = Picocuries per gram

Table 12

Calculation of Relative Percent Difference for Duplicate Soil Samples Collected During Voluntary Corrective Measure at Former Buildings 838 and 839, Technical Area I, Sandia National Laboratories/New Mexico

Parameter	Result A Sample # 20683	Result B Sample # 20684	RPD
VOCs (Acetone)	40 µg/kg (B)	ND	NC
SVOCs	ND	ND	NC
PCBs	ND	ND	NC
Metals, mg/kg			
Arsenic	11.4	11.7	2.6
Barium	619	447	32.3
Beryllium	0.51	0.37	31.8
Chromium	7.2	6.5	10.2
Lead	6.7	ND	NC
Mercury	0.052	ND	NC
Nickel	7.6	6.4	17.1
Radionuclides, pCi/g			MD
Th-234[a]	ND	1.16 ± 0.983	NC
Ra-226	1.79 ± 0.894	ND	NC
Pb-214	0.633 ± 0.139	0.611 ± 0.132	0.11
Bi-214	0.491 ± 0.118	0.540 ± 0.125	0.29
Th-232	0.790 ± 0.315	0.362 ± 0.281	1.01
Ra-228	0.383 ± 0.269	0.315 ± 0.293	0.17
Ra-224	ND	1.62 ± 0.522	NC
Pb-212	ND	0.530 ± 0.139	NC
K-40	9.31 ± 1.67	9.41 ± 1.69	0.04
Iso-Plutonium	ND	ND	NC
Iso-Thorium			
Th-228	0.650 ± 0.082	1.66 ± 0.18	5.11
Th-230	0.956 ± 0.092 B	2.37 ± 0.20 B	6.42
Th-232	0.572 ± 0.067	1.62 ± 0.16	6.04
Iso-Uranium			
U-233/U-234	1.14 ± 0.15	0.99 ± 0.16	0.68
U-235	0.150 ± 0.056	ND	NC
U-238	1.03 ± 0.14	0.80 ± 0.15	1.12
Tritium	ND	ND	NC

[a]Radionuclides: Bi = bismuth, K = potassium, Pb = lead, Ra = radium, Th = thorium, U = uranium.

B = Analyte detected in laboratory method blank
MD = Mean difference = (|Result A – Result B|)/Square root ((Error A)^2 + (Error B)^2)
mg/kg = Milligram per kilogram
NC = Not calculable
ND = Not detected above laboratory reporting limit
PCB = Polychlorinated biphenyl
RPD = Relative percent difference = {(|Result A – Result B|)/([Result A + Result B)/2)) X 100
pCi/g = Picocuries per gram
SVOC = Semivolatile organic compounds
VOC = Volatile organic compound
µg/kg = Microgram per kilogram

COMMUNICATION DUCT WITH THE ABANDONED ACID DRAIN

Shaw Environmental, Inc.

5301 Central Avenue NE, Suite 700
Albuquerque, NM 87108-1513
505.262.8800
Fax: 505.262.8855

Shaw™ Shaw Environmental, Inc.

October 24, 2003

Project No. 842717.01

Brenda Langkopf
Sandia National Laboratories/New Mexico
P.O. Box 5800, M/S 1087
Albuquerque, NM 87185-1087

Report on the Investigation of the
Communication Duct with the Abandoned Acid Drain,
Sandia National Laboratories/New Mexico
Task Order CPA56064, Purchase Order 107802

Miss Langkopf:

Soil and sediment sampling results for sampling conducted at the intersection of K and 9th Street are presented in "Report on the Investigation of the Intersection of the Communication Duct with the Abandoned Acid Drain" (IT, 1992; SHEARS # 26892). IT Corporation collected samples on February 26, March 31, and April 2, 1992. The samples are documented on chain of custody numbers: 03141, 03142, 03145, and 03091. A total of 3 soil samples and 1 clay tile sample were collected. The soil samples were collected to determine the presence and concentrations of potential hazardous constituents associated with the abandoned acid drain line that could pose a health threat to workers during construction of a proposed communication duct. The location of the samples is depicted in Figure 5-35. A summary of the samples collected and the sample results are presented in Table 1. Gamma spectroscopy data is also attached.

Respectfully submitted,

SHAW ENVIRONMENTAL, INC.

Lara Beasley

cc: M. Skelly, SNL/NM (w/ enclosures)
M. Goodrich, Shaw Environmental, Inc. (w/o enclosures)
Project File (w/ enclosures)

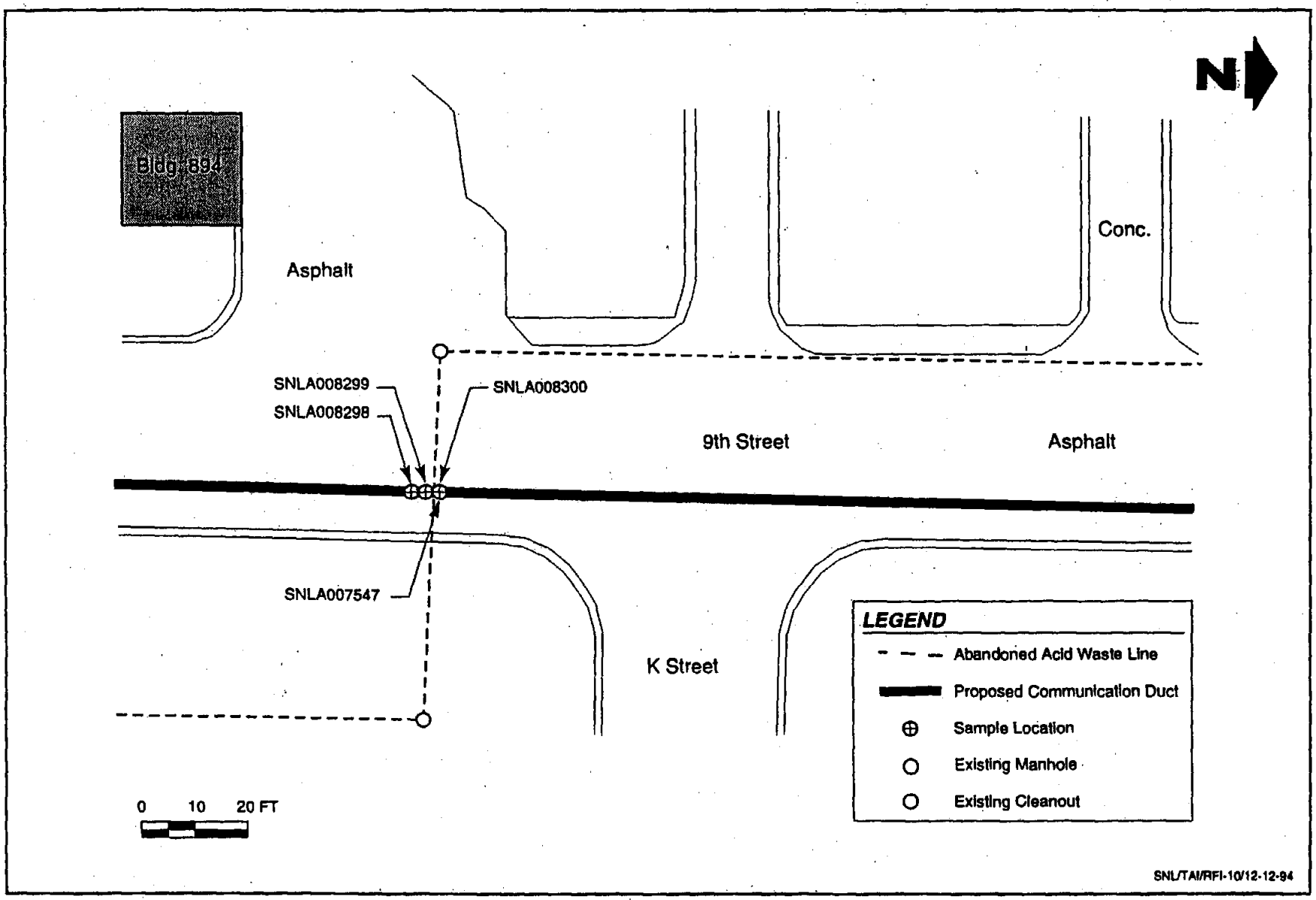


Figure 5-35
ER Site 226: Location of Samples Collected Near Intersection of Communications Duct and Acid Waste Line, 9th and K Streets

Table 1
Acid Drain Line
Sample Analysis Results

Parameter Sample Type: Sampling Date: Sampling Location:	SNLA008298 Soil 02/26/92 5' South of Drain Line	SNLA008299 Soil 03/31/92 6" South of Drain Line	SNLA008300 Soil 03/31/92 6" North of Drain Line	SNLA007547 Clay Tile 04/02/92 Bottom of Tile	Average Background Soil Concentrations and Ranges[a]	Action Level Soil 40 CFR 264[b]
Volatile Organics	ND[c]	16 ug/kg[d]	14 ug/kg[d]	NA	NA	8000 mg/kg[e]
Semivolatile Organics	ND[c]	ND[c]	ND[c]	NA	NA	f
Arsenic	2.6 mg/kg	1.6 mg/kg	2.1 mg/kg	0.73 mg/kg	Avg.=1.89 mg/kg Range=0.9-2.7 mg/kg	80 mg/kg
Barium	156 mg/kg	79.5 mg/kg	108 mg/kg	143 mg/kg	Avg.=82.07 mg/kg Range=55.6-177 mm/kg	4000 mg/kg
Cadmium	ND < 0.5 mg/kg	0.96 mg/kg	2.4 mg/kg	0.69 mg/kg	ND<0.50 mg/kg	40 mg/kg
Chromium	3.0 mg/kg	6.2 mg/kg	7.6 mg/kg	36.3 mg/kg	Avg.=7.95 mg/kg	400 mg/kg (chromium 6+)
Lead	3.4 mg/kg	ND < 5.0 mg/kg	ND < 5.0 mg/kg	14.8 mg/kg	9.59 ±2.16 mg/kg	NG
Mercury	ND <0.10 mg/kg	ND < 0.10 mg/kg	ND < 0.10 mg/kg	ND < 0.10 mg/kg	ND < 0.10 mg/kg	20 mg/kg
Selenium	ND <2.0 mg/kg	ND < 1.0 mg/kg	ND < 1.0 mg/kg	ND < 0.50 mg/kg	ND < 1.0 mg/kg	NG
Silver	ND <1.0 mg/kg	ND < 1.0 mg/kg	ND < 1.0 mg/kg	ND < 1.0 mg/kg	ND < 1.0 mg/kg	200 mg/kg

[a]Background values are based on 14 surface soil samples collected from Area III during April. Samples were prepared and analyzed in an identical manner as drain line soils (Enseco Report 022083, 05/01/92).
[b]Proposed actions levels for soil remediation (40 CFR 264, Subpart S, Appendix A).
[c]Reporting limits are analyte-specific and are approximately 100 ug/kg; see laboratory report for specific reporting limits.
[d]Acetone—measured in method blank at 11 mg/kg.
[e]Action level for acetone, only target analyte measured in samples.
[f]Compound-specific; action levels are well over laboratory reporting limits.
NA = Not analyzed
ND = Not detected
NG = None given

****
********** 27-FEB-92 12:31:56 **********
****

Soil Sample #SNLA008298-3 for Bill Bishop (TA-I)

PECTRAL FILE NAME: 0227JWK1.SPT
SAMPLE DATE: 06-FEB-92 14:00:00
SAMPLE IDENTIFICATION:
YPE OF SAMPLE:
AMPLE QUANTITY: 1.000000 UNITS: EACH
SAMPLE GEOMETRY:
FFICIENCY FILE NAME: VERT0.EFF

ACQUIRE DATE: 27-FEB-92 10:28:51	* FWHM(1332) 2.085
RESET TIME(LIVE): 14400. SEC	* SENSITIVITY: 5.000
ELAPSED REAL TIME: 6690. SEC	* SHAPE PARAMETER : 5.0 %
ELAPSED LIVE TIME: 6689. SEC	* NBR ITERATIONS: 0.
	*
ETECTOR: Vert	* LIBRARY:AREAV.LIB
ALIB DATE: 27-FEB-92 10:23:42	* ENERGY TOLERANCE: 1.500 KEV
KEV/CHNL: .2498394	* HALF LIFE RATIO: 8.00
OFFSET: .6835088 KEV	* ABUNDANCE LIMIT: 80.00%
	*

ENERGY WINDOW 70.64 TO 2047.37

PK	IT	ENERGY	AREA	BKGND	FWHM	CHANNEL	LEFT	PW	CTS/SEC	%ERR	FIT
1	0	77.51	398.	1107.	2.99	307.51	296	35	5.96E-02	29.8	
2	0	238.68	428.	341.	1.34	952.61	946	15	6.40E-02	11.1	
3	0	295.27	185.	217.	1.41	1179.11	1172	14	2.77E-02	18.4	
4	0	351.97	464.	130.	1.18	1406.06	1398	19	6.94E-02	8.2	
5	0	511.16	286.	117.	2.20	2043.23	2029	28	4.28E-02	16.1	
6	0	583.05	206.	91.	2.23	2330.97	2317	29	3.07E-02	14.8	
7	0	609.29	284.	180.	1.38	2436.00	2426	31	4.25E-02	13.1	
8	0	911.15	99.	60.	2.13	3644.22	3633	24	1.48E-02	20.2	
9	0	1120.87	94.	24.	1.04	4483.61	4475	20	1.41E-02	15.3	
10	0	1460.82	894.	63.	2.60	5844.28	5829	28	1.34E-01	3.7	

PEAK SEARCH COMPLETED (REV 15.8 - ND PC VERSION MAR 90)

..UCLIDE IDENTIFICATION SYSTEM (ND PC VERSION DEC 88)
NUCLIDE LINE ACTIVITY REPORT PAGE 1

FISSION GAS

UCLIDE	SBHR	ENERGY	AREA	BKGND	%ABN	%EFF	UCI/ EACH	1-SIGMA ERROR
AE-135	FG	249.60	0.	0.	92.00*	0.000E+00	.000E 0	.000E 0
		608.18	284.	180.	2.89	4.742E+00	2.417E 13	3.178E 12

ACTIVATION PRODUCT

UCLIDE	SBHR	ENERGY	AREA	BKGND	%ABN	%EFF	UCI/ EACH	1-SIGMA ERROR
BA-131	AP	123.80	0.	0.	29.00	0.000E+00	.000E 0	.000E 0
		133.61	0.	0.	2.16	0.000E+00	.000E 0	.000E 0
		216.07	0.	0.	19.70	0.000E+00	.000E 0	.000E 0
		239.62	428.	341.	2.40	1.096E+01	2.242E -3	2.483E -4
		373.24	0.	0.	14.00	0.000E+00	.000E 0	.000E 0
		496.31	0.	0.	46.80*	0.000E+00	.000E 0	.000E 0
		585.03	0.	0.	1.22	0.000E+00	.000E 0	.000E 0
		620.09	0.	0.	1.36	0.000E+00	.000E 0	.000E 0
		1047.51	0.	0.	1.17	0.000E+00	.000E 0	.000E 0

FISSION PRODUCT

..JCLIDE	SBHR	ENERGY	AREA	BKGND	%ABN	%EFF	UCI/ EACH	1-SIGMA ERROR
TE-133M	FP	912.58	99.	60.	87.00*	2.791E+00	4.510E158	9.105E157

NATURAL PRODUCT

JCLIDE	SBHR	ENERGY	AREA	BKGND	%ABN	%EFF	UCI/ EACH	1-SIGMA ERROR
K-40	NP	1460.85	894.	63.	11.00*	1.889E+00	1.738E -3	6.424E -5
RA-226	NP	295.20	185.	217.	20.10	1.003E+01	3.710E -5	6.830E -6
		351.96	464.	130.	39.30	7.855E+00	6.074E -5	4.987E -6
		609.19	284.	180.	48.30*	4.742E+00	5.017E -5	6.597E -6
		1120.30	94.	24.	16.00	2.300E+00	1.035E -4	1.579E -5
		1764.50	0.	0.	16.60	0.000E+00	.000E 0	.000E 0
3-214	NP	87.30	0.	0.	4.67	0.000E+00	.000E 0	.000E 0
		241.90	0.	0.	7.60	0.000E+00	.000E 0	.000E 0
		295.00	185.	217.	19.00*	1.003E+01	2.380E333	4.383E332
		352.00	464.	130.	36.00	7.855E+00	4.022E333	3.302E332
BI-214	NP	609.30	284.	180.	47.00*	4.742E+00	1.502E455	1.975E454
		1120.40	94.	24.	17.00	2.300E+00	2.840E455	4.331E454
		1238.30	0.	0.	6.00	0.000E+00	.000E 0	.000E 0
		1764.00	0.	0.	17.00	0.000E+00	.000E 0	.000E 0
AN-511	NP	511.01	286.	117.	100.00*	5.537E+00	2.089E -5	3.358E -6
3-228	NP	338.32	0.	0.	11.40	0.000E+00	.000E 0	.000E 0
		911.07	99.	60.	27.70*	2.791E+00	2.167E 20	4.375E 19
		969.11	0.	0.	16.60	0.000E+00	.000E 0	.000E 0
TL-208	NP	277.35	0.	0.	6.80	0.000E+00	.000E 0	.000E 0
		510.84	286.	117.	21.60	5.537E+00	9.672E -5	1.555E -5
		583.14	206.	91.	84.20*	4.918E+00	2.006E -5	2.972E -6
		860.37	0.	0.	12.46	0.000E+00	.000E 0	.000E 0
		763.13	0.	0.	1.64	0.000E+00	.000E 0	.000E 0
		1093.90	0.	0.	.37	0.000E+00	.000E 0	.000E 0

ATURAL PRODUCT

UCLIDE	SBHR	ENERGY	AREA	BKGND	%ABN	%EFF	UCI/ EACH	1-SIGMA ERROR
rB-212	NP	115.19	0.	0.	.60	0.000E+00	.000E 0	.000E 0
		252.70	0.	0.	.36	0.000E+00	.000E 0	.000E 0
		238.62	428.	341.	44.60*	1.096E+01	3.611E -5	3.999E -6
		300.08	0.	0.	3.41	0.000E+00	.000E 0	.000E 0

UNIDENTIFIED PEAKS

PK	IT	ENERGY	AREA	BKGND	FWHM	CHANNEL	LEFT	PW	CTS/SEC	%ERR	%EFF
1	0	77.51	398.	1107.	2.99	307.51	296	35	5.96E-02	29.8	0.00E+00
8	0	911.15	99.	60.	2.13	3644.22	3633	24	1.48E-02	20.2	2.79E+00

LINES NOT MEETING SUMMARY CRITERIA

PK	NUCLIDE	ENERGY	HLFE	DECAY	UCI/EACH	ABNDIFF	FAILED
2	BA-131	239.62	11.80D	3.412E 0	2.242E -3	2.04%	ABN
3	PB-214	295.00	26.80M	6.066E337	2.380E333	81.76%	DCY
4	PB-214	352.00	26.80M	6.066E337	4.022E333	81.76%	DCY
7	XE-135	608.18	9.17H	2.883E 16	2.417E 13	3.05%	DCY,ABN
7	BI-214	609.30	19.70M	2.914E459	1.502E455	73.56%	DCY,ABN
8	AC-228	911.07	6.13H	4.191E 24	2.167E 20	49.73%	DCY,ABN
8	TE-133M	912.58	55.40M	2.739E163	4.510E158	100.00%	DCY
9	BI-214	1120.40	19.70M	2.914E459	2.840E455	73.56%	DCY,ABN

..JCLIDE IDENTIFICATION SYSTEM (ND PC VERSION DEC 88)
SUMMARY OF NUCLIDE ACTIVITY PAGE 4

..OTAL LINES IN SPECTRUM 10
..IDENTIFIED PEAKS 2
..DENTIFIED IN SUMMARY REPORT 8 80.00%

NATURAL PRODUCT

..JCLIDE	SBHR	HLIFE	DECAY	UCI/EACH	1-SIGMA ERROR	%ERR
K-40	NP	1.28E+09Y	1.000	1.738E -3	6.424E -5	3.70
..-226	NP	1602.00Y	1.000	5.017E -5	6.597E -6	13.15
..-511	NP	1000.00Y	1.000	2.089E -5	3.358E -6	16.07
TL-208	NP	1602.00Y	1.000	2.006E -5	2.972E -6	14.82
..B-212	NP	1.91Y	1.021	3.611E -5	3.999E -6	11.07

No radioactivity in excess of background found.

7713

STORM DRAIN DISCHARGE AREA AND OLD ACID WASTE DRAIN LINE

Shaw Environmental, Inc.

5301 Central Avenue NE, Suite 700
Albuquerque, NM 87108-1513
505.262.8800
Fax: 505.262.8855

Shaw™ Shaw Environmental, Inc.

October 24, 2003

Project No. 842717.01

Brenda Langkopf
Sandia National Laboratories/New Mexico
P.O. Box 5800, M/S 1087
Albuquerque, NM 87185-1087

Storm Drain Discharge Area and
Old Acid Waste Drain Line Sampling Summary,
Sandia National Laboratories/New Mexico
Task Order CPA56064, Purchase Order 107802

Miss Langkopf:

Soil and sediment sampling results for sampling conducted at the Storm Drain Discharge Area (SDDA) and Old Acid Waste Drain Line (OAWDL) Investigation are presented in "Storm Drain Discharge Area and Old Acid Waste Drain Line Site Investigation Southeast of Technical Area I" (IT, 1992, SHEARS # 27252, 27235, 27236, and 27237). IT Corporation collected samples on May 6, 7, 8 and 11, 1992. The samples are documented on chain of custody numbers: 03524 through 03527, 03530, 03531, 03534, 03535, 03537, 03538, 03547 through 03549, 03550, 03553, 03565, 03566, 03569, 03581 through 03584, 03586 through 03593, 03601, 03627, 03628, 03684, and 03687. A total of 30 soil samples, 4 duplicate soil samples, 3 sediment samples, 1 field blank sample, and 4 equipment rinsate samples were collected. The soil samples were collected to determine the type and extent of contamination in soils adjacent to the SDDA. The sediment samples were collected to determine the type and extent of contamination within the OAWDL. The locations of the SDDA and OAWDL as well as sample locations are depicted in Figures 1 and 2. A summary of the samples collected is presented in Table 1. Soil sample results are summarized in Tables 2, 3, 6, and 7.

Respectfully submitted,

SHAW ENVIRONMENTAL, INC.

Lara Beasley

Lara Beasley

cc: M. Skelly, SNL/NM (w/ enclosures)
M. Goodrich, Shaw Environmental, Inc. (w/o enclosures)
Project File (w/ enclosures)

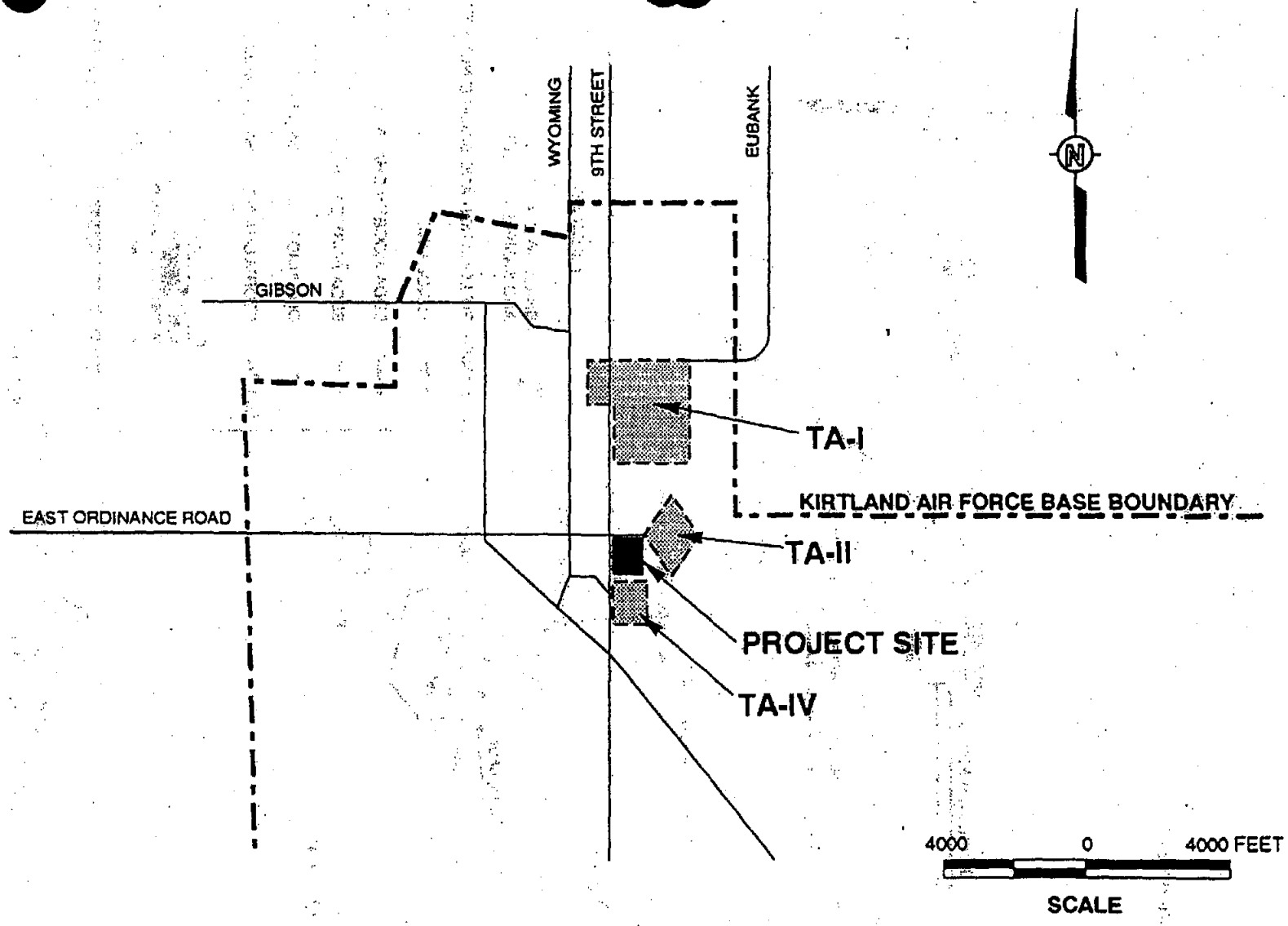


Figure 1

Site Location Map for the SDDA and OAWDL Site Investigation
Sandia National Laboratories, New Mexico

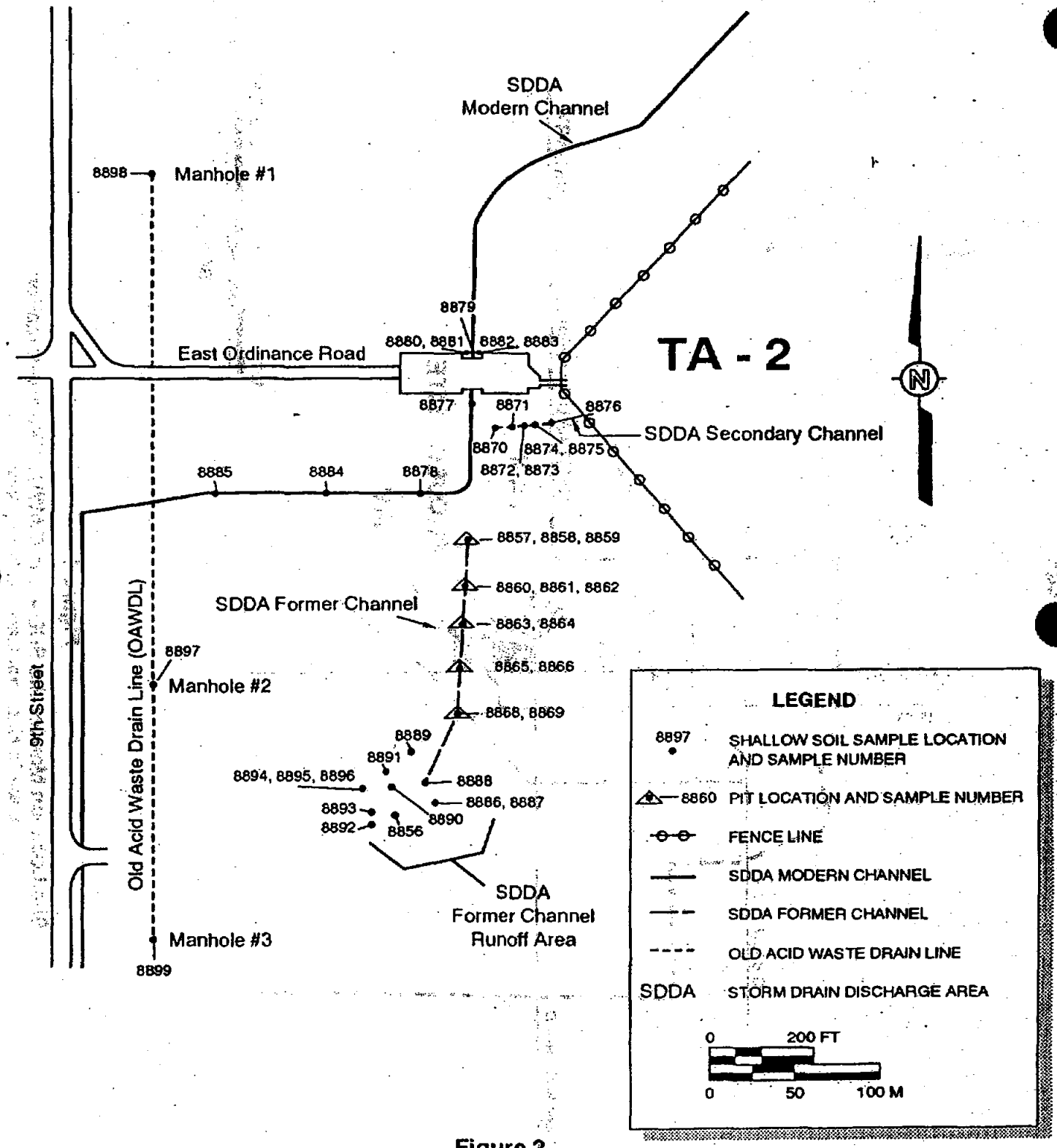


Figure 2
Soil Sample Location Map
SDDA and OAWDL Site Investigation
Sandia National Laboratories, New Mexico

Table 1

Sample Summary
Storm Drain Discharge Area and Old Acid Waste Drain Line

Sample Number SNLA00-	Date Collected	Sample Area	Collection Method	Sample Matrix	Quality Control Designation	Sample Depth (feet)
8857	5/7/92	SDDA-FC	BH	Soil	Routine	3'
8858	5/7/92	SDDA-FC	BH	Soil	Routine	6'
8859	5/7/92	SDDA-FC	BH	Soil	Dup 8858	6'
8860	5/7/92	SDDA-FC	BH	Soil	Routine	3'
8861	5/7/92	SDDA-FC	BH	Soil	Routine	6'
8862	5/7/92	SDDA-FC	NA	Water	Equip Rinse	NA
8863	5/7/92	SDDA-FC	BH	Soil	Routine	3'
8864	5/7/92	SDDA-FC	BH	Soil	Routine	6'
8865	5/7/92	SDDA-FC	BH	Soil	Routine	3'
8866	5/7/92	SDDA-FC	BH	Soil	Routine/SNL	6'
8868	5/8/92	SDDA-FC	BH	Soil	Routine/SNL	3'
8869	5/8/92	SDDA-FC	BH	Soil	Routine	6'
8870	5/8/92	SDDA-MC	HA	Soil	Routine	1'
8871	5/8/92	SDDA-MC	HA	Soil	Routine	1'
8872	5/8/92	SDDA-MC	NA	Water	Equip Rinse	NA
8873	5/8/92	SDDA-MC	HA	Soil	Routine/SNL	1'
8874	5/8/92	SDDA-MC	HA	Soil	Routine	1'
8875	5/8/92	SDDA-MC	HA	Soil	Dup 8874	1'
8876	5/8/92	SDDA-MC	HA	Soil	Routine	1'
8877	5/8/92	SDDA-MC	HA	Soil	Routine	1'
8878	5/8/92	SDDA-MC	HA	Soil	Routine	1'
8879	5/11/92	SDDA-MC	HA	Soil	Routine	1'
8880	5/11/92	SDDA-MC	HA	Soil	Routine	1'
8881	5/11/92	SDDA-MC	NA	Water	Field Blank	NA
8882	5/11/92	SDDA-MC	HA	Soil	Routine	1'
8883	5/11/92	SDDA-MC	NA	Water	Equip Rinse	NA
8884	5/11/92	SDDA-MC	HA	Soil	Routine	1'
8885	5/11/92	SDDA-MC	HA	Soil	Routine	1'
8856	5/6/92	SDDA-FCRA	HA	Soil	Routine	1'
8886	5/11/92	SDDA-FCRA	HA	Soil	Routine	1'
8887	5/11/92	SDDA-FCRA	HA	Soil	Dup 8886	1'
8888	5/11/92	SDDA-FCRA	HA	Soil	Routine/SNL	1'

Table 1 *(Continued)*

Sample Summary
Storm Drain Discharge Area and Old Acid Waste Drain Line

Sample Number SNLA00-	Date Collected	Sample Area	Collection Method	Sample Matrix	Quality Control Designation	Sample Depth (feet)
8889	5/11/92	SDDA-FCRA	HA	Soil	Routine	1'
8890	5/11/92	SDDA-FCRA	HA	Soil	Routine	1'
8891	5/11/92	SDDA-FCRA	HA	Soil	Routine	1'
8892	5/11/92	SDDA-FCRA	HA	Soil	Routine/SNL	1'
8893	5/11/92	SDDA-FCRA	HA	Soil	Routine	1'
8894	5/11/92	SDDA-FCRA	HA	Soil	Routine	1'
8895	5/11/92	SDDA-FCRA	HA	Soil	Dup 8894	1'
8896	5/11/92	SDDA-FCRA	NA	Water	Equip Rinse	NA
8897	5/12/92	Manhole No. 2	Scoop	Sediment	Routine	NA
8898	5/12/92	Manhole No. 1	Scoop	Sediment	Routine	NA
8899	5/12/92	Manhole No. 3	Scoop	Sediment	Routine	NA

NA = Not applicable.
Routine/SNL = Split samples collected for radioactive screening by SNL.
SDDA-FCRA = Storm Drain Discharge Area—Former Channel Runoff Area.
SDDA-FC = Storm Drain Discharge Area—Former Channel.
SDDA-MC = Storm Drain Discharge Area—Modern Channel.
HA = Hand auger.
BH = Backhoe.
Dup = Duplicate soil sample.

Table 2

Detected Total Metals in Soil Samples Collected from the Storm Drain Discharge Area (Method 6010/7000 Series)

Results in mg/kg

Sample SNLA00-	Sample Area	Sample Depth (feet)	Arsenic (7060)[a]	Barium (6010)	Selenium (7740)	Cadmium (6010)	Total Chromium (6010)	Lead (7421)	Mercury (7471)	Silver (6010)
Proposed Correction Levels in Soil[b]			80	400	NL	40	NL	NL	20	200
8857	SDDA-FC	3'	3.4	122	ND <1.0	ND <0.50	5.0	14.0	ND <0.10	ND <1.0
8858	SDDA-FC	6'	2.3	82.6	ND <1.0	ND <0.50	3.0	6.6	ND <0.10	ND <1.0
8859	SDDA-FC	6' (Dup)	2.2	77.8	ND <1.0	ND <0.50	3.6	6.9	ND <0.10	ND <1.0
8860	SDDA-FC	3'	3.9	161	ND <2.0	ND <0.50	4.6	14.6	ND <0.10	ND <1.0
8861	SDDA-FC	6'	2.4	110	ND <1.0	ND <0.50	5.1	6.3	ND <0.10	ND <1.0
8863	SDDA-FC	3'	3.0	135	ND <2.0	ND <0.50	3.6	4.5	ND <0.10	ND <1.0
8864	SDDA-FC	6'	3.7	126	ND <1.0	ND <0.50	4.3	10.8	ND <0.10	ND <1.0
8865	SDDA-FC	3'	3.4	113	ND <2.0	ND <0.50	5.0	8.9	ND <0.10	ND <1.0
8866	SDDA-FC	6'	2.0	64.3	ND <1.0	ND <0.50	2.7	5.3	ND <0.10	ND <1.0
8868	SDDA-FC	3'	3.1	186	ND <1.0	ND <0.50	6.4	3.4	ND <0.10	ND <1.0
8869	SDDA-FC	6'	0.68	68.1	ND <1.0	ND <0.50	4.9	2.5	ND <0.10	ND <1.0
8870	SDDA-MC	1'	3.7	108	ND <1.0	ND <0.50	3.5	16.0	ND <0.10	ND <1.0
8871	SDDA-MC	1'	2.9	103	ND <2.0	ND <0.50	5.3	23.8	ND <0.10	ND <1.0
8873	SDDA-MC	1'	3.5	141	ND <1.0	ND <0.50	7.6	20.2	ND <0.10	ND <1.0
8874	SDDA-MC	1'	2.6	84.7	ND <1.0	ND <0.50	5.1	15.5	ND <0.10	ND <1.0
8875	SDDA-MC	1' (Dup)	3.2	87.2	ND <1.0	ND <0.50	5.0	7.6	ND <0.10	ND <1.0
8876	SDDA-MC	1'	3.4	ND <1.0	ND <1.0	ND <0.50	ND <1.0	10.6	ND <0.10	ND <1.0
8877	SDDA-MC	1'	1.4	72.6	ND <1.0	ND <0.50	3.2	6.6	ND <0.10	ND <1.0
8878	SDDA-MC	1'	1.0	66.1	ND <1.0	ND <0.50	2.9	3.3	ND <0.10	ND <1.0
8879	SDDA-MC	1'	2.5	34.6	ND <2.0	ND <0.50	1.6	2.9	ND <0.10	ND <1.0
38880	SDDA-MC	1'	1.4	44.2	ND <1.0	ND <0.50	3.5	13.2	ND <0.10	ND <1.0

Table 2 *(Continued)*

Detected Total Metals in Soil Samples Collected from the Storm Drain Discharge Area (Method 6010/7000 Series)

Results in mg/kg

Sample SNLA00-	Sample Area	Sample Depth (feet)	Arsenic (7060)[a]	Barium (6010)	Selenium (7740)	Cadmium (6010)	Total Chromium (6010)	Lead (7421)	Mercury (7471)	Silver (6010)
8882	SDDA-MC	1'	1.7	63.0	ND <1.0	ND <0.50	3.0	4.7	ND <0.10	ND <1.0
8884	SDDA-MC	1'	0.87	52.9	ND <1.0	ND <0.50	2.0	3.3	ND <0.10	ND <1.0
8885	SDDA-MC	1'	1.6	67.9	ND <1.0	ND <0.50	1.9	4.8	ND <0.10	ND <1.0
8856	SDDA-FCRA	1'	3.9	110	ND <1.0	ND <0.50	7.8	9.9	ND <0.10	ND <1.0
8886	SDDA-FCRA	1'	3.9	66.9	ND <1.0	ND <0.50	3.7	7.6	ND <0.10	ND <1.0
8887	SDDA-FCRA	1' (Dup)	3.4	68.7	ND <5.0	ND <0.50	3.8	5.2	ND <0.10	ND <1.0
8888	SDDA-FCRA	1'	2.9	108	ND <5.0	ND <0.50	4.3	6.4	ND <0.10	ND <1.0
8889	SDDA-FCRA	1'	2.4	85.9	ND <5.0	ND <0.50	3.7	4.1	ND <0.10	ND <1.0
8890	SDDA-FCRA	1'	2.1	90.8	ND <5.0	ND <0.50	4.0	4.7	ND <0.10	ND <1.0
8891	SDDA-FCRA	1'	2.4	146	ND <5.0	ND <0.50	4.2	6.5	ND <0.10	ND <1.0
8892	SDDA-FCRA	1'	3.2	108	ND <5.0	ND <0.50	6.1	12.0	ND <0.10	ND <1.0
8893	SDDA-FCRA	1'	2.2	189	ND <5.0	ND <0.50	4.8	6.0	ND <0.10	ND <1.0
8894	SDDA-FCRA	1'	2.9	137	ND <5.0	ND <0.50	4.7	12.0	ND <0.10	ND <1.0
8895	SDDA-FCRA	1' (Dup)	2.5	228	ND <5.0	ND <0.50	3.6	5.7	0.18	ND <1.0

[a]Number in parenthesis is the EPA Test Method reference number.
[b]From EPA, 1990a.
NL = Value not listed.
Dup = Duplicate soil sample.
ND = Analyte not detected at respective laboratory reporting limits.
SDDA-FCRA = Storm Drain Discharge Area—Former Channel Runoff Area.
SDDA-FC = Storm Drain Discharge Area—Former Channel.
SDDA-MC = Storm Drain Discharge Area—Modern Channel.

Table 3

TCLP Leachate Analyses[a] of Soil Samples Collected from the Storm Drain Discharge Area (Method 6010/7000 Series)

Results in mg/L

Sample SNLA00-	Sample Area	Sample Depth (feet)	Arsenic (6010)	Barium (6010)	Selenium (7740)	Cadmium (6010)	Total Chromium (6010)	Lead (6010)	Mercury (7470)	Silver (6010)
TCLP Regulatory Level[b]			5.0	100.0	1.0	1.0	5.0	5.0	0.2	5.0
8857	SDDA-FC	3'	ND <1.0	0.85	ND <0.050	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8858	SDDA-FC	6'	ND <1.0	0.78	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8859	SDDA-FC	6' (Dup)	ND <1.0	0.79	ND <0.050	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8860	SDDA-FC	3'	ND <1.0	1.7	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8861	SDDA-FC	6'	ND <1.0	1.23	ND <0.050	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8863	SDDA-FC	3'	ND <1.0	1.6	ND <0.050	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8864	SDDA-FC	6'	ND <1.0	0.82	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8865	SDDA-FC	3'	ND <1.0	1.4	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8866	SDDA-FC	6'	ND <1.0	0.61	ND <0.050	ND <0.050	ND <0.10	ND <0.50	0.018	ND <0.10
8868	SDDA-FC	3'	ND <1.0	1.4	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8869	SDDA-FC	6'	ND <1.0	0.85	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8870	SDDA-MC	1'	ND <1.0	2.0	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8871	SDDA-MC	1'	ND <1.0	2.0	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8873	SDDA-MC	1'	ND <1.0	1.9	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8874	SDDA-MC	1'	ND <1.0	1.6	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8875	SDDA-MC	1' (Dup)	ND <1.0	1.4	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8876	SDDA-MD	1'	ND <1.0	1.9	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8877	SDDA-MC	1'	ND <1.0	0.88	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8878	SDDA-MC	1'	ND <1.0	0.74	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8879	SDDA-MC	1'	ND <1.0	0.43	ND <0.010	ND <0.050	0.42	ND <0.50	ND <0.0020	ND <0.10
8880	SDDA-MC	1'	ND <1.0	0.54	ND <0.010	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8882	SDDA-MC	1'	ND <1.0	0.65	ND <0.010	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10

Table 3 *(Continued)*

TCLP Leachate Analyses[a] of Soil Samples Collected from the Storm Drain Discharge Area (Method 6010/7000 Series)

Results in mg/L

Sample SNLA00-	Sample Area	Sample Depth (feet)	Arsenic (6010)	Barium (6010)	Selenium (7740)	Cadmium (6010)	Total Chromium (6010)	Lead (6010)	Mercury (7470)	Silver (6010)
8884	SDDA-MC	1'	ND <1.0	0.76	ND <0.010	ND <0.050	0.95	ND <0.50	ND <0.0020	ND <0.10
8885	SDDA-MC	1'	ND <1.0	0.86	ND <0.010	ND <0.050	0.14	ND <0.50	ND <0.0020	ND <0.10
8886	SDDA-FCRA	1'	ND <1.0	1.7	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8886	SDDA-FCRA	1'	ND <1.0	1.2	ND <0.010	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8887	SDDA-FCRA	1' (Dup)	ND <1.0	1.6	ND <0.050	ND <0.050	1.7	ND <0.50	ND <0.0020	ND <0.10
8888	SDDA-FCRA	1'	ND <1.0	2.1	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8889	SDDA-FCRA	1'	ND <1.0	1.8	ND <0.10	ND <0.050	3.0	ND <0.50	ND <0.0020	ND <0.10
8890	SDDA-FCRA	1'	ND <1.0	1.7	ND <0.10	ND <0.050	1.5	ND <0.50	ND <0.0020	ND <0.10
8891	SDDA-FCRA	1'	ND <1.0	1.7	ND <0.10	ND <0.050	3.6	ND <0.50	ND <0.0020	ND <0.10
8892	SDDA-FCRA	1'	ND <1.0	1.3	ND <0.050	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8893	SDDA-FCRA	1'	ND <1.0	2.2	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8894	SDDA-FCRA	1'	ND <1.0	1.4	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10
8895	SDDA-FCRA	1' (Dup)	ND <1.0	1.2	ND <0.10	ND <0.050	ND <0.10	ND <0.50	ND <0.0020	ND <0.10

[a]Values corrected for matrix effects.
[b]From EPA, 1990b.
Dup = Duplicate soil sample.
ND = Analyte not detected at laboratory reporting limit.
SDDA-FCRA = Storm Drain Discharge Area—Former Channel Runoff Area.
SDDA-FC = Storm Drain Discharge Area—Former Channel.
SDDA-MC = Storm Drain Discharge Area—Modern Channel.

Table 6

Summary of Radiological Analyses of Soil Samples from the SDDA and OAWDL

(Results in pCi/g)

Sample SNLA-00	Sample Area	^{137}Cs	^{40}K	^{224}Ra	^{226}Ra	^{228}Ra	Tritium	Percent Moisture	Gross Alpha	Gross Beta	^{234}Th
8857	SDDA-FC	0.0807 [0.0272]	20.0 [2.9]	0.811 [0.117]	0.777 [0.081]	0.820 [0.107]	ND (50)	3.37%	19.8 [8.7]	21.4 [6.0]	0.99 [0.208]
8858	SDDA-FC	ND (0.031)	20.8 [3.0]	0.92 [0.133]	0.87 [0.088]	0.958 [0.118]	ND (50)	2.50%	10.6 [6.2]	23.5 [6.2]	0.771 [0.224]
8859 (dup)	SDDA-FC	ND (0.027)	17.8 [2.6]	0.99 [0.14]	0.906 [0.090]	1.03 [0.12]	ND (50)	2.25%	12.8 [6.8]	23.8 [6.2]	0.569 [0.178]
8860	SDDA-FC	0.0725 [0.0297]	19.0 [2.8]	0.922 [0.133]	0.900 [0.093]	0.966 [0.124]	ND (50)	3.78%	15.6 [7.4]	18.3 [5.3]	0.877 [0.234]
8861	SDDA-FC	ND (0.032)	22.6 [3.2]	0.843 [0.122]	0.784 [0.084]	0.927 [0.119]	ND (50)	2.48%	13.9 [6.8]	21.6 [6.0]	0.905 [0.227]
8863	SDDA-FC	ND (0.024)	16.9 [2.5]	0.765 [0.112]	0.685 [0.074]	0.783 [0.104]	ND (50)	2.74%	ND (10.0)	17.4 [5.3]	0.969 [0.206]
8864	SDDA-FC	ND (0.036)	22.3 [3.2]	0.799 [0.118]	0.765 [0.083]	0.856 [0.116]	ND (50)	1.99%	ND (10.0)	17.6 [5.2]	0.892 [0.227]
8865	SDDA-FC	0.0608 [0.027]	22.5 [3.3]	0.951 [0.142]	0.935 [0.101]	1.01 [0.14]	ND (50)	4.28%	13.4 [7.3]	15.1 [4.8]	1.39 [0.31]
8866	SDDA-FC	ND (0.029)	21.4 [3.1]	0.830 [0.12]	0.750 [0.083]	0.847 [0.113]	ND (50)	1.74%	13.5 [7.0]	21.9 [6.0]	1.26 [0.26]
8868	SDDA-FC	ND (0.020)	16.5 [1.8]	0.683 [0.069]	0.673 [0.053]	0.750 [0.204]	ND (50)	1.28%	8.52 [5.2]	24.7 [6.8]	--
8869	SDDA-FC	ND (0.020)	18.7 [2.6]	0.819 [0.089]	0.702 [0.065]	0.777 [0.082]	ND (50)	0.76%	8.99 [5.65]	24.2 [6.6]	--
8870	SDDA-MC	0.0434 [0.0163]	16.3 [1.8]	0.721 [0.079]	0.664 [0.055]	0.865 [0.085]	ND (50)	19.25%	ND (7.8)	19.2 [5.9]	--
8871	SDDA-MC	0.173 [0.031]	17.6 [2.6]	0.740 [0.102]	0.768 [0.072]	0.935 [0.099]	ND (50)	6.28%	18.6 [8.2]	21.5 [6.3]	--
8873	SDDA-MC	0.253 [0.044]	17.9 [2.6]	0.836 [0.120]	0.810 [0.080]	0.910 [0.104]	ND (50)	9.23%	12.5 [7.3]	23.7 [6.6]	--
8874	SDDA-MC	0.131 [0.027]	17.8 [2.5]	0.806 [0.107]	0.750 [0.071]	0.858 [0.092]	ND (50)	9.22%	18.6 [8.6]	21.3 [6.3]	--
8875 (dup)	SDDA-MC	0.0638 [0.0195]	17.2 [1.9]	0.777 [0.079]	0.790 [0.060]	0.802 [0.079]	ND (50)	24.47%	15.1 [7.5]	27.3 [7.5]	--
8876	SDDA-MC	0.186 [0.031]	15.9 [1.8]	0.775 [0.082]	0.724 [0.060]	0.881 [0.088]	ND (50)	10.35%	15.6 [7.9]	25.8 [7.2]	--
8877	SDDA-MC	0.248 [0.041]	18.5 [2.7]	0.696 [0.102]	0.755 [0.071]	0.904 [0.097]	ND (50)	11.65%	20.0 [8.8]	29.8 [7.8]	--
8878 (dup)	SDDA-MC	ND (0.022)	18.8 [2.7]	0.801 [0.113]	0.842 [0.080]	0.832 [0.094]	ND (50)	2.17%	13.7 [7.2]	23.6 [6.8]	--
8879	SDDA-MC	ND (0.018)	20.5 [2.9]	0.510 [0.076]	0.536 [0.053]	0.538 [0.065]	ND (50)	5.96%	12.0 [7.2]	24.6 [7.0]	--
8880	SDDA-MC	ND (0.019)	24.9 [2.6]	0.581 [0.063]	0.546 [0.047]	0.618 [0.069]	ND (50)	5.25%	10.5 [6.2]	22.3 [6.4]	--
8882	SDDA-MC	ND (0.024)	20.2 [2.2]	0.739 [0.077]	0.681 [0.056]	0.817 [0.080]	ND (50)	6.99%	22.8 [9.6]	25.1 [6.5]	--
8884	SDDA-MC	ND (0.018)	22.3 [3.2]	0.538 [0.079]	0.592 [0.059]	0.628 [0.074]	ND (50)	2.77%	5.54 [4.52]	21.6 [5.9]	--
8885	SDDA-MC	ND (0.021)	21.9 [3.2]	0.629 [0.095]	0.682 [0.068]	0.711 [0.086]	ND (50)	3.15%	18.5 [8.8]	24.7 [6.5]	--
8856	SDDA-FCRA	0.0255 [0.0195]	21.1 [3.1]	0.737 [0.111]	0.659 [0.075]	0.810 [0.109]	ND (50)	6.52%	10.8 [6.9]	18.2 [5.4]	--

Table 6 *(Continued)*

Summary of Radiological Analyses of Soil Samples from the SDDA and OAWDL

(Results in pCi/g)

Sample SNLA-00	Sample Area	^{137}Cs	^{40}K	^{224}Ra	^{226}Ra	^{228}Ra	Tritium	Percent Moisture	Gross Alpha	Gross Beta	^{234}Th
8886	SDDA-FCRA	0.133 [0.026]	18.4 [2.6]	0.746 [0.102]	0.778 [0.072]	0.879 [0.092]	ND (50)	3.95%	14.4 [7.0]	22.5 [6.1]	--
8887	SDDA-FCRA	0.0733 [0.0208]	20.8 [2.2]	0.777 [0.082]	0.725 [0.058]	0.898 [0.088]	ND (50)	7.02%	17.7 [8.7]	21.8 [6.0]	--
8888	SDDA-FCRA	0.0413 [0.0174]	19.2 [2.8]	0.983 [0.134]	0.957 [0.091]	1.20 [0.12]	ND (50)	7.31%	26.6 [10.6]	25.5 [6.6]	--
8889	SDDA-FCRA	ND (0.019)	18.4 [2.0]	0.681 [0.071]	0.648 [0.054]	0.775 [0.076]	ND (50)	4.32%	7.15 [5.16]	18.9 [5.5]	--
8890	SDDA-FCRA	ND (0.021)	18.6 [2.0]	0.797 [0.086]	0.763 [0.061]	0.856 [0.087]	ND (50)	5.94%	13.3 [7.2]	22.6 [6.1]	--
8891	SDDA-FCRA	0.0471 [0.0162]	18.4 [2.7]	0.704 [0.101]	0.763 [0.071]	0.837 [0.092]	ND (50)	3.12%	15.9 [7.8]	20.1 [5.7]	--
8892	SDDA-FCRA	0.206 [0.038]	19.7 [2.9]	0.951 [0.130]	0.973 [0.091]	1.07 [0.12]	ND (50)	3.07%	20.8 [9.0]	26.0 [6.7]	--
8893	SDDA-FCRA	ND (0.023)	18.0 [1.9]	0.676 [0.071]	0.652 [0.053]	0.746 [0.076]	ND (50)	3.76%	17.4 [8.5]	19.2 [5.5]	--
8894	SDDA-FCRA	0.0358 [0.0145]	17.7 [2.5]	0.594 [0.090]	0.728 [0.068]	0.746 [0.082]	ND (50)	3.43%	15.9 [7.7]	25.0 [6.6]	--
8895 (dup)	SDDA-FCRA	0.0591 [0.0194]	18.2 [2.0]	0.732 [0.080]	0.779 [0.063]	0.792 [0.084]	ND (50)	3.50%	19.2 [8.8]	18.4 [5.3]	--
8897	OAWDL Manhole #2	0.664 [0.142]	15.5 [3.1]	1.28 [0.23]	1.01 [0.18]	1.25 [0.31]	ND (50)	6.75%	44.9 [14.7]	38.8 [9.1]	--
8898	OAWDL Manhole #1	0.226 [0.086]	22.4 [3.2]	1.31 [0.20]	0.857 [0.161]	1.11 [0.27]	ND (50)	19.69%	28.2 [10.8]	29.2 [7.3]	--
8899	OAWDL Manhole #3	0.333 [0.055]	13.1 [2.0]	0.644 [0.098]	0.687 [0.069]	0.732 [0.090]	ND (50)	7.74%	15.2 [7.4]	21.4 [5.8]	--

-- = Isotope activity not reported.
ND (0.022)= Not detected at respective laboratory reporting limit.
[0.146] = 2-sigma error in brackets.
SDDA = Storm Drain Discharge Area.
OAWDL = Old Acid Waste Drain Line.
FC = Former channel.
MC = Modern channel.
FCRA = Former channel run off area.
pCi/g = picocuries per gram.
Dup = Duplicate sample.

Table 7

Summary of Duplicate Soil Analyses

Parameter	SNLA008858	SNLA008859	RPD[a]	SNLA008874	SNLA008875	RPD[a]	SNLA008886	SNLA008887	RPD[a]	SNLA008894	SNLA008895	RPD[a]
Total Metals (mg/kg)												
Arsenic	2.3	2.2	4.4	2.6	3.2	20.7	3.9	3.4	13.7	2.9	2.5	14.8
Barium	82.6	77.8	6.0	84.7	87.2	2.9	66.9	68.7	2.7	228	110	69.8
Selenium	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
Cadmium	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
Chromium	3.0	3.6	18.2	5.1	5.0	2.0	3.7	7.6	69.0	4.7	3.8	26.5
Lead	6.6	6.9	4.4	15.5	7.6	68.4	7.6	5.2	37.5	12.0	5.7	71.2
Mercury	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	0.18	NC
Silver	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
TCLP Leachate (mg/L)												
Arsenic	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
Barium	0.76	0.77	1.3	1.5	1.4	6.9	1.2	1.5	22.2	1.4	1.2	15.4
Cadmium	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
Selenium	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
Chromium	ND	ND	NC	ND	ND	NC	ND	1.5	NC	ND	ND	NC
Lead	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
Mercury	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
Silver	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC

[a]RPD = Relative percent difference = $\frac{|R_1 - R_2|}{(R_1 + R_2)/2} \times 100$

ND = Not reported at laboratory detection limit.
NC = Not calculable.

Addendum H

ADDENDUM H

ANALYTICAL DATA TABLES FOR SWMU 96/
METHOD DETECTION LIMIT TABLES FOR ALL SWMUS

Table H1-1
SWMUs 96, 187, and 226
Summary of Metals Analytical Detection Limits,
1998 and 2002 Supplemental Investigations

Analyte	Method Detection Limit (mg/kg)
Aluminum	0.121–0.05
Antimony	0.00394– 0.191
Arsenic	0.193–0.269
Barium	0.0275–0.0654
Beryllium	0.00026–0.576
Cadmium	0.024–0.0469
Chromium	0.151–0.428
Cobalt	0.00069–0.0176
Copper	0.00104–0.067
Lead	0.268–0.334
Mercury	0.00085–0.00438
Nickel	0.032–0.0807
Selenium	0.151–0.265
Silver	0.0843–0.113
Thallium	0.00308–0.221
Vanadium	0.0059–0.027
Zinc	0.005–0.185

mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.

Table H1-2
SWMUs 96, 187, and 226
Summary of PCB Analytical Detection Limits,
1998 and 2002 Supplemental Investigations

Analyte	Method Detection Limit (µg/kg)
Aroclor-1016	1
Aroclor-1221	2.82
Aroclor-1232	1.67
Aroclor-1242	1.67
Aroclor-1248	1
Aroclor-1254	0.5
Aroclor-1260	1

µg/kg = Microgram(s) per kilogram.
PCB = Polychlorinated biphenyl.
SWMU = Solid Waste Management Unit.

Table H1-3
SWMUs 96, 187, and 226
Summary of SVOC Analytical Detection Limits,
1998 and 2002 Supplemental Investigations

Analyte	Method Detection Limit (µg/kg)
Acenaphthene	4–8
Acenaphthylene	3.67–16.7
Anthracene	4.67–16.7
Benzo(a)anthracene	6–16.7
Benzo(a)pyrene	2–16.7
Benzo(b)fluoranthene	2.33–16.7
Benzo(g,h,i)perylene	5–16.7
Benzo(k)fluoranthene	5–16.7
4-Bromophenyl phenyl ether	4.67–34
Butylbenzyl phthalate	12.7–28.7
Carbazole	5–16.7
4-Chlorobenzenamine	59–167
bis(2-Chloroethoxy)methane	6–12.3
bis(2-Chloroethyl)ether	6.67–37.3
bis-Chloroisopropyl ether	11–37.2
4-Chloro-3-methylphenol	36.7–167
2-Chloronaphthalene	3.67–13.7
2-Chlorophenol	5–15.3
4-Chlorophenyl phenyl ether	3.33–19.7
Chrysene	6.33–16.7
o-Cresol	26–47.7
Di-n-butyl phthalate	20.7–24
Di-n-octyl phthalate	9–30.3
Dibenz(a,h)anthracene	2.67–16.7
Dibenzofuran	2.67–17
1,2-Dichlorobenzene	4.33–10
1,3-Dichlorobenzene	3.33–11.3
1,4-Dichlorobenzene	6–15.7
3,3'-Dichlorobenzidine	143–167
2,4-Dichlorophenol	8–20.7
Diethylphthalate	17.7–19.7
2,4-Dimethylphenol	72–167
Dimethylphthalate	11.7–18.3
Dinitro-o-cresol	16–167
2,4-Dinitrophenol	15–167
2,4-Dinitrotoluene	5–25.3
2,6-Dinitrotoluene	3–33.3
Diphenyl amine	7–22.3
bis(2-Ethylhexyl) phthalate	7–30
Fluoranthene	3.33–16.7
Fluorene	3–4
Hexachlorobenzene	4.67–20

Refer to footnotes at end of table.

Table H1-3 (Concluded)
SWMUs 96, 187, and 226
Summary of SVOC Analytical Detection Limits,
1998 and 2002 Supplemental Investigations

Analyte	Method Detection Limit (µg/kg)
Hexachlorobutadiene	6.67–12.7
Hexachlorocyclopentadiene	33–167
Hexachloroethane	4.33–22
Indeno(1,2,3-cd)pyrene	6.67–16.7
Isophorone	2.33–16
2-Methylnaphthalene	4–16.7
4-Methylphenol	5.67–33.3
Naphthalene	3.33–16.7
2-Nitroaniline	81–167
3-Nitroaniline	86.7–167
4-Nitroaniline	37–84
Nitro-benzene	20.3–36.7
2-Nitrophenol	17–46.3
4-Nitrophenol	21–167
n-Nitrosodipropylamine	22.7–33
Pentachlorophenol	61–167
Phenanthrene	4–16.7
Phenol	3.67–12.7
Pyrene	8.67–16.7
1,2,4-Trichlorobenzene	4.67–12.7
2,4,5-Trichlorophenol	17.3–42.3
2,4,6-Trichlorophenol	24.7–27.3

µg/kg = Microgram(s) per kilogram.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.

Table H1-4
SWMUs 96, 187, and 226
Summary of VOC Analytical Detection Limits,
1998 and 2002 Supplemental Investigations

Analyte	Method Detection Limit (µg/kg)
Acetone	3.52
Benzene	0.45
Bromodichloromethane	0.49
Bromoform	0.49
Bromomethane	0.5
2-Butanone	3.74
Carbon disulfide	2.36
Carbon tetrachloride	0.49
Chlorobenzene	0.41
Chloroethane	0.81
Chloroform	0.52
Chloromethane	0.37
Dibromochloromethane	0.5
1,1-Dichloroethane	0.47
1,2-Dichloroethane	0.43
1,1-Dichloroethene	0.5
cis-1,2-Dichloroethene	0.47
trans-1,2-Dichloroethene	0.53
1,2-Dichloropropane	0.48
cis-1,3-Dichloropropene	0.43
trans-1,3-Dichloropropene	0.25
Ethyl benzene	0.38
2-Hexanone	3.77
Methylene chloride	1.35
4-Methyl-,2-pentanone	4.03
Styrene	0.39
Tetrachloroethene	0.38
Toluene	0.34
1,1,1-Trichloroethane	0.53
1,1,2-Trichloroethane	0.54
1,1,2,2-Tetrachloroethane	0.91
Trichloroethene	0.45
Vinyl acetate	1.78
Vinyl chloride	0.56
Xylene	1.08

µg/kg = Microgram(s) per kilogram.
VOC = Volatile organic compound.
SWMU = Solid Waste Management Unit.

Table H2-1
SWMU 96, Summary of Metals Analytical Results, Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
600829	T1096-GP-060-005-S	5	5,710	ND (0.191)	2.29	97.7	0.322 J (0.5)	0.0767 J (0.5)
600829	T1096-GP-060-010-S	10	6,840	ND (0.191)	2.57	199	0.343 J (0.496)	0.15 J (0.496)
600829	T1096-GP-061-005-S	5	5,250	ND (0.191)	2.11	73.1	0.265 J (0.501)	ND (0.019)
600829	T1096-GP-061-010-S	10	9,840	ND (0.191)	3.47	189	0.482 J (0.528)	0.118 J (0.528)
600829	T1096-GP-061-015-S	15	9,080	ND (0.191)	3.35	155	0.467 J (0.591)	0.111 J (0.591)
600829	T1096-GP-061-020-S	20	5,930	ND (0.191)	2.23	130	0.325 J (0.473)	0.0538 J (0.473)
600830	T1096-GP-062-005-S	5	5,710	ND (0.191)	2.1	97.3	0.314 J (0.51)	0.0988 J (0.51)
600830	T1096-GP-062-010-S	10	10,800	ND (0.191)	3.01	166	0.517	0.131 J (0.511)
600830	T1096-GP-062-015-S	15	6,360	ND (0.191)	2.26	115	0.326 J (0.488)	0.0899 J (0.488)
600830	T1096-GP-062-020-S	20	8,540	ND (0.191)	2.79	133	0.395 J (0.538)	0.112 J (0.538)
600830	T1096-GP-063-001-S	1	9,000	ND (0.191)	3.26	155	0.334 J (0.489)	0.173 J (0.489)
600830	T1096-GP-063-005-S	5	5,490	ND (0.191)	1.88	77.4	0.292 J (0.482)	0.0823 J (0.482)
600830	T1096-GP-063-010-S	10	6,740	ND (0.191)	3.02	143	0.35 J (0.511)	**14**
600830	T1096-GP-063-015-S	15	8,260	ND (0.191)	2.64	107	0.412 J (0.507)	0.0757 J (0.507)
600830	T1096-GP-063-020-S	20	8,780	ND (0.191)	2.7	141	0.448 J (0.538)	0.0802 J (0.538)
600830	T1096-GP-064-001-S	1	7,250	ND (0.191)	2.61	111	0.359 J (0.493)	0.178 J (0.493)
600830	T1096-GP-064-005-S	5	6,740	ND (0.191)	2.45	124	0.374 J (0.511)	0.0722 J (0.511)
600830	T1096-GP-064-010-S	10	6,070	ND (0.191)	2.06	98.7	0.313 J (0.487)	0.0437 J (0.487)
600830	T1096-GP-064-015-S	15	7,330	ND (0.191)	2.63	139	0.397 J (0.532)	0.0486 J (0.532)
600830	T1096-GP-064-020-S	20	8,690	ND (0.191)	2.33	124	0.426 J (0.553)	0.0602 J (0.553)
600831	T1096-GP-065-005-S	5	7,050	ND (0.191)	2.45	90.5	0.334 J (0.543)	ND (0.019)
600831	T1096-GP-065-010-S	10	8,970	ND (0.191)	3.16	183	0.479 J (0.552)	ND (0.019)
600831	T1096-GP-065-015-S	15	8,140	ND (0.191)	2.77	146	0.453 J (0.534)	ND (0.019)
600831	T1096-GP-065-020-S	20	12,800	ND (0.191)	3.57	153	0.604	ND (0.019)
600831	T1096-GP-066-005-S	5	9,460	ND (0.191)	3.33	197	0.449 J (0.514)	0.0611 J (0.514)
600831	T1096-GP-066-010-S	10	4,820	ND (0.191)	1.76	91.4	0.293 J (0.512)	ND (0.019)
600831	T1096-GP-066-015-S	15	5,220	ND (0.191)	2.57	119	0.311 J (0.521)	0.0569 J (0.521)
600831	T1096-GP-066-020-S	20	8,930	ND (0.191)	2.52	138	0.434 J (0.538)	ND (0.019)
600831	T1096-GP-067-005-S	5	10,800	ND (0.191)	3.67	153	0.514	ND (0.019)
600831	T1096-GP-067-010-S	10	10,400	ND (0.191)	3.77	**204**	0.547	ND (0.019)
Background Concentration			69,957	3.9	4.4	200	0.80	<1

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
600831	T1096-GP-067-015-S	15	6,110	ND (0.191)	2.16	83.9	0.347 J (0.521)	ND (0.019)
600831	T1096-GP-067-020-S	20	10,300	ND (0.191)	3.07	158	0.493 J (0.519)	ND (0.019)
600831	T1096-GP-085-005-SD	5	6,160	ND (0.191)	2.21	103	0.309 J (0.532)	ND (0.019)
600832	T1096-GP-068-001-S	1	6,400	ND (0.191)	3.58	**293**	0.321 J (0.555)	ND (0.019)
600832	T1096-GP-068-005-S	5	6,880	ND (0.191)	2.71	156	0.383 J (0.524)	ND (0.019)
600832	T1096-GP-068-010-S	10	8,320	ND (0.191)	3.28	169	0.533	ND (0.019)
600832	T1096-GP-068-015-S	15	6,070	ND (0.191)	2.27	**209**	0.385 J (0.534)	ND (0.019)
600832	T1096-GP-068-020-S	20	9,460	ND (0.191)	2.73	**240**	0.501 J (0.514)	ND (0.019)
600832	T1096-GP-069-001-S	1	6,610	ND (0.191)	3.92	**309**	0.285 J (0.551)	ND (0.019)
600832	T1096-GP-069-005-S	5	7,130	ND (0.191)	2.34	68.8	0.369 J (0.512)	ND (0.019)
600832	T1096-GP-069-010-S	10	9,520	ND (0.191)	3.16	157	0.56	ND (0.019)
600832	T1096-GP-069-015-S	15	5,840	ND (0.191)	2.4	127	0.353 J (0.519)	ND (0.019)
600832	T1096-GP-069-020-S	20	7,700	ND (0.191)	2.35	166	0.425 J (0.539)	ND (0.019)
600838	T1096-GP-080-005-S	5	7,710	0.898 J (1.05)	1.85	151	0.384 J (0.524)	0.04 J (0.524)
600838	T1096-GP-080-010-S	10	6,420	0.582 J (1.04)	3.17	151	0.376 J (0.518)	ND (0.019)
600838	T1096-GP-080-015-S	15	4,340	ND (0.191)	1.14 J (1.22)	130	0.233 J (0.487)	ND (0.019)
600838	T1096-GP-080-020-S	20	4,280	0.559 J (1.04)	1.38	76.3	0.232 J (0.521)	ND (0.019)
600838	T1096-GP-081-005-S	5	10,400	0.717 J (1.12)	2.96	123	0.511 J (0.56)	ND (0.019)
600838	T1096-GP-081-010-S	10	5,620	ND (0.191)	1.41	89.5	0.307 J (0.527)	ND (0.019)
600838	T1096-GP-081-015-S	15	5,450	0.486 J (1.08)	2.27	82.3	0.29 J (0.538)	ND (0.019)
600838	T1096-GP-081-020-S	20	3,640	ND (0.191)	1.54	57.8	0.232 J (0.506)	0.0601 J (0.506)
600838	T1096-GP-082-005-S	5	9,990	0.656 J (1.15)	3.42	137	0.506 J (0.576)	ND (0.019)
600838	T1096-GP-082-010-S	10	8,950	0.65 J (1.13)	3.52	181	0.478 J (0.563)	ND (0.019)
600838	T1096-GP-082-015-S	15	5,020	0.708 J (1.01)	1.43	162	0.253 J (0.506)	ND (0.019)
600838	T1096-GP-082-020-S	20	3,820	0.531 J (0.965)	1.3	50.4	0.231 J (0.482)	0.114 J (0.482)
600838	T1096-GP-083-001-S	1	5,620	ND (0.191)	2.41	214	0.303 J (0.521)	0.0795 J (0.521)
600838	T1096-GP-083-005-S	5	6,770	0.684 J (1.05)	1.23 J (1.32)	110	0.341 J (0.527)	ND (0.019)
600838	T1096-GP-083-010-S	10	5,960	0.672 J (1.05)	2.18	128	0.314 J (0.523)	0.0418 J (0.523)
600838	T1096-GP-083-015-S	15	3,870	0.509 J (1.05)	1.92	50.8	0.233 J (0.527)	ND (0.019)
Background Concentration			69,957	3.9	4.4	200	0.80	<1

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
600838	T1096-GP-083-020-S	20	5,190	ND (0.191)	1.7	51	0.321 J (0.483)	ND (0.019)
600840	T1096-GP-084-001-S	1	6,200	ND (0.191)	3.86	**292**	0.332 J (0.533)	0.0886 J (0.533)
600840	T1096-GP-084-005-S	5	5,930	0.706 J (1)	1.39	122	0.284 J (0.502)	ND (0.019)
600840	T1096-GP-084-010-S	10	4,750	ND (0.191)	1.18 J (1.25)	85.8	0.257 J (0.501)	0.0464 J (0.501)
600840	T1096-GP-084-015-S	15	5,110	0.589 J (1.02)	ND (0.228)	79.5	0.266 J (0.511)	ND (0.019)
600840	T1096-GP-084-020-S	20	8,720	0.549 J (1.03)	2.23	148	0.478 J (0.515)	0.0406 J (0.515)
600842	T1096-GP-070-005-S	5	6,960	ND (0.191)	2.47	135	0.369 J (0.539)	ND (0.019)
600842	T1096-GP-070-010-S	10	8,560	ND (0.191)	3.32	146	0.459 J (0.567)	ND (0.019)
600842	T1096-GP-070-015-S	15	3,810	ND (0.191)	0.861	71.3	0.22 J (0.506)	ND (0.019)
600842	T1096-GP-070-020-S	20	8,780	ND (0.191)	2.86	158	0.448 J (0.551)	ND (0.019)
600842	T1096-GP-071-005-S	5	7,470	0.468 J (1.02)	2.63	191	0.395 J (0.511)	ND (0.019)
600842	T1096-GP-071-010-S	10	7,590	ND (0.191)	2.37	118	0.404 J (0.522)	ND (0.019)
600842	T1096-GP-071-015-S	15	4,980	ND (0.191)	2.27	118	0.286 J (0.506)	ND (0.019)
600842	T1096-GP-071-020-S	20	5,420	ND (0.191)	2.11	74.4	0.289 J (0.483)	ND (0.019)
600842	T1096-GP-072-005-S	5	9,970	ND (0.191)	3.56	**295**	0.494 J (0.547)	ND (0.019)
600842	T1096-GP-072-010-S	10	9,140	ND (0.191)	3.92	181	0.528 J (0.531)	ND (0.019)
600842	T1096-GP-072-015-S	15	4,680	0.505 J (0.984)	1.32	73.7	0.264 J (0.492)	ND (0.019)
600842	T1096-GP-072-020-S	20	4,350	ND (0.191)	1.75	65.5	0.272 J (0.501)	ND (0.019)
600843	T1096-GP-073-001-S	1	6,140	ND (0.191)	3.35	**244**	0.314 J (0.514)	0.737
600843	T1096-GP-073-005-S	5	9,750	ND (0.191)	3.47	162	0.498 J (0.556)	ND (0.019)
600843	T1096-GP-073-010-S	10	9,260	ND (0.191)	3.02	150	0.457 J (0.523)	0.255 J (0.523)
600843	T1096-GP-073-015-S	15	8,940	ND (0.191)	3	160	0.505 J (0.547)	ND (0.019)
600843	T1096-GP-073-020-S	20	7,240	ND (0.191)	2.44	**265**	0.393 J (0.503)	ND (0.019)
600843	T1096-GP-074-001-S	1	7,620	ND (0.191)	4.11	**270**	0.376 J (0.509)	0.613
600845	T1096-GP-075-005-S	5	4,720	ND (0.191)	1.18	75.9	0.288 J (0.491)	ND (0.019)
600845	T1096-GP-075-010-S	10	9,890	ND (0.191)	2.62	188	0.508	ND (0.019)
600845	T1096-GP-075-015-S	15	10,800	ND (0.191)	3.06	107	0.606	ND (0.019)
600845	T1096-GP-075-020-S	20	10,700	ND (0.191)	2.92	**301**	0.577	ND (0.019)
600845	T1096-GP-076-005-S	5	5,640	ND (0.191)	1.47	136	0.279 J (0.482)	ND (0.019)
600845	T1096-GP-076-010-S	10	9,160	ND (0.191)	2.42	92.6	0.461 J (0.538)	ND (0.019)
Background Concentration			69,957	3.9	4.4	200	0.80	<1

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
600845	T1096-GP-076-015-S	15	9,470	ND (0.191)	3.23	146	0.522 J (0.54)	ND (0.019)
600845	T1096-GP-076-020-S	20	8,730	ND (0.191)	2.66	133	0.477 J (0.556)	ND (0.019)
600845	T1096-GP-077-005-S	5	4,550	ND (0.191)	1.03	65	0.258 J (0.464)	ND (0.019)
600845	T1096-GP-077-010-S	10	9,150	ND (0.191)	2.1	137	0.437 J (0.484)	ND (0.019)
600845	T1096-GP-077-015-S	15	9,010	ND (0.191)	2.97	188	0.503 J (0.539)	ND (0.019)
600845	T1096-GP-077-020-S	20	8,300	ND (0.191)	2.92	157	0.444 J (0.527)	ND (0.019)
600845	T1096-GP-086-010-SD	10	8,250	ND (0.191)	2.09	101	0.42 J (0.521)	ND (0.019)
600845	T1096-GP-087-001-SD	1	3,520	ND (0.191)	2.21	**303**	0.251 J (0.5)	ND (0.019)
600846	T1096-GP-078-001-S	1	4,230	ND (0.191)	2.63	163	0.296 J (0.521)	ND (0.019)
600846	T1096-GP-078-005-S	5	5,550	ND (0.191)	1.52	76.9	0.314 J (0.5)	ND (0.019)
600846	T1096-GP-078-010-S	10	7,100	ND (0.191)	2.08	148	0.406 J (0.506)	ND (0.019)
600846	T1096-GP-078-015-S	15	8,390	ND (0.191)	2.65	137	0.441 J (0.497)	ND (0.019)
600846	T1096-GP-078-020-S	20	8,990	ND (0.191)	3.34	192	0.514 J (0.514)	ND (0.019)
600846	T1096-GP-079-001-S	1	7,750	ND (0.191)	**5.09**	**431**	0.384 J (0.55)	ND (0.019)
600846	T1096-GP-079-005-S	5	6,500	ND (0.191)	2.07	114	0.358 J (0.496)	ND (0.019)
600846	T1096-GP-079-010-S	10	6,020	ND (0.191)	1.88	87.5	0.393 J (0.488)	ND (0.019)
600846	T1096-GP-079-015-S	15	8,260	ND (0.191)	2.95	159	0.483 J (0.535)	ND (0.019)
600846	T1096-GP-079-020-S	20	9,490	ND (0.191)	3.42	159	0.546	ND (0.019)
601096	T1096-GP-074-005	5	9,960	ND (0.191)	**4.49**	162	0.523 J (0.526)	ND (0.019)
601096	T1096-GP-074-010	10	12,200	ND (0.191)	**5.24**	171	0.676	ND (0.019)
601096	T1096-GP-074-015	15	8,420	ND (0.191)	3.91	92.5	0.459 J (0.545)	ND (0.019)
601096	T1096-GP-074-020	20	5,700	ND (0.191)	1.94	65.6	0.299 J (0.502)	ND (0.019)
601096	T1096-GP-088-005	5	8,610	ND (0.191)	3.81	156	0.451 J (0.519)	ND (0.019)
601096	T1096-GP-089-010	10	10,400	0.418 J (1.06)	3.89	155	0.586	ND (0.019)
Background Concentration			69,957	3.9	4.4	200	0.80	<1
Quality Assurance/Quality Control Samples (mg/L)								
600831	T1096-EB-006-000-W	0	0.135	ND (0.00394)	ND (0.00451)	0.0164	ND (0.00026)	ND (0.00044)
600838	T1096-EB-009-000-W	0	0.0421 J (0.05)	ND (0.00394)	ND (0.00451)	0.00215 J (0.005)	ND (0.00026)	ND (0.00044)
600840	T1096-EB-010-000-W	0	0.0536	ND (0.00394)	ND (0.00451)	0.00407 J (0.005)	ND (0.00026)	ND (0.00044)
600849	T1096-EB-007-000-W	0	0.0252 J (0.05)	ND (0.00394)	ND (0.00451)	0.00584	ND (0.00026)	ND (0.00044)
601096	T1096-EB-011-000	0	ND (0.0121)	ND (0.00394)	ND (0.00451)	0.00095 J (0.005)	ND (0.00026)	ND (0.00044)

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Chromium	Manganese	Cobalt	Copper	Lead	Mercury
600829	T1096-GP-060-005-S	5	8.3	224	5.68	9.17	5.74	ND (0.00225)
600829	T1096-GP-060-010-S	10	12	250	6	9.68	4.74	ND (0.00225)
600829	T1096-GP-061-005-S	5	7.6	232	3.98	8.02	3.87	ND (0.00225)
600829	T1096-GP-061-010-S	10	12.8	309	6.27	12.1	7.2	ND (0.00225)
600829	T1096-GP-061-015-S	15	**13.3**	343	6.68	13.7	10.6	ND (0.00225)
600829	T1096-GP-061-020-S	20	**15.7**	240	4.55	9.73	4.92	ND (0.00225)
600830	T1096-GP-062-005-S	5	6.86	220	4.98	9.78	4.53	0.0038 J (0.0323)
600830	T1096-GP-062-010-S	10	**13.2**	321	5.99	10.9	7.24	0.0122 J (0.035)
600830	T1096-GP-062-015-S	15	9.17	226	4.41	9.19	4.69	0.00435 J (0.0344)
600830	T1096-GP-062-020-S	20	**13.9**	254	5.45	14.2	5.91	ND (0.00225)
600830	T1096-GP-063-001-S	1	9.37	221	5.7	14.2	8.44	0.0384
600830	T1096-GP-063-005-S	5	7.01	183	3.46	7.11	4.09	ND (0.00225)
600830	T1096-GP-063-010-S	10	12.1	485	5.1	12.3	6.26	0.00383 J (0.0322)
600830	T1096-GP-063-015-S	15	10	223	4.46	9.24	5.36	ND (0.00225)
600830	T1096-GP-063-020-S	20	9.74	266	5.59	9.28	6.05	ND (0.00225)
600830	T1096-GP-064-001-S	1	7.2	226	4.39	11.5	7.27	0.0238 J (0.0322)
600830	T1096-GP-064-005-S	5	8.91	228	5.07	8.79	6.3	ND (0.00225)
600830	T1096-GP-064-010-S	10	9.38	226	4.52	9.41	4.61	ND (0.00225)
600830	T1096-GP-064-015-S	15	9.85	256	5.38	9.22	5.81	ND (0.00225)
600830	T1096-GP-064-020-S	20	**13.1**	258	5.33	9.41	5.61	ND (0.00225)
600831	T1096-GP-065-005-S	5	6.44	160	3.44	5.03	5.13	ND (0.00225)
600831	T1096-GP-065-010-S	10	8.1	240	4.98	8.55	6.9	**0.347**
600831	T1096-GP-065-015-S	15	7.95	255	5.11	9.26	6.38	ND (0.00225)
600831	T1096-GP-065-020-S	20	11.3	309	6.16	11.2	8.16	0.0232 J (0.0368)
600831	T1096-GP-066-005-S	5	8.84	300	4.82	7.14	6.73	ND (0.00225)
600831	T1096-GP-066-010-S	10	4.94	180	3.17	5.72	3.78	ND (0.00225)
600831	T1096-GP-066-015-S	15	6.89	282	3.97	9.07	5.46	ND (0.00225)
600831	T1096-GP-066-020-S	20	10	257	5.18	9.26	5.91	ND (0.00225)
600831	T1096-GP-067-005-S	5	9.59	276	5.67	8.66	7.59	ND (0.00225)
600831	T1096-GP-067-010-S	10	10.8	286	6.13	11.1	7.49	ND (0.00225)
Background Concentration			12.8	831	7.1	17	11.2	<0.1

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Chromium	Manganese	Cobalt	Copper	Lead	Mercury
600831	T1096-GP-067-015-S	15	6.24	209	4.05	8.23	4.92	ND (0.00225)
600831	T1096-GP-067-020-S	20	10.4	283	5.75	10.1	7.08	0.00799 J (0.0342)
600831	T1096-GP-085-005-SD	5	5.54	120	2.87	4.11	3.91	ND (0.00225)
600832	T1096-GP-068-001-S	1	7.86	147	3.6	13.1	**17.5**	ND (0.00225)
600832	T1096-GP-068-005-S	5	5.78	258	4.33	7.4	5.9	ND (0.00225)
600832	T1096-GP-068-010-S	10	10.6	291	5.88	10.5	7.49	ND (0.00225)
600832	T1096-GP-068-015-S	15	5.6	318	4.29	7.61	5.31	ND (0.00225)
600832	T1096-GP-068-020-S	20	8.91	275	5.32	9.15	6.93	ND (0.00225)
600832	T1096-GP-069-001-S	1	8.8	152	4.47	11.8	9.12	0.00881 J (0.0356)
600832	T1096-GP-069-005-S	5	6.3	229	4.21	7.32	5.25	ND (0.00225)
600832	T1096-GP-069-010-S	10	9.53	273	5.72	9.97	7.49	ND (0.00225)
600832	T1096-GP-069-015-S	15	5.62	210	3.96	6.93	5.5	ND (0.00225)
600832	T1096-GP-069-020-S	20	7.56	250	4.99	7.9	6.48	ND (0.00225)
600838	T1096-GP-080-005-S	5	7.13	208	4.69	7	6.28	0.0142 J (0.0342)
600838	T1096-GP-080-010-S	10	6.79	273	4.76	8.63	6.28	0.0157 J (0.0346)
600838	T1096-GP-080-015-S	15	5.77	211	3.41	9.72	3.41	0.0129 J (0.0344)
600838	T1096-GP-080-020-S	20	8.27	210	3.25	5.76	3.65	0.0138 J (0.0355)
600838	T1096-GP-081-005-S	5	9.53	331	6.83	11.6	8.2	0.0181 J (0.0314)
600838	T1096-GP-081-010-S	10	5.55	210	4.02	7.78	5.26	0.0177 J (0.0349)
600838	T1096-GP-081-015-S	15	4.9	187	3.65	10.3	4.33	0.0157 J (0.035)
600838	T1096-GP-081-020-S	20	6.57	183	2.46	5.2	4.32	0.0129 J (0.0284)
600838	T1096-GP-082-005-S	5	9.11	267	5.99	9.36	7.5	0.0219 J (0.0352)
600838	T1096-GP-082-010-S	10	8.12	270	5.93	9.13	7.66	0.0167 J (0.0353)
600838	T1096-GP-082-015-S	15	4.82	234	3.92	10.9	4.02	0.00928 J (0.034)
600838	T1096-GP-082-020-S	20	5.08	190	2.84	5.45	3.92	0.0115 J (0.0286)
600838	T1096-GP-083-001-S	1	4.7	150	3	7.07	**20.3**	0.013 J (0.037)
600838	T1096-GP-083-005-S	5	4.87	225	4.2	6.62	5	0.0136 J (0.0315)
600838	T1096-GP-083-010-S	10	6.13	237	4.22	11	5.4	0.0112 J (0.0361)
600838	T1096-GP-083-015-S	15	4.74	215	3.11	8.21	4.05	0.00401 J (0.0334)
600838	T1096-GP-083-020-S	20	5.42	186	3.27	6.3	4.67	0.00794 J (0.0287)
Background Concentration			12.8	831	7.1	17	11.2	<0.1

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Chromium	Manganese	Cobalt	Copper	Lead	Mercury
600840	T1096-GP-084-001-S	1	5.49	148	3.48	9.94	33	ND (0.00225)
600840	T1096-GP-084-005-S	5	4.66	205	3.93	7.24	4.49	ND (0.00225)
600840	T1096-GP-084-010-S	10	5.73	185	3.47	5.88	3.62	ND (0.00225)
600840	T1096-GP-084-015-S	15	10.4	316	3.69	7.31	4.38	ND (0.00225)
600840	T1096-GP-084-020-S	20	7.9	265	5.28	8.35	6.96	ND (0.00225)
600842	T1096-GP-070-005-S	5	8.25	193	4.01	6.68	6.78	0.0173 J (0.0302)
600842	T1096-GP-070-010-S	10	8.68	270	5.64	13.3	7.08	0.01 J (0.0339)
600842	T1096-GP-070-015-S	15	4.7	182	3.71	5.58	3.45	0.0127 J (0.0328)
600842	T1096-GP-070-020-S	20	8.09	251	5.3	8.23	6.46	0.00267 J (0.0362)
600842	T1096-GP-071-005-S	5	8.35	188	3.34	7.84	6.11	0.00552 J (0.0345)
600842	T1096-GP-071-010-S	10	7.13	268	4.77	7.6	5.91	ND (0.00225)
600842	T1096-GP-071-015-S	15	6.68	237	4.02	7.39	5.81	0.00756 J (0.0285)
600842	T1096-GP-071-020-S	20	11	188	4.39	9.31	5.66	0.00852 J (0.0282)
600842	T1096-GP-072-005-S	5	10.5	306	5.67	8	7.48	0.0106 J (0.0301)
600842	T1096-GP-072-010-S	10	10.1	281	6.03	9.85	7.67	0.0152 J (0.0361)
600842	T1096-GP-072-015-S	15	4.92	210	3.28	5.84	4.12	ND (0.00225)
600842	T1096-GP-072-020-S	20	5.26	387	3.8	8.15	4.2	0.0139 J (0.0267)
600843	T1096-GP-073-001-S	1	**20.1**	151	3.88	**20.2**	**51.2**	0.03 J (0.0314)
600843	T1096-GP-073-005-S	5	8.71	278	5.4	8.48	7.06	ND (0.00225)
600843	T1096-GP-073-010-S	10	8.33	293	5.31	9.34	6.96	ND (0.00225)
600843	T1096-GP-073-015-S	15	9.41	284	5.55	9.79	7.67	0.00519 J (0.029)
600843	T1096-GP-073-020-S	20	9.56	208	4.53	8.35	5.65	ND (0.00225)
600843	T1096-GP-074-001-S	1	12.1	159	4.15	**17.7**	**18.6**	0.0267 J (0.0317)
600845	T1096-GP-075-005-S	5	3.82	200	3.13	6.57	3.95	ND (0.00225)
600845	T1096-GP-075-010-S	10	9.09	317	6.02	11.2	7.65	ND (0.00225)
600845	T1096-GP-075-015-S	15	11.8	328	6.24	11.6	8.25	0.00483 J (0.0335)
600845	T1096-GP-075-020-S	20	10.9	316	6.09	11.4	8.03	0.00523 J (0.0326)
600845	T1096-GP-076-005-S	5	5.05	215	3.73	9.91	3.87	ND (0.00225)
600845	T1096-GP-076-010-S	10	12	258	5.31	10.2	7	ND (0.00225)
600845	T1096-GP-076-015-S	15	10.1	333	6.21	11.3	8.11	ND (0.00225)
Background Concentration			12.8	831	7.1	17	11.2	<0.1

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Chromium	Manganese	Cobalt	Copper	Lead	Mercury
600845	T1096-GP-076-020-S	20	9.35	263	4.92	9.27	6.72	ND (0.00225)
600845	T1096-GP-077-005-S	5	4.03	174	3.47	7.3	3.76	ND (0.00225)
600845	T1096-GP-077-010-S	10	11.5	307	6.33	14.2	6.35	ND (0.00225)
600845	T1096-GP-077-015-S	15	10.2	304	5.79	10.9	7.53	ND (0.00225)
600845	T1096-GP-077-020-S	20	9.21	305	5.66	10.3	7.35	ND (0.00225)
600845	T1096-GP-086-010-SD	10	10.1	277	4.88	9.4	6.03	ND (0.00225)
600845	T1096-GP-087-001-SD	1	3.23	113	2.34	4.12	6.91	ND (0.00225)
600846	T1096-GP-078-001-S	1	4.76	151	3.34	5.18	4.54	0.00589 J (0.0267)
600846	T1096-GP-078-005-S	5	10.1	256	4.85	8.6	4.4	0.00271 J (0.0282)
600846	T1096-GP-078-010-S	10	10.3	379	4.51	9.05	5.59	ND (0.00225)
600846	T1096-GP-078-015-S	15	10.8	305	5.98	9.59	6.47	0.00407 J (0.028)
600846	T1096-GP-078-020-S	20	10.2	368	5.86	10.2	7.65	0.0272 J (0.0359)
600846	T1096-GP-079-001-S	1	7.09	173	4.88	6.13	6.64	0.0255 J (0.029)
600846	T1096-GP-079-005-S	5	12.1	281	5.35	8.98	5.67	0.0225 J (0.0344)
600846	T1096-GP-079-010-S	10	8.92	201	3.91	8.56	5.73	0.0166 J (0.0296)
600846	T1096-GP-079-015-S	15	11.1	275	5.33	9.7	7.65	0.0243 J (0.0346)
600846	T1096-GP-079-020-S	20	9.96	306	6.22	10.7	8.01	0.0286 J (0.0304)
601096	T1096-GP-074-005	5	11.3	286	5.94	8.41	7.67	ND (0.00225)
601096	T1096-GP-074-010	10	**29.6**	399	**8.37**	**18.9**	**12.2**	0.0127 JH (0.0381)
601096	T1096-GP-074-015	15	10.5	237	5.66	9.34	6.99	0.0113 JH (0.0329)
601096	T1096-GP-074-020	20	7.26	202	4.26	6.63	5.08	ND (0.00225)
601096	T1096-GP-088-005	5	9.54	256	5.44	7.73	7.85	0.00254 JH (0.0354)
601096	T1096-GP-089-010	10	11.4	306	6.82	10.9	8.8	0.00344 JH (0.0304)
Background Concentration			12.8	831	7.1	17	11.2	<0.1
Quality Assurance/Quality Control Samples (mg/L)								
600831	T1096-EB-006-000-W	0	0.00216 J (0.005)	ND (0.00069)	ND (0.00069)	ND (0.00104)	ND (0.00159)	ND (0.00004)
600838	T1096-EB-009-000-W	0	0.00171 J (0.005)	ND (0.00069)	ND (0.00069)	ND (0.00104)	ND (0.00159)	ND (0.00004)
600840	T1096-EB-010-000-W	0	0.00136 J (0.005)	ND (0.00069)	ND (0.00069)	0.00236 J (0.005)	0.00197 J (0.005)	ND (0.00004)
600849	T1096-EB-007-000-W	0	ND (0.00056)	ND (0.00069)	ND (0.00069)	0.00147 J (0.005)	ND (0.00159)	ND (0.00004)
601096	T1096-EB-011-000	0	0.00082 J (0.005)	ND (0.00069)	ND (0.00069)	ND (0.00104)	ND (0.00159)	ND (0.00004)

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
600829	T1096-GP-060-005-S	5	6.2	ND (0.135)	ND (0.031)	0.695 J (1)	28	26.1
600829	T1096-GP-060-010-S	10	7.16	ND (0.135)	ND (0.031)	0.621 J (0.991)	25.8	26.8
600829	T1096-GP-061-005-S	5	7.06	ND (0.135)	ND (0.031)	0.461 J (1)	23.4	24.4
600829	T1096-GP-061-010-S	10	9.81	ND (0.135)	ND (0.031)	0.779 J (1.06)	30	37.4
600829	T1096-GP-061-015-S	15	9.9	0.406 J (0.591)	ND (0.031)	0.662 J (1.18)	**33.3**	**105**
600829	T1096-GP-061-020-S	20	6.6	0.358 J (0.473)	ND (0.031)	**1.12**	27.5	30.2
600830	T1096-GP-062-005-S	5	5.65	ND (0.135)	ND (0.031)	0.853 J (1.02)	27.7	27.1
600830	T1096-GP-062-010-S	10	10.2	ND (0.135)	ND (0.031)	0.493 J (1.02)	30.7	37.2
600830	T1096-GP-062-015-S	15	6.46	ND (0.135)	ND (0.031)	ND (0.221)	24.7	29.7
600830	T1096-GP-062-020-S	20	8.5	ND (0.135)	ND (0.031)	0.619 J (1.08)	28.1	32.7
600830	T1096-GP-063-001-S	1	8.57	ND (0.135)	0.0644 J (0.489)	ND (0.221)	31.7	40.6
600830	T1096-GP-063-005-S	5	5.58	ND (0.135)	ND (0.031)	0.493 J (0.965)	22.4	22.6
600830	T1096-GP-063-010-S	10	9.45	ND (0.135)	ND (0.031)	0.887 J (1.02)	28.1	**105**
600830	T1096-GP-063-015-S	15	8.04	ND (0.135)	ND (0.031)	ND (0.221)	23.2	29.7
600830	T1096-GP-063-020-S	20	8.42	ND (0.135)	ND (0.031)	ND (0.221)	25.6	34.4
600830	T1096-GP-064-001-S	1	6.68	ND (0.135)	0.248 J (0.493)	ND (0.221)	23.1	30.8
600830	T1096-GP-064-005-S	5	6.52	ND (0.135)	ND (0.031)	0.555 J (1.02)	28.8	28.4
600830	T1096-GP-064-010-S	10	6.74	ND (0.135)	ND (0.031)	0.49 J (0.974)	23.4	28.9
600830	T1096-GP-064-015-S	15	7.9	ND (0.135)	ND (0.031)	0.486 J (1.06)	25	31.3
600830	T1096-GP-064-020-S	20	9.01	ND (0.135)	ND (0.031)	0.692 J (1.11)	26.8	32.1
600831	T1096-GP-065-005-S	5	5.59	ND (0.135)	ND (0.031)	0.537 J (1.09)	21.7	24.7
600831	T1096-GP-065-010-S	10	8.79	ND (0.135)	ND (0.031)	0.767 J (1.1)	22.2	31.6
600831	T1096-GP-065-015-S	15	8.58	ND (0.135)	ND (0.031)	0.638 J (1.07)	21.7	36.1
600831	T1096-GP-065-020-S	20	10.8	ND (0.135)	ND (0.031)	0.942 J (1.09)	28.5	40.2
600831	T1096-GP-066-005-S	5	8.02	ND (0.135)	ND (0.031)	**1.24**	30.6	30.3
600831	T1096-GP-066-010-S	10	4.98	ND (0.135)	ND (0.031)	0.938 J (1.02)	14.1	20.4
600831	T1096-GP-066-015-S	15	6.13	ND (0.135)	ND (0.031)	0.855 J (1.04)	19.4	28.5
600831	T1096-GP-066-020-S	20	8.17	0.397 J (0.538)	ND (0.031)	0.982 J (1.08)	22.9	32.1
600831	T1096-GP-067-005-S	5	9.23	ND (0.135)	ND (0.031)	0.561 J (0.997)	**35.5**	34.9
600831	T1096-GP-067-010-S	10	10.5	0.323 J (0.525)	ND (0.031)	0.606 J (1.05)	25.5	38.1
Background Concentration			25.4	<1	<1	<1.1	33	76

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
600831	T1096-GP-067-015-S	15	6.09	ND (0.135)	ND (0.031)	0.801 J (1.04)	17.8	29.3
600831	T1096-GP-067-020-S	20	9.31	ND (0.135)	ND (0.031)	0.616 J (1.04)	25	33.3
600831	T1096-GP-085-005-SD	5	4.95	ND (0.135)	ND (0.031)	0.624 J (1.06)	18.6	19.2
600832	T1096-GP-068-001-S	1	6.29	0.607	1.04	ND (0.221)	23.8	50.7
600832	T1096-GP-068-005-S	5	7.1	0.473 J (0.524)	0.233 J (0.524)	ND (0.221)	21.7	32.2
600832	T1096-GP-068-010-S	10	11	0.591	0.232 J (0.525)	ND (0.221)	20.9	38.9
600832	T1096-GP-068-015-S	15	7.25	0.505 J (0.534)	0.281 J (0.534)	ND (0.221)	15.6	32.8
600832	T1096-GP-068-020-S	20	9.23	0.377 J (0.514)	0.303 J (0.514)	ND (0.221)	21.5	33.7
600832	T1096-GP-069-001-S	1	7.48	ND (0.135)	0.953	ND (0.221)	26.7	35.5
600832	T1096-GP-069-005-S	5	6.99	0.373 J (0.512)	0.253 J (0.512)	ND (0.221)	22	30.4
600832	T1096-GP-069-010-S	10	11.2	0.625	0.233 J (0.515)	ND (0.221)	20.3	37.7
600832	T1096-GP-069-015-S	15	6.77	ND (0.135)	0.235 J (0.519)	ND (0.221)	13.8	26.8
600832	T1096-GP-069-020-S	20	8.16	0.712	0.277 J (0.539)	ND (0.221)	19.5	31.5
600838	T1096-GP-080-005-S	5	7.08	ND (0.135)	0.166 J (0.524)	ND (0.221)	21.7	30
600838	T1096-GP-080-010-S	10	7.56	0.372 J (0.518)	0.145 J (0.518)	ND (0.221)	18.8	31
600838	T1096-GP-080-015-S	15	5.24	0.276 J (0.487)	ND (0.031)	ND (0.221)	12.6	22.4
600838	T1096-GP-080-020-S	20	4.92	ND (0.135)	0.125 J (0.521)	ND (0.221)	12.3	24.4
600838	T1096-GP-081-005-S	5	10.6	ND (0.135)	0.139 J (0.56)	ND (0.221)	26.9	43.7
600838	T1096-GP-081-010-S	10	6.45	0.457 J (0.527)	0.205 J (0.527)	ND (0.221)	16	28.5
600838	T1096-GP-081-015-S	15	5.83	ND (0.135)	0.16 J (0.538)	ND (0.221)	14.1	23.7
600838	T1096-GP-081-020-S	20	4.43	ND (0.135)	0.0791 J (0.506)	ND (0.221)	11.3	19.6
600838	T1096-GP-082-005-S	5	9.37	ND (0.135)	0.156 J (0.576)	ND (0.221)	25	38.9
600838	T1096-GP-082-010-S	10	9.75	ND (0.135)	0.121 J (0.563)	ND (0.221)	23.1	36.2
600838	T1096-GP-082-015-S	15	5.21	ND (0.135)	0.19 J (0.506)	ND (0.221)	14.5	26.1
600838	T1096-GP-082-020-S	20	4.35	ND (0.135)	0.147 J (0.482)	ND (0.221)	12.1	18
600838	T1096-GP-083-001-S	1	5.26	ND (0.135)	0.159 J (0.521)	ND (0.221)	17.5	30.6
600838	T1096-GP-083-005-S	5	5.93	ND (0.135)	0.071 J (0.527)	ND (0.221)	20.7	32
600838	T1096-GP-083-010-S	10	6.54	ND (0.135)	0.245 J (0.523)	ND (0.221)	17.4	27
600838	T1096-GP-083-015-S	15	4.36	0.321 J (0.527)	0.118 J (0.527)	ND (0.221)	13.1	21.6
600838	T1096-GP-083-020-S	20	4.93	0.343 J (0.483)	0.102 J (0.483)	ND (0.221)	13.4	19.6
Background Concentration			25.4	<1	<1	<1.1	33	76

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
600840	T1096-GP-084-001-S	1	6.11	ND (0.135)	0.221 J (0.533)	ND (0.221)	19.8	38.2
600840	T1096-GP-084-005-S	5	5.71	ND (0.135)	0.114 J (0.502)	ND (0.221)	19.6	25.7
600840	T1096-GP-084-010-S	10	5.02	ND (0.135)	0.145 J (0.501)	ND (0.221)	14.7	24.7
600840	T1096-GP-084-015-S	15	6.06	ND (0.135)	0.0705 J (0.511)	ND (0.221)	15.3	26.1
600840	T1096-GP-084-020-S	20	9.11	0.503 J (0.515)	0.169 J (0.515)	ND (0.221)	18.6	30.9
600842	T1096-GP-070-005-S	5	6.18	ND (0.135)	**1.1**	ND (0.221)	19.4	31.7
600842	T1096-GP-070-010-S	10	9.44	0.508 J (0.567)	0.639	ND (0.221)	21.5	35.6
600842	T1096-GP-070-015-S	15	4.36	0.795	0.1 J (0.506)	ND (0.221)	14.3	22
600842	T1096-GP-070-020-S	20	8.42	ND (0.135)	ND (0.031)	ND (0.221)	25.2	33.7
600842	T1096-GP-071-005-S	5	6.31	0.45 J (0.511)	0.998	ND (0.221)	22.5	32.1
600842	T1096-GP-071-010-S	10	7.55	0.423 J (0.522)	ND (0.031)	ND (0.221)	21.8	34.7
600842	T1096-GP-071-015-S	15	5.33	0.347 J (0.506)	0.294 J (0.506)	ND (0.221)	18.2	29.6
600842	T1096-GP-071-020-S	20	5.79	0.515	0.3 J (0.483)	ND (0.221)	22.4	30
600842	T1096-GP-072-005-S	5	9.25	ND (0.135)	0.145 J (0.547)	ND (0.221)	29.2	37.2
600842	T1096-GP-072-010-S	10	10.7	ND (0.135)	0.148 J (0.531)	ND (0.221)	24.1	39.7
600842	T1096-GP-072-015-S	15	5.2	ND (0.135)	0.0607 J (0.492)	ND (0.221)	13.2	22.8
600842	T1096-GP-072-020-S	20	5.45	0.356 J (0.501)	0.111 J (0.501)	ND (0.221)	15.2	22.8
600843	T1096-GP-073-001-S	1	6.87	ND (0.135)	**11.8**	0.567 J (1.03)	20	**96.2**
600843	T1096-GP-073-005-S	5	9.53	ND (0.135)	ND (0.031)	0.525 J (1.11)	27.8	36.3
600843	T1096-GP-073-010-S	10	8.82	ND (0.135)	0.0629 J (0.523)	0.551 J (1.05)	24.8	38
600843	T1096-GP-073-015-S	15	9.83	ND (0.135)	ND (0.031)	0.55 J (1.09)	23.3	36.6
600843	T1096-GP-073-020-S	20	7.01	ND (0.135)	ND (0.031)	0.784 J (1.01)	24	28.2
600843	T1096-GP-074-001-S	1	7.16	ND (0.135)	**14.9**	0.95 J (1.02)	25.5	**89.2**
600845	T1096-GP-075-005-S	5	4.48	ND (0.135)	ND (0.031)	0.556 J (0.983)	16.3	25.6
600845	T1096-GP-075-010-S	10	10	ND (0.135)	ND (0.031)	0.48 J (1.01)	24.2	41.6
600845	T1096-GP-075-015-S	15	12	ND (0.135)	ND (0.031)	ND (0.221)	22.8	40.7
600845	T1096-GP-075-020-S	20	11.4	ND (0.135)	ND (0.031)	0.554 J (1.04)	23.2	39.4
600845	T1096-GP-076-005-S	5	5.38	ND (0.135)	ND (0.031)	0.751 J (0.965)	18.5	29.7
600845	T1096-GP-076-010-S	10	8.98	ND (0.135)	ND (0.031)	0.788 J (1.08)	25.8	33.9
600845	T1096-GP-076-015-S	15	11.3	ND (0.135)	ND (0.031)	0.692 J (1.08)	22.9	42
Background Concentration			25.4	<1	<1	<1.1	33	76

Refer to footnotes at end of table.

Table H2-1 (Continued)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Sample Attributes			Metals (EPA Method 6010/7060/7421/7470/7471/7740/6010A/7196/7470/7471/SW846[a]) (mg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft)	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
600845	T1096-GP-076-020-S	20	9.32	ND (0.135)	ND (0.031)	0.501 J (1.11)	20.6	34.7
600845	T1096-GP-077-005-S	5	4.58	ND (0.135)	ND (0.031)	ND (0.221)	17.5	24.6
600845	T1096-GP-077-010-S	10	9.53	ND (0.135)	ND (0.031)	0.674 J (0.967)	25.3	40.1
600845	T1096-GP-077-015-S	15	10.7	ND (0.135)	ND (0.031)	0.583 J (1.08)	22.3	39.8
600845	T1096-GP-077-020-S	20	9.53	ND (0.135)	ND (0.031)	0.49 J (1.05)	22.9	40.7
600845	T1096-GP-086-010-SD	10	8.07	ND (0.135)	ND (0.031)	1.04 J (1.04)	23.1	34.8
600845	T1096-GP-087-001-SD	1	3.4	ND (0.135)	ND (0.031)	0.932 J (1)	16.1	16.4
600846	T1096-GP-078-001-S	1	4.95	ND (0.135)	ND (0.031)	0.732 J (1.04)	22.2	21.2
600846	T1096-GP-078-005-S	5	5.88	0.473 J (0.5)	ND (0.031)	0.678 J (1)	21.1	28.6
600846	T1096-GP-078-010-S	10	7.04	0.385 J (0.506)	ND (0.031)	0.953 J (1.01)	20.5	32.5
600846	T1096-GP-078-015-S	15	9.33	0.402 J (0.497)	ND (0.031)	0.951 J (0.993)	23.7	41.4
600846	T1096-GP-078-020-S	20	10.8	0.435 J (0.514)	ND (0.031)	**1.12**	22.1	39.7
600846	T1096-GP-079-001-S	1	8.25	ND (0.135)	ND (0.031)	**1.63**	28.6	26.5
600846	T1096-GP-079-005-S	5	6.88	0.574	ND (0.031)	**1.5**	28.1	36.5
600846	T1096-GP-079-010-S	10	6.33	0.377 J (0.488)	ND (0.031)	0.52 J (0.976)	19.1	26.6
600846	T1096-GP-079-015-S	15	9.29	0.391 J (0.535)	ND (0.031)	0.789 J (1.07)	23.7	35.8
600846	T1096-GP-079-020-S	20	11.4	0.483 J (0.534)	ND (0.031)	0.542 J (1.07)	23.3	41.2
601096	T1096-GP-074-005	5	11.1	0.39 J (0.526)	0.477 J (0.526)	ND (0.221)	32.6	38.8
601096	T1096-GP-074-010	10	14.5	**1.21**	**4.38**	ND (0.221)	31.5	71
601096	T1096-GP-074-015	15	9.25	0.707	0.285 J (0.545)	ND (0.221)	24	34.7
601096	T1096-GP-074-020	20	6.26	0.509	0.143 J (0.502)	ND (0.221)	18.9	27.8
601096	T1096-GP-088-005	5	9.38	0.494 J (0.519)	0.488 J (0.519)	ND (0.221)	28.8	37
601096	T1096-GP-089-010	10	11.7	0.615	0.454 J (0.529)	ND (0.221)	26.8	44.8
Background Concentration			25.4	<1	<1	<1.1	33	76
Quality Assurance/Quality Control Samples (mg/L)								
600831	T1096-EB-006-000-W	0	0.0016 J (0.005)	0.0029 J (0.005)	ND (0.00073)	ND (0.00308)	ND (0.00059)	0.0122
600838	T1096-EB-009-000-W	0	ND (0.00129)	0.00496 J (0.005)	0.00081 J (0.005)	ND (0.00308)	ND (0.00059)	0.0018 J (0.005)
600840	T1096-EB-010-000-W	0	0.00131 J (0.005)	0.00345 J (0.005)	0.00124 J (0.005)	ND (0.00308)	ND (0.00059)	0.00797
600849	T1096-EB-007-000-W	0	ND (0.00129)	ND (0.00271)	ND (0.00073)	ND (0.00308)	ND (0.00059)	0.0073
601096	T1096-EB-011-000	0	ND (0.00129)	ND (0.00271)	ND (0.00073)	0.00334 J (0.01)	ND (0.00059)	0.00317 J (0.005)

Refer to footnotes at end of table.

Table H2-1 (Concluded)
SWMU 96, Summary of Metals Analytical Results,
Soil Samples Collected 1998

Note: **Bold** indicates values that exceed background screening levels.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

EB	= Equipment blank.
EPA	= U.S. Environmental Protection Agency.
ER	= Environmental Restoration.
ft	= Foot (feet).
GP	= Geoprobe.
H	= The hold time was exceeded for the associated sample analysis.
ID	= Identification.
J ( )	= The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
MDL	= Method detection limit.
mg/kg	= Milligram(s) per kilogram.
mg/L	= Milligram(s) per liter.
ND ( )	= Not detected above the MDL, shown in parentheses.
PQL	= Practical quantitation limit.
S	= Soil Sample.
SD	= Sample Duplicate.
SWMU	= Solid Waste Management Unit.
T1	= Technical Area 1.
W	= Water Sample.

Table H2-2
SWMU 96. Summary of PCB Analytical Results—Detections Only,
Soil Samples Collected 1998

Sample Attributes			(EPA Method 8080/SW846[a]) (µg/kg)		
Record Number[b]	ER Sample ID	Sample Depth (ft)	Aroclor-1248	Aroclor-1254	Aroclor-1260
600831	T1096-GP-065-005-S	5	ND (1.5)	ND (1.5)	**4.4**
600831	T1096-GP-067-005-S	5	ND (1.5)	ND (1.5)	**2.1 J (3.62)**
600832	T1096-GP-068-001-S	1	ND (1.5)	**92**	**160**
600832	T1096-GP-069-001-S	1	ND (1.5)	**74**	**110**
600840	T1096-GP-084-001-S	1	ND (1.5)	ND (1.5)	**71**
600842	T1096-GP-072-010-S	10	**34**	ND (1.5)	ND (1.5)
601096	T1096-GP-074-010	10	ND (1.5)	**20**	ND (1.5)

Note: **Bold** indicates values that exceed background screening levels.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
ND ( ) = Not detected above the MDL, shown in parentheses.
PCB = Polychlorinated biphenyl.
PQL = Practical quantitation limit.
S = Soil Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.

Table H2-3
SWMU 96, Summary of SVOC Analytical Results—Detections Only,
Soil Samples Collected 1998

Sample Attributes			SVOCs (EPA Method 8270/8270/SW846[a]) (µg/kg)				
Record Number[b]	ER Sample ID	Sample Depth (ft)	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Chrysene
600842	T1096-GP-070-005-S	5	ND (10)	ND (10)	ND (10)	ND (10)	**63 J (360)**
600842	T1096-GP-071-020-S	20	**170 J (345)**	**210 J (345)**	**170 J (345)**	**88 J (345)**	**190 J (345)**
600843	T1096-GP-073-001-S	1	ND (10)	ND (10)	**930 J (1,470)**	ND (10)	**780 J (1,470)**
600843	T1096-GP-074-001-S	1	**800 J (1,470)**	**1,000 J (1,470)**	**1,300 J (1,470)**	**730 J (1,470)**	**1,100 J (1,470)**

Record Number[b]	ER Sample ID	Sample Depth (ft)	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
600842	T1096-GP-070-005-S	5	**120 J (360)**	ND (10)	ND (10)	**120 J (360)**
600842	T1096-GP-071-020-S	20	**380**	**100 J (345)**	**170 J (345)**	**360**
600843	T1096-GP-073-001-S	1	**1,700**	ND (10)	**1,100 J (1,470)**	**1,400 J (1,470)**
600843	T1096-GP-074-001-S	1	**1,700**	ND (10)	ND (10)	**1,400 J (1,470)**

Note: **Bold** indicates values that exceed background screening levels.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
ND ( ) = Not detected above the MDL, shown in parentheses.
PQL = Practical quantitation limit.
S = Soil Sample.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.

Table H2-4
SWMU 96, Summary of VOC Analytical Results—Detections Only,
Soil Samples Collected 1998

Sample Attributes			VOCs (EPA Method 8240/8240/8260/SW846[a]) (µg/kg)				
Record Number[b]	ER Sample ID	Sample Depth (ft)	2-Butanone	Carbon disulfide	Chloroform	Methylene chloride	Tetrachloro-ethene
600829	T1096-GP-060-005-S	5	ND (2.1)	ND (2.2)	**0.53 J (1.01)**	ND (0.25)	ND (0.23)
600829	T1096-GP-061-005-S	5	ND (2.1)	ND (2.2)	**0.66 J (1.04)**	ND (0.25)	ND (0.23)
600829	T1096-GP-061-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	ND (0.25)	ND (0.23)
600829	T1096-GP-061-015-S	15	ND (2.1)	ND (2.2)	**0.57 J (1.08)**	ND (0.25)	ND (0.23)
600829	T1096-GP-061-020-S	20	ND (2.1)	**0.64 JB (5.18)**	**0.59 J (1.04)**	ND (0.25)	ND (0.23)
600830	T1096-GP-062-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	ND (0.25)	ND (0.23)
600830	T1096-GP-062-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	ND (0.25)	ND (0.23)
600830	T1096-GP-062-020-S	20	ND (2.1)	ND (2.2)	**0.64 J (1.08)**	ND (0.25)	ND (0.23)
600830	T1096-GP-063-001-S	1	ND (2.1)	ND (2.2)	**0.56 J (1.08)**	ND (0.25)	ND (0.23)
600830	T1096-GP-063-005-S	5	ND (2.1)	ND (2.2)	**0.65 J (1.04)**	ND (0.25)	ND (0.23)
600830	T1096-GP-063-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**4.4 J (5.3)**	ND (0.23)
600830	T1096-GP-063-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	ND (0.25)	ND (0.23)
600830	T1096-GP-064-001-S	1	ND (2.1)	ND (2.2)	ND (0.24)	**2.7 J (5.28)**	ND (0.23)
600830	T1096-GP-064-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**3.4 J (5.17)**	ND (0.23)
600830	T1096-GP-064-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**3.2 J (5.21)**	ND (0.23)
600830	T1096-GP-064-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**3.2 J (5.38)**	ND (0.23)
600830	T1096-GP-064-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**2.6 J (5.7)**	ND (0.23)
600831	T1096-GP-065-010-S	10	ND (2.1)	ND (2.2)	**2.2 B**	ND (0.25)	ND (0.23)
600831	T1096-GP-065-015-S	15	ND (2.1)	ND (2.2)	**2.8 B**	ND (0.25)	ND (0.23)
600831	T1096-GP-065-020-S	20	ND (2.1)	ND (2.2)	**2.6 B**	ND (0.25)	ND (0.23)
600831	T1096-GP-066-005-S	5	ND (2.1)	ND (2.2)	**2.6 B**	ND (0.25)	ND (0.23)
600831	T1096-GP-066-010-S	10	ND (2.1)	ND (2.2)	**2.5 B**	ND (0.25)	ND (0.23)
600831	T1096-GP-066-015-S	15	ND (2.1)	ND (2.2)	**2.7 B**	ND (0.25)	ND (0.23)
600831	T1096-GP-066-020-S	20	ND (2.1)	ND (2.2)	**2.2 B**	ND (0.25)	ND (0.23)
600831	T1096-GP-067-005-S	2	ND (2.1)	ND (2.2)	**2.7 B**	ND (0.25)	ND (0.23)
600831	T1096-GP-067-010-S	10	ND (2.1)	ND (2.2)	**2.3 B**	ND (0.25)	ND (0.23)
600831	T1096-GP-067-015-S	15	ND (2.1)	ND (2.2)	**1.4 B**	ND (0.25)	ND (0.23)

Refer to footnotes at end of table.

Table H2-4 (Continued)
SWMU 96, Summary of VOC Analytical Results—Detections Only,
Soil Samples Collected 1998

Sample Attributes			VOCs (EPA Method 8240/8240/8260/SW846[a]) (µg/kg)				
Record Number[b]	ER Sample ID	Sample Depth (ft)	2-Butanone	Carbon disulfide	Chloroform	Methylene chloride	Tetrachloro-ethene
600831	T1096-GP-067-020-S	20	ND (2.1)	ND (2.2)	**1.6 B**	ND (0.25)	ND (0.23)
600831	T1096-GP-085-005-SD	5	ND (2.1)	ND (2.2)	**2.5 B**	ND (0.25)	ND (0.23)
600832	T1096-GP-068-001-S	1	ND (2.1)	ND (2.2)	ND (0.24)	ND (0.25)	ND (0.23)
600832	T1096-GP-068-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**1.8 JB (5.56)**	ND (0.23)
600832	T1096-GP-068-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	ND (0.25)	ND (0.23)
600832	T1096-GP-068-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	ND (0.25)	ND (0.23)
600832	T1096-GP-068-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	ND (0.25)	ND (0.23)
600832	T1096-GP-069-001-S	1	ND (2.1)	ND (2.2)	ND (0.24)	**2.1 JB (5.62)**	ND (0.23)
600832	T1096-GP-069-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	ND (0.25)	**1.4**
600832	T1096-GP-069-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**1.7 JB (5.56)**	ND (0.23)
600838	T1096-GP-081-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	ND (0.25)	ND (0.23)
600838	T1096-GP-081-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**7.6 HB**	ND (0.23)
600838	T1096-GP-082-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**8.2 B**	**3.1**
600838	T1096-GP-082-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**11 B**	ND (0.23)
600838	T1096-GP-082-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**7.8 B**	ND (0.23)
600838	T1096-GP-082-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**6.7 B**	ND (0.23)
600838	T1096-GP-083-001-S	1	ND (2.1)	ND (2.2)	ND (0.24)	**7.2 B**	ND (0.23)
600838	T1096-GP-083-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**11 B**	ND (0.23)
600838	T1096-GP-083-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**6.4 HB**	ND (0.23)
600838	T1096-GP-083-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**10 B**	ND (0.23)
600840	T1096-GP-084-001-S	1	ND (2.1)	ND (2.2)	ND (0.24)	**9.7 B**	ND (0.23)
600840	T1096-GP-084-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**8.6 B**	ND (0.23)
600840	T1096-GP-084-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**5.3 JB (5.37)**	ND (0.23)
600840	T1096-GP-084-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**7.5 B**	ND (0.23)
600840	T1096-GP-084-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**8.1 B**	**15**
600842	T1096-GP-070-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**3.3 JB (5.49)**	ND (0.23)
600842	T1096-GP-070-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**5.5 JHB (5.95)**	ND (0.23)

Refer to footnotes at end of table.

Table H2-4 (Continued)
SWMU 96, Summary of VOC Analytical Results—Detections Only,
Soil Samples Collected 1998

Sample Attributes			VOCs (EPA Method 8240/8240/8260/SW846[a]) (µg/kg)				
Record Number[b]	ER Sample ID	Sample Depth (ft)	2-Butanone	Carbon disulfide	Chloroform	Methylene chloride	Tetrachloro-ethene
600842	T1096-GP-071-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**3.8 JB (5.38)**	ND (0.23)
600842	T1096-GP-071-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**3.2 JB (5.21)**	ND (0.23)
600842	T1096-GP-071-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**3.7 JB (5.26)**	ND (0.23)
600842	T1096-GP-072-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**2.7 JB (5.75)**	ND (0.23)
600842	T1096-GP-072-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**4 JB (5.68)**	ND (0.23)
600842	T1096-GP-072-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**4.3 JB (5.26)**	ND (0.23)
600842	T1096-GP-072-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**3.8 JB (5.26)**	ND (0.23)
600843	T1096-GP-073-001-S	1	ND (2.1)	ND (2.2)	ND (0.24)	**2.6 JB (5.49)**	ND (0.23)
600843	T1096-GP-073-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**2.7 JB (5.56)**	ND (0.23)
600843	T1096-GP-073-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**1.9 JB (5.49)**	ND (0.23)
600843	T1096-GP-073-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**2.3 JB (5.75)**	ND (0.23)
600843	T1096-GP-073-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**1.6 JB (5.43)**	ND (0.23)
600843	T1096-GP-074-001-S	1	ND (2.1)	ND (2.2)	ND (0.24)	**2.7 JHB (5.49)**	ND (0.23)
600845	T1096-GP-075-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**3.4 JB (5.21)**	ND (0.23)
600845	T1096-GP-075-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**4.3 JB (5.56)**	ND (0.23)
600845	T1096-GP-075-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**4.4 JB (5.26)**	ND (0.23)
600845	T1096-GP-075-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**4 JB (5.68)**	ND (0.23)
600845	T1096-GP-076-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**2.8 JB (5.21)**	ND (0.23)
600845	T1096-GP-076-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**3.1 JB (5.38)**	ND (0.23)
600845	T1096-GP-076-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**2.4 JB (5.88)**	ND (0.23)
600845	T1096-GP-076-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**4.4 JB (5.62)**	ND (0.23)
600845	T1096-GP-077-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**1.8 JB (5.1)**	ND (0.23)
600845	T1096-GP-077-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**3.4 JB (5.32)**	ND (0.23)
600845	T1096-GP-077-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**3.1 JB (5.56)**	ND (0.23)
600845	T1096-GP-077-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**2.3 JB (5.38)**	ND (0.23)
600846	T1096-GP-078-001-S	1	ND (2.1)	ND (2.2)	ND (0.24)	**2.3 J (5.26)**	ND (0.23)
600846	T1096-GP-078-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**1.5 J (5.15)**	ND (0.23)

Refer to footnotes at end of table.

Table H2-4 (Continued)
SWMU 96, Summary of VOC Analytical Results—Detections Only,
Soil Samples Collected 1998

Sample Attributes			VOCs (EPA Method 8240/8240/8260/SW846[a]) (µg/kg)				
Record Number[b]	ER Sample ID	Sample Depth (ft)	2-Butanone	Carbon disulfide	Chloroform	Methylene chloride	Tetrachloro-ethene
600846	T1096-GP-078-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**4 J (5.26)**	ND (0.23)
600846	T1096-GP-078-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**5 J (5.26)**	ND (0.23)
600846	T1096-GP-078-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**5 J (5.49)**	ND (0.23)
600846	T1096-GP-079-001-S	1	ND (2.1)	ND (2.2)	ND (0.24)	**2.2 J (5.56)**	ND (0.23)
600846	T1096-GP-079-005-S	5	ND (2.1)	ND (2.2)	ND (0.24)	**7.7**	ND (0.23)
600846	T1096-GP-079-010-S	10	ND (2.1)	ND (2.2)	ND (0.24)	**14**	ND (0.23)
600846	T1096-GP-079-015-S	15	ND (2.1)	ND (2.2)	ND (0.24)	**10**	ND (0.23)
600846	T1096-GP-079-020-S	20	ND (2.1)	ND (2.2)	ND (0.24)	**9.7**	ND (0.23)
601096	T1096-GP-074-005	5	ND (2.1)	ND (2.2)	ND (0.24)	**9.6 B**	ND (0.23)
601096	T1096-GP-074-010	10	ND (2.1)	ND (2.2)	ND (0.24)	**11 B**	ND (0.23)
601096	T1096-GP-074-015	15	**8.1**	ND (2.2)	ND (0.24)	**12 B**	ND (0.23)
601096	T1096-GP-074-020	20	ND (2.1)	ND (2.2)	ND (0.24)	**12 B**	ND (0.23)
601096	T1096-GP-088-005	5	ND (2.1)	ND (2.2)	ND (0.24)	**9 B**	ND (0.23)
601096	T1096-GP-089-010	10	ND (2.1)	ND (2.2)	ND (0.24)	**7.5 HB**	ND (0.23)
Quality Assurance/Quality Control Samples (mg/L)							
600831	T1096-EB-006-000-W	0	ND (5.9)	NA	NA	ND (1.2)	**0.88 J (1)**
600840	T1096-EB-010-000-W	0	ND (5.9)	NA	NA	**3.3 JB (5)**	ND (0.7)
601096	T1096-EB-011-000	0	ND (5.9)	NA	NA	**2.5 JB (5)**	ND (0.7)
600831	T1096-TB-021-000-W	0	**23 H**	NA	NA	**1.3 JHB (5)**	ND (0.7)
600838	T1096-TB-030-000-W	0	ND (5.9)	NA	NA	**5.1 B**	ND (0.7)
600840	T1096-TB-029-000-W	0	ND (5.9)	NA	NA	**4.1 JB (5)**	ND (0.7)
600842	T1096-TB-023-000-W	0	ND (5.9)	NA	NA	**4.2 JB (5)**	ND (0.7)
600849	T1096-TB-022-000-W	0	**8.2 J (10)**	NA	NA	ND (1.2)	ND (0.7)
601096	T1096-TB-031-000-W	0	ND (5.9)	NA	NA	**5.4 B**	**2.5**

Refer to footnotes at end of table.

Table H2-4 (Continued)
SWMU 96, Summary of VOC Analytical Results—Detections Only,
Soil Samples Collected 1998

Sample Attributes			VOCs (EPA Method 8240/8240/8260/SW846[a]) (µg/kg)			
Record Number[b]	ER Sample ID	Sample Depth (ft)	Toluene	Trichloroethene	Xylene	cis-1,2-Dichloroethene
600829	T1096-GP-060-005-S	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600829	T1096-GP-061-005-S	5	**2.5**	ND (0.27)	ND (0.62)	ND (0.25)
600829	T1096-GP-061-010-S	10	**1.6**	ND (0.27)	ND (0.62)	ND (0.25)
600829	T1096-GP-061-015-S	15	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600829	T1096-GP-061-020-S	20	**2.2**	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-062-010-S	10	**4.2**	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-062-015-S	15	**2.8**	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-062-020-S	20	**15**	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-063-001-S	1	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-063-005-S	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-063-010-S	10	**2.2**	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-063-015-S	15	**1.7**	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-064-001-S	1	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-064-005-S	5	**1.9**	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-064-010-S	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-064-015-S	15	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600830	T1096-GP-064-020-S	20	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-065-010-S	10	**1.3**	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-065-015-S	15	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-065-020-S	20	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-066-005-S	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-066-010-S	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-066-015-S	15	**1.2**	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-066-020-S	20	**3.3**	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-067-005-S	2	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-067-010-S	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-067-015-S	15	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)

Refer to footnotes at end of table.

Table H2-4 (Continued)
SWMU 96, Summary of VOC Analytical Results—Detections Only,
Soil Samples Collected 1998

Sample Attributes			VOCs (EPA Method 8240/8240/8260/SW846[a]) (µg/kg)			
Record Number[b]	ER Sample ID	Sample Depth (ft)	Toluene	Trichloroethene	Xylene	cis-1,2-Dichloroethene
600831	T1096-GP-067-020-S	20	**1**	ND (0.27)	ND (0.62)	ND (0.25)
600831	T1096-GP-085-005-SD	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600832	T1096-GP-068-001-S	1	**1.4 B**	ND (0.27)	ND (0.62)	ND (0.25)
600832	T1096-GP-068-005-S	5	**1.7 B**	ND (0.27)	ND (0.62)	ND (0.25)
600832	T1096-GP-068-010-S	10	**5.3 B**	ND (0.27)	ND (0.62)	ND (0.25)
600832	T1096-GP-068-015-S	15	**6.4 B**	ND (0.27)	ND (0.62)	ND (0.25)
600832	T1096-GP-068-020-S	20	**1.5 B**	ND (0.27)	ND (0.62)	ND (0.25)
600832	T1096-GP-069-001-S	1	**1.3 B**	ND (0.27)	ND (0.62)	ND (0.25)
600832	T1096-GP-069-010-S	10	**1.2 B**	ND (0.27)	ND (0.62)	ND (0.25)
600832	T1096-GP-069-020-S	20	**7.9 B**	ND (0.27)	ND (0.62)	ND (0.25)
600838	T1096-GP-081-015-S	15	ND (0.22)	ND (0.27)	**0.77 J (2.17)**	ND (0.25)
600838	T1096-GP-081-020-S	20	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600838	T1096-GP-082-005-S	5	ND (0.22)	**2.1**	ND (0.62)	ND (0.25)
600838	T1096-GP-082-010-S	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600838	T1096-GP-082-015-S	15	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600838	T1096-GP-082-020-S	20	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600838	T1096-GP-083-001-S	1	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600838	T1096-GP-083-005-S	5	**1.7**	ND (0.27)	ND (0.62)	ND (0.25)
600838	T1096-GP-083-010-S	10	**1 JH (1.09)**	ND (0.27)	ND (0.62)	ND (0.25)
600838	T1096-GP-083-020-S	20	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600840	T1096-GP-084-001-S	1	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600840	T1096-GP-084-005-S	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600840	T1096-GP-084-010-S	10	**1 J (1.07)**	ND (0.27)	ND (0.62)	ND (0.25)
600840	T1096-GP-084-015-S	15	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600840	T1096-GP-084-020-S	20	ND (0.22)	**5.7**	ND (0.62)	**1.5**
600842	T1096-GP-070-005-S	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600842	T1096-GP-070-010-S	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)

Refer to footnotes at end of table.

Table H2-4 (Continued)
SWMU 96, Summary of VOC Analytical Results—Detections Only,
Soil Samples Collected 1998

Sample Attributes			VOCs (EPA Method 8240/8240/8260/SW846[a]) (µg/kg)			
Record Number[b]	ER Sample ID	Sample Depth (ft)	Toluene	Trichloroethene	Xylene	cis-1,2-Dichloroethene
600842	T1096-GP-071-010-S	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600842	T1096-GP-071-015-S	15	**1.2**	ND (0.27)	ND (0.62)	ND (0.25)
600842	T1096-GP-071-020-S	20	**2**	ND (0.27)	ND (0.62)	ND (0.25)
600842	T1096-GP-072-005-S	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600842	T1096-GP-072-010-S	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600842	T1096-GP-072-015-S	15	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600842	T1096-GP-072-020-S	20	**3.2**	ND (0.27)	ND (0.62)	ND (0.25)
600843	T1096-GP-073-001-S	1	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600843	T1096-GP-073-005-S	5	**1 J (1.11)**	ND (0.27)	ND (0.62)	ND (0.25)
600843	T1096-GP-073-010-S	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600843	T1096-GP-073-015-S	15	**2.7**	ND (0.27)	ND (0.62)	ND (0.25)
600843	T1096-GP-073-020-S	20	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600843	T1096-GP-074-001-S	1	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-075-005-S	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-075-010-S	10	**1.3**	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-075-015-S	15	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-075-020-S	20	**3.1**	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-076-005-S	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-076-010-S	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-076-015-S	15	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-076-020-S	20	**2.4**	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-077-005-S	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-077-010-S	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-077-015-S	15	**1.5**	ND (0.27)	ND (0.62)	ND (0.25)
600845	T1096-GP-077-020-S	20	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600846	T1096-GP-078-001-S	1	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600846	T1096-GP-078-005-S	5	**1.6**	ND (0.27)	ND (0.62)	ND (0.25)

Refer to footnotes at end of table.

Table H2-4 (Continued)
SWMU 96, Summary of VOC Analytical Results—Detections Only,
Soil Samples Collected 1998

Sample Attributes			VOCs (EPA Method 8240/8240/8260/SW846[a]) (µg/kg)			
Record Number[b]	ER Sample ID	Sample Depth (ft)	Toluene	Trichloroethene	Xylene	cis-1,2-Dichloroethene
600846	T1096-GP-078-010-S	10	**2.1**	ND (0.27)	ND (0.62)	ND (0.25)
600846	T1096-GP-078-015-S	15	**5.4**	ND (0.27)	ND (0.62)	ND (0.25)
600846	T1096-GP-078-020-S	20	**20**	ND (0.27)	ND (0.62)	ND (0.25)
600846	T1096-GP-079-001-S	1	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
600846	T1096-GP-079-005-S	5	**2.9**	ND (0.27)	ND (0.62)	ND (0.25)
600846	T1096-GP-079-010-S	10	**20**	ND (0.27)	ND (0.62)	ND (0.25)
600846	T1096-GP-079-015-S	15	**6.9**	ND (0.27)	ND (0.62)	ND (0.25)
600846	T1096-GP-079-020-S	20	**1.7**	ND (0.27)	ND (0.62)	ND (0.25)
601096	T1096-GP-074-005	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
601096	T1096-GP-074-010	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
601096	T1096-GP-074-015	15	**1.2**	ND (0.27)	ND (0.62)	ND (0.25)
601096	T1096-GP-074-020	20	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
601096	T1096-GP-088-005	5	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
601096	T1096-GP-089-010	10	ND (0.22)	ND (0.27)	ND (0.62)	ND (0.25)
Quality Assurance/Quality Control Samples (mg/L)						
600831	T1096-EB-006-000-W	0	ND (0.5)	NA	**2.3**	NA
600840	T1096-EB-010-000-W	0	ND (0.5)	NA	ND (1.1)	NA
601096	T1096-EB-011-000	0	ND (0.5)	NA	ND (1.1)	NA
600831	T1096-TB-021-000-W	0	**0.51 JH (1)**	NA	ND (1.1)	NA
600838	T1096-TB-030-000-W	0	ND (0.5)	NA	ND (1.1)	NA
600840	T1096-TB-029-000-W	0	ND (0.5)	NA	ND (1.1)	NA
600842	T1096-TB-023-000-W	0	ND (0.5)	NA	ND (1.1)	NA
600849	T1096-TB-022-000-W	0	ND (0.5)	NA	ND (1.1)	NA
601096	T1096-TB-031-000-W	0	ND (0.5)	NA	ND (1.1)	NA

Refer to footnotes at end of table.

Table H2-4 (Concluded)
SWMU 96, Summary of VOC Analytical Results—Detections Only, Soil Samples Collected 1998

Note: **Bold** indicates values that exceed background screening levels.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

B	= Analyte detected in associated blank.
EB	= Equipment blank.
EPA	= U.S. Environmental Protection Agency.
ER	= Environmental Restoration.
ft	= Foot (feet).
GP	= Geoprobe.
H	= The hold time was exceeded for the associated sample analysis.
ID	= Identification.
J ( )	= The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
µg/kg	= Microgram(s) per kilogram.
mg/L	= Milligram(s) per liter.
ND ( )	= Not detected above the MDL, shown in parentheses.
PQL	= Practical quantitation limit.
S	= Soil Sample.
SD	= Sample Duplicate.
SWMU	= Solid Waste Management Unit.
T1	= Technical Area 1.
TB	= Trip blank.
VOC	= Volatile organic compound.
W	= Water Sample.

Table H2-5a
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Plutonium-238	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600829	T1096-GP-060-010-S	10	0.0193	0.0168
600829	T1096-GP-061-020-S	20	0.0708	0.0399
600830	T1096-GP-064-001-S	1	0.0813	0.118
600830	T1096-GP-064-015-S	15	0.0135	0.0156
600830	T1096-GP-064-020-S	20	0.0131	0.0152
600831	T1096-GP-065-010-S	10	0.0189	0.0191
600831	T1096-GP-066-005-S	5	0.0167	0.0202
600831	T1096-GP-067-005-S	5	0.0279	0.0233
600832	T1096-GP-069-015-S	15	0.012	0.0139
600842	T1096-GP-072-020-S	20	0.0229	0.0262
600846	T1096-GP-078-001-S	1	0.0221	0.0178
600846	T1096-GP-079-001-S	1	0.19	0.0616
600846	T1096-GP-078-015-S	15	0.0517	0.0274
600846	T1096-GP-079-015-S	15	0.112	0.0445
600846	T1096-GP-079-020-S	20	0.0663	0.0397
600838	T1096-GP-080-010-S	10	0.0671	0.0294
600838	T1096-GP-080-020-S	20	0.00932	0.0108
600838	T1096-GP-083-005-S	5	0.0326	0.0187
600840	T1096-GP-084-001-S	1	0.0102	0.0135
600840	T1096-GP-084-005-S	5	0.00903	0.012
601096	T1096-GP-074-020	20	0.155	0.0455
600849	T1096-EB-007-000-W	0	0.0477	0.042
Background Activity—North Area[c]		NA	NA	NA

[a]Analysis request/chain-of-custody record.
[b]Two standard deviations about the mean detected activity.
[c]Dinwiddie September 1997.
EB = Equipment Blank.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
NA = Not applicable.
pCi/g = Picocuries per gram.
S = Soil Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.
W = Water Sample.

Table H2-5b
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Plutonium-239/240	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600829	T1096-GP-060-005-S	5	0.0323	0.0233
600829	T1096-GP-061-020-S	20	0.213	0.0644
600830	T1096-GP-062-005-S	5	0.0335	0.0635
600830	T1096-GP-062-015-S	15	0.0222	0.0259
600830	T1096-GP-063-001-S	1	0.18	0.0687
600830	T1096-GP-063-005-S	5	0.0926	0.0506
600830	T1096-GP-064-005-S	5	0.0171	0.0346
600830	T1096-GP-064-020-S	20	0.00653	0.00977
600831	T1096-GP-065-005-S	5	0.00856	0.0173
600831	T1096-GP-066-015-S	15	0.00829	0.0146
600831	T1096-GP-066-020-S	20	0.0183	0.0166
600831	T1096-GP-067-005-S	5	0.0131	0.0155
600831	T1096-GP-067-015-S	15	0.0136	0.014
600832	T1096-GP-069-005-S	5	0.00624	0.00887
600842	T1096-GP-071-005-S	5	0.0139	0.0115
600842	T1096-GP-071-015-S	15	0.0114	0.0103
600842	T1096-GP-072-010-S	10	0.0307	0.0192
600842	T1096-GP-072-020-S	20	0.0181	0.0154
600843	T1096-GP-073-005-S	5	0.0137	0.016
600845	T1096-GP-075-005-S	5	0.0332	0.0258
600845	T1096-GP-077-010-S	10	0.00953	0.0133
600846	T1096-GP-078-001-S	1	0.01	0.0107
600846	T1096-GP-079-001-S	1	0.105	0.0425
600846	T1096-GP-078-010-S	10	0.0298	0.0193
600846	T1096-GP-079-015-S	15	0.115	0.0409
600846	T1096-GP-079-020-S	20	0.0199	0.0189
600838	T1096-GP-080-010-S	10	0.0262	0.0178
600838	T1096-GP-080-020-S	20	0.031	0.0201
600838	T1096-GP-081-020-S	20	0.00585	0.0083
600838	T1096-GP-082-015-S	15	0.00563	0.00654
600838	T1096-GP-083-005-S	5	0.0157	0.0131
600838	T1096-GP-083-020-S	20	0.00808	0.00955
600840	T1096-GP-084-005-S	5	0.0045	0.00792
601096	T1096-GP-074-015	15	0.0182	0.014
601096	T1096-GP-074-020	20	0.0453	0.0228
600831	T1096-EB-006-000-W	0	0.0534	0.0315
600849	T1096-EB-007-000-W	0	0.0253	0.0272
601096	T1096-EB-011-000	0	0.0258	0.0329

Refer to footnotes at end of table.

Table H2-5b (Concluded)
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

[a]Analysis request/chain-of-custody record.
[b]Two standard deviations about the mean detected activity.
EB = Equipment Blank.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
pCi/g = Picocuries per gram.
S = Soil Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.
W = Water Sample.

Table H2-5c
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Tritium	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600830	T1096-GP-062-010-S	10	0.0109	0.00975
600830	T1096-GP-062-015-S	15	0.0117	0.00995
600830	T1096-GP-062-020-S	20	0.0102	0.00965
600830	T1096-GP-063-001-S	1	0.01155	0.01
600830	T1096-GP-063-010-S	10	0.01185	0.00995
600830	T1096-GP-063-015-S	15	0.01335	0.0099
600830	T1096-GP-064-005-S	5	0.01105	0.00995
600831	T1096-GP-066-005-S	5	0.00995	0.01025
600842	T1096-GP-072-010-S	10	0.00945	0.00955
600843	T1096-GP-073-005-S	5	0.0146	0.0102
600843	T1096-GP-073-020-S	20	0.01425	0.01085
600843	T1096-GP-074-001-S	1	0.0123	0.01025
600845	T1096-GP-076-020-S	20	0.0134	0.01115
600845	T1096-GP-077-010-S	10	0.0138	0.01035
600845	T1096-GP-077-020-S	20	0.0095	0.01015

[a]Analysis request/chain-of-custody record.
[b]Two standard deviations about the mean detected activity.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
pCi/g = Picocuries per gram.
S = Soil Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.

Table H2-5d
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Uranium-233/234	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600829	T1096-GP-060-005-S	5	1.2	0.164
600829	T1096-GP-060-010-S	10	0.876	0.128
600829	T1096-GP-061-005-S	5	1.09	0.152
600829	T1096-GP-061-010-S	10	1.02	0.142
600829	T1096-GP-061-015-S	15	1.1	0.151
600829	T1096-GP-061-020-S	20	0.871	0.138
600830	T1096-GP-062-005-S	5	1.07	0.145
600830	T1096-GP-062-010-S	10	0.813	0.124
600830	T1096-GP-062-015-S	15	0.824	0.13
600830	T1096-GP-062-020-S	20	1.03	0.143
600830	T1096-GP-063-001-S	1	0.81	0.124
600830	T1096-GP-063-005-S	5	0.946	0.142
600830	T1096-GP-063-010-S	10	0.897	0.133
600830	T1096-GP-063-015-S	15	1.06	0.15
600830	T1096-GP-063-020-S	20	0.875	0.126
600830	T1096-GP-064-001-S	1	0.819	0.125
600830	T1096-GP-064-005-S	5	1.06	0.146
600830	T1096-GP-064-010-S	10	0.944	0.139
600830	T1096-GP-064-015-S	15	0.847	0.127
600830	T1096-GP-064-020-S	20	0.926	0.139
600831	T1096-GP-065-005-S	5	0.861	0.161
600831	T1096-GP-065-010-S	10	0.998	0.17
600831	T1096-GP-065-015-S	15	0.81	0.142
600831	T1096-GP-065-020-S	20	0.968	0.149
600831	T1096-GP-066-005-S	5	0.866	0.147
600831	T1096-GP-066-010-S	10	1.13	0.17
600831	T1096-GP-066-015-S	15	0.89	0.154
600831	T1096-GP-066-020-S	20	0.724	0.132
600831	T1096-GP-067-005-S	5	1.07	0.193
600831	T1096-GP-067-010-S	10	1.02	0.173
600831	T1096-GP-067-015-S	15	1.31	0.22
600831	T1096-GP-067-020-S	20	0.774	0.139
600831	T1096-GP-085-005-SD	5	0.587	0.127
600832	T1096-GP-068-001-S	1	0.582	0.121
600832	T1096-GP-068-005-S	5	1.34	0.21
600832	T1096-GP-068-010-S	10	1.02	0.181
600832	T1096-GP-068-015-S	15	0.904	0.134
600832	T1096-GP-068-020-S	20	0.697	0.109
600832	T1096-GP-069-001-S	1	0.621	0.129
600832	T1096-GP-069-005-S	5	0.962	0.162

Refer to footnotes at end of table.

Table H2-5d (Continued)
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Uranium-233/234	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600832	T1096-GP-069-010-S	10	1.14	0.205
600832	T1096-GP-069-015-S	15	0.861	0.166
600832	T1096-GP-069-020-S	20	0.959	0.169
600842	T1096-GP-070-005-S	5	0.937	0.148
600842	T1096-GP-070-010-S	10	0.846	0.143
600842	T1096-GP-070-015-S	15	0.732	0.137
600842	T1096-GP-070-020-S	20	0.782	0.143
600842	T1096-GP-071-005-S	5	1.24	0.199
600842	T1096-GP-071-010-S	10	0.809	0.152
600842	T1096-GP-071-015-S	15	0.796	0.143
600842	T1096-GP-071-020-S	20	1.09	0.192
600842	T1096-GP-072-005-S	5	0.755	0.135
600842	T1096-GP-072-010-S	10	0.68	0.127
600842	T1096-GP-072-015-S	15	0.778	0.143
600842	T1096-GP-072-020-S	20	0.751	0.124
600843	T1096-GP-073-001-S	1	0.581	0.146
600843	T1096-GP-073-005-S	5	1.05	0.226
600843	T1096-GP-073-010-S	10	0.839	0.18
600843	T1096-GP-073-015-S	15	0.885	0.227
600843	T1096-GP-073-020-S	20	0.834	0.182
600843	T1096-GP-074-001-S	1	0.648	0.185
600845	T1096-GP-075-005-S	5	1.11	0.226
600845	T1096-GP-075-010-S	10	0.916	0.213
600845	T1096-GP-075-015-S	15	0.819	0.175
600845	T1096-GP-075-020-S	20	0.986	0.197
600845	T1096-GP-076-005-S	5	1.05	0.216
600845	T1096-GP-076-010-S	10	0.761	0.177
600845	T1096-GP-076-015-S	15	0.995	0.19
600845	T1096-GP-076-020-S	20	0.868	0.193
600845	T1096-GP-077-005-S	5	1.14	0.191
600845	T1096-GP-077-010-S	10	0.765	0.202
600845	T1096-GP-077-015-S	15	0.622	0.157
600845	T1096-GP-077-020-S	20	0.855	0.362
600845	T1096-GP-086-010-SD	10	0.766	0.155
600845	T1096-GP-087-001-SD	1	0.764	0.173
600846	T1096-GP-078-001-S	1	0.915	0.12
600846	T1096-GP-079-001-S	1	0.913	0.138
600846	T1096-GP-078-005-S	5	0.76	0.111
600846	T1096-GP-078-010-S	10	0.678	0.106
600846	T1096-GP-078-015-S	15	0.857	0.116

Refer to footnotes at end of table.

Table H2-5d (Continued)
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Uranium-233/234	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600846	T1096-GP-078-020-S	20	0.701	0.101
600846	T1096-GP-079-005-S	5	0.912	0.146
600846	T1096-GP-079-010-S	10	0.743	0.103
600846	T1096-GP-079-015-S	15	0.713	0.105
600846	T1096-GP-079-020-S	20	0.809	0.111
600838	T1096-GP-080-005-S	5	1.17	0.191
600838	T1096-GP-080-010-S	10	0.998	0.169
600838	T1096-GP-080-015-S	15	0.787	0.139
600838	T1096-GP-080-020-S	20	0.901	0.159
600838	T1096-GP-081-005-S	5	1.08	0.175
600838	T1096-GP-081-010-S	10	0.902	0.156
600838	T1096-GP-081-015-S	15	0.793	0.144
600838	T1096-GP-081-020-S	20	0.726	0.133
600838	T1096-GP-082-005-S	5	0.99	0.177
600838	T1096-GP-082-010-S	10	0.886	0.156
600838	T1096-GP-082-015-S	15	0.909	0.212
600838	T1096-GP-082-020-S	20	0.766	0.145
600838	T1096-GP-083-001-S	1	0.793	0.146
600838	T1096-GP-083-005-S	5	1.09	0.194
600838	T1096-GP-083-010-S	10	1.02	0.181
600838	T1096-GP-083-015-S	15	0.877	0.168
600838	T1096-GP-083-020-S	20	0.646	0.128
600840	T1096-GP-084-001-S	1	0.788	0.115
600840	T1096-GP-084-005-S	5	1.03	0.135
600840	T1096-GP-084-010-S	10	0.923	0.132
600840	T1096-GP-084-015-S	15	0.9	0.14
600840	T1096-GP-084-020-S	20	0.723	0.162
601096	T1096-GP-074-005	5	0.855	0.14
601096	T1096-GP-074-010	10	0.983	0.149
601096	T1096-GP-074-015	15	0.694	0.124
601096	T1096-GP-074-020	20	0.773	0.12
601096	T1096-GP-088-005	5	0.793	0.126
601096	T1096-GP-089-010	10	1.18	0.182
600831	T1096-EB-006-000-W	0	0.151	0.0681
600838	T1096-EB-009-000-W	0	0.0648	0.0755

Refer to footnotes at end of table.

Table H2-5d (Concluded)
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

[a]Analysis request/chain-of-custody record.
[b]Two standard deviations about the mean detected activity.
EB = Equipment Blank.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
pCi/g = Picocuries per gram.
S = Soil Sample.
SD = Sample Duplicate.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.
W = Water Sample.

Table H2-5e
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Uranium-235	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600829	T1096-GP-060-005-S	5	0.0431	0.0228
600829	T1096-GP-060-010-S	10	0.0578	0.0253
600829	T1096-GP-061-005-S	5	0.0599	0.0269
600829	T1096-GP-061-010-S	10	0.0458	0.0228
600829	T1096-GP-061-015-S	15	0.0507	0.0238
600829	T1096-GP-061-020-S	20	0.0513	0.0284
600830	T1096-GP-062-005-S	5	0.0473	0.023
600830	T1096-GP-062-010-S	10	0.0458	0.0233
600830	T1096-GP-062-015-S	15	0.0535	0.0287
600830	T1096-GP-062-020-S	20	0.0494	0.0232
600830	T1096-GP-063-001-S	1	0.0495	0.0246
600830	T1096-GP-063-005-S	5	0.026	0.0203
600830	T1096-GP-063-010-S	10	0.0397	0.0227
600830	T1096-GP-063-015-S	15	0.041	0.0245
600830	T1096-GP-063-020-S	20	0.0394	0.0209
600830	T1096-GP-064-001-S	1	0.0407	0.0233
600830	T1096-GP-064-005-S	5	0.0365	0.0208
600830	T1096-GP-064-010-S	10	0.0214	0.023
600830	T1096-GP-064-015-S	15	0.0463	0.0237
600830	T1096-GP-064-020-S	20	0.0466	0.0258
600831	T1096-GP-065-005-S	5	0.0368	0.031
600831	T1096-GP-065-010-S	10	0.0268	0.0247
600831	T1096-GP-065-015-S	15	0.0503	0.0329
600831	T1096-GP-065-020-S	20	0.0578	0.0288
600831	T1096-GP-066-005-S	5	0.0365	0.0267
600831	T1096-GP-066-010-S	10	0.0351	0.0241
600831	T1096-GP-066-015-S	15	0.0657	0.0349
600831	T1096-GP-066-020-S	20	0.0452	0.0277
600831	T1096-GP-067-005-S	5	0.0688	0.043
600831	T1096-GP-067-010-S	10	0.0543	0.0338
600831	T1096-GP-067-015-S	15	0.0505	0.0369
600831	T1096-GP-067-020-S	20	0.0352	0.0255
600831	T1096-GP-085-005-SD	5	0.0172	0.0237
600832	T1096-GP-068-001-S	1	0.0493	0.0341
600832	T1096-GP-068-005-S	5	0.0425	0.033
600832	T1096-GP-068-010-S	10	0.0817	0.0421
600832	T1096-GP-068-015-S	15	0.0584	0.0287
600832	T1096-GP-068-020-S	20	0.0609	0.0262
600832	T1096-GP-069-001-S	1	0.0627	0.0355
600832	T1096-GP-069-005-S	5	0.0458	0.0299

Refer to footnotes at end of table.

Table H2-5e (Continued)
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Uranium-235	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600832	T1096-GP-069-010-S	10	0.0388	0.0355
600832	T1096-GP-069-015-S	15	0.0351	0.0293
600832	T1096-GP-069-020-S	20	0.0449	0.0307
600842	T1096-GP-070-005-S	5	0.0488	0.0279
600842	T1096-GP-070-010-S	10	0.0535	0.0291
600842	T1096-GP-070-015-S	15	0.0606	0.033
600842	T1096-GP-070-020-S	20	0.0477	0.0311
600842	T1096-GP-071-005-S	5	0.0456	0.0313
600842	T1096-GP-071-020-S	10	0.107	0.0512
600842	T1096-GP-072-005-S	5	0.0366	0.0247
600842	T1096-GP-072-010-S	10	0.0475	0.0293
600842	T1096-GP-072-015-S	15	0.0874	0.0417
600842	T1096-GP-072-020-S	20	0.0582	0.0291
600843	T1096-GP-073-001-S	1	0.0213	0.0247
600843	T1096-GP-073-005-S	5	0.0969	0.0602
600843	T1096-GP-073-010-S	10	0.0379	0.0348
600843	T1096-GP-073-015-S	15	0.0334	0.0443
600843	T1096-GP-073-020-S	20	0.0424	0.035
600843	T1096-GP-074-001-S	1	0.0712	0.0546
600845	T1096-GP-075-005-S	5	0.0831	0.0544
600845	T1096-GP-075-010-S	10	0.0299	0.0355
600845	T1096-GP-075-015-S	15	0.0469	0.0359
600845	T1096-GP-075-020-S	20	0.0162	0.0286
600845	T1096-GP-076-005-S	5	0.0696	0.051
600845	T1096-GP-076-010-S	10	0.0253	0.0434
600845	T1096-GP-076-015-S	15	0.0388	0.0325
600845	T1096-GP-076-020-S	20	0.0307	0.041
600845	T1096-GP-077-005-S	5	0.0769	0.0411
600845	T1096-GP-077-010-S	10	0.0101	0.0202
600845	T1096-GP-077-015-S	15	0.03	0.0355
600845	T1096-GP-077-020-S	20	0.0431	0.0894
600845	T1096-GP-086-010-SD	10	0.0449	0.0321
600845	T1096-GP-087-001-SD	1	0.0354	0.0365
600846	T1096-GP-078-001-S	1	0.0468	0.0199
600846	T1096-GP-079-001-S	1	0.0884	0.0354
600846	T1096-GP-078-005-S	5	0.0524	0.025
600846	T1096-GP-078-010-S	10	0.0581	0.0294
600846	T1096-GP-078-015-S	15	0.0987	0.0303
600846	T1096-GP-078-020-S	20	0.0435	0.0218
600846	T1096-GP-079-005-S	5	0.0448	0.0287

Refer to footnotes at end of table.

Table H2-5e (Concluded)
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Uranium-235	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600846	T1096-GP-079-010-S	10	0.0327	0.018
600846	T1096-GP-079-015-S	15	0.0421	0.0207
600846	T1096-GP-079-020-S	20	0.0414	0.0185
600838	T1096-GP-080-005-S	5	0.0397	0.0283
600838	T1096-GP-080-010-S	10	0.0644	0.0335
600838	T1096-GP-080-015-S	15	0.0163	0.0174
600838	T1096-GP-080-020-S	20	0.0319	0.0245
600838	T1096-GP-081-005-S	5	0.0521	0.0295
600838	T1096-GP-081-010-S	10	0.0335	0.0248
600838	T1096-GP-081-015-S	15	0.0526	0.0304
600838	T1096-GP-081-020-S	20	0.0352	0.0238
600838	T1096-GP-082-005-S	5	0.0359	0.0266
600838	T1096-GP-082-010-S	10	0.0658	0.0343
600838	T1096-GP-082-015-S	15	0.0302	0.0336
600838	T1096-GP-082-020-S	20	0.0431	0.0284
600838	T1096-GP-083-001-S	1	0.0253	0.0208
600838	T1096-GP-083-005-S	5	0.049	0.0324
600838	T1096-GP-083-010-S	10	0.0416	0.0289
600838	T1096-GP-083-015-S	15	0.0716	0.0392
600838	T1096-GP-083-020-S	20	0.0347	0.0249
600840	T1096-GP-084-001-S	1	0.0775	0.0283
600840	T1096-GP-084-005-S	5	0.0698	0.0248
600840	T1096-GP-084-010-S	10	0.0381	0.02
600840	T1096-GP-084-015-S	15	0.103	0.0372
600840	T1096-GP-084-020-S	20	0.0826	0.0483
601096	T1096-GP-074-005	5	0.0395	0.0241
601096	T1096-GP-074-010	10	0.0324	0.0223
601096	T1096-GP-074-015	15	0.0378	0.0242
601096	T1096-GP-074-020	20	0.0406	0.0233
601096	T1096-GP-088-005	5	0.049	0.025
601096	T1096-GP-089-010	10	0.0584	0.0308
600831	T1096-EB-006-000-W	0	0.0309	0.0317
600849	T1096-EB-007-000-W	0	0.0495	0.032

[a]Analysis request/chain-of-custody record.
[b]Two standard deviations about the mean detected activity.

EB = Equipment Blank.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
pCi/g = Picocuries per gram.
S = Soil Sample.
SD = Sample Duplicate.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.
W = Water Sample.

Table H2-5f
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Uranium-238	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600829	T1096-GP-060-005-S	5	1.07	0.149
600829	T1096-GP-060-010-S	10	0.787	0.118
600829	T1096-GP-061-005-S	5	0.895	0.132
600829	T1096-GP-061-010-S	10	0.875	0.127
600829	T1096-GP-061-015-S	15	0.837	0.124
600829	T1096-GP-061-020-S	20	0.894	0.14
600830	T1096-GP-062-005-S	5	1.11	0.148
600830	T1096-GP-062-010-S	10	0.788	0.122
600830	T1096-GP-062-015-S	15	0.763	0.123
600830	T1096-GP-062-020-S	20	0.721	0.11
600830	T1096-GP-063-001-S	1	0.679	0.109
600830	T1096-GP-063-005-S	5	1	0.147
600830	T1096-GP-063-010-S	10	0.807	0.123
600830	T1096-GP-063-015-S	15	1.04	0.147
600830	T1096-GP-063-020-S	20	0.77	0.115
600830	T1096-GP-064-001-S	1	0.74	0.116
600830	T1096-GP-064-005-S	5	1.05	0.144
600830	T1096-GP-064-010-S	10	0.873	0.131
600830	T1096-GP-064-015-S	15	0.637	0.105
600830	T1096-GP-064-020-S	20	1.02	0.149
600831	T1096-GP-065-005-S	5	0.77	0.148
600831	T1096-GP-065-010-S	10	1	0.17
600831	T1096-GP-065-015-S	15	0.8	0.14
600831	T1096-GP-065-020-S	20	0.878	0.139
600831	T1096-GP-066-005-S	5	0.808	0.139
600831	T1096-GP-066-010-S	10	0.903	0.145
600831	T1096-GP-066-015-S	15	0.797	0.143
600831	T1096-GP-066-020-S	20	0.654	0.124
600831	T1096-GP-067-005-S	5	0.873	0.169
600831	T1096-GP-067-010-S	10	0.786	0.145
600831	T1096-GP-067-015-S	15	1.01	0.183
600831	T1096-GP-067-020-S	20	0.64	0.122
600831	T1096-GP-085-005-SD	5	0.777	0.149
600832	T1096-GP-068-001-S	1	0.549	0.116
600832	T1096-GP-068-005-S	5	1.09	0.181
600832	T1096-GP-068-010-S	10	1.12	0.192
600832	T1096-GP-068-015-S	15	0.751	0.117
600832	T1096-GP-068-020-S	20	0.641	0.103
600832	T1096-GP-069-001-S	1	0.563	0.121
600832	T1096-GP-069-005-S	5	0.948	0.16

Refer to footnotes at end of table.

Table H2-5f (Continued)
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Uranium-238	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600832	T1096-GP-069-010-S	10	1.14	0.204
600832	T1096-GP-069-015-S	15	0.834	0.162
600832	T1096-GP-069-020-S	20	1	0.174
600842	T1096-GP-070-005-S	5	0.836	0.137
600842	T1096-GP-070-010-S	10	0.863	0.145
600842	T1096-GP-070-015-S	15	0.9	0.156
600842	T1096-GP-070-020-S	20	0.745	0.137
600842	T1096-GP-071-005-S	5	1.07	0.18
600842	T1096-GP-071-010-S	10	0.734	0.143
600842	T1096-GP-071-015-S	15	0.914	0.157
600842	T1096-GP-071-020-S	20	1.04	0.187
600842	T1096-GP-072-005-S	5	0.721	0.131
600842	T1096-GP-072-010-S	10	0.702	0.13
600842	T1096-GP-072-015-S	15	0.825	0.147
600842	T1096-GP-072-020-S	20	0.711	0.119
600843	T1096-GP-073-001-S	1	0.524	0.137
600843	T1096-GP-073-005-S	5	0.941	0.211
600843	T1096-GP-073-010-S	10	0.825	0.178
600843	T1096-GP-073-015-S	15	0.776	0.207
600843	T1096-GP-073-020-S	20	0.794	0.175
600843	T1096-GP-074-001-S	1	0.827	0.212
600845	T1096-GP-075-005-S	5	1.18	0.235
600845	T1096-GP-075-010-S	10	0.729	0.182
600845	T1096-GP-075-015-S	15	0.819	0.175
600845	T1096-GP-075-020-S	20	0.778	0.167
600845	T1096-GP-076-005-S	5	0.958	0.202
600845	T1096-GP-076-010-S	10	0.856	0.189
600845	T1096-GP-076-015-S	15	0.709	0.152
600845	T1096-GP-076-020-S	20	0.987	0.21
600845	T1096-GP-077-005-S	5	0.952	0.169
600845	T1096-GP-077-010-S	10	0.891	0.221
600845	T1096-GP-077-015-S	15	0.645	0.158
600845	T1096-GP-077-020-S	20	0.882	0.369
600845	T1096-GP-086-010-SD	10	0.76	0.154
600845	T1096-GP-087-001-SD	1	0.768	0.173
600846	T1096-GP-078-001-S	1	0.846	0.114
600846	T1096-GP-079-001-S	1	0.704	0.115
600846	T1096-GP-078-005-S	5	0.728	0.107
600846	T1096-GP-078-010-S	10	0.675	0.105
600846	T1096-GP-078-015-S	15	0.783	0.109

Refer to footnotes at end of table.

Table H2-5f (Continued)
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

Sample Attributes			Activity (pCi/g) Uranium-238	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]
600846	T1096-GP-078-020-S	20	0.719	0.103
600846	T1096-GP-079-005-S	5	0.789	0.131
600846	T1096-GP-079-010-S	10	0.609	0.0887
600846	T1096-GP-079-015-S	15	0.74	0.108
600846	T1096-GP-079-020-S	20	0.777	0.108
600838	T1096-GP-080-005-S	5	1.22	0.197
600838	T1096-GP-080-010-S	10	1.01	0.17
600838	T1096-GP-080-015-S	15	0.784	0.139
600838	T1096-GP-080-020-S	20	0.768	0.143
600838	T1096-GP-081-005-S	5	1.03	0.169
600838	T1096-GP-081-010-S	10	0.729	0.135
600838	T1096-GP-081-015-S	15	0.833	0.149
600838	T1096-GP-081-020-S	20	0.616	0.119
600838	T1096-GP-082-005-S	1	0.774	0.149
600838	T1096-GP-082-010-S	10	0.891	0.157
600838	T1096-GP-082-015-S	15	0.968	0.221
600838	T1096-GP-082-020-S	20	0.778	0.147
600838	T1096-GP-083-001-S	1	0.717	0.136
600838	T1096-GP-083-005-S	5	0.987	0.182
600838	T1096-GP-083-010-S	10	0.946	0.172
600838	T1096-GP-083-015-S	15	0.881	0.169
600838	T1096-GP-083-020-S	20	0.636	0.127
600840	T1096-GP-084-001-S	1	0.62	0.0966
600840	T1096-GP-084-005-S	2	0.906	0.122
600840	T1096-GP-084-010-S	10	0.799	0.119
600840	T1096-GP-084-015-S	15	0.856	0.135
600840	T1096-GP-084-020-S	20	0.655	0.152
601096	T1096-GP-074-005	5	0.715	0.124
601096	T1096-GP-074-010	10	0.886	0.139
601096	T1096-GP-074-015	15	0.758	0.132
601096	T1096-GP-074-020	20	0.726	0.114
601096	T1096-GP-088-005	5	0.752	0.121
601096	T1096-GP-089-010	10	0.907	0.151
600831	T1096-EB-006-000-W	0	0.024	0.0284
600840	T1096-EB-010-000-W	0	0.0274	0.039

Table H2-5f (Continued)
SWMU 96, Summary of Radiochemistry Analytical Results,
1998 Supplemental Investigation

[a]Analysis request/chain-of-custody record.
[b]Two standard deviations about the mean detected activity.
EB = Equipment Blank.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
pCi/g = Picocuries per gram.
S = Soil Sample.
SD = Sample Duplicate.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.
W = Water Sample.

Table H3-1
SWMU 96, Summary of Metals Analytical Results,
2002 Supplemental Investigation

Sample Attributes			Metals (EPA Method SW846 3005/SW846 3050/SW846 7470/SW846 7471[a]) (mg/kg)			
Record Number[b]	ER Sample ID	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium
605198	T1096-GP-098	5	2.06	113	0.253 J (0.476)	8.92
605198	T1096-GP-099	5	2.6	114	ND (0.0249)	10.6
605198	T1096-SD-034	1	3.05	111	ND (0.0252)	10.2
605198	T1096-SD-034	1	2.97	102	ND (0.0254)	9.73
605198	T1096-SD-035	1	3.53	169	ND (0.024)	4.39
605533	T1096-GP-092-06-S	6	4.11	**292**	ND (0.0455)	**18**
605533	T1096-GP-093-06-DUP	6	3.22	162	ND (0.0447)	10.5
605533	T1096-GP-093-06-S	6	3.13	**314**	ND (0.046)	10.1
605533	T1096-SD-030-00-S	1	**5.28**	**271**	ND (0.0464)	**12.6**
605533	T1096-SD-031-00-S	1	4.28	200	ND (0.046)	**13.1**
Background Concentration—North Area[c]			4.4	200	<1	12
Quality Assurance/Quality Control Samples (mg/L)						
605198	T1096-EB	0	ND (0.00457)	0.00069 J (0.005)	ND (0.00025)	0.00126 J (0.005)
605533	T1096-GP-00-EB	0	ND (0.00224)	0.00097 J (0.005)	0.00038 J (0.005)	0.0009 J (0.005)

Refer to footnotes at end of table.

Table H3-1 (Concluded)
SWMU 96, Summary of Metals Analytical Results,
2002 Supplemental Investigation

Sample Attributes			Metals (EPA Method SW846 3005/SW846 3050/SW846 7470/SW846 7471[a]) (mg/kg)			
Record Number[b]	ER Sample ID	Sample Depth (ft)	Lead	Mercury	Selenium	Silver
605198	T1096-GP-098	5	5.02	ND (0.00414)	ND (0.257)	ND (0.11)
605198	T1096-GP-099	5	4.3	ND (0.00438)	ND (0.26)	ND (0.111)
605198	T1096-SD-034	1	9.25	0.0112	0.516	ND (0.112)
605198	T1096-SD-034	1	9.47	0.00696 J (0.00922)	0.295 J (0.49)	ND (0.113)
605198	T1096-SD-035	1	2.94	ND (0.00431)	0.341 J (0.463)	ND (0.107)
605533	T1096-GP-092-06-S	6	5.67	0.00462 J (0.0086)	0.562	ND (0.0859)
605533	T1096-GP-093-06-DUP	6	6.14	0.00311 J (0.00946)	0.626	ND (0.0843)
605533	T1096-GP-093-06-S	6	6.36	0.00466 J (0.00972)	0.488	ND (0.0867)
605533	T1096-SD-030-00-S	1	10.7	0.00395 J (0.00939)	0.51	ND (0.0876)
605533	T1096-SD-031-00-S	1	**17**	0.00748 J (0.00951)	0.584	0.496
Background Concentration—North Area[c]			11.2	<0.1	<10	<1
Quality Assurance/Quality Control Samples (mg/L)						
605198	T1096-EB	0	ND (0.00344)	ND (0.00007)	0.00365 JB (0.005)	0.00089 JB (0.005)
605533	T1096-GP-00-EB	0	ND (0.00172)	ND (0.00005)	ND (0.00281)	ND (0.00084)

Note: **Bold** indicates values that exceed background screening levels.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Dinwiddie September 1997.

B = Analyte detected in associated blank.
DUP = Duplicate.
EB = Equipment Blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.
mg/L = Milligram(s) per liter.
ND ( ) = Not detected above the MDL, shown in parentheses.
PQL = Practical quantitation limit.
S = Soil Sample.
SD = Sediment Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.

Table H3-2
SWMU 96, Summary of PCB Analytical Results—Detections Only,
2002 Supplemental Investigation

Sample Attributes			(EPA Method SW846 8082[a]) (µg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	Aroclor-1260
605533	T1096-SD-02R-00-S	0	**3 J (3.33)**
605533	T1096-SD-030-00-S	0	**42.9**
605533	T1096-SD-031-00-S	0	**76**
Quality Assurance/Quality Control Samples (µg/L)			
605533	T1096-GP-00-EB	0	ND (0.0485)

Note: **Bold** indicates values that exceed background screening levels.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

EB = Equipment Blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
ND ( ) = Not detected above the MDL, shown in parentheses.
PCB = Polychlorinated biphenyl.
PQL = Practical quantitation limit.
S = Soil Sample.
SD = Sediment Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.

Table H3-3
SWMU 96,Summary of SVOC Analytical Results—Detections Only,
2002 Supplemental Investigation

Sample Attributes			SVOCs (EPA Method SW846 8270[a]) (µg/kg)			
Record Number[b]	ER Sample ID	Sample Depth (ft)	Anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene
605198	T1096-SD-032	1	ND (4.67)	ND (2)	ND (2.33)	ND (5)
605198	T1096-SD-033	1	ND (4.67)/ND (4.67)	ND (2)/ND (2)	**17.4 HJ (33.3)/ND (2.33)**	**10.1 HJ (33.3)/ND (5)**
605198	T1096-SD-15R	1	**23.5 J (33.3)/ND (4.67)**	**12.7 HJ (33.3)/ND (2)**	**20.4 HJ (33.3)/ND (2.33)**	**16.9 HJ (33.3)/ND (5)**
Quality Assurance/Quality Control Samples (µg/L)						
605198	T1096-EB	0	ND (0.126)	ND (0.126)	ND (0.126)	ND (0.222)

Sample Attributes			SVOCs (EPA Method SW846 8270[a]) (µg/kg)			
Record Number[b]	ER Sample ID	Sample Depth (ft)	Butylbenzyl phthalate	Chrysene	Diethylphthalate	bis(2-Ethylhexyl) phthalate
605198	T1096-SD-032	1	ND (12.7)	ND (6.33)	**35.9 JB (333)**	ND (7)
605198	T1096-SD-033	1	ND (12.7)/ND (12.7)	**19.3 HJ (33.3)/ND (6.33)**	**31.4 JHB (333)/34.1**	**67.4 JHB (333)/ND (7)**
605198	T1096-SD-15R	1	**52.2 J (333)/ND (12.7)**	**38.3/ND (6.33)**	**39.5 JB (333)/ND (19.7)**	ND (7)/ND (7)
Quality Assurance/Quality Control Samples (µg/L)						
605198	T1096-EB	0	ND (1.76)	ND (0.116)	**1.36 JB (9.66)**	**0.285 JB (9.66)**

Sample Attributes			SVOCs (EPA Method SW846 8270[a]) (µg/kg)		
Record Number[b]	ER Sample ID	Sample Depth (ft)	Fluoranthene	Phenanthrene	Pyrene
605198	T1096-SD-032	1	**21.6 J (33.3)**	ND (4)	ND (8.67)
605198	T1096-SD-033	1	**18.8 J (33.3)/28.1**	**15.1 HJ (33.3)/ND (4)**	**26.2 HJ (33.3)/ND (8.67)**
605198	T1096-SD-15R	1	**32.4 HJ (33.3)/51.1**	**21.1 HJ (33.3)/ND (4)**	**20.8 J (33.3)/34.5**
Quality Assurance/Quality Control Samples (µg/L)					
605198	T1096-EB	0	ND (0.116)	ND (0.116)	ND (0.135)

Refer to footnotes at end of table.

Table H3-3 (Concluded)
SWMU 96,Summary of SVOC Analytical Results—Detections Only,
2002 Supplemental Investigation

Note: **Bold** indicates values that exceed background screening levels.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

B	= Analyte detected in associated blank.
EB	= Equipment Blank.
EPA	= U.S. Environmental Protection Agency.
ER	= Environmental Restoration.
ft	= Foot (feet).
H	= The hold time was exceeded for the associated sample analysis.
ID	= Identification.
J ( )	= The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
MDL	= Method detection limit.
µg/kg	= Microgram(s) per kilogram.
µg/L	= Microgram(s) per liter.
ND ( )	= Not detected above the MDL, shown in parentheses.
PQL	= Practical quantitation limit.
R	= Resampled Location.
SD	= Sediment Sample.
SVOC	= Semivolatile organic compound.
SWMU	= Solid Waste Management Unit.
T1	= Technical Area 1.

Table H3-4
SWMU 96,Summary of VOC Analytical Results—Detections Only,
2002 Supplemental Investigation

Sample Attributes			VOCs (EPA Method SW846 8260[a]) (µg/kg)	
Record Number[b]	ER Sample ID	Sample Depth (ft)	Acetone	Methylene chloride
605533	T1096-GP-01R-09-S	9	ND (3.52)	**2.88 JB (5)**
605533	T1096-GP-090-09-S	9	ND (3.52)	**2.58 JB (5)**
605533	T1096-GP-091-09-S	9	ND (3.52)	**2.61 JB (5)**
605533	T1096-GP-096-06-S	6	ND (3.52)	**2.46 JB (5)**
605533	T1096-GP-097-06-S	6	**4.98 JB (5)**	**2.43 JB (5)**
605533	T1096-GP-47R-06-DUP	6	ND (3.52)	**2.51 JB (5)**
605533	T1096-GP-47R-06-S	6	ND (3.52)	**2.54 JB (5)**
Quality Assurance/Quality Control Samples (µg/L)				
605533	T1096-GP-00-TB	0	ND (2.29)	ND (1.9)

Note: **Bold** indicates values that exceed background screening levels.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

B = Analyte detected in associated blank.
J ( ) = The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
DUP = Duplicate.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
ND ( ) = Not detected above the MDL, shown in parentheses.
PQL = Practical quantitation limit.
R = Resampled Location.
S = Soil Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.
TB = Trip Blank.
VOC = Volatile organic compound.

Table H3-5
SWMU 96, Summary of Radiochemistry Analytical Results,
2002 Supplemental Investigation

Sample Attributes			Activity (pCi/g)			
			Plutonium-238		Plutonium-239/240	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]	Result	Error[b]
605198	T1096-SD-036	1	0.00122 U	0.00535	0.00488 U	0.00678
605198	T1096-SD-037	1	0.00774 U	0.00719	0 U	0.00715
605533	T1096-GP-090-09-DUP	9	0 U	0.00473	-0.00171 U	0.0058
605533	T1096-GP-090-09-S	9	-0.00151 U	0.00661	0.00301 U	0.00724
605533	T1096-GP-091-09-S	9	-0.00174 U	0.00589	0.00173 U	0.00589
605533	T1096-GP-092-06-S	6	0 U	0.00552	-0.00598 U	0.0103
605533	T1096-GP-093-06-S	6	-0.00397 U	0.00675	0.00199 U	0.00674
605533	T1096-GP-094-05-S	5	0.00723 U	0.00712	-0.00542 U	0.00939
605533	T1096-GP-095-05-S	5	-0.00356 U	0.00604	0.0124 U	0.0144
605537	T1BSI-PGS-001-00-S	1	-0.00153 U	0.003	-0.00764 U	0.00796
605537	T1BSI-PGS-002-00-S	1	-0.0029 U/0.00476	0.00569	0.00724 U/0.0412	0.0124
605537	T1BSI-PGS-003-00-S	1	0.00144 U	0.00487	0.00574 U	0.0143
605537	T1BSI-PGS-004-00-S	1	-0.0061 U	0.00601	-0.00914 U	0.0153
605537	T1BSI-PGS-005-00-S	1	-0.00296 U	0.0071	-0.00591 U	0.01
605537	T1BSI-PGS-006-00-S	1	-0.00137 U	0.00464	0.00683 U	0.00806
605537	T1BSI-PGS-007-00-S	1	0.00166 U	0.00326	0.00332 U	0.00462
605537	T1BSI-PGS-008-00-S	1	0.00292 U	0.00573	-1.39E-11 U	0.0107
605537	T1BSI-PGS-009-00-S	1	0.00549 U	0.00852	0.0137 U	0.0108
605537	T1BSI-PGS-010-00-S	1	-0.00713 U	0.0101	0.00142 U	0.00739
605537	T1BSI-PGS-011-00-S	1	-0.00282 U	0.0135	0.00563 U	0.0103
605537	T1BSI-PGS-012-00-S	1	0.00139 U	0.00982	0.00139 U	0.0156
605537	T1BSI-PGS-013-00-S	1	-0.00271 U	0.00531	0.00811 U	0.0119
605537	T1BSI-PGS-014-00-S	1	0 U	0.00569	-0.0029 U	0.0106
605537	T1BSI-PGS-015-00-S	1	0.00401 U	0.00695	0.00401 U	0.00946
605537	T1BSI-PGS-016-00-S	1	0 U	0.00408	-0.00294 U	0.0108
605537	T1BSI-PGS-017-00-S	1	-0.00299 U	0.00508	0.00299 U	0.0117

Refer to footnotes at end of table.

Table H3-5 (Concluded)
SWMU 96, Summary of Radiochemistry Analytical Results,
2002 Supplemental Investigation

Sample Attributes			Activity (pCi/g)			
			Plutonium-238		Plutonium-239/240	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]	Result	Error[b]
605537	T1BSI-PGS-018-00-S	1	-0.00617 U/0.00	0.0186/0.0049	0.00529 U/0.0277	0.00601/0.0131
605537	T1BSI-PGS-019-00-S	1	-0.00338 U/-0.00913	0.00813/0.0223	0.00507 U/0.0167	0.00878/0.01
605537	T1BSI-PGS-020-00-S	1	-0.00142 U	0.00392	0 U	0.00679
605537	T1BSI-PGS-021-00-S	1	0.00302 U	0.0118	-7.19E-11 U	0.00836
605537	T1BSI-PGS-022-00-S	1	-0.00439 U	0.00862	-0.00732 U	0.00762
605537	T1BSI-PGS-023-00-S	1	0.00315 U	0.00757	0.00472 U	0.0102
605537	T1BSI-PGS-024-00-S	1	-0.00294 U	0.0108	-0.00587 U	0.00816
605537	T1BSI-PGS-025-00-S	1	0.00278 U	0.0102	-0.00139 U	0.0136
605537	T1BSI-PGS-026-00-S	1	0.00536 U	0.00832	-0.00268 U	0.0117
605537	T1BSI-PGS-027-00-S	1	0.00359 U	0.00499	-0.00359 U	0.00704
605537	T1BSI-PGS-028-00-S	1	-1.60E-11 U	0.00371	0.00535 U	0.00644
605537	T1BSI-PGS-029-00-S	1	0 U	0.0029	0 U	0.00709
605537	T1BSI-PGS-030-00-S	1	0.00303 U	0.00421	-0.00152 U	0.00515
605537	T1BSI-PGS-031-00-S	1	0.0115 U	0.0133	-0.00144 U	0.00746
605537	T1BSI-PGS-032-00-S	1	-0.00447 U	0.00877	-0.00595 U	0.00827
605537	T1BSI-PGS-033-00-S	1	0 U	0.00701	0.00357 U	0.0111
605537	T1BSI-PGS-034-00-S	1	0 U	0.0116	-0.00446 U	0.00874
605537	T1BSI-PGS-035-00-S	1	0 U	0.00738	0.00307 U	0.0148

[a]Analysis request/chain-of-custody record.
[b]Two standard deviations about the mean detected activity.

BSI = Background Soil Investigation.
DUP = Duplicate.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
pCi/g = Picocurie(s) per gram.
PGS = Plutonium Grid Survey.
S = Soil Sample.
SD = Sediment Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.
U = Analyte not detected.

Addendum I

ADDENDUM I

ANALYTICAL DATA TABLES FOR SWMU 187

Table I-1
SWMU 187, Summary of VOC Analytical Results—Detections Only,
2002 Supplemental Investigation

Sample Attributes			VOCs (EPA Method SW846 8260[a]) (µg/kg)	
Record Number[b]	ER Sample ID	Sample Depth (ft)	Acetone	Chloroform
605534	T1187-BH-098-05-S	5	ND (3.52)	ND (0.52)
605534	T1187-BH-099-05-S	5	ND (3.52)	ND (0.52)
605534	T1187-BH-60R-05-S	5	**5.2**	ND (0.52)
605535	T1187-BH-104-16-S	16	**4.37 J (5)**	**3.12**
605535	T1187-BH-105-16-S	16	**4.22 J (5)**	**1.11**
605535	T1187-BH-71R-16-DUP	16	ND (3.52)	**0.848 J (1)**
605535	T1187-BH-71R-16-S	16	ND (3.52)	ND (0.52)
Quality Assurance/Quality Control Samples (µg/L)				
605534	T1187-BH-00-TB	0	**2.52 J (5)**	ND (0.36)
605535	T1187-BH-00-TB	0	**13.9 B**	ND (0.36)

Note: **Bold** indicates values that exceed background screening levels.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

B = Analyte detected in associated blank.
BH = Borehole.
DUP = Duplicate.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
MDL = Method detection limit.
ND ( ) = Not detected above the MDL, shown in parentheses.
PQL = Practical quantitation limit.
R = Resampled Location.
S = Soil Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1
TB = Trip Blank.
VOC = Volatile organic compound.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.

Table I-2
SWMU 187, Summary of SVOC Analytical Results—Detections Only,
2002 Supplemental Investigation

Sample Attributes			SVOCs (EPA Method SW846 8270[a]) (µg/kg)				
Record Number[b]	ER Sample ID	Sample Depth (ft)	Benzo(a) anthracene	Benzo(a)pyrene	Benzo(b)fluoran-thene	Benzo(k)fluoran-thene	Chrysene
605534	T1187-BH-096-09-S	9	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)
605534	T1187-BH-097-09-S	9	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)
605534	T1187-BH-56R-09-S	9	**36.6**	**28 J (33.3)**	**30.2 J (33.3)**	**17.5 J (33.3)**	**34.5**
Quality Assurance/Quality Control Samples (µg/L)							
605534	T1187-BH-00-EB	0	ND (0.485)	ND (0.485)	ND (0.485)	ND (0.485)	ND (0.485)

Sample Attributes			SVOCs (EPA Method SW846 8270[a]) (µg/kg)				
Record Number[b]	ER Sample ID	Sample Depth (ft)	Fluoranthene	Phenanthrene	Phenol	Pyrene	bis(2-Ethylhexyl) phthalate
605534	T1187-BH-096-09-S	9	ND (16.7)	ND (16.7)	**639**	ND (16.7)	ND (30)
605534	T1187-BH-097-09-S	9	**20.4 J (33.3)**	**17.7 J (33.3)**	**353**	**17.2 J (33.3)**	ND (30)
605534	T1187-BH-56R-09-S	9	**78.2**	**57.6**	ND (12.7)	**79.7**	**44.2 J (333)**
Quality Assurance/Quality Control Samples (µg/L)							
605534	T1187-BH-00-EB	0	ND (0.485)	ND (0.485)	ND (0.291)	ND (0.485)	ND (1.26)

Note: **Bold** indicates values that exceed background screening levels.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

BH = Borehole.
EB = Equipment Blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
ND ( ) = Not detected above the MDL, shown in parentheses.
PQL = Practical quantitation limit.
R = Resampled Location.
S = Soil Duplicate.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.

Table I-3
SWMU 187, Summary of Metals Analytical Results,
2002 Supplemental Investigation

Sample Attributes			Metals (EPA Method SW846 3005/SW846 3050/SW846 7470/SW846 7471[a]) (mg/kg)				
Record Number[b]	ER Sample ID	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Lead
605534	T1187-BH-100-08-S	8	3.98	257	ND (0.0469)	7.58	4.83
605534	T1187-BH-101-08-S	8	4.65	153	0.0728 J (0.49)	11.1	6.93
Background Concentration			4.4	200	<1	12.8	11.2
Quality Assurance/Quality Control Samples (mg/L)							
605534	T1187-BH-00-EB	0	ND (0.00224)	0.00046 J (0.005)	ND (0.00031)	ND (0.0005)	ND (0.00172)

Sample Attributes			Metals (EPA Method SW846 3005/SW846 3050/SW846 7470/SW846 7471) (mg/kg)			
Record Number[b]	ER Sample ID	Sample Depth (ft)	Mercury	Nickel	Selenium	Silver
605534	T1187-BH-100-08-S	8	0.00218 J (0.00861)	6.65	0.539	ND (0.0884)
605534	T1187-BH-101-08-S	8	0.00744 J (0.00927)	9.16	0.686	ND (0.0884)
Background Concentration			<0.1	25.4	<1	<1
Quality Assurance/Quality Control Samples (mg/L)						
605534	T1187-BH-00-EB	0	ND (0.00005)	NR	ND (0.00281)	ND (0.00084)

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

BH = Borehole.
EB = Equipment Blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.
mg/L = Milligram(s) per liter.
ND ( ) = Not detected above the MDL, shown in parentheses.
NR = Not Reported.
PQL = Practical quantitation limit.
S = Soil Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.

Table I-4
SWMU 187, Summary of Radiochemistry Analytical Results,
2002 Supplemental Investigation

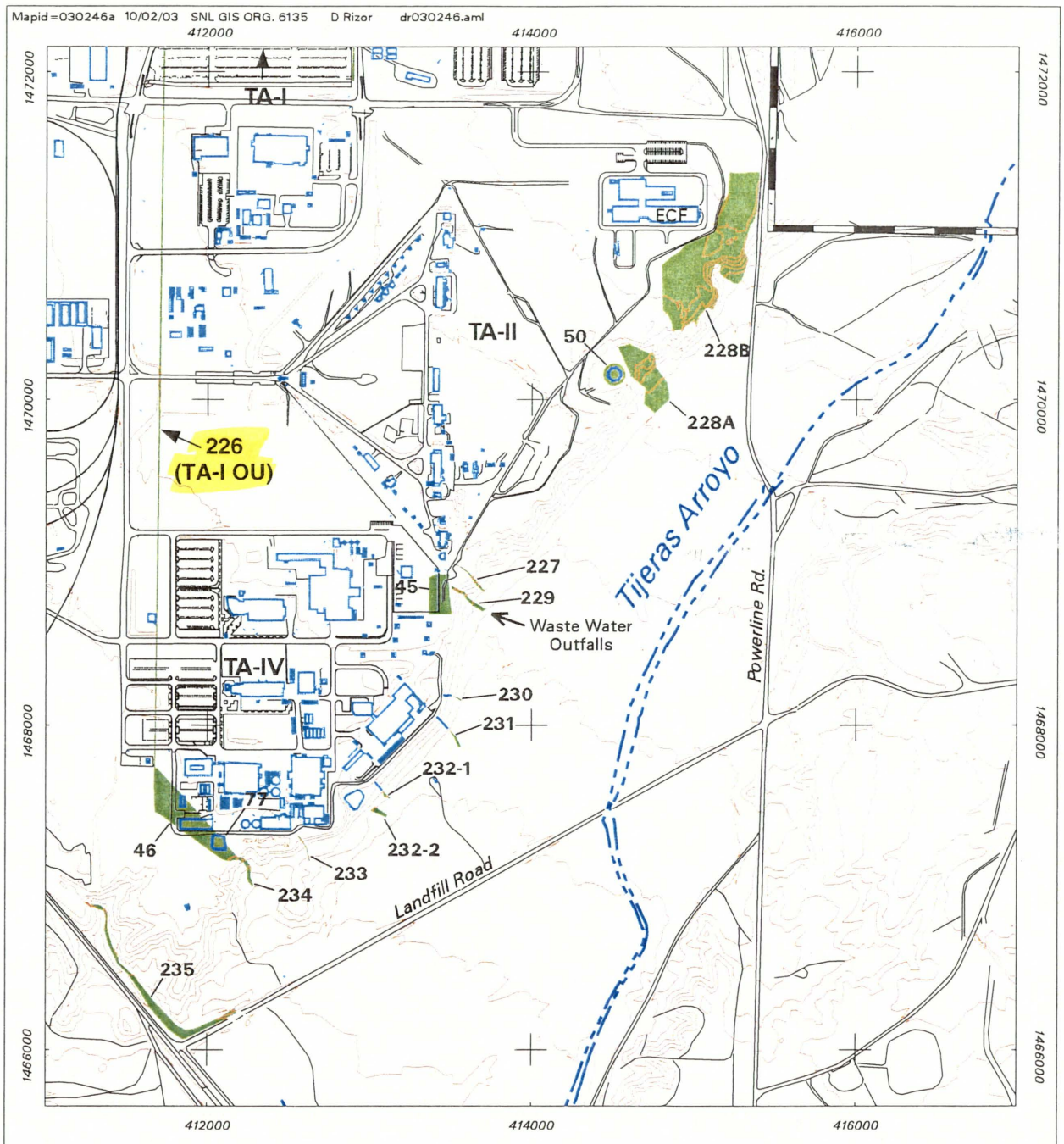
Sample Attributes			Activity (pCi/g)				Activity (pCi/L)	
			Plutonium-238		Plutonium-239/240		Tritium	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]	Result	Error[b]	Result	Error[b]
605534	T1187-BH-088-07-S	7	-0.00381 U	0.00747	0.0019 U	0.0112	NR	--
605534	T1187-BH-089-07-DUP	7	-0.00164 U	0.00849	-0.00164 U	0.00717	NR	--
605534	T1187-BH-089-07-S	7	0.00155 U	0.01	-0.00154 U	0.00524	NR	--
605534	T1187-BH-090-04-S	4	NR	--	NR	--	57.1 U	121
605534	T1187-BH-091-04-S	4	NR	--	NR	--	173 U	132
605534	T1187-BH-092-07-S	7	-0.00201 U	0.0104	-0.00201 U	0.00681	NR	--
605534	T1187-BH-093-07-S	7	0.00178 U	0.0144	-0.00889 U	0.0126	NR	--
605534	T1187-BH-098-05-S	5	NR	--	NR	--	85.1 U	122
605534	T1187-BH-099-05-S	5	NR	--	NR	--	57.4 U	122
605535	T1187-BH-094-07-S	7	0.00352 U	0.00489	-0.00528 U	0.00599	88.4 U	118
605535	T1187-BH-102-11-S	11	NR	--	NR	--	29.5 U	114
605535	T1187-BH-103-11-S	11	NR	--	NR	--	146 U	120

[a]Analysis request/chain-of-custody record.
[b]Two standard deviations about the mean detected activity.
BH = Borehole.
DUP = Duplicate.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
NR = Not Reported.
pCi/g = Picocurie(s) per gram.
pCi/L = Picocuries per liter.
S = Soil Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.
U = Analyte not detected.
-- = Error not calculated for nondetected results.

Addendum J

ADDENDUM J

FIGURE SHOWING THE RELATIONSHIP OF SWMU 226 TO SWMU 46 AND OTHER TIJERAS ARROYO OPERABLE UNIT 1309 SWMUS



Legend

- Road
- 10 Foot Contour
- Tijeras Arroyo Channel
- KAFB Boundary
- Building / Structure
- SWMU

Relationship of Solid Waste Management Unit (SWMU) 226 to SWMU 46 (Old Acid Waste Outfall) and other Tijeras Arroyo Operable Unit 1309 SWMUs

0 500 1000
Scale in Feet

0 120 240
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Addendum K

ADDENDUM K

SUMMARY OF SWMU 226 CONFIRMATORY SOIL SAMPLING DATA COLLECTED FROM BELOW BUILDING 863 (SWMU 98), JULY 1999

Sandia National Laboratories
Operated for the U.S. Department of Energy by
Sandia Corporation

Albuquerque, New Mexico 87185 .

date: 21 March 2003

to: Brenda Langkopf, 6133 (MS1087)

from: Michael Skelly, 6133 (MS1087)

subject: Summary of SWMU 226 Confirmatory Soil Sampling Data Collected From Below Building 863 (SWMU 98), July 1999.

The purpose of this memo is to summarize data collected from locations associated with Solid Waste Management Unit (SWMU) 226. As you brought to my attention last week, there were several soil samples collected in July 1999 that should be addressed in the Sandia National Laboratories, New Mexico (SNL/NM) Response to New Mexico Environment Department (NMED) Technical Comments on the SWMU 226 No Further Action (NFA) Proposal (NMED March 1998). The samples in question were originally associated with the SWMU 98 (Building 863 TCA and Photochemical Release) Supplemental Field Investigation. The SWMU 98 NFA Proposal (SNL/NM September 2000) discussed other data collected from the site during the 1999 investigation but deferred discussion of the results of samples T1098-GP-017, T1098-GP-018, and T1098-GP-019 because it was thought that they "will be included in the Acid Waste Line (SWMU 226) investigation".

As reported in the SWMU 98 NFA Proposal, "these samples [T1098-GP-017, T1098-GP-018, and T1098-GP-019] were collected along a lateral pipe connected to the Old Acid Waste Line" at a depth of 3 feet below ground surface using a Geoprobe™ sampling rig. The samples were collected on July 29, 1999 from the northwest corner of SWMU 98 (Figure 1) and shipped to General Engineering Laboratories in Charleston, SC. The samples were documented on Analysis Request/Chain of Custody (AR/COC) 602188 and the requested analyses included Semivolatile Organic Compounds (SVOC) (U.S. Environmental Protection Agency [EPA] Method 8270), Target Analyte List (TAL) Metals (EPA Method 6010A/7471), and Volatile Organic Compounds (VOC) (EPA Method 8260).

Although the SWMU 98 NFA Proposal did not discuss these three samples, the Environmental Restoration Data Management System (ERDMS) still had these samples associated with SWMU 98. In order to tie these samples to SWMU 226, the sample identifications were modified in ERDMS and the Records Center. As of 14 March 2003, the ER Sample IDs for these three samples have been revised as follows:

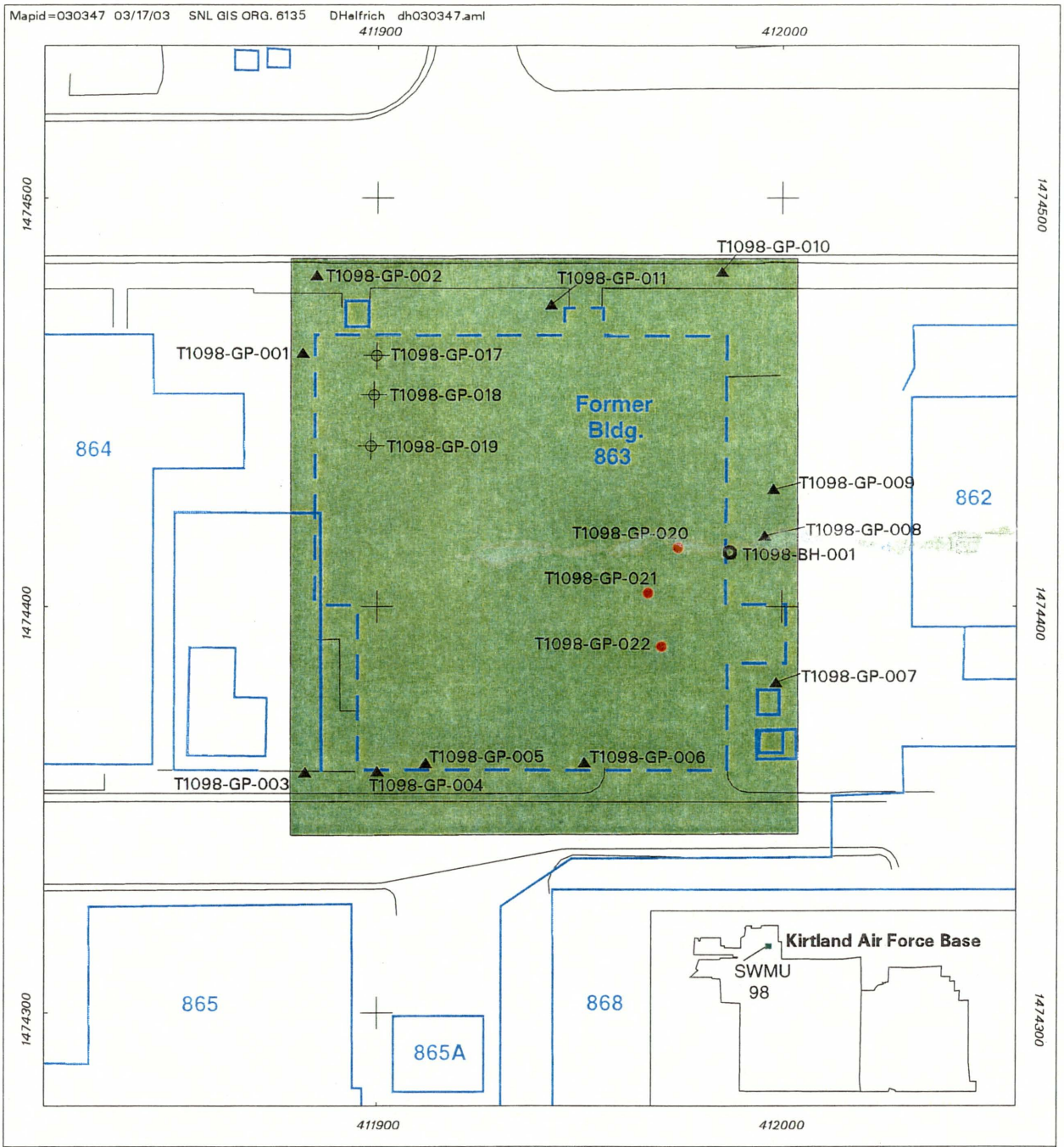
New ER Sample ID	Old ER Sample ID
T1226-X098-GP-017	T1098-GP-017
T1226-X098-GP-018	T1098-GP-018
T1226-X098-GP-019	T1098-GP-019

The analytical results are presented in the attached tables and are briefly discussed here. The overall significance of the analytical results will be reserved for the Response to the NMED's Technical Comments for SWMUs 96, 187, and 226 that is currently being prepared. Four metals (arsenic, barium, mercury, and vanadium) exceeded the NMED approved background concentrations (Table 1), and one VOC was detected (methylene chloride; Table 2). No other metals, SVOC, or VOCs were detected above their respective method detection limits as shown in Tables 2.4.5-3, 2.4.5-4 and 2.4.5-5 (SNL/NM September 2000).

References

New Mexico Environment Department (NMED), March 1998. NMED Technical Comments: SNL SWMUs 96, 187, 226; Proposals for NFA, 7th Round, May 1997." Letter from Robert S. Dinwiddie, NMED to Michael Zamorski, U.S. Department of Energy Albuquerque Operations Office, Santa Fe, New Mexico. March 17, 1998

Sandia National Laboratories/New Mexico (SNL/NM), September 2000. "Proposals for No Further Action Environmental Restoration Project, SWMUs 98, 82, 60, 81A, 81B, 81D, 81E, 81F, 9, and 117" Environmental Restoration Project, Sandia National Laboratories, New Mexico. September 2000.



Legend

- Subsurface Soil Sample Location (SWMU 226)
- Borehole Location (SWMU 98)
- Surface Soil Sample Location (SWMU 98)
- 1995 Sample Location (SWMU 98)
- Road
- Former Building 863
- Other Buildings
- SWMU 98

Location of the SWMU 226 Subsurface Samples Collected During the 1999 Field Investigation of SWMU 98

0 20 40
Scale in Feet

0 4.8 9.6
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Table 1. Summary of SWMU 226 Confirmatory Soil Sampling From Below Building 863 (SWMU 98)
Metals Analytical Results, July 1999

Sample Attributes			Metals (EPA Method SW846 6010A) (mg/kg)							
Record Number[a]	ER Sample ID[b]	Sample Depth(ft)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium
602188	T1226-X098-GP-017-3-S	3	8050	0.634J (0.971)	**6.46**	**249**	0.394J (0.485)	0.0979J (0.485)	74700	7.19
602188	T1226-X098-GP-018-3-S	3	10200	0.411J (0.99)	**6.69**	**436**	0.497	0.12J (0.495)	61100	10.4
602188	T1226-X098-GP-019-3-S	3	8600	U (<0.191)	**4.88**	**239**	0.443J (0.485)	0.0948J (0.485)	54400	7.8
Background concentration[c]			NC	3.9	4.4	200	0.80	0.9	NC	12.8

Sample Attributes			Metals (EPA Method SW846 6010A and SW846 7471) (mg/kg)							
Record Number[a]	ER Sample ID[b]	Sample Depth(ft)	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel
602188	T1226-X098-GP-017-3-S	3	4.37	6.35	9780	5.82	5830	166	U (<0.00225)	7.7
602188	T1226-X098-GP-018-3-S	3	6.53	10.1	13500	8.02	7170	279	0.0322	11
602188	T1226-X098-GP-019-3-S	3	4.42	7.44	10600	6.22	5720	191	**0.369**	8.19
Background concentration[c]			8.8	17	NC	11.2	NC	NC	<0.1	25.4

Sample Attributes			Metals (EPA Method SW846 6010A) (mg/kg)						
Record Number[a]	ER Sample ID[b]	Sample Depth(ft)	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
602188	T1226-X098-GP-017-3-S	3	1330	U (<0.135)	0.243J (0.485)	352	U (<0.221)	**41**	26.8
602188	T1226-X098-GP-018-3-S	3	1910	U (<0.135)	0.406J (0.495)	723	U (<0.221)	**59.9**	40.3
602188	T1226-X098-GP-019-3-S	3	1530	U (<0.135)	0.428J (0.485)	587	U (<0.221)	**37.8**	29.9
Background concentration[c]			NC	<1	<1	NC	<1.1	33.0	76

Note: Values in bold represent analytes detected above their respective background concentration.

[a] = Analysis request/chain-of-custody record.

[b] = As of March 2003, the ER Sample IDs have been revised as follows:

New ER Sample ID	Old ER Sample ID
T1226-X098-GP-017-3-S	T1098-GP-017-3-S
T1226-X098-GP-018-3-S	T1098-GP-018-3-S
T1226-X098-GP-019-3-S	T1098-GP-019-3-S

[c] = Dinwiddie September 1997.

GP= Geoprobe™.
EPA = U.S. Environmental Protection Agency.
ER= Environmental Restoration.
ft = Foot (feet).
ID = Identification
J ( ) = The reported value is greater than or equal to the method detection limit but is less than the practical quantitation limit, shown in parentheses.

mg/kg = Milligram(s) per kilogram.
NC = Not calculated.
S = Soil sample.
SWMU = Solid Waste Management Unit.
U = Analyte not detected, method detection limit shown in parentheses.

Table 2. Summary of SWMU 226 Confirmatory Soil Sampling From Below Building 863 (SWMU 98) VOC Analytical Results, July 1999

Sample Attributes			VOCs (EPA Method SW846 8260) (ug/kg)
Record Number[a]	ER Sample ID[b]	Sample Depth(ft)	Methylene Chloride
602188	T1226-X098-GP-017-3-S	3	2.9 JB (5)
602188	T1226-X098-GP-018-3-S	3	2.8 JB (5)
602188	T1226-X098-GP-019-3-S	3	3.2 JB (5)

Note: Values in bold represent analytes detected above their respective background concentration.

[a] = Analysis request/chain-of-custody record.

[b] = As of March 2003, the ER Sample IDs have been revised as follows:

Old ER Sample ID	New ER Sample ID
T1098-GP-017-3-S	T1226-X098-GP-017-3-S
T1098-GP-018-3-S	T1226-X098-GP-018-3-S
T1098-GP-019-3-S	T1226-X098-GP-019-3-S

B = The analyte was also detected in an associated blank.
GP = Geoprobe™.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification

J ( ) = The reported value is greater than or equal to the method detection limit but is less than the practical quantitation limit, shown in parentheses.
ug/kg = Microgram(s) per kilogram.
NC = Not calculated.
S = Soil sample.
SWMU = Solid Waste Management Unit.
U = Analyte not detected, method detection limit shown in parentheses.

Table 2.4.5-3
Metal Analytical Method Detection Limits Used for SWMU 98 RFI Soil Sampling
July–August 1999
(Off-Site Laboratory)

Analyte	Method Detection Limit (mg/kg)
Aluminum	0.591–1.18
Antimony	0.191–0.381
Arsenic	0.228–0.455
Barium	0.027–0.054
Beryllium	0.012–0.024
Cadmium	0.019–0.038
Calcium	3.49–32.9
Chromium	0.038–0.076
Cobalt	0.017–0.033
Copper	0.067–0.134
Iron	5–10
Lead	0.079–0.157
Magnesium	0.254–0.507
Manganese	0.355–0.709
Mercury	0.00186–0.0022
Mercury	0.00225
Nickel	0.032–0.063
Potassium	1.42–2.84
Selenium	0.135–0.27
Silver	0.031–0.06
Sodium	3.21–6.42
Thallium	0.221–0.441
Vanadium	0.027–0.053
Zinc	0.185–0.37

mg/kg = Milligram(s) per kilogram.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
SWMU = Solid Waste Management Unit.

Table 2.4.5-4
VOC Analytical Method Detection Limits Used for SWMU 98 RFI Soil Sampling
July–August 1999
(Off-Site Laboratory)

Analyte	Method Detection Limit (µg/kg)
1,1,1-Trichloroethane	0.1
1,1,2,2-Tetrachloroethane	0.6
1,1,2-Trichloroethane	0.3
1,1-Dichloroethane	0.1
1,1-Dichloroethene	0.3
1,2-Dichloroethane	0.2
1,2-Dichloropropane	0.2
2-Butanone	3.2
2-Hexanone	2.8
4-Methyl-2-pentanone	3.1
Acetone	10.3
Benzene	0.5
Bromodichloromethane	0.1
Bromoform	0.3
Bromomethane	0.3
Carbon disulfide	0.3
Carbon tetrachloride	0.5
Chlorobenzene	0.3
Chloroethane	0.3
Chloroform	0.1
Chloromethane	0.2
Dibromochloromethane	0.2
Ethyl benzene	0.3
Methylene chloride	1.4
Styrene	0.3
Tetrachloroethene	0.4
Toluene	0.9
Trichloroethene	0.3
Vinyl acetate	2.1
Vinyl chloride	0.4
Xylene	0.7
cis-1,2-Dichloroethene	0.1
cis-1,3-Dichloropropene	0.2
trans-1,2-Dichloroethene	0.1
trans-1,3-Dichloropropene	0.3

µg/kg = Microgram(s) per kilogram.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
SWMU = Solid Waste Management Unit.
VOC = Volatile organic compound.

Table 2.4.5-5 (Concluded)
SVOC Analytical Method Detection Limits Used for SWMU 98 RFI Soil Sampling
July–August 1999
(Off-Site Laboratory)

Analyte	Method Detection Limit (µg/kg)
Fluorene	114
Hexachlorobenzene	70
Hexachlorobutadiene	153
Hexachlorocyclopentadiene	193
Hexachloroethane	132
Indeno(1,2,3-c,d)pyrene	80
Isophorone	146
Naphthalene	157
Nitrobenzene	132
Pentachlorophenol	57
Phenanthrene	60
Phenol	57
Pyrene	72
bis(2-Chloroethoxy)methane	169
bis(2-Chloroethyl)ether	53
bis(2-Ethylhexyl)phthalate	299
bis-Chloroisopropyl ether	105
m,p-Cresol	153
n-Nitrosodiphenylamine	21
n-Nitrosodipropylamine	129
o-Cresol	63

µg/kg = Microgram(s) per kilogram.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.

Addendum L

ADDENDUM L

ANALYTICAL DATA TABLES FOR SWMU 226

Table L-1
SWMU 226, Summary of SVOC Analytical Results—Detections Only, 2002 Supplemental Investigation

Sample Attributes			SVOCs (EPA Method SW846 8270[a]) (µg/kg)						
Record Number[b]	ER Sample ID	Sample Depth (ft)	1,4-Dichlorobenzene	Acenaphthene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(g,h,i)-perylene	Chrysene	Fluoranthene
605536	T1226-GP-025-06-S	6	ND (15.7)	ND (8)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)
605536	T1226-GP-026-06-S	6	**31.3 J (333)**	ND (8)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)
605536	T1226-GP-09R-06-S	6	ND (15.7)	**9.11 J (33.3)**	**124**	**134**	**147**	**72.3**	**148**
605536	T1226-GP-18R-10-S	10	ND (15.7)	ND (8)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)
Quality Assurance/Quality Control Samples (µg/L)									
605536	T1226-GP-00-EB	0	ND (0.301)	ND (0.485)	ND (0.485)	ND (0.485)	ND (0.485)	ND (0.485)	ND (0.485)

Sample Attributes			SVOCs (EPA Method SW846 8270[a]) (µg/kg)						
Record Number[b]	ER Sample ID	Sample Depth (ft)	Fluorene	Indeno(1,2,3-cd)pyrene	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	bis(2-Ethylhexyl)-phthalate
605536	T1226-GP-025-06-S	6	**4.05 J (33.3)**	ND (16.7)	ND (167)	ND (16.7)	**340**	ND (16.7)	ND (30)
605536	T1226-GP-026-06-S	6	ND (4)	ND (16.7)	ND (167)	ND (16.7)	**216 J (333)**	ND (16.7)	ND (30)
605536	T1226-GP-09R-06-S	6	**6.49 J (33.3)**	**148**	**182 J (333)**	**62.9**	ND (12.7)	**98.2**	ND (30)
605536	T1226-GP-18R-10-S	10	ND (4)	ND (16.7)	ND (167)	ND (16.7)	**262 J (333)**	ND (16.7)	ND (30)
Quality Assurance/Quality Control Samples (µg/L)									
605536	T1226-GP-00-EB	0	ND (0.485)	ND (0.485)	ND (4.85)	ND (0.485)	ND (0.291)	ND (0.485)	**1.27 JHB (9.71)**

Note: **Bold** indicates values that exceed background screening levels.

[a]EPA November 1986.

[b]Analysis request/chain-of-custody record.

B = Analyte detected in associated blank.
EB = Equipment Blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
H = The hold time was exceeded for the associated sample analysis.
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the PQL, shown in parentheses.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
ND ( ) = Not detected above the MDL, shown in parentheses.
PQL = Practical quantitation limit.
R = Resampled Location.
S = Soil Sample.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.

Table L-2
SWMU 226, Summary of Radiochemistry Analytical Results,
2002 Supplemental Investigation

Sample Attributes			Activity (pCi/g)			
			Plutonium-238		Plutonium-239/240	
Record Number[a]	ER Sample ID	Sample Depth (ft)	Result	Error[b]	Result	Error[b]
605536	T1226-GP-027-05-S	5	0.00326 U	0.00453	0.00326 U	0.00784
605536	T1226-GP-028-05-S	5	0 U	0.00428	0.00463 U	0.0145
605536	T1226-GP-029-10-S	10	0.00888 U	0.00921	0.00148 U	0.00767
605536	T1226-GP-030-10-S	10	0.00161 U	0.00548	-0.00484 U	0.0123

[a]Analysis request/chain-of-custody record.
[b]Two standard deviations about the mean detected activity.
ER = Environmental Restoration.
ft = Foot (feet).
GP = Geoprobe.
ID = Identification.
pCi/g = Picocurie(s) per gram.
S = Soil Sample.
SWMU = Solid Waste Management Unit.
T1 = Technical Area 1.
U = Analyte not detected.

11639

National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

SEP 1 7 2004

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

cc: ESHSEC

Mr. James Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Road East, Building 1
Santa Fe, NM 87505

Dear Mr. Bearzi,

On behalf of the Department of Energy (DOE) and Sandia Corporation, DOE is submitting the enclosed Responses to NMED's June 25, 2004 Request for Supplemental Information, Solid Waste Management Units 96, 187, and 226, Environmental Restoration Project at Sandia National Laboratories, New Mexico, EPA ID No. NM5890110518.

DOE and Sandia are requesting a determination that these sites are acceptable for No Further Action or Corrective Action Complete without controls.

If you have any questions, please contact John Gould at (505) 845-6089.

Sincerely,

Patty Wagner
Manager

Enclosure

cc w/ enclosure:
W. Moats, NMED-HWB (via Certified Mail)
L. King, EPA, Region 6 (Via Certified Mail)
M. Gardipe, NNSA/SC/ERD
C. Voorhees, NMED-OB

cc w/o enclosure:
K. Thomas, EPA, Region 6
F. Nimick, SNL, MS 1089
R. E. Fate, SNL, MS 1089
M. J. Davis, SNL, MS 1089
D. Stockham, SNL, MS 1087
B. Langkopf, SNL, MS 1087
M. Skelly, SNL, MS 1088
A. Blumberg, SNL, MS 0141

Sandia National Laboratories/Albuquerque, New Mexico

Responses to NMED's June 25, 2004 Request for Supplemental Information Solid Waste Management Units 96, 187, and 226 Environmental Restoration Project

September 2004

INTRODUCTION

Sandia National Laboratories/New Mexico (SNL/NM) is submitting this response to a Request for Supplemental Information (RSI) for Solid Waste Management Units (SWMUs) 96, 187, and 226 which are managed by the Technical Area I (TA-I), Operable Unit (OU) 1302. The three SWMUs discussed in this RSI response are:

SWMU 96—Storm Drain System
SWMU 187—Sanitary Sewer System, and
SWMU 226—Old Acid Waste Line

Over the past ten years these three SWMUs have been the subjects of numerous investigations as well as the topic of numerous discussions with the NMED. This RSI response addresses the most current correspondence from the NMED (NMED June 2004) by providing the requested information for the site-specific comments (discussed in numerical order). Each section provides NMED technical comments repeated in **bold** arranged by comment number in the original order. The DOE/Sandia National Laboratories response is written in normal font style on a separate line under "Response." Additional supporting information for the general and site-specific comments is included as appendices to this document (Table 1).

Table 1
List of Appendices to the RSI Response

Appendix A	Summary Data Tables for the Storm Drain/Sanitary Sewer Cross-Connect Elimination Project
Appendix B	Excerpt from IT 1993 discussing the results from VOC analysis.
Appendix C	Revised radionuclide constituent tables.
Appendix D	Revised Table H3-5.
Appendix E	Figures 5.4.4-1 (Land Survey) and 5.4.4-2 (Radiological Survey) from Rust Geotech 1994
Appendix F	Figure 4 from Bldg 839 VCM Report (IT December 1995)

RESPONSES TO NMED REQUEST FOR SUPPLEMENTAL INFORMATION ON NO FURTHER ACTION PROPOSALS DATED MAY 1997 (7th ROUND)

GENERAL COMMENTS

It is NMED policy that everything needed to support a decision for No Further Action (NFA) must be included in any document that proposes NFA for a SWMU or Area Of Concern (AOC). General issues related to the subject document are described below, followed by site-specific comments.

1. **Residential Screening Levels: SNL conducted separate screening assessments using both industrial and residential levels. NMED will only approve NFA status at this time for sites that can meet an unrestricted residential land use scenario. Therefore, NMED only reviewed the risk calculations on residential screening levels.**

   Response 1: For completeness, Sandia National Laboratories, New Mexico (SNL/NM) provided risk assessments for both industrial and residential land use scenarios. Based on the requirements of the Compliance Order on Consent (NMED April 2004), SNL/NM understands that NMED will review the risk calculations on industrial screening levels for SWMUs proposed for "Corrective Action Complete With Controls". The "Corrective Action Complete With Controls" status indicates that these SWMUs will require structural or institutional controls to maintain the projected future land use. Because these SWMUs will be proposed for Corrective Action Complete with Controls, SNL/NM requests that NMED review the risk assessment under the industrial scenario for each SWMU.

SPECIFIC COMMENTS

SWMU 96

2. **Laboratory data sheets were provided for the "Storm Drain/Sanitary Sewer Cross-Connect Elimination" project. Provide summary data tables and a figure showing sample locations for the cross-connect study.**

   Response 2: Appendix A presents the summary data tables for the Storm Drain/Sanitary Sewer Cross-Connect Elimination project, and includes:

   - Table A1--Summary of Confirmatory Soil Sampling SVOC Analytical Results, March/April 1993.
   - Table A2--Summary of SVOC Analytical Method Detection Limits, March/April 1993.
   - Table A3--Summary of Confirmatory Soil Sampling Metals Analytical Results, March/April 1993.
   - Table A4--Summary of Metals/Inorganics Analytical Method Detection Limits, March/April 1993.

- Table A5—Summary of PCB Analytical Method Detection Limits, March/April 1993.

The Storm Drain/Sanitary Sewer Cross-Connect Elimination Project Report (IT June 1993) refers to analytical results for volatile organic compounds (VOCs) associated with sample 4708. However, the document in the Environmental Restoration records center did not contain the VOC data. Because this investigation was part of SNL/NM's Decontamination and Demolition Program, the data do not reside in the Environmental Restoration Data Management System. Attempts to retrieve the analytical package were unsuccessful. However, the report states that VOCs were not detected in concentrations that exceed EPA proposed RCRA corrective action levels. The portion of the report that discusses the VOC data is provided in Appendix B.

3. **Addendum H contains the Analytical Data Tables for SWMU 96 and the Method Detection Limit Tables for the three subject SWMUs. Provide the background levels and detection limits for the radionuclide constituent tables.**

Response 3: For those constituents with established background levels, the background concentrations have been added to the revised radionuclide constituent tables (Appendix C). Tables with radionuclides that do not have established background levels have not been revised. Method Detection Limit (or Minimum Detectable Activity) tables are not usually provided for radionuclide constituents; detection limits for nondetected radionuclides are included in the tables in Appendix C.

4. **Include a footnote at the bottom of Table H3-5 that identifies the duplicate samples.**

Response 4: A footnote has been added to identify the duplicate samples in the revised Table H3-5 (Appendix D).

SWMU 226

5. **The radiation screening data for the outfall area (SWMU 46) were not provided in Addendum E. Provide summary data tables and a figure showing sample locations for the radiation screening conducted at the outfall area.**

Response 5: SNL/NM regrets not including these figures in our 2003 expanded response. Appendix E includes copies of Figures 5.4.4-1 (Land Survey) and 5.4.4-2 (Radiological Survey) from Rust Geotech (July 1994). It should be noted that the Rust Geotech report did not include a summary data table for the radiological survey, and there is no data available to create a summary table. Figure 5.4.4-2 simply shows the location of the radiological survey boundary and includes the statement, "All gamma measurements are within the range of natural background of 10-13 μR/h." (Rust Geotech July 1994).

6. **Provide a figure showing all of the Phase I and II sample locations, Voluntary Corrective Measure (VCM) confirmatory sample locations, and the locations of all piping that was removed during the VCM at Buildings 838 and 839.**

Response 6: The Figure 4 submitted to NMED was incomplete. A complete Figure 4 showing all of the VCM confirmatory sample locations is included as Appendix F.

References

International Technology (IT) Corporation, June 1993. *Field and Laboratory Documentation for Subsurface Soil Samples for TA-I Storm Drain/Sanitary Sewer Cross-Connect Elimination Project.* Prepared for Sandia National Laboratories Environmental Protection Department 7044. June 1993.

New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act, § 74-4-10,* NMED Santa Fe, New Mexico. April 29, 2004.

New Mexico Environment Department (NMED), June 2004. *Request for Supplemental Information: Environmental Restoration Project Expanded Reponses to NMED's 1998 Technical Comments on No Further Action Proposal for Solid Waste Management Units (SWMUs) 96, 187, 226; Dated May 1997; November 2003. Sandia National Laboratories, EPA ID# NM5890110518. HWB-SNL-04-019.* Letter from William S. McDonald, NMED to Patty Wagner, U.S. Department of Energy Sandia Site Office/NNSA; and Peter Davies, Sandia National Laboratories, Geoscience and Environment Center. Santa Fe, New Mexico. June 25, 2004.

RUST Geotech, Inc., July 1994. *Sandia Surface Radiological Surveys Report (4 Volumes),* Technical Support Program for Sandia National Laboratories/New Mexico. July 1994.

Tharp, February 1999. Internal memorandum from Tommy L. Tharp (Roy F. Weston, Inc.) to Fran. B Nimick (SNL/NM), *Tritium Background Data Statistical Analysis for Site-Wide Surface Soils.* Sandia National Laboratories, Albuquerque, New Mexico. February 25, 1999.

Appendix E

Figures 5.4.4-1 (Land Survey) and 5.4.4-2 (Radiological Survey) from Rust Geotech 1994.

MAP DELIBERATELY

NOT SCANNED

MUST BE VIEWED AT THE
CUSTOMER FUNDED
RECORD CENTER

FOR ASSISTANCE CALL
844-4688

Appendix F

Figure 4 from Bldg 839 VCM Report (IT December 1995).

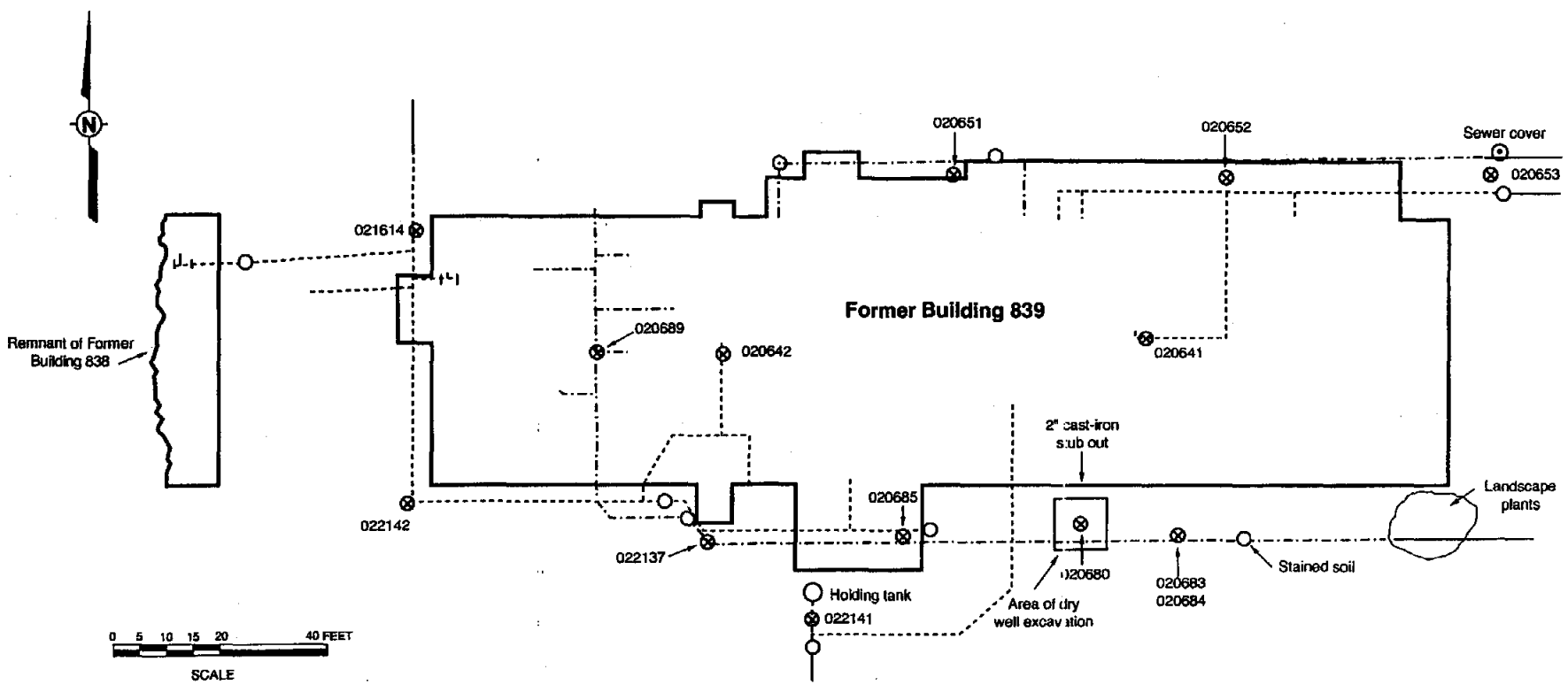


Figure 4
Acid Waste and Sanitary Sewer Lines Removed During Voluntary Corrective Measure at Former Building 839, Technical Area I
Sandia National Laboratories/New Mexico

341942

JUSTIFICATION FOR CLASS III
PERMIT MODIFICATION MARCH 2005
SWMU 226 OPERABLE UNIT 1302 OLD
ACID WASTE LINE AT TECHNICAL AREA
I