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Investigation Report for Consolidated Unit 21-018(a)-99, Material Disposal Area V, at Technical Area 21, Revision 1

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Prepared by the Environmental Programs Directorate

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July 2007

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EXECUTIVE SUMMARY

This investigation report presents the results of characterization and remediation activities conducted at Consolidated Unit 21-018(a)-99 at Los Alamos National Laboratory (the Laboratory). This site consists of four inactive solid waste management units (SWMUs) and one area of concern (AOC). In 1999, the following SWMUs and AOC were consolidated into 21-018(a)-99 according to their related operational history and geographic proximity:

- SWMU 21-018(a), three absorption beds comprising Material Disposal Area (MDA) V, and SWMU 21-018(b), a former laundry facility south of DP Road;
- SWMU 21-013(b) and AOC 21-013(g), debris disposal areas south of MDA V on the slope of BV Canyon; and
- SWMU 21-023(c), a septic system and outfall immediately west of MDA V and the surface disposal areas.

The objective of this investigation was to finalize surface and subsurface chemical and geotechnical characterization of Consolidated Unit 21-018(a)-99 in accordance with the New Mexico Environment Department (NMED)-approved investigation work plan. Characterization data were used to define the nature and extent of contamination associated with waste disposal activities and to determine whether the site poses a potential unacceptable risk to human health or the environment. The primary objective of remediation activities performed in 2005 and 2006 was to remove infrastructure, primarily underground pipes, and environmental media with concentrations of chemicals of potential concern (COPCs) exceeding residential screening action levels (SALs) for radionuclides or soil screening levels (SSLs) for inorganic and organic chemicals.

Field investigation activities conducted in 2005 and 2006 included drilling 15 boreholes and sampling in and around SWMU 21-018(a) and SWMU 21-018(b) to characterize the vertical and lateral extent of contamination and fractures in tuff. Surface and shallow subsurface samples were collected from beneath distribution lines associated with SWMUs 21-018(a) and 21-018(b), at the SWMU 21-023(c) septic system and outfall, and from SWMU 21-013(b) and AOC 21-013(g) after debris was removed. At the direction of NMED, additional confirmatory sampling was completed in 2007 on the northwest slope of SWMU 21-013(b). Additionally, an investigation is in progress in an area of elevated radioactivity identified north of former absorption bed 3 [SWMU 21-018(a)] during the post-remediation walkover survey. The results of the SWMU 21-013(b) sampling are provided in this revision to the original investigation report. The results of the investigation at the area of elevated radioactivity and removal action will be provided in a supplemental Consolidated Unit 21-018(a)-99 investigation report.

Based on the characterization data from the 2005 to 2006 and 2007 investigations and from previous investigations conducted at the site, the nature and extent of radionuclide, inorganic, and organic COPCs in both surface and subsurface media are defined for SWMUs 21-018(b), 21-013(b), 21-023(c), and AOC 21-013(g). Nature and extent of the inorganic and organic COPCs in both surface and subsurface media have been defined for SWMU 21-018(a). Radiological COPCs are not fully defined in the subsurface of SWMU 21-018(a), because an investigation of the area of elevated radioactivity is in progress. Groundwater monitoring requirements for Technical Area 21, including Consolidated Unit 21-018(a)-99, will be addressed in the “Los Alamos/Pueblo Canyons Groundwater Monitoring Well Network Evaluation Report,” scheduled for submittal to NMED on December 30, 2007. No substantial fracture zone or saturation was encountered during drilling at this consolidated unit.

Currently, the consolidated unit is located within an industrial area under Laboratory (institutional) control. The property may be transferred to the public and was therefore evaluated using a residential scenario.

Screening human health and ecological risk assessments were conducted at Consolidated Unit 21-018(a)-99 for three areas, based on similar contaminant sources and topography: (1) SWMUs 21-018(a) and 21-018(b); (2) SWMU 21-013(b) and AOC 21-013(g); and (3) SWMU 21-023(c).

Exposure point concentrations of carcinogenic COPCs are less than the respective residential SSLs for all the areas evaluated. The incremental excess cancer risks are all approximately 1×10^{-5}. These risk levels do not exceed the NMED target cancer risk level of 1×10^{-5}. All of the noncarcinogenic exposure point concentrations are less than the respective residential SSLs, and the hazard indices (HIs) do not exceed the NMED target level of an HI of 1.0. The exposure point concentrations for radionuclide COPCs are less than the respective residential SALs. The total dose at each of the areas evaluated is less than the Department of Energy target dose limit of 15 mrem/yr, with a maximum dose of 10.0 mrem/yr at SWMU 21-023(c). Therefore, concentrations of COPCs in soil and tuff at Consolidated Unit 21-018(a)-99 do not pose a potential unacceptable risk/dose to human health under a residential scenario.

The human health risk assessment also includes an evaluation of the potential inhalation risk to chemicals from pore gas via an indoor air pathway, per NMED's direction. The potential inhalation risks from chemicals in pore gas for residential receptors are evaluated using the Johnson and Ettinger model of indoor air exposure. All of the chemicals evaluated are carcinogens and, therefore, an HI was not calculated. The cumulative cancer risks do not exceed 1×10^{-5} for any of the indoor air model site conditions evaluated.

Overall, the uncertainties associated with the evaluation of ecological risks to residual concentrations of chemicals of potential ecological concern in soil and tuff at Consolidated Unit 21-018(a)-99 overestimate potential risk to ecological receptors. The results of the ecological screening assessment indicate that no potential unacceptable risk exists to receptors at Consolidated Unit 21-018(a)-99.

Based on the results of this and previous investigations, the five sites within Consolidated Unit 21-018(a)-99, specifically SWMUs 21-018(a), 21-018(b), 21-023(c), 21-013(b), and AOC 21-013(g), are recommended as "Corrective Action Complete without Controls" because nature and extent have been defined, and no potential unacceptable risk exists under a residential scenario.

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1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) and managed by Los Alamos National Security (LANS), LLC. The Laboratory is located in north-central New Mexico approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory covers 40 mi^2 of the Pajarito Plateau, which consists of a series of finger-like mesas separated by deep canyons containing perennial and intermittent streams running from west to east. Mesa tops range in elevation from 6200 to 7800 ft above mean sea level (amsl).

The Laboratory's Environmental Programs (EP) Directorate is participating in a national effort by DOE to clean up sites and facilities formerly involved in weapons research and development. The goal of the Directorate is to ensure that past operations do not threaten human or environmental health and safety in and around Los Alamos County, New Mexico. To achieve this goal, EP is currently investigating sites potentially contaminated by past Laboratory operations. These sites are designated as solid waste management units (SWMUs) or areas of concern (AOCs). Individual SWMUs and AOCs may be grouped into consolidated units.

This investigation report addresses Consolidated Unit 21-018(a)-99, also known as Material Disposal Area (MDA) V, which is potentially contaminated with both hazardous and radioactive chemicals. Corrective actions at the Laboratory are subject to the Compliance Order on Consent (the Consent Order), signed by New Mexico Environment Department (NMED), DOE, the Regents of the University of California, and the State of New Mexico Attorney General on March 1, 2005. The Consent Order was issued pursuant to the New Mexico Hazardous Waste Act (HWA), New Mexico Statutes Annotated (NMSA) 1978, § 74-4-10, and the New Mexico Solid Waste Act, NMSA 1978, § 74-9-36(D). Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with DOE policy.

1.1 General Site Information

Consolidated Unit 21-018(a)-99 is located on the southeastern section of the Delta Prime (DP) Mesa, just outside of the main gate to Technical Area (TA) 21 (Figure 1.1-1 and Figure 1.1-2). The elevation of DP Mesa ranges from 7160 to 7170 ft amsl, with a 5% slope southward into BV Canyon, which is named for its location directly below MDAs B and V. The approximate elevation of the center of MDA V is 7165 ft amsl. The canyon slope ranges in elevation from 7050 ft amsl at the bottom of BV Canyon to 7160 ft amsl along the southern edge of Consolidated Unit 21-018(a)-99.

From 1945 to 1978, TA-21 was used primarily for plutonium research, metal production, and related activities. Since 1978, various administrative and chemical research activities have been conducted at TA-21. The current land use is industrial, and it is expected to remain industrial for the reasonably foreseeable future.

Consolidated Unit 21-018(a)-99 consists of four inactive SWMUs and one inactive AOC consolidated in 1999 according to their related operational history as well as the proximity of each site to one another (Figure 1.1-3). The sites include the following:

- SWMU 21-018(a) (MDA V)—three wastewater absorption beds that received effluent from 1945 to 1961, located on the mesa south of the laundry facility;

- SWMU 21-018(b)—a former laundry facility for radioactively contaminated clothing that operated from 1945 to 1961, located immediately south of DP Road and directly north of the absorption beds;
- SWMU 21-023(c)—a waste treatment laboratory septic system and outfall that received effluent from 1948 to 1965. The septic tank and inlet are located primarily on the mesa, and the outfall on the south-facing hillslope of BV Canyon;
- SWMU 21-013(b)—a surface disposal area emplaced in 1965 during demolition of the laundry facility [SWMU 21-018(b)] and a waste research laboratory (AOC 21-009). This SWMU consists of building debris and is located south of the MDA V absorption beds on the slope leading into BV Canyon; and
- AOC 21-013(g)—a surface disposal area emplaced post-1965 east of SWMU 21-013(b) consisting of building debris of unknown origin located on the south-facing hillslope of BV Canyon.

Although Consolidated Unit 21-027(d)-99 (an aboveground storage tank and associated secondary containment and outfall) is not specifically discussed in this investigation report, sampling to define nature and extent was performed within this consolidated unit to assist in characterizing SWMU 21-023(c), located immediately to the east.

1.2 Field Investigation Scope

The primary objective of this investigation was to complete characterization of Consolidated Unit 21-018(a)-99, in accordance with the investigation work plan (LANL 2004, 087358); the work plan notice of disapproval (NOD) (NMED 2004, 090109); the response to the work plan NOD (LANL 2004, 088812); and NMED's approval with modifications of the work plan (NMED 2004, 090174). Remediation activities were conducted to eliminate contaminant sources by removing the remaining infrastructure, primarily underground pipes, and areas where radionuclides exceeded screening action levels (SALs) (LANL 2005, 088493) or inorganic and organic chemicals exceeded soil screening limits (SSLs) (NMED 2006, 092513).

Investigation activities specified in section 4.2 of the approved work plan included the following:

- Borehole Sampling. Sampling was conducted in and around MDA V and the footprint of the laundry facility to characterize the vertical and lateral extent of contamination and fractures in units Qbt 2 and Qbt 3 of the Tshirege Member of the Bandelier Tuff. Samples were collected from a minimum of four depth intervals in each borehole. Fracture characterization was performed visually on cores, and geotechnical analysis was performed on each lithologic unit from the borehole penetrating the Cerro Toledo interval (Qct) of the Bandelier Tuff.
- Surface and Shallow Subsurface Sampling. Surface and shallow subsurface sampling includes both sampling to define nature and extent and confirmation sampling. At the SWMU 21-023(c) outfall and the BV Canyon bottom, sampling was conducted to determine the lateral extent of contamination resulting from downslope migration. Shallow subsurface sampling was also performed to characterize the nature and extent of contamination from the previously removed septic system components. After removal actions, surface and shallow subsurface samples were collected from beneath the distribution lines in and around the absorption beds associated with SWMUs 21-018(a) and 21-018(b), at the SWMU 21-023(c) septic system and outfall, and from SWMU 21-013(b) and AOC 21-013(g).

At the direction of NMED (NMED 2007, 094854; NMED 2007, 096393), additional confirmatory sampling was completed in 2007 on the northwest slope of SWMU 21-013(b) to confirm the effectiveness of the debris-removal activities in one area where benzo(a)anthracene was detected above the SSL. Additionally, an area of elevated radioactivity identified north of former absorption bed 3 [SWMU 21-018(a)] during the postremediation walkover survey is being investigated (section 5.1.3).

Figure 1.2-1 presents the borehole and subsurface sample locations collected for the 2005–2006 investigation and the historical borehole/subsurface sample locations. Figure 1.2-2 shows the locations of surface and shallow subsurface samples collected for the 2005–2007 investigation and the historical surface and shallow subsurface sample locations.

1.3 Remediation Activities Scope

The primary objective of remediation activities performed in 2005 and 2006 was to remove infrastructure and environmental media with concentrations of chemicals of potential concern (COPCs) exceeding residential SALs or the SSLs. As directed by the approved work plan, remediation activities conducted at Consolidated Unit 21-018(a)-99 included the following:

- SWMUs 21-018(a). The work plan specified removing all distribution lines and absorption bed material. Based on levels of plutonium-239 above residential SALs, all distribution lines were located and removed (Figure 1.3-1), and all three absorption beds were completely excavated.
- SWMU 21-023(c). The work plan specified removing all remaining infrastructure and any soil in the septic tank or outfall channel with COPC concentrations that exceed residential SALs/SSLs. Trenching determined that no additional infrastructure (lines, septic tank, etc.) remained at the site.
- SMWU 21-013(b) and AOC 21-013(g). The work plan specified removing and disposing of concrete, asphalt, and metal surface debris from the hillslope. Significant volumes of subsurface debris, primarily asphalt, were discovered during removal activities. The subsurface debris was excavated and removed along with the surface debris identified in the work plan. In addition, small areas of soil containing radionuclides or polycyclic aromatic hydrocarbons (PAHs) in excess of residential SALs/SSLs were removed.

Following removal activities, confirmation samples were collected from beneath (1) removed absorption bed material [SWMU 21-018(a)], (2) the former septic system outfall channel [SWMU 21-023(c)], and (3) the excavated debris materials on the slope [SWMU 21-013(b) and AOC 21-013(g)].

2.0 BACKGROUND

The following sections provide the site descriptions and operational histories, summaries of previous investigations, and a description of additional data needs for the SWMUs and AOCs that comprise Consolidated Unit 21-018(a)-99. The historical investigation report (HIR) (LANL 2004, 087358, Appendix B) provides additional details of past operations and investigations at Consolidated Unit 21-018(a)-99.

2.1 SWMU 21-018(a), MDA V

2.1.1 Site Description and Operational History

SWMU 21-018(a), more commonly referred to as MDA V, is an approximately 1-acre site located immediately south of the former laundry facility [building 21-20; SWMU 21-018(b)] (Figure 1.1-3) and consists of three interconnected liquid waste absorption beds. MDA V was constructed to receive radioactive liquid waste from washing radioactively contaminated clothes in the laundry facility and was designed to enhance the infiltration of liquids into the tuff bedrock. The absorption beds ran parallel to each other, with absorption bed 1 receiving effluent directly from the laundry. Effluent was transported from absorption bed 1 to absorption bed 2 and subsequently to absorption bed 3 by means of a series of collection and distribution pipes buried within the bed materials. This design was intended to allow absorption bed 1 to fill with effluent to a depth of approximately 2 ft from the bottom of the pit before the overflow pipes distributed water to the downgradient absorption beds.

The absorption beds were constructed in 1945 and operated until 1961. They remained on stand-by status until September 1963 when they were permanently removed from service (LANL 1991, 007529, p. 16-223). In January 1984, a chain-link fence was constructed around the absorption bed area. Minor surface stabilization work, including the installation of a soil cover, was completed in 1985 to repair erosion damage (LANL 1986, 007419, p. 69). It is not known whether a soil cover was ever installed over the site before the work conducted in 1985 (LANL 1991, 007529, p. 16-223). No record exists of additional activities at the site after 1985.

During the 2005–2006 remediation activities, the actual construction and dimensions of MDA V were clarified. It was determined that absorption beds 2 and 3 were not entirely contained within the formerly fenced area and that the piping was configured substantially differently than previously thought. Section 5.0 describes the layout of the beds and piping as they were found during excavation activities.

2.1.2 Historical Investigations

This section briefly summarizes the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) sampling and investigation activities conducted at MDA V from 1992 to 2000. Although samples of effluent, soil, vegetation, and bed materials were collected at MDA V from 1946 to 2000, the data from these samples are not included in this report. Details regarding pre-RFI investigations are provided in the HIR (LANL 2004, 087358, Appendix B).

TA-21 Site-Wide Baseline Investigation—1992

A site-wide investigation was performed at TA-21 in 1992 to collect baseline concentrations for a comprehensive suite of analytes, as well as to identify contaminant trends resulting from airborne stack emissions (LANL 1994, 026073; LANL 1995, 052350). Surface and shallow subsurface samples were collected at six locations on the mesa edge to the south and west of SWMU 21-018(a). Samples were analyzed for a limited suite of radionuclides.

Phase I RFI—1994 and 1996

Phase I RFI characterization activities were conducted in 1994 and 1996 (LANL 1996, 054969). These characterization activities focused on the absorption beds and associated surface drainage areas potentially impacted by historical site operations. Phase I RFI activities included the following:

- 1994—A preinvestigation ground-surface radiation survey was conducted to guide borehole locations and identify potential health and safety risks to field personnel. No readings were observed above instrument background (LANL 1996, 054969, p. 40).
- 1994—Eight boreholes were drilled to investigate the absorption beds: six were drilled directly in the absorption beds (five were drilled to 75 ft [locations 21-02518 to 21-02522], one was drilled to 10 ft [location 21-02580, which was excavated along with associated absorption bed material in 2005 and 2006]), two were drilled outside of the beds (one east of the absorption beds [location 21-02523] to 660 ft, and one outside of the MDA V fence [location 21-02517] to 125 ft). Generally, samples were collected from each borehole at 2.5-ft intervals from the surface to a depth of 15-ft and at 5-ft intervals from 15 ft to total depth (TD).
- 1994—Fifteen surface samples were collected from five locations in drainages below MDA V. Sample location were selected according to a geomorphological survey of TA-21 (Broxton and Eller 1995, 058207).
- 1996—A geodetic survey was conducted to better define the geometry of the absorption beds.
- 1996—Four surface samples were collected outside of the MDA V fence (surrounding borehole location 21-02517) and archived core from location 21-02517 was sampled at two depth intervals (5–7.5 ft and 25–30 ft bgs) to further evaluate total uranium data from this location. Two trenches were excavated across absorption bed 1 and sampled (four locations from the trench across the eastern end of absorption bed 1 and two locations from the trench near the drainline from the laundry facility).

Vitrification Demonstration—2000

A nontraditional in situ vitrification (NTISV) demonstration was conducted in absorption bed 1 to demonstrate the technology's capacity for stabilizing radiological contaminants present in the absorption beds. The results of the NTISV demonstration have been previously reported and summarized (LANL 2003, 080923).

Historical Nature and Extent of Contamination

The Consolidated Unit 21-018(a)-99 work plan provides a summary of the nature and extent of contamination at MDA V based on the data from the RFI activities described above (LANL 2004, 087358; section 2.6). A number of inorganic chemicals exceeded background values (BVs) within the absorption beds (LANL 1998, 059730). Several radionuclides were also detected at concentrations above applicable background values (BVs) or fallout values (FVs) within the absorption beds, and a number of these concentrations also exceeded residential SALs (LANL 2004, 087358), particularly in and around the eastern half of absorption bed 1. All SAL exceedances were from locations within absorption bed materials at depths of less than 7.5 ft below ground surface (bgs). Location 21-04509, which was situated at the point where wastewater was introduced into absorption bed 1 from the laundry, was consistently the location of maximum detected concentrations of inorganic chemicals and radionuclides within MDA V. Location 21-04509 was melted during the NTISV demonstration, and data from this location are no longer representative of site conditions (LANL 2003, 080923).

A total of 20 different organic chemicals were detected at 6 locations within MDA V, all associated with absorption bed 1. Of these detections, six were present in Qbt 3 beneath the absorption bed (locations 21-02518 and 21-02519).

2.1.3 Additional Data Requirements

Based on a review of existing site data for SWMU 21-018(a), the following data requirements were identified in the work plan (LANL 2004, 087358):

- definition of lateral extent of COPCs within the absorption beds
- definition of lateral and vertical extent of COPC migration in tuff surrounding the absorption beds
- characterization of fractures beneath MDA V.

2.2 SWMU 21-018(b), Former Laundry Facility

2.2.1 Site Description and Operational History

SWMU 21-018(b), the former laundry facility (building 21-20), was located at the eastern end and south of DP Road, immediately west of the security fence that encloses active TA-21 facilities to the east (Figure 1.1-3). Operational from 1945 to 1961, the laundry facility was used to wash personal protective clothing and other reusable cloth items used in both research and production operations involving radioactive materials at TA-21. It is estimated that the laundry facility generated approximately 2 million gal. of effluent annually (Abrahams 1962, 001306). This effluent was discharged to MDA V.

The laundry facility was a wood-frame structure with both concrete slab and wood-framing-on-pier floors. The wood portions of the building were decommissioned and demolished in 1965 and taken to MDA G where the debris was burned. The concrete foundation and associated piping were bulldozed over the edge of DP Mesa onto the south-facing slope of BV Canyon. This debris was later identified as SWMU 21-013(b). AOC 21-013(g) may have also received debris from the laundry facility.

2.2.2 Historical Investigations

Although effluent samples were collected from the laundry facility for radiochemical analysis from 1945 to 1960, the data from these samples are not included in this report. Details regarding pre-RFI investigations are provided in the HIR (LANL 2004, 087358, Appendix B). No RFI sampling was conducted specifically at SWMU 21-018(b) before the 2005–2006 investigation. One sample (location 21-01973) was collected from the southwestern corner of the laundry building footprint as part of an RFI at MDA B (LANL 2004, 087358; p. B-13).

Based on the small amount of historical data available for the area around the laundry facility, the investigation work plan provides a summary of the nature and extent of contamination at SWMU 21-018(b) (LANL 2004, 087358; section 2.6). Lead was the single inorganic chemical detected at a concentration above BV in the one sample from the laundry facility footprint (location 21-01973).

All historical samples collected in the vicinity of SWMU 21-018(b) were analyzed for radionuclides, although the suite changed from one sampling event to the next. Only strontium-90 and uranium-235 were detected at levels above BVs/FVs in the western area of the laundry facility footprint.

One sample from the laundry facility footprint was analyzed for organic chemicals; none were detected.

2.2.3 Additional Data Requirements

Based on the review of the existing site data for SWMU 21-018(b), the following data requirements were identified in the approved investigation work plan (LANL 2004, 087358; NMED 2004, 090174):

- definition of lateral extent of COPCs in and around the former laundry facility footprint
- definition of vertical extent of COPCs associated with the laundry facility drainline, blow-down sump, and boiler room floor drains
- definition of lateral and vertical extent of COPCs from the sump drainline discharge

2.3 SWMU 21-023(c), Waste Treatment Laboratory Septic Tank System

2.3.1 Site Description and Operational History

SWMU 21-023(c), a former septic system that consisted of a tank (structure 21-62), inlet and outlet lines, and an outfall, served a waste treatment laboratory (building 21-33 [AOC 21-009]). The septic tank was located immediately west of the MDA V absorption beds (Drawing A5-C142, LANL 2004, 085559) and was constructed of reinforced concrete, 3.5 ft wide × 7 ft long × 5.8 ft deep. The inlet and outlet lines were 4-in. vitrified clay pipe (VCP); the outlet line surfaced 40 ft southwest from the tank, approximately 30 ft from the canyon edge above BV Canyon (Drawings ENG-R-1191 and ENG-R-1193, LANL 2004, 085559). The outfall area extended south into BV Canyon.

The waste treatment laboratory septic system was put into service in 1948. Sewage was pumped from a sump in building 21-33 through the septic system. The tank was removed in 1965 and taken to MDA G; however, the inlet and outlet lines were believed to remain in place. During the 2005–2006 field activities, it was determined that none of the septic system components remained in place.

2.3.2 Historical Investigations

This section briefly summarizes the RFI sampling and investigation activities conducted at SWMU 21-023(c) in 1992 and 1993. Although one sample was collected at SWMU 21-023(c) in 1988, approximately 35 ft upgradient of the actual outfall (LANL 1995, 052350, p. 4-13), the data from this sample are not included in this report. Details regarding pre-RFI investigations are provided in the HIR (LANL 2004, 087358).

SWMU 21-023(c) was investigated in 1992 as part of a TA-21-wide Phase I RFI of septic systems (LANL 1995, 052350). A radiological survey was conducted and six surface soil samples were collected based on the survey results of locations with levels of low-energy gamma emitters slightly greater than background.

In 1993, follow-up radiation survey and sampling activities were conducted at SWMU 21-023(c) to meet additional requirements specified in the TA-21 RFI work plan (LANL 1991, 007680) and to address radionuclide and inorganic chemical detections measured at levels above background in the 1992 investigation. The 1993 investigation consisted of a radiological field survey, additional soil sampling, and the installation and sampling of a shallow borehole drilled at the location of the former septic tank (LANL 1995, 052350). Surface samples were collected at eight locations; subsurface samples were collected at 5-ft intervals from the borehole (location 21-01665) to a TD of 20 ft bgs.

The Consolidated Unit 21-018(a)-99 work plan data review provides a summary of the nature and extent of contamination at SWMU 21-023(c) based on the 1992–1993 RFI data (LANL 2004, 087358,

section 2.6). Cadmium, chromium, copper, lead, and selenium were detected at concentrations exceeding BVs (LANL 1998, 059730). Lithium and strontium, for which no BVs have been established, were also detected. None of the detected inorganic chemicals exceeded SSLs (LANL 2004, 087358).

Americium-241 and plutonium-238/239 were detected at levels exceeding their respective FVs. Within the drainage below the septic system outfall, americium-241 and plutonium-239 also exceeded residential SALs (LANL 2004, 087358). The highest levels of americium-241 (213.4 pCi/g) and plutonium-239 (107.5 pCi/g) were from location 21-01339. During the 2005–2006 field effort, the outfall materials in the vicinity of this location were completely removed.

Bis(2-ethylhexyl)phthalate was the only organic chemical detected in samples collected from SWMU 21-023(c).

2.3.3 Additional Data Requirements

Based on the review of the existing site data for SWMU 21-023(c), the following data requirements were identified in the investigation work plan (LANL 2004, 087358):

- definition of the vertical extent of COPCs beneath the inlet and outlet lines
- definition of the lateral and vertical extent of COPCs within the outfall area.

2.4 SWMU 21-013(b) and AOC 21-013(g), Surface Disposal

2.4.1 Site Description and Operational History

SWMU 21-013(b) and AOC 21-013(g) are located immediately south of MDA V on the south-facing slope leading into BV Canyon (Figure 1.1-3). Both have historically been described as surface debris disposal sites. In 1990, sections of discarded pipe and building debris were observed during a site visit, and SWMU and AOC numbers were subsequently assigned. It is not known how long these sites received building debris; however, they did not receive wastes after 1994. SWMU 21-013(b) contained the external concrete piers, the concrete building foundations, and other building debris derived from the 1965 demolition of the laundry facility (building 21-20 [SWMU 21-018(b)]) and a waste treatment laboratory (building 21-33 [AOC 21-009]) (LANL 1991, 007680, pp. 17–29). Other debris included asphalt and concrete poured onto the slope before it solidified, broken asphalt, concrete, piping, and miscellaneous building materials. The origin of the additional debris is not documented. AOC 21-013(g) consisted of two discarded drainlines and miscellaneous building materials, also of unknown origin.

Based on the results of the 2005–2006 field activities, the SWMU 21-013(b) debris field extent is shown to be farther south and east than previously delineated and AOC 21-013(g) is of limited extent (Figure 1.1-3). In addition, unexpectedly large volumes of shallow subsurface debris, mostly asphalt, were encountered during excavation. Section 5.0 describes the removal action conducted at these sites in more detail.

2.4.2 Historical Investigations

Because of the similarities between the two surface debris disposal areas, SWMU 21-013(b) and AOC 21-013(g) were investigated as one site in 1994 (LANL 1991, 007529). During this investigation, a radiation survey was conducted, and surface and shallow subsurface samples were collected. A total of 10 soil samples were collected from 9 locations at SWMU 21-013(b); 26 soil samples were collected from 9 locations at AOC 21-013(g). The results were never published in an RFI report; however, the data are

summarized in the HIR (LANL 2004, 087358, Appendix B, section B-2.0). Many of the samples collected in 2004 are no longer representative of site conditions, because construction debris had been removed and the slope at SWMU 21-013(b) had been regraded in 2005 (Figure 1.2-2).

The Consolidated Unit 21-018(a)-99 work plan data review provides a summary of the nature and extent of contamination at SWMU 21-013(b) and AOC 21-013(g), including the BV Canyon drainage, based on the 1994 RFI data (LANL 2004, 087358, section 2.6)

Four inorganic chemicals (uranium, mercury, lead, and zinc) were detected at concentrations above BVs. No inorganic chemicals exceeded residential SSLs (LANL 2004, 087358).

Americium-241, plutonium-238, plutonium-239, and tritium were detected at levels above BVs/FVs in surface samples (0 to 0.5 ft bgs); strontium-90 and cesium-137 were also detected in shallow subsurface samples on the slope. No radionuclides exceeded residential SALs (LANL 2005, 088493).

Bis(2-ethylhexyl)phthalate was detected at a single location (21-01877). Eight SVOCs, all PAHs, were detected in a surface sample collected at location 21-01906; this finding is consistent with the ubiquitous presence of asphalt on the slope.

2.4.3 Additional Data Requirements

Based on the review of the existing site data for SWMU 21-013(b) and AOC 21-013(g), the following data requirements were identified in the investigation work plan (LANL 2004, 087358):

- definition of lateral and vertical extent of COPCs into drainage
- definition of lateral extent of COPCs east and west of the historical sampling locations
- definition of lateral and vertical extent of COPCs on the original slope surface

3.0 SCOPE OF ACTIVITIES

This section describes the scope of activities conducted at Consolidated Unit 21-018(a)-99 from May 2005 to June 2006. All work was conducted in accordance with the approved investigation work plan (LANL 2004, 087358; NMED 2004, 090174). At the direction of NMED (NMED 2007, 094854; NMED 2007, 096393), additional confirmatory sampling was completed on the northwest slope of SWMU 21-013(b) and at an area of elevated radioactivity, identified during the postremediation walkover survey, is being investigated north of former absorption bed 3.

The activities described in the work plan had two main objectives: (1) to define the nature and extent of potential lateral and vertical migration of COPCs in Consolidated Unit 21-018(a)-99 by collecting additional surface and subsurface data around the site, and (2) to reduce or prevent the migration of contamination by removing infrastructure (e.g., piping) and environmental media known to contain contaminants exceeding residential SALs for radionuclides (LANL 2005, 088493) or residential SSLs for inorganic and organic chemicals (NMED 2006, 092513).

The quality procedures (QPs) and standard operating procedures (SOPs) used during the 2005–2006 characterization and remediation activities are listed in Table 3.0-1. The most current versions of all QPs and SOPs were used for implementing the approved investigation work plan (LANL 2004, 087358; NMED 2004, 090174) for Consolidated Unit 21-018(a)-99. Specific details of the methods used for drilling and sampling activities are presented in Appendix C, along with deviations from the approved work plan. The results of sampling data are summarized in section 7.0.

A summary of the characterization and remediation activities at each SWMU and AOC in Consolidated Unit 21-018(a)-99 is provided in the following sections.

3.1 SWMU 21-018(a), MDA V, and SWMU 21-018(b), Former Laundry Facility

SWMU 21-018(a) and 21-018(b) are situated on an approximately 1-acre parcel on the mesa-top portion of Consolidated Unit 21-018(a)-99. The objectives of the characterization activities at these two sites were to define the lateral and vertical extent of contamination and to characterize potential fractures to better understand the nature of subsurface migration. The objectives of the remediation activities at SWMUs 21-018(a) and 21-018(b) were to remove any remaining underground pipes and to excavate absorption bed material with contaminants exceeding residential SALs/SSLs.

3.1.1 Characterization Sampling

Characterization drilling was performed at Consolidated Unit 21-018(a)-99 from May 12 to June 9, 2005. The objectives of characterization drilling were to define the subsurface extent of contamination and to characterize fractures known to be present in the Tshirege Member of the Bandelier Tuff, units Qbt 3 and Qbt 2. A CME 85 drilling rig equipped with hollow-stem augers was used to advance 15 boreholes in and around MDA V [SWMU 21-018(a)] and the former laundry facility footprint [SWMU 21-018(b)], as discussed in section 3.2. All boreholes drilled at Consolidated Unit 21-018(a)-99, including those drilled during previous investigations, are shown in Figure 1.2-1.

Boreholes were drilled to TDs ranging from 40 to 380 ft bgs. Core material was continuously retrieved at 5-ft-depth intervals using a 3-in.-internal-diameter split-spoon core-barrel sampler. A description of the methods used during characterization drilling for all 2005 boreholes is presented in Appendix C.

To define the vertical and lateral extent of potential chemical and radiological migration from MDA V, eight boreholes were drilled using a “step-out” approach. Two paired boreholes were advanced along each edge of the fenced area. The boreholes closest to the fence line were advanced approximately 80 ft bgs (as opposed to the 40 ft specified in the approved work plan): north (borehole [BH] 06 at location 21-24531), east (BH-08 at location 21-24533), south (BH-10 at location 21-24535), and west (BH-12 at location 21-24539). The outer boreholes were advanced to a minimum of 40 ft bgs: north (BH-05 at location 21-24528), east (BH-09 at location 21-24534), south (BH-11 at location 21-24538), and west (BH-13 at location 21-24540). BH-11 (location 21-24538) was advanced to 55 ft bgs, based on core sample observations.

Two boreholes were drilled within the MDA V fence to characterize the vertical extent of potential migration. Borehole 14 (location 21-24541) was drilled to 80 ft bgs in the southwestern corner adjacent to absorption bed 3, and BH-01 (location 21-24524) was drilled to 380 ft bgs between absorption beds 1 and 2.

Three boreholes (location 21-24525 [BH-02, 40 ft bgs], location 21-24526 [BH-03, 40 ft bgs], and location 21-24527 [BH-04, 40 ft bgs]) were advanced within the footprint of former laundry facility building 21-020 (Figure 1.2-1). One borehole, location 21-24542 (BH-15, 40 ft bgs), was drilled next to the northwestern corner of SWMU 21-018(a) in the vicinity of the underground piping that led into the absorption beds from the laundry building. This borehole was located near a sump line that ran from the west end of building 21-020 into SWMU 21-018(a) but not into the absorption beds themselves. Borehole location 21-24528 (BH-05, 40 ft bgs) and location 21-24531 (BH-06, 80 ft bgs) were drilled near the distribution line that ran from building 21-020 to the center of absorption bed 1. Location 21-24532 (BH-07, 40 ft bgs) was drilled

to the southeast of SWMU 21-018(b) in a drainage channel leading around the northeastern corner of SWMU 21-018(a).

A total of 1160 linear ft was drilled during characterization activities.

Samples were collected from the following intervals:

- highest field-screening detection
- deepest field-screening detection
- at or below nearby structures of concern (absorption beds, drainlines, etc.), if applicable
- TD of borehole

In addition to these intervals, additional samples were collected where fractures, staining, or other field observations indicated the potential for contamination.

Field screening for organic vapors and radioactivity on sample core was conducted continuously throughout all field activity. Field screening for detection of alpha- and beta/gamma-emitters was completed by a Laboratory radiological control technician (RCT). Screening values for alpha and beta/gamma emitters were collected from subsurface material whereas background levels were collected from ambient air and therefore do not represent true background (section 7.2). Field screening for organic vapors was also conducted by the site-safety officer using a photoionization detector (PID). Field screening is discussed in Appendix C.

3.1.2 Chemical and Radiological Analyses

Samples were collected for fixed laboratory analysis during characterization drilling at SWMUs 21-018(a) and 21-018(b), in accordance with the approved work plan (LANL 2004, 087358; NMED 2004, 090174). Field duplicate samples were collected at a frequency of 10% (1 duplicate sample for every 10 samples collected), for a total of 8. Six equipment rinsate samples were also collected.

Table 3.1-1 summarizes the samples collected during characterization drilling, including the borehole number, location, sample interval, sample number, organic vapor background and field screening results, and alpha- and beta/gamma-emitters radioactivity background and field-screening results.

All 2005–2006 characterization samples collected at SWMUs 21-018(a) and 21-018(b) were analyzed for SVOCs (SW-846 8270C), pH (SW-846 9045C), target analyte list (TAL) metals (SW-846 6010B/6020/7471A), nitrate (U.S. Environmental Protection Agency [EPA] Method 300.0), perchlorate (SW-846 8731A; SW-846 6850; EPA Method 314), cyanide (SW-846 9012A), radionuclides by gamma spectroscopy (EPA Method 901.1), americium-241 (Health and Safety Laboratory [HASL]-300/AM-241), isotopic plutonium (HASL-300:ISOPU), isotopic uranium (HASL-300:ISOU), strontium-90 (EPA Method 905.0), and tritium (EPA Method 906.0). In addition, three samples from location 21-24524 (BH-01) included analyses of bromide, fluoride, chloride, and sulfate (EPA Method 300).

3.1.3 Geotechnical Analyses

Thirteen geotechnical samples were collected from location 21-24524 (BH-01) at 1- and 0.5-ft intervals. The objective of geotechnical sampling in the deep borehole only was to characterize potential fractures underlying the absorption beds in MDA V. Samples were initially collected in 1-ft intervals until the Sample Management Office (SMO) determined that 0.5-ft intervals provided enough samples for

geotechnical characterization. One geotechnical duplicate sample was collected for laboratory quality assurance (QA) purposes.

Geotechnical samples were analyzed for moisture content (American Society for Testing and Materials [ASTM] D2216V), bulk density (ASTM D2937), pH (SW-846:9045C), porosity (Methods of Soil Analysis [MOSA] 18-1896), and saturated hydraulic conductivity (ASTM D5084). A summary of the geotechnical sample information is presented in Table 3.1-2.

3.1.4 Geophysical Logging

From July 14 to July 25, 2005, geophysical logging was conducted for all boreholes located in and around SWMUs 21-018(a) and 21-018(b). Each borehole was logged using a neutron probe for measuring soil moisture content, a natural gamma meter for measuring gamma radiation, a three-arm caliper for measuring borehole diameter, and a downhole camera for recording borehole wall imagery to capture any subsurface features, such as character and orientation of potential fracture zones. The instruments and methods used during these geophysical surveys are described in Appendix C. Geophysical logs for the boreholes drilled in 2005 are included in Appendix D.

3.1.5 Pore-Gas Sampling

Following geophysical logging, pore-gas sampling was conducted from July to August 2005 in all boreholes. Pore-gas samples were collected using a straddle-packer system capable of isolating a discrete 1-ft sampling interval. Two depth intervals were sampled in each of the 15 boreholes. The shallow interval was sampled at the extrapolated base of the waste disposal units (i.e., the approximate depth of the fill/tuff contact below the absorption beds). The deep interval was sampled at the bottom of the open borehole at the time of pore-gas sampling. These pore-gas samples were collected several feet above the original TD (Table 3.1-3) because drill cuttings sloughed into the borehole when the augers were removed. Additional slough was added from the borehole sides and ground surface over time. At Consolidated Unit 21-018(a)-99, heavy equipment traffic resulting from remediation activities may have exacerbated slough in the boreholes. However, in most cases, boreholes sloughed approximately 25% of borehole TD.

Per the approved work plan, which states that a second round of pore gas samples would be collected if any volatile contaminants were detected in samples from the first round, a second pore-gas sampling event was conducted from May 24 to June 19, 2006. Although the second round of sampling was to be conducted 30 days following the first, the use of heavy equipment for excavation activities resulted in the collapse of the boreholes and prevented access to the boreholes for reaming and sampling. After removal activities were completed, each of the 15 boreholes was reamed to the original total depth using a hollow-stem auger drilling rig. Sampling was conducted with the auger flights in place to keep the borehole open. A single-packer system was used to isolate the sampling interval at the bottom of the borehole. A straddle-packer system was used to collect the base-of-disposal-unit sample, as described above for the first round of pore-gas sampling.

Two pore-gas samples were collected from each depth interval from both sampling events: one for analysis of VOCs and the second for analysis of tritium. Subsurface pore-gas samples were collected in SUMMA canisters for VOC analysis (EPA Method TO-15) and in silica gel tubes for tritium analysis (EPA Method 906.0). Table 3.1-3 summarizes the purging and sampling information for pore-gas samples collected at Consolidated Unit 21-018(a)-99. The methods used during pore-gas sampling are discussed in Appendix C.

3.1.6 Confirmation Sampling

Remediation of SWMU 21-018(a) absorption beds involved excavating and removing distribution pipes and absorption bed material (soil, sand, gravel, and cobbles). Figure 1.3-1 provides the location map for all corrective action at Consolidated Unit 21-018(a)-99. When the distribution pipes were excavated and removed, samples of absorption bed material were collected and sent for fixed-laboratory analysis to guide material removal. Plutonium-239 activity in characterization samples exceeded the residential SAL of 33 pCi/g; therefore, bed material from all three absorption beds was removed. Remediation activities are discussed in section 5.0.

Absorption bed 1 was measured at 240 ft in length. Absorption beds 2 and 3 were each measured at approximately 250 ft. After bed material was excavated and removed, seven confirmation samples from the floor of each absorption bed were collected from tuff at depths of approximately 12 ft below the original ground surface. The samples were collected from down the center of each bed at intervals of 30, 60, 90, 120, 150, 180, and 210 ft from the eastern end of each bed. Additional material was removed from three locations between the beds, below former interbed distribution pipes (locations 21-24585, 21-24593, and 21-24595). Subsurface confirmation sample locations within the absorption beds are shown in Figure 1.2-1.

Following removal of the distribution line that carried wastewater from the laundry facility to MDA V, confirmation samples were collected from the trench at three locations (21-24551, 21-24552, and 21-24553) (Figure 1.2-2), two depth intervals each (0–0.5 ft and 1.5–2.0 ft below the trench). Two locations were at the building exit points of the main and secondary distribution line; the third location was approximately halfway between the connection of the secondary line to the main line and the north fence of MDA V. After the steel sump line that ran from the west end of the laundry building was removed, confirmation samples were collected from the trench at each end of the pipe line (21-24554 and 21-24555) at two depth intervals each (0–0.5 ft and 1.5–2.0 ft below the trench). Following removal of the clay pipe line, which was situated beneath and just to the west of the steel sump line, one location (21-24556) was sampled at approximately the middle of the run. The location of these trench samples are shown in Figure 1.2-2.

The confirmation samples collected at SWMUs 21-018(a) and 21-018(b) were analyzed for SVOCs (SW-846 8270C), TAL metals (SW-846 6010B/6020/7471A), radionuclides by gamma spectroscopy (EPA Method 901.1), americium-241 (HASL-300/AM-241), isotopic plutonium (HASL-300:ISOPU), isotopic uranium (HASL-300:ISOU), strontium-90 (EPA Method 905.0), tritium (EPA Method 906.0), perchlorate (SW-846 8731A; SW-846 6850; EPA Method 314), cyanide (SW-846 9012A), pH (SW-846 9045C), and nitrate (EPA Method 300.0). Table 3.1-4 summarizes all the confirmation samples collected at SWMUs 21-018(a) and 21-018(b).

3.2 SWMU 21-023(c), Waste Treatment Laboratory Septic Tank System and Associated Outfall

SWMU 21-023(c), a former waste treatment laboratory septic system and associated outfall, is located on mesa top and hillslope, respectively, immediately west of SWMU 21-018(a). The septic system consisted of a concrete septic tank with 4-in.-diameter VCP inlet and outlet lines. The septic tank was removed in 1965. Although the inlet and outlet lines were believed to still be in place at the start of 2005–2006 field activities (LANL 2004, 087358, p.3), they were not located during excavation at SWMU 21-023(c). Only a backfilled utility trench was found where the former inlet/outlet line trenches had been located. The date of inlet/outlet line removal is not known.

3.2.1 Surface and Shallow Subsurface Soil Characterization

Data needs identified for SWMU 21-023(c) to complete characterization of the nature and extent of contamination included the following:

- determining the vertical extent of contamination underneath the former inlet/outlet lines
- determining the lateral and vertical extent of contamination within the outfall area

Sampling to complete characterization of the nature and extent of contamination occurred during three separate events: from December 6 to December 7, 2005; on February 2, 2006; and from March 27 to March 28, 2006. Samples were collected from the following locations throughout SWMU 21-023(c) (Figure 1.2-2):

- former septic system inlet line
- former septic system outlet line
- outfall
- Consolidated Unit 21-027(d)-99
- up- and downgradient of SWMU 21-023(c) in BV Canyon

Table 3.2-1 summarizes the samples and associated field screening results. The procedures for collecting samples are described in Appendix C.

Eight samples were collected at two depth intervals from the former septic system inlet line from locations 21-24569, 21-24570, 21-24571, and 21-24572. Six samples were collected at two depth intervals from the former septic tank outlet line at locations 21-24573, 21-24574, and 21-24575. The sample depths ranged from 2–4 ft bgs at 0.5-ft intervals. Samples were collected in tuff directly underneath backfill in the inlet and outlet line trenches.

Septic system outfall samples and outfall drainage samples were collected from locations 21-24576, 21-24577, 21-24578, 21-24579, 21-24580, 21-25411, 21-25412, 21-25413, 21-25414, and 21-25416. Twenty samples were collected from these locations at two depth intervals per location: one at the surface (0.0–0.5 ft bgs) and the second at 1.5–2.0 ft bgs. The sample from location 21-25416 was collected just upstream of the confluence of the SWMU 21-023(c) and the Consolidated Unit 21-027(d)-99 drainage channels.

Samples from locations 21-25415 and 21-25419 were collected from within Consolidated Unit 21-027(d)-99. Although this site is not part of Consolidated Unit 21-018(a)-99, its drainage joins the SWMU 21-023(c) outfall downstream. Samples from locations 21-25417, 21-25418, 21-25420, and 21-25622 were collected from the drainage channel below this confluence. A total of 12 samples were collected from 2 depths, 0.0–0.5 ft bgs and 1.5–2.0 ft bgs, at these 6 locations. These sampling results are used to address the lateral extent of contamination from SWMU 21-023(c) and to evaluate the potential impact from neighboring Consolidated Unit 21-027(d)-99. Based on the topography of the slope between Consolidated Units 21-018(a)-99 and 21-027(d)-99, it is very unlikely that flow from SWMU 21-023(c) or MDA V could have entered the Consolidated Unit 21-027(d)-99 drainage above the point where it merges with SWMU 21-023(c).

Samples collected up- and downgradient of SWMU 21-023(c) within BV Canyon included locations 21-25421, 21-25422, 21-25423, 21-25623, 21-25624, 21-25625, and 21-25626. Fourteen samples were collected from these seven locations at two depths: 0.0–0.5 ft bgs and 1.5–2.0 ft bgs.

All of the above samples were analyzed for SVOCs (SW-846 8270C), TAL metals (SW-846 6010B/6020/7471A), radionuclides by gamma spectroscopy (EPA Method 901.1), americium-241 (HASL-300/AM-241), isotopic plutonium (HASL-300:ISOPU), isotopic uranium (HASL-300:ISOU), strontium-90 (EPA Method 905), tritium (EPA Method 906), perchlorate (SW-846 8731A; EPA Method 314), cyanide (SW-846 9012A), pH (SW-846 9045C), nitrate (EPA Method 300.0), and polychlorinated biphenyls (PCBs) (SW-846 8082).

3.2.2 Confirmation Samples

Based on historical and current investigation data for SMWU 21-023(c), americium-241 and plutonium-239 exceeded residential SALs in the outfall drainage, thus requiring excavation and removal of contaminated soil in two field campaigns from the outfall channel starting from the southern edge of the mesa down into BV Canyon. Fixed-laboratory analytical results were used to determine the amount of soil removed from the outfall. Figure 1.3-1 shows the soil removal area in the SWMU 21-023(c) outfall drainage channel.

Eight confirmation samples were collected following the April 2006 removal of outfall soil from historical sampling locations where americium-241 and plutonium-239 exceeded the SALs and where no deeper sample was available to confirm vertical extent. These locations are 21-01337, 21-01607, 21-01610, 21-01611, 21-01614, 21-24579, 21-25411, and 21-25412. While the samples are representative of current surface conditions, the sample depth intervals were recorded from the original ground surface. The samples were generally collected from depth intervals of 2.0–2.5 ft bgs. One field duplicate sample was collected for QA purposes.

Americium-241 and/or plutonium-239 analytical results from the April 2006 sampling exceeded residential SALs at five locations (21-01337, 21-01607, 21-01614, 21-01610, and 21-25411). Additional soil and weathered tuff were removed from these locations in August 2006 (section 5.3). Final confirmation samples were collected at the surface from each location, although the final sample depth intervals were recorded from the original ground surface and varied from between 2.5 ft bgs to 4.5 ft bgs. The results of the final confirmation samples are summarized in section 7.0.

The first eight soil/tuff confirmation samples were analyzed for SVOCs (SW-846 8270C), TAL metals (SW-846 6010B/6020/7471A), radionuclides by gamma spectroscopy (EPA Method 901.1), americium-241 (HASL-300/AM-241), isotopic plutonium (HASL-300:ISOPU), isotopic uranium (HASL-300:ISOU), strontium-90 (EPA Method 905), tritium (EPA Method 906), perchlorate (SW-846 8731A; EPA Method 314), cyanide (SW-846 9012A), pH (SW-846 9045C), and nitrate (EPA Method 300.0). The five confirmation samples collected in August 2006 were analyzed only for americium-241, plutonium-238, and plutonium-239 because the extent had been established for all other analytes. Table 3.2-1 summarizes the samples collected from SWMU 21-023(c) and the associated outfall.

3.3 SWMU 21-013(b) and AOC 21-013(g), Surface Debris Disposal Areas

SWMU 21-013(b) and AOC 21-013(g) are located on the south-facing slope of BV Canyon, immediately south of SWMU 21-018(a). These surface disposal areas contain concrete and metal building debris from demolition of the laundry facility (building 21-20), the waste treatment laboratory (building 21-033), asphalt, and debris from other unknown sources. Much of the concrete debris was partially buried at the surface and revegetated. The material underlying the surface debris may have been affected by wastewater overflow from MDA V.

3.3.1 Confirmation Samples

Debris removal was conducted at SWMU 21-013(b) and AOC 21-013(g) from July to October, 2005. After debris was removed from the south-facing slope leading into BV Canyon, samples were collected from soil and tuff in accordance with the approved work plan (LANL 2004, 087358; NMED 2004, 090174). Confirmation sampling occurred from September 7 to September 15, 2005, and on November 4, 2005. A total of 89 samples were collected from 45 locations along an approximate 25-m^2 grid spacing in and around SWMU 21-013(b) and AOC 21-013(g). Two depths (0.0–0.5 ft bgs and 1.5–2.0 ft bgs) were sampled from all but one location; only the 0–0.5 ft bgs sample was collected from location 21-24676 because the welded nature of the underlying tuff precluded the collection of the deeper interval using a hand-auger or spade-and-scoop method. Two field duplicate samples were collected for QA purposes.

Confirmation samples were analyzed for SVOCs (SW-846 8270C), TAL metals (SW-846 6010B/6020/7471A), radionuclides by gamma spectroscopy (EPA Method 901.1), americium-241 (HASL-300/AM-241), isotopic plutonium (HASL-300:ISOPU), isotopic uranium (HASL-300:ISOU), strontium-90 (EPA Method 905), tritium (EPA Method 906), perchlorate (SW-846 8731A; EPA Method 314), cyanide (SW-846 9012A), pH (SW-846 9045C), and nitrate (EPA Method 300.0). Table 3.3-1 summarizes the samples collected from SWMU 21-013(b) and AOC 21-013(g) following the hillslope debris removal activities.

3.3.2 Additional Remediation

Analytical results from locations 21-24654 and 21-24660 indicated that plutonium-239 exceeded the residential SAL of 33 pCi/g in the surface sample (0–0.5 ft bgs) but not in the deeper sample (1.5–2 ft bgs). Benzo(a)anthracene exceeded the residential SSL of 6.81 mg/kg at a third location (21–24650) in the surface sample (0–0.5 ft bgs) but not in the deeper sample (1.5–2 ft bgs). All three locations were excavated (section 5.0). No confirmation samples were collected at locations 21-24654 or 21-24660 because the vertical extent of contamination above SSLs/SALs had already been bounded at these two locations. Confirmation samples were collected in May 2007 at and around location 21-24650 (Figure 1.2-2) to determine the extent of benzo(a)anthracene and to determine if benzo(a)anthracene concentrations were less than the residential SSL in this area of the south-facing slope. Four locations were sampled at two depths each (0–0.5 ft bgs and 1.5–2.0 ft bgs) and samples were analyzed for SVOCs (SW-846 8270C). One field duplicate was collected in conjunction with the surface (0–0.5 ft bgs) sample at location 21-24650.

4.0 FIELD INVESTIGATION RESULTS

This section summarizes the methods, procedures, and results of the characterization activities at Consolidated Unit 21-018(a)-99. The methods and procedures are discussed further in Appendix C. Information and data specific to the chemical characterization of potential contamination are presented in section 7.0.

4.1 Surface Conditions

The elevation of DP Mesa in the vicinity of Consolidated Unit 21-018(a)-99 ranges from 7160 to 7170 ft amsl, with a 5% slope southward into BV Canyon. The approximate elevation of the center of MDA V is 7165 ft amsl. The canyon slope ranges in elevation from 7050 ft amsl in the bottom of BV Canyon to 7160 ft amsl along the southern edge of MDA V.

Consolidated Unit 21-018(a)-99 is an inactive site; no operations have been conducted since the mid-1960s. In recent years, the area of the former location of the laundry facility [SWMU 21-018(b)], which is now paved with asphalt, has been used as a vehicle turnaround area. Before the removal activity began, no surface expression of the three absorption beds or remaining infrastructure (distribution lines) was evident at the site. The three absorption beds were covered with additional fill material in 1985 (LANL 1991, 007529, p. 16-223). The absorption beds that comprise MDA V were surrounded by a chain-link fence before the beds were removed; during excavation, it was determined that the eastern portion of absorption beds 2 and 3 extended beyond the fence line. In May 2006, after final removal of bed material, the former beds were backfilled with clean soil and the surface was graded. Final site restoration was completed in September 2006 and included constructing additional erosion control structures and hydromulching native seeds for revegetation.

Asphalt, concrete, and metallic debris were exposed at the surface on the adjacent hillslope [SWMU 21-013(b) and AOC 21-013(g)]. The south-facing slope of BV Canyon directly south of MDA V was littered with large pieces of concrete building foundation debris, strewn along the slope to the valley floor below. Other debris on the slope included asphalt, metal channels and sheets, and metal piping, some of which was embedded in pieces of concrete. Near the southwestern corner of SWMU 21-018(a), waste asphalt and wet concrete were apparently poured over the edge of the mesa on top of the existing debris pile. In 2005, the debris was removed from the hillslope and shipped to Area G for disposal; debris removal is discussed in detail in section 5.0. Photographs showing the debris slope and stages of removal are provided in Appendix C.

The former septic system [SWMU 21-023(c)] is located primarily on the mesa top west of MDA V, and the associated outfall is located on a steep rocky slope west of SWMU 21-013(b). Before field activities began, this site was heavily vegetated with native trees and shrubs.

Fill material and limited, undisturbed, surface soil constitute the landscape around Consolidated Unit 21-018(a)-99, with fill the dominant surface material. Where undisturbed, the soil on the mesa top is thin and poorly developed; it tends to be silty to fine sand in texture near the surface and more clay-like beneath the surface. Soil profiles tend to be more poorly developed on the cliff-forming, south-facing slopes, such as to the south of MDA V, than on north-facing slopes, which tend to have a higher organic content. A discussion of the soil types in the Los Alamos area can be found in section 2.2.1.3 of the installation work plan (LANL 1998, 062060, p. 2-21) and in Nyhan et al. (1978, 005702, pp. 24–25).

Before removal, the unpaved portions of Consolidated Unit 21-018(a)-99 were covered with dense vegetation, including native shrubs, grasses, and forbs typical of disturbed soil. Vegetation was dominated by the shrub chamisa (*Chrysothamnus nauseosus*). Because the topography of the mesa top is relatively flat and the vegetation on the slopes well established, erosion was minimal before the removal activity. During the removal activity, the surface was disturbed and, as a result, exposed to higher erosion potential. Erosion-control best management practices (BMPs) were implemented during and after the 2005–2006 field activities and are being maintained to minimize erosion.

4.1.1 Relationship to Other SWMUs and AOCs

Other consolidated units, SWMUs, and AOCs located in the vicinity of Consolidated Unit 21-018(a)-99 are shown in Figure 1.1-2 of the approved work plan (LANL 2004, 087358; NMED 2004, 090174) and include the following:

- Consolidated Unit 21-027(d)-99—a former aboveground fuel tank and secondary containment (AOC C-21-028) and stormwater drainline and outfall [SWMU 21-027(d)], which borders the western edge of Consolidated Unit 21-018(a)-99. The tank was removed in 1960. A VCM

conducted in the vicinity of the underground storage tank in 1999 (LANL 2002, 073107) indicated that radionuclides and inorganic chemicals at this site may be attributed to its proximity to MDAs B and V.

- AOC 21-009—a former waste treatment laboratory (building 21-33) located to the west of Consolidated Unit 21-018(a)-99. The septic system, now designated as SWMU 21-023(c), served this laboratory. The laboratory underwent decontamination and decommissioning (D&D) in 1965, and the concrete portions of the laboratory were bulldozed onto the slope south of MDA V. This building debris was part of SWMU 21-013(b).
- SWMU 21-015 (MDA B)—an inactive 6.03-acre disposal site located west of Consolidated Unit 21-018(a)-99. MDA B, which operated from 1945 to 1952, consists of at least five burial pits containing radioactively contaminated debris and hazardous chemicals.
- AOC C-21-015—a former waste treatment laboratory (building 21-45) located on the north side of DP Road, across from Consolidated Unit 21-018(a)-99. Wastewater from the laundry facility was one of the waste streams evaluated at the waste treatment laboratory. Building 21-45 was removed in 1954.
- AOC 21-030—a concrete sump located within the footprint of former building 21-45 (AOC C-21-015), north of Consolidated Unit 21-018(a)-99. The sump was removed during a voluntary corrective action (VCA) conducted from 2000 to 2002 (LANL 2003, 083093).
- SWMU 21-024(f)—a former septic system (including outfall) located across DP Road (north) from Consolidated Unit 21-018(a)-99. The septic system received sewage from building 21-45 (AOC C-21-015) and was removed during a VCA conducted from 2000 to 2002 (LANL 2003, 083093).
- SWMU 21-024(e)—an inactive septic system located east of Consolidated Unit 21-018(a)-99. This septic system routed sewage from the former laundry facility (building 21-20) through a septic tank (structure 21-123) to the surface on the south rim of DP Mesa above Los Alamos Canyon. The septic tank remains in place.

Any of these SWMUs, AOCs, and consolidated units may have contributed to surface and subsurface contamination at Consolidated Unit 21-018(a)-99; however, given the similarity of contaminants encountered at TA-21, it is difficult to distinguish between potential sources of contamination.

4.2 Exploratory Characterization Drilling

Characterization drilling activities were conducted in and around SWMUs 21-018(a) and 21-018(b) between May 12 and June 9, 2005. The objective of the characterization drilling and borehole sampling activities was to define the vertical and lateral extent of contamination and characterize fractures in the Tshirege Member of the Bandelier Tuff cooling units Qbt 3 and Qbt 2.

Fifteen boreholes were advanced using a CME 85 rotary-drill rig equipped with hollow-stem augers and a 3-in.-internal-diameter split-spoon, core barrel sampler. The methods and procedures followed during field activities are described in Appendix C. The 14 boreholes drilled into the Tshirege Member of the Bandelier Tuff Qbt 3 are described in section 4.4. The final borehole, location 21-24524 (BH-01), was advanced through Qbt 3, Qbt 2, the Qbt 1 series, the Cerro Toledo interval, and into the Otowi Member of the Bandelier Tuff (Qbo). These units are described in section 4.4. The borehole logs completed during characterization drilling are presented in Appendix D.

Drilling in all boreholes produced 5-ft continuous core samples that were observed, photographed, and geologically logged after field screening for radioactivity and organic vapors indicated that it was safe to proceed. For each 5-ft core interval recovered, the following information was recorded in field borehole logs: footage and percent recovery, rock-quality designation, general lithology, structural features (if present), depth of samples collected, field-screening results for radioactivity and organic vapors, and date and time of core retrieval. Descriptions of each core interval also included the following:

- color (using a Munsell Soil Color Chart)
- ash matrix size
- degree of matrix welding
- presence and size of phenocrysts
- presence of pumice clasts in tuff with color, size, alteration, and color, size, and nature of phenocrysts
- staining and/or presence of clay-fill fracture zones
- qualitative description of moisture presence
- any other information pertinent to the geology of the core recovered

Descriptions of lithology were completed in accordance with accepted terminology of Pajarito Plateau regional geology (Broxton and Eller 1995, 058207).

4.3 Exploratory Characterization Borehole Geophysical Logging

Geophysical surveys were conducted in all 15 boreholes from July 14 to July 25, 2005. Logging was completed using a neutron probe to measure soil moisture (Mount Sopris Instruments [MSI] Model No. 2NUA-1000); a gamma meter (MSI Model No. 2PGA-1000); a three-arm caliper for measuring borehole diameter (MSI Model No. 2PCA-1000); and downhole camera (MSI Model No. OBI-40). The TD measured for each borehole varied as a result of subsurface material sloughing during auger flight removal. On average, each borehole sloughed approximately 25% of the originally drilled depth. However, location 21-24524 (BH-01), the deep borehole drilled in 2005 (380 ft bgs), sloughed only 11%. No other field conditions or instrument malfunctions affected geophysical logging results.

Geophysical logs for each borehole drilled in 2005 are presented in Appendix D. These logs show neutron and gamma data, expressed as counts per second (cps), as well as a graphical representation of volumetric water content as a calculated percent. This information is superimposed on lithologic logs to allow better visualization of the relationship between lithology and geophysical data.

4.4 Subsurface Conditions

The general stratigraphy beneath Consolidated Unit 21-018(a)-99 has been defined by characterization drilling activities conducted in several separate field events between 1993 and 2005. The information provided in this section is specific to the subsurface at Consolidated Unit 21-018(a)-99 and emphasizes information gained during the 2005–2006 activities.

The Quarternary-age Bandelier Tuff (Qbt) and Cerro Toledo interval are derived primarily from explosive volcanic eruptions in the Valles Caldera approximately 1.2 million yr ago (Broxton and Eller 1995, 058207, p. 7). The basal Guaje Pumice Bed separates the Bandelier Tuff from the underlying clastic fanglomerate sediments of the Puye Formation (Tp). The Guaje Pumice Bed was not encountered in the

area of SWMU 21-018(a) at historical borehole location 21-02523, drilled to 660 ft bgs (LANL 2004, 087358, p. B-10).

DP Mesa consists of Bandelier Tuff overlain by a thin layer of alluvium and soil. The Bandelier Tuff unit is subdivided into two members, in ascending order: the Otowi and the Tshirege. Consolidated Unit 21-018(a)-99 is situated within the Tshirege Member, a compound cooling unit divided into four distinct cooling units (Qbt 4, Qbt 3, Qbt 2, and Qbt 1v/1g) (Broxton and Eller 1995, 058207, pp. 45–51).

Qbt 4 does not occur at TA-21; bedrock directly underlying TA-21 is Qbt 3, a cliff-forming, nonwelded to partially welded tuff. Beneath Consolidated Unit 21-018(a)-99, the Otowi and Tshirege Members are separated at approximately 305 ft bgs by the Cerro Toledo interval, a 30- to 50-ft-thick sequence of volcaniclastic sediments deposited in braided stream systems.

Fill material was observed in the majority of boreholes drilled in and around the former laundry facility footprint, ranging from 8.5 to 15 ft thick. Between the former laundry facility and MDA V, the thickness of fill ranged from 9 to approximately 22 ft. Of the boreholes drilled in and around MDA V, only one penetrated significant quantities of fill. BH-14 (location 21-24541) penetrated approximately 10 ft of mixed fill, broken asphalt chunks, and rounded gravel.

The subsurface lithology is presented on two cross sections, both of which pass through the deep borehole, location 21-24524 (BH-01). The cross-section locations are shown in Figure 4.4-1. Cross section A-A′ is presented from northwest to southeast through locations 21-24540, 21-24539, 21-02522, 21-24524, 21-02520, 21-24533, and 21-24534 as well as absorption bed 2 (Figure 4.4-2). Cross section B-B′ is presented from south to north through locations 21-24526, 21-24528, 21-24531, 21-24524, 21-02521, 21-24535, and 21-24538 and absorption beds 1 through 3 (Figure 4.4-3). These cross sections provide details of the subsurface, which is also shown in the borehole logs (Appendix D).

No perched water or detectable moisture zones were encountered in any of the boreholes drilled during 2005 characterization activity.

Quaternary Tshirege Member of the Bandelier Tuff Unit 3 (Qbt 3)

Qbt 3 is approximately 95 ft thick beneath Consolidated Unit 21-018(a)-99 and consists primarily of nonwelded to moderately welded ash flow tuff (ignimbrite). A nonwelded zone was encountered consistently across the site at approximately 60 ft bgs. This zone consisted of a 20- to 25-ft-thick zone of very fine ash, indicating the base of Qbt 3 and the upper contact with unit Qbt 2.

Quaternary Tshirege Member of the Bandelier Tuff Unit 2 (Qbt 2)

Qbt 2 is typically 75 to 90 ft thick beneath Consolidated Unit 21-018(a)-99 and is a vertical cliff-forming unit with an upper contact defined by the appearance of relatively thin, unconsolidated, nonwelded tuff. This unit is identified by its abundant phenocrysts (especially sanidine) and pumice fragments. The degree of welding is greatest toward the bottom of the section displaying a variation in color to reddish gray. A stained zone was encountered when drilling penetrated this interval; however, no fracture zones were encountered at location 21-24524 (BH-01), the only 2005 borehole to penetrate this unit.

Quaternary Tshirege Member of the Bandelier Tuff Unit 1 (Qbt 1v and Qbt 1g)

Qbt 1v (vapor-phase) separates Qbt 1g (glass phase) from the overlying unit, Qbt 2. Qbt 1v varies in thickness from 52 to 66 ft beneath Consolidated Unit 21-018(a)-99 and is primarily a nonwelded, devitrified ignimbrite. The uppermost portion of Qbt 1v is a slope-forming, nonwelded ash flow tuff, rich in

pumice clasts and increasing up section in vapor-phase alteration. Moisture content was noted to increase in Qbt 1v from 225 to 230 ft bgs, the observed contact with the basal layer of Qbt 1v, a distinct orange-brown devitrified tuff forming columnar joints. This basal colonnade tuff separates the light gray-white nonwelded ash flow of the upper unit 1v from the white-light pinkish gray nonwelded tuff of underlying Qbt 1g unit.

The thickness of the Qbt 1g (glass phase) of the lower Tshirege Member across the Pajarito Plateau is reported to range from 72 to 105 ft (Broxton and Eller 1995, 058207, p.46). However, the thickness of Qbt 1g at Consolidated Unit 21-018(a)-99 was observed to be approximately 55 ft. This unit is cliff-forming because of a prominent protective bench at the top of the unit; below, the unit is a poorly indurated, softer, more massive tuff. Altered reddish-brown pumice fragments are present in the bottom of this interval along with native lithics in increasing size.

Tsankawi Pumice Bed

The Tsankawi Pumice Bed is the basal pumice fall of the Tshirege Member and is approximately 3 ft thick at Consolidated Unit 21-018(a)-99. It is a pumice-rich pyroclastic ash flow tuff and is a distinct unit of coarse ash matrix containing large, fibrous pumice fragments with a vitreous luster and abundant phenocrysts of quartz and other mafic minerals. The Tsankawi Pumice Bed was encountered at location 21-24524 at a thickness of 7 ft.

An erosional surface of weathered tuff overlying the Cerro Toledo interval between the Tsankawi Pumice Bed indicates a period of exposure and erosion before deposition of the overlying pumice bed. Geophysical logging showed a slight increase in moisture content (location 21-24524), but no visible moisture was observed during characterization drilling.

Cerro Toledo Interval

The Tshirege and Otowi Members of the Bandelier Tuff are separated by the Cerro Toledo interval, a volcaniclastic sequence of sediments deposited in braided stream systems (Broxton and Eller 1995, 058207). Deposits of the Cerro Toledo interval are derived primarily from explosive volcanic eruptions approximately 1.2 Ma (Broxton and Eller 1995, 058207) and reworked by wind and water to form tuffaceous sand and gravel zones. The Cerro Toledo interval underlying Consolidated Unit 21-018(a)-99 is a sequence of at least five different pyroclastic eruptions of silica-rich rhyolites interbedded with fluvial sand and gravel deposits. Other interbedded material observed in recovered core was poorly sorted sand, gravel, cobble, and boulder deposits derived from lava flows from an earlier depositional activity. These tuffaceous sands contained the highest moisture content observed in the deep borehole drilled in 2005 (BH-01 at location 21-24524), from 310 to 315 ft bgs and 320 to 330 ft bgs, but no evidence of saturation was found. The moisture data are presented in the geophysical logs (Appendix D) and are discussed in section 4.9.

Quaternary Otowi Member of the Bandelier Tuff (Qbo)

Drilling advanced approximately 20 ft into the Otowi Member, which was determined to be at a minimum 320 ft thick beneath Consolidated Unit 21-018(a)-99, as shown on the borehole log for location 21-02523. The Otowi Member is a light-gray to white ash-flow tuff with light-gray to orange-gray pumice clasts. The purpose of drilling into the Otowi Member was to gain a more thorough understanding of the Cerro Toledo interval underlying MDA V.

4.5 Borehole Abandonment

All 15 boreholes were plugged and abandoned in June 2006 following the second pore-gas sampling event. Location 21-24524 was filled with a bentonite/Portland cement mixture. The remaining 14 boreholes were filled with bentonite. All 15 boreholes were capped with a cement plug from 3 ft bgs to the ground surface.

4.6 Groundwater Conditions

The degree of surface disturbance and the geologic properties of the subsurface at Consolidated Unit 21-018(a)-99 lead to differences in groundwater recharge rates. Mesa-top recharge can be locally significant when vegetation is removed, soil and shallow subsurface bedrock are disturbed, or water is artificially added to the local hydrologic system by activities such as effluent disposal. All these conditions have occurred in the past at Consolidated Unit 21-018(a)-99. However, no effluent has been discharged to the absorption beds since 1961. Before remediation activities began in July 2005, the site was densely vegetated with native shrubs, forbs, and grasses. All vegetation was removed from the site starting in August 2005. Final site restoration, including construction of additional erosion-control structures and hydromulching native seeds for revegetation, was conducted in September 2006.

Although saturated conditions do not currently exist at Consolidated Unit 21-018(a)-99, they may have existed beneath the absorption beds sometime during active wastewater disposal (from 1945 to 1961). A gravimetric water content of 39% is the value for saturation in Bandelier Tuff (LANL 2004, 087358, p.14). Boreholes drilled under the absorption beds during the Phase I RFI had moisture levels that ranged from 3 to 18%, with most measurements below 10% (LANL 1996, 054969, pp. 48–52). In boreholes drilled during 2005, the highest moisture content (maximum of 31.6%, measured gravimetrically) was measured at the contact between the pumice-rich base of the Tshirege Member and the top of the Cerro Toledo interval at location 21-24524. No free moisture was observed in any of the fracture zones encountered during 2005, as would be expected at the measured moisture levels. Only when substantial infiltration occurs from the ground surface, as potentially was the case during active operation of the absorption beds, will the fractures become wet and conduct water. However, modeling studies predict that when fractures disappear at contacts between stratigraphic subunits, when fracture fills are encountered, or when fracture coatings are interrupted, fracture moisture is absorbed into the tuff matrix (Soll and Birdsell 1998, 070011, pp. 193–202). No moisture was observed in any of the fractures encountered during drilling activities at Consolidated Unit 21-018(a)-99.

Perched Groundwater

Perched groundwater zones are defined as zones of saturation located above the regional aquifer and are thought to form mainly at horizons where medium properties change dramatically, such as at paleosol horizons with clay or caliche found in basalt and volcanic sediment sequences (Broxton and Eller 1995, 058207). These zones have been observed in some locations on the plateau within approximately 1.25 mi of Consolidated Unit 21-018(a)-99, such as at well LADP-3 to the southwest in Los Alamos Canyon (in the Guaje Pumice Bed at 6430 ft amsl), regional well R-7 to the south (in the Puye Formation at 6420 ft amsl), and well Otowi-4 on the eastern base of DP Mesa (in the Puye Formation at 6380 ft amsl). The Cerro Toledo interval, which was encountered at location 21-24524, occurs at approximately 6793 ft amsl at Consolidated Unit 21-018(a)-99. No perched saturation zone was observed in the Cerro Toledo interval, nor was evidence of saturated zones found anywhere in the subsurface beneath Consolidated Unit 21-018(a)-99.

Regional Aquifer

The regional aquifer in the Los Alamos area rises westward from the Rio Grande within the Santa Fe Group into the Puye Formation beneath the central and western portion of the Pajarito Plateau. The depth of the aquifer decreases from about 1200 ft bgs along the western margin of the plateau to about 600 ft bgs along the eastern margin. The elevation of DP Mesa at Consolidated Unit 21-018(a)-99 is approximately 7165 ft amsl. The regional aquifer was encountered in deep wells near the site at 5870 ft amsl (well R-7), 5850 ft amsl (well Otowi-4), and 5835 ft amsl [well R-8, downgradient of Consolidated Unit 21-018(a)-99] (LANL 2004, 087358, Figure 3.2-3). Based on this information, the regional aquifer is approximately 1300 ft bgs at Consolidated Unit 21-018(a)-99. The water in the regional aquifer is separated from alluvial and perched water in the volcanics by 350 to 620 ft of tuff and volcanic sediments.

4.7 Surface Water Conditions

Surface water is not present at Consolidated Unit 21-018(a)-99. The approved investigation work plan (LANL 2004, 087358) describes surface water runoff, sedimentation, and erosion on DP Mesa.

4.8 Surface Air and Subsurface Vapor Conditions

Surface air monitoring was conducted at Consolidated Unit 21-018(a)-99 during characterization drilling and all remediation activities to gauge the amount of airborne particulates using an analog version personal DataRAM. Data from airborne particulate (dust) monitoring were collected as a requirement for health and safety purposes. The range of data from dust monitoring at MDA V was 0.000 to 0.143 mg/m^3, which is significantly lower than the lowest dust action level (15 mg/m^3) for COPCs identified in the site-specific health and safety plan (LANL 2005, 094088).

Subsurface vapor (pore-gas) sampling was conducted in each of the 15 boreholes drilled in 2005 during two separate sampling events: in July and August 2005 and again in May and June 2006 (Table 3.1-3). Two samples were collected from each borehole during the 2005 sampling event: one at approximately the base of the open borehole (i.e., at the top of any sloughed material) and the second at the depth adjacent to the approximate base of the absorption beds. During the 2006 sampling event, two samples were also collected; however, the boreholes were reamed out, and the augers were left in place to ensure that a pore-gas sample could be collected from the TD of the borehole. The second interval was sampled at the depth adjacent to the approximate base of the absorption beds. One 2006 sample (the shallow sample from location 21-24524) was not analyzed because a SUMMA canister developed a leak.

Pore-gas samples were collected using a packer system capable of isolating a discrete 1-ft interval. Before sampling, the sample interval was purged using a Bruel & Kjaer (B&K) multigas analyzer until carbon dioxide measurements were stable and representative of subsurface conditions. During the first round of pore-gas sampling, a PID was used for field screening of VOCs in all boreholes before samples were collected. Subsurface pore-gas samples were collected using SUMMA canisters for VOC analysis by EPA Method TO-15 and silica gel samplers for tritium analysis by EPA Method 906.0.

Table 3.1-3 summarizes the pore-gas sampling intervals and the purging and field-screening results for the 2005 and 2006 sampling events. Analytical results for pore gas VOCs and tritium are discussed in section 7.6 and in Appendix B. Appendix C describes the methods followed for collecting subsurface pore-gas samples.

4.9 Materials Testing Results

Per the approved investigation work plan (LANL 2004, 087358; NMED 2004, 090174), the investigation at Consolidated Unit 21-018(a)-99 included collecting geotechnical data for the bedrock units underlying the site. Geotechnical samples were collected from location 21-24524 (BH-01), located within MDA V between absorption beds 1 and 2. A minimum of one sample was collected in each unit from Qbt 3 through the Otowi Member. Five samples were collected from the Cerro Toledo interval.

To collect a relatively undisturbed sample for geotechnical analysis, the split-spoon core barrel was lined with a lexan tube before core was collected. When the core barrel was retrieved, the lexan tube containing the core material was sealed at each end with caps and duct tape. The sample was then labeled and sent by the SMO to a geotechnical laboratory for analysis.

Geotechnical analyses conducted include percent moisture, bulk density (ASTM D2937), saturated hydraulic conductivity (ASTM D5084), gravimetric moisture content (ASTM D2216V), and calculated total porosity (MOSA 18-1986). Test methods for geotechnical analysis are regulated under ASTM and MOSA and produced by the American Society of Agronomy. The results of geotechnical analyses are presented in Table 4.9-1.

Zones with elevated saturated hydraulic conductivity (K_{sat}) were delineated throughout samples from location 21-24524, though no free moisture was observed in any of the cores retrieved. Throughout the entire borehole, an inverse relationship was found between bulk density and total porosity, and it continued further down the Cerro Toledo interval with a spike in density and drop in porosity. Other geotechnical results include the following:

- As measured gravimetrically, the percent moisture ranged from 4.7 to 31.6%, with a median value of 7.9%. Moisture values were relatively stable at 5.6–8% in all units of the Bandelier Tuff. Moisture values were consistently higher in the Cerro Toledo interval (11.3–31.6%). Defined zones of moisture measured historically in Bandelier Tuff at TA-21 had moisture contents of approximately 39% (Broxton and Eller 1995, 058207).
- K_{sat} values for tuff beneath Consolidated Unit 21-018(a)-99 ranged from 0.0000039 to 0.084 cm/sec, with a median value of 0.012 cm/sec. A spike occurred in the shallow clay-filled fracture zone interval from 43–45 ft bgs. A slight decrease in K_{sat} occurred down-section to 25 ft bgs, with an increase to 45 ft bgs, spiking at 45 ft bgs, and dropping significantly at 95 ft bgs with the Qbt 3/Qbt 2 contact. Two more spikes in K_{sat} occurred in Qct and again at TD in the Qto interval.
- Bulk density in tuff beneath Consolidated Unit 21-018(a)-99 ranged from 0.87 to 1.59 gm/cm^3, with a median value of 1.24 gm/cm^3. An initial drop in bulk density occurred at the top of the Qct contact followed by an increase from 314–315 ft bgs, with a value of 1.59 gm/cm^3.
- Total porosity ranged from 40.0 to 67.0%, with a median value of 53.2%. Total porosity was consistent throughout the borehole with the exception of an increase at the top Qct contact followed by a sharp drop. This drop in porosity occurred at 314–315 ft bgs in unit Qct.

Geotechnical results for samples from location 21-24524 are consistent with observed stratigraphy, with changes in conditions noted consistently at or near the top of the Cerro Toledo interval, directly below the porous Tsankawi Pumice Bed. No evidence of saturation was observed in any of the core samples from location 21-24524.

Per the approved investigation work plan (LANL 2004, 087358; NMED 2004, 090174), a fracture analysis was conducted to determine the role fractures play in potential contaminant transport at Consolidated Unit

21-018(a)-99. However, because the originally proposed deep angled borehole was not drilled per the NOD (NMED 2004, 090109), the analysis of fractures was limited to vertical boreholes. Historically, fracture zones observed around TA-21 tended to be vertical (Broxton and Eller 1995, 058207) and filled with strong brown clays and detritus washed into fractures from the surface. Fracture zones encountered during the 2005 characterization drilling activities averaged 2–4 cm in thickness and were clay-filled and generally vertical. Fractures were most prevalent in the upper portion of the Qbt 3 interval, from 25 to 50 ft bgs, and across the western portion of the site; they did not appear to extend eastward beyond the absorption beds. The borehole logs (Appendix D) and cross sections (Figures 4.4-2 and 4.4-3) show only minor fractures throughout this interval, especially between 20 and 40 ft bgs. In general, minor fracturing and zones of oxidation were observed in boreholes throughout Consolidated Unit 21-018(a)-99. As discussed in section 3.1.1, subsurface sampling was biased towards these zones.

5.0 STRUCTURES, DEBRIS, AND SOIL REMOVAL

The primary objective of remediation activities performed in 2005 and 2006 was to remove infrastructure (primarily underground pipes) and environmental media with concentrations of COPCs exceeding residential SALs for radionuclides or residential SSLs for inorganic and organic chemicals. In general, the extent of remediation activities in the SWMU 21-018(a) absorption beds was determined by plutonium-239 activity and those along the SWMU 21-023(c) outfall channel by plutonium-239 and americium-241 activity. The removal at SWMU 21-013(b) and AOC 21-013(g) was driven largely by the presence of construction debris on the slope, but a limited amount of soil containing radionuclides above residential SALs or PAHs above residential SSLs was also removed.

5.1 SWMU 21-018(a), Absorption Beds, and SWMU 21-018(b), Laundry Facility

Remediation activities at SWMUs 21-018(a) and 21-018(b) included removing all distribution lines and absorption bed material. All three absorption beds were excavated based on analytical results from waste characterization samples that were collected when the pipelines were removed. All but 1 of the 15 samples collected from the bed material before excavation indicated that plutonium-239 exceeded the residential SAL of 33 pCi/g.

5.1.1 Removal of Distribution Lines

The location of the main distribution line between SWMUs 21-018(b) and 21-018(a) and the distribution line network within the absorption beds in SWMU 21-018(a) is shown in Figure 1.3-1. Removal of the distribution lines began on August 9, 2005, and was completed on August 19, 2005, with the exception of absorption bed 1 lines. Absorption bed 1 lines were removed in conjunction with the excavation of the bed material to minimize disturbance of the most contaminated material. The distributions lines were 4- to 6-in.-diameter steel pipe, typically connected in 5-ft-length sections. A total of approximately 550 linear ft of lines were removed from the absorption beds.

A steel sump line that ran from the west end of SWMU 21-018(b) was trenched and removed. The 100-ft-long, 4-in.-diameter line ended approximately 20 ft into the northwestern corner of SWMU 21-018(a) but did not connect with the absorption beds. A clay-pipe line was also discovered in the sump-line trench. Approximately 80 ft of clay pipe was removed during the sump-line removal. The sump-line trench was sampled at two depth intervals at each end of the pipe line (locations 21-24554 and 21-24555) (Figure 1.2-2). Following removal of the clay pipe line, which was situated beneath and just to the west of the sump line, one location (21-24556) was sampled at approximately the middle of the run.

During removal of the line from the laundry to the absorption beds, confirmation samples were collected from the trench beneath the line at three locations (21-24551, 21-24552, and 21-24553) (Figure 1.2-2), at two depth intervals each (0–0.5 ft and 1.5–2.0 ft below the line). Two of these locations were at the building exit points of the main and secondary distribution line; the third location was approximately halfway between the connection of the secondary line to the main line and the north fence of MDA V. Following removal and confirmation sampling, the trenches were backfilled and compacted.

5.1.2 Removal of Absorption Bed Material

The absorption bed materials was removed in several phases related to the disposal site designated for the waste stream. The first phase began on September 19, 2005, and ended on November 18, 2005. A total of approximately 3000 yd^3 of bed material was shipped to Area G in TA-54 in 20 yd^3 end dump trucks (162 truck shipments). The second phase of bed material removal began on December 14, 2006, for off-site waste shipments to EnviroCare (now Energy Solutions) in Utah. Bed material was placed into "supersacks" with an 8- to 9-yd^3 capacity. A total of 449 supersacks with approximately 8000 yd^3 of bed material was shipped off-site to EnviroCare between January and March 2006. The third phase of bed material removal involved on-site disposal of the bed material at Area G in TA-54 during April and May 2006. A total of approximately 3600 yd^3 of bed material was shipped to Area G in 20 yd^3 end dump trucks (185 truck shipments). Waste documentation for all of these activities is included in Appendix G.

The final dimensions of the three excavated absorption beds were as follows:

- absorption bed 1: 240 ft × 30 ft × 12 ft ~= 3200 yd^3
- absorption bed 2: 247 ft × 30 ft × 14 ft ~= 3850 yd^3
- absorption bed 3: 248 ft × 30 ft × 14 ft ~= 3850 yd^3

The total excavated volume for all three absorption beds was approximately 10,900 yd^3. The total volume of absorption bed material (with expansion) shipped from SWMU 21-018(a) was approximately 14,600 yd^3.

When the material was removed in each bed, confirmation samples were collected in tuff along the center line of each absorption bed floor. Confirmation samples were collected at approximately 30-ft intervals from east to west. Three additional samples were collected from the bottom of the three interbed trenches (locations 21-24585, 21-24593, and 21-24595) where material beneath distribution lines was excavated because the levels exceeded residential SALs (Figure 1.2-1). Confirmation sampling in the tuff underlying the absorption beds and the interbed distribution lines is described in section 3.1.2, and the analytical results are presented in section 7.0. Analytical results for excavated media are summarized in Tables 5.1-1 through 5.1-4.

Following excavation, all three absorption beds were backfilled with clean fill material obtained from the Los Alamos townsite. The backfill material was placed in lifts and compacted with a bulldozer. Water was periodically applied during lift placement and compaction. Backfilling was completed on May 31, 2006.

5.1.3 Excavation of Area of Elevated Radioactivity

After the final site grading of MDA V was completed, a radiological walkover survey was performed in 2006. As a result of this survey, a shallow (less than 5 ft depth) area of elevated radioactivity (approximately 6 ft by 12 ft, Figure 1.2-2) was identified. Four soil samples were collected in 2006 and analyzed for radionuclides. Americium-241, cesium-137, plutonium-238, plutonium-239, uranium-234, uranium-235, and uranium-238 were detected greater than BV in all four samples. Plutonium-239 was

detected at concentrations ranging from 51.2 to 322 pCi/g. Americium-241 was detected at concentrations ranging from 6.9 to 29.5 pCi/g.

In May 2007, this target area was excavated, and a layer of material was encountered which, based on field observations, was operationally related to the laundry facility complex and exceeded the original target areal extent. Potholing was performed with a backhoe to visually determine the lateral extent of this layer. Radiological field screening was performed on the sidewalls of each pothole to determine the areal extent of the radiological anomaly. Based on this investigation, the area of elevated radioactivity is approximately 50 ft in length and 23 ft in width (Figure 1.2-2). The highest field radiological screening values (direct reading of 220–1000 disintegrations per minute [dpm] alpha-emitting radionuclides and 10,000–30,000 dpm beta/gamma-emitting radionuclides) were detected in a thin 1–2-in. layer of material appearing to be fibrous in nature with a matrix of silt to coarse sand-size particles, and fine wood chips less than ¼ in. long. Material color varied between dark brown to black and a grayish-green. A sample was collected from the highest radiological field-screening location of the layer and analyzed for radiological constituents. Radiological field screening above and below the layer indicates radionuclides may have migrated vertically to a depth of 4–5 ft bgs. Additional removal activities are planned for this area and the results will be reported in a supplemental Consolidated Unit 21-018(a)-99 investigation report.

5.2 SWMU 21-023(c), Septic System and Outfall

Per the approved investigation work plan (LANL 2004, 087358; NMED 2004, 090174), remediation activities at SWMU 21-023(c) were to include removing all remaining infrastructure as well as outfall material exceeding residential SSLs/SALs. Because all components of the septic system were found to have been removed previously, remediation at SWMU 21-023(c) was limited to removing contaminated material from the outfall.

Based on historical and new analytical data, americium-241 and/or plutonium-239 exceeded the residential SALs of 30 pCi/g and 33 pCi/g, respectively, at the following sample locations: 21-01337, 21-01339, 21-01607, 21-01610, 21-0611, 21-0612, 21-01614, 21-24579, 21-24580, 21-25411, and 21-25412 (Figure 1.2-2). In April 2006, approximately 10 yd^3 of material was removed from the area defined by these locations using a vacuum truck equipped with a 6-in. flexible hose. Confirmation samples were collected from eight of these locations where vertical extent was not already defined by deeper samples without residential SAL exceedances (section 3.3.2). The analytical results indicated that americium-241 and/or plutonium-239 still exceeded the residential SALs at five locations (21-01337, 21-01607, 21-01614, 21-01610, and 21-25411). Additional soil and weathered tuff (approximately 1 yd^3) were removed from these locations in August 2006. Final confirmation surface samples were collected from each location (section 3.3.2). The results of the final confirmation samples are discussed in section 7.0. Analytical results for excavated media are summarized in Tables 5.1-1 through 5.1-4. Waste documentation for the excavated material is presented in Appendix G.

5.3 SWMU 21-013(b) and AOC 21-013(g), Slope Debris Removal

Remediation activities at SMWU 21-013(b) and AOC 21-013(g) included removing concrete, asphalt, and metallic debris from the sites for disposal at Area G in TA-54. Slope debris removal operations were conducted from July 25 to August 4, 2005. The site was cleared, and an access road was graded just west of MDA V to the bottom of BV Canyon. Hillslope terraces were graded to provide equipment access to the debris areas. An excavator was used to remove the major portion of the concrete debris from the slope. The material was picked up off the slope and temporarily placed near the canyon bottom. The debris was broken up into smaller pieces (if necessary) and transported by front-end loader to a lined,

bermed staging area on the mesa top. The debris was reduced in size again and loaded into 20 yd^3, rolloff bins. Approximately 1100 yd^3 of concrete as well as small amounts of asphalt and metal debris was removed from the slope and shipped to Area G. Waste documentation for the debris removal is included in Appendix G.

Slope stabilization was performed in August 2005 following the debris removal. The terraces used during debris removal were modified and temporary BMPs, including straw wattles and silt fencing, were installed pending final site restoration. The access road was terraced and covered with vegetation removed during clearing operations.

Following slope stabilization activities, a confirmation sampling grid was established over the hillslope and sampled on grid nodes spaced approximately 50 ft apart. These sample locations are shown Figure 1.2-2. Each location was sampled at two depth intervals: 0–0.5 ft and 1.5–2.0 ft. Samples from the eastern half of the sampling grid were collected from relatively undisturbed, natural settings. The samples from the western half of the sampling grid were collected from reworked fill that was representative of the material underlying the debris before it was removed. Sampling activities were conducted from September 7, to September 15, 2005. Details of the confirmation sampling are provided in section 3.3.1, and the analytical results are discussed in section 7.0.

Plutonium-239 exceeded the residential SAL of 33 pCi/g at two locations (21-24654 and 21-24660), both at a depth of 0–0.5 ft. Benzo(a)anthracene was detected at 6.88 mg/kg, just above the residential SSL of 6.81 mg/kg, at location 21–24650 (0–0.5 ft). Based on these analytical results, approximately 1 yd^3 of material was removed from each location and disposed of at Area G.

During slope debris removal, it was determined that an area from the southwestern corner of SWMU 21-018(a) to the upper portion of the western half of the slope consisted of a large amount of asphalt debris, which made the upper slope unstable. Following a September 21, 2005, site walk with representatives from NMED and EP, it was decided that the upper slope needed to be cut back into the southwestern corner of MDA V, redistributed, and graded to enhance stability and reduce the pitch of the slope. This final slope grading was performed after grid sampling was completed (section 3.4.1) but before the spot removals, described above, were conducted. Because location 21-24650, where benzo(a)anthracene exceeded the residential SSL, is situated on the upper portion of the western half of the slope, it is possible that it was affected by the regrading. The extent to which location 21-24650 was affected by regrading, and therefore the effectiveness of the removal action, was investigated in May 2007; location 21-24650 and three downgradient locations were sampled to determine the extent of benzo(a)anthracene and to determine if benzo(a)anthracene concentrations were less than the residential SSL. (Section 3.3.2 provides details of the confirmation sampling, and section 7.0 discusses the analytical results.) The other two locations where plutonium-239 exceeded residential SALs are situated east of the regraded area and were not affected by the regrading activities.

6.0 REGULATORY CRITERIA

This section describes the criteria used for screening COPCs and evaluating potential risk to ecological and human receptors. Regulatory criteria identified in the Consent Order include cleanup standards, risk-based screening levels, and risk-based cleanup goals and are established by medium.

In accordance with the approved investigation work plan (LANL 2004, 087358; NMED, 2004, 090174), all relevant and qualified data collected at MDA V historically and during the 2005–2006 characterization activities were evaluated in risk screening assessments (Appendix H). “Relevant data” refers to all

samples collected between the surface and 10 ft bgs, and "qualified data" refers to data validated to current standards for data usability.

The human health screening assessment was performed according to NMED and EPA Region 6 guidance (NMED 2006, 092513; EPA 2005, 091002). The SSLs used in the human health screening assessment are presented in Appendix H (Table H-4.1-1) and were obtained from NMED and EPA Region 6 guidance (NMED 2006, 092513; EPA 2005, 091002) and EPA Region 9 (epa.gov/region09/waste/sfund/prg/files/04prgtable.pdf). The SALs were obtained from Laboratory guidance (LANL 2005, 088493) and were calculated using the radioactive residual materials (RESRAD) model (Appendix H, Table H-4.1-2). Because this property may be transferred out of DOE control, the residential SALs/SSLs are used for the cleanup levels for these sites.

The above screening levels are based on a target risk level of 10^{-5} for carcinogens or a hazard quotient (HQ) of 1.0 for noncarcinogens (NMED 2006, 092513). For radionuclides, the target dose is 15 mrem/yr based on DOE guidance (DOE 2000, 067489). The screening levels presented in Appendix H are based on these cleanup goals.

The ecological screening assessment was performed according to Laboratory guidance (LANL 2004, 087630). The ecological screening levels used in the screening assessment were obtained from the ECORISK Database, Version 2.2 (LANL 2005, 090032) (Appendix H, Table H-5.2-1).

The Consent Order does not provide screening levels for VOCs in pore gas. VOC data were screened to determine whether VOCs in subsurface pore gas were a potential source of groundwater contamination through migration of pore gas to groundwater. This screening process, presented in Appendix H, accounts for equilibrium partitioning between VOCs in the gas and liquid phases and compares measured concentrations of VOCs in pore gas to concentrations required to cause groundwater cleanup standards to be exceeded.

7.0 SITE CONTAMINATION

The following sections summarize the results of field-screening and fixed-analytical sampling performed during drilling and remediation activities at Consolidated Unit 21-018(a)-99. Appendix B provides details of the analytical results, Appendix E describes the analytical program, and Appendix F provides all of the analytical reports (on DVD accompanying this report).

7.1 Sampling Summary

Investigations at Consolidated Unit 21-018(a)-99 fall into one of the following three categories: (1) pre-RFI activities conducted between 1946 and 1990; (2) historical RFI activities conducted between 1992 and 2000; and (3) current field activities conducted between May 2005 and May 2006. No pre-RFI data are presented or evaluated in this report. All qualifying data from historical RFI investigations and the 2005–2006 investigation are included in this report. The soil, fill, rock (tuff), and sediment samples collected from Consolidated Unit 21-018(a)-99 are evaluated in this report.

7.1.1 Surface and Shallow Subsurface Samples

The surface and shallow subsurface samples were collected during the 2005–2006 investigation at Consolidated Unit 21-018(a)-99 for fixed-laboratory analysis. The samples were collected to characterize contamination associated with SWMUs 21-023(c) and 21-013(b) and AOC 21-013(g). In 2007, four additional locations on the northwest slope of SWMU 21-013(b) were sampled. Table 3.2-1 presents the

samples collected from SWMU 21-023(c) during the 2005–2006 investigation. Table 3.3-1 presents the samples collected from SWMU 21-013(b) and AOC 21-013(g) during the 2005–2007 investigation.

7.1.2 Tuff and Other Bedrock Samples (Subsurface Samples)

Samples were collected and submitted for fixed-laboratory analyses during the 2005–2007 field activities, in accordance with the approved work plan (LANL 2004, 087358; NMED 2004, 090174; NMED 2007, 096393). Table 3.1-1 summarizes the samples collected during the 2005 characterization drilling activities, including borehole number, location number, sample interval, sample number, media code, analyses performed, and results of field screening for organic vapors and alpha and beta/gamma radioactivity. Table 3.1-4 summarizes the confirmation samples collected in 2006 from the top of the tuff beneath the former absorption bed material following removal, including alpha and beta field-screening results.

7.2 Soil, Rock, and Sediment Sample Field-Screening Results

This section summarizes the results of all field screening conducted at Consolidated Unit 21-018(a)-99 during the 2005–2006 field activities. Field screening for radioactivity and organic vapors was performed continuously on core samples from all boreholes during characterization drilling, primarily for health and safety purposes but also to guide sampling.

7.2.1 Field Screening for Radioactivity

Field screening of retrieved subsurface core samples for radioactivity was performed continuously throughout all characterization drilling activities, as described in section 3.1.1 and in section C-3.0 of Appendix C. The field-screening results for radioactivity from the 2005 drilling activities are provided in Table 3.1-1.

Local background levels, calculated twice daily in ambient air, were consistent within each borehole across the site but varied with changes in borehole location, date, and other environmental factors such as temperature, wind speed, and humidity. However, measurement of radiological background in ambient air is not directly comparable to a downhole measurement of background activity because of the presence of naturally occurring radionuclides in rocks and soil. Field-screening levels for alpha and beta emitters on retrieved core samples were consistent within each borehole, and all measurements were less than 2 times the local ambient air background levels (the target for sample collection based on elevated radioactivity). The consistency of local ambient air background levels across the site provided a baseline for naturally occurring radioactivity and was also used throughout characterization drilling activities as the target for sample selection based on elevated radiation levels. Samples were collected from location 21-24524 (168–170 ft bgs), location 21-24527 (12–14 ft bgs), and location 21-24532 (28–30 ft bgs) at Consolidated Unit 21-018(a)-99, based on elevated radioactivity.

7.2.2 Field Screening for Organic Vapors

Field screening for organic vapors in headspace using a PID was conducted on each core sample throughout 2005 drilling activities, as described in section 3.1.1 and in section C-3.0 of Appendix C. The results of field screening for organic vapors are presented in Table 3.1-1.

Local background levels were measured from ambient air and recorded in parts per million. No samples were collected at Consolidated Unit 21-018(a)-99 based on elevated organic-vapor field-screening

results. Because head space screening results were similar to background levels, they could not be used to guide drilling and determine total depths for boreholes.

7.3 Soil, Fill, Rock, and Sediment Sampling Analytical Results

The analytical results for all soil, fill, tuff, and sediment samples collected at Consolidated Unit 21-018(a)-99 since 1992 are summarized in Appendix B. The data reports for all of the samples evaluated are provided in Appendix F (on DVD accompanying this report).

A summary of the analytical results for soil, fill, tuff, and sediment samples from SWMUs 21-018(a) and 21-018(b) is presented in Tables 7.3-1, 7.3-2, and 7.3-3 for inorganic, radionuclide, and organic COPCs, respectively. Figures 7.3-1, 7.3-2, and 7.3-3 show the locations and the analytical results for inorganic, radionuclide, and organic COPCs, respectively.

A summary of the analytical results for soil, fill, tuff, and sediment samples from SWMU 21-023(c) is presented in Tables 7.3-4, 7.3-5, and 7.3-6 for inorganic, radionuclide, and organic COPCs, respectively. Plates 1, 2, and 3 show the locations and the analytical results for inorganic, radionuclide, and organic COPCs, respectively.

A summary of the analytical results for soil, fill, tuff, and sediment samples from SWMUs 21-013(b) and AOC 21-013(g) are presented in Tables 7.3-7, 7.3-8, and 7.3-9 for inorganic, radionuclide, and organic COPCs, respectively. Plates 1, 2, and 3 show the locations and the analytical results for inorganic, radionuclide, and organic COPCs, respectively.

7.4 Air and Subsurface Vapor Monitoring

As described in section 3.1.5, pore-gas sampling was conducted in conjunction with geophysical logging from July 21 to August 4, 2005. A second pore-gas sampling event was conducted from May 24 to June 19, 2006. In both events, pore-gas samples were collected from two depth intervals: one at the approximate depth of nearby disposal units, and one at the bottom of the borehole. During the first pore-gas sampling event, the deeper interval was collected at the open depth of the borehole, which was shallower than the original TD of the borehole because of sloughing. During the second pore-gas sampling event, the augers were left in place to ensure the samples were collected from TD.

All pore-gas samples were analyzed for VOCs and tritium. A summary of pore-gas sampling information is presented in Table 3.1-3. The methods used during pore-gas sampling are discussed in Appendix C.

7.5 Air and Subsurface Vapor Field-Screening Results

As described in section 4.8, all pore-gas samples were field screened for oxygen and carbon dioxide; the first round pore-gas samples were also screened for organic vapors using a PID for health and safety purposes. The results are presented in Table 3.1-3.

7.6 Air and Subsurface Vapor Laboratory Analytical Results

The analytical results for all Consolidated Unit 21-018(a)-99 pore-gas samples are summarized in Appendix B, and the analytical reports are included in Appendix F (on DVD). The analytical results of VOCs detected in pore gas are presented in Tables 7.6-1 and Table 7.6-2 for the 2005 and 2006 sampling events, respectively. The analytical results of tritium detected in pore gas are presented in Tables 7.6-3 and 7.6-4 for the 2005 and 2006 sampling events, respectively. The locations and analytical

results of VOCs detected in pore gas are shown in Figures 7.6-1 and 7.6-2 for the 2005 and 2006 sampling events, respectively. The locations and analytical results of tritium detected in pore gas are shown in Figures 7.6-3 and 7.6-4 for the 2005 and 2006 sampling events, respectively.

8.0 CONCLUSIONS

8.1 Summary of the Investigation Activities

The primary objective of this investigation was to complete the characterization of Consolidated Unit 21-018(a)-99, in accordance with the approved investigation work plan (LANL 2004, 087358; NMED 2004, 090174). At the direction of NMED (NMED 2007, 094854; NMED 2007, 096393), additional confirmatory sampling was completed in 2007 on the northwest slope of SWMU 21-013(b). Additionally, a removal action is in progress at an area of elevated radioactivity identified north of former absorption bed 3 [SWMU 21-018(a)] during the postremediation walkover survey.

Although all primary potential sources of contamination have been removed from Consolidated Unit 21-018(a)-99, some residual contamination remains, as discussed in the following sections.

8.1.1 SWMUs 21-018(a) and 21-018(b)

Appendix B provides a detailed discussion of the nature and extent of residual contamination at SWMUs 21-018(a) and 21-018(b). At MDA V, all absorption bed material and associated piping have been removed. The results of confirmation samples collected in tuff at the base of the beds indicate little residual contamination, and the boreholes drilled in and around MDA V during the 2005 to 2006 investigation show decreasing trends of COPCs, both with depth and laterally. In and around the footprint of the former laundry facility, few COPCs were detected, and those detected were present at low concentrations and decreased with depth. All pipes have been removed, and the former laundry facility does not represent a significant source of contamination to the environment. Based on the distribution and concentrations of COPCs at SWMUs 21-018(a) and 21-018(b), the objectives of the investigation have been met, with the exception of low levels of tritium in subsurface pore water. Groundwater monitoring requirements for TA-21, including Consolidated Unit 21-018(a)-99, will be addressed in the "Los Alamos/Pueblo Canyons Groundwater Monitoring Well Network Evaluation Report," scheduled for submittal to NMED on December 30, 2007. The area of elevated radioactivity identified during postremediation radiological surveys will be remediated and the results reported in a supplemental Consolidated Unit 21-018(a)-99 investigation report.

8.1.2 SWMU 21-023(c)

Appendix B provides a detailed discussion of the nature and extent of residual contamination at SWMU 21-023(c). Based on the distribution of COPCs at SWMU 21-023(c), the extent of residual contamination is defined. Very few COPCs were detected in the area of the former septic system, indicating no significant unintentional releases occurred. Contamination at SMWU 21-023(c) is primarily the result of the intentional releases at the septic system outfall. Characterization sampling at the outfall indicates a decreasing trend downgradient from the point of release. Samples collected to the east of Consolidated Unit 21-018(a)-99, in Consolidated Unit 21-027(d)-99 (Figure 1.2-2), indicate no significant impact from contamination from either the SWMU 21-023(c) outfall or overflows from MDA V. Confirmation sampling following removal of material from the outfall drainage confirm decreasing vertical trends for COPCs. Amercium-241 and plutonium-239, the drivers for the removal action at SWMU 21-023(c), were detected at approximately an order of magnitude less than in the overlying material removed during

remediation of the outfall. Based on the distribution and concentrations of COPCs at SMWU 21-023(c), the objectives of the investigation have been met.

8.1.3 SWMU 21-013(b) and AOC 21-013(g)

Appendix B provides a detailed discussion of the nature and extent of residual contamination at SWMU 21-013(b) and AOC 21-013(g). The lateral and vertical extent of contamination at SWMU 21-013(c) and AOC 21-013(g) are defined. The sampling grid was extended farther east and west on the debris slope than was sampled historically. The samples collected along the eastern and western edges of the grid had fewer COPCs and/or lower concentrations of COPCs than samples from within the grid. This trend is also true of samples collected along the toe of the slope.

Although the preoperational surface was not reached for sampling in a portion of SWMU 21-013(b) because of the thickness of the fill material present, a significant number of samples were collected from relatively undisturbed areas surrounding the area covered by fill. Samples on the upper portion of the eastern half of the debris slope suggest some impact to the surface from radionuclides, possibly from overflows from MDA V. However, the radionuclides (primarily plutonium-239 and americium-241) show decreasing concentration trends, both with depth and laterally. Based on the distribution and concentrations of COPCs, neither SWMU 21-013(b) or AOC 21-013(g) represents a significant source of contamination, and the objectives of the investigation have been met.

8.2 Summary of the Remediation Activities

The primary objective of remediation activities performed in 2005 and 2006 was to remove infrastructure and environmental media where inorganic or organic chemicals exceeded residential SSLs (NMED 2006, 092513) or radionuclides exceeded residential SALs (LANL 2005, 088493).

8.2.1 SWMUs 21-018(a) and 21-018(b)

All absorption bed material and associated piping were removed from SWMU 21-018(a). In general, the extent of remediation activities in the SWMU 21-018(a) absorption beds was determined by the presence of plutonium-239 exceeding residential SALs. The total excavated volume for all three absorption beds was approximately 10,900 yd^3. The total volume of absorption bed material (with expansion) shipped from SWMU 21-018(a) was approximately 14,600 yd^3. The removal action for the area of elevated radioactivity will be reported in a supplemental Consolidated Unit 21-018(a)-99 investigation report.

8.2.2 SWMU 21-023(c)

Approximately 11 yd^3 of soil and weathered tuff containing plutonium-239 and americium-241 exceeding residential SALs was removed from the SWMU 21-023(c) outfall drainage using a vacuum truck. Confirmation sampling conducted in the outfall drainage indicates that residual americium-241 slightly exceeds residential SALs at two locations in tuff; however, the overall exposure is less than residential SALs.

8.2.3 SWMU 21-013(b) and AOC 21-013(g)

Over 1,000 yd^3 of concrete, asphalt, and metal debris was removed from SWMU 21-013(b) and AOC 21-013(g). In addition, a limited amount of soil containing radionuclides exceeding residential SSLs was removed from two locations on the slope of BV Canyon, just below MDA V. Soil removed from a third location, where benzo(a)anthracene was detected slightly above residential SSLs, may have been

regraded before the removal action was conducted. However, based on the analytical data from the additional sampling conducted in 2007 at and downgradient of location 21-24650, benzo(a)anthracene was not detected .

8.3. Comparisons of Data to Screening Levels and Applicable Cleanup Levels

8.3.1 Evaluation of Soil and Tuff Media Based on Screening Risk Levels

The historical data collected during RFI activities from 1992 to 2000 and the data collected during the 2005–2006 characterization drilling and sampling activities at Consolidated Unit 21-018(a)-99 were used to determine the COPCs in soil, fill, sediment, and tuff and to complete risk screening assessments for human and ecological receptors. The COPCs identified are presented in Appendix B. Screening-level comparisons for determining potential risks to human health (residential receptors) and terrestrial ecological receptors are provided in Appendix H. The cleanup goals are a target risk level of 10^{-5} for carcinogens and an HI of 1.0 for noncarcinogens (NMED 2006, 092513). For radionuclides, the target dose is 15 mrem/yr based on DOE guidance (DOE 2000, 067489).

8.3.2 Evaluation of Pore-Gas Screening Levels Based on Potential Groundwater Contamination

The VOC results from pore-gas sampling were screened to evaluate whether concentrations of VOCs are a potential source of groundwater contamination. Because no screening levels are available for pore gas that address the potential for groundwater contamination, the screening evaluation was based on groundwater cleanup levels and Henry's Law Constant that describe the equilibrium relationship between vapor and water concentrations. Maximum detected concentrations of VOCs detected in samples from two pore-gas sampling events were screened. The screening analysis is presented in Appendix H. These results show that the screening value is less than 1 in all cases, with the exception of 1,4-dioxane, which slightly exceeds 1 (1.11) in borehole location 21-24531 from the 14–15 ft bgs depth interval in August 2005. No 1,4-dioxane was detected in the lower depth interval sampled at 51–52 ft bgs, nor was 1,4-dioxane detected at any other location. Location 21-24531 (BH-06) was resampled in June 2006, and no 1,4-dioxane was detected. The results of this screening indicate that VOCs in subsurface pore gas at Consolidated Unit 21-018(a)-99 are not a potential source of groundwater contamination.

8.4 Summary of Risk Assessment

8.4.1 Human Health Risk Screening Assessment

The results of the data review for each site within Consolidated Unit 21-018(a)-99 identified inorganic, organic, and radionuclide COPCs presented in Appendix B.

Exposure point concentrations of carcinogenic COPCs are less than the respective residential SSLs for each site. The incremental excess cancer risks are all approximately 1×10^{-5} and do not exceed the NMED target risk level of 1×10^{-5} (NMED 2006, 092513). For all of the sites, arsenic is the main contributor to the total incremental excess cancer risk. The exposure point concentrations for arsenic at each site are similar to background concentrations for soil and tuff and indicate that exposure is similar to background across the sites. The total estimated excess cancer risks without arsenic are less than 1×10^{-5}.

All of the noncarcinogenic exposure point concentrations are less than the respective residential SSLs, with one exception. AOC 21-013(g) had an elevated uranium concentration in one sample that exceeded the residential SSL. The total uranium analyses were found to be inaccurate, and they substantially

overestimate the concentrations of total uranium. Based on an analysis of the data in the uncertainty section of Appendix H and the resampling and analysis of uranium at this location, it was found that uranium concentrations are similar to background concentrations in this area of the consolidated unit. As a result, the elevated total uranium results should not be included in the calculation of the hazard index (HI). The HI for SWMU 21-013(b) and AOC 21-013(g) using representative uranium concentrations is less than 1.0. Therefore, the HIs for each site do not exceed the NMED target level of an HI of 1.0 (NMED 2006, 092513).

Per direction from NMED (NMED 2007, 094854; NMED 2007, 096393), the human health risk assessment also includes an evaluation of the potential inhalation risk to chemicals from pore gas via an indoor air pathway. The potential risks from chemicals in pore gas for residential receptors are evaluated using the Johnson and Ettinger model of indoor air exposure (EPA 2002, 094114). All the chemicals evaluated are carcinogens and, therefore, an HI was not calculated. The cumulative cancer risk does not exceed 1 x 10^{-5} for any of the indoor air model site conditions evaluated.

The exposure point concentrations for radionuclide COPCs are less than the respective residential SALs. The total dose for each site is less than 15 mrem/yr, with a maximum dose of 10.0 mrem/yr at SWMU 21-023(c). The total dose for each site corresponds to radiological risks of approximately 5×10^{-6} for SWMUs 21-018(a) and 21-018(b), approximately 1×10^{-5} for SWMU 21-013(b) and AOC 21-013(g), and approximately 3×10^{-5} for SWMU 21-023(c) based on comparisons with EPA radionuclide preliminary remediation goals (PRGs) for a residential receptor (http://epa-prgs.ornl.gov/radionuclides/download/rad_master_prg_table_pci.xls). Based on the risk assessments, concentrations of COPCs in soil and tuff at Consolidated Unit 21-018(a)-99 do not pose a potential unacceptable risk/dose to human health under a residential scenario.

8.4.2 Ecological Risk Screening Assessment

Overall, the uncertainties associated with the evaluation of ecological risks to residual concentrations of COPCs in the soil and tuff at Consolidated Unit 21-018(a)-99 overestimate potential risk to ecological receptors. The results of this screening assessment indicate that potential risk to the receptors is not present at Consolidated Unit 21-018(a)-99.

8.5 Additional Data Requirements

As presented in Appendix B and summarized above, the nature and extent of contamination at the four SWMUs and one AOC comprising the consolidated unit have been defined, with the exception of low levels of tritium in subsurface pore water. Groundwater monitoring requirements for TA-21, including Consolidated Unit 21-018(a)-99, will be addressed in the "Los Alamos/Pueblo Canyons Groundwater Monitoring Well Network Evaluation Report," scheduled for submittal to NMED on December 30, 2007. The area of elevated radioactivity identified during postremediation radiological surveys will be remediated and the results reported in a supplemental Consolidated Unit 21-018(a)-99 investigation report.

Additionally, it was concluded that no perched saturation zones exist beneath Consolidated Unit 21-018(a)-99. The human health and ecological risk screening assessments (Appendix H) conclude that no potential unacceptable risk, hazard, or dose is posed by COPCs in soil, fill, sediment, and tuff at the site.

9.0 RECOMMENDATIONS

Based on information and data presented in this investigation report, characterization activities are complete at Consolidated Unit 21-018(a)-99, in accordance with the approved investigation work plan (LANL 2004, 087358; NMED 2004, 090174) and subsequent requirements from NMED following review of the investigation report (NMED 2007, 094854; NMED 2007, 096393). Additionally, a removal action will be conducted at the area of elevated radioactivity identified north of former absorption bed 3 [SWMU 21-018(a)] during the postremediation walkover survey. The area of elevated radioactivity identified during postremediation radiological surveys will be remediated and the results reported in a supplemental Consolidated Unit 21-018(a)-99 investigation report.

Consolidated Unit 21-018(a)-99 was remediated in 2005 and 2006 by removing infrastructure and environmental media with concentrations of COPCs exceeding residential SALs for radionuclides or residential SSLs for inorganic and organic chemicals. The nature and extent of contamination have been defined, with the exception of low levels of tritium in subsurface pore water. Groundwater monitoring requirements for TA-21, including Consolidated Unit 21-081(a)-99, will be addressed in the "Los Alamos/Pueblo Canyons Groundwater Monitoring Well Network Evaluation Report," scheduled for submittal to NMED on December 30, 2007.

It has been shown that the residual contamination does not pose a potential unacceptable risk to human health (under a residential scenario) or the environment, and it is expected that the future removal action of the area of elevated radioactivity will result in no residual contamination that would cause unacceptable risk. An appropriate recommendation for the designation of Consolidated Unit 21-018(a)-99 will be submitted in the supplemental Consolidated Unit 21-018(a)-99 investigation report pending successful removal of the area of elevated radioactivity.

10.0 REFERENCES AND MAP DATA SOURCES

10.1 References

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in text citations. ER ID numbers are assigned by the EP Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau; the U.S. Department of Energy–Los Alamos Site Office; EPA, Region 6; and the EP Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

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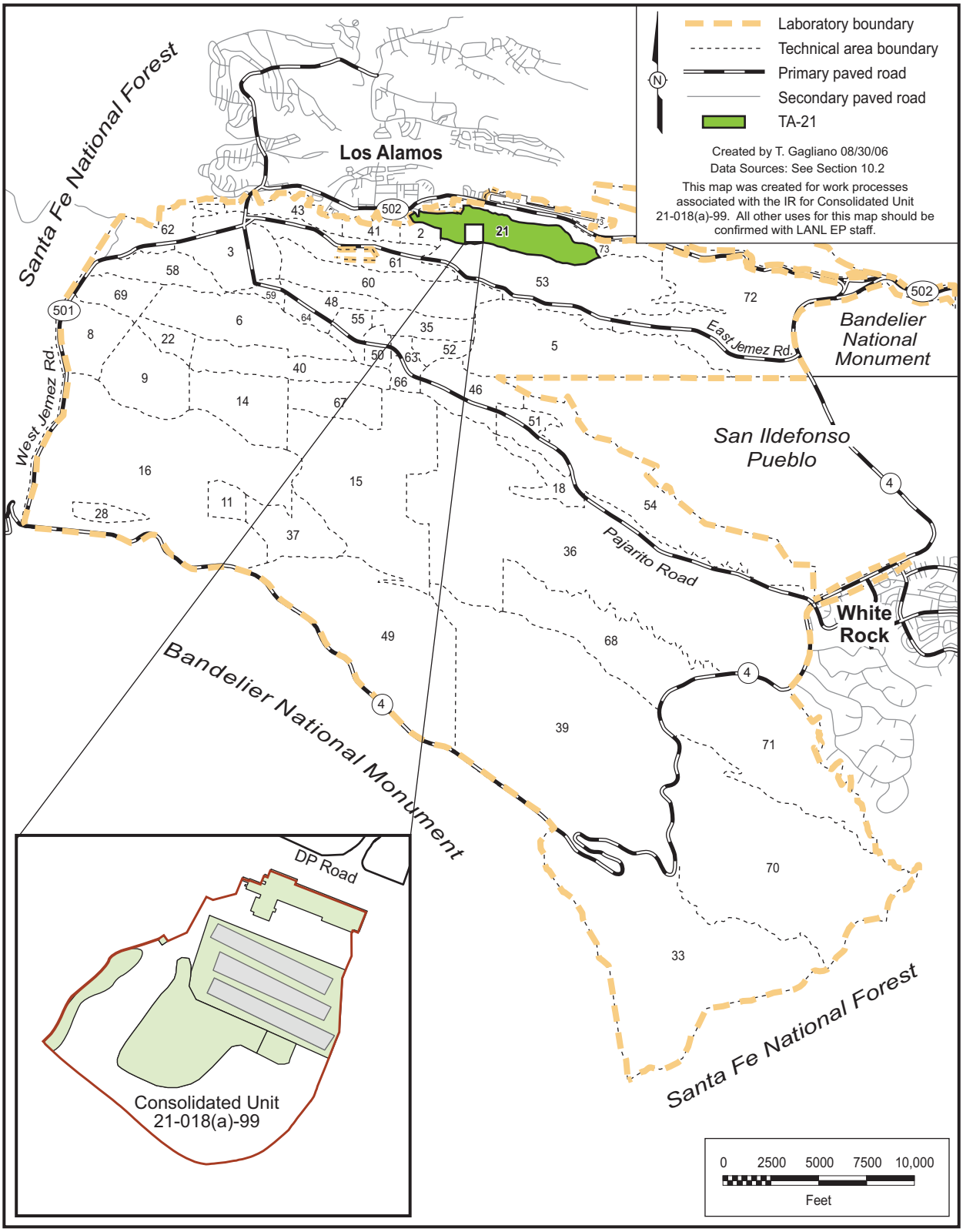


Figure 1.1-1 Location of TA-21 and Consolidated Unit 21-018(a)-99 with respect to Laboratory technical areas and surrounding land holdings

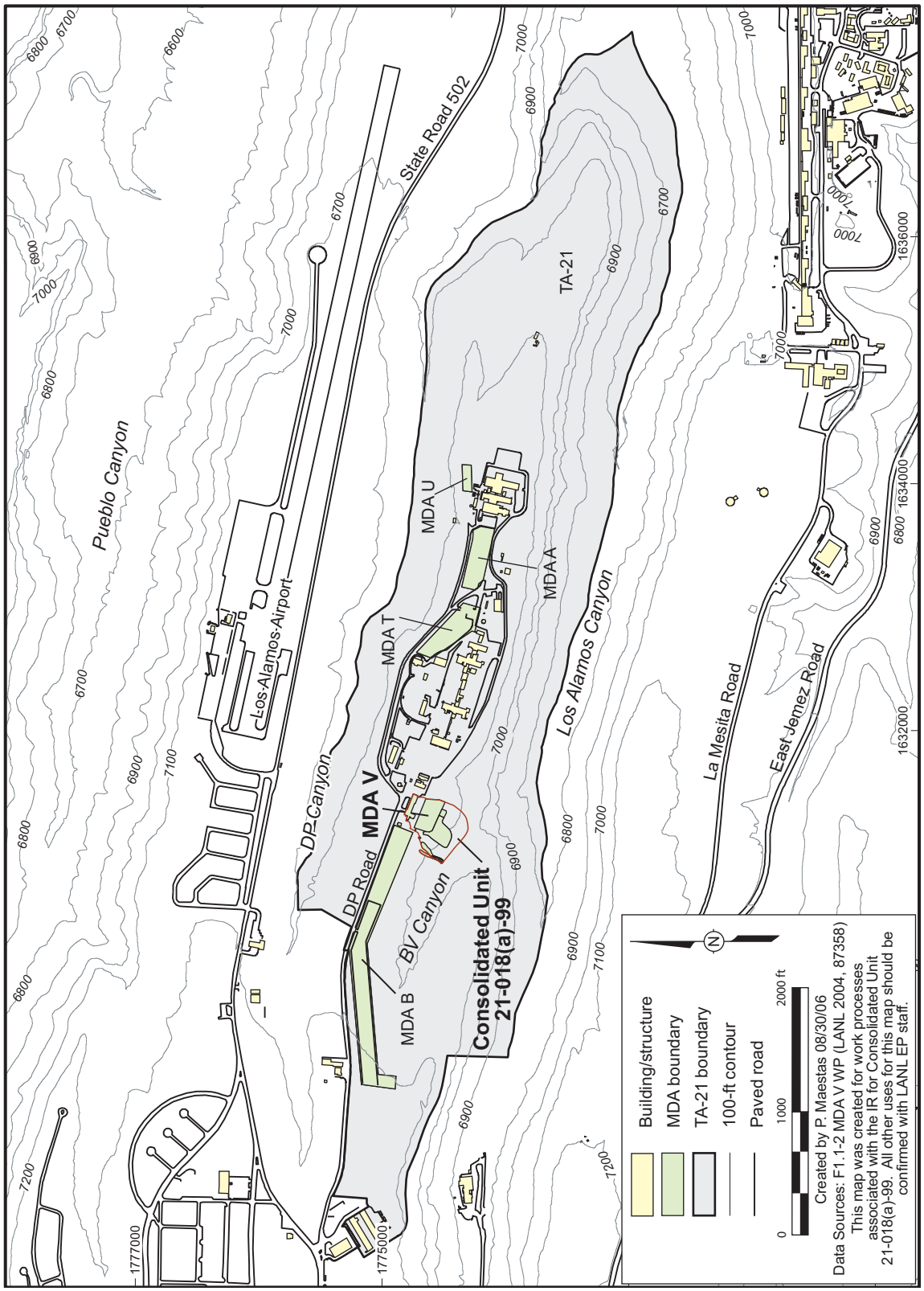


Figure 1.1-2. Location map of Consolidated Unit 21-018(a)-99 within TA-21 and surrounding MDAs

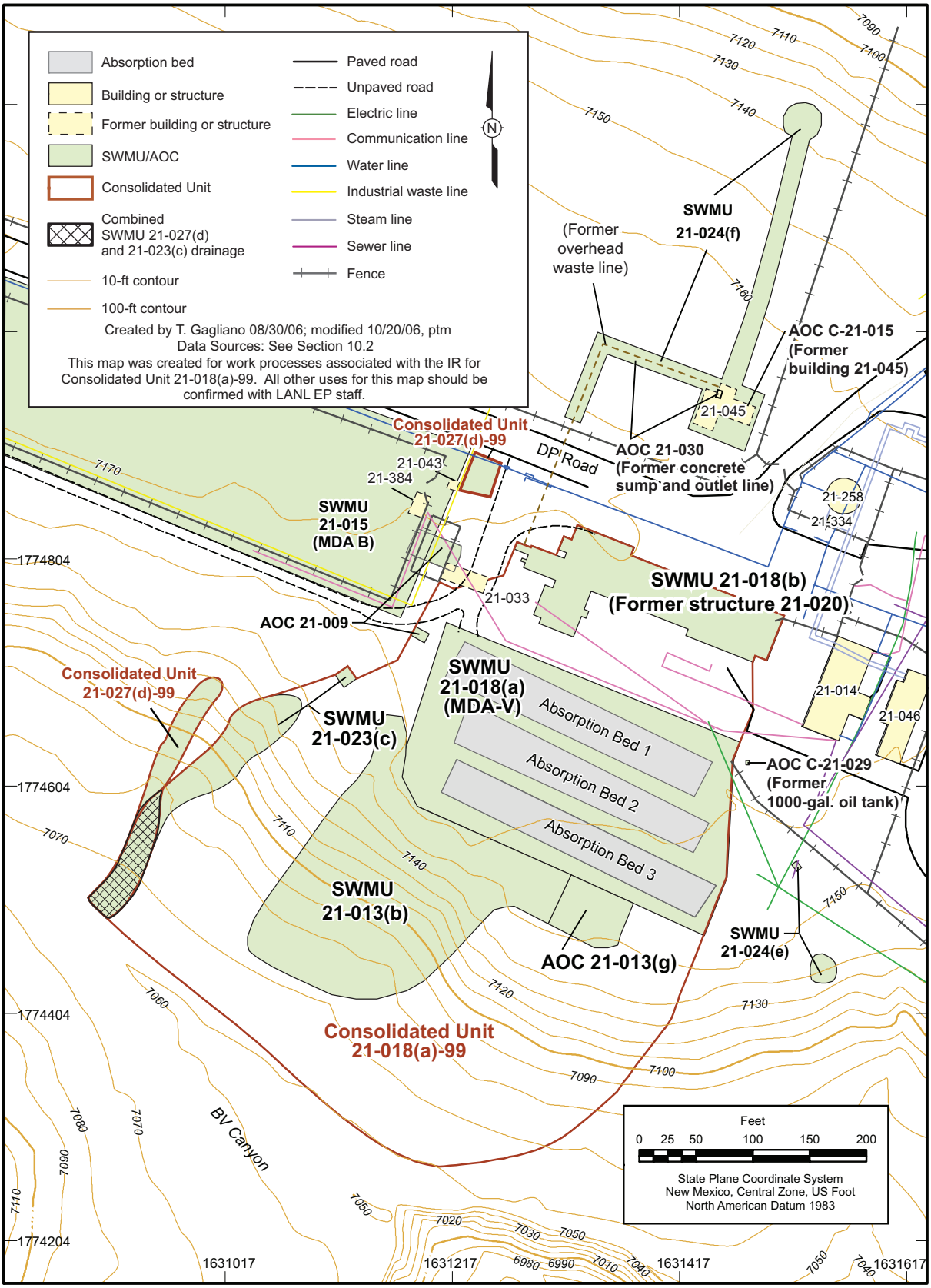


Figure 1.1-3 Site map of Consolidated Unit 21-018(a)-99 and adjacent SWMU and AOCs

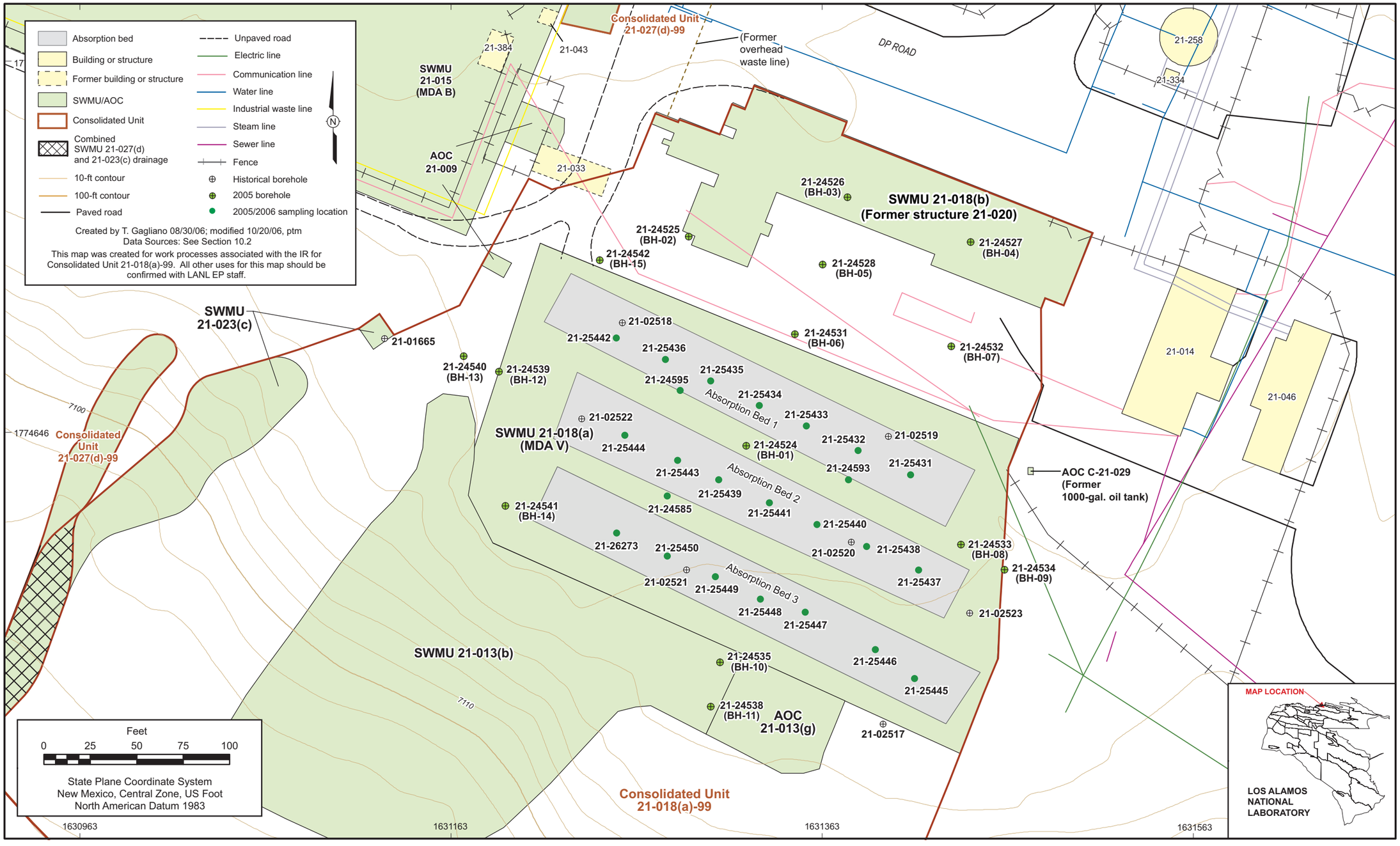


Figure 1.2-1 Locations of boreholes and other subsurface samples collected in 2005–2006 investigation at Consolidated Unit 21-018(a)-99

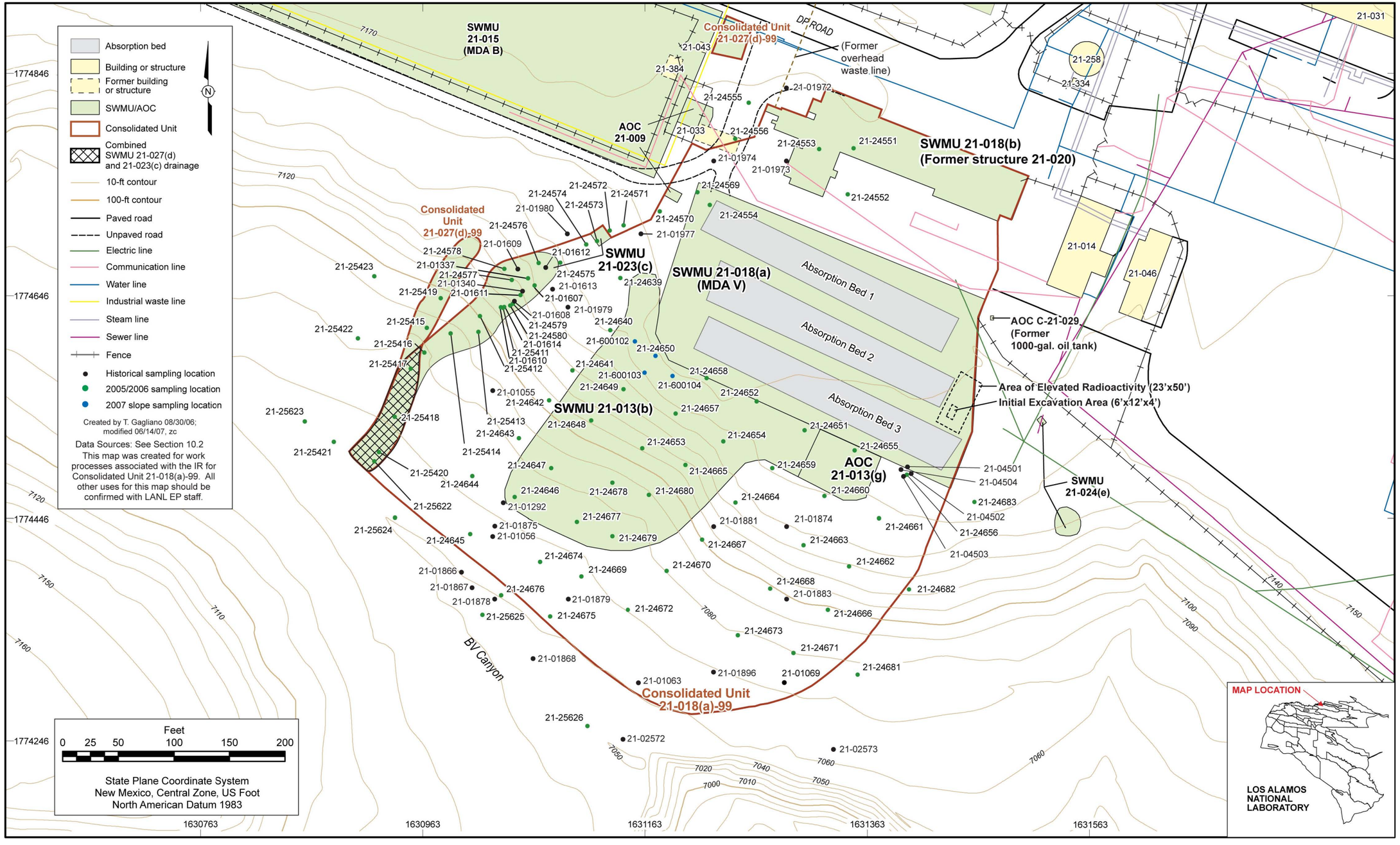


Figure 1.2-2 Locations of surface and shallow subsurface samples collected at Consolidated Unit 21-018(a)-99

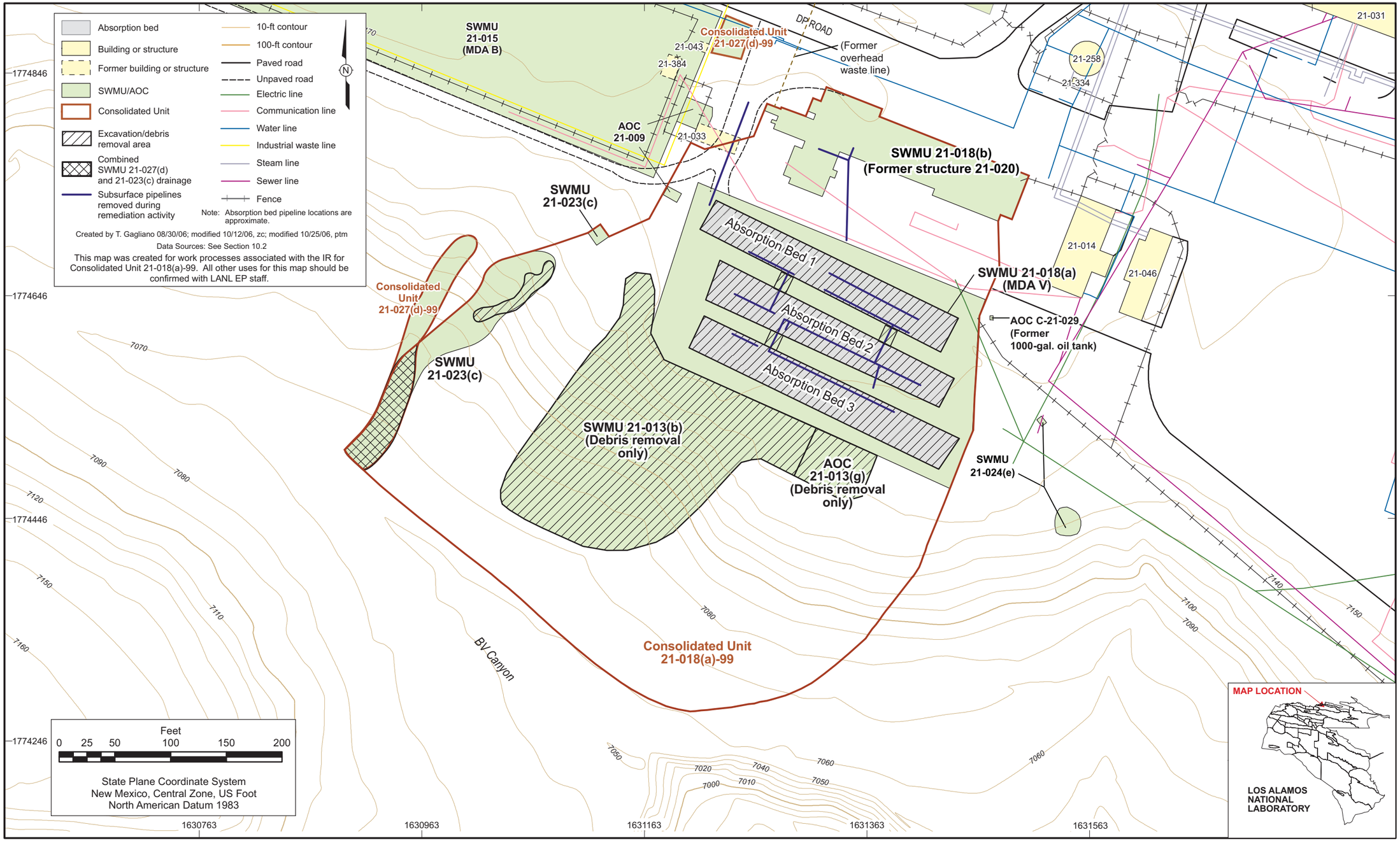


Figure 1.3-1 Locations of distribution pipelines removed during corrective action at Consolidated Unit 21-018(a)-99

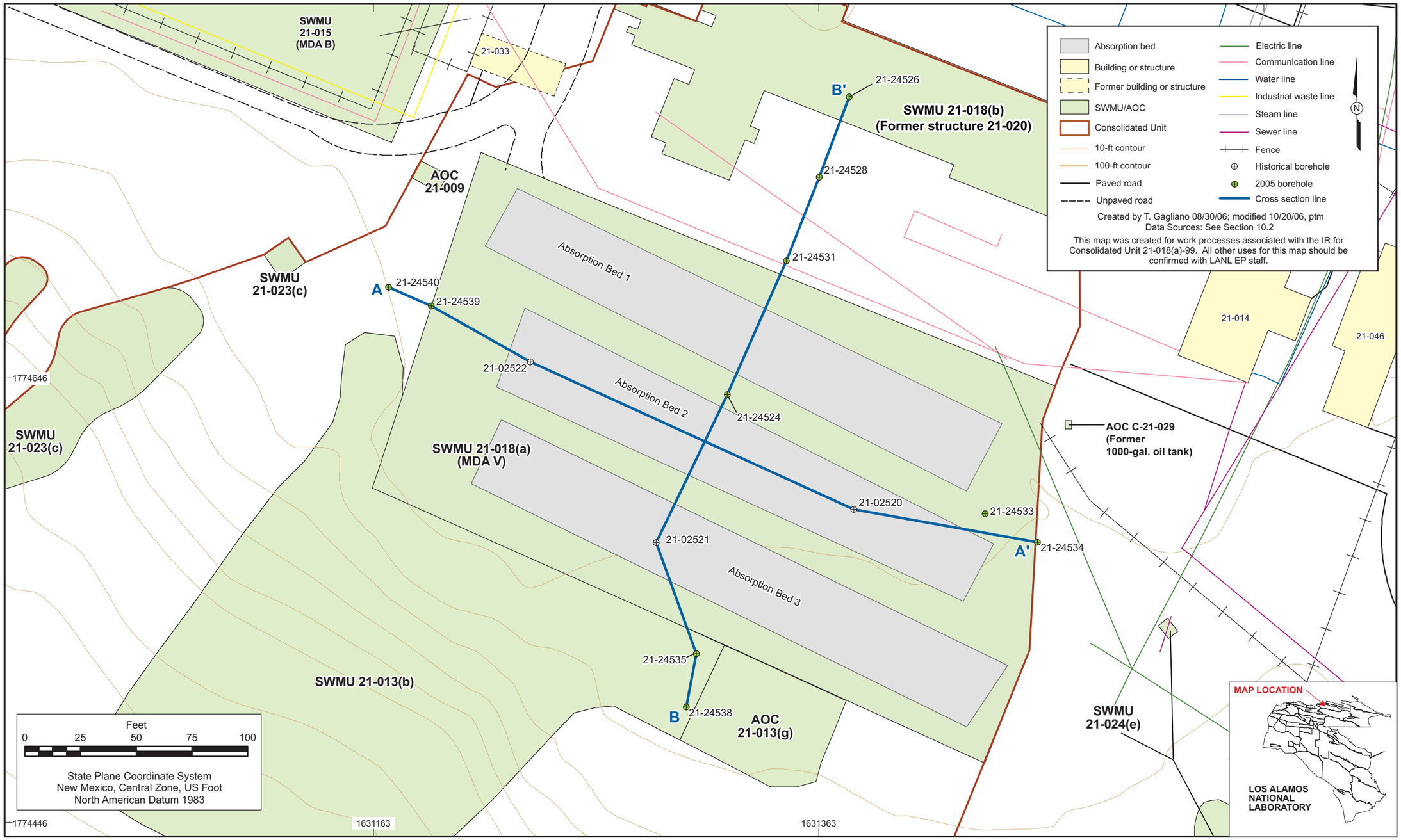


Figure 4.4-1 Locations of cross sections A-A' and B-B' at Consolidated Unit 21-018(a)-99

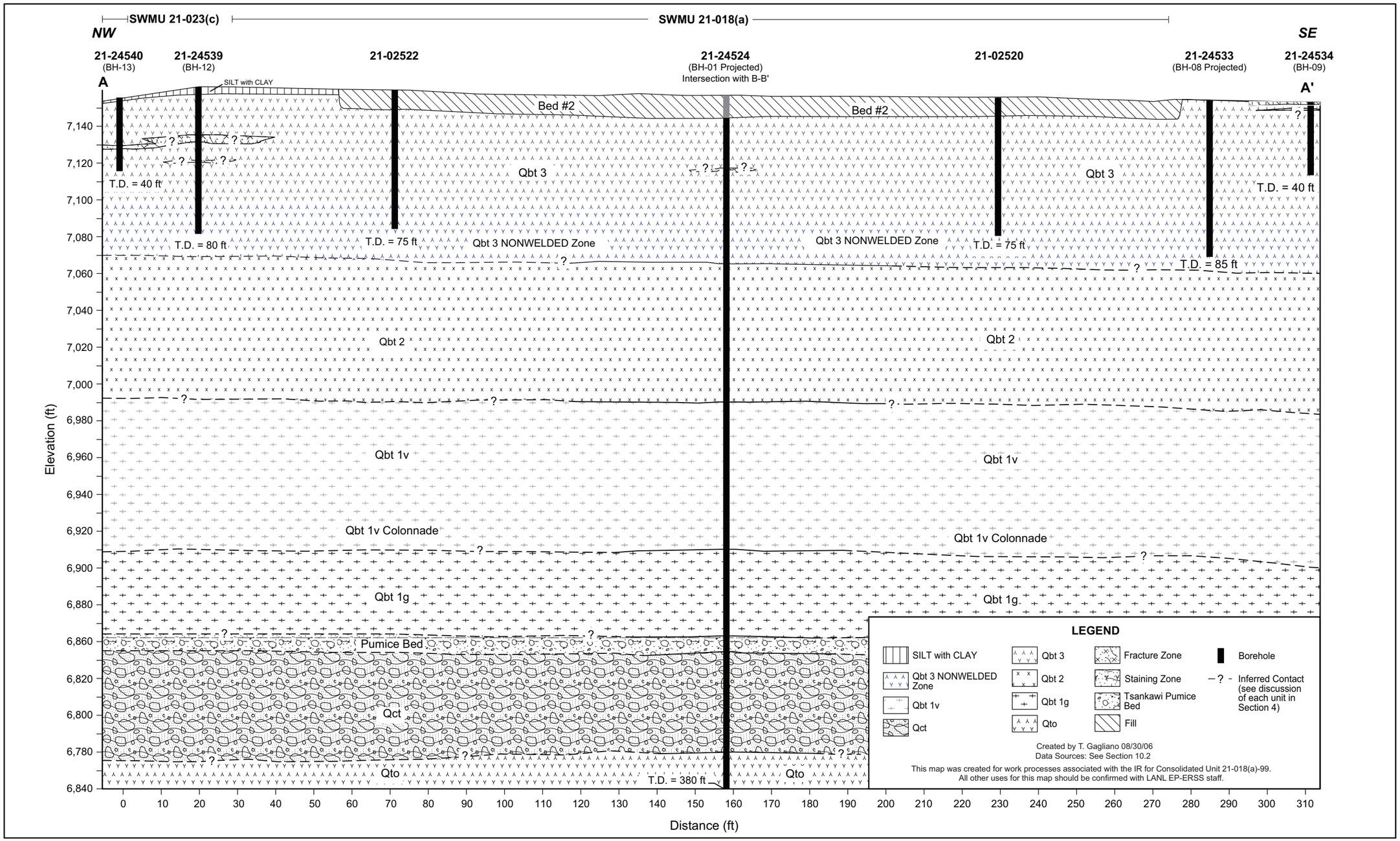


Figure 4.4-2 Cross section A-A' from northwest to southeast through absorption bed 2 at Consolidated Unit 21-018(a)-99

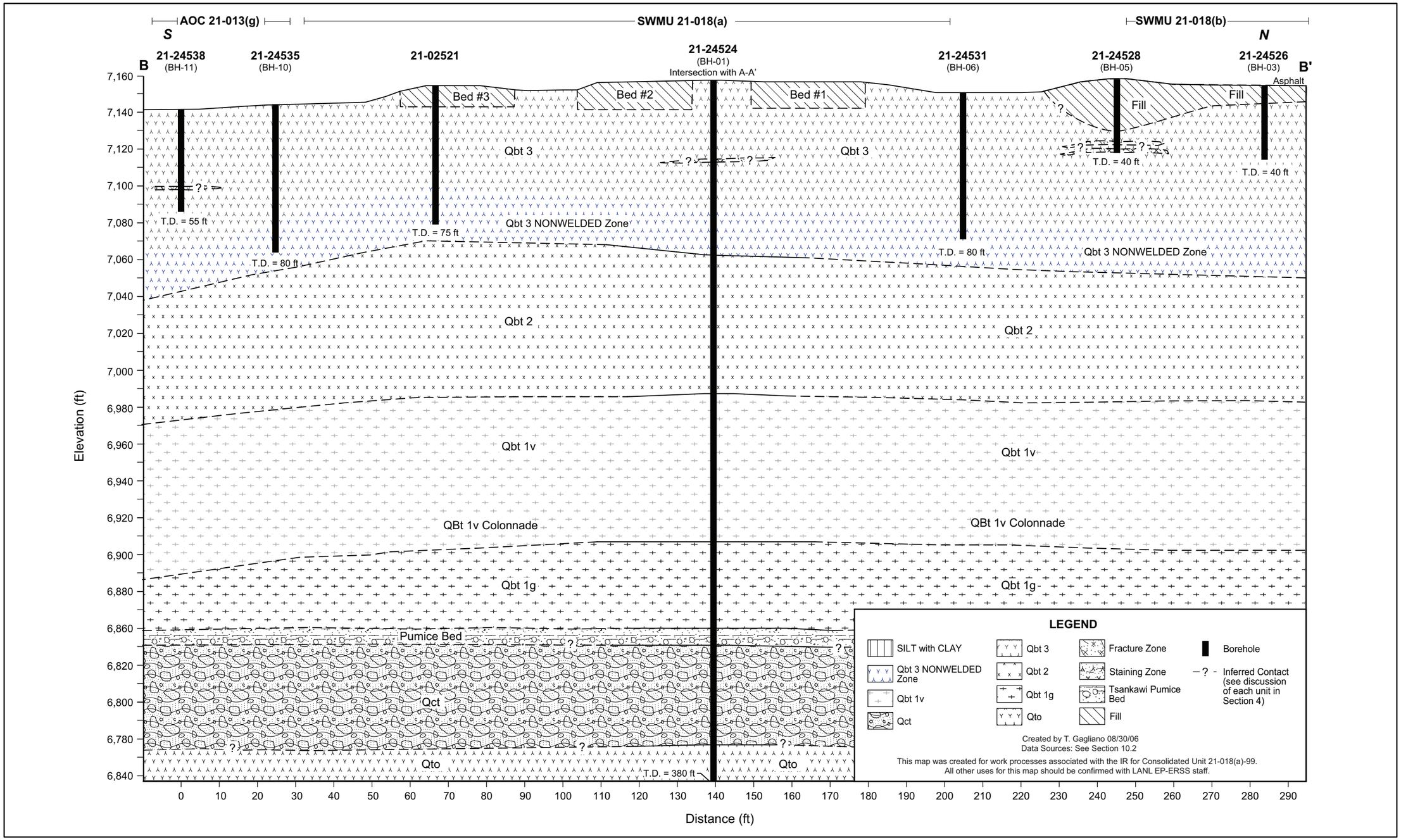


Figure 4.4-3 Cross section B-B' from south to north through absorption beds 1, 2, and 3 at Consolidated Unit 21-018(a)-99

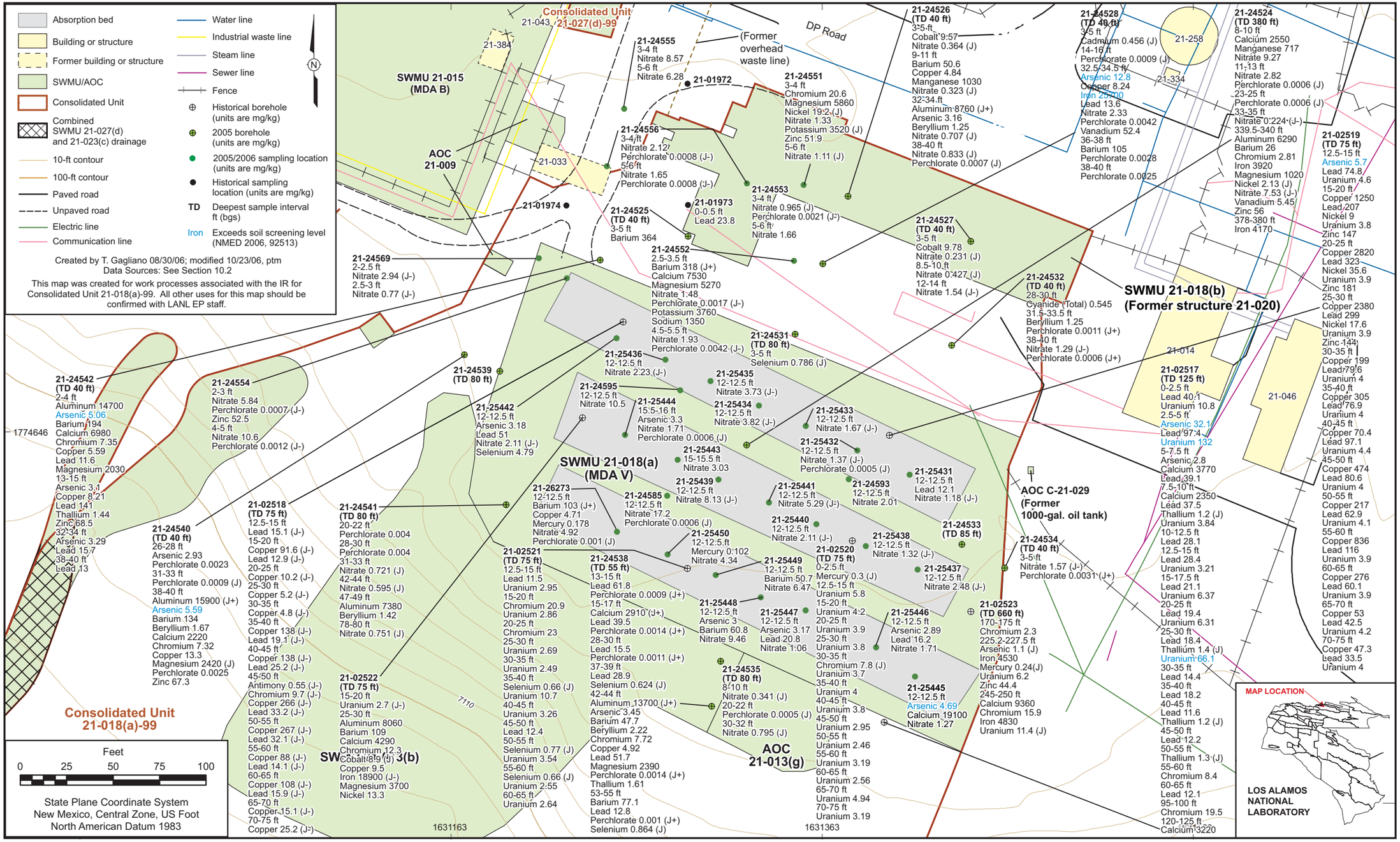


Figure 7.3-1 Inorganic chemicals detected or detected above background values in samples from SWMUs 21-018(a) and 21-018(b)

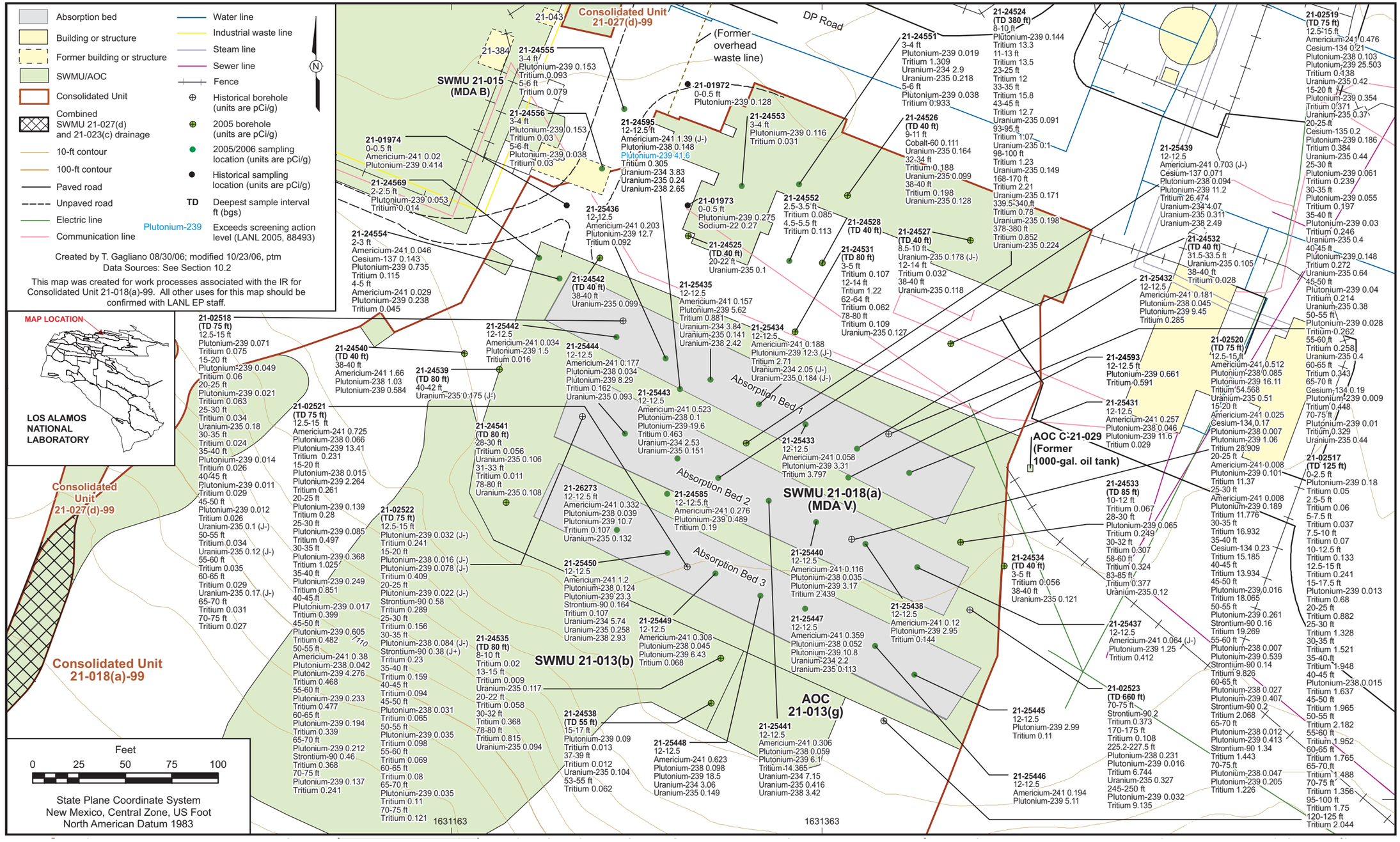


Figure 7.3-2 Radionuclides detected or detected above background values in samples from SWMUs 21-018(a) and 21-018(b)

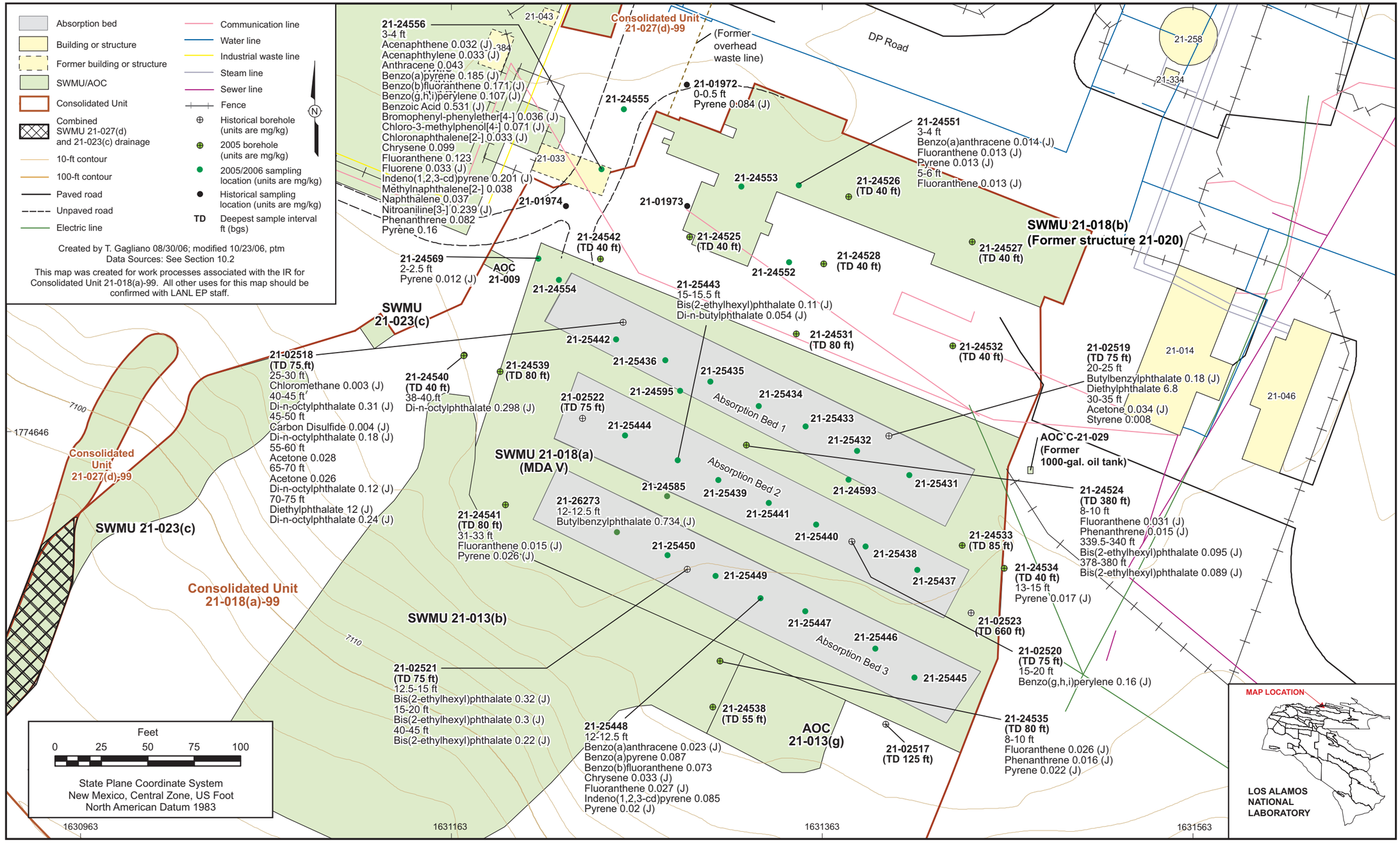


Figure 7.3-3 Organic chemicals detected in samples from SWMUs 21-018(a) and 21-018(b)

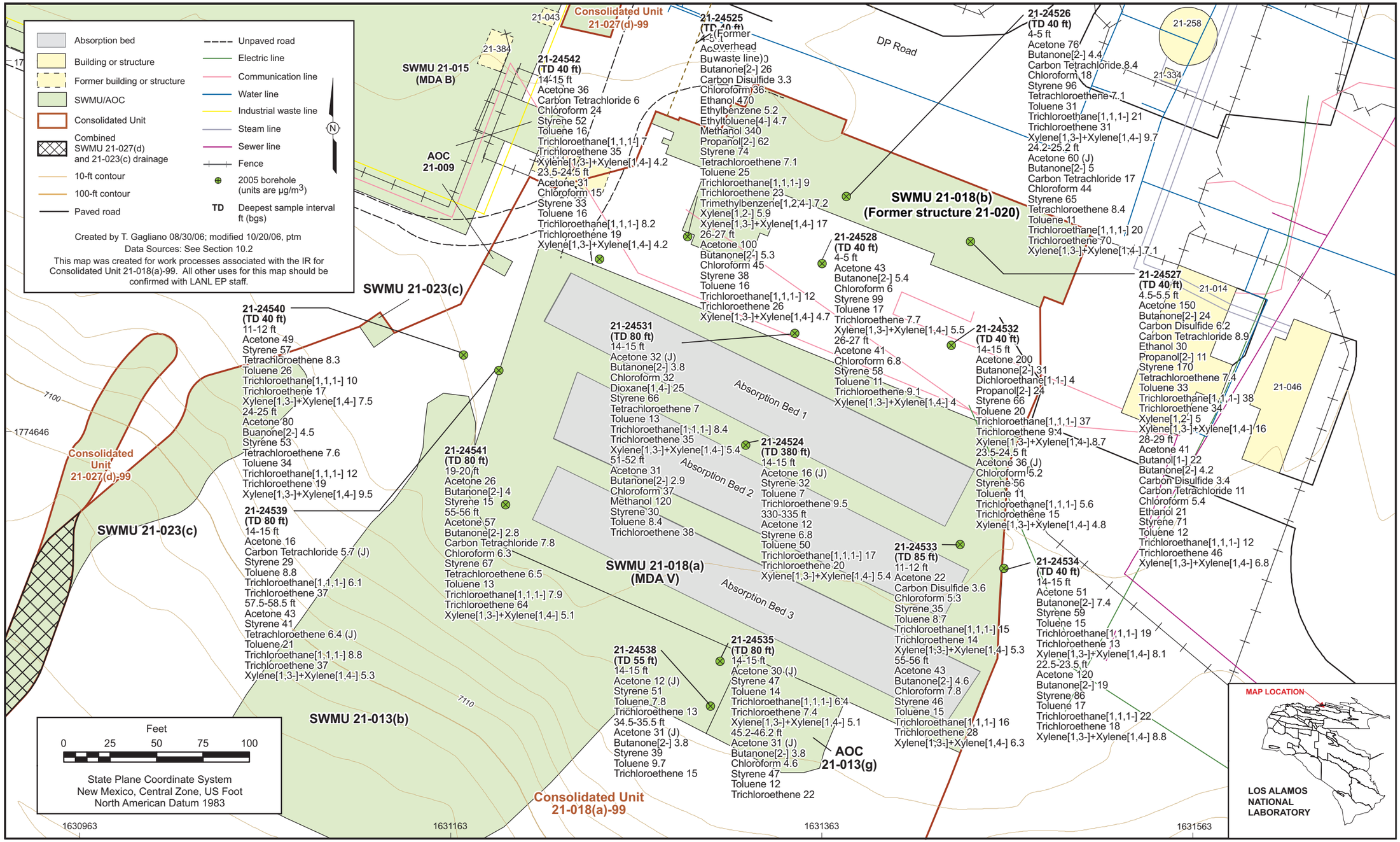


Figure 7.6-1 Pore-gas organic chemicals detected in borehole locations collected in 2005 investigation at Consolidated Unit 21-018(a)-99

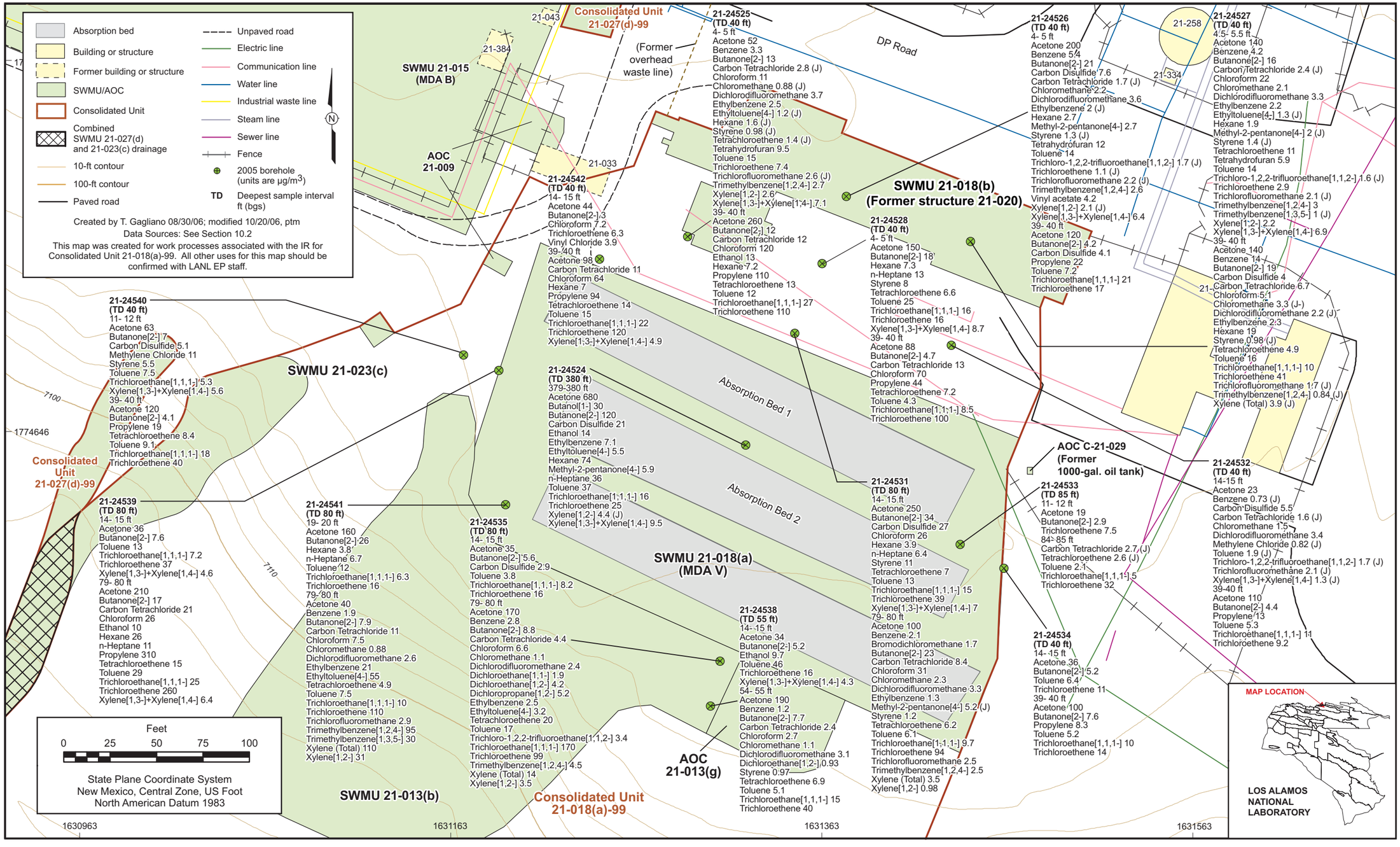


Figure 7.6-2 Pore-gas organic chemicals detected in borehole locations collected in 2006 investigation at Consolidated Unit 21-018(a)-99

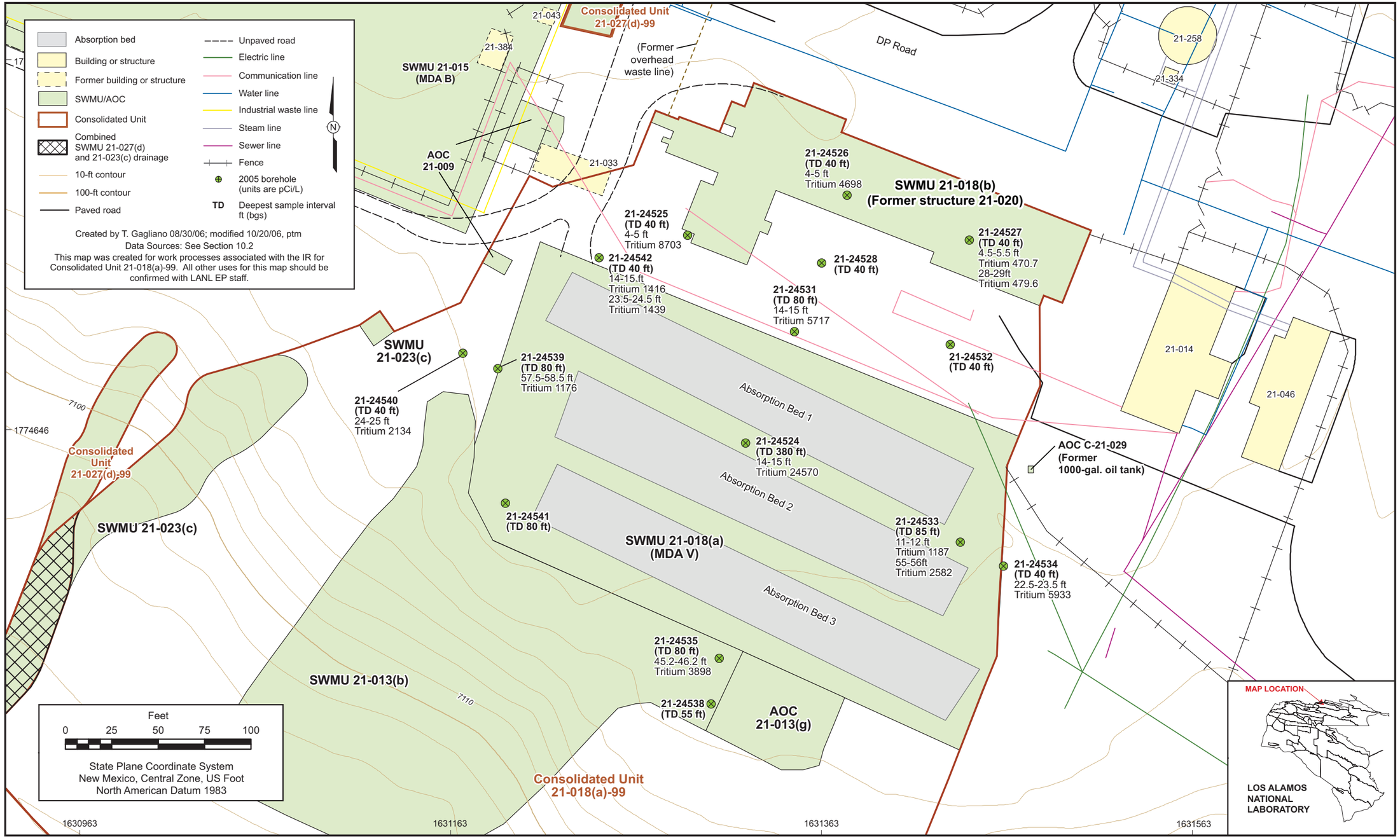


Figure 7.6-3 Pore-gas tritium detected in borehole locations collected in 2005 investigation at Consolidated Unit 21-018(a)-99

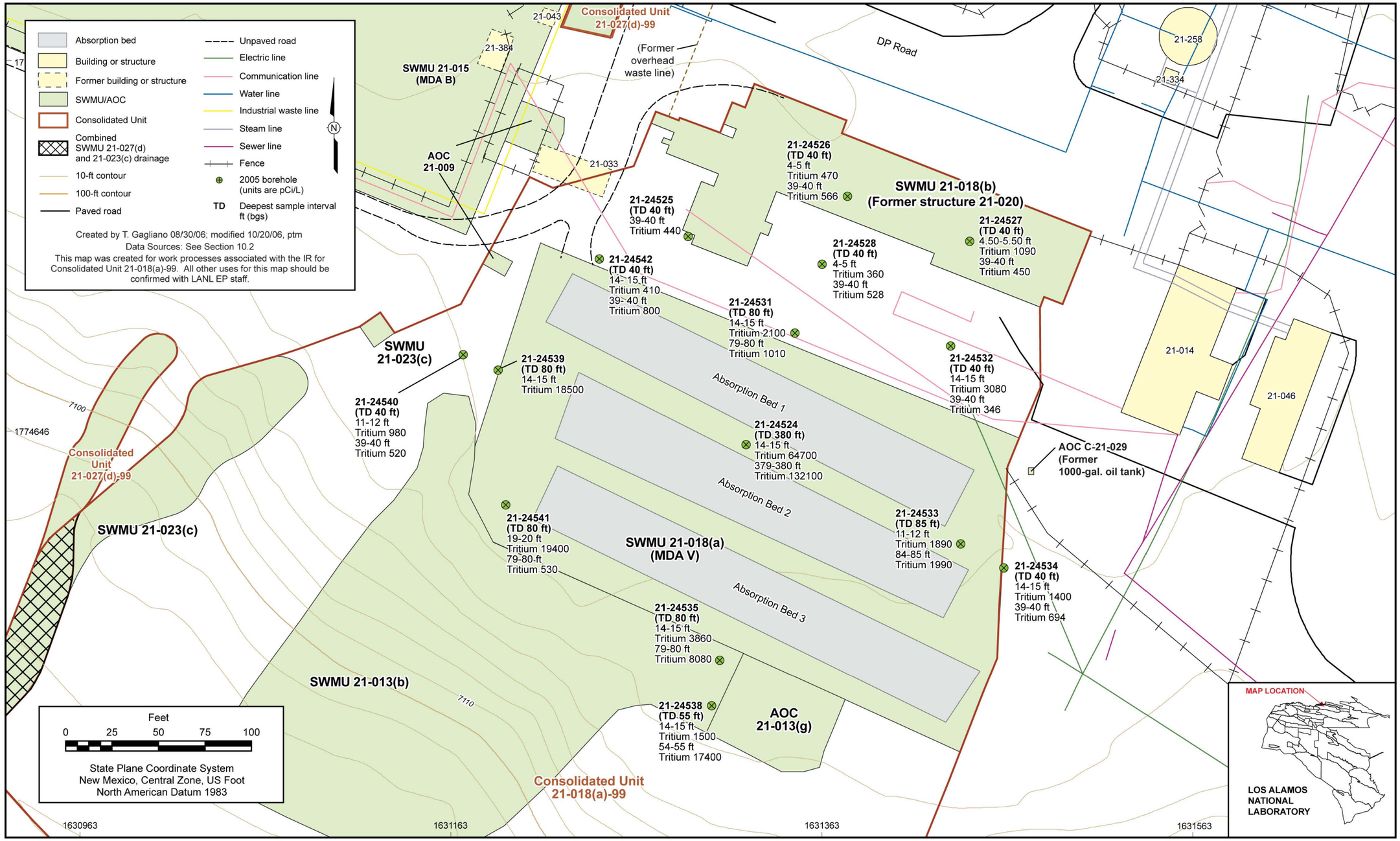


Figure 7.6-4 Pore-gas tritium detected in borehole locations collected in 2006 investigation at Consolidated Unit 21-018(a)-99

Table 3.0-1
Quality Procedures and Standard Operating Procedures Used for the 2005–2007 Characterization and Remediation Activities at Consolidated Unit 21-018(a)-99

QP-2.1, Personnel Qualification and Selection Process
QP-2.2, Personnel Training Management
QP-3.4, Corrective Action Process
QP-3.5, Peer Review Process
QP-4.3, Records Management
QP-4.4, Record Transmittal to the Record Processing Facility
QP-4.5, Document Control
QP-4.9, Document Development and Approval Process: Peer Review Required
QP-5.2, Control of Measuring and Test Equipment
QP-5.3, Readiness Planning and Review
QP-5.7, Notebook Documentation for Environmental Restoration Technical Activities
QP-7.1, Procurement
QP-8.1, Inspection and Acceptance Testing
QP-10.3, Stop Work and Restart
SOP-01.01, General Instructions for Field Investigations
SOP-01.02, Sample Containers and Preservation
SOP-01.03, Handling, Packaging, and Transporting Field Samples
SOP-01.04. Sample Control and Field Documentation
SOP-01.05, Field Quality Control Samples
SOP-01.06, Management of Environmental Restoration Project Waste
SOP-01.08, Field Decontamination of Drilling and Sampling Equipment
SOP-01.10, Waste Characterization
SOP-01.12, Field Site Closeout Checklist
SOP-01.13, Initiating and Managing Data Set Requests
SOP-02.01, Surface Water Site Assessments
SOP-03.11, Coordinating and Evaluating Geodetic Surveys
SOP-04.01, Drilling Methods and Drill Site Management
SOP-04.04, Contract Geophysical Logging
SOP-05.02, Well Development
SOP-05.03, Monitoring Well and RFI Borehole Abandonment
SOP-05.08, Operation of Borehole, Logging Equipment
SOP-06.01, Purging and Sampling Methods for Single Completion Wells
SOP-06.02, Field Analytical Measurements of Groundwater
SOP-06.03, Sampling for Volatile Organic Compounds in Groundwater
SOP-06.09, Spade and Scoop Method for Collection of Soil Samples
SOP-06.10, Hand Auger and Thin-Wall Tube Sampler
SOP-06.24, Sample Collection from Split-Spoon Samplers and Shelby Tube Samplers
SOP-06.26, Core Barrel Sampling for Subsurface Earth Materials

Table 3.0-1 (continued)

SOP-06.31, Sampling of Subatmospheric Air
SOP-06.33, Headspace Vapor Screening with a Photoionization Detector
SOP-09.10, Field Sampling of Core and Cuttings for Geological Analysis
SOP-10.14, Performing and Documenting Gross Gamma Radiation Scoping Surveys
SOP-12.01, Field Logging, Handling, and Documentation of Borehole Materials
SOP-12.02, Transportation and Admittance of Borehole Materials to the Field Support Facility

Note: These procedures are available at: http://erproject.lanl.gov/documents/VL/operations.html#procedures.

Table 3.1-1
Summary of Borehole Samples Collected for Analyses and Field-Screening Results

Borehole Number	Location ID	Sample ID	Media	Sample Interval (ft bgs)	Alpha Background (dpm)	Alpha (dpm)	Beta Background (dpm)	Beta (dpm)	PID bg (ppm)	PID (ppm)
BH-01	21-24524	MD21-05-59560	Qbt 3	8–10	85.3	36	1842	761	NA[a]	NA
BH-01	21-24524	MD21-05-59561	Qbt 3	11–13	85.3	<85.3	1842	698	NA	NA
BH-01	21-24524	MD21-05-59562	Qbt 3	23–25	59	41	1797	398	NA	NA
BH-01	21-24524	MD21-05-59563	Qbt 3	33–35	59	130	1797	800	NA	NA
BH-01	21-24524	MD21-05-59564	Qbt 3	43–45	59	28	1797	700	NA	NA
BH-01	21-24524	MD21-05-59565	Qbt 3	93–95	52	<71	1741	<853	NA	NA
BH-01	21-24524	MD21-05-59566	Qbt 2	98–100	52	54	1741	1107	NA	NA
BH-01	21-24524	MD21-05-59567	Qbt 2	168–170	44	38	1951	1117	NA	0.6
BH-01	21-24524	MD21-05-60609	Qct	337.5–339.5	54	17	1078	1046	NA	2.0
BH-01	21-24524	MD21-05-60610	Qbo	378–380	53	33	1688	930	13.2	6.3
BH-02	21-24525	MD21-05-59570	FILL	3–5	49	54	1969	2570	1.7	1.7
BH-02	21-24525	MD21-05-59571	FILL	13–15	49	30	1969	2940	1.7	1.2
BH-02	21-24525	MD21-05-59572	Qbt 3	20–22	49	42	1969	2860	1.7	1.4
BH-02	21-24525	MD21-05-59573	Qbt 3	37–39	49	60	1969	3520	1.7	1.9
BH-02	21-24525	MD21-05-59577[b]	Qbt 3	37–39	49	60	1969	3520	1.7	1.9
BH-02	21-24525	MD21-05-59607	—[c]	—	NA	NA	NA	NA	NA	NA
BH-03	21-24526	MD21-05-59581	FILL	3–5	108.7	10.44	1866	396	NA	NA
BH-03	21-24526	MD21-05-59578	Qbt 3	9–11	80.2	26.2	1949	751	NA	NA
BH-03	21-24526	MD21-05-59579	Qbt 3	32–34	80.2	26.2	1949	959	NA	NA
BH-03	21-24526	MD21-05-59580	Qbt 3	38–40	80.2	42	1949	697	NA	NA
BH-04	21-24527	MD21-05-59591	FILL	3–5	108.7	<109	1866	62	NA	NA
BH-04	21-24527	MD21-05-59592	Qbt 3	8.5–10	89.6	<89.6	1923	675	NA	NA
BH-04	21-24527	MD21-05-59593	Qbt 3	12–14	89.6	<89.6	1923	1118	NA	NA
BH-04	21-24527	MD21-05-59594	Qbt 3	38–40	89.6	<89.6	1923	355	NA	NA
BH-05	21-24528	MD21-05-59608	—	—	NA	NA	NA	NA	NA	NA
BH-05	21-24528	MD21-05-59597	FILL	14–16	49	96	2660	3390	0.5	0.8
BH-05	21-24528	MD21-05-59604[b]	FILL	14–16	49	84	2660	3410	0.5	1.7
BH-05	21-24528	MD21-05-59598	Qbt 3	32.5–34.5	49	66	2660	2850	0.5	1.8
BH-05	21-24528	MD21-05-59599	Qbt 3	36–38	49	60	2660	2830	0.5	1.7
BH-05	21-24528	MD21-05-59600	Qbt 3	38–40	49	60	2660	2830	0.5	1.7
BH-05	21-24528	MD21-05-59596	FILL	3–5	49.0	42	2660	2520	0.5	0.5
BH-06	21-24531	MD21-05-59655	Qbt 3	3–5	70.0	84	2160	3270	5.3	4.0
BH-06	21-24531	MD21-05-59663[b]	Qbt 3	12–14	70	90	2160	3220	5.3	5.3
BH-06	21-24531	MD21-05-59656	Qbt 3	12–14	70	90	2160	3220	5.3	5.3

Table 3.1-1 (continued)

Borehole Number	Location ID	Sample ID	Media	Sample Interval (ft bgs)	Alpha Background (dpm)	Alpha (dpm)	Beta Background (dpm)	Beta (dpm)	PID bg (ppm)	PID (ppm)
BH-06	21-24531	MD21-05-59657	Qbt 3	62–64	76	33	1746	83	5.3	2.6
BH-06	21-24531	MD21-05-59658	Qbt 3	78–80	76	52	1746	1108	5.3	0.8
BH-06	21-24531	MD21-05-59703	—	—	NA	NA	NA	NA	NA	NA
BH-07	21-24532	MD21-05-59664	Qbt 3	20–22	45	21	206	849	4.9	4.1
BH-07	21-24532	MD21-05-59665	Qbt 3	28–30	45	21	206	1009	4.9	4.9
BH-07	21-24532	MD21-05-59666	Qbt 3	31.5–33.5	45	35	206	954	4.9	4.1
BH-07	21-24532	MD21-05-59667	Qbt 3	38–40	45	57	206	825	4.9	4.5
BH-08	21-24533	MD21-05-59673	Qbt 3	10–12	47	49	207	1458	0.9	1.7
BH-08	21-24533	MD21-05-59674	Qbt 3	28–30	47	13	207	1569	0.9	4.8
BH-08	21-24533	MD21-05-59675	Qbt 3	30–32	47	13	207	1173	0.9	2.6
BH-08	21-24533	MD21-05-59676	Qbt 3	58–60	49	13	211	1323	4.2	9.8
BH-08	21-24533	MD21-05-59677	Qbt 3	83–85	49	37	211	1821	4.2	3.7
BH-09	21-24534	MD21-05-59682	Qbt 3	3–5	45	9	230	393	4.8	3.5
BH-09	21-24534	MD21-05-59683	Qbt 3	8–10	45	27	230	860	4.8	4.2
BH-09	21-24534	MD21-05-59684	Qbt 3	13–15	45	64	230	301	4.8	2.5
BH-09	21-24534	MD21-05-59685	Qbt 3	38–40	45	45	230	411	4.8	3.2
BH-09	21-24534	MD21-05-59702	—	—	NA	NA	NA	NA	NA	NA
BH-10	21-24535	MD21-05-59691	Qbt 3	8–10	29	43	227	1679	7.1	17.1
BH-10	21-24535	MD21-05-59692	Qbt 3	13–15	29	13	227	617	7.1	11.2
BH-10	21-24535	MD21-05-59693	Qbt 3	20–22	29	25	227	1643	7.1	16.3
BH-10	21-24535	MD21-05-59694	Qbt 3	30–32	29	37	227	1870	7.1	9.4
BH-10	21-24535	MD21-05-59695	Qbt 3	78–80	43	25	213	1747	2.5	2.7
BH-11	21-24538	MD21-05-59750	Qbt 3	13–15	69	37	209	1563	2.5	8.2
BH-11	21-24538	MD21-05-59751	Qbt 3	15–17	69	37	209	1864	2.5	7.2
BH-11	21-24538	MD21-05-59752	Qbt 3	28–30	69	25	209	1446	2.5	7.2
BH-11	21-24538	MD21-05-59758[b]	Qbt 3	37–39	69	43	209	1600	2.5	5.8
BH-11	21-24538	MD21-05-59753	Qbt 3	37–39	69	43	209	1600	2.5	5.8
BH-11	21-24538	MD21-05-59754	Qbt 3	42–44	69	49	209	1329	2.5	5.6
BH-11	21-24538	MD21-05-59755	Qbt 3	53–55	69	43	209	1581	2.5	5.7
BH-12	21-24539	MD21-05-59759	Qbt 3	12–14	64	27	229	1261	3.7	0.8
BH-12	21-24539	MD21-05-59767[b]	Qbt 3	12–14	64	27	229	1261	3.7	0.8
BH-12	21-24539	MD21-05-59760	Qbt 3	28–30	64	51	229	1095	3.7	1.4
BH-12	21-24539	MD21-05-59761	Qbt 3	40–42	64	33	229	991	3.7	1.6
BH-12	21-24539	MD21-05-59762	Qbt 3	78–80	64	45	229	1144	3.7	1.1
BH-13	21-24540	MD21-05-59768	Qbt 3	9–11	39	66	2000	3220	7.2	3.8

Table 3.1-1 (continued)

Borehole Number	Location ID	Sample ID	Media	Sample Interval (ft bgs)	Alpha Background (dpm)	Alpha (dpm)	Beta Background (dpm)	Beta (dpm)	PID bg (ppm)	PID (ppm)
BH-13	21-24540	MD21-05-59776[b]	Qbt 3	9–11	39	66	2000	3220	7.2	3.8
BH-13	21-24540	MD21-05-59769	Qbt 3	26–28	39	102	2000	2990	7.2	3.8
BH-13	21-24540	MD21-05-59770	Qbt 3	31–33	39	115	2000	3370	7.2	3.8
BH-13	21-24540	MD21-05-59771	Qbt 3	38–40	39	102	2000	3080	7.2	4.2
BH-13	21-24540	MD21-05-59797	—	—	NA	NA	NA	NA	NA	NA
BH-14	21-24541	MD21-05-59777	Qbt 3	20–22	45	43	1000	545	9.8	5.0
BH-14	21-24541	MD21-05-59778	Qbt 3	28–30	45	NA	1000	NA	9.8	4.7
BH-14	21-24541	MD21-05-59779	Qbt 3	31–33	27	50	242	1072	8.0	2.5
BH-14	21-24541	MD21-05-59785[b]	Qbt 3	31–33	27	50	242	1072	8.0	2.5
BH-14	21-24541	MD21-05-59780	Qbt 3	42–44	27	80	242	846	8.0	1.3
BH-14	21-24541	MD21-05-59781	Qbt 3	47–49	27	38	242	686	8.0	1.2
BH-14	21-24541	MD21-05-59782	Qbt 3	78–80	27	44	242	1039	8.0	0.2
BH-15	21-24542	MD21-05-59786	FILL	2–4	49	102	2660	2910	5.0	0.7
BH-15	21-24542	MD21-05-59787	Qbt 3	13–15	49	84	2660	3180	5.0	0.6
BH-15	21-24542	MD21-05-59794[b]	Qbt 3	32–34	49	66	2660	3240	5.0	NA
BH-15	21-24542	MD21-05-59788	Qbt 3	32–34	49	66	2660	3240	5.0	NA
BH-15	21-24542	MD21-05-59789	Qbt 3	38–40	49	90	2660	3030	5.0	NA
BH-15	21-24542	MD21-05-59798	—	—	NA	NA	NA	NA	NA	NA

Note: All samples analyzed for VOCs (SW-846 8260B), SVOCs (SW-846 8270C), pH (SW-846 9045C), total uranium (SW-846 6020), TAL metals (SW-846 6010B/6020/7471A), anions (EPA Method 300), gamma spectroscopy (EPA Method 901.1), americium-241 (HASL-300/AM-241), isotopic plutonium (HASL-300:ISOPU), isotopic uranium (HASL-300:ISOU), strontium-90 (EPA Method 905.0), and tritium (EPA Method 906).

[a] NA = Not analyzed.

[b] Analytical field duplicate.

[c] — = Field rinsate, no sample interval.

Table 3.1-2
Summary of Geotechnical Samples Collected from Location 21-24524[a] (BH-01)

Sample ID	Media	Sample Interval (ft bgs)	Rationale for Sample Selection	PID Background (ppm)	PID (ppm)	Alpha Background (dpm)	Alpha (dpm)	Beta Background (dpm)	Beta (dpm)
MD21-05-59560	Qbt 3	10–11	Fracture Zone	NA[b]	NA	108.7	36	1866	761
MD21-05-59561	Qbt 3	13–14	Base Structure	NA	NA	85.3	<85.3	698	<698
MD21-05-59562	Qbt 3	25–26	Qbt 3 20–30 ft	NA	NA	59	41	398	<398
MD21-05-59563	Qbt 3	35–36	Qbt 3 30–40 ft	NA	NA	59	130	1797	800
MD21-05-59564	Qbt 3	45–46	Fracture Zone	NA	NA	43	28	1000	700
MD21-05-59565	Qbt 2	95–96	Contact Zone Qbt 3/Qbt 2	NA	NA	52	<71	1741	853
MD21-05-59566	Qbt 2	97.5–98	Qbt 2	NA	NA	52	54	1741	1107
MD21-05-59567	Qbt 1	170–170.5	Qbt 1 series	NA	0.6	44	38	1951	117
MD21-05-60605	Qct	312.5–313.5	Qct	NA	NA	NA	80	NA	24
MD21-05-60606	Qct	314–315	Qct	NA	3.2	33	80	1464	248
MD21-05-60607	Qct	333.5–334	Qct	NA	4.6	54	<54	1642	437
MD21-05-60608[c]	Qct	334–334.5	Qct	NA	4.6	54	<54	1642	437
MD21-05-60609	Qct	339.5–340	Qct	NA	3.7	54	54	1078	950
MD21-05-60610	Qbo	375.5–376	Qbo	13.2	6.3	53	33	1688	930

[a] All samples collected for density (ASTM:D2937), saturated hydraulic conductivity (ASTM:D2434), gravimetric/volumetric moisture content (ASTM:D2216V), and calculated total porosity (MOSA:18-1986).

[b] NA = Not analyzed.

[c] Geotechnical field duplicate sample.

Table 3.1-3
Summary of Pore-Gas Samples[a] and Field-Screening Results

Borehole Information			Base of Waste Unit Sample Field Screen Results					Bottom Borehole Depth Sample Field Screen Results				
Borehole Number	Location ID	Total Depth[b] (ft bgs)	Sample ID	Top Interval (ft bgs)	% Oxygen	% Carbon Dioxide	PID Results (ppm)	Sample ID	Bottom Interval (ft bgs)	% Oxygen	% Carbon Dioxide	PID Results (ppm)
July–August 2005												
BH-01	21-24524	380	MD21-05-61752	14–15	18.1	0	0	MD21-05-61753	330–335[c]	20.2	0	0
BH-02	21-24525	40	MD21-05-61755	4–5	18	0	0	MD21-05-61754	26–27	17.7	0.6	0
BH-03	21-24526	40	MD21-05-61757	4–5	19.4	0.4	0	MD21-05-61756	24.2–25.2	19	1.1	0
BH-04	21-24527	40	MD21-05-61759	4.5–5.5	19.5	0.5	0	MD21-05-61758	28–29	18.7	1.1	0
BH-05	21-24528	40	MD21-05-61761	4–5	17.5	0	0	MD21-05-61760	26–27	17.7	0	0
BH-06	21-24531	80	MD21-05-61763	14–15	17.5	0.6	0	MD21-05-61762	51–52	17.7	0.6	0
BH-07	21-24532	40	MD21-05-61765	14–15	20.2	0.3	0	MD21-05-61764	23.5–24.5[c]	17.9	0.1	0
BH-08	21-24533	85	MD21-05-61767	11–12	19.2	0.5	0	MD21-05-61766	55–56	20.2	0.8	0
BH-09	21-24534	40	MD21-05-61769	14–15	19.9	0.7	0	MD21-05-61768	22.5–23.5	20.1	1	0
BH-10	21-24535	80	MD21-05-61771	14–15	17.7	0.7	0	MD21-05-61770	45.2–46.2	17.2	0.4	0
BH-11	21-24538	55	MD21-05-61773	14–15	16.9	0.1	0	MD21-05-61772	34.5–35.5	17.8	0.4	0
BH-12	21-24539	80	MD21-05-61775	14–15	17.6	0.4	0	MD21-05-61774	57.5–58.5	18.2	0	0
BH-13	21-24540	40	MD21-05-61777	11–12	17.9	0	0	MD21-05-61776	24–25	17.4	0.5	0
BH-14	21-24541	80	MD21-05-61779	19–20	17.4	0.7	0	MD21-05-61778	55–56	17	0.6	0
BH-15	21-24542	40	MD21-05-61781	14–15	17.3	0.6	0	MD21-05-61780	23.5–24.5	17.2	1.1	0
May–June 2006												
BH-01	21-24524	380	MD21-06-71202[d]	14–15	19.6	0.4	NA[e]	MD21-06-71201	379–380[c]	20.0	0.0	NA
BH-02	21-24525	40	MD21-06-71204	4–5	20.6	0.0	NA	MD21-06-71203	39–40	20.2	0.7	NA
BH-03	21-24526	40	MD21-06-71206	4–5	20.6	0.0	NA	MD21-06-71205	39–40	20.8	0.0	NA
BH-04	21-24527	40	MD21-06-71208	4.5–5.5	20.7	0.0	NA	MD21-06-71207	39–40	20.1	0.6	NA
BH-05	21-24528	40	MD21-06-71210	4–5	20.4	0.2	NA	MD21-06-71209	39–40	20.1	0.7	NA

Table 3.1-3 (continued)

Borehole Information			Base of Waste Unit Sample Field Screen Results					Bottom Borehole Depth Sample Field Screen Results				
Borehole Number	Location ID	Total Depth[b] (ft bgs)	Sample ID	Top Interval (ft bgs)	% Oxygen	% Carbon Dioxide	PID Results (ppm)	Sample ID	Bottom Interval (ft bgs)	% Oxygen	% Carbon Dioxide	PID Results (ppm)
BH-06	21-24531	80	MD21-06-71212	14–15	19.6	0.6	NA	MD21-06-71211	79–80	20.5	0.1	NA
BH-07	21-24532	40	MD21-06-71214	14–15[c]	20.4	0.2	NA	MD21-06-71213	39–40	20.4	0.2	NA
BH-08	21-24533	85	MD21-06-71216	11–12	20.4	0.0	NA	MD21-06-71215	84–85	20.7	0.2	NA
BH-09	21-24534	40	MD21-06-71218	14–15	20.5	0.5	NA	MD21-06-71217	39–40	20.8	0.2	NA
BH-10	21-24535	80	MD21-06-71220	14–15	20.4	0.5	NA	MD21-06-71219	79–80	20.8	0.1	NA
BH-11	21-24538	55	MD21-06-71222	14–15	20.5	0.4	NA	MD21-06-71221	54–55	20.5	0.3	NA
BH-12	21-24539	80	MD21-06-71224	14–15	20.3	0.6	NA	MD21-06-71223	79–80	20.6	0.2	NA
BH-13	21-24540	40	MD21-06-71226	11–12	20.9	0.0	NA	MD21-06-71225	39–40	21.0	0.3	NA
BH-14	21-24541	80	MD21-06-71228	19–20	19.8	1.2	NA	MD21-06-71227	79–80	20.6	0.2	NA
BH-15	21-24542	40	MD21-06-71230	14–15	19.9	0.6	NA	MD21-06-71229	39–40	19.7	0.8	NA

[a] Samples were analyzed for VOCs (EPA Method TO-15) and tritium (EPA Method 906.0).

[b] Original total depth of borehole.

[c] Field duplicate sample collected at this interval.

[d] Sample MD21-06-71202 not analyzed for VOCs because the SUMMA canister leaked. Sample analyzed for tritium only.

[e] NA = Not analyzed.

Table 3.1-4
Summary of Confirmation Samples Collected for Analyses[a] and Field-Screening Results, SWMU 21-018(a) Absorption Bed Removal

Location ID	Sample ID	Media	Sample Depth Top (ft bgs)	Sample Depth Bottom (ft bgs)	Location Description	Alpha (dpm)	Beta (dpm)	PID (ppm)
21-25431	MD21-06-66647	Qbt 3	12.0	12.5	Bed # 1, 30 ft from east to west in center of bed	<MDA[b]	<MDA	NA[c]
21-25432	MD21-06-66648	Qbt 3	12.0	12.5	Bed # 1, 60 ft from east to west in center of bed	<MDA	<MDA	NA
21-25433	MD21-06-66649	Qbt 3	12.0	12.5	Bed # 1, 90 ft from east to west in center of bed	<MDA	<MDA	NA
21-25434	MD21-06-66650	Qbt 3	12.0	12.5	Bed # 1, 120 ft from east to west in center of bed	<MDA	<MDA	NA
21-25435	MD21-06-66651	Qbt 3	12.0	12.5	Bed # 1, 150 ft from east to west in center of bed	<MDA	<MDA	NA
21-25436	MD21-06-66652	Qbt 3	12.0	12.5	Bed # 1, 180 ft from east to west in center of bed	<MDA	<MDA	NA
21-25437	MD21-06-66653	Qbt 3	12.0	12.5	Bed # 2, 30 ft from east to west in center of bed	<MDA	<MDA	NA
21-25438	MD21-06-66654	Qbt 3	12.0	12.5	Bed # 2, 60 ft from east to west in center of bed	<MDA	<MDA	NA
21-25439	MD21-06-66655	Qbt 3	12.0	12.5	Bed # 2, 150 ft from east to west in center of bed	<MDA	<MDA	NA
21-25440	MD21-06-66656	Qbt 3	12.0	12.5	Bed # 2, 90 ft from east to west in center of bed	<MDA	<MDA	NA
21-25441	MD21-06-66657	Qbt 3	12.0	12.5	Bed # 2, 120 ft from east to west in center of bed	<MDA	<MDA	NA
21-25442	MD21-06-66658	Qbt 3	12.0	12.5	Bed # 1, 210 ft from east to west in center of bed	<MDA	<MDA	NA
21-25443	MD21-06-66659	Qbt 3	15.0	15.5	Bed # 2, 180 ft from east to west in center of bed	<MDA	<MDA	NA
21-25444	MD21-06-66660	Qbt 3	15.5	16.0	Bed # 2, 210 ft from east to west in center of bed	<MDA	<MDA	NA
21-25445	MD21-06-66661	Qbt 3	12.0	12.5	Bed #3, 30 ft from east to west in center of bed	<MDA	<MDA	NA
21-25446	MD21-06-66662	Qbt 3	12.0	12.5	Bed #3, 60 ft from east to west in center of bed	<MDA	<MDA	NA
21-25447	MD21-06-66663	Qbt 3	12.0	12.5	Bed #3, 90 ft from east to west in center of bed	<MDA	<MDA	NA
21-25448	MD21-06-66664	Qbt 3	12.0	12.5	Bed #3, 120 ft from east to west in center of bed	<MDA	<MDA	NA
21-25449	MD21-06-66665	Qbt 3	12.0	12.5	Bed #3, 150 ft from east to west in center of bed	<MDA	<MDA	NA
21-25450	MD21-06-66666	Qbt 3	12.0	12.5	Bed #3, 180 ft from east to west in center of bed	<MDA	<MDA	NA
21-26273	MD21-06-70162	Qbt 3	12.0	12.5	Bed #3, 210 ft from east to west of center of bed	<MDA	<MDA	NA
21-24585	MD21-06-70163	Qbt 3	12.0	12.5	Below distribution line between absorption beds #2 and #3	<MDA	<MDA	NA

Table 3.1-4 (continued)

Location ID	Sample ID	Media	Sample Depth Top (ft bgs)	Sample Depth Bottom (ft bgs)	Location Description	Alpha (dpm)	Beta (dpm)	PID (ppm)
21-24593	MD21-06-70164	Qbt 3	12.0	12.5	Below distribution line between absorption beds #1 and #2	<MDA	<MDA	NA
21-24595	MD21-06-70165	Qbt 3	12.0	12.5	Below distribution line between absorption beds #1 and #2	<MDA	<MDA	NA

[a] All samples analyzed for SVOCs (SW-846 8270C), pH (SW-846 9045C), TAL metals (SW-846 6010B/6020/7174A), gamma spectroscopy (EPA Method 901.1), americium-241 (HASL-300/AM-241), isotopic plutonium (HASL-300:ISOPU), isotopic uranium (HASL-300/ISOU), strontium-90 (EPA Method 905), tritium (EPA Method 906), cyanide (SW-846 9012A), nitrate (EPA Method 300.0), and perchlorate (SW-846 8731A; EPA Method 314).

[b] MDA = Minimum detectable activity.

[c] NA = Not analyzed.

Table 3.2-1
Summary of Samples Collected for Analyses[a] and
Field-Screening Results, SWMU 21-023(c) Inlet and Associated Outfall

Location ID	Sample ID	Media	Sample Depth Interval (ft bgs)	Alpha (dpm)	Beta (dpm)	PID (ppm)
21-01337	MD21-06-70175	ALLH	1.2–1.7	<MDA[b]	<MDA	<bg[c]
21-01607	MD21-06-70176	Qbt 3	1.0–1.5	<MDA	<MDA	<bg
21-01610	MD21-06-70172	Qbt 3	0.8-1.3	<MDA	<MDA	<bg
21-01614	MD21-06-70173	Qbt 3	1.5–2.0	<MDA	<MDA	<bg
21-01611	MD21-06-70174	Qbt 3	0.7–1.2	<MDA	<MDA	<bg
21-24569	MD21-05-59984	ALLH	2.0–2.5	<MDA	<MDA	<bg
21-24569	MD21-05-59985	ALLH	2.5–3.0	<MDA	<MDA	<bg
21-24570	MD21-05-59987	ALLH	2.5–3.0	<MDA	<MDA	<bg
21-24570	MD21-05-59988	ALLH	3.0–3.5	<MDA	<MDA	<bg
21-24571	MD21-05-59990	ALLH	2.5–3.0	<MDA	<MDA	<bg
21-24571	MD21-05-59991	ALLH	3.0–3.5	<MDA	<MDA	<bg
21-24572	MD21-05-59993	ALLH	2.0–2.5	<MDA	<MDA	<bg
21-24572	MD21-05-59994	ALLH	2.5–3.0	<MDA	<MDA	<bg
21-24573	MD21-05-59996	ALLH	2.0–2.5	<MDA	<MDA	<bg
21-24573	MD21-05-59997	ALLH	2.5–3.0	<MDA	<MDA	<bg
21-24574	MD21-05-59999	ALLH	3.0–3.5	<MDA	<MDA	<bg
21-24574	MD21-05-60000	ALLH	3.5–4.0	<MDA	<MDA	<bg
21-24575	MD21-05-60002	ALLH	2.0–2.5	<MDA	<MDA	<bg
21-24575	MD21-05-60003	ALLH	2.5–3.0	<MDA	<MDA	<bg
21-24575	MD21-05-60020[d]	ALLH	2.5–3.0	<MDA	<MDA	<bg
21-24576	MD21-05-60005	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-24576	MD21-05-60006	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-24577	MD21-05-60008	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-24577	MD21-05-60009	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-24578	MD21-05-60011	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-24578	MD21-05-60012	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-24579	MD21-05-60014	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-24579	MD21-05-60015	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-24579	MD21-06-70177	Qbt 3	2.0–2.5	<MDA	<MDA	<bg
21-24580	MD21-05-60017	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-24580	MD21-05-60018	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25411	MD21-06-66255	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25411	MD21-06-66256	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25411	MD21-06-70171	Qbt 3	2.0–2.5	<MDA	<MDA	<bg

Table 3.2-1 (continued)

Location ID	Sample ID	Media	Sample Depth Interval (ft bgs)	Alpha (dpm)	Beta (dpm)	PID (ppm)
21-25412	MD21-06-66258	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25412	MD21-06-66259	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25412	MD21-06-70170	Qbt 3	2.0–2.5	<MDA	<MDA	<bg
21-25413	MD21-06-66261	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25413	MD21-06-66262	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25414	MD21-06-66264	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25414	MD21-06-66265	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25415	MD21-06-66267	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25415	MD21-06-66268	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25416	MD21-06-66270	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25416	MD21-06-66271	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25417	MD21-06-66273	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25417	MD21-06-66274	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25418	MD21-06-66276	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25418	MD21-06-66277	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25418	MD21-06-66302[d]	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25419	MD21-06-66279	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25419	MD21-06-66280	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25420	MD21-06-66282	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25420	MD21-06-66283	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25421	MD21-06-66285	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25421	MD21-06-66286	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25422	MD21-06-66288	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25422	MD21-06-66289	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25423	MD21-06-66291	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25423	MD21-06-66292	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25622	MD21-06-68044	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25622	MD21-06-68045	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25622	MD21-06-68054[d]	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25623	MD21-06-68046	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25623	MD21-06-68047	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25624	MD21-06-68048	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25624	MD21-06-68049	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25625	MD21-06-68050	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25625	MD21-06-68051	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25626	MD21-06-68052	ALLH	0.0–0.5	<MDA	<MDA	<bg

Table 3.2-1 (continued)

Location ID	Sample ID	Media	Sample Depth Interval (ft bgs)	Alpha (dpm)	Beta (dpm)	PID (ppm)
21-25626	MD21-06-68053	ALLH	1.5–2.0	<MDA	<MDA	<bg
21-25626	MD21-06-68055[d]	ALLH	0.0–0.5	<MDA	<MDA	<bg
21-25626	MD21-06-68056[e]	NA[f]	NA	NA	NA	NA

Note: Shading indicates that sample was excavated during remediation activities.

[a] All samples analyzed for SVOCs (SW-846 8270C), pH (SW-846 9045C), TAL metals (SW-846 6010B/6020/7471A), gamma spectroscopy (EPA Method 901.1), strontium-90 (EPA Method 905), tritium (EPA Method 906), cyanide (SW-846 9012A), nitrates (EPA Method 300.0), PCBs (SW-846 8082), perchlorate (SW-846 8731A; EPA Method 314), and radionuclides (HASL-300).

[b] MDA = Minimum detectable activity.

[c] <bg = Less than background.

[d] Field duplicate.

[e] Field rinsate.

[f] NA = Not analyzed.

Table 3.3-1
Summary of Samples Collected for Analyses[a] and
Field-Screening Results, SWMU 21-013(b) and AOC 21-013(g)

Location ID	Sample ID	Sample Depth Interval (ft bgs)	Media	Alpha (dpm)	Beta (dpm)	PID (ppm)
21-24639	MD21-05-60367	0–0.5	ALLH	84	2720	NA[b]
21-24639	MD21-05-60368	1.5–2.0	ALLH	133	3080	NA
21-24640	MD21-05-60370	0–0.5	ALLH	127	3510	NA
21-24640	MD21-05-60371	1.5–2.0	ALLH	127	3120	NA
21-24641	MD21-05-60373	0–0.5	ALLH	60	3260	NA
21-24641	MD21-05-60374	0.5–1.0	ALLH	60	3250	NA
21-24642	MD21-05-60376	0–0.5	ALLH	108	3280	NA
21-24642	MD21-05-60377	1.5–2.0	ALLH	42	3220	NA
21-24643	MD21-05-60379	0–0.5	ALLH	78	3400	NA
21-24643	MD21-05-60380	1.5–2.0	ALLH	102	3370	NA
21-24644	MD21-05-60382	0–0.5	ALLH	48	3170	NA
21-24644	MD21-05-60383	1.5–2.0	ALLH	72	3240	NA
21-24645	MD21-05-60385	0–0.5	ALLH	78	3310	NA
21-24645	MD21-05-60386	1.5–2.0	ALLH	96	3460	NA
21-24646	MD21-05-60388	0–0.5	ALLH	96	3480	NA
21-24646	MD21-05-60389	1.5–2.0	ALLH	108	3270	NA
21-24647	MD21-05-60391	0–0.5	ALLH	121	3430	NA
21-24647	MD21-05-60392	1.5–2.0	ALLH	48	3260	NA
21-24648	MD21-05-60394	0–0.5	ALLH	102	3240	NA
21-24648	MD21-05-60395	1.5–2.0	ALLH	72	3350	NA
21-24649	MD21-05-60397	0–0.5	ALLH	96	3040	NA
21-24649	MD21-05-60398	1.5–2.0	ALLH	127	3050	NA
21-24650	MD21-05-60400	0–0.5	ALLH	78	2740	NA
21-24650	MD21-05-60401	1.5–2.0	ALLH	108	2890	NA
21-24658	MD21-05-60424	0–0.5	ALLH	90	2870	NA
21-24658	MD21-05-60425	1.5–2.0	ALLH	90	2870	NA
21-24657	MD21-05-60421	0–0.5	ALLH	72	2920	NA
21-24657	MD21-05-60422	1.5–2.0	ALLH	66	2780	NA
21-24653	MD21-05-60409	0–0.6	ALLH	96	2650	NA
21-24653	MD21-05-60410	1.5–2.0	ALLH	72	2700	NA
21-24678	MD21-05-60493	0–0.5	ALLH	90	3020	NA
21-24678	MD21-05-60494	1.5–2.0	ALLH	72	2890	NA
21-24677	MD21-05-60490	0–0.5	ALLH	145	2670	NA

Table 3.3-1 (continued)

Location ID	Sample ID	Sample Depth Interval (ft bgs)	Media	Alpha (dpm)	Beta (dpm)	PID (ppm)
21-24677	MD21-05-60491	1.5–2.0	ALLH	187	3130	NA
21-24677	MD21-05-60428[c]	1.5–2.0	ALLH	115	3110	NA
21-24674	MD21-05-60481	0–0.5	ALLH	181	3300	NA
21-24674	MD21-05-60482	1.5–2.0	ALLH	181	3300	NA
21-24676	MD21-05-60487	0–0.5	ALLH	72	3300	NA
21-24675	MD21-05-60484	0–0.5	ALLH	90	3370	NA
21-24675	MD21-05-60485	1.5–2.0	ALLH	123	3240	NA
21-24669	MD21-05-60466	0–0.5	ALLH	90	3270	NA
21-24669	MD21-05-60467	1.5–2.0	ALLH	84	3320	NA
21-24679	MD21-05-60568	0–0.5	ALLH	139	3110	NA
21-24679	MD21-05-60569	1.5–2.0	ALLH	127	3250	NA
21-24680	MD21-05-60571	0–0.5	ALLH	84	3040	NA
21-24680	MD21-05-60572	1.5–2.0	ALLH	90	2720	NA
21-24665	MD21-05-60454	0–0.5	ALLH	84	2711	NA
21-24665	MD21-05-60455	1.5–2.0	ALLH	72	2660	NA
21-24654	MD21-05-60412	0–0.5	ALLH	102	3160	NA
21-24654	MD21-05-60413	1.5–2.0	ALLH	127	3390	NA
21-24652	MD21-05-60406	0–0.5	ALLH	84	2700	NA
21-24652	MD21-05-60407	1.5–2.0	ALLH	54	2790	NA
21-24651	MD21-05-60403	0–0.5	ALLH	66	3050	NA
21-24651	MD21-05-60404	1.5–2.0	ALLH	66	2990	NA
21-24659	MD21-05-60437	0–0.5	ALLH	66	2810	NA
21-24659	MD21-05-60436	1.0–1.5	ALLH	84	3200	NA
21-24664	MD21-05-60451	0–0.5	ALLH	90	3220	NA
21-24664	MD21-05-60452	1.5–2.0	ALLH	78	3090	NA
21-24667	MD21-05-60460	0–0.5	ALLH	78	3240	NA
21-24667	MD21-05-60461	1.5–2.0	ALLH	84	3320	NA
21-24670	MD21-05-60469	0–0.5	ALLH	78	3120	NA
21-24670	MD21-05-60470	1.5–2.0	ALLH	84	3230	NA
21-24672	MD21-05-60475	0–0.5	ALLH	102	3370	NA
21-24672	MD21-05-60476	1.5–2.0	ALLH	84	3110	NA
21-24673	MD21-05-60478	0–0.5	ALLH	78	3210	NA
21-24673	MD21-05-60479	1.5–2.0	ALLH	96	3170	NA
21-24668	MD21-05-60463	0–0.5	ALLH	96	3150	NA
21-24668	MD21-05-60464	1.5–2.0	ALLH	102	2940	NA
21-24663	MD21-05-60448	0–0.5	ALLH	109	3100	NA

Table 3.3-1 (continued)

Location ID	Sample ID	Sample Depth Interval (ft bgs)	Media	Alpha (dpm)	Beta (dpm)	PID (ppm)
21-24663	MD21-05-60449	1.5–2.0	ALLH	90	2920	NA
21-24660	MD21-05-60439	0–0.5	ALLH	163	3050	NA
21-24660	MD21-05-60440	1.5–2.0	ALLH	90	2950	NA
21-24655	MD21-05-60415	0–0.5	ALLH	102	3240	NA
21-24655	MD21-05-60416	1.5–2.0	ALLH	60	3210	NA
21-24656	MD21-05-60418	0–0.5	ALLH	66	3060	NA
21-24656	MD21-05-60419	1.5–2.0	ALLH	115	3080	NA
21-24661	MD21-05-60442	0–0.5	ALLH	66	3020	NA
21-24661	MD21-05-60443	1.5–2.0	ALLH	60	3350	NA
21-24662	MD21-05-60445	0–0.5	ALLH	96	3060	NA
21-24662	MD21-05-60446	1.5–2.0	ALLH	139	2620	NA
21-24666	MD21-05-60457	0–0.5	ALLH	66	3240	NA
21-24666	MD21-05-60458	1.5–2.0	ALLH	90	3320	NA
21-24666	MD21-05-60427[c]	1.5–2.0	ALLH	115	3270	NA
21-24671	MD21-05-60472	0–0.5	ALLH	66	3340	NA
21-24671	MD21-05-60473	1.5–2.0	ALLH	72	3140	NA
21-24681	MD21-05-60574	0–0.5	ALLH	NA	NA	NA
21-24681	MD21-05-60575	1.5–2.0	ALLH	NA	NA	NA
21-24682	MD21-05-60577	0–0.5	ALLH	NA	NA	NA
21-24682	MD21-05-60578	1.5–2.0	ALLH	NA	NA	NA
21-24683	MD21-05-60580	0–0.5	ALLH	NA	NA	NA
21-24683	MD21-05-60581	1.5–2.0	ALLH	NA	NA	NA
21-24650	RE21-07-595[d]	0–0.5	ALLH	0	0	0.7
21-24650	RE21-07-600[c,d]	0–0.5	ALLH	0	0	0.7
21-24650	RE21-07-596[d]	1.5–2.0	ALLH	13	356	0.3
21-600102	RE21-07-597[d]	0–0.5	ALLH	11	288	0.5
21-600102	RE21-07-608[d]	1.5–2.0	ALLH	1	448	0
21-600103	RE21-07-598[d]	0–0.5	ALLH	7	243	1.7
21-600103	RE21-07-609[d]	1.5–2.0	ALLH	7	583	1.3
21-600104	RE21-07-599[d]	0–0.5	ALLH	8	608	0
21-600104	RE21-07-610[d]	1.5–2.0	ALLH	7	50	0

Note: Shading indicates that the sample was excavated during remediation activities.

[a] All samples analyzed for SVOCs (SW-846 8270C), pH (SW-846 9045C), TAL metals (SW-846 6010B/6020/7471A), gamma spectroscopy (EPA Method 901.1), strontium-90 (EPA Method 905), tritium (EPA Method 906), cyanide (SW-846 9012A), nitrates (EPA Method 300.0), perchlorate (SW-846 8731A; EPA Method 314), and radionuclides (HASL-300), except where noted.

[b] NA = Not analyzed.

[c] Field duplicate.

[d] Samples analyzed for SVOCs (SW-846 8270C).

Table 4.9-1
Results of Geotechnical Characterization of Subsurface Units in Location 21-24524 (BH-01)

Sample Depth Interval (ft bgs)	Media Code	Density[a] (g/cm^3)	Saturated Hydraulic Conductivity[b] (cm/s)	Gravimetric/Volumetric Moisture Content[c] (%)	Calculated Total Porosity[d] (%)
10–11	Qbt 3	1.21	3.5E-03	6.70	54.30
13–14	Qbt 3	1.24	2.0E-03	6.20	53.20
25–26	Qbt 3	1.29	1.8E-03	5.60	51.30
35–36	Qbt 3	1.24	7.0E-02	4.70	53.10
45–46	Qbt 3	1.25	8.4E-02	8.00	52.70
95–96	Qbt 3	1.23	1.5E-03	5.30	53.80
97.5–98	Qbt 2	1.24	2.9E-02	7.80	53.40
170–170.5	Qbt 1v	1.24	1.3E-02	7.10	53.30
312.5–313.5	Qct	0.87	3.3E-02	26.20	67.00
314–315	Qct	1.59	3.9E-06	31.60	40.00
333.5–334	Qct	1.38	1.1E-02	11.30	48.00
334–334.5	Qct	1.38	4.0E-02	11.90	48.10
339.5–340	Qct	1.51	1.1E-03	20.40	43.10
375.5–376	Qbo	0.94	2.8E-02	11.40	64.70
	Minimum	0.87	3.9E-06	4.70	40.00
	Maximum	1.59	8.4E-02	31.60	67.00
	Median	1.24	1.2E-02	7.90	53.15
	Average	1.26	2.2E-02	11.73	52.57

[a] ASTM:D2937.

[b] ASTM:D2434.

[c] ASTM:D2216V.

[d] MOSA:18-1986.

Table 5.1-1
Excavated Location Results of Inorganic Anions
Detected Greater than Background Values at Consolidated Unit 21-018(a)-99

Location ID	Depth (ft)	Sample ID	Media	Cyanide (Total)	Nitrate	Perchlorate
QBT3 Background Value				**0.5**	**n/a**[a]	**n/a**
Soil Background Value				**0.5**	**n/a**	**n/a**
SSL Residential				**1220**	**100000**	**55**
SSL Industrial				**13700**	**100000**	**1400**
SWMU 21-013(b)						
21-24650	0–0.5	MD21-05-60400	ALLH	—[b]	7.2	—
21-24654	0–0.5	MD21-05-60412	ALLH	—	5.5	0.0014 (J-)
21-24660	0–0.5	MD21-05-60439	ALLH	—	3.15	0.0006 (J)
SWMU 21-023(c)						
21-01337	1.2–1.7	MD21-06-70175	ALLH	—	0.938 (J)	0.0015 (J)
21-01607	1–1.5	MD21-06-70176	QBT3	—	—	0.0023
21-01610	0.8–1.3	MD21-06-70172	QBT3	—	—	0.0045
21-01614	1.5–2	MD21-06-70173	QBT3	—	1.24	0.985
21-24579	0–0.5	MD21-05-60014	ALLH	—	0.462 (J)	0.0047
21-24579	1.5–2	MD21-05-60015	ALLH	—	0.445 (J)	0.0036
21-24580	0–0.5	MD21-05-60017	ALLH	—	0.474 (J)	0.0069
21-24580	1.5–2	MD21-05-60018	ALLH	—	0.501 (J)	0.0016 (J)
21-25411	0–0.5	MD21-06-66255	ALLH	—	—	0.004
21-25411	1.5–2	MD21-06-66256	ALLH	2.68 (U)	—	0.0011 (J)
21-25411	2–2.5	MD21-06-70171	QBT3	—	0.99 (J)	0.0037
21-25412	0–0.5	MD21-06-66258	ALLH	—	1.38 (J-)	0.0211
21-25412	1.5–2	MD21-06-66259	ALLH	—	0.654 (J-)	0.004

Note: Units are mg/kg. Data qualifiers are defined in Appendix A.

Source: Background values from LANL (1998, 059730, Table 6.01, p. 44). SSLs from NMED (2006, 092513), unless otherwise noted.

[a] n/a = Not applicable; no background value available.

[b] A dash indicates that if analyzed, sample result is less than background value.

Table 5.1-2
Excavated Location IDs Results of Inorganic Chemicals Detected Greater than Background Values at Consolidated Unit 21-018(a)-99

Location ID	Depth (ft)	Sample ID	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium
QBT3 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**
SSL Residential				**77800**	**31.3**	**3.9**	**15600**	**156**	**39**	**n/a** [a]
SSL Industrial				**100000**	**454**	**17.7**	**100000**	**2250**	**564**	**n/a**
SWMU 21-018(a) and SWMU 21-018(b)										
21-02518	7.5–10	AAB6658	QBT3	— [b]	—	—	—	—	—	2490 (J-)
21-02518	10–12.5	AAB6659	QBT3	—	—	—	—	—	—	—
21-02519	0–2.5	AAB6673	FILL	—	—	—	—	—	0.59 (U)	—
21-02519	10–12.5	AAB6677	QBT3	—	—	—	—	—	—	2750
21-02520	0–2.5	AAB6691	FILL	—	—	—	—	—	0.77 (U)	—
21-02520	2.5–5	AAB6692	FILL	—	—	—	—	—	0.45 (U)	—
21-02520	10–12.5	AAB6695	QBT3	—	—	—	—	—	—	—
21-02521	0–2.5	AAB6709	FILL	—	—	—	—	—	0.43 (U)	—
21-02521	5–7.5	AAB6711	FILL	—	—	—	—	—	0.43 (U)	—
21-02522	0–2.5	AAC0089	FILL	—	5.3 (U)	—	—	—	0.77 (J)	—
21-02522	2.5–5	AAC0090	FILL	—	5.1 (U)	—	—	—	1.5	—
21-02522	5–7.5	AAC0091	FILL	—	5.1 (U)	—	—	—	0.63 (U)	—
21-02522	10–12.5	AAC0093	QBT3	—	4.4 (U)	—	—	—	—	—
21-04505	7–7.5	0121-96-0220	FILL	—	5.2 (U)	—	—	—	0.52 (U)	—
21-04506	7–7.5	0121-96-0221	FILL	—	4.9 (U)	—	—	—	0.49 (U)	—
21-04507	7–7.5	0121-96-0222	FILL	—	5 (U)	—	—	—	0.5 (U)	—
21-04508	3–6	0121-96-0218	FILL	—	—	—	—	—	—	—
21-04508	7–7.5	0121-96-0223	FILL	—	5 (U)	—	—	—	0.5 (U)	—
21-04509	3–3.5	0121-96-0224	FILL	—	**84**	—	551	2.9	16.2	—
21-04509	5–5.5	0121-96-0225	FILL	—	**83.3**	—	511	—	12.1	—

Table 5.1-2 (continued)

Location ID	Depth (ft)	Sample ID	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium
QBT3 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**
SSL Residential				**77800**	**31.3**	**3.9**	**15600**	**156**	**39**	**n/a**[a]
SSL Industrial				**100000**	**454**	**17.7**	**100000**	**2250**	**564**	**n/a**
21-04509	6.5–7	0121-96-0226	FILL	—	**44.8**	**10.9**	—	—	**50.1**	—
21-04510	3.5–4	0121-96-0227	FILL	—	4.9 (U)	—	—	—	0.49 (U)	—
SWMU 21-013(b)										
21-24650	0–0.5	MD21-05-60400	ALLH	—	—	—	—	—	—	—
21-24654	0–0.5	MD21-05-60412	ALLH	—	—	—	—	—	0.536 (U)	—
21-24660	0–0.5	MD21-05-60439	ALLH	—	—	—	—	—	0.552 (U)	—
SWMU 21-023(c)										
21-01337	0–0.5	AAA0624	ALLH	—	5.3 (UJ)	—	—	—	0.99	—
21-01337	1.2–1.7	MD21-06-70175	ALLH	—	—	**13.5**	—	—	0.506 (U)	—
21-01339	0–0.25	AAA0628	ALLH	—	5.2 (UJ)	—	—	—	1.3	—
21-01607	1–1.5	MD21-06-70176	QBT3	10300 (J+)	—	**10.5**	95.1	—	—	—
21-01610	0.8–1.3	MD21-06-70172	QBT3	—	—	**6.38**	71	—	—	—
21-01614	1.5–2	MD21-06-70173	QBT3	—	—	**9.98**	63	—	—	—
21-24579	0–0.5	MD21-05-60014	ALLH	—	—	—	—	—	0.564 (U)	—
21-24579	1.5–2	MD21-05-60015	ALLH	—	—	—	—	—	0.528 (U)	—
21-24580	0–0.5	MD21-05-60017	ALLH	—	—	—	—	—	0.556 (U)	—
21-24580	1.5–2	MD21-05-60018	ALLH	—	—	—	—	—	0.552 (U)	—
21-25411	0–0.5	MD21-06-66255	ALLH	—	—	—	—	—	0.557 (U)	—
21-25411	1.5–2	MD21-06-66256	ALLH	—	—	—	—	—	0.535 (U)	—
21-25411	2–2.5	MD21-06-70171	QBT3	—	—	3.49	—	—	—	—
21-25412	0–0.5	MD21-06-66258	ALLH	—	—	—	—	—	0.502 (U)	—
21-25412	1.5–2	MD21-06-66259	ALLH	—	—	—	—	—	0.554 (U)	—

Table 5.1-2 (continued)

Location ID	Depth (ft)	Sample ID	Media	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Nickel
QBT3 Background Value				**7.14**	**3.14**	**4.66**	**11.2**	**n/a**	**0.1**	**6.58**
Soil Background Value				**19.3**	**8.64**	**14.7**	**22.3**	**n/a**	**0.1**	**15.4**
SSL Residential				**100000**	**1520**	**3130**	**400**	**1600**	**100000**	**1560**
SSL Industrial				**100000**	**20500**	**45400**	**800**	**41000**	**100000**	**22700**
SWMU 21-018(a) and SWMU 21-018(b)										
21-02518	7.5–10	AAB6658	QBT3	—	—	6 (J-)	78.5 (J-)	—	—	—
21-02518	10–12.5	AAB6659	QBT3	7.3 (J-)	—	251 (J-)	42.9 (J-)	—	—	—
21-02519	0–2.5	AAB6673	FILL	—	—	—	—	—	—	—
21-02519	10–12.5	AAB6677	QBT3	—	—	31.4	78.3	—	—	—
21-02520	0–2.5	AAB6691	FILL	—	—	48.3	—	—	0.3 (J)	—
21-02520	2.5–5	AAB6692	FILL	—	—	—	—	—	—	—
21-02520	10–12.5	AAB6695	QBT3	—	—	—	—	—	—	—
21-02521	0–2.5	AAB6709	FILL	—	—	—	—	—	—	—
21-02521	5–7.5	AAB6711	FILL	—	—	—	—	—	—	—
21-02522	0–2.5	AAC0089	FILL	—	—	—	—	—	—	—
21-02522	2.5–5	AAC0090	FILL	—	—	—	—	—	—	—
21-02522	5–7.5	AAC0091	FILL	—	—	—	—	—	—	—
21-02522	10–12.5	AAC0093	QBT3	—	—	—	—	—	—	—
21-04505	7–7.5	0121-96-0220	FILL	—	—	—	47.6	—	—	—
21-04506	7–7.5	0121-96-0221	FILL	—	—	—	—	—	0.35 (J+)	—
21-04507	7–7.5	0121-96-0222	FILL	—	—	—	—	—	0.14 (J+)	—
21-04508	3–6	0121-96-0218	FILL	—	—	—	—	—	0.85	—
21-04508	7–7.5	0121-96-0223	FILL	—	—	—	—	—	0.14 (J+)	—
21-04509	3–3.5	0121-96-0224	FILL	111	16.1	388	**452 (J-)**	—	29.1	63.8
21-04509	5–5.5	0121-96-0225	FILL	151	11.7	642	389 (J-)	—	139 (J)	93.5
21-04509	6.5–7	0121-96-0226	FILL	128	13.1	**13000**	**1090 (J-)**	—	13.2 (J)	240

Table 5.1-2 (continued)

Location ID	Depth (ft)	Sample ID	Media	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Nickel
QBT3 Background Value				**7.14**	**3.14**	**4.66**	**11.2**	**n/a**	**0.1**	**6.58**
Soil Background Value				**19.3**	**8.64**	**14.7**	**22.3**	**n/a**	**0.1**	**15.4**
SSL Residential				**100000**	**1520**	**3130**	**400**	**1600**	**100000**	**1560**
SSL Industrial				**100000**	**20500**	**45400**	**800**	**41000**	**100000**	**22700**
21-04510	3.5–4	0121-96-0227	FILL	—	—	—	—	—	—	—
SWMU 21-013(b)										
21-24650	0–0.5	MD21-05-60400	ALLH	—	—	—	—	—	—	—
21-24654	0–0.5	MD21-05-60412	ALLH	—	—	—	—	—	0.103	—
21-24660	0–0.5	MD21-05-60439	ALLH	—	—	—	—	—	0.133	—
SWMU 21-023(c)										
21-01337	0–0.5	AAA0624	ALLH	50.2 (J+)	—	—	51.9	5.2	—	—
21-01337	1.2–1.7	MD21-06-70175	ALLH	248	—	38.1	154	—	4.1	25.4
21-01339	0–0.25	AAA0628	ALLH	158 (J+)	—	18.5 (J+)	97.4	7.5	—	—
21-01607	1–1.5	MD21-06-70176	QBT3	375	—	16.3	157	—	5.95	7.72
21-01610	0.8–1.3	MD21-06-70172	QBT3	225	—	26.5	119	—	2.22	14.5
21-01614	1.5–2	MD21-06-70173	QBT3	311	—	16.9	151	—	0.245	—
21-24579	0–0.5	MD21-05-60014	ALLH	36.3	—	—	35.1	—	0.505	—
21-24579	1.5–2	MD21-05-60015	ALLH	40.5	—	—	24.9	—	1.08	—
21-24580	0–0.5	MD21-05-60017	ALLH	28	—	—	—	—	0.402	—
21-24580	1.5–2	MD21-05-60018	ALLH	—	—	—	—	—	0.34	—
21-25411	0–0.5	MD21-06-66255	ALLH	75.2	—	—	44	—	0.889	—
21-25411	1.5–2	MD21-06-66256	ALLH	25.3	—	—	—	—	0.233	—
21-25411	2–2.5	MD21-06-70171	QBT3	21.8	—	—	29.1	—	0.155	—
21-25412	0–0.5	MD21-06-66258	ALLH	34.3	—	—	26.9	—	0.551	—
21-25412	1.5–2	MD21-06-66259	ALLH	24.4	—	—	—	—	0.349	—

Table 5.1-2 (continued)

Location ID	Depth (ft)	Sample ID	Media	Selenium	Silver	Strontium	Thallium	Uranium	Vanadium	Zinc
QBT3 Background Value				**0.3**	**1**	**n/a**	**1.1**	**2.4**	**17**	**63.5**
Soil Background Value				**1.52**	**1**	**n/a**	**0.73**	**1.82**	**39.6**	**48.8**
SSL Residential				**391**	**391**	**46900**	**5.16**	**16**	**78.2**	**23500**
SSL Industrial				**5680**	**5680**	**100000**	**74.9**	**200**	**1140**	**100000**
SWMU 21-018(a) and SWMU 21-018(b)										
21-02518	7.5–10	AAB6658	QBT3	0.61 (UJ)	—	—	—	—	—	—
21-02518	10–12.5	AAB6659	QBT3	0.62 (UJ)	—	—	—	—	—	—
21-02519	0–2.5	AAB6673	FILL	—	1.9 (U)	—	—	4	—	—
21-02519	10–12.5	AAB6677	QBT3	0.62 (U)	—	—	—	5.6	—	64.3
21-02520	0–2.5	AAB6691	FILL	—	12.8	—	—	4.5	—	82.3
21-02520	2.5–5	AAB6692	FILL	—	2.2 (U)	—	—	4.1	—	—
21-02520	10–12.5	AAB6695	QBT3	0.64 (U)	2.1 (U)	—	—	4.5	—	—
21-02521	0–2.5	AAB6709	FILL	—	2.2 (U)	—	—	2.03 (J)	—	—
21-02521	5–7.5	AAB6711	FILL	—	2.2 (U)	—	—	2.21	—	—
21-02522	0–2.5	AAC0089	FILL	—	—	—	—	1.97 (J-)	—	—
21-02522	2.5–5	AAC0090	FILL	—	—	—	—	2.59 (J-)	—	—
21-02522	5–7.5	AAC0091	FILL	—	—	—	—	3.02 (J-)	—	—
21-02522	10–12.5	AAC0093	QBT3	—	—	—	—	—	—	—
21-04505	7–7.5	0121-96-0220	FILL	—	—	—	—	—	—	59.8
21-04506	7–7.5	0121-96-0221	FILL	—	—	—	—	—	—	—
21-04507	7–7.5	0121-96-0222	FILL	—	—	—	—	—	—	—
21-04508	3–6	0121-96-0218	FILL	—	—	—	0.77 (U)	—	—	—
21-04508	7–7.5	0121-96-0223	FILL	—	—	—	—	—	—	52.2
21-04509	3–3.5	0121-96-0224	FILL	—	20	—	—	—	—	857
21-04509	5–5.5	0121-96-0225	FILL	—	40	—	—	—	—	699
21-04509	6.5–7	0121-96-0226	FILL	—	139	—	—	—	—	4970
21-04510	3.5–4	0121-96-0227	FILL	—	—	—	—	—	—	—

Table 5.1-2 (continued)

Location ID	Depth (ft)	Sample ID	Media	Selenium	Silver	Strontium	Thallium	Uranium	Vanadium	Zinc
QBT3 Background Value				**0.3**	**1**	**n/a**	**1.1**	**2.4**	**17**	**63.5**
Soil Background Value				**1.52**	**1**	**n/a**	**0.73**	**1.82**	**39.6**	**48.8**
SSL Residential				**391**	**391**	**46900**	**5.16**	**16**	**78.2**	**23500**
SSL Industrial				**5680**	**5680**	**100000**	**74.9**	**200**	**1140**	**100000**
SWMU 21-013(b)										
21-24650	0–0.5	MD21-05-60400	ALLH	1.54 (U)	—	—	—	—	—	—
21-24654	0–0.5	MD21-05-60412	ALLH	1.61 (U)	—	—	—	—	—	—
21-24660	0–0.5	MD21-05-60439	ALLH	1.66 (U)	—	—	—	—	—	76.4
SWMU 21-023(c)										
21-01337	0–0.5	AAA0624	ALLH	—	—	16.9 (J)	—	—	—	—
21-01337	1.2–1.7	MD21-06-70175	ALLH	1.84	—	—	—	—	44	—
21-01339	0–0.25	AAA0628	ALLH	—	—	25.6 (J)	—	—	—	—
21-01607	1–1.5	MD21-06-70176	QBT3	0.771 (J)	—	—	—	—	20.5	—
21-01610	0.8–1.3	MD21-06-70172	QBT3	1.5 (U)	—	—	—	—	—	—
21-01614	1.5–2	MD21-06-70173	QBT3	1.5 (U)	—	—	—	—	20.4	—
21-24579	0–0.5	MD21-05-60014	ALLH	1.69 (U)	—	—	—	—	—	—
21-24579	1.5–2	MD21-05-60015	ALLH	1.58 (U)	—	—	—	—	—	—
21-24580	0–0.5	MD21-05-60017	ALLH	1.67 (U)	—	—	—	—	—	—
21-24580	1.5–2	MD21-05-60018	ALLH	1.66 (U)	—	—	—	—	—	—
21-25411	0–0.5	MD21-06-66255	ALLH	1.67 (U)	—	—	—	—	—	—
21-25411	1.5–2	MD21-06-66256	ALLH	1.61 (U)	—	—	—	—	—	—
21-25411	2–2.5	MD21-06-70171	QBT3	1.59 (U)	—	—	—	—	—	—
21-25412	0–0.5	MD21-06-66258	ALLH	—	—	—	—	—	—	—
21-25412	1.5–2	MD21-06-66259	ALLH	1.66 (U)	—	—	—	—	—	—

Note: Units are mg/kg. Data qualifiers are defined in Appendix A. Bold denotes value exceeds soil screening level.

Source: Background values from LANL 1998 (59730, Table 6.01, p. 44). SSLs from NMED (2006, 092513), unless otherwise noted.

[a] n/a = Not applicable; no background value available.

[b] A dash indicates that if analyzed, sample result is less than background value.

Table 5.1-3
Excavated Location IDs Results of Radionuclides Detected
Greater than Background Values or Fallout Values at Consolidated Unit 21-018(a)-99

Location ID	Depth (ft)	Sample ID	Media	Americium-241	Cesium-137	Cobalt-60	Gross Alpha	Gross Beta	Plutonium-238	Plutonium-239
QBT3 Background Value				**0.05**	**0.1**	**n/a[a]**	**n/a**	**n/a**	**0.05**	**0.05**
Soil Background Value				**0.013**	**1.65**	**n/a**	**n/a**	**n/a**	**0.023**	**0.054**
SAL Residential				**30**	**5.6**	**1.3**	**n/a**	**n/a**	**37**	**33**
SAL Industrial				**180**	**23**	**5.1**	**n/a**	**n/a**	**240**	**210**
SWMU 21-018(a) and SWMU 21-018(b)										
21-02518	0–2.5	AAA7595	FILL	0.017	—[b]	—	—	—	—	0.167 (J-)
21-02518	2.5–5	AAA7596	FILL	0.05	—	—	—	—	0.015	0.905
21-02518	7.5–10	AAB6658	QBT3	0.012	—	—	—	—	—	1.05
21-02518	10–12.5	AAB6659	QBT3	—	—	—	—	—	—	0.202
21-02519	0–2.5	AAB6673	FILL	0.02	—	—	—	—	—	0.51
21-02519	10–12.5	AAB6677	QBT3	0.567	—	—	—	—	0.126	29.943
21-02520	0–2.5	AAB6691	FILL	0.014	0.23	—	—	—	0.005	0.059
21-02520	2.5–5	AAB6692	FILL	0.013	—	—	—	—	—	0.295
21-02520	10–12.5	AAB6695	QBT3	0.072	—	—	—	—	0.015	2.905
21-02521	0–2.5	AAB6709	FILL	—	—	—	—	—	—	—
21-02521	5–7.5	AAB6711	FILL	—	—	—	—	—	—	0.986
21-02522	0–2.5	AAC0089	FILL	—	—	—	—	—	0.014	1.096
21-02522	2.5–5	AAC0090	FILL	—	—	—	—	—	—	0.024
21-02522	5–7.5	AAC0091	FILL	0.22	—	—	—	—	—	2.696
21-02522	10–12.5	AAC0093	QBT3	—	—	—	—	—	—	0.119
21-02580	5–7.5	AAB6729	FILL	0.322	—	—	—	—	0.032	5.825
21-04505	7–7.5	0121-96-0220	FILL	3.08	—	—	177	8.91	1.09	231

Table 5.1-3 (continued)

Location ID	Depth (ft)	Sample ID	Media	Americium-241	Cesium-137	Cobalt-60	Gross Alpha	Gross Beta	Plutonium-238	Plutonium-239
QBT3 Background Value				**0.05**	**0.1**	**n/a**[a]	**n/a**	**n/a**	**0.05**	**0.05**
Soil Background Value				**0.013**	**1.65**	**n/a**	**n/a**	**n/a**	**0.023**	**0.054**
SAL Residential				**30**	**5.6**	**1.3**	**n/a**	**n/a**	**37**	**33**
SAL Industrial				**180**	**23**	**5.1**	**n/a**	**n/a**	**240**	**210**
21-04506	7–7.5	0121-96-0221	FILL	6.98	—	—	360	22.1	2	**525**
21-04507	7–7.5	0121-96-0222	FILL	2.99	—	—	200	10.5	0.602	**155**
21-04508	7–7.5	0121-96-0223	FILL	5.61	—	—	522	17.4	1.34	**326**
21-04509	3–3.5	0121-96-0224	FILL	**115**	0.866	0.13	6300	1070	**4560**	23.5
21-04509	5–5.5	0121-96-0225	FILL	**92.3**	**7.14**	**1.39**	2550	603	**51.2**	**9110**
21-04509	6.5–7	0121-96-0226	FILL	**70.9**	4.54	**1.69**	5190	3020	12.5	**1470**
21-04510	3.5–4	0121-96-0227	FILL	4.97	—	—	45.2	4.27	1.05	**207**
21-24581	9–10	MD21-05-60023	FILL	6.6	0.088	—	—	—	1.24	**188**
21-24582	9–10	MD21-05-60026	FILL	5.02	—	—	—	—	—	**88.6**
21-24583	9–10	MD21-05-60029	FILL	4.92	—	—	—	—	—	**99.2**
21-24584	9–10	MD21-05-60032	FILL	8.41	—	—	—	—	—	**112**
21-24585	9–10	MD21-05-60035	FILL	7.11	—	—	—	—	—	**164**
21-24586	12–13	MD21-05-60038	FILL	2.49	0.102	—	—	—	—	**97.7**
21-24587	11–12	MD21-05-60041	FILL	1.57	—	—	—	—	—	**36.4**
21-24588	11–12	MD21-05-60044	FILL	8.69	0.123	—	—	—	—	**257**
21-24589	10–11	MD21-05-60037	FILL	12.8	0.159	—	—	—	1.96	**316**
21-24590	10–11	MD21-05-60052	FILL	5.36	0.09	—	—	—	0.656 (J+)	**108 (J+)**
21-24591	10–11	MD21-05-60055	FILL	8.9	0.112	—	—	—	0.783 (J+)	**207 (J+)**
21-24592	10–11	MD21-05-60058	FILL	0.432 (J-)	—	—	—	—	—	5.77 (J+)
21-24593	8–9	MD21-05-60061	FILL	2.55	—	—	—	—	—	**115 (J+)**

Table 5.1-3 (continued)

Location ID	Depth (ft)	Sample ID	Media	Americium-241	Cesium-137	Cobalt-60	Gross Alpha	Gross Beta	Plutonium-238	Plutonium-239
QBT3 Background Value				**0.05**	**0.1**	**n/a**[a]	**n/a**	**n/a**	**0.05**	**0.05**
Soil Background Value				**0.013**	**1.65**	**n/a**	**n/a**	**n/a**	**0.023**	**0.054**
SAL Residential				**30**	**5.6**	**1.3**	**n/a**	**n/a**	**37**	**33**
SAL Industrial				**180**	**23**	**5.1**	**n/a**	**n/a**	**240**	**210**
21-24594	5–6	MD21-05-60064	FILL	7.45	0.163	—	—	—	0.678 (J+)	**165 (J+)**
21-24595	5–6	MD21-05-60067	FILL	6.26 (J-)	—	—	—	—	1.26 (J+)	**318 (J+)**
21-24596	6–7	MD21-05-60070	FILL	27.2	—	—	—	—	2.17 (J+)	**699 (J+)**
21-24597	8–9	MD21-05-60073	FILL	2.65	—	—	—	—	0.466	**72**
SWMU 21-013(b)										
21-24650	0–0.5	MD21-05-60400	ALLH	0.101	—	—	—	—	0.0191	0.729
21-24654	0–0.5	MD21-05-60412	ALLH	2.93	0.175	—	—	—	0.528	48.9
21-24660	0–0.5	MD21-05-60439	ALLH	15.9 (J+)	0.202	—	—	—	1.45 (J+)	170 (J+)
SWMU 21-023(c)										
21-01062	0–0.08	AAA0233	ALLH	0.033	—	—	—	—	—	0.343
21-01062	0–0.5	AAA0234	ALLH	—	—	—	—	—	—	0.106
21-01337	0–0.5	AAA0624	ALLH	14.25 (J-)	—	—	—	—	0.24 (U)	**34.34 (J-)**
21-01337	1.2–1.7	MD21-06-70175	ALLH	**148 (J+)**	0.315	—	—	—	—	**134**
21-01339	0–0.25	AAA0628	ALLH	**213.4 (J-)**	—	—	—	—	0.56 (U)	**107.5 (J-)**
21-01607	0–0.33	AAA4041	ALLH	29.272 (J-)	—	—	—	—	0.272 (J-)	**44.674 (J-)**
21-01607	1–1.5	MD21-06-70176	QBT3	**117 (J+)**	1.06	—	—	—	1	**183**
21-01610	0–0.5	AAA4044	ALLH	**120.76 (J-)**	—	—	—	—	0.353 (J-)	22.409 (J-)
21-01610	0.8–1.3	MD21-06-70172	QBT3	**377 (J+)**	0.39	—	—	—	1.52	**154**
21-01611	0–0.5	AAA4045	ALLH	29.36 (J-)	—	—	—	—	0.289 (J-)	**46.739 (J-)**
21-01612	0–0.5	AAA4047	ALLH	22.021 (J-)	—	—	—	—	0.305 (J-)	**50.153 (J-)**

Table 5.1-3 (continued)

Location ID	Depth (ft)	Sample ID	Media	Americium-241	Cesium-137	Cobalt-60	Gross Alpha	Gross Beta	Plutonium-238	Plutonium-239
QBT3 Background Value				**0.05**	**0.1**	**n/a**[a]	**n/a**	**n/a**	**0.05**	**0.05**
Soil Background Value				**0.013**	**1.65**	**n/a**	**n/a**	**n/a**	**0.023**	**0.054**
SAL Residential				**30**	**5.6**	**1.3**	**n/a**	**n/a**	**37**	**33**
SAL Industrial				**180**	**23**	**5.1**	**n/a**	**n/a**	**240**	**210**
21-01614	0–0.5	AAA4055	ALLH	**113.201 (J-)**	—	—	—	—	0.232 (J-)	28.505 (J-)
21-01614	0.5–1	AAA4056	ALLH	0.066 (J-)	—	—	—	—	0.013 (J-)	1.868 (J-)
21-01614	1–1.5	AAA4057	ALLH	23.594 (J-)	—	—	—	—	0.086 (J-)	11.373 (J-)
21-01614	1.5–2	MD21-06-70173	QBT3	**398**	0.738	—	—	—	0.656	**177**
21-01872	0–0.5	AAB8901	ALLH	—	—	—	—	—	—	0.292
21-01872	0.5–1	AAB8902	ALLH	—	—	—	—	—	—	0.068 (J-)
21-01873	0–0.5	AAB8906	ALLH	3.04	—	—	—	—	0.193	21.1
21-01873	0.5–1	AAB8907	ALLH	0.692	0.614	—	—	—	0.071	10.7
21-01873	1–1.5	AAB8908	ALLH	—	0.411	—	—	—	0.028	4.24
21-01876	0–0.5	AAB8921	ALLH	0.034 (U)	—	—	—	—	—	0.113
21-01876	0.5–1	AAB8922	ALLH	—	—	—	—	—	—	0.051
21-01877	0–0.5	AAB8926	ALLH	0.232 (U)	—	—	—	—	—	0.211 (J-)
21-01877	1–1.5	AAB8928	QBT3	—	—	—	—	—	—	0.009
21-01903	0–0.5	AAB9056	ALLH	0.095 (U)	—	—	—	—	—	—
21-01903	0.5–1	AAB9057	ALLH	—	0.176	—	—	—	—	—
21-01904	0–0.33	AAB9061	ALLH	—	—	—	—	—	—	1.13
21-01905	0–0.5	AAB9066	ALLH	0.465 (U)	—	—	—	—	0.026	1.53
21-01906	0–0.5	AAB9071	ALLH	—	—	—	—	—	0.028	0.609
21-01906	0.5–1	AAB9072	ALLH	—	—	—	—	—	0.037	1.92
21-01978	0–0.5	AAB6980	FILL	0.067	—	—	—	—	—	0.913

Table 5.1-3 (continued)

Location ID	Depth (ft)	Sample ID	Media	Americium-241	Cesium-137	Cobalt-60	Gross Alpha	Gross Beta	Plutonium-238	Plutonium-239
QBT3 Background Value				**0.05**	**0.1**	**n/a**[a]	**n/a**	**n/a**	**0.05**	**0.05**
Soil Background Value				**0.013**	**1.65**	**n/a**	**n/a**	**n/a**	**0.023**	**0.054**
SAL Residential				**30**	**5.6**	**1.3**	**n/a**	**n/a**	**37**	**33**
SAL Industrial				**180**	**23**	**5.1**	**n/a**	**n/a**	**240**	**210**
21-24579	0–0.5	MD21-05-60014	ALLH	**37.2**	—	—	—	—	0.108	17.9
21-24579	1.5–2	MD21-05-60015	ALLH	**52.3**	0.124	—	—	—	0.146	24.6
21-24580	0–0.5	MD21-05-60017	ALLH	**40.7 (J+)**	—	—	—	—	0.101	19.1
21-24580	1.5–2	MD21-05-60018	ALLH	23	—	—	—	—	—	9.2
21-24650	0–0.5	MD21-05-60400	ALLH	0.101	—	—	—	—	—	0.729
21-24654	0–0.5	MD21-05-60412	ALLH	2.93	—	—	—	—	0.528	**48.9**
21-24660	0–0.5	MD21-05-60439	ALLH	15.9 (J+)	—	—	—	—	1.45 (J+)	**170 (J+)**
21-25411	0–0.5	MD21-06-66255	ALLH	**173**	—	—	—	—	0.414 (U)	**99.8**
21-25411	1.5–2	MD21-06-66256	ALLH	28.6	—	—	—	—	—	**33.3**
21-25411	2–2.5	MD21-06-70171	QBT3	**48.2 (J+)**	—	—	—	—	—	31.3
21-25412	0–0.5	MD21-06-66258	ALLH	24	—	—	—	—	0.122	22.4
21-25412	1.5–2	MD21-06-66259	ALLH	21.5	—	—	—	—	0.072	13.4

Table 5.1-3 (continued)

Location ID	Depth (ft)	Sample ID	Media	Strontium-90	Thorium-228	Thorium-230	Tritium	Uranium-234	Uranium-235	Uranium-238
QBT3 Background Value				**1**	**2.52**	**1.98**	**0.3**	**1.98**	**0.09**	**1.93**
Soil Background Value				**1.31**	**2.28**	**2.29**	**0.766**	**2.59**	**0.2**	**2.29**
SAL Residential				**5.7**	**2.3**	**5**	**750**	**170**	**17**	**86**
SAL Industrial				**1900**	**9**	**5**	**440000**	**1500**	**87**	**430**
SWMU 21-018(a) and SWMU 21-018(b)										
21-02518	0–2.5	AAA7595	FILL	—	—	—	0.038	—	—	—
21-02518	2.5–5	AAA7596	FILL	—	—	—	0.089	—	—	—
21-02518	7.5–10	AAB6658	QBT3	—	—	—	0.074	—	—	—
21-02518	10–12.5	AAB6659	QBT3	—	—	—	0.086	—	—	—
21-02519	0–2.5	AAB6673	FILL	—	—	—	0.182	—	0.4	—
21-02519	10–12.5	AAB6677	QBT3	—	—	—	0.116	—	—	—
21-02520	0–2.5	AAB6691	FILL	—	—	—	0.25	—	—	—
21-02520	2.5–5	AAB6692	FILL	—	—	—	0.862	—	—	—
21-02520	10–12.5	AAB6695	QBT3	—	—	—	42.453	—	0.27	—
21-02521	0–2.5	AAB6709	FILL	0.32	—	—	0.041	—	—	—
21-02521	5–7.5	AAB6711	FILL	—	—	—	0.199	—	—	—
21-02522	0–2.5	AAC0089	FILL	—	—	—	0.072	—	—	—
21-02522	2.5–5	AAC0090	FILL	0.48	—	—	0.174	—	—	—
21-02522	5–7.5	AAC0091	FILL	—	—	—	0.49	—	—	—
21-02522	10–12.5	AAC0093	QBT3	—	—	—	0.279	—	—	—
21-02580	5–7.5	AAB6729	FILL	—	**5.86 (U)**	—	0.099	—	—	—
21-04505	7–7.5	0121-96-0220	FILL	—	—	—	0.519	—	—	—
21-04506	7–7.5	0121-96-0221	FILL	—	—	—	0.247	6.3	0.268	5.18
21-04507	7–7.5	0121-96-0222	FILL	—	—	—	1.42	4.54	0.204	2.5
21-04508	7–7.5	0121-96-0223	FILL	—	—	—	0.97	—	—	—

Table 5.1-3 (continued)

Location ID	Depth (ft)	Sample ID	Media	Strontium-90	Thorium-228	Thorium-230	Tritium	Uranium-234	Uranium-235	Uranium-238
QBT3 Background Value				**1**	**2.52**	**1.98**	**0.3**	**1.98**	**0.09**	**1.93**
Soil Background Value				**1.31**	**2.28**	**2.29**	**0.766**	**2.59**	**0.2**	**2.29**
SAL Residential				**5.7**	**2.3**	**5**	**750**	**170**	**17**	**86**
SAL Industrial				**1900**	**9**	**5**	**440000**	**1500**	**87**	**430**
21-04509	3–3.5	0121-96-0224	FILL	**30.1**	—	—	133	3.01	**47.3**	74.6
21-04509	5–5.5	0121-96-0225	FILL	**196**	—	—	258	**3460**	**144**	**2090**
21-04509	6.5–7	0121-96-0226	FILL	**220**	—	2.43	388	**5820**	**238**	**2590**
21-04510	3.5–4	0121-96-0227	FILL	—	—	—	1.06	75.9	5.49	30.5
21-24581	9–10	MD21-05-60023	FILL	0.282	—	—	0.008	13.3	0.777	6.27
21-24582	9–10	MD21-05-60026	FILL	0.138	—	—	0.12	9.65	0.631	4.6
21-24583	9–10	MD21-05-60029	FILL	0.204	—	—	0.28	18.9	1.18	8.41
21-24584	9–10	MD21-05-60032	FILL	0.189	—	—	0.29	27.9	1.29	12.2
21-24585	9–10	MD21-05-60035	FILL	—	—	—	0.361	16.6	1.68	8.96
21-24586	12–13	MD21-05-60038	FILL	—	—	—	0.249	7.33	0.354	3.66
21-24587	11–12	MD21-05-60041	FILL	—	—	—	0.991	6.05	0.408	3.37
21-24588	11–12	MD21-05-60044	FILL	0.429	—	—	35.098	16	1.05	8.2
21-24589	10–11	MD21-05-60037	FILL	0.193	—	—	31.568	62.9	3.38	30.8
21-24590	10–11	MD21-05-60052	FILL	0.895	—	—	1.34	23.8	0.894	10.3 (J-)
21-24591	10–11	MD21-05-60055	FILL	0.969	—	—	4.81	23.8	1.38	14.4 (J-)
21-24592	10–11	MD21-05-60058	FILL	—	—	—	0.148	—	—	—
21-24593	8–9	MD21-05-60061	FILL	1.14	—	—	6.79	—	0.202 (U)	—
21-24594	5–6	MD21-05-60064	FILL	1.14	—	—	1.13	44.4	4.39	22.4 (J-)
21-24595	5–6	MD21-05-60067	FILL	0.955	—	—	0.499	18.8	0.859 (U)	10.4 (J-)
21-24596	6–7	MD21-05-60070	FILL	1.47	—	—	3.58	49.4	3.83	27.2 (J-)
21-24597	8–9	MD21-05-60073	FILL	0.502	—	—	0.032	5.12	0.222 (U)	4.05 (J-)

Table 5.1-3 (continued)

Location ID	Depth (ft)	Sample ID	Media	Strontium-90	Thorium-228	Thorium-230	Tritium	Uranium-234	Uranium-235	Uranium-238
QBT3 Background Value				**1**	**2.52**	**1.98**	**0.3**	**1.98**	**0.09**	**1.93**
Soil Background Value				**1.31**	**2.28**	**2.29**	**0.766**	**2.59**	**0.2**	**2.29**
SAL Residential				**5.7**	**2.3**	**5**	**750**	**170**	**17**	**86**
SAL Industrial				**1900**	**9**	**5**	**440000**	**1500**	**87**	**430**
SWMU 21-013(b)										
21-24650	0–0.5	MD21-05-60400	ALLH	—	—	—	0.0385	0.81	0.627	0.886
21-24654	0–0.5	MD21-05-60412	ALLH	—	—	—	0.0613	1.36	0.1	1.42
21-24660	0–0.5	MD21-05-60439	ALLH	0.545	—	—	0.0316	1.19	0.131	1.12
SWMU 21-023(c)										
21-01062	0–0.08	AAA0233	ALLH	—	—	—	—	—	—	—
21-01062	0–0.5	AAA0234	ALLH	—	—	—	—	—	—	—
21-01337	0–0.5	AAA0624	ALLH	—	—	—	—	—	—	—
21-01337	1.2–1.7	MD21-06-70175	ALLH	—	—	—	0.015	4	—	3.59
21-01339	0–0.25	AAA0628	ALLH	—	—	—	—	—	—	—
21-01607	0–0.33	AAA4041	ALLH	—	—	—	—	—	—	—
21-01607	1–1.5	MD21-06-70176	QBT3	—	—	—	—	—	0.129	—
21-01610	0–0.5	AAA4044	ALLH	—	—	—	—	—	—	—
21-01610	0.8–1.3	MD21-06-70172	QBT3	—	—	—	—	—	0.108	—
21-01611	0–0.5	AAA4045	ALLH	—	—	—	—	—	—	—
21-01612	0–0.5	AAA4047	ALLH	—	—	—	—	—	—	—
21-01614	0–0.5	AAA4055	ALLH	—	—	—	—	—	—	—
21-01614	0.5–1	AAA4056	ALLH	—	—	—	0.059 (J-)	—	—	—
21-01614	1–1.5	AAA4057	ALLH	—	—	—	0.526 (J-)	—	—	—
21-01614	1.5–2	MD21-06-70173	QBT3	—	—	—	—	2.74	0.119	2.42
21-01872	0–0.5	AAB8901	ALLH	—	—	—	—	—	—	—

Table 5.1-3 (continued)

Location ID	Depth (ft)	Sample ID	Media	Strontium-90	Thorium-228	Thorium-230	Tritium	Uranium-234	Uranium-235	Uranium-238
QBT3 Background Value				**1**	**2.52**	**1.98**	**0.3**	**1.98**	**0.09**	**1.93**
Soil Background Value				**1.31**	**2.28**	**2.29**	**0.766**	**2.59**	**0.2**	**2.29**
SAL Residential				**5.7**	**2.3**	**5**	**750**	**170**	**17**	**86**
SAL Industrial				**1900**	**9**	**5**	**440000**	**1500**	**87**	**430**
21-01872	0.5–1	AAB8902	ALLH	—	—	—	—	—	—	—
21-01873	0–0.5	AAB8906	ALLH	—	—	—	—	—	—	—
21-01873	0.5–1	AAB8907	ALLH	0.139	—	—	0.178	—	—	—
21-01873	1–1.5	AAB8908	ALLH	0.186	—	—	0.031	—	—	—
21-01876	0–0.5	AAB8921	ALLH	—	—	—	—	—	—	—
21-01876	0.5–1	AAB8922	ALLH	—	—	—	—	—	—	—
21-01877	0–0.5	AAB8926	ALLH	—	—	—	—	—	—	—
21-01877	1–1.5	AAB8928	QBT3	—	—	—	—	—	—	—
21-01903	0–0.5	AAB9056	ALLH	—	—	—	—	—	—	—
21-01903	0.5–1	AAB9057	ALLH	0.055	—	—	—	—	—	—
21-01904	0–0.33	AAB9061	ALLH	—	—	—	—	—	—	—
21-01905	0–0.5	AAB9066	ALLH	—	—	—	—	—	—	—
21-01906	0–0.5	AAB9071	ALLH	—	—	—	—	—	—	—
21-01906	0.5–1	AAB9072	ALLH	—	—	—	0.042	—	—	—
21-01978	0–0.5	AAB6980	FILL	—	—	—	—	—	0.37 (U)	—
21-24579	0–0.5	MD21-05-60014	ALLH	—	—	—	—	—	—	—
21-24579	1.5–2	MD21-05-60015	ALLH	—	—	—	—	—	—	—
21-24580	0–0.5	MD21-05-60017	ALLH	—	—	—	—	—	0.203	—
21-24580	1.5–2	MD21-05-60018	ALLH	—	—	—	—	—	0.205	—
21-24650	0–0.5	MD21-05-60400	ALLH	—	—	—	—	—	—	—
21-24654	0–0.5	MD21-05-60412	ALLH	—	—	—	—	—	—	—

Table 5.1-3 (continued)

Location ID	Depth (ft)	Sample ID	Media	Strontium-90	Thorium-228	Thorium-230	Tritium	Uranium-234	Uranium-235	Uranium-238
QBT3 Background Value				**1**	**2.52**	**1.98**	**0.3**	**1.98**	**0.09**	**1.93**
Soil Background Value				**1.31**	**2.28**	**2.29**	**0.766**	**2.59**	**0.2**	**2.29**
SAL Residential				**5.7**	**2.3**	**5**	**750**	**170**	**17**	**86**
SAL Industrial				**1900**	**9**	**5**	**440000**	**1500**	**87**	**430**
21-24660	0–0.5	MD21-05-60439	ALLH	—	—	—	—	—	—	—
21-25411	0–0.5	MD21-06-66255	ALLH	—	—	—	—	—	—	—
21-25411	1.5–2	MD21-06-66256	ALLH	0.217	—	—	—	—	—	—
21-25411	2–2.5	MD21-06-70171	QBT3	—	—	—	0.013	—	—	—
21-25412	0–0.5	MD21-06-66258	ALLH	—	—	—	—	—	—	—
21-25412	1.5–2	MD21-06-66259	ALLH	0.167	—	—	—	—	—	—

Note: Units are mg/kg. Data qualifiers are defined in Appendix A. Bold denotes value exceeds screening action level.

Source: BVs from LANL (1998, 059730, Table 6.02, p. 45). SALs from LANL (2002, 073705) using RESRAD 6.21.

[a] n/a = Not applicable; no background value available.

[b] A dash indicates that if analyzed, sample result is less than background value.

Table 5.1-4
Excavated Location IDs Results of Organic Chemicals Detected at Consolidated Unit 21-018(a)-99

Location ID	Depth (ft)	Sample ID	Media	Acenaphthene	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Butanone[2-]
SSL Residential				**3730**	**22000**	**1.12**	**1.12**	**6.21**	**0.621**	**6.21**	**2290**	**100000**	**347**	**31800**
SSL Industrial				**33500**	**100000**	**8.26**	**8.26**	**23.4**	**2.34**	**23.4**	**30900**	**100000**	**1370**	**48700**
SWMU 21-018(a) and SWMU 21-018(b)														
21-02518	7.5–10	AAB6658	QBT3	—*	—	—	—	—	—	—	—	—	—	0.037
21-02518	10–12.5	AAB6659	QBT3	—	—	—	—	—	—	—	—	—	—	—
21-04506	7–7.5	0121-96-0221	FILL	—	—	—	—	—	—	—	—	—	—	—
21-04507	7–7.5	0121-96-0222	FILL	—	—	—	—	—	—	0.034 (J)	—	—	—	—
21-04508	7–7.5	0121-96-0223	FILL	—	—	—	—	—	—	—	—	—	—	—
21-04509	3–3.5	0121-96-0224	FILL	—	—	—	—	—	**0.7 (J)**	1.1 (J)	0.79 (J)	0.63 (J)	—	—
21-04509	5–5.5	0121-96-0225	FILL	—	—	—	—	—	—	1.4 (J)	—	—	—	—
21-04509	6.5–7	0121-96-0226	FILL	—	—	—	—	—	**0.88 (J)**	1.1 (J)	—	—	—	—
21-02519	0–2.5	AAB6673	FILL	—	—	—	—	—	—	—	—	—	—	—
SWMU 21-013(b)														
21-24650	0–0.5	MD21-05-60400	ALLH	0.78	2.07	—	—	**6.88 (J-)**	—	—	3.15	—	—	—
21-24654	0–0.5	MD21-05-60412	ALLH	—	—	0.019 (J)	—	—	—	—	—	—	—	—
21-24660	0–0.5	MD21-05-60439	ALLH	—	—	0.043 (J)	0.026 (J)	—	—	—	—	—	—	—
SWMU 21-023(c)														
21-01337	1.2–1.7	MD21-06-70175	ALLH	—	—	—	0.002 (J)	—	—	—	—	—	—	—
21-01607	1–1.5	MD21-06-70176	QBT3	—	—	—	0.005	—	—	—	—	—	—	—
21-01610	0.8–1.3	MD21-06-70172	QBT3	—	—	—	0.001 (J)	—	—	—	—	—	—	—
21-01614	0.5–1	AAA4056	ALLH	—	—	—	—	—	—	—	—	—	9.2	—
21-01614	1.5–2	MD21-06-70173	QBT3	—	—	—	0.004	—	—	—	—	—	—	—

Table 5.1-4 (continued)

Location ID	Depth (ft)	Sample ID	Media	Acenaphthene	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Butanone[2-]
SSL Residential				**3730**	**22000**	**1.12**	**1.12**	**6.21**	**0.621**	**6.21**	**2290**	**100000**	**347**	**31800**
SSL Industrial				**33500**	**100000**	**8.26**	**8.26**	**23.4**	**2.34**	**23.4**	**30900**	**100000**	**1370**	**48700**
21-24579	0–0.5	MD21-05-60014	ALLH	—	—	—	—	—	—	—	—	—	—	—
21-24579	1.5–2	MD21-05-60015	ALLH	—	—	—	—	—	—	—	—	—	—	—
21-25411	1.5–2	MD21-06-66256	ALLH	—	—	—	—	—	—	—	—	—	—	—
21-25412	1.5–2	MD21-06-66259	ALLH	—	—	—	—	—	—	—	—	—	—	—

Table 5.1-4 (continued)

Location ID	Depth (ft)	Sample ID	Media	Butylbenzylphthalate	Chrysene	Diethylphthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Styrene	Trichlorofluoromethane
SSL Residential				**240**	**615**	**48900**	**6110**	**2400**	**2290**	**2660**	**6.21**	**1830**	**2300**	**100**	**588**
SSL Industrial				**240**	**2310**	**100000**	**68400**	**82000**	**24400**	**26500**	**23.4**	**20500**	**54000**	**100**	**983**
SWMU 21-018(a) and SWMU 21-018(b)															
21-02518	7.5–10	AAB6658	QBT3	—	—	—	—	—	—	—	—	—	—	—	—
21-02518	10–12.5	AAB6659	QBT3	—	—	17	—	0.26 (J)	—	—	—	—	—	—	—
21-04506	7–7.5	0121-96-0221	FILL	—	—	—	0.15 (J)	—	—	—	—	—	—	—	—
21-04507	7–7.5	0121-96-0222	FILL	—	—	—	—	—	0.052 (J)	—	—	—	0.04 (J)	—	—
21-04508	7–7.5	0121-96-0223	FILL	—	—	—	—	—	—	—	—	—	—	—	0.005
21-04509	3–3.5	0121-96-0224	FILL	—	0.71 (J)	—	3	—	0.6 (J)	—	0.71 (J)	0.51 (J)	0.47 (J)	—	—
21-04509	5–5.5	0121-96-0225	FILL	—	—	—	20	—	—	—	—	—	—	—	—
21-04509	6.5–7	0121-96-0226	FILL	—	0.83 (J)	—	14	—	0.79 (J)	—	—	—	0.72 (J)	—	—
21-02519	0–2.5	AAB6673	FILL	0.44	—	—	—	—	—	—	—	—	—	0.006	—
SWMU 21-013(b)															
21-24650	0–0.5	MD21-05-60400	ALLH	—	6.7 (J-)	—	—	—	13.4	0.325 (J)	3.2	7.42	11.7	—	—
21-24654	0–0.5	MD21-05-60412	ALLH	—	0.018 (J)	—	—	—	0.014 (J)	—	—	0.013 (J)	0.022 (J)	—	—
21-24660	0–0.5	MD21-05-60439	ALLH	—	—	—	—	—	0.009 (J)	—	—	—	0.01 (J)	—	—
SWMU 21-023(c)															
21-01337	1.2–1.7	MD21-06-70175	ALLH	—	—	—	—	—	—	—	—	—	—	—	—
21-01607	1–1.5	MD21-06-70176	QBT3	—	—	—	—	—	0.014 (J)	—	—	—	0.013 (J)	—	—
21-01610	0.8–1.3	MD21-06-70172	QBT3	—	—	—	—	—	—	—	—	—	—	—	—
21-01614	0.5–1	AAA4056	ALLH	—	—	—	—	—	—	—	—	—	—	—	—
21-01614	1.5–2	MD21-06-70173	QBT3	—	—	—	—	—	—	—	—	—	—	—	—
21-24579	0–0.5	MD21-05-60014	ALLH	—	—	—	0.208 (J)	—	—	—	—	—	—	—	—
21-24579	1.5–2	MD21-05-60015	ALLH	—	—	—	0.403 (J)	—	—	—	—	—	—	—	—

Table 5.1-4 (continued)

Location ID	Depth (ft)	Sample ID	Media	Butylbenzylphthalate	Chrysene	Diethylphthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Styrene	Trichlorofluoromethane
SSL Residential				**240**	**615**	**48900**	**6110**	**2400**	**2290**	**2660**	**6.21**	**1830**	**2300**	**100**	**588**
SSL Industrial				**240**	**2310**	**100000**	**68400**	**82000**	**24400**	**26500**	**23.4**	**20500**	**54000**	**100**	**983**
21-25411	1.5–2	MD21-06-66256	ALLH	—	—	—	0.259 (J)	—	—	—	—	—	—	—	—
21-25412	1.5–2	MD21-06-66259	ALLH	—	0.012 (J)	—	—	—	—	—	—	—	—	—	—

Note: Units are mg/kg. Data qualifiers are defined in Appendix A. Bold denotes value exceeds soil screening level.

Source: SSLs from NMED (2006, 092513), unless otherwise noted. EPA Region 6 value (EPA 2004, 087478).

*A dash indicates that if analyzed, sample result is not detected.

Table 7.3-1
Summary of Inorganic Chemicals above Background Values at SWMUs 21-018(a) and 21-018(b)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
SWMU 21-018(a)																												
AAA7567	21-02517	0.00–2.50	Soil	—[b]	—	—	—	—	—	—	—	—	—	—	—	40.1	—	—	—	—	—	—	—	—	0.93 (U)	10.8	—	—
AAA7568	21-02517	2.50–5.00	Qbt 3	—	—	32.1	—	—	—	—	—	—	—	—	—	97.4	—	—	—	—	—	—	0.91 (U)	—	—	132	—	—
AAA7569	21-02517	5.00–7.50	Qbt 3	—	—	2.8	—	—	—	3770	—	—	—	—	—	39.1	—	—	—	—	—	—	0.87 (U)	—	—	—	—	—
AAA7570	21-02517	7.50–10.00	Qbt 3	—	—	—	—	—	—	2350	—	—	—	—	—	37.5	—	—	—	—	—	—	0.87 (U)	—	1.2 (J)	3.84	—	—
AAA7571	21-02517	10.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	28.1	—	—	—	—	—	—	0.88 (U)	—	—	—	—	—
AAA7572	21-02517	12.50–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	28.4	—	—	—	—	—	—	0.88 (U)	—	—	3.21	—	—
AAA7573	21-02517	15.00–17.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	21.1	—	—	—	—	—	—	0.88 (U)	—	—	6.37	—	—
AAA7574	21-02517	20.00–25.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	19.4	—	—	—	—	—	—	0.89 (U)	—	—	6.31	—	—
AAA7575	21-02517	25.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	18.4	—	—	—	—	—	—	0.86 (U)	—	1.4 (J)	66.1	—	—
AAA7576	21-02517	30.00–35.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	14.4	—	—	—	—	—	—	0.87 (U)	—	—	—	—	—
AAA7577	21-02517	35.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	18.2	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAA7578	21-02517	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	11.6	—	—	—	—	—	—	0.88 (U)	—	1.2 (J)	—	—	—
AAA7579	21-02517	45.00–50.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	12.2	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAA7580	21-02517	50.00–55.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.89 (U)	—	1.3 (J)	—	—	—
AAA7581	21-02517	55.00–60.00	Qbt 3	—	—	—	—	—	—	—	8.4	—	—	—	—	—	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAA7582	21-02517	60.00–65.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	12.1	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAA7583	21-02517	65.00–70.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAA7584	21-02517	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.88 (U)	—	—	—	—	—
AAA7589	21-02517	95.00–100.00	Qbt 2	—	—	—	—	—	—	—	19.5	—	—	—	—	—	—	—	—	—	—	—	0.88 (U)	—	—	—	—	—
AAA7594	21-02517	120.00–125.00	Qbt 2	—	—	—	—	—	—	3220	—	—	—	—	—	—	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAB6660	21-02518	12.50–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	15.1 (J-)	—	—	—	—	—	—	0.61 (UJ)	—	—	—	—	—
AAB6661	21-02518	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	—	—	91.6 (J-)	—	—	12.9 (J-)	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6662	21-02518	20.00–25.00	Qbt 3	—	—	—	—	—	—	—	—	—	10.2 (J-)	—	—	—	—	—	—	—	—	—	0.61 (UJ)	—	—	—	—	—
AAB6663	21-02518	25.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	5.2 (J-)	—	—	—	—	—	—	—	—	—	0.61 (UJ)	—	—	—	—	—
AAB6664	21-02518	30.00–35.00	Qbt 3	—	—	—	—	—	—	—	—	—	4.8 (J-)	—	—	—	—	—	—	—	—	—	0.61 (UJ)	—	—	—	—	—
AAB6665	21-02518	35.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	138 (J-)	—	—	19.1 (J-)	—	—	—	—	—	—	0.6 (UJ)	—	—	—	—	—
AAB6666	21-02518	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	138 (J-)	—	—	25.2 (J-)	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6667	21-02518	45.00–50.00	Qbt 3	—	0.55 (J-)	—	—	—	—	—	9.7 (J-)	—	266 (J-)	—	—	33.2 (J-)	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6668	21-02518	50.00–55.00	Qbt 3	—	—	—	—	—	—	—	—	—	267 (J-)	—	—	32.1 (J-)	—	—	—	—	—	—	0.63 (UJ)	—	—	—	—	—
AAB6669	21-02518	55.00–60.00	Qbt 3	—	—	—	—	—	—	—	—	—	88 (J-)	—	—	14.1 (J-)	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6670	21-02518	60.00–65.00	Qbt 3	—	—	—	—	—	—	—	—	—	108 (J-)	—	—	15.9 (J-)	—	—	—	—	—	—	0.61 (UJ)	—	—	—	—	—
AAB6671	21-02518	65.00–70.00	Qbt 3	—	—	—	—	—	—	—	—	—	15.1 (J-)	—	—	—	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6672	21-02518	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	25.2 (J-)	—	—	—	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6678	21-02519	12.50–15.00	Qbt 3	—	—	5.7	—	—	—	—	—	—	—	—	—	74.8	—	—	—	—	—	—	0.62 (U)	—	—	4.6	—	—
AAB6679	21-02519	15.00–20.00	Qbt 3	—	1.7 (U)	—	—	—	—	—	—	—	1250	—	—	207	—	—	—	9	—	—	0.63 (U)	—	—	3.8	—	147
AAB6680	21-02519	20.00–25.00	Qbt 3	—	4.1 (U)	—	—	—	—	—	—	—	2820	—	—	323	—	—	—	35.6	—	—	0.62 (U)	—	—	3.9	—	181

Table 7.3-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
AAB6681	21-02519	25.00–30.00	Qbt 3	—	3.5 (U)	—	—	—	—	—	—	—	2380	—	—	299	—	—	—	17.6	—	—	0.64 (U)	—	—	3.9	—	144
AAB6682	21-02519	30.00–35.00	Qbt 3	—	—	—	—	—	—	—	—	—	199	—	—	79.6	—	—	—	—	—	—	0.63 (U)	—	—	4	—	—
AAB6683	21-02519	35.00–40.00	Qbt 3	—	0.59 (U)	—	—	—	—	—	—	—	305	—	—	76.9	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	4	—	—
AAB6684	21-02519	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	70.4	—	—	97.1	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	4.4	—	—
AAB6685	21-02519	45.00–50.00	Qbt 3	—	0.86 (U)	—	—	—	—	—	—	—	474	—	—	80.6	—	—	—	—	—	—	0.62 (U)	2.1 (U)	—	4	—	—
AAB6686	21-02519	50.00–55.00	Qbt 3	—	—	—	—	—	—	—	—	—	217	—	—	62.9	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	4.1	—	—
AAB6687	21-02519	55.00–60.00	Qbt 3	—	1.5 (U)	—	—	—	—	—	—	—	836	—	—	116	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	3.9	—	—
AAB6688	21-02519	60.00–65.00	Qbt 3	—	0.52 (U)	—	—	—	—	—	—	—	276	—	—	60.1	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	3.9	—	—
AAB6689	21-02519	65.00–70.00	Qbt 3	—	—	—	—	—	—	—	—	—	53	—	—	42.5	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	4.2	—	—
AAB6690	21-02519	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	47.3	—	—	33.5	—	—	—	—	—	—	0.62 (U)	2.1 (U)	—	4	—	—
AAB6691	21-02520	0-00–2.50	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.3 (J)	—	—	—	—	—	—	—	—	—
AAB6696	21-02520	12.50–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	5.8	—	—
AAB6697	21-02520	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.65 (U)	2.2 (U)	—	4.2	—	—
AAB6698	21-02520	20.00–25.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	3.9	—	—
AAB6699	21-02520	25.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	3.8	—	—
AAB6700	21-02520	30.00–35.00	Qbt 3	—	—	—	—	—	—	—	7.8 (J)	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	3.7	—	—
AAB6701	21-02520	35.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	4	—	—
AAB6702	21-02520	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	3.8	—	—
AAB6703	21-02520	45.00–50.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.65 (U)	2.2 (U)	—	2.95	—	—
AAB6704	21-02520	50.00–55.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	2.46	—	—
AAB6705	21-02520	55.00–60.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.66 (U)	2.2 (U)	—	3.19	—	—
AAB6706	21-02520	60.00–65.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	2.56	—	—
AAB6707	21-02520	65.00–70.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.65 (U)	2.2 (U)	—	4.94	—	—
AAB6708	21-02520	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	3.19	—	—
AAB6714	21-02521	12.50–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	11.5	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	2.95	—	—
AAB6715	21-02521	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	20.9	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	2.86	—	—
AAB6716	21-02521	20.00–25.00	Qbt 3	—	—	—	—	—	—	—	23	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	—	—	—
AAB6717	21-02521	25.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.65 (U)	2.2 (U)	—	2.69	—	—
AAB6718	21-02521	30.00–35.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.66 (U)	2.2 (U)	—	2.49	—	—
AAB6719	21-02521	35.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.66 (J)	2.1 (U)	—	10.7	—	—
AAB6720	21-02521	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	3.26	—	—
AAB6721	21-02521	45.00–50.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	12.4	—	—	—	—	—	—	0.85 (U)	2.8 (U)	—	—	—	—
AAB6722	21-02521	50.00–55.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.77 (J)	2.2 (U)	—	3.54	—	—
AAB6723	21-02521	55.00–60.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.66 (J)	2.2 (U)	—	2.55	—	—
AAB6724	21-02521	60.00–65.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	2.64	—	—
AAB6725	21-02521	65.00–70.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	—	—	—
AAB6726	21-02521	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	—	—	—
AAC0094	21-02522	12.50–15.00	Qbt 3	—	4.5 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 7.3-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
AAC0095	21-02522	15.00–20.00	Qbt 3	—	5.1 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.7 (J-)	—	—
AAC0096	21-02522	20.00–25.00	Qbt 3	—	6 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0097	21-02522	25.00–30.00	Qbt 3	8060	4.7 (U)	—	109	—	—	4290	12.3	8.9 (J)	9.5	—	18900 (J-)	—	3700	—	—	13.3	—	—	—	—	—	—	—	—
AAC0098	21-02522	30.00–35.00	Qbt 3	—	5.1 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0099	21-02522	35.00–40.00	Qbt 3	—	4.8 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0100	21-02522	40.00–45.00	Qbt 3	—	4.7 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0101	21-02522	45.00–50.00	Qbt 3	—	6.6 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0102	21-02522	50.00–55.00	Qbt 3	—	4.8 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0103	21-02522	55.00–60.00	Qbt 3	—	4.9 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0104	21-02522	60.00–65.00	Qbt 3	—	5.1 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0105	21-02522	65.00–70.00	Qbt 3	—	5 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0106	21-02522	70.00–75.00	Qbt 3	—	5.1 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB7043	21-02523	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (UJ)	—	—	—	—	—
AAB7063	21-02523	170.00–175.00	Qbt 1v	—	—	—	—	—	—	—	2.3	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	—	—	—	—	—
AAC0555	21-02523	225.20–227.50	Qbt 1g	—	—	1.1 (J)	—	—	—	—	—	—	—	—	4530	—	—	—	0.24	—	—	—	0.97 (U)	—	—	6.2	—	44.4
AAB7078	21-02523	245.00–250.00	Qbt 1g	—	—	0.96 (U)	33.5 (U)	—	0.56 (U)	9360	15.9	—	4.3 (U)	—	4830	—	—	—	—	2.9 (U)	—	—	0.68 (U)	2.3 (U)	—	11.4 (J)	—	—
MD21-05-59560	21-24524	8.00–10.00	Qbt 3	—	—	—	—	—	—	2550	—	—	—	—	—	—	—	—	—	—	2.82	0.000575 (J)	1.56 (U)	—	—	—	—	—
MD21-05-59561	21-24524	11.00–13.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7.81 (U)	—	—	—	—	—
MD21-05-59562	21-24524	23.00–25.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.000599 (J)	1.52 (U)	—	—	—	—	—
MD21-05-59563	21-24524	33.00–35.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.224 (J)	—	1.54 (U)	—	—	—	—	—
MD21-05-59564	21-24524	43.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59565	21-24524	93.00–95.00	Qbt 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	717	—	—	9.27	—	1.59 (U)	—	—	—	—	—
MD21-05-59566	21-24524	98.00–100.00	Qbt 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—	—
MD21-05-59567	21-24524	168.00–170.00	Qbt 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.55 (U)	—	—	—	—	—
MD21-05-60609	21-24524	339.50–340.00	Qct	6290	—	1.74 (U)	26	—	0.579 (U)	—	2.81	—	—	—	3920	—	1020	—	—	2.13 (J)	7.53 (J-)	—	1.74 (U)	—	—	—	5.45	56
MD21-05-60610	21-24524	378.00–380.00	Qbo	—	—	1.62 (U)	—	—	0.542 (U)	—	—	—	—	—	4170	—	—	—	—	—	—	—	1.62 (U)	—	—	—	—	—
MD21-05-59596	21-24528	3.00–5.00	Fill	—	—	—	—	—	0.456 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	1.75 (U)	—	—	—	—	—
MD21-05-59597	21-24528	14.00–16.00	Fill	—	—	—	—	—	0.533 (U)	—	—	—	—	—	—	—	—	—	—	—	—	0.000866 (J)	1.6 (U)	—	—	—	—	—
MD21-05-59598	21-24528	32.50–34.50	Qbt 3	—	—	12.8	—	—	—	—	—	—	8.24	—	25700	13.6	—	—	—	—	2.33	0.00421	8.11 (U)	—	—	—	52.4	—
MD21-05-59599	21-24528	36.00–38.00	Qbt 3	—	—	—	105	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00284	1.6 (U)	—	—	—	—	—
MD21-05-59600	21-24528	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00254	1.57 (U)	—	—	—	—	—
MD21-05-59655	21-24531	3.00–5.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.786 (J)	—	—	—	—	—
MD21-05-59656	21-24531	12.00–14.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59657	21-24531	62.00–64.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.58 (U)	—	—	—	—	—
MD21-05-59658	21-24531	78.00–80.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59664	21-24532	20.00–22.00	Fill	—	—	—	—	—	0.555 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MD21-05-59665	21-24532	28.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.545	—	—	—	—	—	—	—	—	1.62 (U)	—	—	—	—	—
MD21-05-59666	21-24532	31.50–33.50	Qbt 3	—	—	—	—	1.25	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00114 (J+)	1.64 (U)	—	—	—	—	—

Table 7.3-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
MD21-05-59667	21-24532	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.29 (J-)	0.000647 (J+)	1.57 (U)	—	—	—	—	—
MD21-05-59673	21-24533	10.00–12.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59674	21-24533	28.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59675	21-24533	30.00–32.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—	—
MD21-05-59676	21-24533	58.00–60.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.57 (U)	—	—	—	—	—
MD21-05-59677	21-24533	83.00–85.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.56 (U)	—	—	—	—	—
MD21-05-59682	21-24534	3.00–5.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.52 (U)	—	—	—	—	—
MD21-05-59683	21-24534	8.00–10.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.57 (J-)	0.00313 (J+)	1.6 (U)	—	—	—	—	—
MD21-05-59684	21-24534	13.00–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.56 (U)	—	—	—	—	—
MD21-05-59685	21-24534	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.55 (U)	—	—	—	—	—
MD21-05-59691	21-24535	8.00–10.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.48 (U)	—	—	—	—	—
MD21-05-59692	21-24535	13.00–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.000532 (J)	1.51 (U)	—	—	—	—	—
MD21-05-59693	21-24535	20.00–22.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.795 (J)	—	1.56 (U)	—	—	—	—	—
MD21-05-59694	21-24535	30.00–32.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—	—
MD21-05-59695	21-24535	78.00–80.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.341 (J)	—	1.52 (U)	—	—	—	—	—
MD21-05-59750	21-24538	13.00–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	61.8	—	—	—	—	—	0.000885 (J+)	1.5 (U)	—	—	—	—	—
MD21-05-59751	21-24538	15.00–17.00	Qbt 3	—	—	—	—	—	—	2910 (J+)	—	—	—	—	—	39.5	—	—	—	—	—	0.00139 (J+)	1.5 (U)	—	—	—	—	—
MD21-05-59752	21-24538	28.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	15.5	—	—	—	—	—	0.00107 (J+)	1.5 (U)	—	—	—	—	—
MD21-05-59753	21-24538	37.00–39.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	28.9	—	—	—	—	—	—	0.624 (J)	—	—	—	—	—
MD21-05-59754	21-24538	42.00–44.00	Qbt 3	13700 (J+)	—	3.45	47.7	2.22	—	—	7.72	—	4.92	—	—	51.7	2390	—	—	—	—	0.00136 (J+)	1.6 (U)	—	1.61	—	—	—
MD21-05-59755	21-24538	53.00–55.00	Qbt 3	—	—	—	77.1	—	—	—	—	—	—	—	—	12.8	—	—	—	—	—	0.00101 (J+)	0.864 (J)	—	—	—	—	—
MD21-05-59759	21-24539	12.00–14.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.5 (U)	—	—	—	—	—
MD21-05-59760	21-24539	28.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59761	21-24539	40.00–42.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.52 (U)	—	—	—	—	—
MD21-05-59762	21-24539	78.00–80.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59768	21-24540	9.00–11.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00232	1.54 (U)	—	—	—	—	—
MD21-05-59769	21-24540	26.00–28.00	Qbt 3	—	—	2.93	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.000914 (J)	1.52 (U)	—	—	—	—	—
MD21-05-59770	21-24540	31.00–33.00	Qbt 3	—	—	—	—	—	—	—	—	—	13.3	—	—	—	2420 (J)	—	—	—	—	0.00249	1.63 (U)	—	—	—	—	67.3
MD21-05-59771	21-24540	38.00–40.00	Qbt 3	15900 (J+)	—	5.59	134	1.67	—	2220	7.32	—	—	—	—	—	—	—	—	—	—	—	1.5 (U)	—	—	—	—	—
MD21-05-59777	21-24541	20.00–22.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00401	1.51 (U)	—	—	—	—	—
MD21-05-59778	21-24541	28.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00398	1.55 (U)	—	—	—	—	—
MD21-05-59779	21-24541	31.00–33.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.721 (J)	—	1.52 (U)	—	—	—	—	—
MD21-05-59780	21-24541	42.00–44.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.595 (J)	—	1.53 (U)	—	—	—	—	—
MD21-05-59781	21-24541	47.00–49.00	Qbt 3	7380	—	—	—	1.42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.57 (U)	—	—	—	—	—
MD21-05-59782	21-24541	78.00–80.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.751 (J)	—	1.53 (U)	—	—	—	—	—
MD21-05-59786	21-24542	2.00–4.00	Qbt 3	14700	—	5.06	194	—	—	6980	7.35	—	8.21	—	—	141	—	—	—	—	—	—	1.51 (U)	1.03 (U)	1.44	—	—	68.5
MD21-05-59787	21-24542	13.00–15.00	Qbt 3	—	—	3.1	—	—	—	—	—	—	5.59	—	—	11.6	2030	—	—	—	—	—	8.41 (U)	—	—	—	—	—
MD21-05-59788	21-24542	32.00–34.00	Qbt 3	—	—	3.29	—	—	—	—	—	—	—	—	—	15.7	—	—	—	—	—	—	1.56 (U)	—	—	—	—	—

Table 7.3-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
MD21-05-59789	21-24542	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	13	—	—	—	—	—	—	1.57 (U)	—	—	—	—	—
MD21-05-59934	21-24554	2.00–3.00	Fill	—	—	—	—	—	0.518 (U)	—	—	—	—	—	—	—	—	—	—	—	5.84	0.00073 (J-)	1.56 (U)	—	—	—	—	—
MD21-05-59935	21-24554	4.00–5.00	Fill	—	—	—	—	—	0.507 (U)	—	—	—	—	—	—	—	—	—	—	—	10.6	0.00124 (J-)	—	—	—	—	—	—
MD21-05-59984	21-24569	2.00–2.50	Soil	—	—	—	—	—	0.505 (U)	—	—	—	—	—	—	—	—	—	—	—	2.94 (J-)	—	—	—	—	—	—	—
MD21-05-59985	21-24569	2.50–3.00	Soil	—	—	—	—	—	0.503 (U)	—	—	—	—	—	—	—	—	—	—	—	0.77 (J-)	—	—	—	—	—	—	—
MD21-06-70163	21-24585	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17.2	0.000571 (J)	1.54 (U)	—	—	—	—	—
MD21-06-70164	21-24593	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.01	—	1.52 (U)	—	—	—	—	—
MD21-06-70165	21-24595	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10.5	—	1.57 (U)	—	—	—	—	—
MD21-06-66647	21-25431	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	12.1	—	—	—	—	1.18 (J-)	—	1.47 (U)	—	—	—	—	—
MD21-06-66648	21-25432	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.37 (J-)	0.000517 (J)	1.44 (U)	—	—	—	—	—
MD21-06-66649	21-25433	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.67 (J-)	—	1.52 (U)	—	—	—	—	—
MD21-06-66650	21-25434	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.82 (J-)	—	1.57 (U)	—	—	—	—	—
MD21-06-66651	21-25435	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.73 (J-)	—	1.48 (U)	—	—	—	—	—
MD21-06-66652	21-25436	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.23 (J-)	—	1.52 (U)	—	—	—	—	—
MD21-06-66653	21-25437	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.48 (J-)	—	1.53 (U)	—	—	—	—	—
MD21-06-66654	21-25438	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.32 (J-)	—	1.66 (U)	—	—	—	—	—
MD21-06-66655	21-25439	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8.13 (J-)	—	1.52 (U)	—	—	—	—	—
MD21-06-66656	21-25440	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.11 (J-)	—	1.58 (U)	—	—	—	—	—
MD21-06-66657	21-25441	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.29 (J-)	—	1.51 (U)	—	—	—	—	—
MD21-06-66658	21-25442	12.00–12.50	Qbt 3	—	—	3.18	—	—	—	—	—	—	—	—	—	51	—	—	—	—	2.11 (J-)	—	4.79	—	—	—	—	—
MD21-06-66659	21-25443	15.00–15.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.03	—	1.51 (U)	—	—	—	—	—
MD21-06-66660	21-25444	15.50–16.00	Qbt 3	—	—	3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.71	0.000587 (J)	1.52 (U)	—	—	—	—	—
MD21-06-66661	21-25445	12.00–12.50	Qbt 3	—	—	4.69	—	—	—	19100	—	—	—	—	—	—	—	—	—	—	1.27	—	1.45 (U)	—	—	—	—	—
MD21-06-66662	21-25446	12.00–12.50	Qbt 3	—	—	2.89	—	—	—	—	—	—	—	—	—	16.2	—	—	—	—	1.71	—	1.47 (U)	—	—	—	—	—
MD21-06-66663	21-25447	12.00–12.50	Qbt 3	—	—	3.17	—	—	—	—	—	—	—	—	—	20.8	—	—	—	—	1.06	—	1.47 (U)	—	—	—	—	—
MD21-06-66664	21-25448	12.00–12.50	Qbt 3	—	—	3	60.8	—	—	—	—	—	—	—	—	—	—	—	—	—	9.46	—	1.47 (U)	—	—	—	—	—
MD21-06-66665	21-25449	12.00–12.50	Qbt 3	—	—	—	50.7	—	—	—	—	—	—	—	—	—	—	—	—	—	6.47	—	1.47 (U)	—	—	—	—	—
MD21-06-66666	21-25450	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.102	—	4.34	—	1.51 (U)	—	—	—	—	—
MD21-06-70162	21-26273	12.00–12.50	Qbt 3	—	—	—	103 (J+)	—	—	—	—	—	4.71	—	—	—	—	—	0.178	—	4.92	0.001 (J)	1.53 (U)	—	—	—	—	—
AAB6974	21-01972	0.00–0.50	Soil	—	—	—	—	—	0.41 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—	—
AAB6975	21-01973	0.00–0.50	Soil	—	—	—	—	—	0.59 (U)	—	—	—	—	—	—	23.8	—	—	—	—	—	—	—	2.1 (U)	—	—	—	—
MD21-05-59570	21-24525	3.00–5.00	Fill	—	—	—	364	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8.41 (U)	—	—	—	—	—
MD21-05-59571	21-24525	13.00–15.00	Fill	—	—	—	—	—	0.549 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	1.65 (U)	—	—	—	—	—
MD21-05-59572	21-24525	20.00–22.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—	—
MD21-05-59573	21-24525	37.00–39.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.56 (U)	—	—	—	—	—
MD21-05-59581	21-24526	3.00–5.00	Fill	—	—	—	—	—	0.588 (U)	—	—	9.57	—	—	—	—	—	—	—	—	0.364 (J)	—	—	—	—	—	—	—
MD21-05-59578	21-24526	9.00–11.00	Qbt 3	—	—	—	50.6	—	—	—	—	—	4.84	0.317 (J+)	—	—	—	1030	—	—	0.323 (J)	—	1.69 (U)	—	—	—	—	—
MD21-05-59579	21-24526	32.00–34.00	Qbt 3	8760 (J+)	—	3.16	—	1.25	—	—	—	—	—	—	—	—	—	—	—	—	0.707 (J)	—	1.69 (U)	—	—	—	—	—

Table 7.3-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na**[a]	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
MD21-05-59580	21-24526	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.833 (J)	—	1.61 (U)	—	—	—	—	—
MD21-05-59591	21-24527	3.00–5.00	Fill	—	—	—	—	—	0.586 (U)	—	—	9.78	—	—	—	—	—	—	—	—	0.231 (J)	—	—	—	—	—	—	—
MD21-05-59592	21-24527	8.50–10.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.427 (J)	—	1.64 (U)	—	—	—	—	—
MD21-05-59593	21-24527	12.00–14.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.54 (J-)	—	1.6 (U)	—	—	—	—	—
MD21-05-59594	21-24527	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.56 (U)	—	—	—	—	—
MD21-05-59925	21-24551	3.00–4.00	Fill	—	—	—	—	—	0.588 (U)	—	20.6	—	—	—	—	—	5860	—	—	—	1.33	—	1.76 (U)	—	—	—	—	51.9
MD21-05-59926	21-24551	5.00–6.00	Fill	—	—	—	—	—	0.579 (U)	—	—	—	—	—	—	—	—	—	—	—	1.11 (J)	—	1.74 (U)	—	—	—	—	—
MD21-05-59928	21-24552	2.50–3.50	Fill	—	—	—	318 (J+)	—	0.549 (U)	7530	—	—	—	—	—	—	5270	—	—	—	1.48	0.00171 (J)	1.65 (U)	—	—	—	—	—
MD21-05-59929	21-24552	4.50–5.50	Fill	—	—	—	—	—	0.537 (U)	—	—	—	—	—	—	—	—	—	—	—	1.93	0.00424 (J-)	1.61 (U)	—	—	—	—	—
MD21-05-59931	21-24553	3.00–4.00	Fill	—	—	—	—	—	0.514 (U)	—	—	—	—	—	—	—	—	—	—	—	0.965 (J)	0.0021 (J-)	1.54 (U)	—	—	—	—	—
MD21-05-59932	21-24553	5.00–6.00	Fill	—	—	—	—	—	0.601 (U)	—	—	—	—	—	—	—	—	—	—	—	1.66	—	1.8 (U)	—	—	—	—	—
MD21-05-59937	21-24555	3.00–4.00	Fill	—	—	—	—	—	0.574 (U)	—	—	—	—	—	—	—	—	—	—	—	8.57	—	1.72 (U)	—	—	—	—	—
MD21-05-59938	21-24555	5.00–6.00	Fill	—	—	—	—	—	0.568 (U)	—	—	—	—	—	—	—	—	—	—	—	6.28	—	1.7 (U)	—	—	—	—	—
MD21-05-59940	21-24556	3.00–4.00	Fill	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	—	—	—	—	—	2.12	0.000806 (J-)	1.62 (U)	—	1.07 (U)	—	—	—
MD21-05-59941	21-24556	5.00–6.00	Fill	—	—	—	—	—	0.535 (U)	—	—	—	—	—	—	—	—	—	—	—	1.65	0.000842 (J-)	1.6 (U)	—	—	—	—	—

Source: Background values from LANL (1998, 059730, Table 6.0-1, p. 44).
Note: Units are mg/kg. Data qualifiers are defined in Appendix A.
[a] A dash indicates that if analyzed, the sample result is less than background value.
[b] na = Not available.

Table 7.3-2
Summary of Radionuclides Detected or Detected above Background/Fallout Values at SWMUs 21-018(a) and 21-018(b)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
SWMU 21-018(a)															
AAB6976	21-01974	0.00–0.50	Soil	0.02	—[d]	—	—	—	0.414	—	—	—	—	—	—
AAA7567	21-02517	0.00–2.50	Soil	—	—	—	—	—	0.1803	—	—	4.98E-02	—	—	—
AAA7568	21-02517	2.5–5	Qbt 3	—	—	—	—	—	—	—	—	5.96E-02	—	—	—
AAA7569	21-02517	5–7.5	Qbt 3	—	—	—	—	—	—	—	—	3.69E-02	—	—	—
AAA7570	21-02517	7.5–10	Qbt 3	—	—	—	—	—	—	—	—	6.96E-02	—	—	—
AAA7571	21-02517	10–12.5	Qbt 3	—	—	—	—	—	—	—	—	0.13	—	—	—
AAA7572	21-02517	12.5–15	Qbt 3	—	—	—	—	—	—	—	—	0.24	—	—	—
AAA7573	21-02517	15–17.5	Qbt 3	—	—	—	—	—	0.0133	—	—	0.68	—	—	—
AAA7574	21-02517	20–25	Qbt 3	—	—	—	—	—	—	—	—	0.88	—	—	—
AAA7575	21-02517	25–30	Qbt 3	—	—	—	—	—	—	—	—	1.33	—	—	—
AAA7576	21-02517	30–35	Qbt 3	—	—	—	—	—	—	—	—	1.52	—	—	—
AAA7577	21-02517	35–40	Qbt 3	—	—	—	—	—	—	—	—	1.95	—	—	—
AAA7578	21-02517	40–45	Qbt 3	—	—	—	—	0.0155	—	—	—	1.64	—	—	—
AAA7579	21-02517	45–50	Qbt 3	—	—	—	—	—	—	—	—	1.96	—	—	—
AAA7580	21-02517	50–55	Qbt 3	—	—	—	—	—	—	—	—	2.18	—	—	—
AAA7581	21-02517	55–60	Qbt 3	—	—	—	—	—	—	—	—	1.95	—	—	—
AAA7582	21-02517	60–65	Qbt 3	—	—	—	—	—	—	—	—	1.77	—	—	—
AAA7583	21-02517	65–70	Qbt 3	—	—	—	—	—	—	—	—	1.49	—	—	—
AAA7584	21-02517	70–75	Qbt 3	—	—	—	—	—	—	—	—	1.36	—	—	—
AAA7589	21-02517	95–100	Qbt 2	—	—	—	—	—	—	—	—	1.75	—	—	—
AAA7594	21-02517	120–125	Qbt 2	—	—	—	—	—	—	—	—	2.04	—	—	—
AAB6660	21-02518	12.5–15	Qbt 3	—	—	—	—	—	0.071	—	—	7.45E-02	—	—	—
AAB6661	21-02518	15–20	Qbt 3	—	—	—	—	—	0.049	—	—	6.04E-02	—	—	—
AAB6662	21-02518	20–25	Qbt 3	—	—	—	—	—	0.021	—	—	6.33E-02	—	—	—
AAB6663	21-02518	25–30	Qbt 3	—	—	—	—	—	—	—	—	0.034	—	0.18	—
AAB6664	21-02518	30–35	Qbt 3	—	—	—	—	—	—	—	—	2.42E-02	—	—	—
AAB6665	21-02518	35–40	Qbt 3	—	—	—	—	—	0.014	—	—	2.58E-02	—	—	—
AAB6666	21-02518	40–45	Qbt 3	—	—	—	—	—	0.011	—	—	2.92E-02	—	—	—
AAB6667	21-02518	45–50	Qbt 3	—	—	—	—	—	0.012	—	—	2.63E-02	—	0.1 (J-)	—
AAB6668	21-02518	50–55	Qbt 3	—	—	—	—	—	—	—	—	3.36E-02	—	0.12 (J-)	—

Table 7.3-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
AAB6669	21-02518	55–60	Qbt 3	—	—	—	—	—	—	—	—	3.50E-02	—	—	—
AAB6670	21-02518	60–65	Qbt 3	—	—	—	—	—	—	—	—	0.029	—	0.17 (J-)	—
AAB6671	21-02518	65–70	Qbt 3	—	—	—	—	—	—	—	—	3.08E-02	—	—	—
AAB6672	21-02518	70–75	Qbt 3	—	—	—	—	—	—	—	—	2.71E-02	—	—	—
AAB6678	21-02519	12.5–15	Qbt 3	0.476	0.21	0.21	—	0.103	25.503	—	—	0.14	—	0.42	—
AAB6679	21-02519	15–20	Qbt 3	—	—	—	—	—	0.354	—	—	0.37	—	0.37	—
AAB6680	21-02519	20–25	Qbt 3	—	0.2	0.2	—	—	0.186	—	—	0.38	—	0.44	—
AAB6681	21-02519	25–30	Qbt 3	—	—	—	—	—	0.061	—	—	0.24	—	—	—
AAB6682	21-02519	30–35	Qbt 3	—	—	—	—	—	0.055	—	—	0.2	—	—	—
AAB6683	21-02519	35–40	Qbt 3	—	—	—	—	—	0.03	—	—	0.25	—	0.4	—
AAB6684	21-02519	40–45	Qbt 3	—	—	—	—	—	0.148	—	—	0.27	—	0.64	—
AAB6685	21-02519	45–50	Qbt 3	—	—	—	—	—	0.04	—	—	0.21	—	0.38	—
AAB6686	21-02519	50–55	Qbt 3	—	—	—	—	—	0.028	—	—	0.26	—	—	—
AAB6687	21-02519	55–60	Qbt 3	—	—	—	—	—	—	—	—	0.26	—	0.4	—
AAB6688	21-02519	60–65	Qbt 3	—	—	—	—	—	—	—	—	0.34	—	—	—
AAB6689	21-02519	65–70	Qbt 3	—	0.19	0.19	—	—	0.009	—	—	0.45	—	—	—
AAB6690	21-02519	70–75	Qbt 3	—	—	—	—	—	0.01	—	—	0.33	—	0.44	—
AAB6696	21-02520	12.5–15	Qbt 3	0.512	—	—	—	0.085	16.11	—	—	54.57	—	0.51	—
AAB6697	21-02520	15–20	Qbt 3	0.025	0.17	0.17	—	0.007	1.06	—	—	28.91	—	—	—
AAB6698	21-02520	20–25	Qbt 3	0.008	—	—	—	—	0.101	—	—	11.37	—	—	—
AAB6699	21-02520	25–30	Qbt 3	0.008	—	—	—	—	0.189	—	—	11.78	—	—	—
AAB6700	21-02520	30–35	Qbt 3	—	—	—	—	—	—	—	—	16.93	—	—	—
AAB6701	21-02520	35–40	Qbt 3	—	0.23	0.23	—	—	—	—	—	15.18	—	—	—
AAB6702	21-02520	40–45	Qbt 3	—	—	—	—	—	—	—	—	13.934	—	—	—
AAB6703	21-02520	45–50	Qbt 3	—	—	—	—	—	0.0165	—	—	18.06	—	—	—
AAB6704	21-02520	50–55	Qbt 3	—	—	—	—	—	0.2607	—	0.16	19.27	—	—	—
AAB6705	21-02520	55–60	Qbt 3	—	—	—	—	0.0068	0.539	—	0.14	9.83	—	—	—
AAB6706	21-02520	60–65	Qbt 3	—	—	—	—	0.0273	0.4067	—	0.2	2.07	—	—	—
AAB6707	21-02520	65–70	Qbt 3	—	—	—	—	0.0124	0.4127	—	1.34	1.44	—	—	—
AAB6708	21-02520	70–75	Qbt 3	—	—	—	—	0.0467	0.2049	—	—	1.23	—	—	—
AAB6714	21-02521	12.5–15	Qbt 3	0.7253	—	—	—	0.0659	13.41	—	—	0.23	—	—	—
AAB6715	21-02521	15–20	Qbt 3	—	—	—	—	0.0151	2.264	—	—	0.26	—	—	—

Table 7.3-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
AAB6716	21-02521	20–25	Qbt 3	—	—	—	—	—	0.1386	—	—	0.28	—	—	—
AAB6717	21-02521	25–30	Qbt 3	—	—	—	—	—	0.0848	—	—	0.5	—	—	—
AAB6718	21-02521	30–35	Qbt 3	—	—	—	—	—	0.3682	—	—	1.03	—	—	—
AAB6719	21-02521	35–40	Qbt 3	—	—	—	—	—	0.249	—	—	0.85	—	—	—
AAB6720	21-02521	40–45	Qbt 3	—	—	—	—	—	0.0168	—	—	0.4	—	—	—
AAB6721	21-02521	45–50	Qbt 3	—	—	—	—	—	0.605	—	—	0.48	—	—	—
AAB6722	21-02521	50–55	Qbt 3	0.38	—	—	—	0.0416	4.276	—	—	0.47	—	—	—
AAB6723	21-02521	55–60	Qbt 3	—	—	—	—	—	0.2328	—	—	0.48	—	—	—
AAB6724	21-02521	60–65	Qbt 3	—	—	—	—	—	0.1943	—	—	0.34	—	—	—
AAB6725	21-02521	65–70	Qbt 3	—	—	—	—	—	0.2115	—	0.46	0.37	—	—	—
AAB6726	21-02521	70–75	Qbt 3	—	—	—	—	—	0.1371	—	—	0.24	—	—	—
AAC0094	21-02522	12.5–15	Qbt 3	—	—	—	—	—	0.0324 (J-)	—	—	0.24	—	—	—
AAC0095	21-02522	15–20	Qbt 3	—	—	—	—	0.016 (J-)	0.0777 (J-)	—	—	0.41	—	—	—
AAC0096	21-02522	20–25	Qbt 3	—	—	—	—	—	0.0222 (J-)	—	0.58	0.29	—	—	—
AAC0097	21-02522	25–30	Qbt 3	—	—	—	—	—	—	—	—	0.16	—	—	—
AAC0098	21-02522	30–35	Qbt 3	—	—	—	—	0.084 (J-)	—	—	0.38 (J+)	0.23	—	—	—
AAC0099	21-02522	35–40	Qbt 3	—	—	—	—	—	—	—	—	0.16	—	—	—
AAC0100	21-02522	40–45	Qbt 3	—	—	—	—	—	—	—	—	9.43E-02	—	—	—
AAC0101	21-02522	45–50	Qbt 3	—	—	—	—	0.0305	—	—	—	6.53E-02	—	—	—
AAC0102	21-02522	50–55	Qbt 3	—	—	—	—	—	0.0348	—	—	0.098	—	—	—
AAC0103	21-02522	55–60	Qbt 3	—	—	—	—	—	—	—	—	0.069	—	—	—
AAC0104	21-02522	60–65	Qbt 3	—	—	—	—	—	—	—	—	8.01E-02	—	—	—
AAC0105	21-02522	65–70	Qbt 3	—	—	—	—	—	0.0348	—	—	0.11	—	—	—
AAC0106	21-02522	70–75	Qbt 3	—	—	—	—	—	—	—	—	0.12	—	—	—
AAB7043	21-02523	70–75	Qbt 3	—	—	—	—	—	—	—	2	0.37	—	—	—
AAB7063	21-02523	170.00–175.00	Qbt 1v	—	—	—	—	—	—	—	—	0.11	—	—	—
AAB7078	21-02523	245.00–250.00	Qbt 1g	—	—	—	—	—	0.0317	—	—	9.13	—	—	—
AAC0555	21-02523	225.20–227.50	Qbt 1g	—	—	—	—	0.231	0.0157	—	—	6.74	—	0.327	—
MD21-05-59560	21-24524	8–10	Qbt 3	—	—	—	—	—	0.144	—	—	13.3	—	—	—
MD21-05-59561	21-24524	11–13	Qbt 3	—	—	—	—	—	—	—	—	13.5	—	—	—
MD21-05-59562	21-24524	23–25	Qbt 3	—	—	—	—	—	—	—	—	12	—	—	—
MD21-05-59563	21-24524	33–35	Qbt 3	—	—	—	—	—	—	—	—	15.8	—	—	—

Table 7.3-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
MD21-05-59564	21-24524	43–45	Qbt 3	—	—	—	—	—	—	—	—	12.7	—	0.091	—
MD21-05-59565	21-24524	93–95	Qbt 2	—	—	—	—	—	—	—	—	1.07	—	0.0999	—
MD21-05-59566	21-24524	98–100	Qbt 2	—	—	—	—	—	—	—	—	1.23	—	0.149	—
MD21-05-59567	21-24524	168–170	Qbt 2	—	—	—	—	—	—	—	—	2.21	—	0.171	—
MD21-05-60609	21-24524	339.50–340.00	Qct	—	—	—	—	—	—	—	—	0.78	—	0.198	—
MD21-05-60610	21-24524	378.00–380.00	Qbo	—	—	—	—	—	—	—	—	0.85	—	0.224	—
MD21-05-59655	21-24531	3–5	Qbt 3	—	—	—	—	—	—	—	—	0.11	—	—	—
MD21-05-59656	21-24531	12–14	Qbt 3	—	—	—	—	—	—	—	—	1.22	—	—	—
MD21-05-59657	21-24531	62–64	Qbt 3	—	—	—	—	—	—	—	—	0.062	—	—	—
MD21-05-59658	21-24531	78–80	Qbt 3	—	—	—	—	—	—	—	—	0.11	—	0.127	—
MD21-05-59666	21-24532	31.5–33.5	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.105	—
MD21-05-59667	21-24532	38–40	Qbt 3	—	—	—	—	—	—	—	—	0.028	—	—	—
MD21-05-59673	21-24533	10–12	Qbt 3	—	—	—	—	—	—	—	—	0.067	—	—	—
MD21-05-59674	21-24533	28–30	Qbt 3	—	—	—	—	—	0.0652	—	—	0.25	—	—	—
MD21-05-59675	21-24533	30–32	Qbt 3	—	—	—	—	—	—	—	—	0.31	—	—	—
MD21-05-59676	21-24533	58–60	Qbt 3	—	—	—	—	—	—	—	—	0.32	—	—	—
MD21-05-59677	21-24533	83–85	Qbt 3	—	—	—	—	—	—	—	—	0.38	—	0.12	—
MD21-05-59682	21-24534	3–5	Qbt 3	—	—	—	—	—	—	—	—	0.056	—	—	—
MD21-05-59685	21-24534	38–40	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.121	—
MD21-05-59691	21-24535	8–10	Qbt 3	—	—	—	—	—	—	—	—	0.02	—	—	—
MD21-05-59692	21-24535	13–15	Qbt 3	—	—	—	—	—	—	—	—	0.0088	—	0.117	—
MD21-05-59693	21-24535	20–22	Qbt 3	—	—	—	—	—	—	—	—	0.058	—	—	—
MD21-05-59694	21-24535	30–32	Qbt 3	—	—	—	—	—	—	—	—	0.37	—	—	—
MD21-05-59695	21-24535	78–80	Qbt 3	—	—	—	—	—	—	—	—	0.82	—	0.094	—
MD21-05-59751	21-24538	15–17	Qbt 3	—	—	—	—	—	0.0902	—	—	0.013	—	—	—
MD21-05-59753	21-24538	37–39	Qbt 3	—	—	—	—	—	—	—	—	0.012	—	0.104	—
MD21-05-59755	21-24538	53–55	Qbt 3	—	—	—	—	—	—	—	—	0.062	—	—	—
MD21-05-59761	21-24539	40–42	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.175 (J-)	—
MD21-05-59771	21-24540	38–40	Qbt 3	1.66	—	—	—	1.03	0.584	—	—	—	—	—	—
MD21-05-59778	21-24541	28–30	Qbt 3	—	—	—	—	—	—	—	—	0.056	—	0.106	—
MD21-05-59779	21-24541	31–33	Qbt 3	—	—	—	—	—	—	—	—	0.011	—	—	—
MD21-05-59782	21-24541	78–80	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.108	—

Table 7.3-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
MD21-05-59789	21-24542	38–40	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.0991	—
MD21-05-59934	21-24554	2.00–3.00	Fill	0.046	—	0.143	—	0.735	—	—	—	0.11	—	—	—
MD21-05-59935	21-24554	4.00–5.00	Fill	0.029	—	—	—	0.238	—	—	—	4.52E-02	—	—	—
MD21-05-59984	21-24569	2.00–2.50	Soil	—	—	—	—	0.0526	—	—	—	1.40E-02	—	—	—
MD21-06-70163	21-24585	12–12.5	Qbt 3	0.276	—	—	—	—	0.489	—	—	0.19	—	—	—
MD21-06-70164	21-24593	12–12.5	Qbt 3	—	—	—	—	—	0.661	—	—	0.59	—	—	—
MD21-06-70165	21-24595	12–12.5	Qbt 3	1.39 (J-)	—	—	—	0.148	41.6	—	—	0.3	3.83	0.24	2.65
MD21-06-66647	21-25431	12–12.5	Qbt 3	0.257	—	—	—	0.0461	11.6	—	—	2.95E-02	—	—	—
MD21-06-66648	21-25432	12–12.5	Qbt 3	0.181	—	—	—	0.0445	9.45	—	—	0.28	—	—	—
MD21-06-66649	21-25433	12–12.5	Qbt 3	0.0575	—	—	—	—	3.31	—	—	3.8	—	—	—
MD21-06-66650	21-25434	12–12.5	Qbt 3	0.188	—	—	—	—	12.3 (J-)	—	—	2.71	2.05 (J-)	0.184 (J-)	—
MD21-06-66651	21-25435	12–12.5	Qbt 3	0.157	—	—	—	—	5.62	—	—	0.88	3.84	0.141	2.42
MD21-06-66652	21-25436	12–12.5	Qbt 3	0.203	—	—	—	—	12.7	—	—	9.17E-02	—	—	—
MD21-06-66653	21-25437	12–12.5	Qbt 3	0.0644 (J-)	—	—	—	—	1.25	—	—	0.41	—	—	—
MD21-06-66654	21-25438	12–12.5	Qbt 3	0.12	—	—	—	—	2.95	—	—	0.14	—	—	—
MD21-06-66655	21-25439	12–12.5	Qbt 3	0.703 (J-)	—	—	—	0.0937	11.2	—	—	26.47	4.07	0.311	2.49
MD21-06-66656	21-25440	12–12.5	Qbt 3	0.116	—	—	—	0.0351	3.17	—	—	2.44	—	—	—
MD21-06-66657	21-25441	12–12.5	Qbt 3	0.306	—	—	—	0.0586	6.1	—	—	14.37	7.15	0.416	3.42
MD21-06-66658	21-25442	12–12.5	Qbt 3	0.0345	—	—	—	—	1.5	—	—	0.016	—	—	—
MD21-06-66659	21-25443	15–15.5	Qbt 3	0.523	—	—	—	0.1	19.6	—	—	0.46	2.53	0.151	—
MD21-06-66660	21-25444	15.5–16	Qbt 3	0.177	—	—	—	0.0337	8.29	—	—	0.16	—	0.0926	—
MD21-06-66661	21-25445	12–12.5	Qbt 3	—	—	—	—	—	2.99	—	—	0.11	—	—	—
MD21-06-66662	21-25446	12–12.5	Qbt 3	0.194	—	—	—	—	5.11	—	—	—	—	—	—
MD21-06-66663	21-25447	12–12.5	Qbt 3	0.359	—	—	—	0.0518	10.8	—	—	—	2.2	0.113	—
MD21-06-66664	21-25448	12–12.5	Qbt 3	0.623	—	—	—	0.0983	18.5	—	—	—	3.06	0.149	—
MD21-06-66665	21-25449	12–12.5	Qbt 3	0.308	—	—	—	0.0445	6.43	—	—	6.76E-02	—	—	—
MD21-06-66666	21-25450	12–12.5	Qbt 3	1.2	—	—	—	0.124	23.3	—	0.164	0.11	5.74	0.258	2.93
MD21-06-70162	21-26273	12–12.5	Qbt 3	0.332	—	—	—	0.0387	10.7	—	—	0.11	—	0.132	—
SWMU 21-018(b)															
AAB6974	21-01972	0.00–0.50	Soil	—	—	—	—	—	0.1279	—	—	—	—	—	—
AAB6975	21-01973	0.00–0.50	Soil	—	—	—	—	—	0.275	0.27	—	4.34E-02	—	—	—
MD21-05-59572	21-24525	20–22	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.1	—

Table 7.3-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
MD21-05-59578	21-24526	9–11	Qbt 3	—	—	—	0.111	—	—	—	—	—	—	0.164	—
MD21-05-59579	21-24526	32–34	Qbt 3	—	—	—	—	—	—	—	—	0.188	—	0.099	—
MD21-05-59580	21-24526	38–40	Qbt 3	—	—	—	—	—	—	—	—	0.198	—	0.128	—
MD21-05-59592	21-24527	8.5–10	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.178 (J-)	—
MD21-05-59593	21-24527	12–14	Qbt 3	—	—	—	—	—	—	—	—	0.0317	—	—	—
MD21-05-59594	21-24527	38–40	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.118	—
MD21-05-59925	21-24551	3.00–4.00	Fill	—	—	—	—	—	0.0189	—	—	1.31	2.9	0.218	—
MD21-05-59926	21-24551	5.00–6.00	Fill	—	—	—	—	—	0.0382	—	—	0.93	—	—	—
MD21-05-59928	21-24552	2.50–3.50	Fill	—	—	—	—	—	—	—	—	8.53E-02	—	—	—
MD21-05-59929	21-24552	4.50–5.50	Fill	—	—	—	—	—	—	—	—	0.11	—	—	—
MD21-05-59931	21-24553	3.00–4.00	Fill	—	—	—	—	—	0.116	—	—	3.07E-02	—	—	—
MD21-05-59937	21-24555	3.00–4.00	Fill	—	—	—	—	—	0.153	—	—	9.33E-02	—	—	—
MD21-05-59938	21-24555	5.00–6.00	Fill	—	—	—	—	—	—	—	—	7.91E-02	—	—	—
MD21-05-59940	21-24556	3.00–4.00	Fill	—	—	—	—	—	0.153	—	—	2.99E-02	—	—	—
MD21-05-59941	21-24556	5.00–6.00	Fill	—	—	—	—	—	0.0384	—	—	2.98E-02	—	—	—

Source: Background/fallout values from LANL 1998 (59730, Table 6.0-2, p. 45).

Note: Units are pCi/g.

[a] The analytical data for tritium were compared to background/fallout value based on the soil moisture content of the given sample. All results are presented in pCi/g for consistency.

[b] na = Not available.

[c] Value applies to samples collected from 0–6 in. only; all activities detected below 6 in. are reported.

[d] A dash indicates that if analyzed, the sample result is less than background/fallout value or is not detected.

Table 7.3-3
Summary of Organic Chemicals Detected at SWMUs 21-018(a) and 21-018(b)

Sample ID	Location ID	Depth (ft bgs)	Media	Acenaphthene	Acenaphthylene	Acetone	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Bromophenyl-phenylether[4-]	Butylbenzylphthalate	Carbon Disulfide	Chloro-3-methylphenol[4-]	Chloromethane	Chloronaphthalene[2-]	Chrysene	Diethylphthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Methylnaphthalene[2-]	Naphthalene	Nitroaniline[3-]	Phenanthrene	Pyrene	Styrene
SWMU 21-018(a)																																
AAB6663	21-02518	25.00–30.00	Qbt 3	—	—	—*	—	—	—	—	—	—	—	—	—	—	—	0.003 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6666	21-02518	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.31 (J)	—	—	—	—	—	—	—	—	—
AAB6667	21-02518	45.00–50.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	0.004 (J)	—	—	—	—	—	—	0.18 (J)	—	—	—	—	—	—	—	—	—
AAB6669	21-02518	55.00–60.00	Qbt 3	—	—	0.028	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6671	21-02518	65.00–70.00	Qbt 3	—	—	0.026	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.12 (J)	—	—	—	—	—	—	—	—	—
AAB6672	21-02518	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12 (J)	—	0.24 (J)	—	—	—	—	—	—	—	—	—
AAB6680	21-02519	20.00–25.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	0.18 (J)	—	—	—	—	—	6.8	—	—	—	—	—	—	—	—	—	—	—
AAB6682	21-02519	30.00–35.00	Qbt 3	—	—	0.034 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.008
AAB6697	21-02520	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	0.16 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6714	21-02521	12.50–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	0.32 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6715	21-02521	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	—	—	0.3 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6720	21-02521	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	0.22 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MD21-05-59560	21-24524	8.00–10.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0305 (J)	—	—	—	—	—	0.0154 (J)	—	—
MD21-05-60609	21-24524	339.50–340.00	Qct	—	—	—	—	—	—	—	—	—	0.0949 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60610	21-24524	378.00–380.00	Qbo	—	—	—	—	—	—	—	—	—	0.0889 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MD21-05-59684	21-24534	13.00–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0174 (J)	—
MD21-05-59691	21-24535	8.00–10.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0257 (J)	—	—	—	—	—	0.0163 (J)	0.022 (J)	—
MD21-05-59771	21-24540	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.298 (J)	—	—	—	—	—	—	—	—	—
MD21-05-59779	21-24541	31.00–33.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0147 (J)	—	—	—	—	—	—	0.0257 (J)	—
MD21-05-59984	21-24569	2.00–2.50	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0119 (J)	—
MD21-06-66659	21-25443	15.00–15.50	Qbt 3	—	—	—	—	—	—	—	—	—	0.11 (J)	—	—	—	—	—	—	—	—	—	0.054 (J)	—	—	—	—	—	—	—	—	—	—
MD21-06-66664	21-25448	12.00–12.50	Qbt 3	—	—	—	—	0.0228 (J)	0.0871	0.074	—	—	—	—	—	—	—	—	—	0.0326 (J)	—	—	—	0.0274 (J)	—	0.085	—	—	—	—	0.0203 (J)	—
MD21-06-70162	21-26273	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	0.734 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SWMU 21-018(b)																																
AAB6974	21-01972	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.084 (J)	—
MD21-05-59925	21-24551	3.00–4.00	Fill	—	—	—	—	0.0137 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0126 (J)	—	—	—	—	—	—	0.013 (J)	—
MD21-05-59926	21-24551	5.00–6.00	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.013 (J)	—	—	—	—	—	—	—	—
MD21-05-59940	21-24556	3.00–4.00	Fill	0.0325 (J)	0.0334 (J)	—	0.043	—	0.185 (J)	0.171 (J)	0.107 (J)	0.531 (J)	—	0.0365 (J)	—	—	0.0708 (J)	—	0.033 (J)	0.099	—	—	—	0.123	0.033 (J)	0.201 (J)	0.038	0.04	0.239 (J)	0.0816	0.16	—

Note: Units are mg/kg. Data qualifiers are defined in Appendix A.
*A dash indicates that if analyzed, sample result is not detected.

Table 7.3-4
Summary of Inorganic Chemicals above Background Values at SWMU 21-023(c)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Cadmium	Chromium	Copper	Cyanide (Total)	Lead	Lithium	Mercury	Nitrate	Perchlorate	Selenium	Silver	Strontium	Thallium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**0.4**	**19.3**	**14.7**	**0.5**	**22.3**	**na**[a]	**0.1**	**na**	**na**	**1.52**	**1**	**na**	**0.73**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**0.4**	**7.14**	**4.66**	**0.5**	**11.2**	**na**	**0.1**	**na**	**na**	**0.3**	**1**	**na**	**1.1**	**63.5**
AAA0629	21-01340	0.00–0.50	Soil	—[b]	5.3 (U)	—	1.2	48.1	—[b]	—	36.3	8.5	—	—	—	—	—	24.9	—	—
MD21-06-70174	21-01611	0.70–1.20	Qbt 3	8930 (J+)	—	4.85	—	30.5	6.32	—	28.2	—	1.06	0.943 (J)	0.00133 (J)	0.738 (J)	—	—	—	—
AAA4093	21-01665	0.00–5.00	Soil	—	—	—	0.63 (U)	—	—	—	—	3.6	—	—	—	—	1.1 (U)	14.4	—	—
AAA4094	21-01665	5.00–9.00	Qbt 3	—	—	—	—	13.3	—	—	—	—	—	—	—	0.41	—	1.1	—	—
AAA4095	21-01665	10.00–15.00	Qbt 3	—	—	—	—	11.2	—	—	—	—	—	—	—	0.53	1.1 (U)	0.49	—	—
AAA4096	21-01665	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	—	1.5	—	—	—	0.49	1.1 (U)	0.64	—	—
AAB6979	21-01977	0.00–0.50	Soil	—	—	—	0.42 (U)	—	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
AAB6981	21-01979	0.00–0.50	Soil	—	—	—	0.68 (U)	—	—	—	23.1	—	—	—	—	—	2.2 (U)	—	—	—
AAB6982	21-01980	0.00–0.50	Soil	—	—	—	0.45 (U)	—	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
MD21-05-59987	21-24570	2.50–3.00	Soil	—	—	—	0.512 (U)	—	—	—	43.3	—	0.218	0.516 (J+)	0.00146 (J)	1.54 (U)	—	—	—	—
MD21-05-59988	21-24570	3.00–3.50	Soil	—	—	—	0.526 (U)	—	—	—	—	—	—	0.501 (J+)	—	1.58 (U)	—	—	—	—
MD21-05-59990	21-24571	2.50–3.00	Soil	—	—	—	0.523 (U)	—	—	—	—	—	0.117	0.497 (J+)	—	1.57 (U)	—	—	—	—
MD21-05-59991	21-24571	3.00–3.50	Soil	—	—	—	0.521 (U)	—	—	—	—	—	—	0.484 (J+)	—	1.56 (U)	—	—	—	—
MD21-05-59993	21-24572	2.00–2.50	Soil	—	—	—	0.522 (U)	—	—	—	—	—	—	0.504 (J+)	—	1.57 (U)	—	—	—	—
MD21-05-59994	21-24572	2.50–3.00	Soil	—	—	—	0.506 (U)	—	—	—	—	—	—	0.49 (J+)	—	—	—	—	—	—
MD21-05-59996	21-24573	2.00–2.50	Soil	—	—	—	0.544 (U)	—	—	—	—	—	—	0.512 (J+)	—	1.63 (U)	—	—	—	—
MD21-05-59997	21-24573	2.50–3.00	Soil	—	—	—	0.522 (U)	—	—	—	—	—	—	0.505 (J+)	—	1.57 (U)	—	—	—	—
MD21-05-59999	21-24574	3.00–3.50	Soil	—	—	—	0.549 (U)	—	—	—	—	—	—	0.519 (J+)	—	1.65 (U)	—	—	—	—
MD21-05-60000	21-24574	3.50–4.00	Soil	—	—	—	0.537 (U)	—	—	—	—	—	—	0.995 (J+)	—	1.61 (U)	—	—	—	—
MD21-05-60002	21-24575	2.00–2.50	Soil	—	—	—	0.514 (U)	—	—	—	—	—	0.247	0.658 (J+)	—	1.54 (U)	—	—	—	—
MD21-05-60003	21-24575	2.50–3.00	Soil	—	—	—	0.525 (U)	—	—	—	—	—	0.782	0.54 (J+)	—	1.58 (U)	—	—	—	—
MD21-05-60005	21-24576	0.00–0.50	Soil	—	—	—	0.557 (U)	—	—	—	24.6	—	—	3.2	—	1.67 (U)	—	—	—	—
MD21-05-60006	21-24576	1.50–2.00	Soil	—	—	—	0.527 (U)	—	—	—	—	—	—	0.503 (J)	—	1.58 (U)	—	—	—	—
MD21-05-60008	21-24577	0.00–0.50	Soil	—	—	—	0.553 (U)	—	—	—	22.7	—	—	2.01	0.00261	1.66 (U)	—	—	—	—
MD21-05-60009	21-24577	1.50–2.00	Soil	—	—	—	0.518 (U)	—	—	—	—	—	—	0.462 (J)	0.00121 (J)	1.55 (U)	—	—	—	—
MD21-05-60011	21-24578	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	0.528 (J)	0.00491	1.74 (U)	—	—	—	—
MD21-05-60012	21-24578	1.50–2.00	Soil	—	—	—	0.533 (U)	—	—	—	—	—	—	—	0.00408	1.6 (U)	—	—	—	—
MD21-06-70177	21-24579	2.00–2.50	Qbt 3	8280 (J+)	—	2.88	—	15.6	—	—	14.2	—	0.105	—	0.00572	0.665 (J)	—	—	—	—
MD21-06-70170	21-25412	2.00–2.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.967 (J)	0.00234	0.94 (J)	—	—	—	—
MD21-06-66261	21-25413	0.00–0.50	Soil	—	—	—	0.515 (U)	—	—	—	—	—	0.123	1.44 (J-)	0.00418	1.54 (U)	—	—	—	—
MD21-06-66262	21-25413	1.50–2.00	Soil	—	—	—	0.55 (U)	—	—	—	—	—	—	—	0.000853 (J)	1.65 (U)	—	—	—	—
MD21-06-66264	21-25414	0.00–0.50	Soil	—	—	—	0.514 (U)	—	—	—	—	—	0.103	3.17 (J-)	0.0033	1.54 (U)	—	—	—	—
MD21-06-66265	21-25414	1.50–2.00	Soil	—	—	—	0.542 (U)	—	—	—	—	—	—	1.39 (J-)	0.00176 (J)	1.63 (U)	—	—	—	—

Table 7.3-4 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Cadmium	Chromium	Copper	Cyanide (Total)	Lead	Lithium	Mercury	Nitrate	Perchlorate	Selenium	Silver	Strontium	Thallium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**0.4**	**19.3**	**14.7**	**0.5**	**22.3**	**na**[a]	**0.1**	**na**	**na**	**1.52**	**1**	**na**	**0.73**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**0.4**	**7.14**	**4.66**	**0.5**	**11.2**	**na**	**0.1**	**na**	**na**	**0.3**	**1**	**na**	**1.1**	**63.5**
MD21-06-66267	21-25415	0.00–0.50	Soil	—	—	—	0.543 (U)	—	—	—	—	—	—	2.19 (J-)	0.00161 (J)	1.63 (U)	—	—	—	—
MD21-06-66268	21-25415	1.50–2.00	Soil	—	—	—	0.577 (U)	—	—	—	—	—	—	—	—	1.73 (U)	—	—	—	—
MD21-06-66270	21-25416	0.00–0.50	Soil	—	1.34 (J-)	—	0.527 (U)	—	—	—	—	—	0.127	2.91 (J-)	—	1.58 (U)	—	—	—	—
MD21-06-66271	21-25416	1.50–2.00	Soil	—	—	—	0.554 (U)	—	—	—	—	—	—	0.972 (J-)	—	1.66 (U)	—	—	—	—
MD21-06-66273	21-25417	0.00–0.50	Soil	—	—	—	0.578 (U)	—	—	—	—	—	—	—	0.000669 (J)	1.73 (U)	—	—	—	—
MD21-06-66274	21-25417	1.50–2.00	Soil	—	—	—	0.53 (U)	—	—	—	—	—	—	—	—	1.59 (U)	—	—	—	—
MD21-06-66276	21-25418	0.00–0.50	Soil	—	—	—	0.505 (U)	—	—	—	—	—	—	2.58 (J-)	—	—	—	—	—	—
MD21-06-66277	21-25418	1.50–2.00	Soil	—	—	—	0.54 (U)	—	—	—	—	—	0.663	1.27 (J-)	—	1.62 (U)	—	—	—	—
MD21-06-66280	21-25419	0.00–0.50	Soil	—	—	—	0.555 (U)	—	—	—	—	—	—	0.653 (J-)	0.000593 (J)	1.66 (U)	—	—	—	—
MD21-06-66279	21-25419	1.50–2.00	Soil	—	—	—	0.532 (U)	—	—	—	—	—	—	1.45 (J-)	0.00159 (J)	1.59 (U)	—	—	—	—
MD21-06-66282	21-25420	0.00–0.50	Soil	—	—	—	0.504 (U)	—	—	—	—	—	—	1.9 (J-)	—	—	—	—	—	—
MD21-06-66283	21-25420	1.50–2.00	Soil	—	—	—	0.529 (U)	—	—	—	—	—	—	0.683 (J-)	—	1.59 (U)	—	—	—	—
MD21-06-66285	21-25421	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	1.44	—	1.67 (U)	—	—	—	—
MD21-06-66286	21-25421	1.50–2.00	Soil	—	—	—	0.548 (U)	21.7	—	—	—	—	—	1.31	—	1.64 (U)	—	—	—	—
MD21-06-66288	21-25422	0.00–0.50	Soil	—	—	—	0.516 (U)	—	—	—	—	—	—	1.08	—	1.55 (U)	—	—	—	—
MD21-06-66289	21-25422	1.50–2.00	Soil	—	—	—	0.524 (U)	—	—	—	—	—	—	—	—	1.57 (U)	—	—	—	—
MD21-06-66291	21-25423	0.00–0.50	Soil	—	—	—	0.515 (U)	—	—	—	—	—	—	1.26	—	1.54 (U)	—	—	—	—
MD21-06-66292	21-25423	1.50–2.00	Soil	—	—	—	0.523 (U)	—	—	—	—	—	—	—	0.000841 (J)	1.57 (U)	—	—	1.04 (U)	—
MD21-06-68044	21-25622	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	1.98	—	1.56 (U)	—	—	—	—
MD21-06-68045	21-25622	1.50–2.00	Soil	—	—	—	—	—	—	—	24.3	—	—	1.19	—	1.62 (U)	—	—	—	—
MD21-06-68046	21-25623	0.00–0.50	Soil	—	—	—	0.846	—	22.6	—	39.1	—	0.765	1.28	—	1.72 (U)	24.5	—	—	105
MD21-06-68047	21-25623	1.50–2.00	Soil	—	—	—	0.414 (J)	—	—	—	—	—	0.304	0.871 (J)	—	1.62 (U)	10.4	—	—	54.7
MD21-06-68048	21-25624	0.00–0.50	Soil	—	—	—	—	—	—	—	24.3	—	0.279	1.45	—	1.84 (U)	8.43	—	—	60.4
MD21-06-68049	21-25624	1.50–2.00	Soil	—	—	—	—	—	—	5.78	—	—	0.429	0.904 (J)	—	1.7 (U)	11.9	—	—	—
MD21-06-68050	21-25625	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	1.06 (J)	—	1.76 (U)	—	—	—	52.1
MD21-06-68051	21-25625	1.50–2.00	Soil	—	—	—	—	—	—	—	—	—	0.103	0.98 (J)	—	1.84 (U)	3.08	—	—	60.9
MD21-06-68052	21-25626	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	0.863 (J)	—	1.64 (U)	—	—	—	—
MD21-06-68053	21-25626	1.50–2.00	Soil	—	—	—	0.519 (J)	—	—	—	—	—	0.379	0.988 (J)	—	1.85 (U)	2.05	—	—	70.5

Source: Background values from LANL (1998, 059730, Table 6.0-1, p. 44).

Note: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] na = Not available.

[b] A dash indicates that if analyzed, sample result is less than background value.

Table 7.3-5
Summary of Radionuclides Detected or Detected above Background/Fallout Values at SWMU 21-023(c)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium–241	Cesium–137	Plutonium–238	Plutonium–239	Strontium–90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Qbt 2,3,4 Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
AAA0223	21-01055	0.00–0.08	Soil	0.041	—[c]	—	0.339	—	—	—	—	—
AAA0224	21-01055	0.00–0.50	Soil	—	—	—	0.735	—	—	—	—	—
MD21-06-73257	21-01337	3.70–4.00	Qbt 3	8.71	—	—	8.85	—	—	—	—	—
AAA0629	21-01340	0.00–0.50	Soil	15.78	—	—	28.85	—	—	—	—	—
MD21-06-73256	21-01607	3.00–3.30	Qbt 3	2.24	—	—	2.90	—	—	—	—	—
AAA4042	21-01608	0.00–0.33	Soil	10.727	—	0.072	7.767	—	6.86E-02	—	—	—
AAA4043	21-01609	0.00–0.42	Soil	0.197	2.15	—	1.246	—	0.18	—	—	2.696
MD21-06-73254	21-01610	3.50–3.80	Qbt 3	28.3	—	0.145	13.82	—	—	—	—	—
MD21-06-70174	21-01611	0.70–1.20	Qbt 3	19.4	—	—	24.8	—	—	—	—	—
AAA4048	21-01612	0.50–1.00	Soil	10.988 (J-)	—	0.099 (J-)	15.235 (J-)	—	—	—	—	—
AAA4049	21-01612	1.00–1.50	Soil	0.604 (J-)	—	—	1.261 (J-)	—	0.34 (J-)	—	—	—
AAA4050	21-01613	0.00–0.50	Soil	0.336	2.65	—	9.09	—	7.92E-02	—	—	—
AAA4051	21-01613	0.50–1.00	Soil	0.024	—	—	0.47	—	0.055	—	—	—
AAA4054	21-01613	1.00–1.50	Soil	0.022	—	—	0.313	0.26	0.56	—	—	—
MD21-06-73255	21-01614	4.20–4.50	Qbt 3	44.4	—	0.125	17.38	—	—	—	—	—
AAA4093	21-01665	0.00–5.00	Soil	0.07	—	0.012	1.368	—	2.02E-02	—	—	—
AAA4094	21-01665	5.00–9.00	Qbt 3	0.036	—	—	0.037	0.05	0.31	—	—	—
AAA4095	21-01665	10.00–15.00	Qbt 3	0.016	—	—	0.015	—	0.60	—	—	—
AAA4096	21-01665	15.00–20.00	Qbt 3	0.021	—	—	—	—	0.37	—	—	—
AAB6979	21-01977	0.00–0.50	Soil	0.078	—	—	0.536	—	3.13E-02	—	0.38	—
AAB6981	21-01979	0.00–0.50	Soil	0.041	—	—	0.729	—	4.63E-02	—	0.36	—

Table 7.3-5 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium–241	Cesium–137	Plutonium–238	Plutonium–239	Strontium–90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Qbt 2,3,4 Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
AAB6982	21-01980	0.00–0.50	Soil	0.05	—	—	0.915	—	5.13E-02	—	0.44	—
MD21-05-59987	21-24570	2.50–3.00	Soil	2.38	—	—	1.26	—	1.83E-02	—	—	—
MD21-05-59988	21-24570	3.00–3.50	Soil	1.02	—	—	0.325	—	1.62E-02	—	—	—
MD21-05-59990	21-24571	2.50–3.00	Soil	0.493	—	—	0.854	—	—	—	—	—
MD21-05-59991	21-24571	3.00–3.50	Soil	0.156	—	—	0.562	—	—	—	—	—
MD21-05-59993	21-24572	2.00–2.50	Soil	—	—	—	0.0505	—	1.93E-02	—	—	—
MD21-05-59994	21-24572	2.50–3.00	Soil	—	—	—	—	—	1.59E-02	—	—	—
MD21-05-59999	21-24574	3.00–3.50	Soil	0.125	—	—	0.251	—	—	—	—	—
MD21-05-60000	21-24574	3.50–4.00	Soil	—	—	—	0.335	—	—	—	—	—
MD21-05-60002	21-24575	2.00–2.50	Soil	1.14	—	—	1.19	—	—	—	—	—
MD21-05-60003	21-24575	2.50–3.00	Soil	3.43	—	—	4.06	0.191	—	—	—	—
MD21-05-60005	21-24576	0.00–0.50	Soil	1.64	—	—	3.98	—	—	—	0.275	—
MD21-05-60006	21-24576	1.50–2.00	Soil	0.782	—	—	0.572	—	—	—	—	—
MD21-05-60008	21-24577	0.00–0.50	Soil	2.15	—	—	3.11	—	2.88E-02	—	—	—
MD21-05-60009	21-24577	1.50–2.00	Soil	2.8	—	—	0.673	—	—	—	—	—
MD21-05-60011	21-24578	0.00–0.50	Soil	0.0561	—	—	0.417 (J+)	—	—	—	—	—
MD21-05-60012	21-24578	1.50–2.00	Soil	—	—	—	0.0439	—	2.07E-02	—	—	—
MD21-06-70177	21-24579	2.00–2.50	Qbt 3	3.67	—	—	2.08	—	1.38E-02	—	—	—
MD21-06-73253	21-25411	4.00–4.30	Qbt 3	39.6	—	0.156	28.41	—	—	—	—	—
MD21-06-70170	21-25412	2.00–2.50	Qbt 3	2.52	—	—	1.66	—	4.46E-02	—	—	—
MD21-06-66261	21-25413	0.00–0.50	Soil	12.5	—	0.0534	6.7	—	1.79E-02	—	—	—
MD21-06-66262	21-25413	1.50–2.00	Soil	1.13	—	—	0.995	—	—	—	—	—

Table 7.3-5 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium–241	Cesium–137	Plutonium–238	Plutonium–239	Strontium–90	Tritium	Uranium-234	Uranium-235	Uranium-238
MD21-06-66264	21-25414	0.00–0.50	Soil	11.2	—	0.0386	5.6	—	1.65E-02	—	—	—
MD21-06-66265	21-25414	1.50–2.00	Soil	6.47	—	—	7.03	—	—	—	—	—
MD21-06-66267	21-25415	0.00–0.50	Soil	—	—	—	0.396	—	—	—	—	—
MD21-06-66268	21-25415	1.50–2.00	Soil	—	0.158	—	1.25	—	—	—	—	—
MD21-06-66270	21-25416	0.00–0.50	Soil	9.31	—	—	5.36	—	1.83E-02	—	—	—
MD21-06-66271	21-25416	1.50–2.00	Soil	0.555	—	—	0.343	—	—	—	—	—
MD21-06-66273	21-25417	0.00–0.50	Soil	1.02	—	—	1.59	—	—	—	—	—
MD21-06-66274	21-25417	1.50–2.00	Soil	0.18	—	—	0.375	—	—	—	—	—
MD21-06-66276	21-25418	0.00–0.50	Soil	5.56	—	—	4.87	—	—	—	—	—
MD21-06-66277	21-25418	1.50–2.00	Soil	9.14	0.225	0.0423	8.59	—	—	—	—	—
MD21-06-66280	21-25419	0.00–0.50	Soil	—	—	—	0.967	—	—	—	—	—
MD21-06-66279	21-25419	1.50–2.00	Soil	—	0.419	—	0.498	—	2.12E-02	—	—	—
MD21-06-66282	21-25420	0.00–0.50	Soil	4.31	—	—	4.79	—	6.41E-03	—	—	—
MD21-06-66283	21-25420	1.50–2.00	Soil	0.182	—	—	0.288	—	—	—	—	—
MD21-06-66285	21-25421	0.00–0.50	Soil	—	—	—	0.408 (J-)	—	0.15	—	—	—
MD21-06-66286	21-25421	1.50–2.00	Soil	—	—	—	0.0934	—	—	—	—	—
MD21-06-66288	21-25422	0.00–0.50	Soil	—	—	—	0.0815	—	1.84E-02	—	—	—
MD21-06-66291	21-25423	0.00–0.50	Soil	—	—	—	—	—	1.82E-02	—	—	—
MD21-06-66292	21-25423	1.50–2.00	Soil	—	—	—	—	—	1.62E-02	—	—	—
MD21-06-68044	21-25622	0.00–0.50	Soil	3.26	—	0.0303	3.87	—	5.85E-02	—	—	—
MD21-06-68045	21-25622	1.50–2.00	Soil	1.04	0.12	—	1.42	—	0.074	—	—	—
MD21-06-68046	21-25623	0.00–0.50	Soil	—	—	—	2.4	—	9.79E-02	6.51	0.32	5.67
MD21-06-68047	21-25623	1.50–2.00	Soil	—	0.166	—	0.831	—	2.35E-02	3.56	0.222	3.26
MD21-06-68048	21-25624	0.00–0.50	Soil	1.42	—	—	4.11	—	0.40	2.87	—	2.65

Table 7.3-5 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium–241	Cesium–137	Plutonium–238	Plutonium–239	Strontium–90	Tritium	Uranium-234	Uranium-235	Uranium-238
MD21-06-68049	21-25624	1.50–2.00	Soil	0.613	0.188	—	3.43	—	3.14E-02	—	—	—
MD21-06-68050	21-25625	0.00–0.50	Soil	0.314	—	—	0.834	—	0.052	—	—	—
MD21-06-68051	21-25625	1.50–2.00	Soil	0.157	0.332	—	0.832	—	—	—	—	—
MD21-06-68052	21-25626	0.00–0.50	Soil	0.095	—	—	2.06	—	3.08E-02	—	—	—
MD21-06-68053	21-25626	1.50–2.00	Soil	0.365	0.316	0.0559	10.1	—	6.23E-02	—	—	—

Source: Background values from LANL (1998, 059730, Table 6.0-2, p. 45).

Note: Units are pCi/g. Data qualifiers are defined in Appendix A.

[a] FV applies to samples collected from 0–6 in. only, all activities detected below 6 in. are reported.

[b] na = Not available.

[c] A dash indicates that if analyzed, sample result is less than background value or is not detected.

Table 7.3-6
Summary of Organic Chemicals Detected at SWMU 21-023(c)

Sample ID	Location ID	Depth (ft bgs)	Media	Anthracene	Aroclor-1242	Aroclor-1254	Aroclor-1260	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzoic acid	Bis(2-ethylhexyl)phthalate
MD21-06-70174	21-01611	0.70–1.20	Qbt 3	—*	—	—	0.0015 (J)	—	—	—	—
AAB6982	21-01980	0.00–0.50	Soil	—	—	—	—	—	—	—	—
MD21-05-59994	21-24572	2.50–3.00	Soil	—	—	—	—	—	—	0.654 (J)	—
MD21-05-60005	21-24576	0.00–0.50	Soil	—	—	—	—	—	—	—	—
MD21-06-66267	21-25415	0.00–0.50	Soil	0.00918 (J)	—	—	—	0.0339 (J)	0.0216 (J)	—	—
MD21-06-66271	21-25416	1.50–2.00	Soil	—	—	—	—	—	—	—	—
MD21-06-66273	21-25417	0.00–0.50	Soil	—	—	—	—	—	—	—	—
MD21-06-66276	21-25418	0.00–0.50	Soil	—	—	—	—	—	0.0124 (J)	—	—
MD21-06-66277	21-25418	1.50–2.00	Soil	—	—	—	—	—	0.0234 (J)	—	—
MD21-06-66279	21-25419	1.50–2.00	Soil	—	—	—	—	—	0.0222 (J)	—	—
MD21-06-66283	21-25420	1.50–2.00	Soil	—	—	—	—	—	—	—	0.0921 (J)
MD21-06-68044	21-25622	0.00–0.50	Soil	—	—	0.002 (J)	0.0019 (J)	—	—	—	0.0912 (J)
MD21-06-68045	21-25622	1.50–2.00	Soil	—	—	0.0028 (J)	0.002 (J)	—	—	—	—
MD21-06-68046	21-25623	0.00–0.50	Soil	—	—	—	0.0281	—	—	—	—
MD21-06-68047	21-25623	1.50–2.00	Soil	—	0.0065	—	0.0073	—	—	—	—
MD21-06-68048	21-25624	0.00–0.50	Soil	—	—	—	0.0044	—	—	—	—
MD21-06-68049	21-25624	1.50–2.00	Soil	—	—	—	0.0108	—	—	—	—
MD21-06-68050	21-25625	0.00–0.50	Soil	—	—	—	—	—	—	—	—
MD21-06-68051	21-25625	1.50–2.00	Soil	—	—	0.0033 (J)	—	—	—	0.659 (J)	—
MD21-06-68053	21-25626	1.50–2.00	Soil	0.0152 (J)	—	—	—	0.0654 (J)	0.123 (J)	—	—

Table 7.3-6 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Chrysene	Di-n-butylphthalate	Fluoranthene	Methylnaphthalene[2-]	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
MD21-06-70174	21-01611	0.70–1.20	Qbt 3	—	—	—	—	—	—	—	—
AAB6982	21-01980	0.00–0.50	Soil	—	0.26 (J)	—	—	—	—	—	—
MD21-05-59994	21-24572	2.50–3.00	Soil	—	—	—	—	—	—	—	—
MD21-05-60005	21-24576	0.00–0.50	Soil	0.0854 (J)	—	0.171	—	—	—	0.0981 (J)	0.146 (J)
MD21-06-66267	21-25415	0.00–0.50	Soil	0.0138 (J)	—	0.0189 (J)	—	—	—	—	0.0167 (J)
MD21-06-66271	21-25416	1.50–2.00	Soil	—	—	—	—	—	0.212 (J)	—	—
MD21-06-66273	21-25417	0.00–0.50	Soil	—	—	0.0118 (J)	—	—	—	—	—
MD21-06-66276	21-25418	0.00–0.50	Soil	—	—	0.0134 (J)	—	—	—	—	0.0116 (J)
MD21-06-66277	21-25418	1.50–2.00	Soil	0.0189 (J)	—	—	—	—	—	—	0.016 (J)
MD21-06-66279	21-25419	1.50–2.00	Soil	0.0141 (J)	—	0.0208 (J)	—	—	—	—	0.0228 (J)
MD21-06-66283	21-25420	1.50–2.00	Soil	—	—	—	—	—	—	—	—
MD21-06-68044	21-25622	0.00–0.50	Soil	—	—	0.225 (J)	—	—	—	0.0131 (J)	0.0253 (J)
MD21-06-68045	21-25622	1.50–2.00	Soil	—	—	0.223 (J)	—	—	—	—	0.0119 (J)
MD21-06-68046	21-25623	0.00–0.50	Soil	—	—	0.236 (J)	0.0495	0.0237 (J)	—	0.0175 (J)	—
MD21-06-68047	21-25623	1.50–2.00	Soil	—	—	—	—	—	—	—	—
MD21-06-68048	21-25624	0.00–0.50	Soil	—	—	0.27 (J)	—	—	—	—	0.0156 (J)
MD21-06-68049	21-25624	1.50–2.00	Soil	—	—	0.235 (J)	0.0309 (J)	0.014 (J)	—	—	—
MD21-06-68050	21-25625	0.00–0.50	Soil	—	—	0.257 (J)	—	—	—	—	0.0173 (J)
MD21-06-68051	21-25625	1.50–2.00	Soil	—	—	0.258 (J)	—	—	—	0.0163 (J)	0.0177 (J)
MD21-06-68053	21-25626	1.50–2.00	Soil	0.0642	—	0.325 (J)	—	—	—	0.0576	0.103

Note: Units are mg/kg. Data qualifiers are defined in Appendix A.
*A dash indicates that if analyzed, sample result is not detected.

Table 7.3-7
Summary of Inorganic Chemicals above Background Values in Soil and Sediment at SWMU 21-013(b) and AOC 21-013(g)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Zinc
Soil Background Value				**0.83**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**0.1**	**na**[a]	**na**	**1.52**	**1**	**0.73**	**1.82**	**48.8**
Sediment Background Value				**0.83**	**0.4**	**4420**	**10.5**	**11.2**	**19.7**	**0.1**	**na**	**na**	**0.3**	**1**	**0.73**	**2.22**	**60.2**
SWMU 21-013(b)																	
AAA7528	21-01866	0.00–0.25	Soil	—[b]	—	—	—	—	—	0.3	—	—	—	—	—	—	—
AAA7529	21-01866	0.25–0.50	Soil	—	—	—	—	—	—	0.18	—	—	—	—	—	—	—
AAA7530	21-01866	0.50-1.00	Soil	—	—	—	—	—	—	0.35	—	—	—	—	—	—	—
AAA7531	21-01867	0.00–0.25	Soil	—	0.41 (U)	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
AAA7532	21-01867	0.25–0.50	Soil	—	0.61 (U)	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
AAA7533	21-01867	0.50–1.00	Soil	—	0.41 (U)	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
AAA7534	21-01868	0.00–0.25	Soil	—	0.43 (U)	—	—	—	—	0.12 (J)	—	—	—	2.1 (U)	—	—	—
AAA7535	21-01868	0.25–0.50	Soil	—	0.86 (U)	6270	—	—	—	0.16 (J)	—	—	—	2.2 (U)	—	—	—
AAA7536	21-01868	0.50–1.00	Soil	—	0.64 (U)	—	—	—	—	0.14 (J)	—	—	—	2.2 (U)	—	1.93 (J)	—
AAB8916	21-01875	0.00–0.42	Soil	—	0.42 (U)	—	—	—	—	—	—	—	—	2.1 (U)	—	2.61 (J)	—
AAB8932	21-01878	0.00–0.33	Soil	—	0.46 (U)	—	—	—	—	—	—	—	—	2.3 (U)	—	3.36 (J)	—
AAB8936	21-01879	0.00–0.42	Soil	—	0.52 (U)	—	—	—	—	—	—	—	—	—	—	5.95	—
AAB8946	21-01881	0.00–0.50	Soil	—	0.42 (U)	—	—	—	—	—	—	—	—	—	—	3.5	—
AAB8947	21-01881	0.50–0.83	Soil	—	0.42 (U)	—	—	—	—	—	—	—	—	—	—	3.6	—
AAB8956	21-01883	0.00–0.50	Soil	—	0.46 (U)	—	—	—	—	—	—	—	—	—	—	2	—
AAB8957	21-01883	0.50–1.00	Soil	—	0.42 (U)	—	—	—	—	—	—	—	—	—	—	—	—
AAB7287	21-02572	0.00–0.25	Soil	—	0.84 (U)	—	—	—	22.5	0.16 (J)	—	—	—	2.4 (U)	—	2.23 (J)	54.6
AAB7288	21-02572	0.25–0.50	Soil	—	0.9 (U)	—	—	—	24.2	0.16 (J)	—	—	—	2.4 (U)	—	3.63 (J)	53.7
AAB7289	21-02572	0.50–1.00	Soil	—	0.86 (U)	—	—	—	22.6	0.43 (J)	—	—	—	14.4	—	5.72 (J)	—
MD21-05-60367	21-24639	0.00–0.50	Soil	—	0.631 (U)	—	—	—	—	—	—	—	1.89 (U)	—	—	—	—
MD21-05-60368	21-24639	1.50–2.00	Soil	—	0.567 (U)	—	—	—	—	—	—	0.000329 (J-)	1.7 (U)	—	—	—	—
MD21-05-60370	21-24640	0.00–0.50	Soil	—	0.53 (U)	—	—	—	—	—	2.61	—	1.59 (U)	—	—	—	—
MD21-05-60371	21-24640	1.50–2.00	Soil	—	0.533 (U)	—	23.9	—	—	—	1.27	0.00105 (J-)	1.6 (U)	—	—	—	—
MD21-05-60373	21-24641	0.00–0.50	Soil	—	0.546 (U)	—	—	—	—	—	5.93	—	1.64 (U)	—	—	—	—
MD21-05-60374	21-24641	0.50–1.00	Soil	—	0.508 (U)	—	—	—	—	—	1.74	—	—	—	—	—	—
MD21-05-60375	21-24642	0.00–0.50	Soil	—	0.527 (U)	—	—	—	—	—	3.77	—	1.58 (U)	—	—	—	—
MD21-05-60377	21-24642	1.50–2.00	Soil	—	0.541 (U)	—	—	—	—	—	1.73	—	1.62 (U)	—	—	—	—
MD21-05-60379	21-24643	0.00–0.50	Soil	—	0.539 (U)	—	—	—	—	—	1.91 (J-)	—	1.62 (U)	—	—	—	—
MD21-05-60380	21-24643	1.50–2.00	Soil	—	0.535 (U)	—	—	—	—	—	—	0.000291 (J-)	1.6 (U)	—	—	—	—
MD21-05-60382	21-24644	0.00–0.50	Soil	—	0.542 (U)	—	—	—	—	—	1.34 (J-)	—	1.63 (U)	—	—	—	—
MD21-05-60383	21-24644	1.50–2.00	Soil	—	0.56 (U)	—	—	—	—	—	—	—	1.68 (U)	—	—	—	—
MD21-05-60385	21-24645	0.00–0.50	Soil	—	0.537 (U)	—	—	—	—	—	1.57 (J-)	0.000912 (J-)	1.61 (U)	—	—	—	—

Table 7.3-7 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Zinc
Soil Background Value				**0.83**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**0.1**	**na**	**na**	**1.52**	**1**	**0.73**	**1.82**	**48.8**
Sediment Background Value				**0.83**	**0.4**	**4420**	**10.5**	**11.2**	**19.7**	**0.1**	**na**	**na**	**0.3**	**1**	**0.73**	**2.22**	**60.2**
MD21-05-60386	21-24645	1.50–2.00	Soil	—	0.527 (U)	—	—	—	—	—	1.99 (J-)	0.000722 (J-)	1.58 (U)	—	—	—	—
MD21-05-60388	21-24646	0.00–0.50	Soil	—	0.564 (U)	—	—	—	—	—	4.06 (J-)	—	1.69 (U)	—	—	—	—
MD21-05-60389	21-24646	1.50–2.00	Soil	—	0.511 (U)	—	—	—	—	—	0.85 (J-)	0.000281 (J-)	1.53 (U)	—	—	—	—
MD21-05-60391	21-24647	0.00–0.50	Soil	—	0.545 (U)	—	—	—	—	—	1.46 (J-)	0.000332 (J-)	1.63 (U)	—	—	—	—
MD21-05-60392	21-24647	1.50–2.00	Soil	—	0.524 (U)	—	—	—	—	—	—	0.0003 (J-)	1.57 (U)	—	—	—	—
MD21-05-60394	21-24648	0.00–0.50	Soil	—	0.52 (U)	—	—	—	—	—	2.22 (J-)	—	1.56 (U)	—	—	—	—
MD21-05-60395	21-24648	1.50–2.00	Soil	—	0.506 (U)	—	—	—	—	—	2.9 (J-)	0.00113	—	—	—	—	—
MD21-05-60397	21-24649	0.00–0.50	Soil	—	—	—	—	—	—	0.118	—	—	1.63 (U)	—	—	—	—
MD21-05-60398	21-24649	1.50–2.00	Soil	—	0.549 (U)	—	—	—	—	—	2.79	0.00107 (J)	1.65 (U)	—	—	—	—
MD21-05-60401	21-24650	1.50–2.00	Soil	—	—	—	—	—	—	0.148	2.02	—	1.68 (U)	—	—	—	—
MD21-05-60403	21-24651	0.00–0.50	Soil	—	0.542 (U)	—	—	—	—	—	3.43	—	1.63 (U)	—	—	—	—
MD21-05-60404	21-24651	1.50–2.00	Soil	—	0.574 (U)	—	—	—	—	—	1.39	0.000917 (J-)	1.72 (U)	—	—	—	—
MD21-05-60406	21-24652	0.00–0.50	Soil	—	0.519 (U)	—	—	—	—	—	2.6	—	1.56 (U)	—	—	—	—
MD21-05-60407	21-24652	1.50–2.00	Soil	—	0.52 (U)	—	—	—	—	—	2.26	0.000633 (J-)	1.56 (U)	—	—	—	50.9
MD21-05-60409	21-24653	0.00–0.60	Soil	—	0.536 (U)	—	—	—	—	—	6.52	0.000834 (J-)	1.61 (U)	—	—	—	55.5
MD21-05-60410	21-24653	1.50–2.00	Soil	—	0.535 (U)	—	—	—	—	—	11	0.000739 (J-)	1.6 (U)	—	—	—	—
MD21-05-60413	21-24654	1.50–2.00	Soil	—	0.529 (U)	—	21.3 (J)	—	—	—	7.25	0.00107 (J-)	1.59 (U)	—	—	—	—
MD21-05-60418	21-24656	0.00–0.50	Soil	—	0.538 (U)	—	—	—	—	—	3.78	0.0011 (J-)	1.61 (U)	—	—	—	—
MD21-05-60419	21-24656	1.50–2.00	Soil	—	0.551 (U)	—	—	—	—	—	1.33	0.000695 (J-)	1.65 (U)	—	—	—	—
MD21-05-60421	21-24657	0.00–0.50	Soil	—	0.54 (U)	—	—	—	—	—	2.35	—	1.62 (U)	—	—	—	54
MD21-05-60422	21-24657	1.50–2.00	Soil	—	0.54 (U)	—	—	—	—	—	6.4	0.00394 (J-)	1.62 (U)	—	—	—	—
MD21-05-60424	21-24658	0.00–0.50	Soil	—	—	—	—	—	—	—	1.97	—	1.62 (U)	—	—	—	—
MD21-05-60425	21-24658	1.50–2.00	Soil	—	0.524 (U)	—	—	—	—	—	0.785 (J)	—	1.57 (U)	—	—	—	—
MD21-05-60437	21-24659	0.00–0.50	Soil	—	0.561 (U)	—	—	—	—	—	15.5	0.000765 (J)	1.68 (U)	—	—	—	—
MD21-05-60436	21-24659	1.00–1.50	Soil	—	0.525 (U)	—	—	—	—	—	3.29	—	1.58 (U)	—	—	—	—
MD21-05-60440	21-24660	1.50–2.00	Soil	—	0.542 (U)	—	—	—	—	—	1.35	0.000981 (J)	1.63 (U)	—	—	—	—
MD21-05-60443	21-24661	1.50–2.00	Soil	—	0.512 (U)	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—
MD21-05-60445	21-24662	0.00–0.50	Soil	—	—	—	—	—	—	—	0.848 (J)	—	—	—	—	—	—
MD21-05-60446	21-24662	1.50–2.00	Soil	—	0.548 (U)	—	23.6 (J+)	—	—	—	—	0.000576 (J)	1.64 (U)	—	—	—	—
MD21-05-60448	21-24663	0.00–0.50	Soil	—	0.516 (U)	—	—	—	—	—	2.26	—	1.55 (U)	—	—	—	—
MD21-05-60449	21-24663	1.50–2.00	Soil	—	0.532 (U)	11100 (J+)	—	—	—	—	1.01 (J)	0.000977 (J)	—	—	—	—	—
MD21-05-60451	21-24664	0.00–0.50	Soil	—	0.537 (U)	—	—	—	25.7	—	3.01	—	1.61 (U)	—	—	—	—
MD21-05-60452	21-24664	1.50–2.00	Soil	—	0.53 (U)	—	—	—	—	—	—	—	1.59 (U)	—	—	—	—
MD21-05-60454	21-24665	0.00–0.50	Soil	—	0.527 (U)	—	—	—	—	—	5.59	—	1.58 (U)	—	—	—	62.9

Table 7.3-7 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Zinc
Soil Background Value				**0.83**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**0.1**	**na**	**na**	**1.52**	**1**	**0.73**	**1.82**	**48.8**
Sediment Background Value				**0.83**	**0.4**	**4420**	**10.5**	**11.2**	**19.7**	**0.1**	**na**	**na**	**0.3**	**1**	**0.73**	**2.22**	**60.2**
MD21-05-60455	21-24665	1.50–2.00	Soil	—	0.534 (U)	—	—	—	—	—	4.68	0.000961 (J)	—	—	—	—	54.7
MD21-05-60457	21-24666	0.00–0.50	Soil	—	0.504 (U)	—	—	—	—	—	1.63	0.000992 (J)	—	—	—	—	—
MD21-05-60458	21-24666	1.50–2.00	Soil	—	0.52 (U)	—	—	—	—	—	0.645 (J)	—	1.56 (U)	—	—	—	—
MD21-05-60460	21-24667	0.00–0.50	Soil	—	0.508 (U)	—	—	—	—	—	2.78	—	—	—	—	—	—
MD21-05-60461	21-24667	1.50–2.00	Soil	—	0.495 (U)	—	—	—	—	—	0.515 (J)	—	—	—	—	—	—
MD21-05-60464	21-24668	1.50–2.00	Soil	—	0.527 (U)	—	—	—	—	—	1.02 (J)	0.00091 (J)	1.58 (U)	—	—	—	—
MD21-05-60466	21-24669	0.00–0.50	Soil	—	0.54 (U)	—	—	—	—	—	0.756 (J)	—	1.62 (U)	—	—	—	—
MD21-05-60467	21-24669	1.50–2.00	Soil	—	0.533 (U)	—	27.1	—	—	—	—	0.000666 (J)	1.6 (U)	—	—	—	—
MD21-05-60469	21-24670	0.00–0.50	Soil	—	0.505 (U)	—	—	—	—	—	0.811 (J)	—	—	—	—	—	—
MD21-05-60470	21-24670	1.50–2.00	Soil	—	0.54 (U)	—	—	—	—	—	0.561 (J)	—	1.62 (U)	—	—	—	—
MD21-05-60472	21-24671	0.00–0.50	Soil	—	0.522 (U)	—	—	—	—	—	0.908 (J)	—	1.57 (U)	—	—	—	—
MD21-05-60473	21-24671	1.50–2.00	Soil	—	0.532 (U)	7050 (J+)	—	—	—	—	—	—	1.6 (U)	—	—	—	—
MD21-05-60475	21-24672	0.00–0.50	Soil	—	0.512 (U)	—	—	—	—	—	2.06	—	1.54 (U)	—	—	—	56.9
MD21-05-60476	21-24672	1.50–2.00	Soil	—	0.528 (U)	—	—	—	—	—	—	0.000576 (J)	1.58 (U)	—	—	—	—
MD21-05-60478	21-24673	0.00–0.50	Soil	—	0.528 (U)	—	—	—	—	—	4.47	0.000985 (J)	1.58 (U)	—	—	—	—
MD21-05-60479	21-24673	1.50–2.00	Soil	—	0.522 (U)	—	—	—	—	—	—	0.000842 (J)	1.57 (U)	—	—	—	—
MD21-05-60481	21-24674	0.00–0.50	Soil	—	0.515 (U)	—	—	—	—	—	1.44	—	1.55 (U)	—	—	—	—
MD21-05-60482	21-24674	1.50–2.00	Soil	—	0.526 (U)	—	—	—	—	—	—	—	1.58 (U)	—	—	—	—
MD21-05-60484	21-24675	0.00–0.50	Soil	—	0.518 (U)	—	—	—	—	—	1.31	—	1.55 (U)	—	—	—	—
MD21-05-60485	21-24675	1.50–2.00	Soil	—	0.536 (U)	—	—	—	—	—	0.963 (J)	—	1.61 (U)	—	—	—	—
MD21-05-60487	21-24676	0.00–0.50	Soil	—	0.529 (U)	—	—	—	—	—	—	0.000578 (J)	1.59 (U)	—	—	—	—
MD21-05-60490	21-24677	0.00–0.50	Soil	—	0.521 (U)	—	—	—	—	—	—	—	1.56 (U)	—	—	—	—
MD21-05-60491	21-24677	1.50–2.00	Soil	—	0.555 (U)	—	—	—	—	—	—	—	1.66 (U)	—	—	—	—
MD21-05-60493	21-24678	0.00–0.50	Soil	—	0.543 (U)	—	—	—	—	—	—	—	1.63 (U)	—	—	—	—
MD21-05-60494	21-24678	1.50–2.00	Soil	—	0.538 (U)	—	—	—	—	0.2	9.83	0.00264	1.62 (U)	—	—	—	—
MD21-05-60568	21-24679	0.00–0.50	Soil	—	0.543 (U)	—	—	—	—	—	1.15	—	1.63 (U)	—	—	—	—
MD21-05-60569	21-24679	1.50–2.00	Soil	—	0.538 (U)	—	—	—	—	—	—	—	1.61 (U)	—	—	—	—
MD21-05-60571	21-24680	0.00–0.50	Soil	—	0.526 (U)	—	—	—	—	—	1.38	—	1.58 (U)	—	—	—	55
MD21-05-60572	21-24680	1.50–2.00	Soil	—	2.5	—	—	20.4	—	—	5.56	0.000778 (J)	1.62 (U)	—	—	—	—
MD21-05-60574	21-24681	0.00–0.50	Soil	—	0.513 (U)	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—
MD21-05-60575	21-24681	1.50–2.00	Soil	—	0.516 (U)	—	—	—	—	—	—	—	1.55 (U)	—	1.05 (U)	—	—
MD21-05-60577	21-24682	0.00–0.50	Soil	—	—	—	—	—	—	—	1.94 (J-)	—	1.59 (U)	—	—	—	—
MD21-05-60578	21-24682	1.50–2.00	Soil	—	0.518 (U)	—	—	—	—	—	2.47 (J-)	0.000555 (J)	1.55 (U)	—	—	—	—
MD21-05-60580	21-24683	0.00–0.50	Soil	0.839	0.522 (U)	—	—	—	—	—	—	—	1.57 (U)	—	—	—	—

Table 7.3-7 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Zinc
Soil Background Value				**0.83**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**0.1**	**na**	**na**	**1.52**	**1**	**0.73**	**1.82**	**48.8**
Sediment Background Value				**0.83**	**0.4**	**4420**	**10.5**	**11.2**	**19.7**	**0.1**	**na**	**na**	**0.3**	**1**	**0.73**	**2.22**	**60.2**
MD21-05-60581	21-24683	1.50–2.00	Soil	—	0.53 (U)	—	—	—	—	—	—	—	1.59 (U)	—	—	—	—
AOC 21-013(g)																	
AAB8911	21-01874	0.00–0.50	Soil	0.48 (U)	—	25.9	—	—	—	—	—	—	—	2.4 (U)	—	—	—
AAB8912	21-01874	0.50–1.00	Soil	0.91 (U)	—	—	—	—	—	—	—	—	—	2.3 (U)	—	2.3 (J)	—
AAB8913	21-01874	1.00–1.33	Soil	0.46 (U)	—	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
AAB9021	21-01896	0.00–0.50	Soil	0.51 (U)	—	—	—	—	—	—	—	—	—	—	—	3.91	—
AAB9022	21-01896	0.50–1.00	Soil	0.42 (U)	—	—	—	—	—	—	—	—	—	—	—	2.03	—
AAB7290	21-02573	0.00–0.25	Sediment	—	0.41 (U)	—	—	—	—	—	—	—	0.61 (U)	2 (U)	—	—	—
AAB7291	21-02573	0.25–0.50	Sediment	—	0.42 (U)	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	—	—
AAB7292	21-02573	0.50–1.00	Sediment	—	0.42 (U)	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	—	—
MD21-05-60415	21-24655	0.00–0.50	Soil	—	0.551 (U)	—	—	—	—	—	1.44	—	1.65 (U)	—	—	—	—
MD21-05-60416	21-24655	1.50–2.00	Soil	—	0.563 (U)	—	27.6 (J)	—	—	—	—	0.00152 (J-)	1.69 (U)	—	—	—	—
MD21-05-60442	21-24661	0.00–0.50	Soil	—	0.691	—	—	—	26.4	—	2.01	0.000985 (J)	1.59 (U)	—	—	—	—
MD21-05-60463	21-24668	0.00–0.50	Soil	—	0.532 (U)	—	—	—	—	—	5.12	0.000815 (J)	1.6 (U)	—	—	—	—

Source: Background values from LANL (1998, 059730, Table 6.0-1, p. 44).
Note: Units are mg/kg. Data qualifiers are defined in Appendix A.
[a] na = Not available.
[b] A dash indicates that if analyzed, sample result is less than background value.

Table 7.3-8
Summary of Radionuclides Detected or Detected above
Background/Fallout Values in Soil and Sediment at SWMU 21-013(b) and AOC 21-013(g)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Sediment Background Value				**0.040**	**0.90**	**0.006**	**0.068**	**1.04**	**0.093**	**2.59**	**0.20**	**2.29**
SWMU 21-013(b)												
AAA0225	21-01056	0.00–0.08	Soil	—[c]	—	—	0.433	—	—	—	—	—
AAA0226	21-01056	0.00–0.50	Soil	0.05	—	—	0.921	—	—	—	—	—
AAA0235	21-01063	0.00–0.08	Soil	0.05	—	—	0.937	—	—	—	—	—
AAA0227	21-01292	0.00–0.08	Soil	0.023	—	—	0.2	—	—	—	—	—
AAA0228	21-01292	0.00–0.50	Soil	0.016	—	—	0.205	—	—	—	—	—
AAA7528	21-01866	0.00–0.25	Soil	—	—	—	0.3558	—	4.30E-02	—	—	—
AAA7529	21-01866	0.25–0.50	Soil	—	—	—	0.2391	—	3.91E-02	—	—	—
AAA7530	21-01866	0.50–1.00	Soil	—	—	—	0.2847	—	—	—	—	—
AAA7531	21-01867	0.00–0.25	Soil	—	—	—	0.2385	—	—	—	—	—
AAA7532	21-01867	0.25–0.50	Soil	—	—	—	0.23	—	—	—	—	—
AAA7533	21-01867	0.50–1.00	Soil	—	—	—	0.0708	—	—	—	—	—
AAA7534	21-01868	0.00–0.25	Soil	—	—	—	1.684	—	3.45E-02	—	—	—
AAA7535	21-01868	0.25–0.50	Soil	—	—	0.9967	2.046	—	—	—	—	—
AAA7536	21-01868	0.50–1.00	Soil	0.1773	—	0.013	2.604	0.52	3.67E-02	—	—	—
AAB8916	21-01875	0.00–0.42	Soil	—	—	—	0.185	—	0.11	—	—	—
AAB8932	21-01878	0.00–0.33	Soil	—	—	—	0.236	—	5.79E-02	—	—	—
AAB8936	21-01879	0.00–0.42	Soil	—	—	—	3.47	—	0.067	—	—	—
AAB8946	21-01881	0.00–0.50	Soil	—	—	—	0.376	—	0.035	—	—	—
AAB8947	21-01881	0.50–0.83	Soil	—	0.866	—	0.168	0.386	2.80E-02	—	—	—
AAB8956	21-01883	0.00–0.50	Soil	—	—	—	0.0565	—	5.63E-02	—	—	—
AAB8957	21-01883	0.50–1.00	Soil	—	—	—	0.0115	0.0802	—	—	—	—

Table 7.3-8 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Sediment Background Value				**0.040**	**0.90**	**0.006**	**0.068**	**1.04**	**0.093**	**2.59**	**0.20**	**2.29**
AAB7287	21-02572	0.00–0.25	Soil	—	—	—	3.505	—	—	—	—	—
AAB7288	21-02572	0.25–0.50	Soil	0.3212	—	0.0341	6.108	—	3.40E-02	—	—	—
AAB7289	21-02572	0.50–1.00	Soil	0.2635	0.7128	0.0246	5.52	—	—	—	—	—
MD21-05-60367	21-24639	0.00–0.50	Soil	0.13	—	—	1.42	—	—	—	—	—
MD21-05-60368	21-24639	1.50–2.00	Soil	0.0347	—	—	0.286	—	—	—	—	—
MD21-05-60370	21-24640	0.00–0.50	Soil	0.0218	—	—	0.12	—	—	—	—	—
MD21-05-60371	21-24640	1.50–2.00	Soil	—	—	—	0.0195	—	2.34E-02	—	—	—
MD21-05-60373	21-24641	0.00–0.50	Soil	0.017	—	—	0.174	—	—	—	—	—
MD21-05-60375	21-24642	0.00–0.50	Soil	0.0375	—	—	0.526	—	—	—	—	—
MD21-05-60377	21-24642	1.50–2.00	Soil	—	—	—	0.038	—	—	—	—	—
MD21-05-60379	21-24643	0.00–0.50	Soil	0.0413	—	—	0.407	—	8.37E-02	—	—	—
MD21-05-60385	21-24645	0.00–0.50	Soil	0.0178	—	—	0.233	—	—	—	—	—
MD21-05-60386	21-24645	1.50–2.00	Soil	0.0204	—	—	0.0929	—	1.70E-02	—	—	—
MD21-05-60391	21-24647	0.00–0.50	Soil	0.0273	—	—	0.832	—	—	—	—	—
MD21-05-60392	21-24647	1.50–2.00	Soil	—	—	—	0.258	—	2.82E-02	—	—	—
MD21-05-60394	21-24648	0.00–0.50	Soil	0.0162	—	—	0.372	—	2.93E-02	—	—	—
MD21-05-60395	21-24648	1.50–2.00	Soil	—	—	—	—	—	3.33E-02	—	—	—
MD21-05-60397	21-24649	0.00–0.50	Soil	0.559	—	0.0556 (J+)	9.22 (J+)	—	3.63E-02	—	—	—
MD21-05-60398	21-24649	1.50–2.00	Soil	0.0212	—	—	0.369	—	0.13	—	—	—
MD21-05-60401	21-24650	1.50–2.00	Soil	0.0418	—	—	0.573	—	—	—	—	—
MD21-05-60403	21-24651	0.00–0.50	Soil	0.0745	—	—	1.52	—	3.63E-02	—	—	—
MD21-05-60404	21-24651	1.50–2.00	Soil	—	—	—	0.103	—	7.29E-02	—	—	—
MD21-05-60406	21-24652	0.00–0.50	Soil	0.0605	—	—	0.56	—	2.90E-02	—	—	—
MD21-05-60407	21-24652	1.50–2.00	Soil	0.0369	—	—	0.579	—	0.050	—	—	—

Table 7.3-8 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Sediment Background Value				**0.040**	**0.90**	**0.006**	**0.068**	**1.04**	**0.093**	**2.59**	**0.20**	**2.29**
MD21-05-60409	21-24653	0.00–0.60	Soil	0.464	—	0.0557	6.54	—	0.15	—	—	—
MD21-05-60410	21-24653	1.50–2.00	Soil	0.178	—	0.0227	3.62	—	0.26	—	—	—
MD21-05-60413	21-24654	1.50–2.00	Soil	0.253	0.107	0.0191	2.64	—	7.19E-02	—	—	—
MD21-05-60418	21-24656	0.00–0.50	Soil	0.064	—	—	0.984	—	5.18E-02	—	—	—
MD21-05-60419	21-24656	1.50–2.00	Soil	—	—	—	0.145	—	5.41E-02	—	—	—
MD21-05-60421	21-24657	0.00–0.50	Soil	0.282	—	0.03	5.75	—	0.16	—	—	—
MD21-05-60422	21-24657	1.50–2.00	Soil	0.314	0.0786	0.0285	3.89	—	0.52	—	—	—
MD21-05-60424	21-24658	0.00–0.50	Soil	0.119	—	—	0.459	—	4.62E-02	—	—	—
MD21-05-60425	21-24658	1.50–2.00	Soil	0.0459	—	—	1.52	—	2.73E-02	—	—	—
MD21-05-60437	21-24659	0.00–0.50	Soil	0.452 (J+)	—	0.0497 (J+)	6.12 (J+)	—	6.64E-02	—	—	2.47
MD21-05-60436	21-24659	1.00–1.50	Soil	0.0361 (J+)	0.149	—	0.623	—	2.57E-02	—	—	—
MD21-05-60440	21-24660	1.50–2.00	Soil	1.13 (J+)	—	0.0979	11.1	0.0966	—	—	—	—
MD21-05-60443	21-24661	1.50–2.00	Soil	0.0163 (J+)	0.0916	—	0.136	—	1.13E-02	—	—	—
MD21-05-60445	21-24662	0.00–0.50	Soil	0.0223 (J+)	—	—	0.23	—	5.60E-02	—	—	—
MD21-05-60446	21-24662	1.50–2.00	Soil	—	—	—	0.0129	—	4.36E-02	—	—	—
MD21-05-60448	21-24663	0.00–0.50	Soil	0.0447 (J+)	—	—	0.615	—	1.81E-02	—	0.21	2.34
MD21-05-60449	21-24663	1.50–2.00	Soil	—	—	—	—	—	4.65E-02	—	—	—
MD21-05-60451	21-24664	0.00–0.50	Soil	—	1.77	0.0265	2.05	—	2.64E-02	3.75	0.366	4.35
MD21-05-60452	21-24664	1.50–2.00	Soil	—	—	—	0.0644	—	—	—	—	—
MD21-05-60454	21-24665	0.00–0.50	Soil	0.574 (J+)	—	0.0586	6.33	—	0.065	—	—	—
MD21-05-60455	21-24665	1.50–2.00	Soil	0.806 (J+)	0.116	0.0957 (J+)	8.31 (J+)	—	5.58E-02	—	—	—
MD21-05-60457	21-24666	0.00–0.50	Soil	—	—	—	0.101	—	1.25E-02	—	—	—
MD21-05-60458	21-24666	1.50–2.00	Soil	—	—	—	0.0886	—	1.47E-02	—	—	—
MD21-05-60460	21-24667	0.00–0.50	Soil	0.0327	—	—	0.213	—	1.92E-02	—	—	—

Table 7.3-8 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Sediment Background Value				**0.040**	**0.90**	**0.006**	**0.068**	**1.04**	**0.093**	**2.59**	**0.20**	**2.29**
MD21-05-60461	21-24667	1.50–2.00	Soil	—	—	—	—	—	8.61E-03	—	—	—
MD21-05-60464	21-24668	1.50–2.00	Soil	0.0186	—	—	0.0306	—	0.026	—	—	—
MD21-05-60466	21-24669	0.00–0.50	Soil	0.0551	—	—	1.56	—	3.47E-02	—	—	—
MD21-05-60467	21-24669	1.50–2.00	Soil	0.0184	—	—	0.325	—	1.85E-02	—	—	—
MD21-05-60469	21-24670	0.00–0.50	Soil	0.0307	—	—	0.278	—	9.05E-03	—	—	—
MD21-05-60470	21-24670	1.50–2.00	Soil	—	—	—	—	—	2.88E-02	—	—	—
MD21-05-60472	21-24671	0.00–0.50	Soil	—	—	—	0.144	—	0.015	—	—	—
MD21-05-60473	21-24671	1.50–2.00	Soil	—	—	—	—	—	0.020	—	—	—
MD21-05-60475	21-24672	0.00–0.50	Soil	0.0237	—	—	0.242	—	1.87E-02	—	—	—
MD21-05-60476	21-24672	1.50–2.00	Soil	—	—	—	0.0289	—	0.040	—	—	—
MD21-05-60478	21-24673	0.00–0.50	Soil	0.222	—	—	1.98	—	0.030	—	—	—
MD21-05-60479	21-24673	1.50–2.00	Soil	—	—	—	—	—	1.21E-02	—	—	—
MD21-05-60481	21-24674	0.00–0.50	Soil	—	—	—	0.0973	—	—	—	—	—
MD21-05-60484	21-24675	0.00–0.50	Soil	0.0361	—	—	0.723	—	0.013	—	—	—
MD21-05-60485	21-24675	1.50–2.00	Soil	0.0177	—	—	0.376	—	—	—	—	—
MD21-05-60487	21-24676	0.00–0.50	Soil	—	—	—	0.111	—	2.61E-02	—	—	—
MD21-05-60490	21-24677	0.00–0.50	Soil	0.066	—	—	1.45	—	2.27E-02	—	—	—
MD21-05-60491	21-24677	1.50–2.00	Soil	—	—	—	0.242	—	3.68E-02	—	—	—
MD21-05-60493	21-24678	0.00–0.50	Soil	0.236	—	0.0315	4.12	—	8.91E-02	—	—	—
MD21-05-60494	21-24678	1.50–2.00	Soil	0.0848	—	0.0184	1.81	—	0.45	—	—	—
MD21-05-60568	21-24679	0.00–0.50	Soil	0.0271	—	—	0.281	—	2.84E-02	—	—	—
MD21-05-60569	21-24679	1.50–2.00	Soil	—	—	—	—	—	4.02E-02	—	—	—
MD21-05-60571	21-24680	0.00–0.50	Soil	0.534	—	0.0473 (J+)	5.05 (J+)	—	3.78E-02	—	—	—
MD21-05-60572	21-24680	1.50–2.00	Soil	0.451	0.0596	0.0312	3.33	—	5.17E-02	—	—	—

Table 7.3-8 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Sediment Background Value				**0.040**	**0.90**	**0.006**	**0.068**	**1.04**	**0.093**	**2.59**	**0.20**	**2.29**
MD21-05-60574	21-24681	0.00–0.50	Soil	—	—	—	0.116	—	—	—	—	—
MD21-05-60577	21-24682	0.00–0.50	Soil	0.0479	—	—	0.628	—	—	—	—	—
MD21-05-60578	21-24682	1.50–2.00	Soil	—	—	—	—	—	2.39E-02	—	—	—
AOC 21-013(g)												
AAA0236	21-01069	0.00–0.08	Soil	0.027	—	—	0.274	—	—	—	—	—
AAA0237	21-01069	0.00–0.50	Soil	—	—	—	0.115	—	—	—	—	—
AAB8911	21-01874	0.00–0.50	Soil	0.805	—	0.0946	9.12	—	—	—	—	—
AAB8912	21-01874	0.50–1.00	Soil	1.05	0.173	0.114	13.7	—	—	—	—	—
AAB8913	21-01874	1.00–1.33	Soil	—	0.232	0.0343	3.36	—	2.84E-02	—	—	—
AAB9021	21-01896	0.00–0.50	Soil	—	—	0.0548	4.73	—	0.15	—	—	—
AAB9022	21-01896	0.50–1.00	Soil	—	0.384	0.0108	0.682	0.237	3.33E-02	—	—	—
AAB7291	21-02573	0.25–0.50	Sediment	—	—	—	0.0926	—	—	—	—	—
AAB7292	21-02573	0.50–1.00	Sediment	—	—	—	0.4104	—	—	—	—	—
MD21-05-60415	21-24655	0.00–0.50	Soil	0.106	—	—	1.2	—	4.11E-02	—	—	—
MD21-05-60416	21-24655	1.50–2.00	Soil	—	—	—	0.292	—	8.42E-02	—	—	—
MD21-05-60442	21-24661	0.00–0.50	Soil	0.099 (J+)	—	—	1.29	—	0.027	2.68	0.272	3.44
MD21-05-60463	21-24668	0.00–0.50	Soil	0.439	—	0.0308 (J+)	3.33 (J+)	—	2.13E-02	—	—	—

Source: Background/fallout values from LANL (1998, 059730, Table 6.0-2, p. 45).

Note: Units are pCi/g. Data qualifiers are defined in Appendix A.

[a] FV applies to samples collected from 0–6 in. only, all activities detected below 6 in. are reported.

[b] na = Not available.

[c] A dash indicates that if analyzed, sample result is less than background/fallout value or is not detected.

Table 7.3-9
Summary of Organic Chemicals Detected in Soil at SWMU 21-013(b) and AOC 21-013(g)

Sample ID	Location ID	Depth (ft bgs)	Media	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Chrysene	Fluoranthene	Phenanthrene	Pyrene
SWMU 21-013(b)																
MD21-05-60367	21-24639	0.00–0.50	Soil	—*	—	0.0115	—	—	—	—	—	—	—	—	—	—
MD21-05-60368	21-24639	1.50–2.00	Soil	—	—	0.0033 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60371	21-24640	1.50–2.00	Soil	—	—	—	0.0136 (J)	—	0.0157 (J)	—	—	—	0.0171 (J)	0.0218 (J)	0.0122 (J)	0.0275 (J)
MD21-05-60373	21-24641	0.00–0.50	Soil	0.0108 (J+)	—	—	—	—	0.0131 (J+)	—	0.0108 (J+)	—	—	0.0167 (J+)	—	0.0164 (J+)
MD21-05-60374	21-24641	0.50–1.00	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60375	21-24642	0.00–0.50	Soil	—	—	0.0033 (J)	—	—	—	—	—	0.084 (J)	—	0.011 (J)	—	—
MD21-05-60379	21-24643	0.00–0.50	Soil	—	—	0.0036 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60394	21-24648	0.00–0.50	Soil	—	—	—	—	—	—	—	—	8.88 (J)	—	—	—	—
MD21-05-60397	21-24649	0.00–0.50	Soil	—	0.0236 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60401	21-24650	1.50–2.00	Soil	—	—	—	—	—	—	—	—	—	0.506 (J-)	0.925 (J)	0.56 (J)	0.826 (J)
MD21-05-60406	21-24652	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	0.0173 (J)	0.0111 (J)	0.0193 (J)
MD21-05-60407	21-24652	1.50–2.00	Soil	—	0.0506 (J)	0.039 (J)	—	0.0851	0.0286 (J)	—	—	—	—	0.0375	0.0302 (J)	0.0367
MD21-05-60409	21-24653	0.00–0.60	Soil	—	0.0217 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60410	21-24653	1.50–2.00	Soil	—	0.0196 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60419	21-24656	1.50–2.00	Soil	—	0.0015 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60421	21-24657	0.00–0.50	Soil	—	0.0227 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60422	21-24657	1.50–2.00	Soil	—	0.0208 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60424	21-24658	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	0.0339 (J)	0.0508	0.0199 (J)	0.0772
MD21-05-60436	21-24659	1.00–1.50	Soil	—	—	0.0014 (J)	—	—	—	—	—	0.0117 (J)	—	—	—	0.0031 (J)
MD21-05-60437	21-24659	0.00–0.50	Soil	—	—	0.0071	—	—	—	—	—	—	—	0.0175 (J)	—	0.0188 (J)
MD21-05-60440	21-24660	1.50–2.00	Soil	—	0.0029 (J)	0.0018 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60445	21-24662	0.00–0.50	Soil	—	0.0052	0.0051	—	—	—	—	—	—	—	—	—	—
MD21-05-60448	21-24663	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	—	—	0.0095 (J)
MD21-05-60449	21-24663	1.50–2.00	Soil	—	—	—	—	—	—	—	—	0.0451 (J)	—	—	—	—
MD21-05-60451	21-24664	0.00–0.50	Soil	—	0.007	0.0073	—	—	—	—	0.556 (J)	—	—	0.0359	0.0199 (J)	0.0303 (J)
MD21-05-60455	21-24665	1.50–2.00	Soil	0.0124 (J)	0.028 (J)	—	—	—	—	—	—	0.0336 (J)	0.0301 (J)	0.0471	0.0434	0.0744 (J)
MD21-05-60458	21-24666	1.50–2.00	Soil	—	—	—	—	—	—	—	—	0.0103 (J)	—	—	—	—
MD21-05-60464	21-24668	1.50–2.00	Soil	—	0.0039	0.0046	—	—	—	—	—	0.0131 (J)	—	—	—	—
MD21-05-60466	21-24669	0.00–0.50	Soil	—	—	—	—	—	—	—	0.59 (J)	—	—	—	—	—
MD21-05-60467	21-24669	1.50–2.00	Soil	—	—	0.0012 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60469	21-24670	0.00–0.50	Soil	—	0.0032 (J)	0.0018 (J)	—	—	—	—	—	—	—	—	—	—

Table 7.3-9 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Chrysene	Fluoranthene	Phenanthrene	Pyrene
MD21-05-60472	21-24671	0.00–0.50	Soil	—	0.0071	0.0032 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60476	21-24672	1.50–2.00	Soil	—	0.0021 (J)	0.0024 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60478	21-24673	0.00–0.50	Soil	—	0.0021 (J)	0.0016 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60481	21-24674	0.00–0.50	Soil	—	—	—	—	—	—	—	0.648 (J)	—	—	—	—	—
MD21-05-60482	21-24674	1.50–2.00	Soil	—	—	0.0015 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60484	21-24675	0.00–0.50	Soil	—	0.0013 (J)	0.0015 (J)	—	—	—	—	—	—	—	—	—	0.0115 (J)
MD21-05-60487	21-24676	0.00–0.50	Soil	—	—	—	—	—	—	—	0.545 (J)	—	—	—	—	—
MD21-05-60490	21-24677	0.00–0.50	Soil	—	—	0.0274 (J)	—	—	—	—	—	—	—	—	—	0.0119 (J)
MD21-05-60491	21-24677	1.50–2.00	Soil	—	—	0.0254 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60493	21-24678	0.00–0.50	Soil	—	0.0184 (J)	—	—	—	—	—	—	—	—	—	—	0.0164 (J)
MD21-05-60568	21-24679	0.00–0.50	Soil	—	0.0387 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60571	21-24680	0.00–0.50	Soil	—	0.0454 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60572	21-24680	1.50–2.00	Soil	—	0.0017 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60577	21-24682	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	0.018 (J)	0.0128 (J)	0.0145 (J)
RE21-07-597	21-600102	0.00–0.50	Soil	—	—	—	—	—	0.708 (J)	0.0491 (J)	—	—	0.0726 (J)	0.110 (J)	0.121 (J)	0.137 (J)
RE21-07-608	21-600102	1.50–2.00	Soil	—	—	—	—	—	—	—	—	—	—	0.0437 (J)	0.0524 (J)	0.115 (J)
AOC 21-013(g)																
MD21-05-60415	21-24655	0.00–0.50	Soil	—	—	0.0013 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60442	21-24661	0.00–0.50	Soil	—	0.0123	0.0083	—	—	—	—	0.659 (J)	—	—	0.0305 (J)	0.017 (J)	0.0401
MD21-05-60463	21-24668	0.00–0.50	Soil	—	—	0.0024	—	—	—	—	—	—	—	0.0132 (J)	—	0.0156 (J)

Note: Units are mg/kg. Data qualifiers are defined in Appendix A.
*A dash indicates that if analyzed, sample result is not detected.

Table 7.6-1
Summary of Organic Chemicals Detected in
Pore Gas from Boreholes at Consolidated Unit 21-018(a)-99, July–August 2005

Location ID	Sample ID	Depth (ft bgs)	Analyte	Sample Value ($\mu g/m^3$)
21-24524	MD21-05-61752	14–15	Acetone	16 (J)
			Styrene	32
			Toluene	7
			Trichloroethene	9.5
	MD21-05-61753	330–335	Acetone	12
			Styrene	6.8
			Toluene	50
			Trichloroethane[1,1,1-]	17
			Trichloroethene	20
			Xylene[1,3-]+Xylene[1,4-]	5.4
21-24525	MD21-05-61755	4–5	Acetone	100
			Butanol[1-]	720
			Butanone[2-]	26
			Carbon Disulfide	3.3
			Chloroform	36
			Ethanol	470
			Ethylbenzene	5.2
			Ethyltoluene[4-]	4.7
			Methanol	340
			Propanol[2-]	62
			Styrene	74
			Tetrachloroethene	7.1
			Toluene	25
			Trichloroethane[1,1,1-]	9
			Trichloroethene	23
			Trimethylbenzene[1,2,4-]	7.2
			Xylene[1,2-]	5.9
			Xylene[1,3-]+Xylene[1,4-]	17
	MD21-05-61754	26–27	Acetone	100
			Butanone[2-]	5.3
			Chloroform	45
			Styrene	38
			Toluene	16
			Trichloroethane[1,1,1-]	12
			Trichloroethene	26
			Xylene[1,3-]+Xylene[1,4-]	4.7

Table 7.6-1 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Sample Value ($\mu g/m^3$)
21-24526	MD21-05-61757	4–5	Acetone	76
			Butanone[2-]	4.4
			Carbon Tetrachloride	8.4
			Chloroform	18
			Styrene	96
			Tetrachloroethene	7.1
			Toluene	31
			Trichloroethane[1,1,1-]	21
			Trichloroethene	31
			Xylene[1,3-]+Xylene[1,4-]	9.7
	MD21-05-61756	24.2–25.2	Acetone	60 (J)
			Butanone[2-]	5
			Carbon Tetrachloride	17
			Chloroform	44
			Styrene	65
			Tetrachloroethene	8.4
			Toluene	11
			Trichloroethane[1,1,1-]	20
			Trichloroethene	70
			Xylene[1,3-]+Xylene[1,4-]	7.1
21-24527	MD21-05-61759	4.5–5.5	Acetone	150
			Butanone[2-]	24
			Carbon Disulfide	6.2
			Carbon Tetrachloride	8.9
			Ethanol	30
			Propanol[2-]	11
			Styrene	170
			Tetrachloroethene	7.4
			Toluene	33
			Trichloroethane[1,1,1-]	38
			Trichloroethene	34
			Xylene[1,2-]	5
			Xylene[1,3-]+Xylene[1,4-]	16
	MD21-05-61758	28–29	Acetone	41
			Butanol[1-]	22
			Butanone[2-]	4.2
			Carbon Disulfide	3.4
			Carbon Tetrachloride	11

Table 7.6-1 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Sample Value (µg/m³)
			Chloroform	5.4
			Ethanol	21
			Styrene	71
			Toluene	12
			Trichloroethane[1,1,1-]	12
			Trichloroethene	46
			Xylene[1,3-]+Xylene[1,4-]	6.8
21-24528	MD21-05-61761	4–5	Acetone	43
			Butanone[2-]	5.4
			Chloroform	6
			Styrene	99
			Toluene	17
			Trichloroethene	7.7
			Xylene[1,3-]+Xylene[1,4-]	5.5
	MD21-05-61760	26–27	Acetone	41
			Chloroform	6.8
			Styrene	58
			Toluene	11
			Trichloroethene	9.1
			Xylene[1,3-]+Xylene[1,4-]	4
21-24531	MD21-05-61763	14–15	Acetone	32 (J)
			Butanone[2-]	3.8
			Chloroform	32
			Dioxane[1,4-]	25
			Styrene	66
			Tetrachloroethene	7
			Toluene	13
			Trichloroethane[1,1,1-]	8.4
			Trichloroethene	35
			Xylene[1,3-]+Xylene[1,4-]	5.4
	MD21-05-61762	51–52	Acetone	31
			Butanone[2-]	2.9
			Chloroform	37
			Methanol	120
			Styrene	30
			Toluene	8.4
			Trichloroethene	38

Table 7.6-1 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Sample Value (µg/m³)
21-24532	MD21-05-61765	14–15	Acetone	200
			Butanone[2-]	31
			Dichloroethane[1,1-]	4
			Propanol[2-]	24
			Styrene	66
			Toluene	20
			Trichloroethane[1,1,1-]	37
			Trichloroethene	9.4
			Xylene[1,3-]+Xylene[1,4-]	8.7
	MD21-05-61764	23.5–24.5	Acetone	36 (J)
			Chloroform	5.2
			Styrene	56
			Toluene	11
			Trichloroethane[1,1,1-]	5.6
			Trichloroethene	15
			Xylene[1,3-]+Xylene[1,4-]	4.8
21-24533	MD21-05-61767	11–12	Acetone	22
			Carbon Disulfide	3.6
			Chloroform	5.3
			Styrene	35
			Toluene	8.7
			Trichloroethane[1,1,1-]	15
			Trichloroethene	14
			Xylene[1,3-]+Xylene[1,4-]	5.3
21-24533 (continued)	MD21-05-61766	55–56	Acetone	43
			Butanone[2-]	4.6
			Chloroform	7.8
			Styrene	46
			Toluene	15
			Trichloroethane[1,1,1-]	16
			Trichloroethene	28
			Xylene[1,3-]+Xylene[1,4-]	6.3
21-24534	MD21-05-61769	14–15	Acetone	51
			Butanone[2-]	7.4
			Styrene	59
			Toluene	15
			Trichloroethane[1,1,1-]	19
			Trichloroethene	13
			Xylene[1,3-]+Xylene[1,4-]	8.1

Table 7.6-1 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Sample Value (µg/m³)
	MD21-05-61768	22.5–23.5	Acetone	120
			Butanone[2-]	19
			Styrene	86
			Toluene	17
			Trichloroethane[1,1,1-]	22
			Trichloroethene	18
			Xylene[1,3-]+Xylene[1,4-]	8.8
21-24535	MD21-05-61771	14–15	Acetone	30 (J)
			Styrene	47
			Toluene	14
			Trichloroethane[1,1,1-]	6.4
			Trichloroethene	7.4
			Xylene[1,3-]+Xylene[1,4-]	5.1
	MD21-05-61770	45.2–46.2	Acetone	31 (J)
			Butanone[2-]	3.8
			Chloroform	4.6
			Styrene	47
			Toluene	12
			Trichloroethene	22
21-24538	MD21-05-61773	14–15	Acetone	12 (J)
			Styrene	51
			Toluene	7.8
			Trichloroethene	13
	MD21-05-61772	34.5–35.5	Acetone	31 (J)
			Butanone[2-]	3.8
			Styrene	39
			Toluene	9.7
			Trichloroethene	15
21-24539	MD21-05-61775	14–15	Acetone	16
			Carbon Tetrachloride	5.7 (J)
			Styrene	29
			Toluene	8.8
			Trichloroethane[1,1,1-]	6.1
			Trichloroethene	37
	MD21-05-61774	57.5–58.5	Acetone	43
			Styrene	41
			Tetrachloroethene	6.4 (J)
			Toluene	21

Table 7.6-1 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Sample Value ($\mu g/m^3$)
			Trichloroethane[1,1,1-]	8.8
			Trichloroethene	37
			Xylene[1,3-]+Xylene[1,4-]	5.3
21-24540	MD21-05-61777	11–12	Acetone	49
			Styrene	57
			Tetrachloroethene	8.3
			Toluene	26
			Trichloroethane[1,1,1-]	10
			Trichloroethene	17
			Xylene[1,3-]+Xylene[1,4-]	7.5
	MD21-05-61776	24–25	Acetone	80
			Butanone[2-]	4.5
			Styrene	53
			Tetrachloroethene	7.6
			Toluene	34
			Trichloroethane[1,1,1-]	12
			Trichloroethene	19
			Xylene[1,3-]+Xylene[1,4-]	9.5
21-24541	MD21-05-61779	19–20	Acetone	26
			Butanone[2-]	4
			Styrene	15
	MD21-05-61778	55–56	Acetone	57
			Butanone[2-]	2.8
			Carbon Tetrachloride	7.8
			Chloroform	6.3
			Styrene	67
			Tetrachloroethene	6.5
			Toluene	13
			Trichloroethane[1,1,1-]	7.9
			Trichloroethene	64
			Xylene[1,3-]+Xylene[1,4-]	5.1
21-24542	MD21-05-61781	14–15	Acetone	36
			Carbon Tetrachloride	6
			Chloroform	24
			Styrene	52
			Toluene	16
			Trichloroethane[1,1,1-]	7
			Trichloroethene	35

Table 7.6-1 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Sample Value ($\mu g/m^3$)
			Xylene[1,3-]+Xylene[1,4-]	4.2
	MD21-05-61780	23.5–24.5	Acetone	31
			Chloroform	15
			Styrene	33
			Toluene	16
			Trichloroethane[1,1,1-]	8.2
			Trichloroethene	19
			Xylene[1,3-]+Xylene[1,4-]	4.2

Note: Data qualifiers are defined in Appendix A.

Table 7.6-2
Summary of Organic Chemicals Detected in Pore Gas from Boreholes at Consolidated Unit 21-018(a)-99, May–June 2006

Location ID	Sample ID	Depth (ft bgs)	Analyte	Result ($\mu g/m^3$)
21-24524	MD21-06-71201	379–380	Acetone	680
			Butanol[1-]	30
			Butanone[2-]	120
			Carbon Disulfide	21
			Ethanol	14
			Ethylbenzene	7.1
			Ethyltoluene[4-]	5.5
			Hexane	74
			Methyl-2-pentanone[4-]	5.9
			n-Heptane	36
			Toluene	37
			Trichloroethane[1,1,1-]	16
			Trichloroethene	25
			Xylene[1,2-]	4.4 (J)
			Xylene[1,3-]+Xylene[1,4-]	9.5
21-24525	MD21-06-71204	4–5	Acetone	52
			Benzene	3.3
			Butanone[2-]	13
			Carbon Tetrachloride	2.8 (J)
			Chloroform	11
			Chloromethane	0.88 (J)
			Dichlorodifluoromethane	3.7
			Ethylbenzene	2.5
			Ethyltoluene[4-]	1.2 (J)
			Hexane	1.6 (J)
			Styrene	0.98 (J)
			Tetrachloroethene	1.4 (J)
			Tetrahydrofuran	9.5
			Toluene	15
			Trichloroethene	7.4
			Trichlorofluoromethane	2.6 (J)
			Trimethylbenzene[1,2,4-]	2.7
			Xylene[1,2-]	2.6
			Xylene[1,3-]+Xylene[1,4-]	7.1

Table 7.6-2 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Result (µg/m3)
	MD21-06-71203	39–40	Acetone	260
			Butanone[2-]	12
			Carbon Tetrachloride	12
			Chloroform	120
			Ethanol	13
			Hexane	7.2
			Propylene	110
			Tetrachloroethene	13
			Toluene	12
			Trichloroethane[1,1,1-]	27
			Trichloroethene	110
21-24526	MD21-06-71206	4–5	Acetone	200
			Benzene	5.4
			Butanone[2-]	21
			Carbon Disulfide	7.6
			Carbon Tetrachloride	1.7 (J)
			Chloromethane	2.2
			Dichlorodifluoromethane	3.6
			Ethylbenzene	2 (J)
			Hexane	2.7
			Methyl-2-pentanone[4-]	2.7
			Styrene	1.3 (J)
			Tetrahydrofuran	12
			Toluene	14
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	1.7 (J)
			Trichloroethene	1.1 (J)
			Trichlorofluoromethane	2.2 (J)
			Trimethylbenzene[1,2,4-]	2.6
			Vinyl acetate	4.2
			Xylene[1,2-]	2.1 (J)
			Xylene[1,3-]+Xylene[1,4-]	6.4
21-24526	MD21-06-71205	39–40	Acetone	120
			Butanone[2-]	4.2
			Carbon Disulfide	4.1
			Propylene	22
			Toluene	7.2
			Trichloroethane[1,1,1-]	21
			Trichloroethene	17

Table 7.6-2 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Result (µg/m3)
21-24527	MD21-06-71208	4.50–5.50	Acetone	140
			Benzene	4.2
			Butanone[2-]	16
			Carbon Tetrachloride	2.4 (J)
			Chloroform	22
			Chloromethane	2.1
			Dichlorodifluoromethane	3.3
			Ethylbenzene	2.2
			Ethyltoluene[4-]	1.3 (J)
			Hexane	1.9
			Methyl-2-pentanone[4-]	2 (J)
			Styrene	1.4 (J)
			Tetrachloroethene	11
			Tetrahydrofuran	5.9
			Toluene	14
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	1.6 (J)
			Trichloroethene	2.9
			Trichlorofluoromethane	2.1 (J)
			Trimethylbenzene[1,2,4-]	3
			Trimethylbenzene[1,3,5-]	1 (J)
			Xylene[1,2-]	2.2
			Xylene[1,3-]+Xylene[1,4-]	6.9
21-24527	MD21-06-71207	39–40	Acetone	140
			Benzene	14
			Butanone[2-]	19
			Carbon Disulfide	4
			Carbon Tetrachloride	6.7
			Chloroform	5.1
			Chloromethane	3.3 (J-)
			Dichlorodifluoromethane	2.2 (J)
			Ethylbenzene	2.3
			Hexane	19
			Styrene	0.98 (J)
			Tetrachloroethene	4.9
			Toluene	16
			Trichloroethane[1,1,1-]	10
			Trichloroethene	41

Table 7.6-2 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Result (µg/m3)
	MD21-06-71207	39–40	Trichlorofluoromethane	1.7 (J)
			Trimethylbenzene[1,2,4-]	0.84 (J)
			Xylene (Total)	3.9 (J)
21-24528	MD21-06-71210	4–5	Acetone	150
			Butanone[2-]	18
			Hexane	7.3
			n-Heptane	13
			Styrene	8
			Tetrachloroethene	6.6
			Toluene	25
			Trichloroethane[1,1,1-]	16
			Trichloroethene	16
			Xylene[1,3-]+Xylene[1,4-]	8.7
	MD21-06-71209	39–40	Acetone	88
			Butanone[2-]	4.7
			Carbon Tetrachloride	13
			Chloroform	70
			Propylene	44
			Tetrachloroethene	7.2
			Toluene	4.3
			Trichloroethane[1,1,1-]	8.5
			Trichloroethene	100
21-24531	MD21-06-71212	14–15	Acetone	250
			Butanone[2-]	34
			Carbon Disulfide	27
			Chloroform	26
			Hexane	3.9
			n-Heptane	6.4
			Styrene	11
			Tetrachloroethene	7
			Toluene	13
			Trichloroethane[1,1,1-]	15
			Trichloroethene	39
			Xylene[1,3-]+Xylene[1,4-]	7

Table 7.6-2 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Result (µg/m3)
	MD21-06-71211	79–80	Acetone	100
			Benzene	2.1
			Bromodichloromethane	1.7
			Butanone[2-]	23
			Carbon Tetrachloride	8.4
			Chloroform	31
			Chloromethane	2.3
			Dichlorodifluoromethane	3.3
			Ethylbenzene	1.3
			Methyl-2-pentanone[4-]	5.2 (J)
			Styrene	1.2
			Tetrachloroethene	6.2
			Toluene	6.1
			Trichloroethane[1,1,1-]	9.7
			Trichloroethene	94
			Trichlorofluoromethane	2.5
			Trimethylbenzene[1,2,4-]	2.5
			Xylene (Total)	3.5
			Xylene[1,2-]	0.98
21-24532	MD21-06-71214	14–15	Acetone	23
			Benzene	0.73 (J)
			Carbon Disulfide	5.5
			Carbon Tetrachloride	1.6 (J)
			Chloromethane	1.5
			Dichlorodifluoromethane	3.4
			Methylene Chloride	0.82 (J)
			Toluene	1.9 (J)
			Trichloro-1,2,2-trifluoroethane[1,1,2-]	1.7 (J)
			Trichlorofluoromethane	2.1 (J)
			Xylene[1,3-]+Xylene[1,4-]	1.3 (J)
	MD21-06-71213	39–40	Acetone	110
			Butanone[2-]	4.4
			Propylene	13
			Toluene	5.3
			Trichloroethane[1,1,1-]	11
			Trichloroethene	9.2

Table 7.6-2 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Result (µg/m3)
21-24533	MD21-06-71216	11–12	Acetone	19
			Butanone[2-]	2.9
			Trichloroethene	7.5
	MD21-06-71215	84–85	Carbon Tetrachloride	2.7 (J)
			Tetrachloroethene	2.6 (J)
			Toluene	2.1
			Trichloroethane[1,1,1-]	5
			Trichloroethene	32
21-24534	MD21-06-71218	14–15	Acetone	36
			Butanone[2-]	5.2
			Toluene	6.4
			Trichloroethene	11
	MD21-06-71217	39–40	Acetone	100
			Butanone[2-]	7.6
			Propylene	8.3
			Toluene	5.2
			Trichloroethane[1,1,1-]	10
			Trichloroethene	14
21-24535	MD21-06-71220	14–15	Acetone	35
			Butanone[2-]	5.6
			Carbon Disulfide	2.9
			Toluene	3.8
			Trichloroethane[1,1,1-]	8.2
			Trichloroethene	16
	MD21-06-71219	79–80	Acetone	170
			Benzene	2.8
			Butanone[2-]	8.8
			Carbon Tetrachloride	4.4
			Chloroform	6.6
			Chloromethane	1.1
			Dichlorodifluoromethane	2.4
			Dichloroethane[1,1-]	1.9
			Dichloroethane[1,2-]	4.2
			Dichloropropane[1,2-]	5.2
			Ethylbenzene	2.5
			Ethyltoluene[4-]	3.2
			Tetrachloroethene	20
			Toluene	17

Table 7.6-2 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Result (µg/m3)
	MD21-06-71219	79–80	Trichloro-1,2,2-trifluoroethane[1,1,2-]	3.4
			Trichloroethane[1,1,1-]	170
			Trichloroethene	99
			Trimethylbenzene[1,2,4-]	4.5
			Xylene (Total)	14
			Xylene[1,2-]	3.5
21-24538	MD21-06-71222	14–15	Acetone	34
			Butanone[2-]	5.2
			Ethanol	9.7
			Toluene	46
			Trichloroethene	16
			Xylene[1,3-]+Xylene[1,4-]	4.3
	MD21-06-71221	54–55	Acetone	190
			Benzene	1.2
			Butanone[2-]	7.7
			Carbon Tetrachloride	2.4
			Chloroform	2.7
			Chloromethane	1.1
			Dichlorodifluoromethane	3.1
			Dichloroethane[1,2-]	0.93
			Styrene	0.97
			Tetrachloroethene	6.9
			Toluene	5.1
			Trichloroethane[1,1,1-]	15
			Trichloroethene	40
21-24539	MD21-06-71224	14–15	Acetone	36
			Butanone[2-]	7.6
			Toluene	13
			Trichloroethane[1,1,1-]	7.2
			Trichloroethene	37
			Xylene[1,3-]+Xylene[1,4-]	4.6
	MD21-06-71223	79–80	Acetone	210
			Butanone[2-]	17
			Carbon Tetrachloride	21
			Chloroform	26
			Ethanol	10
			Hexane	26
			n-Heptane	11

Table 7.6-2 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Result (µg/m3)
	MD21-06-71223	79–80	Propylene	310
			Tetrachloroethene	15
			Toluene	29
			Trichloroethane[1,1,1-]	25
			Trichloroethene	260
			Xylene[1,3-]+Xylene[1,4-]	6.4
21-24540	MD21-06-71226	11–12	Acetone	63
			Butanone[2-]	7
			Carbon Disulfide	5.1
			Methylene Chloride	11
			Styrene	5.5
			Toluene	7.5
			Trichloroethane[1,1,1-]	5.3
			Xylene[1,3-]+Xylene[1,4-]	5.6
	MD21-06-71225	39–40	Acetone	120
			Butanone[2-]	4.1
			Propylene	19
			Tetrachloroethene	8.4
			Toluene	9.1
			Trichloroethane[1,1,1-]	18
			Trichloroethene	40
21-24541	MD21-06-71228	19–20	Acetone	160
			Butanone[2-]	26
			Hexane	3.8
			n-Heptane	6.7
			Toluene	12
			Trichloroethane[1,1,1-]	6.3
			Trichloroethene	16
	MD21-06-71227	79–80	Acetone	40
			Benzene	1.9
			Butanone[2-]	7.9
			Carbon Tetrachloride	11
			Chloroform	7.5
			Chloromethane	0.88
			Dichlorodifluoromethane	2.6
			Ethylbenzene	21
			Ethyltoluene[4-]	55
			Tetrachloroethene	4.9

Table 7.6-2 (continued)

Location ID	Sample ID	Depth (ft bgs)	Analyte	Result (μg/m3)
	MD21-06-71227	79–80	Toluene	7.5
			Trichloroethane[1,1,1-]	10
			Trichloroethene	110
			Trichlorofluoromethane	2.9
			Trimethylbenzene[1,2,4-]	95
			Trimethylbenzene[1,3,5-]	30
			Xylene (Total)	110
			Xylene[1,2-]	31
21-24542	MD21-06-71230	14–15	Acetone	44
			Butanone[2-]	3
			Chloroform	7.2
			Trichloroethene	6.3
			Vinyl Chloride	3.9
	MD21-06-71229	39–40	Acetone	98
			Carbon Tetrachloride	11
			Chloroform	64
			Hexane	7
			Propylene	94
			Tetrachloroethene	14
			Toluene	15
			Trichloroethane[1,1,1-]	22
			Trichloroethene	120
			Xylene[1,3-]+Xylene[1,4-]	4.9

Note: Data qualifiers are defined in Appendix A.

Table 7.6-3
Summary of Tritium Detected in Pore Gas from
Boreholes at Consolidated Unit 21-018(a)-99, July–August 2005

Location ID	Sample ID	Depth (ft bgs)	Sample Value (pCi/L)
21-24524	MD21-05-61752	14–15	24570
21-24525	MD21-05-61755	4–5	8703
21-24526	MD21-05-61757	4–5	4698
21-24527	MD21-05-61759	4.5–5.5	470.7
	MD21-05-61758	28–29	479.6
21-24531	MD21-05-61763	14–15	5717
21-24533	MD21-05-61767	11–12	1187
	MD21-05-61766	55–56	2582
21-24534	MD21-05-61768	22.5–23.5	5933
21-24535	MD21-05-61770	45.2–46.2	3898
21-24539	MD21-05-61774	57.5–58.5	1176
21-24540	MD21-05-61776	24–25	2134
21-24542	MD21-05-61781	14–15	1416
	MD21-05-61780	23.5–24.5	1439

Table 7.6-4
Summary of Tritium Detected in Pore Gas from
Boreholes at Consolidated Unit 21-018(a)-99, May–June 2006

Location ID	Sample ID	Depth (ft bgs)	Result (pCi/L)
21-24524	MD21-06-71202	14–15	64700
	MD21-06-71201	379–380	132100
21-24525	MD21-06-71203	39–40	440
21-24526	MD21-06-71206	4–5	470
	MD21-06-71205	39–40	566
21-24527	MD21-06-71208	4.50–5.50	1090
	MD21-06-71207	39–40	450
21-24528	MD21-06-71210	4–5	360
	MD21-06-71209	39–40	528
21-24531	MD21-06-71212	14–15	2100
	MD21-06-71211	79–80	1010
21-24532	MD21-06-71214	14–15	3080
	MD21-06-71213	39–40	346
21-24533	MD21-06-71216	11–12	1890
	MD21-06-71215	84–85	1990
21-24534	MD21-06-71218	14–15	1400
	MD21-06-71217	39–40	694
21-24535	MD21-06-71220	14–15	3860
	MD21-06-71219	79–80	8080
21-24538	MD21-06-71222	14–15	1500
	MD21-06-71221	84–85	17400
21-24539	MD21-06-71224	14–15	18500
21-24540	MD21-06-71226	11–12	980
	MD21-06-71225	39–40	520
21-24541	MD21-06-71228	19–20	19400
	MD21-06-71227	79–80	530
21-24542	MD21-06-71230	14–15	410
	MD21-06-71229	39–40	800

Appendix A

Acronyms, Glossary,
Metric Conversion Table, and Data Qualifier Definitions

A-1.0 ACRONYMS

amsl	above mean sea level
AOC	Area of Concern
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
AUF	area use factor
B&K	Brüel & Kjaer
BCG	bioconcentration guide
bgs	below ground surface
BH	borehole
BMP	best management practices
BV	background value
CCV	continuing calibration verification
COC	chain-of-custody
cpm	counts per minute
cps	counts per second
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CSM	conceptual site model
CST	Chemical Science and Technology
CVAA	cold vapor atomic absorption
D&D	decontamination and decommissioning
DER	duplicate error ratio
DGPS	differential global positioning system
DOE	Department of Energy (U.S.)
DL	detection limit
DP	Delta Prime
dpm	disintegrations per minute
EDL	estimated detection limit
EP	Environmental Programs Directorate
EPA	Environmental Protection Agency (U.S.)
EQL	estimated quantitation limit
ER	Environmental Restoration Project
ERDB	Environmental Restoration Database
ESL	ecological screening level
FV	fallout value

GFAA	graphite furnace atomic absorption
HASL	Health and Human Safety Laboratory
HI	hazard index
HIR	historical investigation report
HQ	hazard quotient
HR	home range
HWA	Hazardous Waste Act
IA	Information Architecture
ICV	initial calibration verification
ID	identification
IDW	investigation-derived waste
KPA	kinetic phosphorescence analysis
LAL	lower acceptance limit
LANL or the Laboratory	Los Alamos National Laboratory
LANS	Los Alamos National Security
LOAEL	lowest-observed-adverse-effect level
LCS	laboratory control sample
MCL	maximum contaminant level
MDA	material disposal area
MDC	maximum detectable concentration
MDL	method detection limit
MOSA	Methods of Soil Analysis
MS	matrix spike
MSI	Mount Sopris Instruments
NMED	New Mexico Environment Department
NMHWA	New Mexico Hazardous Waste Act
NMSA	New Mexico Statutes Annotated
NMWQCC	New Mexico Water Quality Control Commission
NOAEL	no-observed-adverse-effect level
NOD	notice of disapproval
NTISV	nontraditional in situ vitrification
PAH	polycyclic aromatic hydrocarbon
PAUF	population area use factor
PCB	polychlorinated biphenyl
PID	photoionization detector
PPE	personal protective equipment

PRG	preliminary remediation goal
QA	quality assurance
QC	quality control
QP	quality procedures
RAIS	Risk Assessment Information System
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RESRAD	radioactive residual materials
RfD	reference dose
RFI	RCRA Facility Investigation
RPD	relative percent difference
RPF	Records Processing Facility
SAL	screening action level
SCL	sample collection log
SF	slope factor
SMO	Sample Management Office
SOP	standard operating procedures
SSL	soil screening level
SSO	site-safety officer
SVOC	semivolatile organic compound
SWA	Solid Waste Act
SWMU	solid waste management unit
T&E	threatened and endangered
TA	Technical Area
TAL	target analyte list
TD	total depth
UAL	upper acceptance limit
UCL	upper confidence limit
VCP	vitrified clay pipe
VOC	volatile organic compound
VCA	voluntary corrective action
VCM	voluntary corrective measure
WCSF	waste characterization strategy form

A-2.0 GLOSSARY

abandonment—The plugging of a well or borehole in a manner that precludes the migration of surface runoff or groundwater along the length of the well or borehole.

absorption—The uptake of water, other fluids, or dissolved chemicals by a cell or organism (e.g., tree roots absorb dissolved nutrients in soil).

action level—(1) A numerical value that has been established by statistical analysis or has been set according to regulatory limits and is used as a criterion for action. Contamination found in a particular medium below an appropriate action level is not generally subject to remediation or further study. (2) A health- and environment-based concentration derived using chemical-specific toxicity information and standardized exposure assumptions. An action level can be developed on a facility-specific basis or can be taken from standardized lists.

administrative authority—For Los Alamos National Laboratory, one or more regulatory agencies, such as the New Mexico Environment Department, the U.S. Environmental Protection Agency, or the U.S. Department of Energy, as appropriate.

alluvial—Pertaining to geologic deposits or features formed by running water.

alpha radiation—A form of particle radiation that is highly ionizing and has low penetration. Alpha radiation consists of two protons and two neutrons bound together into a particle that is identical to a helium nucleus and can be written as He^{2+}.

analysis—A critical evaluation, usually made by breaking a subject (either material or intellectual) down into its constituent parts, then describing the parts and their relationship to the whole. Analyses may include physical analysis, chemical analysis, toxicological analysis, and knowledge-of-process determinations.

analyte—The element, nuclide, or ion a chemical analysis seeks to identify and/or quantify; the chemical constituent of interest.

analytical method—A procedure or technique for systematically performing an activity.

area of concern—(1) A release that may warrant investigation or remediation and is not a solid waste management unit (SWMU). (2) An area at Los Alamos National Laboratory that may have had a release of a hazardous waste or a hazardous constituent but is not a SWMU.

artificial fill—A material that has been imported and typically consists of disturbed *soils* mixed with crushed Bandelier Tuff or other rock types.

ash-flow tuff—A tuff deposited by a hot, dense volcanic current. Ash-flow tuff can be either welded tuff or nonwelded tuff.

assessment—(1) The act of reviewing, inspecting, testing, checking, conducting surveillance, auditing, or otherwise determining and documenting whether items, processes, or services meet specified requirements. (2) An evaluation process used to measure the performance or effectiveness of a system and its elements. In this glossary, assessment is an all-inclusive term used to denote any one of the following: audit, performance evaluation, management system review, peer review, inspection, or surveillance.

assessment endpoint—In an ecological risk assessment, the expression of an environmental value to be protected (e.g., fish biomass or reproduction of avian populations).

background concentration—Naturally occurring concentrations of an inorganic chemical or radionuclide in soil, sediment, or tuff.

background data—Data that represent naturally occurring concentrations of inorganic and radionuclide constituents in a geologic medium. Los Alamos National Laboratory's (the Laboratory's) background data are derived from samples collected at locations that are either within, or adjacent to, the Laboratory. These locations (1) are representative of geological media found within Laboratory boundaries, and (2) have not been affected by Laboratory operations.

background level—(1) The concentration of a substance in an environmental medium (air, water, or soil) that occurs naturally or is not the result of human activities. (2) In exposure assessment, the concentration of a substance in a defined control area over a fixed period of time before, during, or after a data-gathering operation.

background radiation—The amount of radioactivity naturally present in the environment, including cosmic rays from space and natural radiation from soils and rock.

background sample—A sample collected from an area or site that is similar to the one being studied but known, or thought, to be free from constituents of concern.

background value (BV)—A statistically derived concentration (i.e., the upper tolerance limit [UTL]) of a chemical used to represent the background data set. If a UTL cannot be derived, either the detection limit or maximum reported value in the background data set is used.

barrier—Any material or structure that prevents, or substantially delays, the movement of solid-, liquid-, or gaseous-phase chemicals in environmental media.

baseline risk assessment—A site-specific analysis of the potential adverse effects of hazardous constituents that have been released from a site in the absence of any controls or mitigating actions. A baseline risk assessment consists of the following four steps: data collection and analysis, exposure assessment, toxicity assessment, and risk characterization.

bentonite—An absorbent aluminum silicate clay formed from volcanic ash and used in various adhesives, cements, and ceramic fillers. Because bentonite can absorb large quantities of water and expand to several times its normal volume, it is a common drilling mud additive.

best management practices—Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources.

beta radiation—High-energy electrons emitted by certain types of radioactive nuclei, such as potassium-40. The beta particles emitted are a form of ionizing radiation also known as beta rays.

bias—The systematic deviation from a true value that remains constant over replicated measurements within the statistical precision of the measurement process.

blank—A sample that is expected to have a negligible or unmeasurable amount of an analyte. Results of blank sample analyses indicate whether field samples might have been contaminated during the sample collection, transport, storage, preparation, or analysis processes.

borehole—(1) A hole drilled or bored into the ground, usually for exploratory or economic purposes. (2) A hole into which casing, screen, and other materials may be installed to construct a well.

borehole logging—The process of making remote measurements of physical, chemical, or other parameters at multiple depths in a borehole.

calibration—A process used to identify the relationship between the true analyte concentration or other variable and the response of a measurement instrument, chemical analysis method, or other measurement system.

calibration blank—A calibration standard prepared to contain negligible or unmeasurable amounts of analytes. A calibration blank is used to establish the zero concentration point for analytical measurement calibrations.

calibration standard—A sample prepared to contain known amounts of analytes of interest and other constituents required for an analysis.

caliche (properly called pedogenic calcite, also known as calcrete)—A layer of hard subsoil encrusted with calcium carbonate that occurs in arid or semiarid regions or precipitates out of groundwater (groundwater caliche). Typically found in near-surface soil.

canyon—A stream-cut chasm or gorge, the sides of which are composed of cliffs or a series of cliffs rising from the chasm's bed. Canyons are characteristic of arid or semiarid regions where downcutting by streams greatly exceeds weathering.

chain of custody—An unbroken, documented trail of accountability that is designed to ensure the uncompromised physical integrity of samples, data, and records.

chemical—Any naturally occurring or human-made substance characterized by a definite molecular composition.

chemical analysis—A process used to measure one or more attributes of a sample in a clearly defined, controlled, and systematic manner. Chemical analysis often requires treating a sample chemically or physically before measurement.

chemical of potential concern (COPC)—A detected chemical compound or element that has the potential to adversely affect human receptors as a result of its concentration, distribution, and toxicity.

chemical of potential ecological concern—A detected chemical compound or element that has the potential to adversely affect ecological receptors as a result of its concentration, distribution, and toxicity.

cleanup—A series of actions taken to deal with the release, or threat of a release, of a hazardous substance that could affect humans and/or the environment. The term cleanup is sometimes used interchangeably with the terms remedial action, removal action, or corrective action.

cleanup levels—Media-specific contaminant concentration levels that must be met by a selected corrective action. Cleanup levels are established by using criteria such as the protection of human health and the environment; compliance with regulatory requirements; reduction of toxicity, mobility, or volume through treatment; long- and short-term effectiveness; implementability; and cost.

Code of Federal Regulations (CFR)—A document that codifies all rules of the executive departments and agencies of the federal government. The code is divided into 50 volumes, known as titles. Title 40 of the CFR (referenced as 40 CFR) covers environmental regulations.

Compliance Order on Consent (Consent Order)—For the Environmental Remediation and Surveillance Program, an enforcement document signed by the New Mexico Environment Department, the U.S. Department of Energy, and the Regents of the University of California on March 1, 2005, which prescribes the requirements for corrective action at Los Alamos National Laboratory. The purposes of the Consent Order are (1) to define the nature and extent of releases of contaminants at, or from, the facility; (2) to identify and evaluate, where needed, alternatives for corrective measures to clean up contaminants in the environment and prevent or mitigate the migration of contaminants at, or from, the facility; and (3) to implement such corrective measures. The Consent Order supersedes the corrective action requirements previously specified in Module VIII of the Laboratory's Hazardous Waste Facility Permit.

Consent Order—See Compliance Order on Consent.

consolidated unit—A group of solid waste management units (SWMUs), or SWMUs and areas of concern, which generally are geographically proximate and have been combined for the purposes of investigation, reporting, or remediation.

contaminant—(1) Chemicals and radionuclides present in environmental media or on debris above background levels. (2) According to the March 1, 2005, Compliance Order on Consent (Consent Order), any hazardous waste listed or identified as characteristic in 40 Code of Federal Regulations (CFR) 261 (incorporated by 20.4.1.200 New Mexico Administrative Code [NMAC]); any hazardous constituent listed in 40 CFR 261 Appendix VIII (incorporated by 20.4.1.200 NMAC) or 40 CFR 264 Appendix IX (incorporated by 20.4.1.500 NMAC); any groundwater contaminant listed in the Water Quality Control Commission (WQCC) Regulations at 20.6.3.3103 NMAC; any toxic pollutant listed in the WQCC Regulations at 20.6.2.7 NMAC; explosive compounds; nitrate; and perchlorate. (Note: Under the Consent Order, the term "contaminant" does not include radionuclides or the radioactive portion of mixed waste.)

contract analytical laboratory—An analytical laboratory under contract to the University of California to analyze samples from work performed at Los Alamos National Laboratory.

corrective action—(1) In the Resource Conservation and Recovery Act, an action taken to rectify conditions potentially adverse to human health or the environment. (2) In the quality assurance field, the process of rectifying and preventing nonconformances.

daily calibration—The combination of a calibration blank and calibration standard used to determine if the instrument response to an analyte concentration is within acceptable bounds relative to the initial calibration. A daily calibration establishes the instrument response factors on which quantitations are based, thus verifying the satisfactory performance of an instrument on a day-to-day basis.

data package—The hard copy deliverable for each sample delivery group produced by a contract analytical laboratory in accordance with the statement of work for analytical services.

data-quality assessment—The statistical and/or scientific evaluation of a data set that establishes whether the data set is adequate for its intended use.

data-quality objectives—Qualitative and quantitative statements of the overall level of uncertainty that a decision maker will accept regarding results or decisions based on environmental data. The objectives provide the statistical framework for planning and managing environmental data operations that will meet user needs.

data validation—A systematic process that applies a defined set of performance-based criteria to a body of data and that may result in the qualification of the data. The data-validation process is performed independently of the analytical laboratory that generates the data set and occurs before conclusions are drawn from the data. The process may include a standardized data review (routine data validation) and/or a problem-specific data review (focused data validation).

decommissioning—The permanent removal of facilities and their components from service after the discontinued use of structures or buildings that are deemed no longer useful. Decommissioning must take place in accordance with regulatory requirements and applicable environmental policies.

decontamination—The removal of unwanted material from the surface of, or from within, another material.

detect (detection)—An analytical result, as reported by an analytical laboratory, that denotes a chemical or radionuclide to be present in a sample at a given concentration.

detection limit—The minimum concentration that can be determined by a single measurement of an instrument. A detection limit implies a specified statistical confidence that the analytical concentration is greater than zero.

discharge—The accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of hazardous waste into, or on, any land or water.

disposal—The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into, or on, any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.

dose (dosage)—(1) The actual quantity of a chemical that is administered to an organism or to which it is exposed. (2) The amount of a substance that reaches a specific tissue (e.g., the liver). (3) The amount of a substance that is available for interaction with metabolic processes after it has crossed an organism's outer boundary.

dose equivalent—The product of the absorbed dose from ionizing radiation and factors that account for biological differences as a result of the radiation type and its distribution in the body.

drill bit—The cutting tool attached to the bottom of a drill stem.

drill rod (drill pipe)—Special pipe used to transmit rotation and energy from the drill rig to the bit. This conduit conveys circulation fluids such as air, water, or other mixtures to cool the bit and evacuate the borehole cuttings.

duplicate analysis—An analysis performed on one member of a pair of identically prepared subsamples taken from the same sample.

ecological screening levels—Soil, sediment, or water concentrations that are used to screen for potential ecological effects. The concentrations are based on a chemical's no-observed-adverse-effect level for a receptor, below which no risk is indicated.

Environmental Restoration (ER) Project—A Los Alamos National Laboratory project established in 1989 as part of a U.S. Department of Energy nationwide program, and precursor of today's Environmental Remediation and Surveillance (ERS) Program. This program is designed (1) to investigate hazardous and/or radioactive materials that may be present in the environment as a result of past Laboratory operations, (2) to determine if the materials currently pose an unacceptable risk to human health or the environment, and (3) to remediate (clean up, stabilize, or restore) those sites where unacceptable risk is still present.

environmental samples—Air, soil, water, or other media samples that have been collected from streams, wells, and soils, or other locations, and that are not expected to exhibit properties classified as hazardous by the U.S. Department of Transportation.

equipment blank (rinsate blank)—A sample used to rinse sample-collection equipment and expected to have negligible or unmeasurable amounts of analytes. The equipment blank is collected after the equipment decontamination is completed but before the collection of another field sample.

ER data—Data derived from samples that have been collected and paid for through Environmental Remediation and Surveillance Program funding.

ER database (ERDB)—A database housing analytical and other programmatic information for the Environmental Remediation and Surveillance Program. The ERDB currently contains about 3 million analyses in 300 tables.

ER identification (ER ID) number—A unique identifier assigned by the Environmental Remediation and Surveillance Program's Records Processing Facility to each document when it is submitted as a final record.

exposure pathway—Any path from the sources of contaminants to humans and other species or settings through air, soil, water, or food.

facility—All contiguous land (and structures, other appurtenances, and improvements on the land) used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units. For the purpose of implementing a corrective action, a facility is all the contiguous property that is under the control of the owner or operator seeking a permit under Subtitle C of the Resource Conservation and Recovery Act.

fault—A fracture, or zone of fractures, in rock along which vertical or horizontal movement has taken place and adjacent rock layers or bodies have been displaced.

Federal Register—The official daily publication for Rules, Proposed Rules, and Notices from federal agencies and organizations, as well as Executive Orders and other presidential documents.

field blank (field reagent blank)—A blank sample prepared in the field or carried to the sampling site, exposed to sampling conditions (e.g., by removing bottle caps), and returned to a laboratory to be analyzed in the same manner in which environmental samples are being analyzed. Field blanks are used to identify the presence of any contamination that may have been added during the sampling and analysis process.

field duplicate (replicate) samples—Two separate, independent samples taken from the same source, which are collected as collocated samples (i.e., equally representative of a sample matrix at a given location and time).

field matrix spike—A known amount of a field sample to which a known amount of a target analyte has been added and used to compute the proportion of the added analyte that is recovered upon analysis.

field notebook—A record of activities performed in the field or a compilation of field data.

field reagent blank—See field blank.

field sample—See sample.

focused data validation—A technically based analyte-, sample-, and data-use-specific process that extends the qualification of data beyond the method or contractual compliance and provides a higher level of confidence that an analyte is present or absent. If an analyte is present, the quality of the quantitation may be obtained through focused validation.

gamma radiation—A form of electromagnetic, high-energy ionizing radiation emitted from a nucleus. Gamma rays are essentially the same as x-rays (though at higher energy) and require heavy shielding, such as concrete or steel, to be blocked.

grab sample—A specimen collected by a single application of a field sampling procedure to a target population (e.g., the surface soil from a single hole collected after the spade-and-scoop sampling procedure, or a single air filter left in the field for three months).

gravimetric moisture content—See water content.

ground cover—Natural or human-made materials (e.g., grasses, pine needles, asphalt, or concrete) which overlay soils.

groundwater—Interstitial water that occurs in saturated earth material and is capable of entering a well in sufficient amounts to be used as a water supply.

grout—Cement or bentonite mixtures used for sealing boreholes and wells and for zone isolation. Only Portland Type I or II cement is approved for use at investigative sites.

half-life—(1) The time required for a pollutant to lose one-half of its original concentration (for example, the biochemical half-life of DDT [dichlorodiphenyltrichloroethane] in the environment is 15 yr). (2) The time required for one half of the atoms in a radioactive element to undergo self-transmutation or

decay (the half-life of radium is 1620 yr). (3) The time required for the elimination of one half of a total dose from the body.

hazard index—The sum of hazard quotients for multiple contaminants to which a receptor may have been exposed.

Hazardous and Solid Waste Amendments (HSWA)—Public Law No. 98-616, 98 Stat. 3221, enacted in 1984, which amended the Resource Conservation and Recovery Act of 1976 (42 United States Code § 6901 et seq).

hazardous constituent (hazardous waste constituent)—According to the March 1, 2005, Compliance Order of Consent (Consent Order), any constituent identified in Appendix VIII of Part 261, Title 40 Code of Federal Regulations (CFR) (incorporated by 20.4.1.200 New Mexico Administrative Code [NMAC]) or any constituent identified in 40 CFR 264, Appendix IX (incorporated by 20.4.1.500 NMAC).

hazardous waste—(1) Solid waste that is listed as a hazardous waste, or exhibits any of the characteristics of hazardous waste (i.e., ignitability, corrosivity, reactivity, or toxicity, as provided in 40 CFR, Subpart C). (2) According to the March 1, 2005, Compliance Order of Consent (Consent Order), any solid waste or combination of solid wastes that, because of its quantity, concentration, or physical, chemical, or infectious characteristics, meets the description set forth in New Mexico Statutes Annotated 1978, § 74-4-3(K) and is listed as a hazardous waste or exhibits a hazardous waste characteristic under 40 CFR 261 (incorporated by 20.4.1.200 New Mexico Administrative Code).

Hazardous Waste Bureau—The New Mexico Environment Department bureau charged with providing regulatory oversight and technical guidance to New Mexico hazardous waste generators and to treatment, storage, and disposal facilities, as required by the New Mexico Hazardous Waste Act.

Hazardous Waste Facility Permit—The authorization issued to Los Alamos National Laboratory (the Laboratory) by the New Mexico Environment Department that allows the Laboratory to operate as a hazardous waste treatment, storage, and disposal facility.

hazard quotient (HQ)—The ratio of the estimated site-specific exposure concentration of a single chemical from a site to the estimated daily exposure level at which no adverse health effects are likely to occur.

holding time—The maximum elapsed time a sample can be stored without unacceptable changes in analyte concentrations. Holding times apply under prescribed conditions, and deviations from these conditions may affect the holding times. Extraction holding time refers to the time lapsed between sample collection and sample preparation. Analytical holding time refers to the time lapsed between sample preparation and analysis.

HSWA module—See Module VIII.

hydrogen-ion activity (pH)—The effective concentration (activity) of dissociated hydrogen ions (H+); a measure of the acidity or alkalinity of a solution that is numerically equal to 7 for neutral solutions, increases with alkalinity, and decreases as acidity increases.

initial calibration—The process used to establish the relationship between instrument response and analyte concentration at several analyte concentration values in order to demonstrate that an instrument is capable of acceptable analytical performance.

institutional controls—Controls that prohibit or limit access to contaminated media. Institutional controls may include use restrictions, permitting requirements, standard operating procedures, laboratory implementation requirements, laboratory implementation guidance, and laboratory performance requirements.

instrument detection limit (IDL)—A measure of instrument sensitivity without any consideration for contributions to the signal from reagents. The IDL is calculated as follows: Three times the average of the standard deviations obtained on three nonconsecutive days from the analysis of a standard solution, with seven consecutive measurements of that solution per day. The standard solution must be prepared at a concentration of three to five times the instrument manufacturer's estimated IDL.

internal standards—Compounds added to a sample after the sample has been prepared for qualitative and quantitative instrument analysis. The compounds serve as a standard of retention time and response that is invariant from run to run.

investigation-derived waste—Solid waste or hazardous waste that was generated as a result of corrective action investigation or remediation field activities. Investigation-derived waste may include drilling muds, cuttings, and purge water from the installation of test pits or wells; purge water, soil, and other materials from the collection of samples; residues from the testing of treatment technologies and pump-and-treat systems; contaminated personal protective equipment; and solutions (aqueous or otherwise) used to decontaminate nondisposable protective clothing and equipment.

laboratory control sample (LCS)—A known matrix that has been spiked with compound(s) representative of target analytes. LCSs are used to document laboratory performance, and the acceptance criteria for LCSs are method-specific.

LANL (Los Alamos National Laboratory) data validation qualifiers—The Los Alamos National Laboratory data qualifiers which are defined by, and used, in the Environmental Remediation and Surveillance (ERS) Program validation process. The qualifiers describe the general usability (or quality) of data. For a complete list of data qualifiers applicable to any particular analytical suite, consult the appropriate ERS standard operating procedure.

LANL (Los Alamos National Laboratory) data validation reason codes—The Los Alamos National Laboratory designations applied to sample data by data validators who are independent of the contract laboratory that performed a given sample analysis. Reason codes provide an analysis-specific explanation for applying a qualifier, with some description of the qualifier's potential impact on data use. For a complete list of data qualifiers applicable to any particular analytical suite, consult the appropriate Environmental Remediation and Surveillance Program standard operating procedure.

log book—A notebook used to record tabulated data (e.g., the history of calibrations, sample tracking, numerical data, or other technical data).

lower acceptance limit (LAL)—The lowest limit that is acceptable according to quality control (QC) criteria for a specific QC sample and for a specific method. Any results lower than the LAL are qualified following the routine validation procedure.

material disposal area (MDA)—A subset of the solid waste management units at Los Alamos National Laboratory (the Laboratory) that include disposal units such as trenches, pits, and shafts. Historically, various disposal areas (but not all) were designated by the Laboratory as MDAs.

matrix—Relatively fine material in which coarser fragments or crystals are embedded; also called "ground mass" in the case of igneous rocks.

matrix spike—An aliquot of a sample to which a known concentration of target analyte has been added. Matrix spike samples are used to measure the ability to recover prescribed analytes from a native sample matrix. The spiking typically occurs before sample preparation and analysis.

matrix spike duplicate—An intralaboratory duplicate sample to which a known amount of target analyte has been added. Spiking typically occurs before sample preparation and analysis.

measuring and test equipment—Devices or systems used to calibrate, measure, gauge, test, or inspect entities to control or acquire data and verify conformance to specified requirements.

medium (environmental)—Any material capable of absorbing or transporting constituents. Examples of media include tuffs, soils and sediments derived from these tuffs, surface water, soil water, groundwater, air, structural surfaces, and debris.

medium (geological)—The solid part of the hydrogeological system; may be unsaturated or saturated.

method blank—An analyte-free matrix to which all reagents are added in the same volumes or proportions as those used in the environmental sample processing, and which is prepared and analyzed in the same manner as the corresponding environmental samples. The method blank is used to assess the potential for sample contamination during preparation and analysis.

method detection limit (MDL)—The minimum concentration of a substance that can be measured and reported with a known statistical confidence that the analyte concentration is greater than zero. After subjecting samples to the usual preparation, the MDL is determined by analyzing those samples of a given matrix type that contain the analyte. The MDL is used to establish detection status.

migration—The movement of inorganic and organic chemical species through unsaturated or saturated materials.

migration pathway—A route (e.g., a stream or subsurface flow path) for the potential movement of contaminants to environmental receptors (plants, humans, or other animals).

minimum detectable activity—For the analysis of radionuclides, the lowest detectable radioactivity for a given analytical technique. The following equation is used to calculate the MDA unless otherwise noted or approved by Los Alamos National Laboratory. (Note: "MDA" here should not to be confused with material disposal area):

$$\mathrm{MDA} = \frac{4.65(\mathrm{BKG})^{0.5} + 2.71}{2.22 \times \mathrm{EFF} \times \mathrm{V} \times \mathrm{T_s} \times \mathrm{Y}} \quad ,$$

where BKG = the total background counts,
EFF = the fraction detector efficiency,
V = the volume or unit weight,
T_s = the sample count duration, and
Y = the fractional chemical recovery obtained from the tracer recovery.

Depending on the type of analysis, other terms may also be required in the denominator (e.g., gamma abundance).

mixed waste—Waste containing both hazardous and source, special nuclear, or byproduct materials subject to the Atomic Energy Act of 1954.

model—A schematic description of a physical, biological, or social system, theory, or phenomenon that accounts for its known or inferred properties and may be used for the further study of its characteristics.

Module VIII—Module VIII of the Los Alamos National Laboratory (the Laboratory) Hazardous Waste Facility Permit. This permit allows the Laboratory to operate as a hazardous-waste treatment, storage, and disposal facility. From 1990 to 2005, Module VIII included requirements from the Hazardous and Solid Waste Amendments. These requirements have been superceded by the March 1, 2005, Compliance Order on Consent (Consent Order).

nondetect—A result that is less than the method detection limit.

notices of approval, of approval with modification, or of disapproval—Notices issued by the New Mexico Environment Department (NMED). Upon receipt of a work plan, schedule, report, or other deliverable document, NMED reviews the document and approves the document as submitted, modifies the document and approves it as modified, or disapproves the document. A notice of approval means that the document is approved as submitted. A notice of approval with modifications means that the document is approved but with modifications specified by NMED. A notice of disapproval means that the document is disapproved and it states the deficiencies and other reasons for disapproval.

operable units (OUs)—At Los Alamos National Laboratory, 24 areas originally established for administering the Environmental Remediation and Surveillance Program. Set up as groups of potential release sites, the OUs were aggregated according to geographic proximity for the purposes of planning and conducting Resource Conservation and Recovery Act (RCRA) facility assessments and RCRA facility investigations. As the project matured, it became apparent that there were too many areas to allow efficient communication and to ensure consistency in approach. In 1994, the 24 OUs were reduced to 6 administrative field units.

outfall—A place where effluent is discharged into receiving waters.

percent recovery (%R)—The amount of material detected in a sample (less any amount already in the sample) divided by the amount added to the sample, expressed as a percentage.

perched water—A zone of unpressurized water held above the water table by impermeable rock or sediment.

polychlorinated biphenyls (PCBs)—Any chemical substance limited to the biphenyl molecule that has been chlorinated to varying degrees, or any combination that contains such substances. PCBs are colorless, odorless compounds that are chemically, electrically, and thermally stable and have proven to be toxic to both humans and other animals.

porosity—The degree to which soil, gravel, sediment, or rock is permeated with pores or cavities through which water or air can move.

precision—The degree of mutual agreement among a series of individual measurements, values, or results.

quality assurance/quality control—A system of procedures, checks, audits, and corrective actions set up to ensure that all U.S. Environmental Protection Agency research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.

quality-control sample—A specimen that, upon analysis, is intended to provide information that is useful for adjusting, controlling, or verifying the continuing acceptability of sampling and/or analysis activities in progress.

radiation—A stream of particles or electromagnetic waves emitted by atoms and molecules of a radioactive substance as a result of nuclear decay. The particles or waves emitted can consist of neutrons, positrons, alpha particles, beta particles, or gamma radiation.

radioactive material—For purposes of complying with U.S. Department of Transportation regulations, any material having a specific activity (activity per unit mass of the material) greater than 2 nanocuries per gram (nCi/g) and in which the radioactivity is evenly distributed.

radioactive waste—Waste that, by either monitoring and analysis, or acceptable knowledge, or both, has been determined to contain added (or concentrated and naturally occurring) radioactive material or activation products, or that does not meet radiological release criteria.

radioactivity (radioactive decay; radioactive disintegration)—The spontaneous change in an atom by the emission of charged particles and/or gamma rays.

radionuclide—Radioactive particle (human-made or natural) with a distinct atomic weight number.

RCRA facility investigation (RFI)—A Resource Conservation and Recovery Act (RCRA) investigation that determines if a release has occurred and characterizes the nature and extent of contamination at a hazardous waste facility. The RFI is generally equivalent to the remedial investigation portion of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process.

reference set—A hard-copy compilation of reference items cited in Environmental Remediation and Surveillance Program documents.

regional aquifer—Geologic material(s) or unit(s) of regional extent whose saturated portion yields significant quantities of water to wells, contains the regional zone of saturation, and is characterized by the regional water table or potentiometric surface.

request number—An identifying number assigned by the Environmental Remediation and Surveillance Program to a group of samples submitted for analysis.

residential scenario—The land use condition under which individuals may be exposed to contaminants as a result of living on or near contaminated sites.

Resource Conservation and Recovery Act—The Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (Public Law [PL] 94-580, as amended by PL 95-609 and PL 96-482, United States Code 6901 et seq.).

rinsate blank—See equipment blank.

risk—A measure of the probability that damage to life, health, property, and/or the environment will occur as a result of a given hazard.

risk assessment—See baseline risk assessment.

routine data validation—The process of reviewing analytical data relative to quantitative routine acceptance criteria. The objective of routine data validation is two-fold—

- to estimate the technical quality of the data relative to minimum national standards adopted by the Environmental Remediation and Surveillance Program, and
- to indicate to data users the technical data quality at a gross level by assigning laboratory qualifiers to environmental data whose quality indicators do not meet acceptance criteria.

runoff—The portion of the precipitation on a drainage area that is discharged from the area.

run-on—Surface water that flows onto an area as a result of runoff occurring higher up on a slope.

sample—A portion of a material (e.g., rock, soil, water, or air), which, alone or in combination with other portions, is expected to be representative of the material or area from which it is taken. Samples are typically either sent to a laboratory for analysis or inspection or are analyzed in the field. When referring to samples of environmental media, the term field sample may be used.

sample matrix—In chemical analysis, that portion of a sample that is exclusive of the analytes of interest. Together, the matrix and the analytes of interest form the sample.

screening action level (SAL)—A radionuclide's medium-specific concentration level; it is calculated by using conservative criteria below which it is generally assumed that no potential exists for a dose that is unacceptable to human health. The derivation of a SAL is based on conservative exposure and on land-use assumptions. However, if an applicable regulatory standard exists that is less than the value derived, it is used in place of the SAL.

screening risk assessment—A risk assessment that is performed with few data and many assumptions in order to identify exposures that should be evaluated more carefully for potential risk.

site characterization—Defining the pathways and methods of migration of hazardous waste or constituents, including the media affected; the extent, direction and speed of the contaminants; complicating factors influencing movement; or concentration profiles.

soil—(1) A material that overlies bedrock and has been subject to soil-forming processes. (2) A sample media group that includes naturally occurring and artificial fill materials.

soil moisture—The water contained in the pore space of the unsaturated zone.

soil screening level (SSL)—The concentration of a chemical (inorganic or organic) below which no potential for unacceptable risk to human health exists. The derivation of an SSL is based on conservative exposure and land-use assumptions, and on target levels of either a hazard quotient of 1.0 for a noncarcinogenic chemical or a cancer risk of 10^{-5} for a carcinogenic chemical.

solid waste management unit (SWMU)—(1) Any discernible site at which solid wastes have been placed at any time, whether or not the site use was intended to be the management of solid or hazardous waste. SWMUs include any site at a facility at which solid wastes have been routinely and systematically released. This definition includes regulated sites (i.e., landfills, surface impoundments, waste piles, and land treatment sites), but does not include passive leakage or one-time spills from production areas and sites in which wastes have not been managed (e.g., product storage areas). (2) According to the March 1, 2005, Compliance Order on Consent (Consent Order), any discernible site at which solid waste has been placed at any time, and from which the New Mexico Environment Department determines there may be a risk of a release of hazardous waste or hazardous waste constituents (hazardous constituents), whether or not the site use was intended to be the management of solid or hazardous waste. Such sites include any area in Los Alamos National Laboratory at which solid wastes have been routinely and systematically released; they do not include one-time spills.

split sample—A sample that has been divided into two or more portions that are expected to be of the same composition; used to characterize within-sample heterogeneity, sample handling, and measurement variability.

split-spoon sampler—A hollow, tubular sampling device below a drill stem that is driven by a weight to retrieve soil samples. The core barrel can be opened to remove samples. This is a sampling method commonly used with auger drilling. The split-spoon sampler can be driven into the ground or can be advanced inside hollow-stem augers.

standard operating procedure—A document that details the officially approved method(s) for an operation, analysis, or action, with thoroughly prescribed techniques and steps.

surface sample—A sample taken at a collection depth that is (or was) representative of the medium's surface during the period of investigative interest. A typical depth interval for a surface sample is 0 to 6 in. for mesa-top locations, but may be up to several feet in sediment-deposition areas within canyons.

target analyte—A chemical or parameter, the concentration, mass, or magnitude of which is designed to be quantified by a particular test method.

technical area (TA)—At Los Alamos National Laboratory, an administrative unit of operational organization (e.g., TA-21).

topography—The physical or natural features of an object or entity and their structural relationships.

trip blank—A sample of analyte-free medium taken from a sampling site and returned to an analytical laboratory unopened, along with samples taken in the field; used to monitor cross contamination of samples during handling and storage both in the field and in the analytical laboratory.

tuff—Consolidated volcanic ash, composed largely of fragments produced by volcanic eruptions.

U.S. Department of Energy—The federal agency that sponsors energy research and regulates nuclear materials for weapons production.

U.S. Environmental Protection Agency (EPA)—The federal agency responsible for enforcing environmental laws. Although state regulatory agencies may be authorized to administer some of this responsibility, EPA retains oversight authority to ensure the protection of human health and the environment.

vadose zone—The zone between the land surface and the water table within which the moisture content is less than saturation (except in the capillary fringe) and pressure is less than atmospheric. Soil pore space also typically contains air or other gases. The capillary fringe is included in the vadose zone.

water content—The amount of water in an unsaturated medium, expressed as the ratio of the weight of water in a sample to the weight of the oven-dried sample (often expressed as a percentage).

welded tuff—A volcanic deposit hardened by the action of heat, pressures from overlying material, and hot gases.

work plan—A document that specifies the activities to be performed when implementing an investigation or remedy. At a minimum, the work plan should identify the scope of the work to be performed, specify the procedures to be used to perform the work, and present a schedule for performing the work. The work plan may also present the technical basis for performing the work.

A-3.0 METRIC TO ENGLISH CONVERSIONS

Multiply SI (Metric) Unit	by	To Obtain US Customary Unit
kilometers (km)	0.622	miles (mi)
kilometers (km)	3281	feet (ft)
meters (m)	3.281	feet (ft)
meters (m)	39.37	inches (in.)
centimeters (cm)	0.03281	feet (ft)
centimeters (cm)	0.394	inches (in.)
millimeters (mm)	0.0394	inches (in.)
micrometers or microns (µm)	0.0000394	inches (in.)
square kilometers (km^2)	0.3861	square miles (mi^2)
hectares (ha)	2.5	acres
square meters (m^2)	10.764	square feet (ft^2)
cubic meters (m^3)	35.31	cubic feet (ft^3)
kilograms (kg)	2.2046	pounds (lb)
grams (g)	0.0353	ounces (oz)
grams per cubic centimeter (g/cm^3)	62.422	pounds per cubic foot (lb/ft^3)
milligrams per kilogram (mg/kg)	1	parts per million (ppm)
micrograms per gram (µg/g)	1	parts per million (ppm)
liters (L)	0.26	gallons (gal.)
milligrams per liter (mg/L)	1	parts per million (ppm)
degrees Celsius (°C)	9/5 + 32	degrees Fahrenheit (°F)

A-4.0 DATA QUALIFIER DEFINITIONS

Data Qualifier	Definition
J	The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.
J+	The analyte was positively identified, and the result is likely to be biased high.
J-	The analyte was positively identified, and the result is likely to be biased low.
R	The data are rejected as a result of major problems with quality assurance/quality control (QA/QC) parameters.
U	The analyte was analyzed for but not detected.
UJ	The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific detection or quantitation limit.

Appendix B

Data Review

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B-1.0 INTRODUCTION

The historical Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) data and 2005–2006 data collected during the investigation of Consolidated Unit 21-018(a)-99, which includes Material Disposal Area (MDA) V, are of varying quality and usability, depending on the available documentation that accompanies the analytical results. In the Environmental Restoration Database (ERDB), all data records include a vintage code denoting how and where samples were submitted for analyses. In the early years of the Environmental Restoration Project, the samples were submitted to the Los Alamos National Laboratory (the Laboratory) Chemical Science and Technology (CST) Division. They were either analyzed at a CST laboratory or shipped to one of several off-site contract laboratories. Samples analyzed at a CST laboratory are identified by the vintage code "CST Onsite." Samples shipped by CST Division to off-site laboratories are identified by the vintage code "CST Offsite." From late 1995 until the present, samples have been shipped through the Sample Management Office (SMO) to off-site contract laboratories. These samples are identified by the vintage code "SMO."

Because samples analyzed at CST laboratories were not accompanied by full chain-of-custody and quality-control documentation, CST Onsite samples are used as screening-level samples only. As a result, CST Onsite sampling data are not included in this data review. Those data have been used at various times during the course of the current and previous investigations to guide sampling and analysis but are not used to determine nature and extent (section B-5.0) and are not included in the screening risk assessments (Appendix H).

Because CST Offsite sampling data were reviewed by examining the original data packages and validating the reported results, most CST Offsite data are used in this investigation. CST Offsite data have been included with the SMO data in the determination of nature and extent. The tables presented in this appendix include all useable (both SMO and CST Offsite vintage) data collected at Consolidated Unit 21-018(a)-99.

B-1.1 Overview of Analytical Data

The data for Consolidated Unit 21-018(a)-99 are from samples collected in 1992, 1993, 1994, 1996, 2005, 2006, and 2007 and include the results from soil samples (including soil, fill, and sediment) and tuff samples (including tuff units Qbt 3, Qbt 2, Qbt 1v, Qbt 1g, Qct, and Qbo). Figures B-1.1-1 and B-1.1-2 show the sample locations at Consolidated Unit 21-018(a)-99 in the subsurface and surface/shallow subsurface, respectively.

Although Consolidated Unit 21-018(a)-99 is made up of five individual sites (four solid waste management units [SWMUs] and one area of concern [AOC]), it was divided into three areas for the purpose of data review, based on potential sources of contamination and anticipated investigation and remediation activities. These are (1) SWMUs 21-018(a) and 21-018(b), MDA V and the laundry facility, respectively; (2) SWMU 21-013(b) and AOC 21-013(g), two surface debris disposal areas; and (3) SWMU 21-023(c), a former septic system for a waste research laboratory.

B-1.2 Identification of Chemicals of Potential Concern

The purpose of the data review is to identify chemicals of potential concern (COPCs) for Consolidated Unit 21-018(a)-99. Inorganic chemical and radionuclide data were compared with media-specific background data (LANL 1998, 059730). For background comparisons, the first step was to compare the site data with a background value (BV). A BV may be a calculated value for the background data set (the upper tolerance limit [95, 95] or the 95% upper confidence bound on the 95th quantile), a detection limit

(DL), a fallout value (FV), or it may be calculated based on secular equilibrium or a total analysis. A FV for fallout radionuclides applies only to surface samples, generally from depths of 0 to 0.5 ft; the fallout radionuclides evaluated in this appendix are tritium, cesium-134, cesium-137, cobalt-60, sodium-22, americium-241, plutonium-238, plutonium-239, and strontium-90. Although a tritium FV for soil is available (LANL 1998, 059730), the FV is in pCi/mL and requires calculating the pCi/g fallout concentration using the sample percent moisture. The tritium soil FV was not used, and tritium was evaluated based on detection status in soil/fill, even in the 0- to 0.5-ft below ground surface (bgs) interval, which is a more conservative approach. If a BV or FV is not available, the inorganic chemicals and radionuclides were evaluated according to detection status. Background comparisons do not apply to organic chemicals, which were evaluated according to their detection status.

If a site-specific datum exceeds its BV, an additional evaluation of the data using box plots may be performed to compare the range of concentrations in the site data set for that organic chemical with the range of concentrations in the background data set. Box plots show the range of concentrations for both the background data set and the MDA V data. If the box plot for an analyte shows that the site concentrations are within the range of background concentrations, the analyte is eliminated as a COPC.

The criteria used to identify COPCs are as follows:

- If at least one detected concentration or a DL for an analyte is above the BV and at least one concentration exceeds the range of background concentrations, the analyte is retained as a COPC.
- If the analyte is detected in at least one sample and has no BV associated with it, the analyte is retained as a COPC.
- If at least one detected concentration for an analyte is above the BV, but all the detected concentrations and DLs are within the range of background data, the analyte is not retained as a COPC. Box plots are used to illustrate this case.
- If all of the detected concentrations and DLs for an analyte are less than the BV, the analyte is not retained as a COPC.

COPCs are determined for soils (including fill and sediment) and the tuff units separately. COPCs are also determined separately for the three areas described in section B.1-1 [SWMUs 21-018(a) and 21-018(b); SWMU 21-013(b) and AOC 21-013(g); and SWMU 21-023(c)].

B-2.0 SWMUs 21-018(a) AND 21-018(b)

B-2.1 Results of Inorganic Chemicals in Samples Collected from SWMUs 21-018(a) and 21-018(b)

B-2.1.1 Inorganic Chemicals in Soil and Fill

Soil and fill samples were collected and analyzed for inorganic chemicals. Table B-2.1-1 summarizes the samples collected and the requested inorganic chemical analysis for each sample.

Table B-2.1-2 presents the frequency of inorganic chemicals above BVs at SWMUs 21-018(a) and 21-018(b). Table B-2.1-3 presents the analytical results for inorganic chemicals detected above BVs or detected, if no BV is available. The locations and concentrations of inorganic chemicals detected above BVs at SWMUs 21-018(a) and 21-018(b) are shown in Figure 7.3-1 of the investigation report.

- Barium, cadmium, calcium, chromium, lead, magnesium, nickel, potassium, sodium, and zinc are detected above their respective BVs but are not retained as COPCs because their concentrations

are within the range of concentrations in the background data set (Figures B-2.1-1 through B-2.1-9).

- Cobalt and silver are reported with at least one detected concentration above the BV. These inorganic chemicals are retained as COPCs.
- Nitrate and perchlorate are detected in at least one sample but have no BVs. These inorganic chemicals are retained as COPCs.
- Selenium is reported with a DL above the BV. This inorganic chemical is retained as a COPC.

B-2.1.2 Inorganic Chemicals in Qbt 2 and Qbt 3

Samples collected from Qbt 2 and Qbt 3 were analyzed for inorganic chemicals. Table B-2.1-1 summarizes the samples collected and the requested inorganic chemical analysis for each sample.

Table B-2.1-2 presents the frequency of inorganic chemicals above BVs in Qbt 2 and Qbt 3 at SWMUs 21-018(a) and 21-018(b). Table B-2.1-3 presents the analytical results for inorganic chemicals detected above BVs or detected, if no BV is available. The locations and concentrations of inorganic chemicals detected above BVs in Qbt 2 and Qbt 3 are shown in Figure 7.3-1 in the investigation report.

- Thallium is detected above its BV but is not retained as a COPC because site concentrations are within the range of concentrations in the background data set (Figure B-2.1-10).
- Aluminum, antimony, arsenic, barium, beryllium, chromium, cobalt, copper, cyanide, iron, lead, manganese, mercury, nickel, selenium, uranium, vanadium, and zinc are reported with at least one detected concentration above the range of background concentrations. These inorganic chemicals are retained as COPCs.
- Silver is reported with a DL above the BV. This inorganic chemical is retained as a COPC.
- Nitrate and perchlorate are detected in tuff samples but have no BVs. They are retained as COPCs.
- Magnesium is detected above its BV in four samples. Concentrations in three samples are within the range of background concentrations. The concentration in the fourth sample (3700 mg/kg) is slightly above the maximum background concentration (2820 mg/kg). In addition, magnesium is an essential nutrient (EPA 1989, 008021). Magnesium is not retained as a COPC.
- Calcium is detected above BV in nine tuff samples. Concentrations in seven samples are less than 2 times the maximum background concentration (2230 mg/kg). The concentrations in the other samples are 3 to 9 times the maximum background concentration. However, one concentration (6980 mg/kg) is at depth in borehole location 21-24542 and decreases to background in deeper samples. The other calcium concentration (19,100 mg/g) is at the bottom of absorption bed 3, and no other elevated concentrations are found. In addition, calcium is an essential nutrient (EPA 1989, 008021). Calcium is not retained as a COPC.

B-2.1.3 Inorganic Chemicals in Qbt 1v

One sample was collected from Qbt 1v and analyzed for inorganic chemicals. Table B-2.1-1 summarizes the requested inorganic chemical analysis for the sample.

Table B-2.1-2 presents the frequency of inorganic chemicals above BVs in Qbt 1v at SWMUs 21-018(a) and 21-018(b). Table B-2.1-3 presents the analytical results for inorganic chemicals detected above BVs

or detected, if no BV is available. The locations and concentrations of inorganic chemicals detected above BVs in Qbt 1v are shown in Figure 7.3-1 in the investigation report.

- Chromium is detected above the Qbt 1v BV. Chromium is retained as a COPC.
- Selenium is not detected above the BV, but the DL is above the BV. Therefore, selenium is retained as a COPC.

B-2.1.4 Inorganic Chemicals in Qbt 1g, Qct, and Qbo

Samples were collected from Qbt 1g, Qct, and Qbo and analyzed for inorganic chemicals. Table B-2.1-1 summarizes the Qbt 1g, Qct, and Qbo samples collected and the requested inorganic chemical analysis for each sample.

Table B-2.1-2 presents the frequency of inorganic chemicals above BVs in Qbt 1g, Qct, and Qbo at SWMUs 21-018(a) and 21-018(b). Table B-2.1-3 presents the analytical results for inorganic chemicals detected above BVs or detected, if no BV is available. The locations and concentrations of inorganic chemicals detected above BVs in Qbt 1g, Qct, and Qbo are shown in Figure 7.3-1 in the investigation report.

- Arsenic, barium, chromium, iron, uranium, vanadium, and zinc are reported with at least one detected concentration above the range of background concentrations. These inorganic chemicals are retained as COPCs.
- Cadmium, copper, nickel, selenium and silver are reported with DLs above the BV. These five inorganic chemicals are retained as COPCs.
- Nitrate is detected in one Qct sample, but it has no BV. Nitrate is retained as a COPC.
- Magnesium is detected above its BV in one Qct sample. The concentration (1070 mg/kg) is less than twice the BV (739 mg/kg). In addition, magnesium is an essential nutrient (EPA 1989, 008021). Magnesium is not retained as a COPC.
- Calcium is detected above BV in one Qbt 1g sample. The concentration (9360 mg/kg) is approximately 4 times the maximum background concentration (2300 mg/kg). In addition, calcium is an essential nutrient (EPA 1989, 008021). Calcium is not retained as a COPC.

B-2.2 Results of Radionuclides in Samples Collected from SWMUs 21-018(a) and 21-018(b)

B-2.2.1 Radionuclides in Soil and Fill

Soil and fill samples were collected and analyzed for americium-241, radionuclides by gamma spectroscopy, isotopic uranium, isotopic plutonium, tritium, and strontium-90. Table B-2.1-1 summarizes the soil and fill samples collected and the requested radionuclide analyses for each sample.

Table B-2.2-1 presents the frequency of radionuclides detected or detected above BVs/FVs in the soil and fill at SWMUs 21-018(a) and 21-018(b). Table B-2.2-2 presents analytical results for radionuclides detected above BVs/FVs or detected, if no BV or FV is available. The locations and analytical results of radionuclides detected or detected above BVs/FVs at SWMUs 21-018(a) and 21-018(b) are shown in Figure 7.3-2 of the investigation report.

- Americium-241, cesium-137, plutonium-238, plutonium-239, strontium-90, and tritium are detected below 0.5 ft in at least one sample. These six radionuclides are retained as COPCs.

- Uranium-234, uranium-235, and uranium-238 are detected above their respective BVs in at least one sample. These three radionuclides are retained as COPCs.
- Sodium-22 is detected in one surface sample but has no BV for comparison. This radionuclide is retained as a COPC.

B-2.2.2 Radionuclides in Qbt 2 and Qbt 3

Samples were collected from Qbt 2 and Qbt 3 and analyzed for americium-241, radionuclides by gamma spectroscopy, isotopic uranium, isotopic plutonium, tritium, and strontium-90. Table B-2.1-1 summarizes the samples collected and the requested radionuclide analyses for each sample.

Table B-2.2-1 presents the frequency of radionuclides detected above the BVs or detected in Qbt 2 and Qbt 3 at SWMU 21-018(a) and 21-018(b). Table B-2.2-2 presents the radionuclides detected above BVs and those detected that have no BV for comparison. The locations and analytical results of radionuclides detected above BVs or detected in Qbt 2 and Qbt 3 are shown in Figure 7.3-2.

- Americium-241, cesium-134, cesium-137, cobalt-60, plutonium-238, plutonium-239, strontium-90, and tritium are detected in at least one tuff sample. These eight radionuclides are retained as COPCs.
- Uranium-234, uranium-235, and uranium-238 are detected above their respective BVs in at least one tuff sample. These three radionuclides are retained as COPCs.

B-2.2.3 Radionuclides in Qbt 1v

One sample was collected from Qbt 1v and analyzed for radionuclides by gamma spectroscopy, isotopic plutonium, and tritium. Table B-2.1-1 summarizes the sample collected and the requested radionuclide analyses.

Table B-2.2-1 presents the frequency of radionuclides detected above BVs or detected in Qbt 1v at SWMU 21-018(a) and 21-018(b). Table B-2.2-2 presents the analytical results for radionuclides detected above BVs or detected, if no BV is available. The locations and analytical results of radionuclides detected above BVs or detected in Qbt 1v are shown in Figure 7.3-2.

- Tritium is detected in Qbt 1v and is retained as a COPC.

B-2.2.4 Radionuclides in Qbt 1g, Qct, and Qbo

Samples were collected from Qbt 1g, Qbo, and Qct and analyzed for americium-241, radionuclides by gamma spectroscopy, isotopic uranium, isotopic plutonium, tritium, and strontium-90. Table B-2.1-1 summarizes the Qbt 1g, Qbo, and Qct samples collected and the requested radionuclide analyses for each sample.

Table B-2.2-1 presents the frequency of radionuclides detected above BVs or detected in Qbt 1g, Qbo, and Qct at SWMUs 21-018(a) and 21-018(b). Table B-2.2-2 presents the analytical results for radionuclides detected above BVs or detected, if no BV is available. The locations and analytical results of radionuclides detected above BVs or detected in Qbt 1g, Qbo, and Qct units are shown in Figure 7.3-2 in the investigation report.

- Plutonium-238, plutonium-239, and tritium are detected in at least one sample. These three radionuclides are retained as COPCs.
- Uranium-235 is detected above the BV in three samples. Uranium-235 is retained as a COPC.

B-2.3 Results of Organic Chemicals in Samples Collected from SWMUs 21-018(a) and 21-018(b)

B-2.3.1 Organic Chemicals Detected in Soil and Fill

Soil and fill samples were collected and analyzed for organic chemicals. Table B-2.1-1 summarizes the samples collected and the requested organic chemical analyses for each sample. The samples were analyzed only for semivolatile organic compounds (SVOCs).

Table B-2.3-1 presents the frequency of organic chemicals detected in soil and fill at SWMUs 21-018(a) and 21-018(b). Identification of organic COPCs is based on detection status. Table B-2.3-2 presents the detected organic chemicals in soil and fill. The locations and concentrations of detected organic chemicals are shown in Figure 7.3-3 of the investigation report.

A total of 21 organic chemicals (acenaphthene; acenaphthylene; anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzoic acid; bis(2-ethylhexyl)phthalate; 4-bromophenyl-phenylether; 4-chloro-3-methylphenol; 2-chloronaphthalene; chrysene; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; 2-methylnaphthalene; naphthalene; 3-nitroaniline; phenanthrene; and pyrene) are detected and retained as COPCs.

B-2.3.2 Organic Chemicals in Qbt 2 and Qbt 3

Samples were collected from Qbt 2 and Qbt 3 and analyzed for organic chemicals (SVOCs only). Table B-2.1-1 summarizes the samples collected and the requested organic chemical analyses for each sample.

Table B-2.3-1 presents the frequency of organic chemicals detected in Qbt 2 and Qbt 3 at SWMU 21-018(a) [no organic chemicals were detected in tuff at SWMU 21-018(b)]. Identification of organic COPCs is based on detection status. Table B-2.3-2 presents the detected organic chemicals in Qbt 2 and Qbt 3. The locations and concentrations of detected organic chemicals in Qbt 2 and Qbt 3 are shown in Figure 7.3-3 in the investigation report.

A total of 18 organic chemicals (acetone; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; bis(2-ethylhexyl)phthalate; butylbenzylphthalate; carbon disulfide; chloromethane; chrysene; diethylphthalate; di-n-butyl phthalate; di-n-octylphthalate; fluoranthene; indeno(1,2,3-cd)pyrene; phenanthrene; pyrene; and styrene) are detected at SWMUs 21-018(a) and 21-018(b) and retained as COPCs.

B-2.3.3 Organic Chemicals in Qbt 1v

The sample collected from the Qbt 1v was not analyzed for organic chemicals.

B-2.3.4 Organic Chemicals in Qbt 1g, Qct, and Qbo

One sample was collected from Qct and Qbo (no sample was collected from Qbt 1g) and analyzed for organic chemicals (SVOCs only). Table B-2.1-1 summarizes the samples collected and the requested organic chemical analyses.

Table B-2.3-1 presents the frequency of organic chemicals detected in Qct and Qbo at SWMU 21-018(a). Table B-2.3-2 presents the detected organic chemicals in Qct and Qbo. The locations and concentrations of detected organic chemicals in Qct and Qbo are shown in Figure 7.3-3 in the investigation report.

Bis(2-ethylhexyl)phthalate is the only organic chemical detected in both Qct and Qbo at SWMU 21-018(a) and is retained as a COPC.

B-2.4 Pore-Gas Results for Consolidated Unit 21-018(a)-99

Pore-gas samples were collected from 15 boreholes drilled at Consolidated Unit 21-018(a)-99 in 2005 and 2006. Samples were collected from two sample depths in each borehole and analyzed for tritium and volatile organic compounds (VOCs) (Table B.2.1-1).

Table B-2.4-1 presents the frequency of VOCs detected in pore gas at Consolidated Unit 21-018(a)-99. Table B-2.4-2 presents the results for the VOCs detected in pore gas at Consolidated Unit 21-018(a)-99. Table B-2.4-3 presents the frequency of tritium detected in pore gas at Consolidated Unit 21-018(a)-99. Table B-2.4-4 presents the tritium results. The locations and concentrations of detected VOCs and tritium are shown in Figures 7.6-1 through 7.6-4 in the investigation report.

- In the 2005 sampling event, 21 organic chemicals (acetone; 1-butanol; 2-butanone; carbon disulfide; carbon tetrachloride; chloroform; 1,1-dichloroethane; 1,4-dioxane; ethanol; ethylbenzene; 4-ethyltoluene; methanol; 2-propanol; styrene; tetrachloroethene; toluene; 1,1,1-trichloroethane; trichloroethane; 1,2,4-trimethylbenzene; 1,2-xylene; and 1,3-xylene+1,4-xylene) are detected in pore-gas samples and retained as COPCs.
- In the 2006 sampling event, 36 organic chemicals (acetone; benzene; bromodichloroethane; 1-butanol; 2-butanone; carbon disulfide; carbon tetrachloride; chloroform; chloromethane; dichlorodifluoromethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,2-dichloropropane; ethanol; ethylbenzene; 4-ethyltoluene; hexane; 2-methyl-4-pentanone; methylene chloride; n-heptane; propylene; styrene; tetrachloroethene; tetrahydrofuran; toluene; 1,2,2-trichloro-1,1,2-trifluoroethane; 1,1,1-trichloroethane; trichloroethane; trichlorofluoromethane; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; vinyl acetate; vinyl chloride; xylene (total); 1,2-xylene; and 1,3-xylene+1,4-xylene) are detected in pore-gas samples and retained as COPCs.
- Tritium is detected in pore-gas samples in both sampling events and is retained as a COPC.

B-2.5 Summary of COPCs at SWMUs 21-018(a) and 21-018(b)

Table B-2.5-1 provides a summary of the COPCs at SWMUs 21-018(a) and 21-018(b) by solid media.

B-3.0 SWMU 21-013(b) AND AOC 21-013(g)

Three boreholes (locations 21-02517, 21-24535, and 21-24538) were drilled within the SWMU 21-013(b) and AOC 21-013(g) boundary to determine the nature and extent of potential contamination from the absorption beds [SWMU 21-018(a)]. The identification of COPCs in these boreholes is presented in the discussion for SWMUs 21-018(a) and 21-018(b) (section B-2.0). The COPCs for these boreholes at the appropriate depth intervals were included in the risk assessments for SWMU 21-013(b) and AOC 21-013(g) because the data represent potential exposure within this portion of the consolidated unit.

B-3.1 Results of Inorganic Chemicals in Samples Collected from SWMU 21-013(b) and AOC 21-013(g)

B-3.1.1 Inorganic Chemicals in Soil and Sediment

Soil and sediment samples were collected and analyzed for inorganic chemicals. Table B-2.1-1 summarizes the samples collected and the requested inorganic chemical analyses for each sample.

Table B-3.1-1 presents the frequency of inorganic chemicals above BVs in soil and sediment at SWMU 21-013(b) and AOC 21-013(g). Table B-3.1-2 presents the analytical results for the inorganic chemicals detected above BVs or detected, if no BV is available. The locations and concentrations of inorganic chemicals detected or detected above BVs in soil and sediment are shown in Plate 1.

- Antimony, cadmium, chromium, and zinc are detected above their respective BVs but are not retained as COPCs because their concentrations are within the range of concentrations in the background data set (Figures B-3.1-1 to B-3.1-4).
- Copper, lead, mercury, silver, and uranium are reported with at least one detected concentration above the range of background concentrations. These inorganic chemicals are retained as COPCs.
- Nitrate and perchlorate are detected in at least one sample but have no BVs. These inorganic chemicals are retained as COPCs.
- Selenium and thallium are reported with DLs above the BVs. These inorganic chemicals are retained as COPCs.
- Calcium is detected above the BV in four samples but the concentrations are within the range of background concentrations. In addition, calcium is an essential nutrient (EPA 1989, 008021). Calcium is not retained as a COPC.

B-3.2 Results of Radionuclides in Samples Collected from SWMU 21-013(b) and AOC 21-013(g)

B-3.2.1 Radionuclides in Soil and Sediment

Soil and sediment samples were collected and analyzed for americium-241, radionuclides by gamma spectroscopy, isotopic uranium, isotopic plutonium, tritium, and strontium-90. Table B-2.1-1 summarizes the samples collected and the requested radionuclide analyses for each sample.

Table B-3.2-1 presents the frequency of radionuclides detected above BVs/FVs in soil and sediment at SWMU 21-013(b) and AOC 21-013(g). Table B-3.2-2 presents the analytical results for radionuclides detected above BVs/FVs or detected, if no BV or FV is available. The locations and analytical results of radionuclides detected or those detected above BVs/FVs in soil and sediment are shown in Plate 2 of the investigation report.

- Americium-241, cesium-137, plutonium-238, plutonium-239, strontium-90, and tritium are detected above FVs in at least one surface sample or detected in deeper samples. These six radionuclides are retained as COPCs.
- Uranium-234, uranium-235, and uranium-238 are detected above BVs in at least one sample. These three radionuclides are retained as COPCs.

B-3.3 Results of Organic Chemicals in Samples Collected from SWMU 21-013(b) and AOC 21-013(g)

B-3.3.1 Organic Chemicals in Soil and Sediment

Soil and sediment samples were collected and analyzed for organic chemicals. Table B-2.1-1 summarizes the samples collected and the requested organic chemical analyses for each sample.

Table B-3.3-1 presents the frequency of organic chemicals detected in soil at SWMU 21-013(b) and AOC 21-013(g) (no organic chemicals were detected in the sediment samples). Identification of organic COPCs is based on detection status. Table B-3.3-2 presents the detected organic chemicals in soil. The locations and concentrations of detected organic chemicals in soil are shown in Plate 3 of the investigation report.

Thirteen organic chemicals (anthracene; Aroclor-1254; Aroclor-1260; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; benzoic acid; bis(2-ethylhexyl)phthalate; chrysene; fluoranthene; phenanthrene; and pyrene) are detected and retained as COPCs.

B-3.4 Summary of COPCs at SWMU 21-013(b) and AOC 21-013(g)

Table B-3.4-1 provides a summary of the COPCs at SWMU 21-013(b) and AOC 21-013(g) by media.

B-4.0 SWMU 21-023(c)

B-4.1 Results of Inorganic Chemicals in Samples Collected from SWMU 21-023(c)

B-4.1.1 Inorganic Chemicals in Soil

Soil samples were collected and analyzed for inorganic chemicals. Table B-2.1-1 summarizes the samples collected and the requested inorganic chemical analysis for each sample.

Table B-4.1-1 presents the frequency of inorganic chemicals above BVs in soil at SWMU 21-023(c). Table B-4.1-2 presents analytical results for inorganic chemicals detected above BVs or detected, if no BV is available. The locations and concentrations of inorganic chemicals detected or detected above BVs in soil are shown in Plate 1 of the investigation report.

- Cadmium is detected above its BV but is not retained as a COPC because the concentrations are within the range of concentrations in the background data set (Figure B-4.1-1).
- Antimony, chromium, copper, cyanide, lead, mercury, silver, and zinc are reported with at least one detected concentration above the range of background concentrations. These inorganic chemicals are retained as COPCs.
- Lithium, nitrate, perchlorate, and strontium are detected in at least one sample but have no BVs. These inorganic chemicals are retained as COPCs.
- Selenium and thallium are reported with DLs above the BV. These inorganic chemicals are retained as COPCs.

B-4.1.2 Inorganic Chemicals in Qbt 3

Samples were collected and analyzed for inorganic chemicals. Table B-2.1-1 summarizes the samples collected and the requested inorganic chemical analysis for each sample.

Table B-4.1-1 presents the frequency of inorganic chemicals above BVs in Qbt 3 at SWMU 21-023(c). Table B-4.1-2 presents analytical results for inorganic chemicals detected above BVs or detected, if no BV is available. The locations and concentrations of inorganic chemicals detected or detected above BVs in Qbt 3 are shown in Plate 1 in the investigation report.

- Silver has a DL above its BV but is not retained as a COPC because the DL is within the range of concentrations in the background data set (Figure B-4.1-2).
- Aluminum, arsenic, chromium, copper, lead, mercury, and selenium are reported with at least one detected concentration above the range of background concentrations. These inorganic chemicals are retained as COPCs.
- Lithium, nitrate, perchlorate, and strontium are detected in at least one sample but have no BVs. These inorganic chemicals are retained as COPCs.

B-4.2 Results of Radionuclides in Samples Collected from SWMU 21-023(c)

B-4.2.1 Radionuclides in Soil

Soil samples were collected at SWMU 21-023(c) and analyzed for americium-241, radionuclides by gamma spectroscopy, isotopic uranium, isotopic plutonium, and tritium. Table B-2.1-1 summarizes the samples collected and the requested radionuclide analyses for each sample.

Table B-4.2-1 presents the frequency of radionuclides detected or detected above BVs/FVs in soil at SWMU 21-023(c). Table B-4.2-2 presents the analytical results for radionuclides detected above BVs/FVs or detected, if no BV or FV is available. The locations and analytical results of radionuclides detected or detected above BVs/FVs in soil are shown in Plate 2 of the investigation report.

- Americium-241, cesium-137, plutonium-238, plutonium-239, strontium-90, and tritium are detected above FV in at least one surface sample or detected in deeper samples. These six radionuclides are retained as COPCs.
- Uranium-234, uranium-235, and uranium-238 are detected above BV in at least one sample. These three radionuclides are retained as COPCs.

B-4.2.2 Radionuclides in Qbt 3

Samples were collected at SWMU 21-023(c) and analyzed for radionuclides. The radionuclide analyses for these samples included americium-241, radionuclides by gamma spectroscopy, isotopic uranium, isotopic plutonium, strontium-90, and tritium. Table B-2.1-1 summarizes the samples collected and the requested radionuclide analyses for each sample.

Table B-4.2-1 presents the frequency of radionuclides detected or detected above the BVs in Qbt 3 at SWMU 21-023(c). Table B-4.2-2 presents the analytical results for radionuclides detected above BVs/FVs or detected, if no BV or FV is available. The locations and analytical results of radionuclides detected or detected above the BVs in Qbt 3 are shown in Plate 2 of the investigation report.

Americium-241, plutonium-239, plutonium-239, strontium-90, and tritium are detected in Qbt 3. These five radionuclides are retained as COPCs.

B-4.3 Results of Organic Chemicals in Samples Collected from SWMU 21-023(c)

B-4.3.1 Organic Chemicals in Soil

Soil samples were collected at SWMU 21-023(c) and analyzed for organic chemicals. Table B-2.1-1 summarizes the samples and the requested organic chemical analyses for each sample.

Table B-4.3-1 presents the frequency of organic chemicals detected in soil at SWMU 21-023(c). Identification of organic COPCs is based on detection status. Table B-4.3-2 presents the detected organic chemicals in soil. The locations and concentrations of detected organic chemicals in soil are shown in Plate 3 of the investigation report.

A total of 16 organic chemicals (anthracene, Aroclor-1242, Aroclor-1254, Aroclor-1260, benzo(a)pyrene, benzo(b)fluoranthene, benzoic acid, bis(2-ethylhexyl)phthalate, chrysene, di-n-butylphthalate, fluoranthene, 2-methylnaphthalene, naphthalene, pentachlorophenol, phenanthrene, and pyrene) are detected and retained as COPCs.

B-4.3.2 Organic Chemicals in Qbt 3

Samples were collected and analyzed for organic chemicals. Table B-2.1-1 summarizes the samples collected and the requested organic chemical analyses for each sample.

Table B-4.3-1 presents the frequency of organic chemicals detected in Qbt 3 at SWMU 21-023(c). Table B-4.3-2 presents the detected organic chemicals in Qbt 3. The locations and concentrations of detected organic chemicals in Qbt 3 are shown in Plate 3 of the investigation report.

- Aroclor-1260 is detected in one Qbt 3 sample and is retained as a COPC.

B-4.4 Summary of COPCs at SWMU 21-023(c)

Table B-4.4-1 provides a summary of the COPCs at SWMU 21-023(c) by media.

B-5.0 NATURE AND EXTENT

The approved investigation work plan (LANL 2004, 087358; NMED 2004, 090174) identified several data requirements for each SWMU and AOC within Consolidated Unit 21-018(a)-99. As described in section B-1.1, the consolidated unit was divided into three areas based on potential sources of contamination and anticipated investigation and remediation activities: (1) SWMUs 21-018(a) and 21-018(b); MDA V and the laundry facility, respectively; (2) SWMU 21-013(b) and AOC 21-013(g), two surface debris disposal areas; and (3) SWMU 21-023(c), a former septic system for a waste research laboratory. Sampling locations and analytical suites for the 2005–2006 investigation activities were selected based on historical data and the results of radiation walk-over surveys (Figures B-5.0-1 and B-5.0-2) to ensure the nature and extent of contamination were defined.

The remediation activities conducted at Consolidated Unit 21-018(a)-99 both historically and during the 2005–2007 investigation resulted in removing all contamination sources. However, some residual contamination remains within the consolidated unit. An evaluation of the nature and extent of this residual contamination is presented in the following sections.

B-5.1 SWMU 21-018(a) and SWMU 21-018(b), MDA V Absorption Beds and Laundry Facility

For the most part, SWMUs 21-018(a) and 21-018(b) represent subsurface sources of contamination (i.e., underground piping and absorption beds). Thus, most characterization samples at these sites were collected from boreholes and trenches. As presented in the approved work plan (LANL 2004, 087358; NMED 2004, 090174), data requirements for SWMUs 21-018(a) and 21-018(b) included the following:

- lateral extent of contamination within the MDA V absorption beds (because all absorption bed material was removed, this data requirement is no longer applicable).
- lateral and vertical extent of subsurface contamination in tuff surrounding the MDA V absorption beds
- lateral extent of surface contamination in and around the former laundry facility footprint
- vertical extent of potential subsurface contamination associated with the laundry facility drainline, blowdown sump, and boiler room floor drains
- lateral and vertical extent of potential contamination from the sump drainline discharge

In addition, no data existed for perchlorate, nitrate, and cyanide in environmental media and no historical pore-gas samples had been collected at the site before the 2005–2006 field activities. Therefore, samples collected within SWMUs 21-018(a) and 21-018(b) were analyzed for perchlorate, nitrate, and cyanide, and two pore-gas sampling events were conducted to define the nature of as well as the lateral and vertical extent of vapor-phase VOCs and tritium in the subsurface.

All qualified data from samples that were not subject to excavation are included in the evaluation of nature and extent. Tables B-2.1-3, B-2.2-2, and B-2.3-2 provide a summary of inorganic chemical, radionuclide, and organic chemical results, respectively, at SWMUs 21-018(a) and 21-018(b). Figures 7.3-1, 7.3-2, and 7.3-3 in the investigation report show the distribution of inorganic chemicals, radionuclides, and organic chemicals, respectively, at SWMUs 21-018(a) and 21-018(b).

B-5.1.1 Inorganic Chemicals

Inorganic COPCs at SWMUs 21-018(a) and 21-018(b) include aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, cyanide, iron, lead, manganese, mercury, nickel, nitrate, perchlorate, selenium, silver, uranium, vanadium, and zinc (Table B-2.5-1). The nature and extent of inorganic COPCs at SWMUs 21-018(a) and 21-018(b) as it relates to the data requirements listed above are discussed first, followed by a discussion of each COPC.

To define the nature and extent of COPCs at SWMU 21-018(a), boreholes were drilled to the north, south, east, and west of the absorption beds using a step-out pattern, for a total of eight boreholes. In addition, a deep borehole (total depth [TD] = 380 ft bgs) was drilled into the center of MDA V, and an 80-ft borehole was drilled at the west end of absorption bed 3. Of these ten boreholes, six had no inorganic COPCs detected above BVs in the TD sample. Three of the remaining four boreholes (locations 21-24528, 21-24538, and 21-24540) were drilled to 40 ft bgs and had detections of inorganic COPCs generally within twice the BV. Further, none of these COPCs were detected at the TD of the associated 80 ft boreholes drilled within 50 ft. Location 21-24524, drilled between absorption beds 1 and 2 near the historical area of the highest contamination at MDA V, had only one inorganic COPC above BV at the TD of 380 ft. Iron was detected at 4170 mg/kg, slightly above the BV of 3700 mg/kg for Qct.

During the 2005–2006 field activities, a total of 24 confirmation samples were collected from the tuff below the removed bed materials and interbed piping at MDA V. No inorganic COPCS were detected above BVs in 12 of the 24 confirmation samples. In the remaining 12 samples, arsenic, barium, copper, lead,

mercury, and selenium were detected above their respective BVs. All but barium and lead were detected within twice the BV. Perchlorate, which has no BV, was also detected at trace levels in four confirmation samples. Barium, lead, and perchlorate were not detected (or detected above BV) at TD of boreholes drilled within MDA V. Based on the distribution and concentrations of inorganic COPCs in boreholes and confirmation samples collected in and around MDA V, the extent of contamination in tuff surrounding the absorption beds is defined.

Of the seven boreholes drilled in and around the footprint of the former laundry facility and associated lines [SWMU 21-018(b)], the only inorganic COPCs detected at TD were lead and perchlorate. Lead was detected at 13 mg/kg, which is within the range of the Qbt 3 background data set (maximum = 15.5 mg/kg), at the TD at location 21-24542. Perchlorate, which has no BV, was detected at trace levels at TD at locations 21-24526, 21-24528, and 21-24532. No inorganic COPCs were detected above BVs in the remaining three locations (21-24525, 21-24527, and 21-24531). Of the few inorganic COPCs detected above BVs (or detected, if no BV) in the trenches of the removed sump and drainline, all but perchlorate were detected only in the shallower of two depth intervals. Perchlorate was detected at trace levels in the deeper interval at three of six locations. Based on the distribution and concentrations of COPCs in boreholes and confirmation samples collected in and around SMWU 21-018(b), the extent of contamination associated with the former laundry facility is defined.

A discussion of the nature and extent of each inorganic COPC follows.

- Aluminum, antimony, barium, beryllium, chromium, cobalt, copper, cyanide, iron, manganese, nickel, uranium, vanadium, and zinc were detected above their respective BVs at depth. With the exception of barium at location 21-24538, chromium at location 21-02523, iron at location 21-02523, and uranium at locations 21-02519, 21-02520, and 21-02523, the concentrations of these inorganic COPCs decrease with depth in each borehole.
    - ❖ Barium was detected at less than twice the BV in the deepest sample (55 ft bgs) collected at location 21-24538 (77.1 mg/kg compared to maximum Qbt 3 background concentration of 51.6 mg/kg). BH-10 (location 21-24535), which is within 25 ft of location 21-24538, shows barium concentrations decreasing or not detected at depth (TD = 80 ft bgs).
    - ❖ Chromium was detected above the Qbt 1g BV (2.6 mg/kg) in the TD sample from location 21-02523 but was either not detected above BV or detected slightly above the Qbt 1v BV (2.3 mg/kg compared to the BV of 2.24 mg/kg) in the shallower samples. Chromium was not detected above BV at TD (380 ft bgs) in the deep borehole drilled in 2005 (location 21-24524).
    - ❖ Uranium was detected above the Qbt 3 BV in the upper portion of the borehole at location 21-02517 but was not detected above BV in the lower portion of this borehole (below 30 ft bgs). Uranium concentrations at locations 21-02519 and 21-02520 did not change with depth but are less than the maximum background concentration for Qbt 3 of 5 mg/kg. Uranium at location 21-02523 was detected in Qbt 1g above the BV at 225 ft and 250 ft but was not detected above BV in any of the shallower samples.
    - ❖ Iron was detected above the Qbt 1g BV of 3700 mg/kg at 250 ft bgs from location 21-02523 at a concentration less than twice the BV. Iron was also detected at less than twice the BV at TD (380 ft bgs) in the deep borehole drilled in 2005 (location 21-24524).

  Therefore, the lateral and vertical extent of aluminum, antimony, barium, beryllium, chromium, cobalt, copper, cyanide, iron, manganese, nickel, uranium, vanadium, and zinc are defined.

- Arsenic exceeded the Qbt 3 BV of 2.79 mg/kg in 17 samples from within SWMUs 21-018(a) and 21-018(b) with concentrations ranging from 2.8 mg/kg to 32.1 mg/kg. However, arsenic was not detected in any TD samples. Further, confirmation samples from tuff below the removed absorption bed material consistently showed arsenic to be below the BV or less than the maximum background concentration (5 mg/kg). Therefore, the extent of arsenic is defined.
- Cadmium was not detected above background but had DLs above BVs. The DLs were either within the range of background concentrations or less than twice the BV (0.4 mg/kg). The extent of cadmium is defined laterally and vertically for SWMUs 21-018(a) and 21-018(b).
- Lead exceeded the Qbt 3 BV of 11.2 mg/kg in 43 samples. Thirty-six of these samples exceeded the maximum background concentration of 15.5 mg/kg, with the majority of lead exceedances occurring in the historical boreholes. The maximum lead concentration (323 mg/kg) was detected in a sample from historical borehole location 21-02519 at 20 to 25 ft bgs. Lead concentrations decrease with depth at this location and are an order of magnitude lower at the TD (33.5 mg/kg). Several boreholes surround location 21-02519, and none of them contain lead outside the range of background concentrations. Lead was also detected above the Qbt 3 BV at TD at locations 21-24538 and 21-24542. However, the concentrations decreased with depth and were within the range of Qbt 3 background concentrations at TD. Therefore, the lateral and vertical extent of lead at SWMUs 21-018(a) and 21-018(b) are defined.
- Mercury was detected above the BV (0.1 mg/kg) in two samples from the bottom of absorption bed 3. Its concentrations were less than twice the BV, and mercury was not detected above BV in any of the boreholes in and around absorption bed 3. Therefore, the lateral and vertical extent of mercury are defined.
- Selenium was detected in three boreholes (locations 21-02521, 21-24531, and 21-24538). Selenium was not detected at TD, except at location 21-24538 where it was detected at 0.864 mg/kg or less than three times the BV (0.3 mg/kg). It was not detected in either location 21-24535 or 21-02517, although the detection limits were elevated above the BV. Selenium was also detected in one sample at the bottom of absorption bed 1 at 4.79 mg/kg (location 21-25442) but was not detected in historical borehole location 21-02518, which is approximately 10 ft north of location 21-25442, to 75 ft bgs. Therefore, the extent selenium is defined laterally and vertically for SWMUs 21-018(a) and 21-018(b).
- Silver was not detected in any samples from SWMUs 21-018(a) and 21-018(b) but was retained as a COPC because the detection limit was above the BV of 1.0 mg/kg in a few samples (elevated detection limits were approximately twice the BV). Because silver was not detected, the extent silver is defined laterally and vertically for SWMUs 21-018(a) and 21-018(b).
- Nitrate and perchlorate do not have BVs for comparison.
    - ❖ Nitrate was detected sporadically across the site at low levels. It was detected at TD in locations 21-24532 (40 ft bgs), 21-24526 (40 ft bgs), and 21-24541 (80 ft bgs) at concentrations of 1.29 mg/kg, 0.833 mg/kg, and 0.751 mg/kg, respectively. It was also detected in samples collected from the bottom of the absorption beds. However, nitrate was not detected at TD in other boreholes including the deep borehole drilled in 2005 (location 21-24524).
    - ❖ Perchlorate was detected at less than 0.003 mg/kg at TD in four boreholes (locations 21-24528, 21-24532, 21-24538, and 21-24540). It was not detected in nearby boreholes at TD, including the deep borehole drilled in 2005 (location 21-24524). Most of the perchlorate detections were below the estimated detection limit and were consistently low

across SWMUs 21-018(a) and 21-018(b) and all of Consolidated Unit 21-018(a)-99, both in the surface and the subsurface.

The detection of nitrate and perchlorate in the subsurface at SWMUs 21-018(a) and 21-018(b) does not indicate a release, and extent is defined.

B-5.1.2 Radionuclides

Radionuclide COPCs identified for SWMUs 21-018(a) and 21-018(b) include americium-241, cesium-134, cesium-137, cobalt-60, plutonium-238, plutonium-239, sodium-22, strontium-90, tritium, uranium-234, uranium-235, and uranium-238 (Table B-2.5-1).

In the boreholes drilled in and around MDA V, tritium and uranium-235 are the radionuclides most often detected in TD samples, with tritium at less than 1 pCi/g and uranium-235 at just above the Qbt 3 BV of 0.09 pCi/g. The only exception is location 21-24540, where americium-241, plutonium-238, and plutonium-239 were detected in the 40-ft (TD) sample. These radionuclides were not detected in any sample from location 21-24539, drilled to 80 ft bgs, approximately 30 ft to the east. Radionuclide COPCs at the TD of boreholes drilled within and around the footprint of the former laundry facility are likewise limited to tritium at low levels and uranium-235 at just above the BV. Radionuclide COPCs detected (or detected above BV/FV) in the trenches of the removed sump and drainline, are within the range detected throughout nonprocess areas at TA-21 (LANL 1994, 026073) and do not indicate a significant release of radionuclides.

A radiation surface scan for high- and low-energy gamma emitters was conducted for TA-21 in October 2004 to help guide sampling locations. A Ludlum Model 44-20 3-in. by 3-in. sodium iodide detector was used for the high-energy gamma survey, and an Alpha Spectra FIDLER detector was used for the low-energy gamma survey. The results of the surveys, which are sensitive to only the upper 1 to 2 ft bgs, show elevated readings near the western SWMU 21-018(a) boundary near borehole 21-024534, and surface and shallow subsurface sample locations 21-04501 to 21-04504 and 21-24656. Following completion of the MDA V final site grading, a radiological walkover survey was performed in 2006. As a result of this survey, a shallow area of elevated radioactivity (less than 5 ft deep and approximately 6 ft by 12 ft) was identified. In May 2007, this target area was excavated, and a layer of material was encountered which, based on field observations, was operationally related to the laundry facility and which exceeded the target areal extent. Potholing was performed with a backhoe to visually determine the lateral extent of this layer. Radiological field screening was performed on the sidewalls of each pothole to determine the areal extent of the radiological anomaly. Based on radiological analytical results from soil samples collected from a hand auger, the area of elevated radioactivity is approximately 50 ft long and 23 ft wide (Figure B.1.1-2). Americium-241, cesium-137, plutonium-238, plutonium-239, uranium-234, uranium-235, and uranium-238 were detected greater than BV in all four samples collected. Plutonium-239 was detected at concentrations ranging from 51.2 to 322 pCi/g. Americium-241 was detected at concentrations ranging from 6.9 to 29.5 pCi/g. The highest field radiological screening values (direct reading: 220–1000 disintegrations per minute [dpm] alpha-emitting radionuclides and 10,000–30,000 dpm beta/gamma-emitting radionuclides) were detected in a thin 1–2-in. layer of material appearing to be fibrous in nature with a matrix of silt to coarse sand-size particles and fine wood chips less than ¼ in. long. The material color varied from dark brown to black and a grayish-green. A sample was collected from the highest radiological field screening location of the layer and was analyzed for radiological constituents. Radiological field screening above and below the layer indicates radionuclides may have migrated vertically to a depth of 4–5 ft bgs. Additional removal activities are planned for this area, and the results will be reported in a supplemental investigation report.

A discussion of the nature and extent of each radionuclide COPC at SWMUs 21-018(a) and 21-018(b) follows.

- Plutonium-239 was detected in nine surface or shallow subsurface samples in and around MDA V and the former laundry facility. The results for plutonium-239 ranged from 0.019 to 0.735 pCi/g in soil and fill and are within the range of nonprocess area baseline concentrations within TA-21 (maximum: 3.26 pCi/g) (LANL 1994, 026073). Although plutonium-239 was the driver for removing the absorption beds, it was not detected in the subsurface in or around the footprint of the laundry building. In borehole samples from within and around MDA V, plutonium-239 concentrations decreased consistently with depth, with the exception of location 21-24540 where it was detected at TD (40 ft bgs). Location 21-24539, 20 ft to the east, had no detections of plutonium-239 (TD = 80 ft bgs); location 21-01665, 40 ft to the west in SWMU 21-023(c), had lower concentrations of plutonium-239 at 9 ft and 15 ft bgs and no detections of plutonium-239 below 15 ft bgs. Plutonium-238 follows the same distribution as plutonium-239 but generally was detected less frequently and at lower concentrations (except at location 21-24540). No samples collected from borehole locations 21-24539 and 21-01665 showed detections of plutonium-238. Therefore, the lateral and vertical extent of plutonium-238 and plutonium-239 are defined.

- Americium-241 was not detected in the subsurface in or around the footprint of the laundry building. In and around MDA V, americium-241 was primarily detected in samples west of the absorption beds, next to SWMU 21-023(c), where it was the driver for removing material from the outfall. Americium-241 was not detected in any of the step-out boreholes drilled in 2005, with the exception of location 21-24540, the borehole farthest west on the west side of MDA V. Americium-241 was not detected in borehole location 21-24539 (20 ft to the east of 21-24540) to 80 ft bgs, and location 21-01665 (40 ft to the west of 21-24540) had lower and decreasing concentrations of americium-241 to a depth of 20 ft bgs. In confirmation samples collected from tuff beneath the removed absorption beds, americium-241 was consistently lower than the excavated material. Therefore, the lateral and vertical extent of americium-241 are defined.

- Within SWMUs 21-018(a) and 21-018(b), the highest tritium concentrations were detected in samples from below absorption bed 2. One of the historical boreholes (location 21-02520) drilled in absorption bed 2 had a maximum tritium concentration of approximately 55 pCi/g at a depth of 12.5 to 15 ft bgs, just below the removed bed materials. Tritium at this location decreased with depth to 1.23 pCi/g. In the step-out boreholes drilled around MDA V in 2005, tritium was not detected in the TD sample from the farthest step-out borehole on each side of the absorption beds, with the exception of the borehole to the south (location 21-24538), where it was detected at 0.065 pCi/g at 55 ft bgs, which is an order of magnitude less than tritium concentrations detected in borehole location 21-24535 (approximately 25 ft to the north). Tritium was detected sporadically and at generally low levels within and around the footprint of the former laundry facility. The maximum tritium concentration (1.309 pCi/g) was detected at 3 to 4 ft bgs at location 21-24551 and decreased slightly with depth. It was detected at lower concentrations at nearby location 21-24552 and not detected at nearby location 21-24553. Therefore, the extent of tritium at SWMUs 21-018(a) and 21-018(b) is defined.

- With a few exceptions, the naturally occurring uranium isotopes were detected at SWMUs 21-018(a) and 21-018(b) at concentrations slightly above their respective BVs. However, the maximum concentrations of uranium-234 (7.15 pCi/g) and uranium-238 (3.42 pCi/g) were detected in one confirmation sample from the center of absorption bed 2 (location 21-25441). The maximum concentration of uranium-235 (0.64 pCi/g) was measured in samples from historical borehole 21-02519, drilled in the east end of absorption bed 1. These levels of isotopic uranium

were not detected in the step-out boreholes drilled in 2005, which surround MDA V and extend deeper than the historical boreholes. Uranium-234 and uranium-238 were not detected above BVs in the deep borehole drilled in 2005 (location 21-24524). Uranium-235 was detected at concentrations less than twice the BVs at location 21-24524. Therefore, the vertical and lateral extent of uranium-234, uranium-235, and uranium-238 are defined.

- Cobalt-60, cesium-134, cesium-137, sodium-22, and strontium-90 were detected sporadically in the subsurface at SWMUs 21-018(a) and 21-018(b). Concentrations decreased with depth in all boreholes and none of these radionuclides were detected at TD. The distribution of these radionuclides is not indicative of a release from the laundry facility or the absorption beds, and extent is defined.

B-5.1.3 Organic Chemicals

Organic COPCs identified for SWMUs 21-018(a) and 21-018(b) include acenaphthene: acenaphthylene; acetone; anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzoic acid; bis(2-ethylhexyl)phthalate; 4-bromophenyl-phenylether; butylbenzylphthalate; carbon disulfide; 4-chloro-3-methylphenol; 2-chloronaphthalene; chloromethane; chrysene; diethylphthalate; di-n-butylphthalate; di-n-octylphthalate; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; 2-methylnaphthalene; naphthalene; 3-nitroaniline; phenanthrene; pyrene; and styrene (Table B-2.5-1).

Although several organic COPCs are detected in the area around the former laundry facility and the MDA V absorption beds, they are detected in few samples and nearly all are below the estimated quantitation limit (EQLs). No organic COPCs were detected in boreholes drilled within and around the former laundry facility. Di-n-octylphthalate, diethylphthalate, and bis(2-ethylhexyl)phthalate were the only organic COPCs detected (in two, one, and one sample, respectively, all below EQLs) at the TD of boreholes within and around MDA V. Based on these data, the laundry facility and the absorption beds were not a significant source of organic chemicals.

- Only three confirmation sample locations (21-25443, 21-25448, and 21-26273) from the bottom of absorption beds 2 and 3 had trace concentrations (near or below the EQL) of organic chemicals (phthalates and polycyclic aromatic hydrocarbons [PAHs]). SVOCs present in new boreholes are similar to those detected in surface samples from SWMU 21-013(b) and AOC 21-013(g) (discussed below). Generally, trace concentrations of organic chemicals are confined to the shallow tuff, except bis(2-ethylhexyl)phthalate, which was detected at TD at location 21-24524 but not in shallower samples.
- In SWMU 21-018(b), several SVOCs, mostly PAHs, were detected at locations 21-24551 and 21-24556 at 3 to 4 ft bgs at concentrations below EQLs in most cases. The sample at location 21-24556 was collected directly below asphalt in the parking lot next to the former laundry facility footprint. Concentrations at both locations decreased with depth (no detects were reported in the 5 to 6 ft bgs samples), except for fluoranthene detected at location 21-24551 at a similar trace concentration in the deeper sample. Pyrene was also detected at two other locations (21-01972 and 21-24569) at trace concentrations. Pyrene was not detected in the deeper sample from location 21-24569 and only a surface sample was collected from location 21-01972. Therefore, lateral and vertical extent of organic COPCs at SWMU 21-018(b) are defined.
- In SWMU 21-018(a), organic chemicals are mainly at trace concentrations in the subsurface and decrease with depth. Diethylphthalate in one borehole (location 21-02518) and di-n-octylphthalate in two boreholes (locations 21-02518 and 21-24540) were detected at TD. Diethylphthalate was not detected in any of the shallower samples and was not detected below 25 ft bgs in any other

borehole, including the deep borehole drilled in 2005 (location 21-24524). Di-n-octylphthalate was detected at similar trace concentrations in three shallower samples at location 21-02518 but was not detected in shallower samples at location 21-24540. Di-n-octylphthalate was not detected in any other borehole, including the deep borehole drilled in 2005 (location 21-24524). The vertical and lateral extent of organic chemicals in the vicinity of SWMU 21-018(a) are defined.

B-5.1.4 Pore Gas

Each of the 15 boreholes drilled in 2005 were sampled at two depth intervals for vapor-phase VOCs and tritium. The shallow interval was sampled at the approximate base of the absorption beds and the deep interval was to be sampled at the TD of the borehole. In 2005, samples were not collected at the drilled TD of the boreholes because all boreholes contained several feet of sloughed material resulting from auger flight removal and heavy equipment traffic. In 2006, each borehole was reamed to the original depth, and the augers were left in place to allow true TD samples to be collected. In 2006, samples were collected from each borehole at two depth intervals, as described above, and were analyzed for VOCs and tritium.

Tritium in Pore Gas

The concentration of tritium in subsurface pore water was determined by collecting samples of subsurface pore gas containing tritiated water vapor. Pore-gas samples were collected and analyzed for tritium in 2005 and in 2006 (Table B-2.4-3). In 2005, the maximum detected tritium activity (24,570 pCi/L at 14–15 ft bgs) occurred at location 21-24524 between absorption beds 1 and 2. In 2006, location 21-24524 also had the maximum detected tritium activity (132,100 pCi/L) at TD. Most locations showed a decrease or similar concentrations with depth. Six locations showed an increase in tritium activity with depth. Tritium activity decreased with distance away from location 21-24524 in both 2005 and 2006 samples. However, sufficient data are not available to conclusively define the vertical and lateral extent of tritium in subsurface pore water in the fractured tuff at depth (greater than 380 ft) below the former absorption beds. Figures 7.6-3 and 7.6-4 in the investigation report present tritium activity in pore gas in 2005 and 2006, respectively.

VOCs in Pore Gas

Twenty-one VOCs were detected in pore-gas samples collected in 2005: acetone; 2-butanone; 1-butanol; carbon disulfide; carbon tetrachloride; chloroform; 1,1-dichloroethane; 1,4-dioxane; ethanol; ethylbenzene; 4-ethyltoluene; methanol; 2-propanol; styrene; tetrachloroethene; toluene; 1,1,1-trichloroethane; trichloroethene; 1,2,4-trimethylbenzene; 1,2-xylene; and 1,3-xylene+1,4-xylene (Table B-2.4-2). The maximum VOC concentration detected in 2005 was 1-butanol (720 µg/m^3) at 4–5 ft bgs at location 21-24525. This borehole is located within the footprint of the former laundry facility.

Thirty-six VOCs were detected in pore-gas samples collected in 2006 (Table B-2.4-1). These include acetone; benzene; bromodichloroethane; 1-butanol; 2-butanone; carbon disulfide; carbon tetrachloride; chloroform; chloromethane; dichlorodifluoromethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,2-dichloropropane; ethanol; ethylbenzene; 4-ethyltoluene; hexane; 2-methyl-4-pentanone; methylene chloride; n-heptane; propylene; styrene; tetrachloroethene; tetrahydrofuran; toluene; 1,2,2-trichloro-1,1,2-trifluoroethane; 1,1,1-trichloroethane; trichloroethane; trichlorofluoromethane; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; vinyl acetate; vinyl chloride; xylene (total); 1,2-xylene; and 1,3-xylene+1,4-xylene (Table B-2.4-2). The maximum VOC concentration in 2006 was acetone (680 µg/m^3) at location 21-24524 at TD (379–380 ft bgs). Generally, pore-gas VOCs were detected at similar concentrations in 2005 and 2006.

Styrene was detected in all 30 pore-gas samples collected in 2005, ranging from 6.8 µg/m^3 to 170 µg/m^3. The maximum concentration was detected at location 21-24527 in the 4.5–5.5 ft bgs sample, decreasing to 71 µg/m^3 at depth. Styrene in 2005 pore-gas samples decreased with depth in 10 of 15 boreholes (styrene increased slightly or did not change in the other five boreholes). In 2006, styrene was detected in only nine pore-gas samples, all with concentrations less than 11 µg/m^3.

Toluene was detected in 29 samples ranging from 7 µg/m^3 to 50 µg/m^3 in 2005 with the maximum concentration at location 21-24524. Generally, toluene concentrations in 2005 pore-gas samples decreased or remained constant with depth at most locations. Toluene was also detected in 27 boreholes in 2006 ranging from 2.1 µg/m^3 to 46 µg/m^3, showing decreasing or stable concentrations with depth and laterally across SWMUs 21-018(a) and 21-018(b).

The VOC data were screened to determine whether VOCs in subsurface pore gas were a potential source of groundwater contamination through migration of pore gas to groundwater. This screening process, described in Appendix H, accounts for equilibrium partitioning between VOCs in the gas and liquid phases and compares measured concentrations of VOCs in pore gas to concentrations required to exceed groundwater cleanup standards. VOCs were detected in pore gas at similar, low concentrations in samples from both 2005 and 2006. Thus, additional pore-gas data for Consolidated Unit 21-018(a)-99 do not need to be collected.

B-5.1.5 Summary of Nature and Extent at SWMUs 21-018(a) and 21-018(b)

At MDA V, all absorption bed material and associated piping have been removed. The results of confirmation samples collected in tuff at the base of the beds indicate little residual contamination, and the boreholes drilled in and around MDA V during the 2005–2006 investigation show decreasing trends of COPCs, both with depth and laterally. In and around the footprint of the former laundry facility, few COPCs were detected, and those that were detected were present at low concentrations and decreased with depth. All pipes have been removed, and the former laundry facility does not represent a significant source of contamination to the environment. Based on the distribution and concentrations of COPCs at SWMUs 21-018(a) and 21-018(b), the objectives of the investigation have been met, with the exception of defining the extent of low levels of tritium in subsurface pore water. Groundwater monitoring requirements for TA-21, including Consolidated Unit 21-018(a)-99, will be addressed in the "Los Alamos/Pueblo Canyons Groundwater Monitoring Well Network Evaluation Report" scheduled for submittal to NMED on December 30, 2007. The area of elevated radioactivity identified during postremediation radiological surveys will be remediated and reported in a supplemental investigation report for Consolidated Unit 21-018(a)-99.

B-5.2 SWMU 21-013(b) and AOC 21-013(g), Debris Disposal Sites

As presented in the approved work plan (LANL 2004, 087358; NMED 2004, 090174), data requirements for the subsurface at SWMUs 21-013(b) and AOC 21-013(g) included

- lateral and vertical extent and potential source of contaminants in the drainage
- lateral extent of contaminants east and west of the historical slope samples
- lateral and vertical extent of contamination on the original surface

In addition, previously collected samples were not analyzed for perchlorate, nitrate, and cyanide.

Remediation activities at SMWU 21-013(b) and AOC 21-013(g) included removing concrete, asphalt, and metallic debris from the sites. Approximately 1100 yd^3 of concrete and small amounts of asphalt and

metal debris were removed from the slope. Because of the degree of surface material disturbance resulting from removing debris and subsequent regrading, historical samples from the remediated area were not included in the data set. A confirmation sampling grid, which extended to the east and west of the historical sampling grid, was laid over the slope (both disturbed and undisturbed). The grid nodes, spaced approximately 50 ft apart, were sampled at two depth intervals: 0–0.5 ft and 1.5 ft–2.0 ft. Samples from the eastern half of the sampling grid were collected from relatively undisturbed, natural soils. The samples from the western half of the sampling grid were collected from reworked dirt that was representative of the material beneath the debris before it was removed (see Appendix C, section C-9.0, Deviations from the Work Plan). The recent sample analytical results are similar to the historical data. The final slope grading in the northwestern corner of the slope (the southwestern corner of MDA V) was performed after sampling within the grid was completed.

Based on the analytical results for surface soil samples (0–0.5 ft) at three locations, approximately 1 yd^3 of material was removed from each location. Plutonium-239 exceeded the residential screening action level (SAL) of 33 pCi/g at two locations (21-24654 and 21-24660). Benzo(a)anthracene was detected at 6.88 mg/kg, just above the residential soil screening level (SSL) of 6.81 mg/kg, at a third location (21-24650). It is possible that slope regrading activities, which took place after sampling but before removal, may have affected the distribution of contamination at the third location. The extent of the impact the regrading may have had on site conditions at this location, which was near the southwest corner of MDA V, was investigated in 2007. Sampling was conducted at and downgradient from location 21-24650. Two depths (0–0.5 ft and 1.5–2.0 ft) were sampled for SVOCs at 21-24650 and three other downgradient locations.

The following discussion of nature and extent of contamination describes the COPCs at SWMU 21-013(b) and AOC 21-013(g) following remediation activities. Tables B-3.1-2, B-3.2-2, and B-3.3-2 summarize the inorganic chemical, radionuclide, and organic chemical results, respectively, at SWMU 21-013(b) and AOC 21-013(g). Plates 1, 2, and 3 in the investigation report show the distribution of inorganic, radionuclide, and organic COPCs, respectively, at SWMU 21-013(b) and AOC 21-013(g).

B-5.2.1 Inorganic Chemicals

The following inorganic chemicals were identified as COPCs for SWMU 21-013(b) and AOC 21-013(g): copper, lead, mercury, nitrate, perchlorate, selenium, silver, thallium, and uranium (Table B-3.4-1). The nature and extent of inorganic COPCs at SWMU 21-013(b) and AOC 21-013(g) as it relates to the data requirements listed above is discussed first, followed by a discussion of each COPC.

Samples collected along the toe of the slope into BV Canyon generally either had no inorganic COPCs detected above BV or had only perchlorate at concentrations below the DL. Uranium was detected in the shallow interval of some of the historical samples from the toe of the slope at concentrations within twice the background range (see above discussion). Samples collected from the bottom of BV Canyon, both historically and during the 2005–2006 investigation, had more detections of inorganic COPCs and at higher concentrations than samples collected from the toe of the slope. Based on the detections at location 21-25623, which is upslope of SWMU 21-013(b) and AOC 21-013(g), the inorganic COPCs within the bottom of BV Canyon do not appear to be coming from the debris disposal areas. Therefore, extent of inorganic COPCs from SWMU 21-013(b) and AOC 21-013(g) is defined down to the canyon bottom.

Samples collected along the eastern and western edges of the debris disposal area generally either had no inorganic COPCs or had just perchlorate at concentrations below the DL. Based on the limited

numbers of COPCs and the low concentrations detected, the lateral extent of contamination to the east and west of the debris disposal areas is defined.

Although the fill and asphalt located on the western half of the slope was much thicker than anticipated and could not be removed to the undisturbed surface, enough undisturbed material was available downgradient and to the east and west (see above) of the area covered with fill to adequately characterize the impacts to the canyon resulting from both debris disposal and potential overflows from MDA V. The eastern half of the slope is largely undisturbed, and, based on the distribution of contaminants from MDA V and the topography, is the portion of the slope that would be most likely to have been impacted by contamination from the absorption beds. Few inorganic COPCs were detected above BVs on the eastern half of the slope. These include lead and cadmium within the range of the background data set, uranium within twice the BV, and perchlorate, which has no BV, at concentrations below the DL. Therefore, the extent of contamination on the original (i.e., preoperational) surface is defined.

A discussion of the nature and extent of each inorganic COPC at SMWU 21-013(b) and AOC 21-013(g) follows.

- Copper, lead, and mercury were detected above BVs in one to five samples.
    - ❖ Copper was detected in one sample at a concentration less than twice the BV and was not detected in any other samples.
    - ❖ Lead was detected above BV at three locations and decreased to below the BV with depth at two locations. At the third location, the concentrations remained the same to a depth of 1 ft bgs, but all detected concentrations were less than the maximum background concentration for lead in soil.
    - ❖ Mercury was detected above BV at three locations at not more than twice the BV.

  Therefore, the extent of copper, lead, and mercury at SWMU 21-013(b) and AOC 21-013(g) is defined.

- Silver was detected in one sample above the BV at location 21-02572 at a depth of 1 ft bgs. Other samples reported silver as not detected but with an elevated DL that was approximately twice the BV. Silver was not detected in any sample location in the vicinity of 21-02572. Therefore, the extent of silver at SWMU 21-013(b) and AOC 21-013(g) is defined.
- Uranium was detected in several samples from SWMU 21-013(b) and AOC 21-013(g). However, only historical samples were analyzed for total uranium and the data are limited to the lower slope and the bottom of BV Canyon. Most of the total uranium concentrations are within the range of background concentrations. Two concentrations are slightly above the maximum soil background concentration (3.91 mg/kg and 3.63 mg/kg compared to 3.6 mg/kg), while two other concentrations (5.72 mg/kg and 5.95 mg/kg) are less than twice the maximum soil background concentration. Therefore, uranium concentrations are similar to background and extent at SWMU 21-013(b) and AOC 21-013(g) is defined.
- Nitrate (maximum concentration 15.5 mg/kg) was detected across the site at low concentrations. At most locations, nitrate concentrations decreased with depth; only 11 locations showed an increase in nitrate concentrations with depth. The maximum concentration at depth (2 ft bgs) was 11 mg/kg and does not indicate a release of nitrate from SWMU 21-013(b) and AOC 21-013(g). Therefore, the extent of nitrate at SWMU 21-013(b) and AOC 21-013(g) is defined.

- Perchlorate was detected across the site at trace concentrations ranging from 0.0003 to 0.0039 mg/kg across Consolidated Unit 21-018(a)-99 and beyond the consolidated unit boundaries and do not appear to be indicative of a release. The extent of perchlorate at SWMU 21-013(b) and AOC 21-013(g) is defined.
- Selenium and thallium were retained as COPCs because the sample-specific DLs were above the BVs. However, DLs exceeded the maximum background concentrations only slightly (1.7 mg/kg for selenium and 1.0 mg/kg for thallium). Because neither selenium not thallium were detected at SWMU 21-013(b) and AOC 21-013(g), the extent is defined.

B-5.2.2 Radionuclides

Radionuclide COPCs identified for SWMU 21-013(b) and AOC 21-013(g) include americium-241, cesium-137, plutonium-238, plutonium-239, strontium-90, tritium, uranium-234, uranium-235, and uranium-238 (Table B-3.4-1).

Samples collected along the toe of the slope into BV Canyon generally had radionuclide COPCs within the range of nonprocess areas at TA-21 (LANL 1994, 026073). Americium-241, plutonium-239, strontium-90, and tritium were all detected at levels less than the maximum of the nonprocess area range. Cesium-137, for which no nonprocess data are available, was also detected (see above). Samples collected from the bottom of BV Canyon had detections of the same radionuclide COPCs as detected at the toe of the slope, with the addition of plutonium-238, but americium-241 and plutonium-239 levels were generally higher than at the toe of the debris slope. The extent of these radionuclides, which may be from Consolidated Unit 21-018(a)-99 as well as MDA B and other SWMUs and AOCs upgradient of MDA V, was evaluated during the investigation of Los Alamos Canyon (LANL 2004, 087390). However, within the boundary of SWMU 21-013(b) and AOC 21-013(g), the extent of these radionuclides is defined.

Samples collected along the eastern and western edges of the debris disposal area generally either had no radionuclide COPCs or had radionuclides within the range for nonprocess areas across TA-21 (LANL 1994, 026073). Plutonium-239, americium-241, and tritium were all detected at low levels in samples bordering the debris disposal areas. Plutonium-239 and americium-241 were detected primarily within the 0- to 0.5-ft interval and decreased with depth. Tritium was detected at low levels, mostly in the 1.5- to 2-ft interval. Based on the limited numbers of radionuclide COPCs and low concentrations detected, the lateral extent of contamination to the east and west of the debris disposal areas is defined.

Although the fill and asphalt located on the western half of the slope was much thicker than anticipated and could not be removed to the undisturbed surface, enough undisturbed material existed downgradient and to the east and west (see above) of the area covered with fill to adequately characterize the impact of potential overflow from MDA V. The eastern half of the slope is largely undisturbed, and, based on the distribution of contaminants from MDA V and the topography, is the portion of the slope that would be most likely to have been impacted by contamination from the absorption beds. Radionuclide COPCs detected above BVs/FVs on the eastern half of the slope include americium-241, plutonium-238, plutonium-239, strontium-90, and tritium, mostly within the range detected across TA-21 in nonprocess areas (LANL 1994, 026073). However, greater concentrations of plutonium-239 and americium-241 were detected on the upper portion of the eastern half of the slope. These radionuclides showed decreasing concentrations with depth, which is consistent with a surface contaminant source, such as overflow from the absorption beds. Cesium-137 was also detected below the FV (see above for a discussion regarding applicability of FVs in disturbed areas), and isotopes of uranium were detected higher up on the slope at levels just above the BVs but were not detected downgradient. Therefore, the extent of contamination on the original (i.e., preoperational) surface is defined.

A discussion of the nature and extent of each radionuclide COPC at SMWU 21-013(b) and AOC 21-013(g) follows.

- Americium-241, plutonium-238, and plutonium-239 were detected across the site. On the slope, the concentrations of these radionuclides typically decrease with depth as well as down the slope into BV Canyon. Radionuclides were detected all the way down to the edge of the hanging canyon leading from BV Canyon into Los Alamos Canyon. The extent of these radionuclides, which may be from Consolidated Unit 21-018(a)-99 as well as MDA B and other SWMUs and AOCs upgradient of MDA V, was evaluated during the investigation of Los Alamos Canyon (LANL 2004, 087390). Within the boundary of SWMU 21-013(b) and AOC 21-013(g), the extent of these radionuclides is defined.
- Tritium was detected at low levels throughout the site (less than 1 pCi/g). Tritium levels generally decreased with depth although at such low levels the change is slight and not consistent. Similarly, tritium levels are generally lower at the toe of the slope. The results indicate that SWMU 21-013(b) and AOC 21-013(g) were not sources of tritium. Within the boundary of the SWMU and AOC, the extent of the tritium is defined.
- Uranium-234, uranium-235, and uranium-238 were detected in two to four sample locations southwest of absorption bed 3 and their concentrations decreased with depth at all locations. Uranium isotopes were not detected above BVs in any of the downslope samples, nor were they detected above BVs in the drainage directly below the slope. Therefore, the extent of isotopic uranium is defined at SMWU 21-013(b) and AOC 21-013(g).
- Cesium-137 and strontium-90 were detected on the slope at concentrations consistently below their respective soil FVs. Although most of these locations are in the shallow subsurface (approximately 1–2 ft), the detections may be from fallout because the colluvium on the slope has been greatly disturbed and the data from SWMU 21-018(a) indicate that MDA V was not a source of cesium-137 or strontium-90. Within the boundary of SWMU 21-013(b) and AOC 21-013(g), the extent of cesium-137 and strontium-90 is defined.

B-5.2.3 Organic Chemicals

Organic COPCs identified for SWMU 21-013(b) and 21-013(g) include anthracene, Aroclor-1254, Aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzoic acid, bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, phenanthrene, and pyrene (Table B-3.4-1).

Samples collected along the eastern and western edges of the debris disposal and at the toe of the slope generally either had no organic chemical COPCs or had trace concentrations (i.e., less than EQLs) of the same COPCs detected across the slope. Based on the ubiquitous nature of these compounds and the trace levels observed, the extent of organic COPCs along the eastern and western margins of SWMU 21-013(b) and AOC 21-013(g) and the toe of the slope into BV canyon is defined. Organic COPCs in the bottom of BV Canyon were also detected at concentrations below the EQLs, and, based on data from samples collected upstream of the debris disposal sites, appear to have come from sources in addition to SWMU 21-013(b) and AOC 21-013(g). These sources may include SWMUs and AOCs upgradient of Consolidated Unit 21-018(a)-99 as well as the Los Alamos townsite.

Although the preoperational surface was not available for sampling in a portion of the western half of the debris slope, the nature and extent of organic COPCs at SWMU 21-013(b) and AOC 21-013(g) can still be defined. It appears that most of the organic COPCs detected on the debris slope are a result of asphalt and other materials included in the debris. Overflows from the absorption beds are not expected

to contribute significant contamination by organic chemicals, based on data from MDA V. Additionally, as discussed in sections B-5.2.1 and B-5.2.2, enough samples from undisturbed locations surrounding the area of the deepest fill were collected to ensure adequate characterization of the preoperational surface.

A discussion of the nature and extent of each organic COPC at SMWU 21-013(b) and AOC 21-013(g) follows.

- Aroclor-1254 and Aroclor-1260 were detected at concentrations ranging from 0.002 mg/kg to 0.045 mg/kg, with most detections below EQLs, in samples collected at SWMU 21-013(b) and AOC 21-013(g). Most of the Aroclor concentrations were in samples collected from 0 to 0.5 ft bgs and did not persist in deeper samples; concentrations in deeper samples were generally at trace levels. Concentrations also decreased down the slope. No Aroclors were detected in the farthest down-drainage sample collected in 2005 from BV Canyon. Therefore, the vertical and lateral extent of Aroclor-1254 and Aroclor-1260 at SWMU 21-013(b) and AOC 21-013(g) are defined.
- The PAHs, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene, were detected in sample locations throughout SWMU 21-013(b) and AOC 21-013(g), mostly at concentrations below the EQL. Of these, fluoranthene was detected in the most samples (13) and at the highest concentration (0.925 mg/kg). With the exception of five locations, the PAH concentrations were reported in the 0- to 0.5-ft-depth interval and were not detected in the deeper sample interval (maximum depth of 2 ft bgs). Concentrations also decreased down the slope into BV Canyon. Therefore, the extent of PAHs at SWMU 21-013(b) and AOC 21-013(a) is defined.
- Bis(2-ethylhexyl)phthalate and benzoic acid were detected in 7 and 6 samples, respectively, at SWMUs 21-013(b) and AOC 21-013(g). Concentrations of benzoic acid were only detected in the surface samples; no deeper samples reported detects for benzoic acid. Five of the bis(2-ethylhexyl)phthalate concentrations were detected in the deeper sample at a location, but not in the surface samples. Bis(2-ethylhexyl)phthalate was on the upper part of the slope but not at the bottom of the slope. Therefore, the extent of bis(2-ethylhexyl)phthalate and benzoic acid is defined.

B-5.2.4 Summary of Nature and Extent at SWMU 21-013(b) and AOC 21-013(g)

The lateral and vertical extent of contamination at SWMU 21-013(c) and AOC 21-013(g) are defined. The sampling grid was extended farther east and west on the debris slope than was historically sampled. The samples collected along the eastern and western edges of the grid had fewer COPCs and/or lower concentrations of COPCs than samples from within the grid. This trend is also true of samples collected along the toe of the slope. However, samples collected within the bottom of BV Canyon did not follow this trend, possibly because of contaminant contribution from farther up BV Canyon. The extent of these contaminants was evaluated during the investigation of Los Alamos Canyon (LANL 2004, 087390).

Although the preoperational surface was not reached for sampling in a portion of SWMU 21-013(b) because of the thickness of fill material present, a significant number of samples were collected from relatively undisturbed areas surrounding the area covered by fill. Samples on the upper portion of the eastern half of the debris slope suggest some impact to the surface from radionuclides, possibly from overflows from MDA V. However, the radionuclides (primarily plutonium-239 and americium-241) show decreasing concentration trends, both with depth and laterally, and therefore the extent is defined.

B-5.3 SWMU 21-023(c), Waste Treatment Laboratory Septic System

Historical investigations of SWMU 21-023(c) identified inorganic, radionuclide, and organic COPCs. With the exception of the borehole location next to the former septic tank (location 21-01665), which was sampled at 5-ft intervals to a TD of 20 ft, all SWMU 21-023(c) historical samples were collected from surficial materials and were restricted to the steep slope below the outfall. While the east-west extent of COPCs was laterally controlled by the established drainage, the down-drainage extent was not defined. Vertical extent was not demonstrated at most of the existing historical sample locations because deeper samples had not been collected.

Within the drainage below the septic system outfall, americium-241 and plutonium-239 were detected in historical samples at activities exceeding their residential SALs. The highest activities of americium-241 (213.4 pCi/g) and plutonium-239 (107.5 pCi/g) were from location 21-01339, where the highest concentrations of inorganic chemicals were also detected.

Based on the review of the existing site data for SWMU 21-023(c) the following data requirements were identified in the approved work plan (LANL 2004, 087358; NMED 2004, 090174):

- vertical extent of contamination underneath the inlet and outlet lines
- lateral and vertical extent of contamination within the outfall area

In addition, previously collected samples from SWMU 21-023(c) were not analyzed for perchlorate, nitrate, and cyanide.

Per the approved work plan (LANL 2004, 087358; NMED 2004, 090174), remediation was proposed at SWMU 21-023(c) to remove any remaining infrastructure (inlet/outlet lines) and soil exceeding residential SALs/SSLs. Trenching performed in the area of the former septic system confirmed that the inlet/outlet lines were previously removed. Seven locations were sampled at multiple depths to define the vertical extent of contamination beneath the line locations.

To define the lateral and vertical extent of contamination in the outfall area, 14 locations were sampled in the drainage channel. Two additional locations were sampled in the SWMU 21-027(d) channel, and two locations in the drainage area farther west of the SWMU 21-027(d) channel were sampled to determine if overflow from either SWMU 21-023(c) or MDA V might have impacted other drainages. Samples were collected from five locations within the BV Canyon channel, both upgradient and downgradient from SWMU 21-023(c), to further assess impacts to BV Canyon.

Based upon these sampling results (and the results of subsequent confirmation sampling), two soil and weathered tuff removal actions were conducted in the upper drainage to reduce radionuclide activities to below the residential SALs. The following discussion of nature and extent of contamination describes the COPCs at SWMU 21-023(c) after these remediation activities.

The following discussion of nature and extent describes residual contamination following remediation activities. Tables B-4.1-2, B-4.2-2, and B-4.3-2 summarize the analytical results for inorganic chemicals, radionuclides, and organic chemicals, respectively, at SWMU 21-023(c). The analytical results for inorganic chemicals, radionuclides, and organic chemicals are presented on Plates 1, 2, and 3, respectively, and show postremediation conditions.

B-5.3.1 Inorganic Chemicals

Inorganic COPCs at SWMU 21-023(c) include aluminum, antimony, chromium, copper, cyanide, lead, lithium, mercury, nitrate, perchlorate, selenium, silver, strontium, thallium, and zinc (Table B-4.4-1).

In the vicinity of the former septic tank and inlet/outlet lines, soil was sampled at seven locations and analyzed for inorganic chemicals during the 2005–2006 investigation. No inorganic COPCs were detected above BVs at four of these locations. Mercury was the only COPC detected above BVs at all three of the remaining locations. It was detected in the shallower of two intervals, except at location 21-24575 where it was detected in the deeper interval as well. All mercury concentrations were below 1 mg/kg in the area of the former septic system. Lead and perchlorate are the only other inorganic COPCs detected above BVs in the seven samples collected from the area of the former septic system in 2005–2006. They were detected in the shallow interval only at location 21-24570. One historical borehole (21-01665) was drilled in the footprint of the septic tank. COPCs detected in this borehole were limited to lithium and strontium, which have no BVs for comparison, and chromium and selenium, which were both within twice their BV. Neither mercury nor lead were detected at location 21-01665 (perchlorate was not analyzed). Therefore, the extent of inorganic COPCs in the area of the former septic system is defined.

A discussion of the nature and extent of each inorganic COPC within the outfall drainage at SMWU 21-023(c) follows.

- Copper and selenium were detected at concentrations slightly above BVs in one or more samples from the upper outfall drainage but were not detected above BV in the lower outfall drainage. Copper was not detected at less than twice the soil BV at one location and was similar to Qbt 3 background at the other location. Selenium concentrations were approximately 3 times the Qbt 3 BV or less and were similar to the soil BV or maximum soil background concentration (1.52 mg/kg and 1.7 mg/kg, respectively). The extent of copper and selenium at SWMU 21-023(c) is defined.
- Silver and zinc were not detected above BVs within the SWMU 21-023(c) boundary but were elevated in BV Canyon both upgradient and downgradient of SWMU 21-023(c). Zinc concentrations generally decreased with depth in BV Canyon and/or were within the range of soil background concentrations. Silver concentrations decreased down-drainage from SWMU 21-023(c). The lateral and vertical extent of silver and zinc is defined at SWMU 21-023(c) and within BV Canyon. The extent beyond the SWMU and BV Canyon was evaluated in the investigation of Los Alamos Canyon (LANL 2004, 087390).
- Aluminum and arsenic were detected above Qbt 3 BVs in the upper outfall drainage in two samples. Their concentrations were less than twice the BVs. Both inorganic chemicals were not detected elsewhere within this SWMU. Therefore, the extent of aluminum and arsenic at SWMU 21-023(c) is defined.
- Chromium was detected above BV in the upper outfall drainage soil and tuff (maximum concentration 48.1 mg/kg) and at one location at the end of the drainage (location 21-25421). Chromium was not detected above BV at depth in most samples and was not detected above the BV in the lower outfall drainage; the concentration at location 21-25421 is within the range of background concentrations. Chromium was also not detected above BV in BV Canyon. The lateral and vertical extent of chromium concentrations are defined in SWMU 21-023(c) and BV Canyon.
- Lead was detected above BVs in the soil and tuff within SWMU 21-023(c). Lead concentrations either decreased with depth or were within the range of background concentrations at most locations. At locations 21-01340 and 21-01611, lead was detected at approximately twice the

maximum background concentration or less in the upper outfall drainage. Lead was also detected below BV or within the range of background concentrations at the end of the drainage and in BV Canyon. Therefore, the lateral and vertical extent of lead is defined for SWMU 21-023(c) and BV Canyon.

- Mercury was detected above BVs in several samples, with the maximum concentration in the upper outfall drainage at location 21-01611 (1.06 mg/kg). Generally, mercury either decreased in concentration or was not detected in the deeper sample. At three locations in the upper outfall drainage (locations 21-01611, 21-24575, and 21-24579), mercury was detected at a higher concentration at depth (1.2 ft to 3.0 ft). It was detected above BV in only one downgradient location (21-25418) but not at the end of the outfall drainage. In BV Canyon, mercury concentration was reported above BV upgradient of SWMU 21-023(c) (location 21-25623) and generally decreased from this location within BV Canyon. The lateral and vertical extent of mercury at SWMU 21-023(c) is defined. The extent of mercury beyond BV Canyon was evaluated in the investigation of Los Alamos Canyon (LANL 2004, 087390).
- Perchlorate analyses were performed on samples collected in the 2005–2006 investigation. Perchlorate was not detected near the former septic tank and was detected at low concentrations (less than 0.006 mg/kg) in the drainage channel. Its concentrations generally decreased or did not change substantially with depth and also decreased down the drainage. The concentrations of perchlorate at SWMU 21-023(c) were similar to those detected across the consolidated unit as well as outside the consolidated unit in areas not designated as SWMUs or AOCs. Perchlorate did not appear to be the result of a release from SWMU 21-023(c). Although samples from BV Canyon were not analyzed for perchlorate (see Appendix C, Section C-9.0), perchlorate was not detected at the end of the outfall drainage at locations 21-25420 and 21-25421. Therefore, the extent of perchlorate is defined for SWMU 21-023(c).
- Nitrate and cyanide analyses were performed on 2005–2006 soil and tuff samples. Nitrate was detected at low concentrations throughout SWMU 21-023(c) and BV Canyon. The maximum concentration of nitrate was 3.2 mg/kg at location 21-24576 located in the upper drainage channel. Nitrate concentrations decreased with depth at nearly every sample location within SWMU 21-023(c) but did not show a substantial decrease down the drainage outfall; its concentrations were generally the same or decreased slightly to the end of the outfall drainage and decreased down BV Canyon. Cyanide was not detected on the slope or in the drainage outfall but was detected above BV at location 21-25624 (5.78 mg/kg) in BV Canyon; it was not detected above BV in the two down-canyon locations (21-25625 and 21-25626). Therefore, the lateral and vertical extent of nitrate and cyanide are defined for SWMU 21-023(c) and BV Canyon.

B-5.3.2 Radionuclides

Radionuclide COPCs at SWMU 21-023(c) include americium-241, cesium-137, plutonium-238, plutonium-239, strontium-90, tritium, uranium 234, uranium-235, and uranium-238 (Table B-3.4-1).

In the vicinity of the former septic tank and inlet/outlet lines, soil was sampled at seven locations and analyzed for radionuclides during the 2005–2006 investigation. Plutonium-239 and americium-241 were detected at all locations, with the exception of location 21-24569, where only plutonium was detected, and location 21-24573, where no radionuclides were detected above applicable BVs/FVs. At six of these locations, plutonium-239 and americium-241 are less than 1 pCi/g, which is similar to surface soils across the site (Plate 2). At location 21-24570, the maximum plutonium-239 concentration was 1.26 pCi/g and the maximum americium-241 concentration was 2.38 pCi/g. One historical borehole (location 21-01665)

was drilled to a TD of 20 ft bgs in the former septic tank location. Americium-241 was detected at low levels (less than 0.1 pCi/g) in the tuff samples to 20 ft bgs. Plutonium-239 was not detected at depth in this borehole. The lateral and vertical extent of plutonium-239 and americium-241 in the vicinity of the septic tank system are defined.

A discussion of the nature and extent of each radionuclide COPC within the outfall drainage at SMWU 21-023(c) follows.

- Americium-241 and plutonium-239 are the primary COPCs in the outfall drainage and are elevated relative to FVs. Maximum americium-241 and plutonium-239 concentrations in the upper drainage outfall [above the confluence with the Consolidated Unit 21-027(d)-99 drainage outfall] before removal actions were 398 pCi/g and 177 pCi/g, respectively, while the maximum concentrations in the upper drainage are now 44.4 pCi/g and 17.4 pCi/g, respectively. The lower drainage outfall and BV Canyon are characterized by concentrations generally less than 10 pCi/g for both americium-241 and plutonium-239. Taking into account the excavated material, a strong decreasing trend in concentrations for americium-241 and plutonium-239 is evident, because concentrations dropped an order of magnitude following remediation. As a result, concentrations decreased down the drainage as well as with depth at most locations. Because the concentrations are detected within the topographic confines of the drainage channel the lateral extent of contamination is defined. Concentrations in BV Canyon show a general decrease down canyon from the outfall [there is a contribution of americium-241 and plutonium-239 from SWMU 21-023(c)]. The extent of americium-241 and plutonium-239 beyond BV Canyon was evaluated during the investigation of Los Alamos Canyon (LANL 2004, 087390).
- Cesium-137 was detected above the soil FV at two locations (21-01609 and 21-01613). Cesium-137 was not detected at depth at location 21-01613 (no deeper sample was collected at location 21-01609) and was also detected in the 2-ft samples at eight locations but not above FV in the surface samples. Its concentrations decreased down the drainage, and cesium-137 was not detected above FV or detected at the end of the drainage. The extent of cesium-137 at SWMU 21-023(c) is defined.
- Strontium-90 was detected at two locations in the deeper samples but was not detected above the soil FV in the surface samples. Strontium-90 was not detected at depth in borehole location 21-01665. Strontium-90 was also not detected or detected above FV in BV Canyon. The extent of strontium-90 at SWMU 21-023(c) is defined.
- Tritium was detected in soil in two of the locations sampled near the septic tank system (locations 21-01665 and 21-024572) and only in the deeper sampling intervals (below the surface sample). The concentrations do not show a substantial change with depth. Tritium is detected at approximately 0.02 pCi/g down the drainage. Tritium is also detected in BV Canyon including upgradient of SWMU 21-023(c). Concentrations upgradient are slightly higher than those in the drainage channel and generally decrease down the canyon. The low concentrations of tritium (less than 1.0 pCi/g) throughout the SWMU are within the range of those detected in nonprocess areas throughout TA-21 (LANL 1994, 026073) and indicate that the septic system was not a source of tritium. The extent of tritium at SWMU 21-023(c) is defined.
- Uranium-235 and uranium-238 were detected above BVs in four and one samples, respectively, near the former septic tank system and the upper drainage channel of SWMU 21-023(c). The concentrations were approximately twice the BVs or less; only one location (21-24576) had a deeper sample collected, and neither isotope was detected above BV in this sample. In BV Canyon, uranium-234, uranium-235, and uranium-238 were detected above BVs at two locations (21-25623 and 21-25624). The concentrations decreased with depth at both locations and

decreased down the canyon. The lateral and vertical extent of uranium-234, uranium-235, and uranium-238 are defined in SWMU 21-023(c) and in BV Canyon.

B-5.3.3 Organic Chemicals

Organic COPCs identified for SWMU 21-023(c) include anthracene, Aroclor-1242, Aroclor-1254, Aroclor-1260, benzo(a)pyrene, benzo(b)fluoranthene, benzoic acid, bis(2-ethylhexyl)phthalate, chrysene, di-n-butylphthalate, fluoranthene, 2-methylnaphthalene, naphthalene, pentachlorophenol, phenanthrene, and pyrene (Table B-4.4-1).

In the vicinity of the former septic tank and inlet/outlet lines, seven locations were sampled for organic chemicals. Trace concentrations of benzoic acid and di-n-butylphthalate were detected at two separate locations, one sample each. Benzoic acid and di-n-butylphthalate were not detected in any other sample within the SWMU boundaries. One historical borehole (location 21-01665) was drilled to a TD of 20 ft bgs in the former septic tank location. No organic chemicals were detected in any of the depth intervals. Therefore, in the vicinity of the former septic tank and inlet/outlet lines, the lateral and vertical extent of organic chemicals is defined.

A discussion of the nature and extent of each organic COPC within the outfall drainage at SMWU 21-023(c) follows.

- In samples from the outfall drainage from SWMU 21-023(c), several organic chemicals were detected, including Aroclor-1254, Aroclor-1260, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, pentachlorophenol, phenanthrene, and pyrene. The organic chemicals were detected at one to four sample locations and most concentrations are below the EQLs. Three PAHs (chrysene, fluoranthene, and pyrene) were also detected in the drainage of Consolidated Unit 21-027(d)-99 above the confluence with the drainage outfall from SWMU 21-023(c) at similar or slightly higher concentrations. Anthracene and benzo(a)pyrene were only detected in the Consolidated Unit 21-027(d)-99 portion of the drainage and were not detected in the SWMU 21-023(c) drainage. Aroclor-1254, Aroclor-1260, and bis(2-ethylhexyl)phthalate were detected at trace concentrations only in samples collected from the end of the drainage (locations 21-25420 and 21-25622); neither Aroclor-1254 nor bis(2-ethylhexyl)phthalate were detected in samples collected from BV Canyon. Benzo(b)fluoranthene, chrysene, and pentachlorophenol were detected at one to three locations along the drainage but were not detected at the end of the drainage. Fluoranthene and pyrene were the most commonly detected organic chemicals in the drainage at trace concentrations and showed little or no change along the length of the drainage. Based on the distributions of organic chemicals and the trace concentrations, the extent of organic COPCs at SWMU 21-023(c) is defined.
- Aroclors, PAHs, and benzoic acid were detected in samples collected in 2005 from BV Canyon. Aroclor-1242, Aroclor-1260, fluoranthene, 2-methylnaphthalene, naphthalene, and phenanthrene were detected at the upgradient sample location (21-25623). Aroclor-1242, Aroclor-1260, 2-methylnaphthalene, and naphthalene concentrations decreased; fluoranthene concentrations did not change; and phenanthrene concentrations increased slightly down the canyon. Pyrene was detected at several sample locations at trace concentrations similar to what was detected in the drainage as well as at SWMU 21-013(b) and AOC 21-013(g). Anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzoic acid, chrysene, and Aroclor-1254 were detected at trace concentrations at the farther down-canyon sample locations (21-25625 and 21-25626). Based on the distributions of organic chemicals and trace concentrations detected extent of organic chemicals within BV Canyon is defined. The occurrence of organic chemicals beyond BV Canyon was evaluated during the investigation of Los Alamos Canyon (LANL 2004, 087390).

B-5.3.4 Summary of Nature and Extent at SWMU 21-023(c)

Based on the distribution of COPCs at SWMU 21-023(c), the extent of residual contamination is defined. Very few COPCs were detected in the area of the former septic system, indicating that no significant unintentional releases occurred. Many more COPCs were detected in the outfall area, but all showed decreasing trends both downgradient and with depth. Amercium-241 and plutonium-239, the drivers for the removal action at SWMU 21-023(c), were detected at approximately an order of magnitude less than the overlying material that was removed during remediation of the outfall.

B-6.0 REFERENCES

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in text citations. ER ID numbers are assigned by the EP-ERSS Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the EP-ERSS master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau; the U.S. Department of Energy–Los Alamos Site Office; the U.S. Environmental Protection Agency, Region 6; and the EP-ERSS. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

EPA (U.S. Environmental Protection Agency), December 1989. "Risk Assessment Guidance for Superfund Vol. I, Human Health Evaluation Manual (Part A)," Interim Final, EPA 540/89/002, Office of Solid Waste and Emergency Response, Washington, D.C. (EPA 1989, 008021)

LANL (Los Alamos National Laboratory), January 28, 1994. "Phase Report IB, TA-21 Operable Unit RCRA Facility Investigation: Operable Unit-Wide Surface Soil, Deposition Layer and Filter Building Investigation," Los Alamos National Laboratory document LA-UR-93-4390, Los Alamos, New Mexico. (LANL 1994, 026073)

LANL (Los Alamos National Laboratory), September 1998. "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 059730)

LANL (Los Alamos National Laboratory), April 2004. "Los Alamos and Pueblo Canyons Investigation Report," Los Alamos National Laboratory document LA-UR-04-2714, Los Alamos, New Mexico. (LANL 2004, 087390)

LANL (Los Alamos National Laboratory), November 2004. "Investigation Work Plan for Material Disposal Area U, Solid Waste Management Unit 21-017(a)-99, at Technical Area 21," Los Alamos National Laboratory document LA-UR-04-7268, Los Alamos, New Mexico. (LANL 2004, 090801)

NMED (New Mexico Environment Department), 2005. "Approval with Modifications, Investigation Work Plan for Material Disposal Area U, Solid Waste Management Unit 21-017(a)-99, at Technical Area 21, Los Alamos National Laboratory, EPA ID #NM0890010515 HWB-LANL-04-015," New Mexico Environment Department letter dated March 21, 2005, Santa Fe, New Mexico. (NMED 2005, 090611)

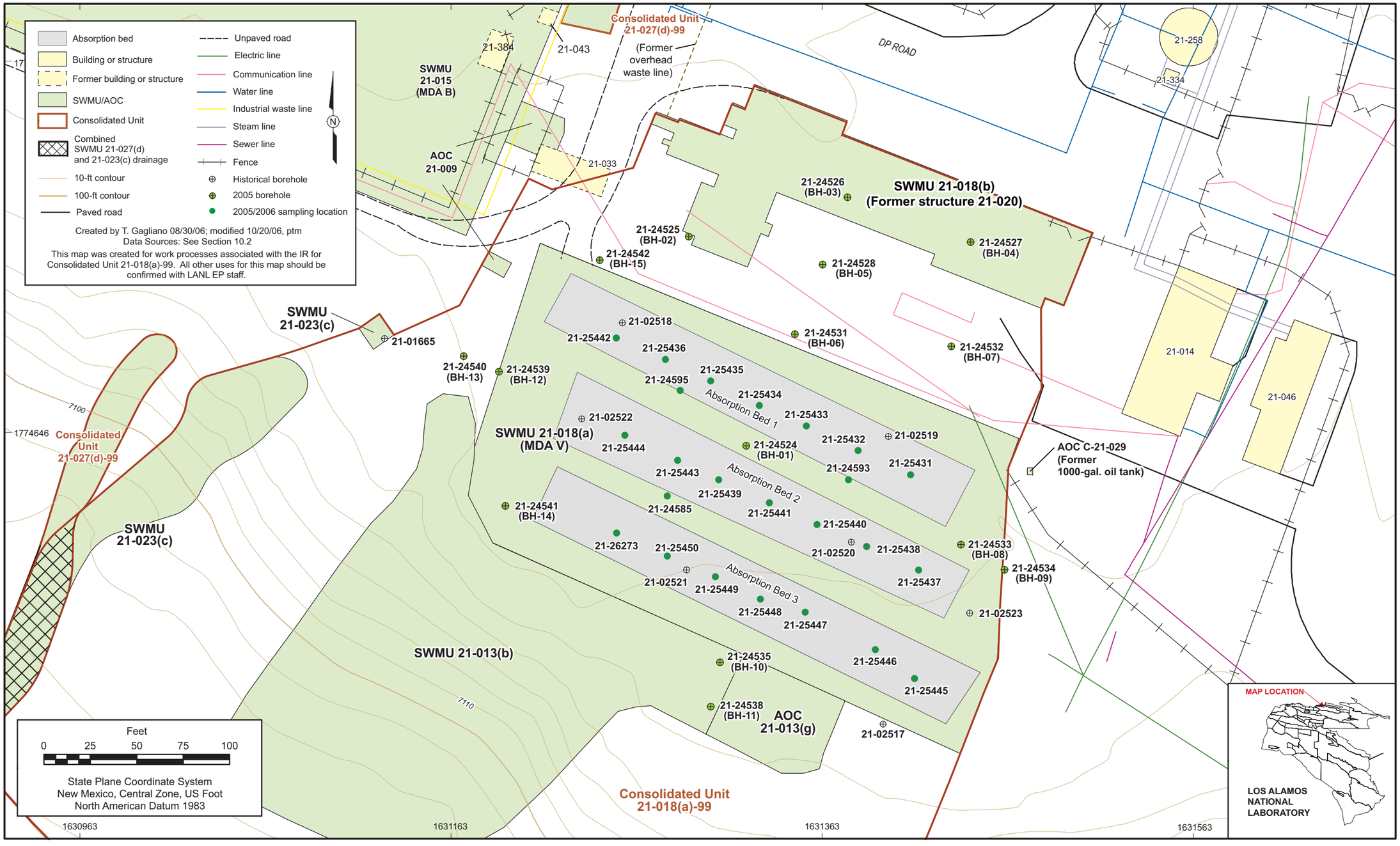


Figure B-1.1-1 Locations of boreholes and other subsurface samples collected at Consolidated Unit 21-018(a)-99

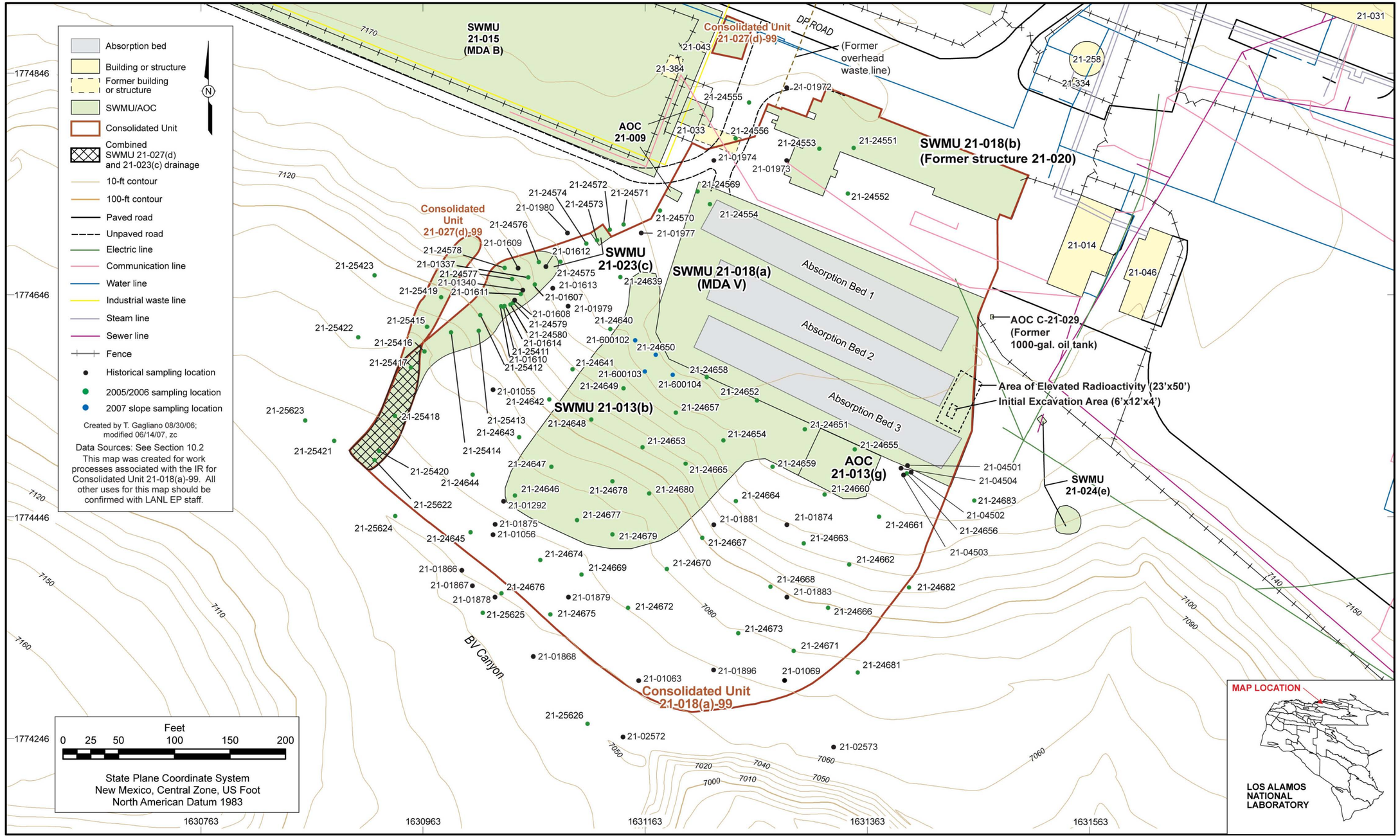


Figure B-1.1-2 Locations of surface and shallow subsurface samples collected at Consolidated Unit 21-018(a)-99

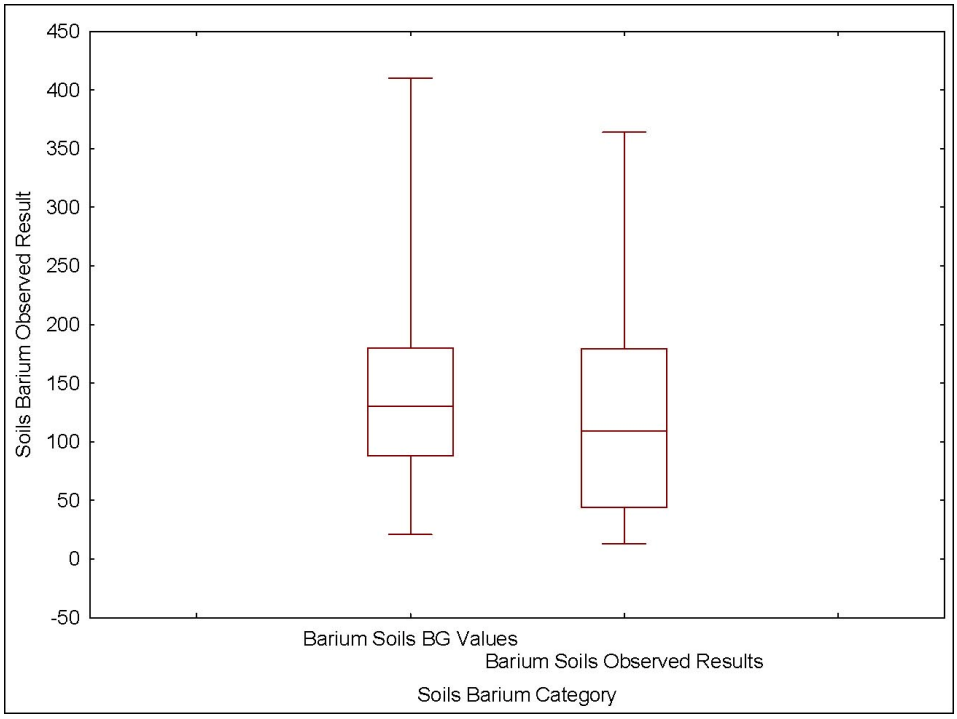


Figure B-2.1-1 Box plots of barium concentrations from Laboratory all-horizon background data and soil and fill material at SWMUs 21-018(a) and 21-018(b)

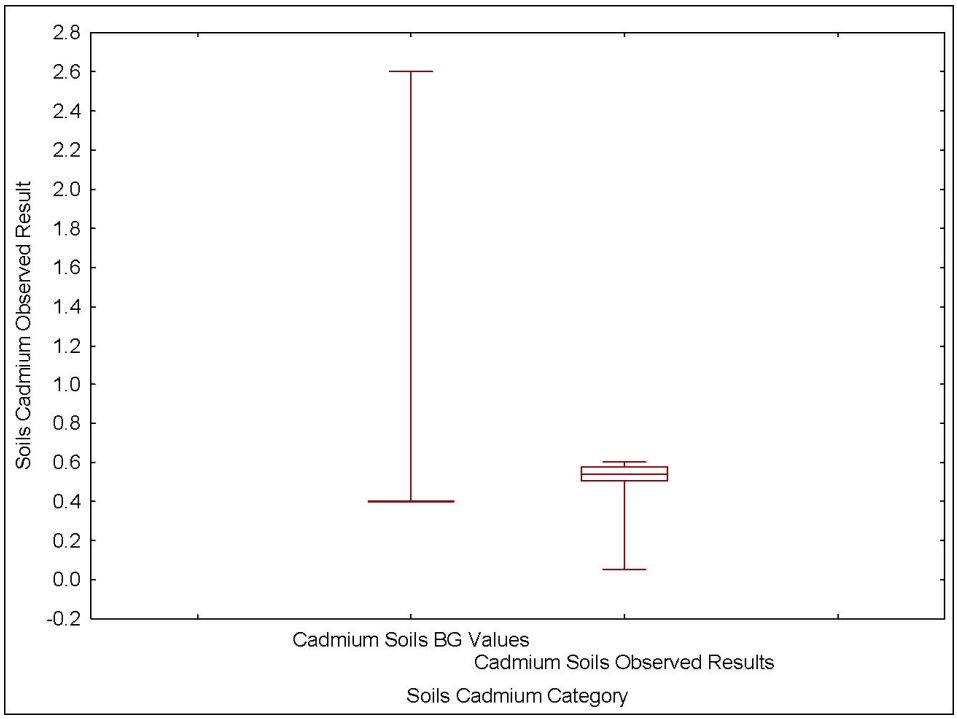


Figure B-2.1-2 Box plots of cadmium concentrations from Laboratory all-horizon background data and soil and fill material at SWMUs 21-018(a) and 21-018(b)

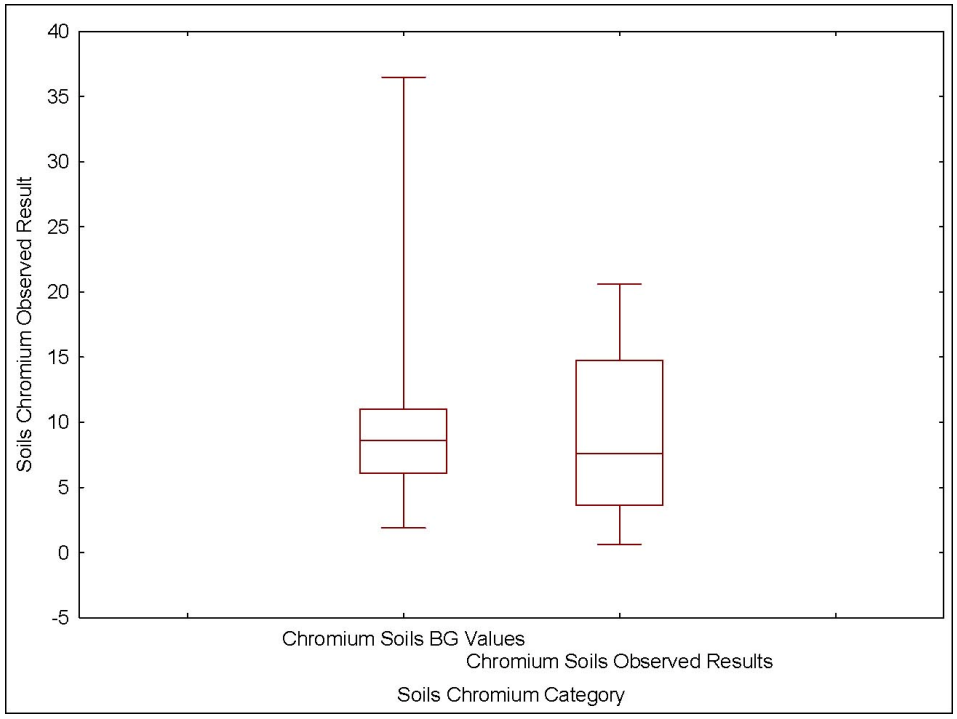


Figure B-2.1-3 Box plots of chromium concentrations from Laboratory all-horizon background data and soil and fill material at SWMUs 21-018(a) and 21-018(b)

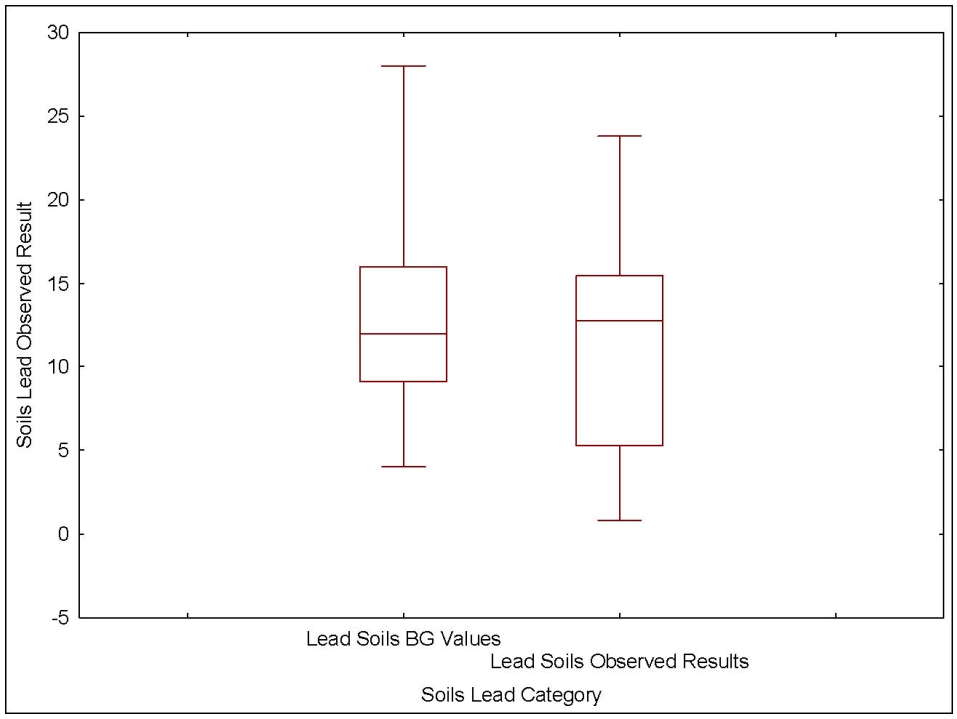


Figure B-2.1-4 Box plots of lead concentrations from Laboratory all-horizon background data and soil and fill material at SWMUs 21-018(a) and 21-018(b)

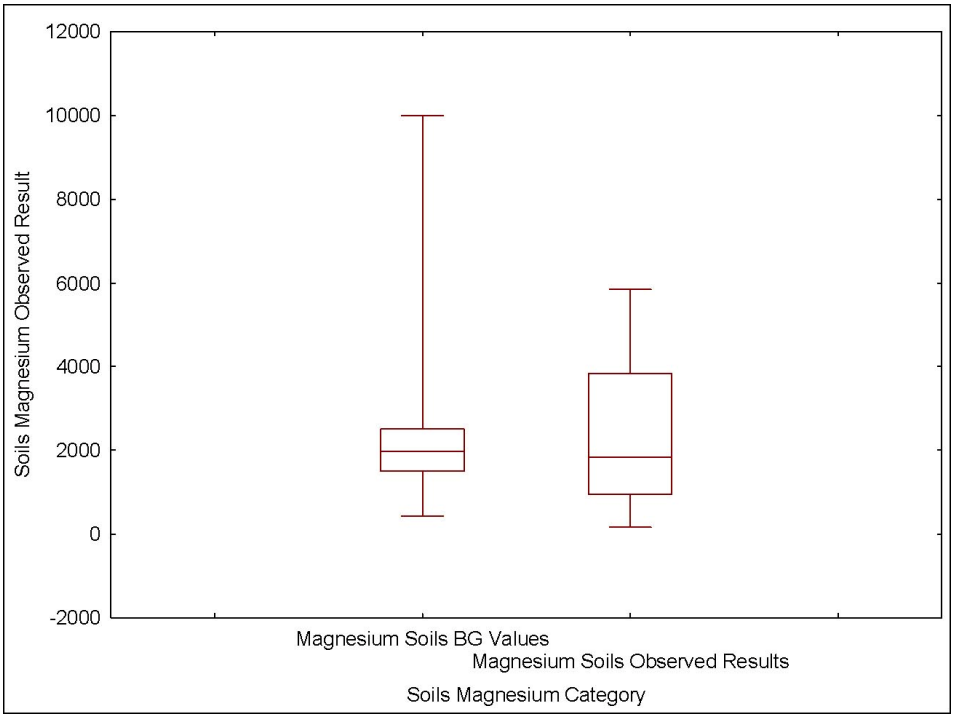


Figure B-2.1-5 Box plots of magnesium concentrations from Laboratory all-horizon background data and soil and fill material at SWMUs 21-018(a) and 21-018(b)

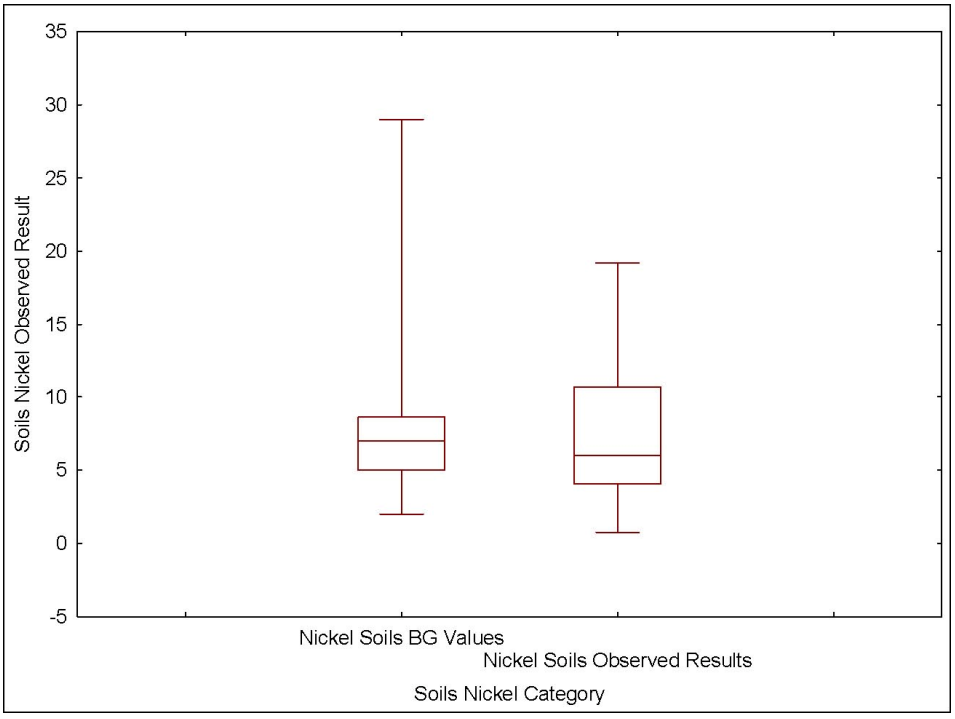


Figure B-2.1-6 Box plots of nickel concentrations from Laboratory all-horizon background data and soil and fill material at SWMUs 21-018(a) and 21-018(b)

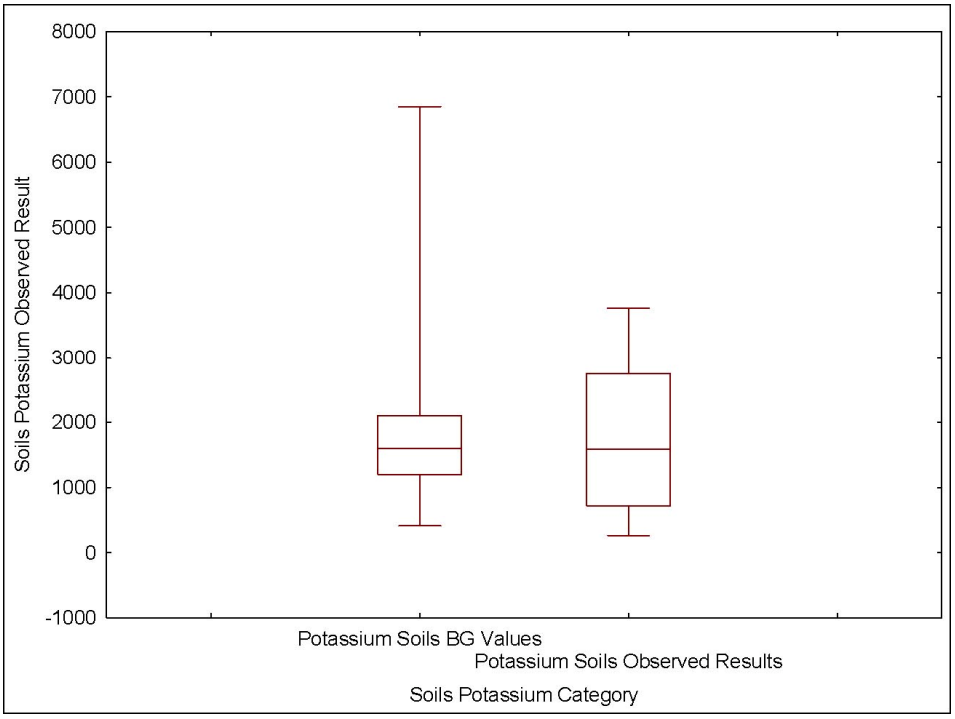


Figure B-2.1-7 Box plots of potassium concentrations from Laboratory all-horizon background data and soil and fill material at SWMUs 21-018(a) and 21-018(b)

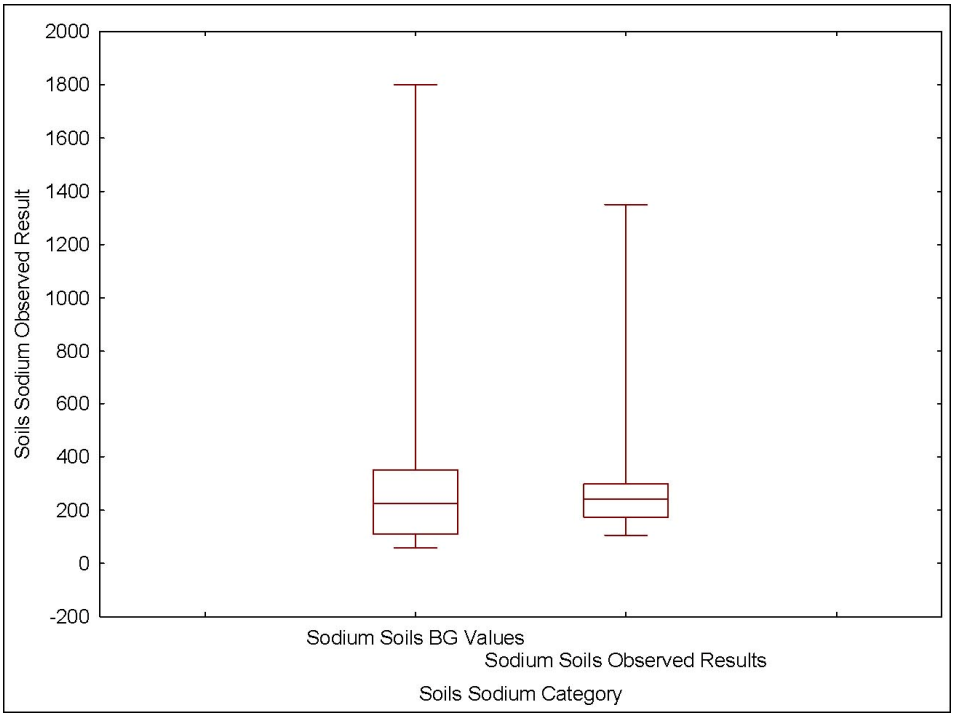


Figure B-2.1-8 Box plots of sodium concentrations from Laboratory all-horizon background data and soil and fill material at SWMUs 21-018(a) and 21-018(b)

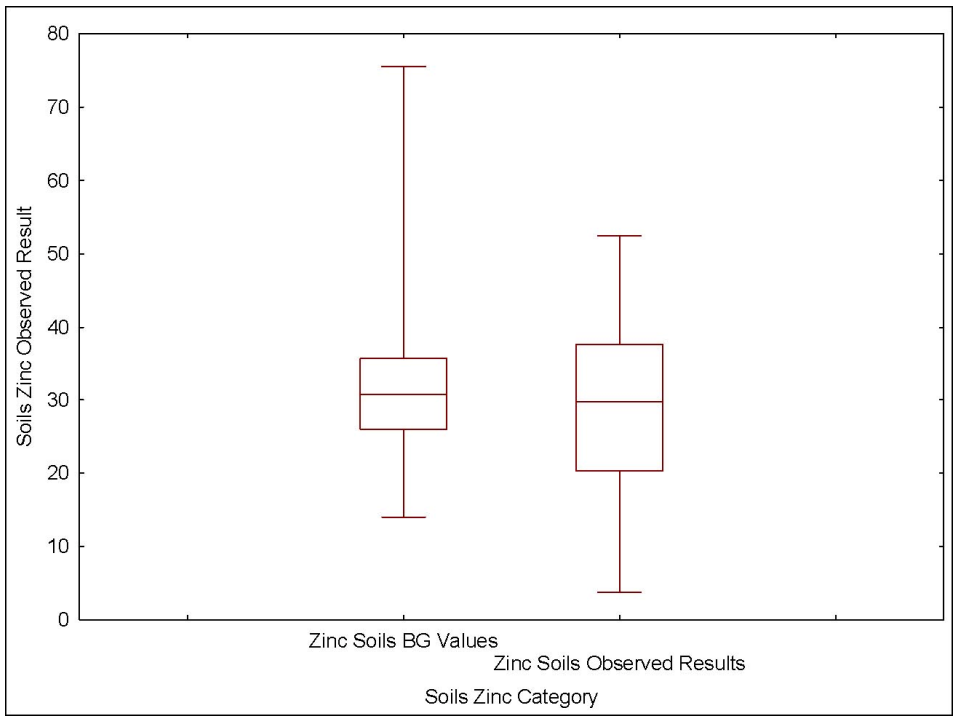


Figure B-2.1-9 Box plots of zinc concentrations from Laboratory all-horizon background data and soil and fill material at SWMUs 21-018(a) and 21-018(b)

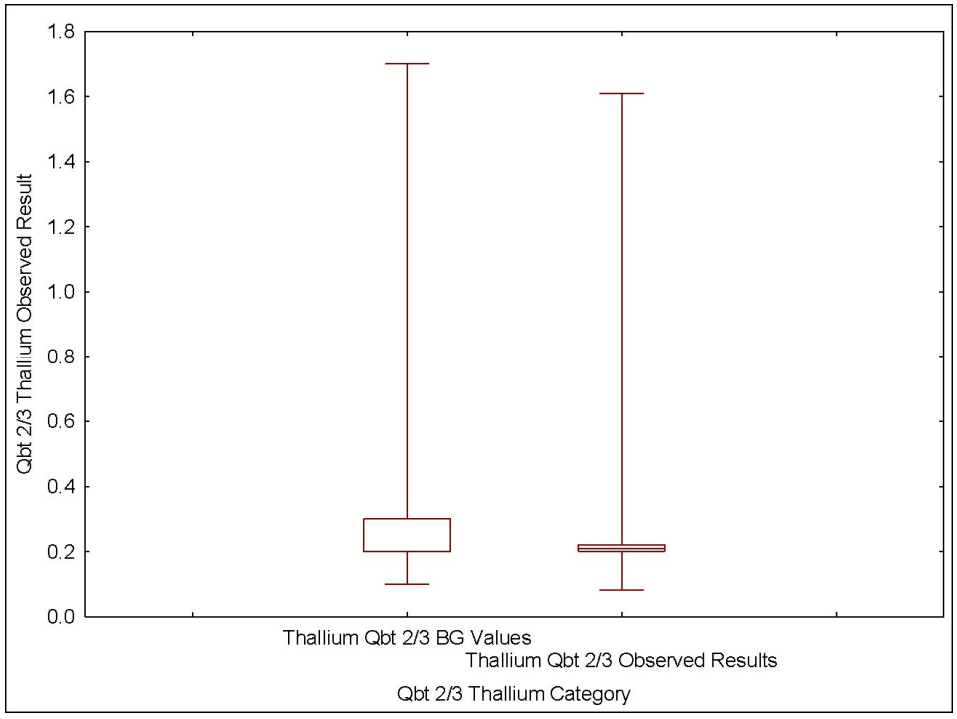


Figure B-2.1-10 Box plots of thallium concentrations from Laboratory Qbt 2, 3, 4 background data and Qbt 2 and 3 tuff material at SWMUs 21-018(a) and 21-018(b)

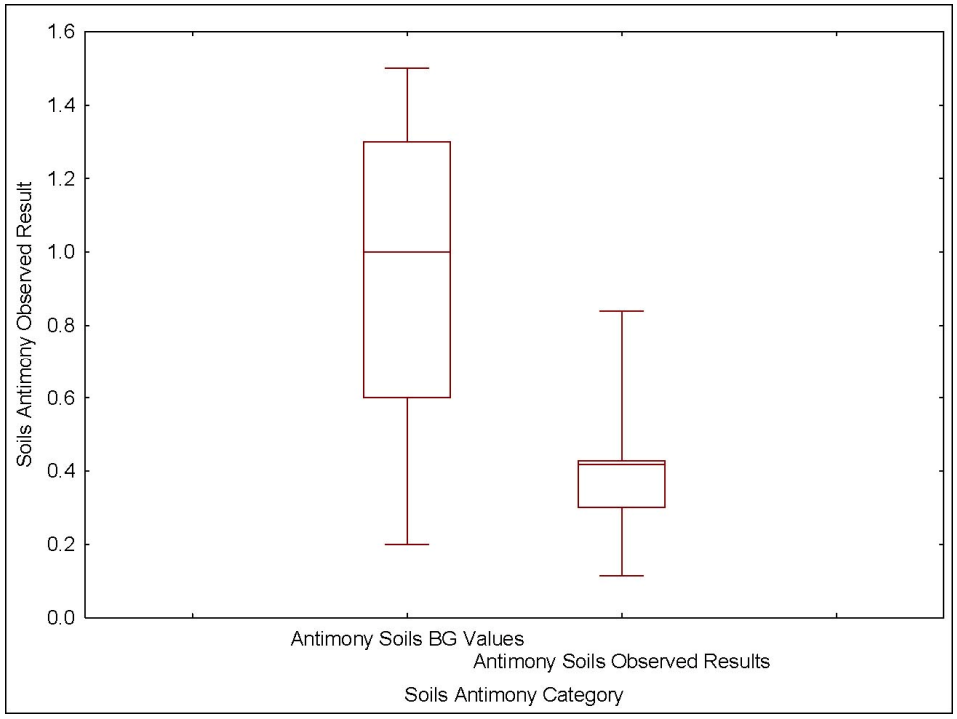


Figure B-3.1-1 Box plots of antimony concentrations from Laboratory all-horizon background data and soil and fill material at SWMU 21-013(b) and AOC 21-013(g)

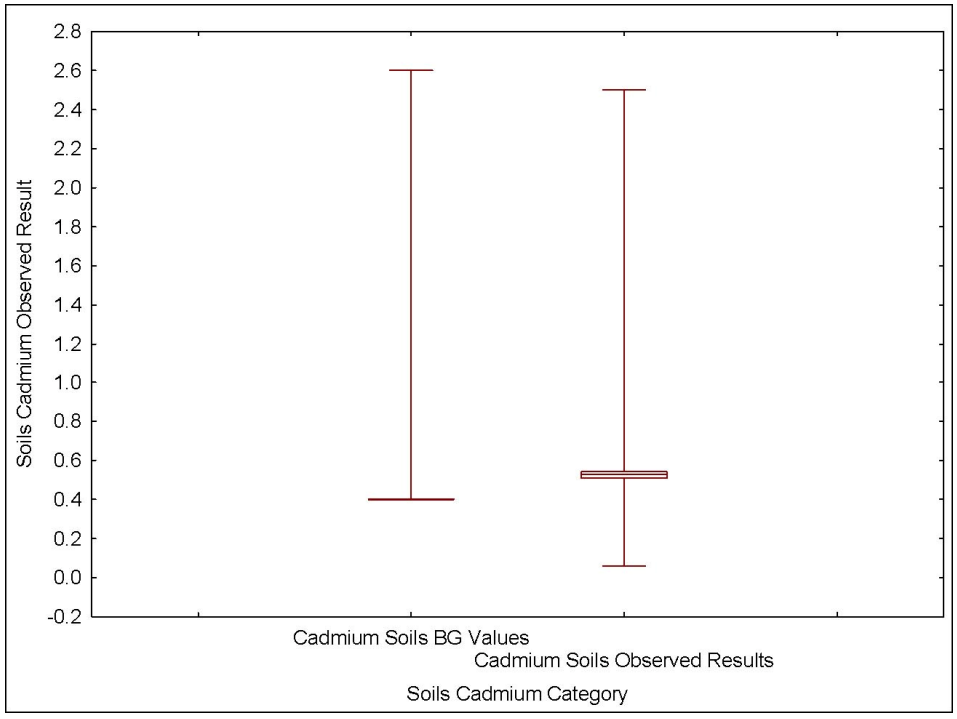


Figure B-3.1-2 Box plots of cadmium concentrations from Laboratory all-horizon background data and soil and fill material at SWMU 21-013(b) and AOC 21-013(g)

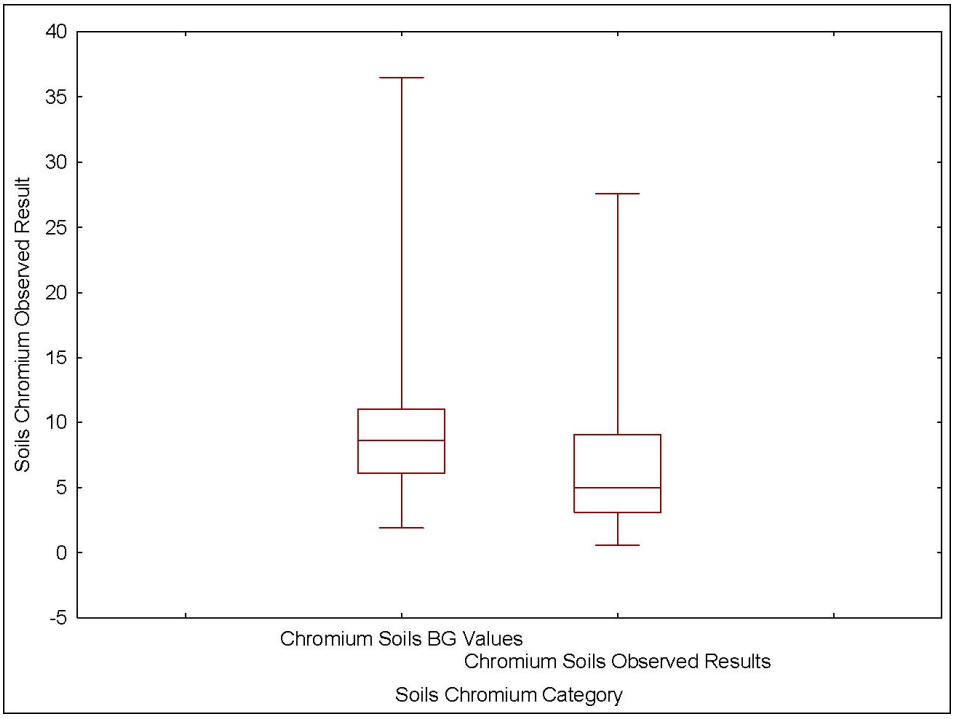


Figure B-3.1-3 Box plots of chromium concentrations from Laboratory all-horizon background data and soil and fill material at SWMU 21-013(b) and AOC 21-013(g)

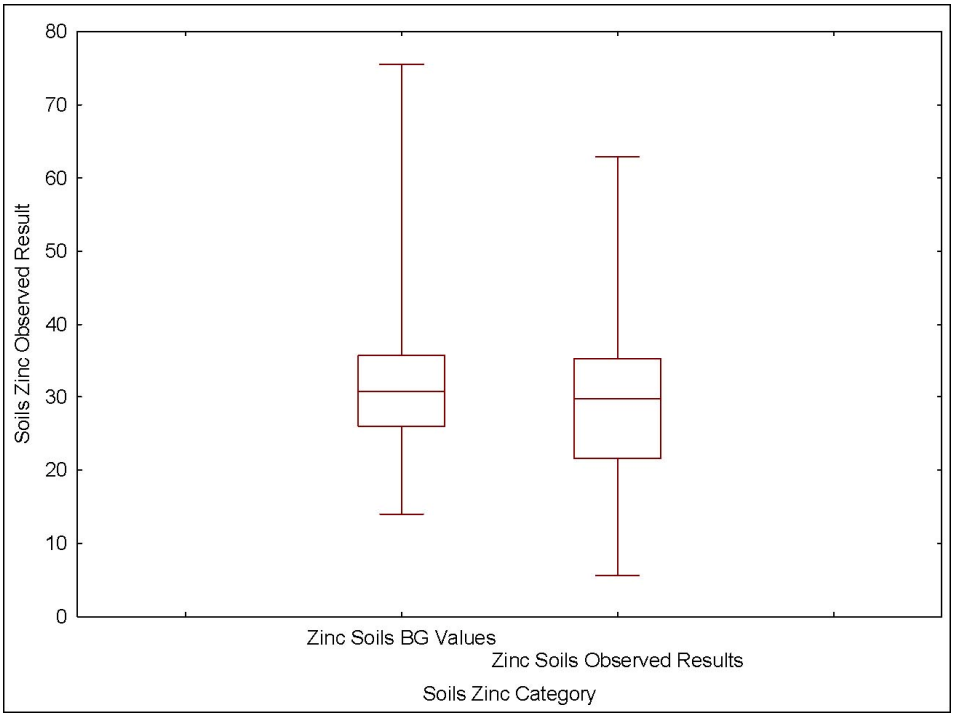


Figure B-3.1-4 Box plots of zinc concentrations from Laboratory all-horizon background data and soil and fill material at SWMU 21-013(b) and AOC 21-013(g)

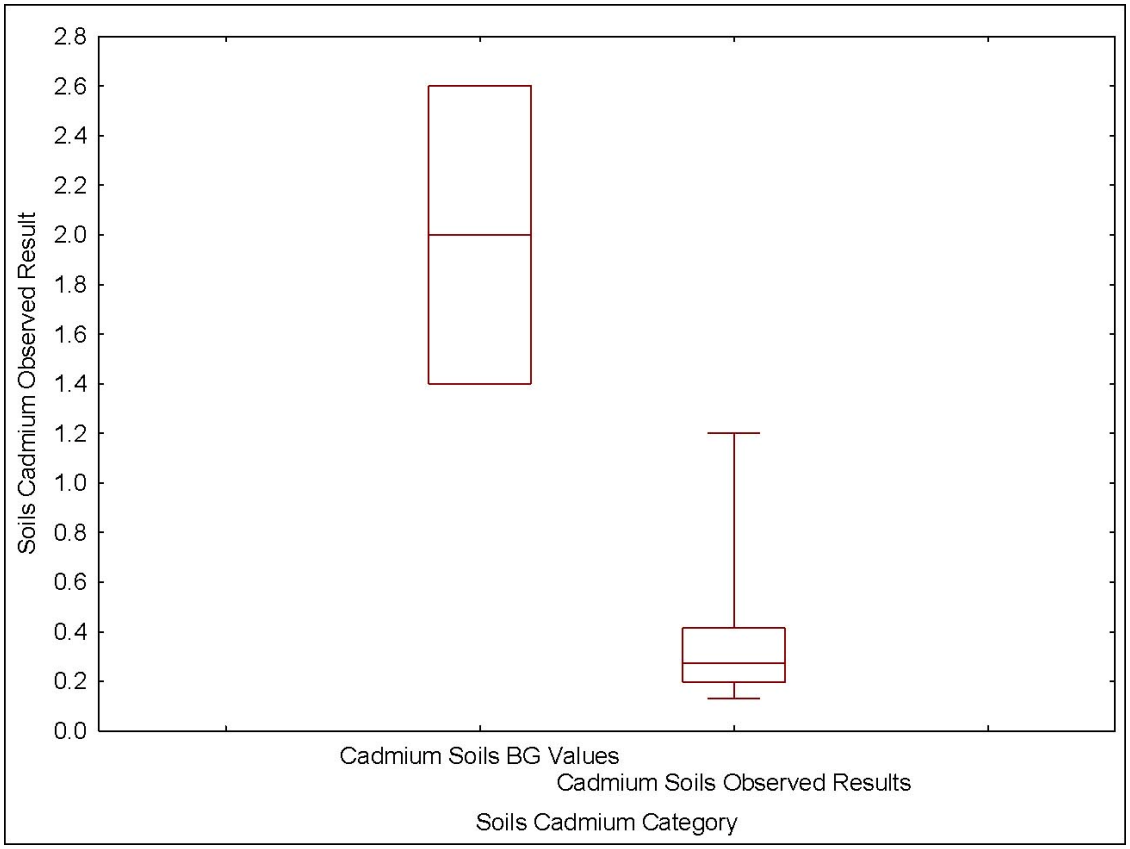


Figure B-4.1-1 Box plots of cadmium concentrations from Laboratory all-horizon background data and soil and fill material at SWMU 21-023(c)

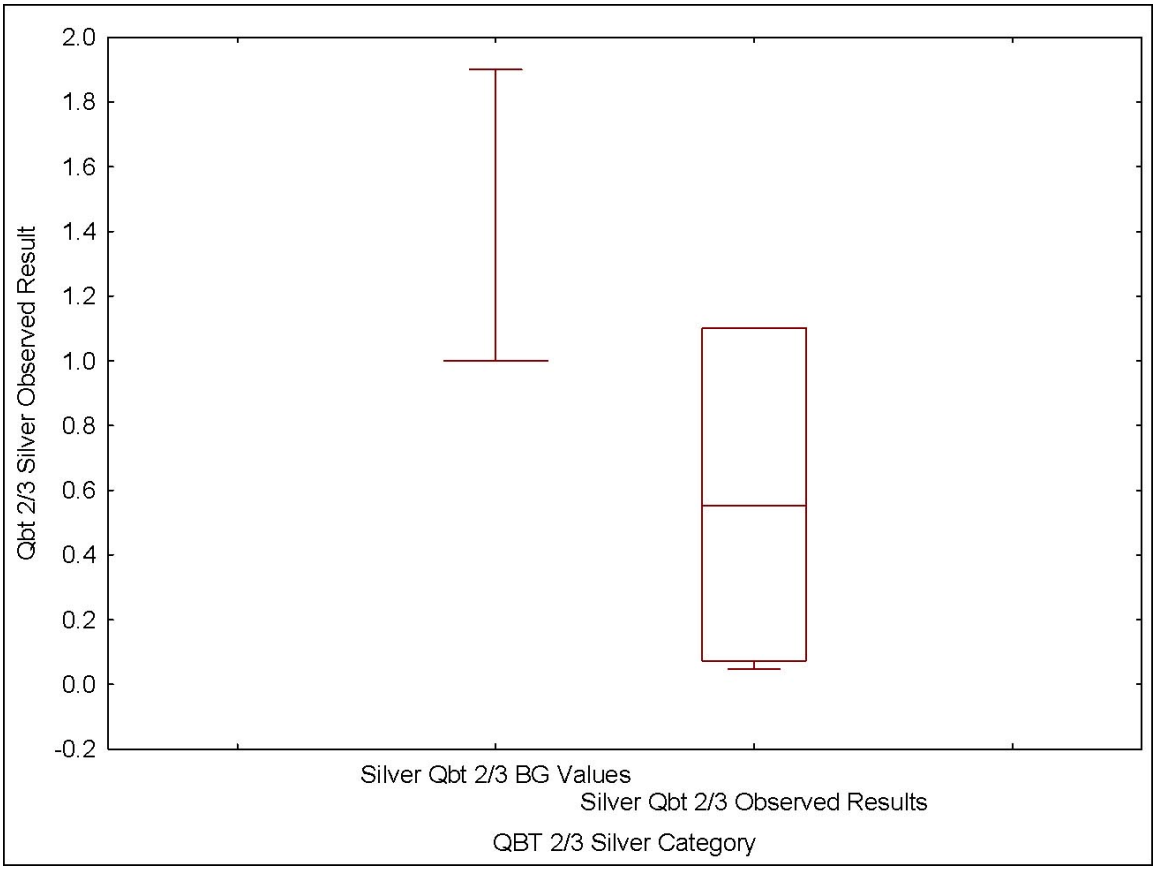


Figure B-4.1-2 Box plots of silver concentrations from Laboratory all-horizon background data and Qbt 2 and 3 tuff material at SWMU 21-023(c)

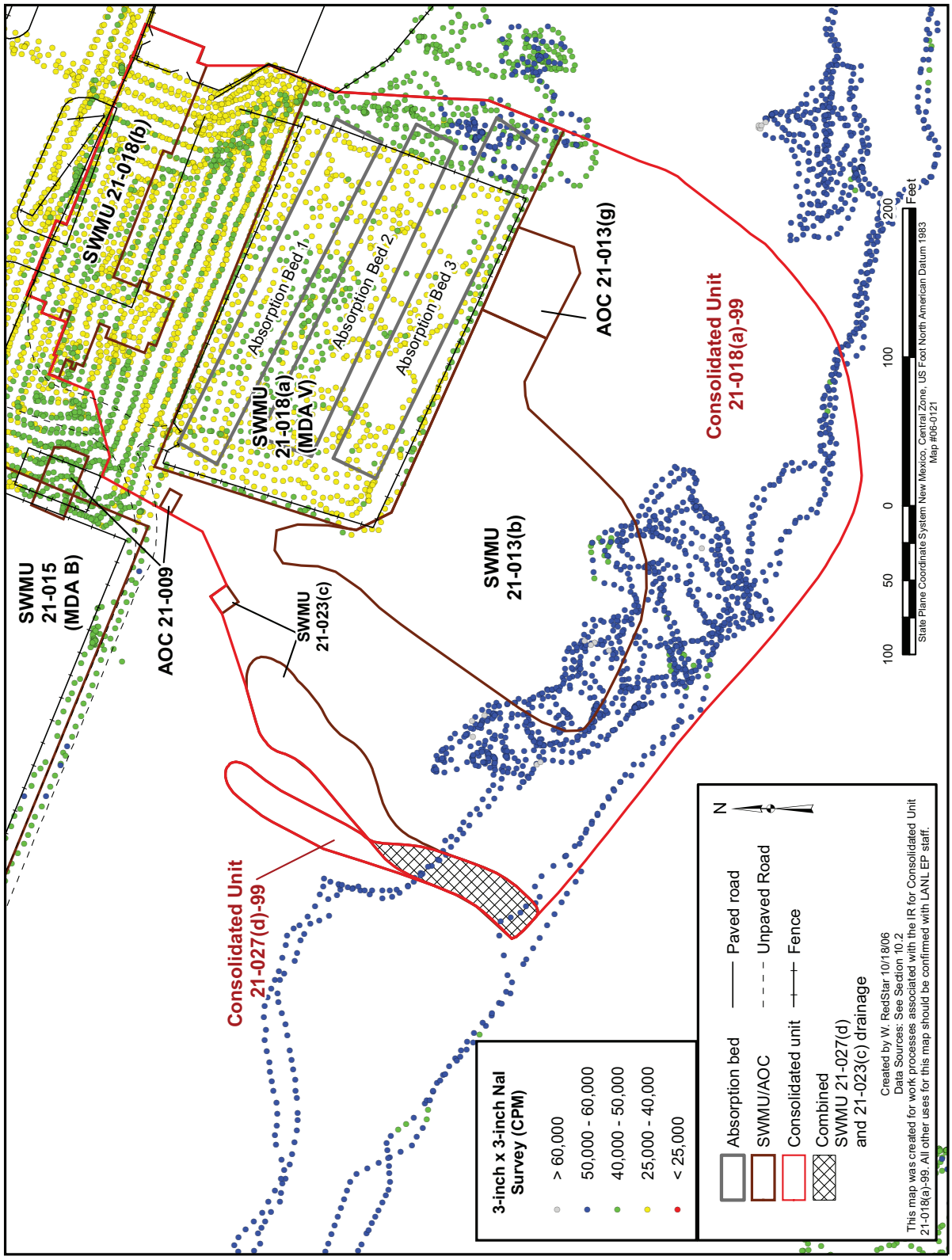


Figure B-5.0-1. GPS-radiological survey using 3-in. by 3-in. NaI detectors of TA-21

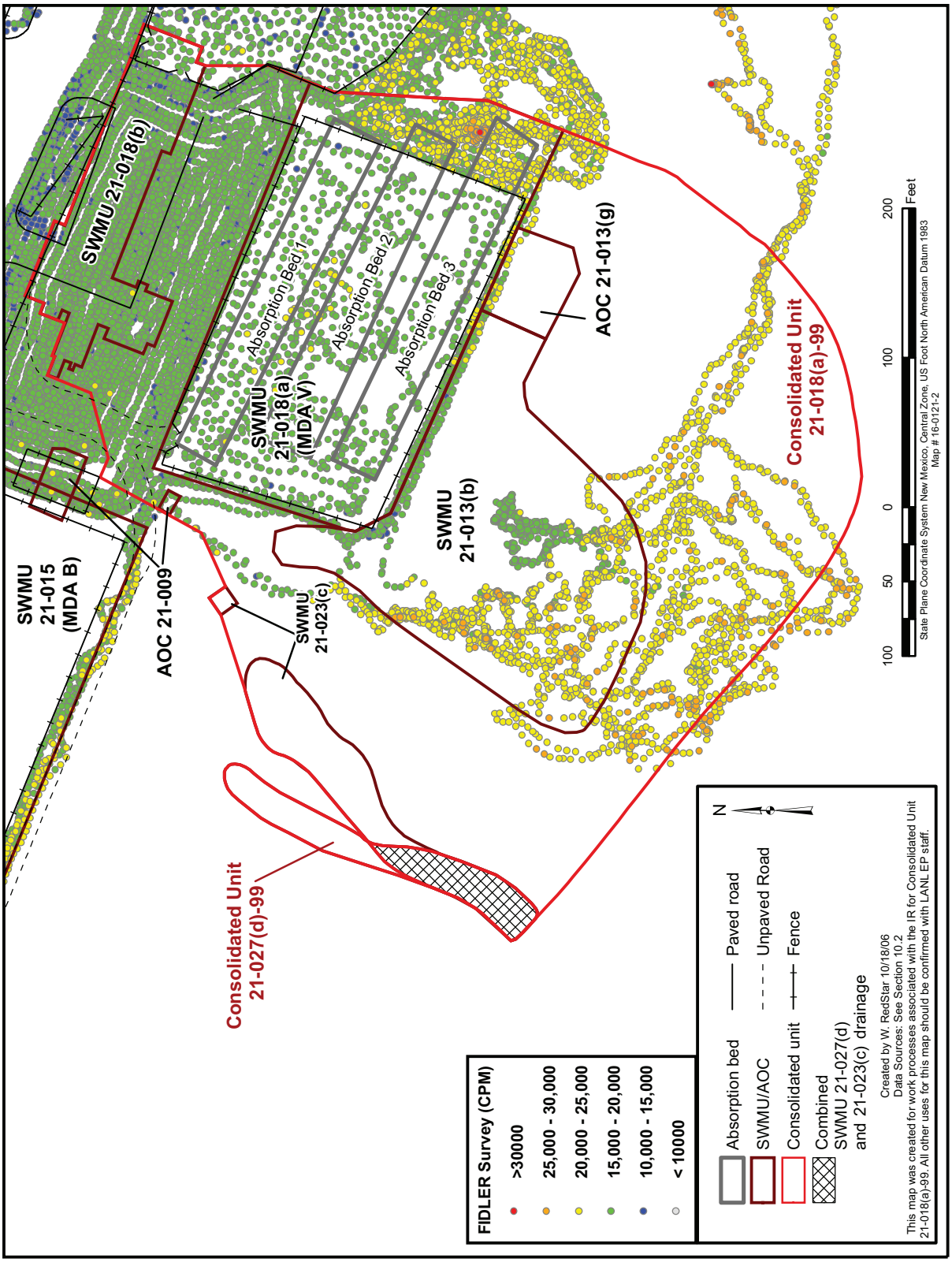


Figure B-5.0-2. GPS-radiological survey using FIDLER detectors of TA-21

Table B-2.1-1
Summary of Samples Collected and Requested Analyses at SWMUs 21-013(b), 21-018(a), 21-018(b), 21-023(c), AOC 21-013(g), and Consolidated Unit 21-018(a)-99

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
SWMU 21-013(b)																			
AAA0225	21-01056	0–0.08	Soil	—[a]	—	—	—	—	—	—	—	—	—	—	—	X[b]	—	—	X
AAA0226	21-01056	0–0.5	Soil	—	—	—	—	—	—	—	—	—	X	—	—	X	X	X	X
AAA0235	21-01063	0–0.08	Soil	—	—	—	—	—	—	—	—	—	X	—	—	X	—	—	X
AAA0227	21-01292	0–0.08	Soil	—	—	—	—	—	—	—	—	—	X	—	—	X	—	—	X
AAA0228	21-01292	0–0.5	Soil	—	—	—	—	—	—	—	—	—	X	—	—	X	X	X	X
AAA7528	21-01866	0–0.25	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAA7529	21-01866	0.25–0.5	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAA7530	21-01866	0.5–1	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAA7531	21-01867	0–0.25	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAA7532	21-01867	0.25–0.5	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAA7533	21-01867	0.5–1	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAA7534	21-01868	0–0.25	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAA7535	21-01868	0.25–0.5	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAA7536	21-01868	0.5–1	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB8916	21-01875	0–0.42	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB8932	21-01878	0–0.33	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB8936	21-01879	0–0.42	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB8946	21-01881	0–0.5	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB8947	21-01881	0.5–0.83	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB8956	21-01883	0–0.5	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB8957	21-01883	0.5–1	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB7287	21-02572	0–0.25	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB7288	21-02572	0.25–0.5	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB7289	21-02572	0.5–1	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
MD21-05-60367	21-24639	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60368	21-24639	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60370	21-24640	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60371	21-24640	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60373	21-24641	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60374	21-24641	0.5–1	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60375	21-24642	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60377	21-24642	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60379	21-24643	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60380	21-24643	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
MD21-05-60382	21-24644	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60383	21-24644	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60385	21-24645	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60386	21-24645	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60388	21-24646	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60389	21-24646	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60391	21-24647	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60392	21-24647	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60395	21-24648	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60397	21-24649	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60398	21-24649	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60401	21-24650	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60403	21-24651	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60404	21-24651	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60406	21-24652	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60407	21-24652	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60409	21-24653	0–0.6	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60410	21-24653	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60413	21-24654	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60418	21-24656	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60419	21-24656	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60421	21-24657	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60422	21-24657	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60424	21-24658	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60425	21-24658	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60437	21-24659	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60436	21-24659	1–1.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60440	21-24660	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60443	21-24661	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60445	21-24662	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60394	21-24648	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60446	21-24662	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60448	21-24663	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60449	21-24663	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60451	21-24664	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60452	21-24664	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60454	21-24665	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
MD21-05-60455	21-24665	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60457	21-24666	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60458	21-24666	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60460	21-24667	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60461	21-24667	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60464	21-24668	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60466	21-24669	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60467	21-24669	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60469	21-24670	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60470	21-24670	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60472	21-24671	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60473	21-24671	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60475	21-24672	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60476	21-24672	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60478	21-24673	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60479	21-24673	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60481	21-24674	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60482	21-24674	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60484	21-24675	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60485	21-24675	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60487	21-24676	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60490	21-24677	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60491	21-24677	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60493	21-24678	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60494	21-24678	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60568	21-24679	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60569	21-24679	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60571	21-24680	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60572	21-24680	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60574	21-24681	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60575	21-24681	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60577	21-24682	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60578	21-24682	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60580	21-24683	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60581	21-24683	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
RE21-07-595	21-24650	0–0.5	Soil	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
RE21-07-596	21-24650	1.5–2.0	Soil	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—
RE21-07-597	21-600102	0–0.5	Soil	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—
RE21-07-608	21-600102	1.5–2.0	Soil	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—
RE21-07-598	21-600103	0–0.5	Soil	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—
RE21-07-609	21-600103	1.5–2.0	Soil	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—
RE21-07-599	21-600104	0–0.5	Soil	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—
RE21-07-610	21-600104	1.5–2.0	Soil	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—
AOC 21-013(g)																			
AAA0236	21-01069	0–0.08	Soil	—	—	—	—	—	—	—	—	—	X	—	—	X	—	—	X
AAA0237	21-01069	0–0.5	Soil	—	—	—	—	—	—	—	—	—	X	—	—	X	—	—	X
AAB8911	21-01874	0–0.5	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB8912	21-01874	0.5–1	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB8913	21-01874	1–1.33	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB9021	21-01896	0–0.5	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
AAB9022	21-01896	0.5–1	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	X
0121-96-0212	21-02517	5–7.5	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
0121-96-0213	21-02517	25–30	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
AAB7290	21-02573	0–0.25	Sediment	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB7291	21-02573	0.25–0.5	Sediment	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB7292	21-02573	0.5–1	Sediment	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
0121-96-0214	21-04501	1–1.5	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
0121-96-0215	21-04502	1–1.5	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
0121-96-0216	21-04503	1–1.5	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
0121-96-0217	21-04504	1–1.5	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
MD21-05-60415	21-24655	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60416	21-24655	1.5–2	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60442	21-24661	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-05-60463	21-24668	0–0.5	Soil	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
SWMU 21-018(a)																			
AAB6976	21-01974	0–0.5	Soil	—	—	X	—	—	—	—	X	—	X	X	X	X	—	X	—
AAA7567	21-02517	0–2.5	Soil	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAA7568	21-02517	2.5–5	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAA7569	21-02517	5–7.5	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7570	21-02517	7.5–10	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7571	21-02517	10–12.5	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7572	21-02517	12.5–15	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7573	21-02517	15–17.5	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
AAA7574	21-02517	20–25	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7575	21-02517	25–30	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7576	21-02517	30–35	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAA7577	21-02517	35–40	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7578	21-02517	40–45	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7579	21-02517	45–50	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAA7580	21-02517	50–55	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAA7581	21-02517	55–60	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7582	21-02517	60–65	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7583	21-02517	65–70	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAA7584	21-02517	70–75	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAA7589	21-02517	95–100	Qbt 2	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAA7594	21-02517	120–125	Qbt 2	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAB6660	21-02518	12.5–15	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6661	21-02518	15–20	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6662	21-02518	20–25	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6663	21-02518	25–30	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6664	21-02518	30–35	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6665	21-02518	35–40	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6666	21-02518	40–45	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6667	21-02518	45–50	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6668	21-02518	50–55	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6669	21-02518	55–60	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6670	21-02518	60–65	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6671	21-02518	65–70	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6672	21-02518	70–75	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6678	21-02519	12.5–15	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6679	21-02519	15–20	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6680	21-02519	20–25	Qbt 3	—	—	X	—	—	—	—	X	X	—	X	X	X	—	X	—
AAB6681	21-02519	25–30	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	—	—
AAB6682	21-02519	30–35	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	—	—
AAB6683	21-02519	35–40	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6684	21-02519	40–45	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6685	21-02519	45–50	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6686	21-02519	50–55	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	—	—
AAB6687	21-02519	55–60	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6688	21-02519	60–65	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
AAB6689	21-02519	65–70	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6690	21-02519	70–75	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6696	21-02520	12.5–15	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6697	21-02520	15–20	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	—	—
AAB6698	21-02520	20–25	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6699	21-02520	25–30	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6700	21-02520	30–35	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	—	—
AAB6701	21-02520	35–40	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	—	—
AAB6702	21-02520	40–45	Qbt 3	—	—	X	—	—	—	—	X	X	X	X	X	X	—	X	—
AAB6703	21-02520	45–50	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAB6704	21-02520	50–55	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAB6705	21-02520	55–60	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAB6706	21-02520	60–65	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAB6707	21-02520	65–70	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAB6708	21-02520	70–75	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAB6714	21-02521	12.5–15	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6715	21-02521	15–20	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6716	21-02521	20–25	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6717	21-02521	25–30	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6718	21-02521	30–35	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6719	21-02521	35–40	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6720	21-02521	40–45	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6721	21-02521	45–50	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6722	21-02521	50–55	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6723	21-02521	55–60	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6724	21-02521	60–65	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6725	21-02521	65–70	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6726	21-02521	70–75	Qbt 3	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAC0094	21-02522	12.5–15	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAC0095	21-02522	15–20	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAC0096	21-02522	20–25	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAC0097	21-02522	25–30	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAC0098	21-02522	30–35	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAC0099	21-02522	35–40	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAC0100	21-02522	40–45	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAC0101	21-02522	45–50	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAC0102	21-02522	50–55	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
AAC0103	21-02522	55–60	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAC0104	21-02522	60–65	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAC0105	21-02522	65–70	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	X	—
AAC0106	21-02522	70–75	Qbt 3	—	—	X	—	—	X	—	X	X	—	X	X	X	—	—	—
AAB7043	21-02523	70–75	Qbt 3	—	—	X	—	—	—	—	—	—	—	X	X	—	—	—	—
AAB7063	21-02523	170–175	Qbt 1v	—	—	X	—	—	X	—	—	—	—	X	X	X	—	—	—
AAC0555	21-02523	225.2–227.5	Qbt 1g	—	—	X	—	—	X	—	—	—	—	X	X	X	—	X	—
AAB7078	21-02523	245–250	Qbt 1g	—	—	X	—	—	X	—	—	—	—	X	X	X	—	—	—
MD21-05-59560	21-24524	8–10	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59561	21-24524	11–13	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59562	21-24524	23–25	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59563	21-24524	33–35	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59564	21-24524	43–45	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59565	21-24524	93–95	Qbt 2	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59566	21-24524	98–100	Qbt 2	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59567	21-24524	168–170	Qbt 2	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-60609	21-24524	339.5–340	Qct	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-60610	21-24524	378–380	Qbo	—	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59596	21-24528	3–5	Fill	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59597	21-24528	14–16	Fill	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59598	21-24528	32.5–34.5	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59599	21-24528	36–38	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59600	21-24528	38–40	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59655	21-24531	3–5	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59656	21-24531	12–14	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59657	21-24531	62–64	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59658	21-24531	78–80	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59664	21-24532	20–22	Fill	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59665	21-24532	28–30	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59666	21-24532	31.5–33.5	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59667	21-24532	38–40	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59673	21-24533	10–12	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59674	21-24533	28–30	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59675	21-24533	30–32	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59676	21-24533	58–60	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59677	21-24533	83–85	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59682	21-24534	3–5	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
MD21-05-59683	21-24534	8–10	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59684	21-24534	13–15	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59685	21-24534	38–40	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59691	21-24535	8–10	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59692	21-24535	13–15	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59693	21-24535	20–22	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59694	21-24535	30–32	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59695	21-24535	78–80	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59750	21-24538	13–15	Qbt 3	—	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59751	21-24538	15–17	Qbt 3	—	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59752	21-24538	28–30	Qbt 3	—	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59753	21-24538	37–39	Qbt 3	—	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59754	21-24538	42–44	Qbt 3	—	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59755	21-24538	53–55	Qbt 3	—	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59759	21-24539	12–14	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59760	21-24539	28–30	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59761	21-24539	40–42	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59762	21-24539	78–80	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59768	21-24540	9–11	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59769	21-24540	26–28	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59770	21-24540	31–33	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59771	21-24540	38–40	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59777	21-24541	20–22	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59778	21-24541	28–30	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59779	21-24541	31–33	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59780	21-24541	42–44	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59781	21-24541	47–49	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59782	21-24541	78–80	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59786	21-24542	2–4	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59787	21-24542	13–15	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59788	21-24542	32–34	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59789	21-24542	38–40	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59934	21-24554	2–3	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59935	21-24554	4–5	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59984	21-24569	2–2.5	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59985	21-24569	2.5–3	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-70163	21-24585	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
MD21-06-70164	21-24593	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-70165	21-24595	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66647	21-25431	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66648	21-25432	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66649	21-25433	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66650	21-25434	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66651	21-25435	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66652	21-25436	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66653	21-25437	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66654	21-25438	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66655	21-25439	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66656	21-25440	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66657	21-25441	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66658	21-25442	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66659	21-25443	15–15.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66660	21-25444	15.5–16	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66661	21-25445	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66662	21-25446	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66663	21-25447	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66664	21-25448	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66665	21-25449	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66666	21-25450	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-70162	21-26273	12–12.5	Qbt 3	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
Consolidated Unit 21-018(a)-99																			
MD21-05-61752	21-24524	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71202	21-24524	14–15	Pore Gas	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—
MD21-05-61753	21-24524	330–335	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71201	21-24524	379–380	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61755	21-24525	4–5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71204	21-24525	4–5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61754	21-24525	26–27	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71203	21-24525	39–40	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61757	21-24526	4–5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71206	21-24526	4–5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61756	21-24526	24.2–25.2	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71205	21-24526	39–40	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61759	21-24527	4.5–5.5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
MD21-06-71208	21-24527	4.5–5.5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61758	21-24527	28–29	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71207	21-24527	39–40	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61761	21-24528	4–5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71210	21-24528	4–5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61760	21-24528	26–27	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71209	21-24528	39–40	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61763	21-24531	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71212	21-24531	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61762	21-24531	51–52	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71211	21-24531	79–80	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61765	21-24532	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71214	21-24532	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61764	21-24532	23.5–24.5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71213	21-24532	39–40	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61767	21-24533	11–12	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71216	21-24533	11–12	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61766	21-24533	55–56	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71215	21-24533	84–85	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61769	21-24534	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71218	21-24534	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61768	21-24534	22.5–23.5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71217	21-24534	39–40	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61771	21-24535	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71220	21-24535	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61770	21-24535	45.2–46.2	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71219	21-24535	79–80	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61773	21-24538	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71222	21-24538	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61772	21-24538	34.5–35.5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71221	21-24538	84–85	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61775	21-24539	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71224	21-24539	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61774	21-24539	57.5–58.5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71223	21-24539	79–80	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61777	21-24540	11–12	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71226	21-24540	11–12	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
MD21-05-61776	21-24540	24–25	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71225	21-24540	39–40	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61779	21-24541	19–20	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71228	21-24541	19–20	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61778	21-24541	55–56	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71227	21-24541	79–80	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61781	21-24542	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71230	21-24542	14–15	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-05-61780	21-24542	23.5–24.5	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
MD21-06-71229	21-24542	39–40	Pore Gas	—	—	—	—	—	—	—	—	X	—	—	X	—	—	—	—
SWMU 21-018(b)																			
AAB6974	21-01972	0–0.5	Soil	—	—	X	—	—	X	—	X	—	—	X	X	X	—	—	—
AAB6975	21-01973	0–0.5	Soil	—	—	X	—	—	—	—	X	—	X	X	X	X	—	X	—
MD21-05-59570	21-24525	3–5	Fill	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59571	21-24525	13–15	Fill	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59572	21-24525	20–22	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59573	21-24525	37–39	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59581	21-24526	3–5	Fill	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59578	21-24526	9–11	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59579	21-24526	32–34	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59580	21-24526	38–40	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59591	21-24527	3–5	Fill	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59592	21-24527	8.5–10	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59593	21-24527	12–14	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59594	21-24527	38–40	Qbt 3	X	X	X	—	X	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59925	21-24551	3–4	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59926	21-24551	5–6	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59928	21-24552	2.5–3.5	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59929	21-24552	4.5–5.5	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59931	21-24553	3–4	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59932	21-24553	5–6	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59937	21-24555	3–4	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59938	21-24555	5–6	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59940	21-24556	3–4	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59941	21-24556	5–6	Fill	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
SWMU 21-023(c)																			
AAA0223	21-01055	0–0.08	Soil	—	—	—	—	—	—	—	—	—	X	—	—	X	—	—	X
AAA0224	21-01055	0–0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	X
MD21-06-73257	21-01337	3.7–4	Qbt 3	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	—
AAA0629	21-01340	0–0.5	Soil	—	—	X	—	—	—	—	—	—	X	—	—	X	—	—	X
MD21-06-73256	21-01607	3–3.3	Qbt 3	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	—
AAA4042	21-01608	0–0.33	Soil	—	—	—	—	—	—	—	X	—	X	X	X	X	—	X	—
AAA4043	21-01609	0–0.42	Soil	—	—	—	—	—	—	—	X	—	X	X	X	X	—	X	—
MD21-06-73254	21-01610	3.5–3.8	Qbt 3	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	—
MD21-06-70174	21-01611	0.7–1.2	Qbt 3	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
AAA4048	21-01612	0.5–1	Soil	—	—	—	—	—	—	—	X	—	X	X	X	X	—	X	—
AAA4049	21-01612	1–1.5	Soil	—	—	—	—	—	—	—	X	—	X	X	X	X	—	X	—
AAA4050	21-01613	0–0.5	Soil	—	—	—	—	—	—	—	X	—	X	X	X	X	—	X	—
AAA4051	21-01613	0.5–1	Soil	—	—	—	—	—	—	—	X	—	X	X	X	X	—	X	—
AAA4054	21-01613	1–1.5	Soil	—	—	—	—	—	—	—	X	—	X	X	X	X	—	X	—
MD21-06-73255	21-01614	4.2–4.5	Qbt 3	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	—
AAA4093	21-01665	0–5	Soil	—	—	X	—	—	—	—	X	—	X	X	X	X	—	X	—
AAA4094	21-01665	5–9	Qbt 3	—	—	X	—	—	—	—	X	—	X	X	X	X	—	X	—
AAA4095	21-01665	10–15	Qbt 3	—	—	X	—	—	—	—	X	—	X	X	X	X	—	X	—
AAA4096	21-01665	15–20	Qbt 3	—	—	X	—	—	—	—	X	—	X	X	X	X	—	X	—
AAB6979	21-01977	0–0.5	Soil	—	—	X	—	—	—	—	X	—	X	X	X	X	—	X	—
AAB6981	21-01979	0–0.5	Soil	—	—	X	—	—	—	—	X	—	X	X	X	X	—	X	—
AAB6982	21-01980	0–0.5	Soil	—	—	X	—	—	—	—	X	—	X	X	X	X	—	X	—
MD21-05-59987	21-24570	2.5–3	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59988	21-24570	3–3.5	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59990	21-24571	2.5–3	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59991	21-24571	3–3.5	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59993	21-24572	2–2.5	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59994	21-24572	2.5–3	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59996	21-24573	2–2.5	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59997	21-24573	2.5–3	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-59999	21-24574	3–3.5	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-60000	21-24574	3.5–4	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-60002	21-24575	2–2.5	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-60003	21-24575	2.5–3	Soil	X	X	X	—	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-60005	21-24576	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-60006	21-24576	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
MD21-05-60008	21-24577	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-60009	21-24577	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-60011	21-24578	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-05-60012	21-24578	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-70177	21-24579	2–2.5	Qbt 3	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-06-73253	21-25411	4–4.3	Qbt 3	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	—
MD21-06-70170	21-25412	2–2.5	Qbt 3	X	X	X	X	—	—	X	X	—	X	X	X	X	—	X	X
MD21-06-66261	21-25413	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66262	21-25413	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66264	21-25414	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66265	21-25414	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66267	21-25415	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66268	21-25415	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66270	21-25416	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66271	21-25416	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66273	21-25417	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66274	21-25417	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66276	21-25418	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66277	21-25418	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66280	21-25419	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66279	21-25419	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66282	21-25420	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66283	21-25420	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66285	21-25421	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66286	21-25421	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66288	21-25422	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66289	21-25422	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66291	21-25423	0–0.5	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-66292	21-25423	1.5–2	Soil	X	X	X	X	—	—	—	X	—	X	X	X	X	—	X	X
MD21-06-68044	21-25622	0–0.5	Soil	X	X	X	—	—	—	X	X	—	X	X	X	X	—	X	X
MD21-06-68045	21-25622	1.5–2	Soil	X	X	X	—	—	—	X	X	—	X	X	X	X	—	X	X
MD21-06-68046	21-25623	0–0.5	Soil	X	X	X	—	—	—	X	X	—	X	X	X	X	—	X	X
MD21-06-68047	21-25623	1.5–2	Soil	X	X	X	—	—	—	X	X	—	X	X	X	X	—	X	X
MD21-06-68048	21-25624	0–0.5	Soil	X	X	X	—	—	—	X	X	—	X	X	X	X	—	X	X
MD21-06-68049	21-25624	1.5–2	Soil	X	X	X	—	—	—	X	X	—	X	X	X	X	—	X	X
MD21-06-68050	21-25625	0–0.5	Soil	X	X	X	—	—	—	X	X	—	X	X	X	X	—	X	X
MD21-06-68051	21-25625	1.5–2	Soil	X	X	X	—	—	—	X	X	—	X	X	X	X	—	X	X

Table B-2.1-1 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anions	Cyanide	Metals	Perchlorate	SVOCs	Uranium	PCBs	SVOCs	VOCs	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90
MD21-06-68052	21-25626	0–0.5	Soil	X	X	X	—	—	—	X	X	—	X	X	X	X	—	X	X
MD21-06-68053	21-25626	1.5–2	Soil	X	X	X	—	—	—	X	X	—	X	X	X	X	—	X	X

[a] A dash indicates that analysis was not requested.

[b] An "X" indicates that analysis was performed.

Table B-2.1-2
Frequency of Inorganic Chemicals above Background Values at SWMUs 21-018(a) and 21-018(b)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
SWMU 21-018(a)							
Aluminum	Soil	4	4	1410–19800	29200	0/4	0/4
Aluminum	Fill	5	5	1420–25900	29200	0/5	0/5
Aluminum	Qbo	1	1	1030	3560	0/1	0/1
Aluminum	Qbt 1g	2	2	674–1250	3560	0/2	0/2
Aluminum	Qbt 1v	1	1	415	8170	0/1	0/1
Aluminum	Qbt 2	5	5	191–923	7340	0/5	0/5
Aluminum	Qbt 3	160	160	173–15900	7340	5/160	0/160
Aluminum	Qct	1	1	6290	3560	1/1	0/1
Antimony	Soil	4	0	[0.3–0.44]	0.83	0/4	0/4
Antimony	Fill	1	0	[0.446]	0.83	0/1	0/1
Antimony	Qbo	1	0	[0.44]	0.5	0/1	0/1
Antimony	Qbt 1g	2	0	[0.23–0.29]	0.5	0/2	0/2
Antimony	Qbt 1v	1	0	[0.21]	0.5	0/1	0/1
Antimony	Qbt 2	5	0	[0.27–0.417]	0.5	0/5	0/5
Antimony	Qbt 3	147	9	0.146–[6.6]	0.5	1/147	20/160
Antimony	Qct	1	0	[0.458]	0.5	0/1	0/1
Arsenic	Soil	4	3	1.37–7.5	8.17	0/4	0/4
Arsenic	Fill	5	4	[1.6]–5.54	8.17	0/5	0/5
Arsenic	Qbo	1	0	[1.62]	0.56	0/1	1/1
Arsenic	Qbt 1g	2	1	[0.96]–1.1	0.56	1/2	1/2
Arsenic	Qbt 1v	1	0	[0.84]	1.81	0/1	0/1
Arsenic	Qbt 2	5	5	0.45–1.62	2.79	0/5	0/5
Arsenic	Qbt 3	160	112	[0.2]–32.1	2.79	16/160	0/160
Arsenic	Qct	1	0	[1.74]	0.56	0/1	1/1
Barium	Soil	4	4	13.6–229	295	0/4	0/4
Barium	Fill	5	5	27–182	295	0/5	0/5
Barium	Qbo	1	1	12.9	25.7	0/1	0/1
Barium	Qbt 1g	2	1	15.4–[33.5]	25.7	0/2	1/2
Barium	Qbt 1v	1	0	[3.6]	26.5	0/1	0/1
Barium	Qbt 2	5	5	2.4–6.47	46	0/5	0/5
Barium	Qbt 3	160	134	[0.62]–194	46	9/160	0/160
Barium	Qct	1	1	26	25.7	1/1	0/1
Beryllium	Soil	4	2	0.249–[1.4]	1.83	0/4	0/4
Beryllium	Fill	5	5	0.0883–1.4	1.83	0/5	0/5
Beryllium	Qbo	1	1	0.822	1.44	0/1	0/1

Table B-2.1-2 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Beryllium	Qbt 1g	2	1	[0.44]–0.52	1.44	0/2	0/2
Beryllium	Qbt 1v	1	0	[0.21]	1.7	0/1	0/1
Beryllium	Qbt 2	5	5	0.08–0.265	1.21	0/5	0/5
Beryllium	Qbt 3	160	102	[0.04]–2.22	1.21	4/160	0/160
Beryllium	Qct	1	1	0.442	1.44	0/1	0/1
Bromide	Qbt 2	3	0	[2.03–2.06]	na[a]	0/3	n/a[b]
Cadmium	Soil	4	1	[0.05]–[0.505]	0.4	0/4	2/4
Cadmium	Fill	5	1	0.456–[0.555]	0.4	1/5	4/5
Cadmium	Qbo	1	0	[0.542]	0.4	0/1	1/1
Cadmium	Qbt 1g	2	0	[0.07–0.56]	0.4	0/2	1/2
Cadmium	Qbt 1v	1	0	[0.21]	0.4	0/1	0/1
Cadmium	Qbt 2	5	0	[0.06–0.521]	1.63	0/5	0/5
Cadmium	Qbt 3	160	28	0.04–1.6	1.63	0/160	0/160
Cadmium	Qct	1	0	[0.579]	0.4	0/1	1/1
Calcium	Soil	4	4	252–2740	6120	0/4	0/4
Calcium	Fill	5	5	261–4920	6120	0/5	0/5
Calcium	Qbo	1	1	647	1900	0/1	0/1
Calcium	Qbt 1g	2	2	1140–9360	1900	1/2	0/2
Calcium	Qbt 1v	1	1	1250	3700	0/1	0/1
Calcium	Qbt 2	5	5	636–3220	2200	1/5	0/5
Calcium	Qbt 3	160	141	199–19100	2200	8/160	0/160
Calcium	Qct	1	1	1080	1900	0/1	0/1
Chloride	Qbt 2	3	3	2.82–5.48	94.6	0/3	0/3
Chromium	Soil	4	4	0.61–9.6	19.3	0/4	0/4
Chromium	Fill	5	5	1.4–15.3	19.3	0/5	0/5
Chromium	Qbo	1	1	0.907	2.6	0/1	0/1
Chromium	Qbt 1g	2	1	[0.09]–15.9	2.6	1/2	0/2
Chromium	Qbt 1v	1	1	2.3	2.24	1/1	0/1
Chromium	Qbt 2	5	2	[0.149]–19.5	7.14	1/5	0/5
Chromium	Qbt 3	160	132	[0.08]–23	7.14	9/160	0/160
Chromium	Qct	1	1	2.81	2.6	1/1	0/1
Cobalt	Soil	4	2	0.32–[4]	8.64	0/4	0/4
Cobalt	Fill	5	5	0.223–5.91	8.64	0/5	0/5
Cobalt	Qbo	1	0	[0.542]	8.89	0/1	0/1
Cobalt	Qbt 1g	2	0	[0.11–1.6]	8.89	0/2	0/2
Cobalt	Qbt 1v	1	0	[0.84]	1.78	0/1	0/1
Cobalt	Qbt 2	5	0	[0.1–0.521]	3.14	0/5	0/5

Table B-2.1-2 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Cobalt	Qbt 3	160	75	[0.1]–8.9	3.14	1/160	0/160
Cobalt	Qct	1	1	1.14	8.89	0/1	0/1
Copper	Soil	4	3	0.732–7.2	14.7	0/4	0/4
Copper	Fill	5	5	0.679–11	14.7	0/5	0/5
Copper	Qbo	1	1	0.389	3.96	0/1	0/1
Copper	Qbt 1g	2	1	1.2–[4.3]	3.96	0/2	1/2
Copper	Qbt 1v	1	0	[0.78]	3.26	0/1	0/1
Copper	Qbt 2	5	5	0.429–1.4	4.66	0/5	0/5
Copper	Qbt 3	160	117	0.365–2820	4.66	31/160	0/160
Copper	Qct	1	1	2.53	3.96	0/1	0/1
Cyanide (Total)	Soil	2	0	[0.241–0.241]	0.5	0/2	0/2
Cyanide (Total)	Fill	5	2	0.199–[0.285]	0.5	0/5	0/5
Cyanide (Total)	Qbo	1	0	[0.275]	0.5	0/1	0/1
Cyanide (Total)	Qbt 2	3	0	[0.247–0.256]	0.5	0/3	0/3
Cyanide (Total)	Qbt 3	77	6	0.144–0.545	0.5	1/77	0/77
Cyanide (Total)	Qct	1	0	[0.268]	0.5	0/1	0/1
Iron	Soil	4	4	1790–12800	21500	0/4	0/4
Iron	Fill	5	5	1280–17200	21500	0/5	0/5
Iron	Qbo	1	1	4170	3700	1/1	0/1
Iron	Qbt 1g	2	2	4530–4830	3700	2/2	0/2
Iron	Qbt 1v	1	1	888	9900	0/1	0/1
Iron	Qbt 2	5	5	688–2670	14500	0/5	0/5
Iron	Qbt 3	160	160	371–25700	14500	2/160	0/160
Iron	Qct	1	1	3920	3700	1/1	0/1
Lead	Soil	4	4	1.99–40.1	22.3	1/4	0/4
Lead	Fill	5	5	0.827–17.5	22.3	0/5	0/5
Lead	Qbo	1	1	2.01	13.5	0/1	0/1
Lead	Qbt 1g	2	2	4–4.6	13.5	0/2	0/2
Lead	Qbt 1v	1	1	2.4	18.4	0/1	0/1
Lead	Qbt 2	5	5	3.17–7.8	11.2	0/5	0/5
Lead	Qbt 3	159	142	0.365–323	11.2	51/159	0/159
Lead	Qct	1	1	3.82	13.5	0/1	0/1
Magnesium	Soil	4	4	175–2500	4610	0/4	0/4
Magnesium	Fill	5	5	160–4000	4610	0/5	0/5
Magnesium	Qbo	1	1	277	739	0/1	0/1
Magnesium	Qbt 1g	2	1	97.6–[408]	739	0/2	0/2
Magnesium	Qbt 1v	1	0	[89.3]	780	0/1	0/1

Table B-2.1-2 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Magnesium	Qbt 2	5	5	43.1–135	1690	0/5	0/5
Magnesium	Qbt 3	160	141	36.1–3700	1690	4/160	0/160
Magnesium	Qct	1	1	1020	739	1/1	0/1
Manganese	Soil	4	4	99.9–204	671	0/4	0/4
Manganese	Fill	5	5	24.3–362	671	0/5	0/5
Manganese	Qbo	1	1	157	189	0/1	0/1
Manganese	Qbt 1g	2	2	125–186	189	0/2	0/2
Manganese	Qbt 1v	1	1	48.5	408	0/1	0/1
Manganese	Qbt 2	5	5	50.4–185	482	0/5	0/5
Manganese	Qbt 3	160	159	22.4–717	482	1/160	0/160
Manganese	Qct	1	1	138	189	0/1	0/1
Mercury	Soil	6	6	0.0079–0.04	0.1	1/6	0/6
Mercury	Fill	8	5	0.0103–0.3	0.1	0/6	0/6
Mercury	Qbo	1	0	[0.0108]	0.1	0/1	0/1
Mercury	Qbt 2	3	0	[0.00999–0.0102]	0.1	0/3	0/5
Mercury	Qbt 3	116	44	0.0027–0.178	0.1	2/116	0/116
Mercury	Qbt 1g	2	1	[0.02]–0.24	0.1	1/2	0/2
Mercury	Qbt 1v	1	0	[0.02]	0.1	0/1	0/1
Mercury	Qct	1	0	[0.0116]	0.1	0/1	0/1
Nickel	Fill	5	5	1–13.6	15.4	0/5	0/5
Nickel	Soil	4	3	1.9–8.1	15.4	0/4	0/4
Nickel	Qbo	1	1	0.717	2	0/1	0/1
Nickel	Qbt 1g	2	0	[0.14–2.9]	2	0/2	1/2
Nickel	Qbt 1v	1	0	[1.3]	2	0/1	0/1
Nickel	Qbt 2	5	4	0.143–1.1	6.58	0/5	0/5
Nickel	Qbt 3	160	102	[0.12]–35.6	6.58	4/160	0/160
Nickel	Qct	1	1	2.13	2	1/1	0/1
Nitrate	Soil	2	2	0.77–2.94	na	2/2	n/a
Nitrate	Fill	5	2	[1.05]–10.6	na	2/5	n/a
Nitrate	Qbt 3	71	35	0.224–17.2	na	35/71	n/a
Nitrate	Qct	1	1	7.53	na	1/1	0/1
Perchlorate	Soil	2	0	[0.00208–0.00208]	na	0/2	n/a
Perchlorate	Fill	5	3	0.00073–[0.00237]	na	3/5	n/a
Perchlorate	Qbo	1	0	[0.0022]	na	0/1	0/1
Perchlorate	Qbt 2	3	0	[0.00205–0.00208]	na	0/3	n/a
Perchlorate	Qbt 3	82	23	0.000517–[0.126]	na	23/82	n/a
Perchlorate	Qct	1	0	[0.00234]	na	0/1	0/1

Table B-2.1-2 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Potassium	Soil	4	3	423–2120	3460	0/4	0/4
Potassium	Fill	5	5	263–3240	3460	0/5	0/5
Potassium	Qbo	1	1	441	2390	0/1	0/1
Potassium	Qbt 1g	2	1	[313]–510	2390	0/2	0/2
Potassium	Qbt 1v	1	0	[204]	6670	0/1	0/1
Potassium	Qbt 2	5	5	122–549	3500	0/5	0/5
Potassium	Qbt 3	160	120	[74.4]–1680	3500	0/160	0/160
Potassium	Qct	1	1	937	2390	0/1	0/1
Selenium	Soil	4	0	[0.71–1.52]	1.52	0/4	0/4
Selenium	Fill	5	1	1.16–[1.75]	1.52	0/5	3/5
Selenium	Qbo	1	0	[1.62]	0.3	0/1	1/1
Selenium	Qbt 1g	2	0	[0.68–0.97]	0.3	0/2	2/2
Selenium	Qbt 1v	1	0	[0.63]	0.3	0/1	1/1
Selenium	Qbt 2	5	0	[0.88–7.81]	0.3	0/5	5/5
Selenium	Qbt 3	160	7	[0.19]–[8.41]	0.3	7/160	140/160
Selenium	Qct	1	0	[1.74]	0.3	0/1	1/1
Silver	Soil	4	1	[0.07]–[0.28]	1	0/4	0/4
Silver	Fill	5	3	0.065–0.536	1	0/5	0/5
Silver	Qbo	1	0	[0.22]	1	0/1	0/1
Silver	Qbt 1g	2	0	[0.23–2.3]	1	0/2	1/2
Silver	Qbt 1v	1	0	[0.63]	1	0/1	0/1
Silver	Qbt 2	5	1	[0.203]–0.3	1	0/5	0/5
Silver	Qbt 3	160	31	0.039–[2.8]	1	0/160	35/160
Silver	Qct	1	0	[0.229]	1	0/1	0/1
Sodium	Soil	4	2	135–[376]	915	0/4	0/4
Sodium	Fill	5	5	146–498	915	0/5	0/5
Sodium	Qbo	1	1	747	4350	0/1	0/1
Sodium	Qbt 1g	2	1	437–[478]	4350	0/2	0/2
Sodium	Qbt 1v	1	0	[106]	6330	0/1	0/1
Sodium	Qbt 2	5	5	358–1580	2770	0/5	0/5
Sodium	Qbt 3	160	123	55.1–490	2770	0/160	0/160
Sodium	Qct	1	1	533	4350	0/1	0/1
Sulfate	Qbt 2	3	3	2.59–6.22	157	3/3	n/a
Thallium	Soil	4	1	0.122–[0.93]	0.73	0/4	1/4
Thallium	Fill	5	4	0.126–0.454	0.73	0/5	0/5
Thallium	Qbo	1	0	[0.22]	1.22	0/1	0/1
Thallium	Qbt 1g	2	0	[0.23–0.92]	1.22	0/2	0/2

Table B-2.1-2 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Thallium	Qbt 1v	1	0	[0.21]	1.24	0/1	0/1
Thallium	Qbt 2	5	0	[0.203–0.85]	1.1	0/5	0/5
Thallium	Qbt 3	160	40	0.0818–1.61	1.1	6/160	0/160
Thallium	Qct	1	0	[0.229]	1.22	0/1	0/1
Uranium	Soil	1	1	10.8	1.82	1/1	0/1
Uranium	Qbt 1g	2	2	6.2–11.4	0.72	2/2	0/2
Uranium	Qbt 1v	1	1	2.17	6.22	0/1	0/1
Uranium	Qbt 2	2	2	0.96–1.83	2.4	0/2	0/2
Uranium	Qbt 3	70	70	0.435–132	2.4	42/70	0/70
Vanadium	Soil	4	4	1.34–19.6	39.6	0/4	0/4
Vanadium	Fill	5	5	1.49–29.5	39.6	0/5	0/5
Vanadium	Qbo	1	1	1.49	4.59	0/1	0/1
Vanadium	Qbt 1g	2	1	1.4–[2.8]	4.59	0/2	0/2
Vanadium	Qbt 1v	1	0	[1.2]	4.48	0/1	0/1
Vanadium	Qbt 2	5	5	0.89–1.84	17	0/5	0/5
Vanadium	Qbt 3	160	119	0.46–52.4	17	1/160	0/160
Vanadium	Qct	1	1	5.45	4.59	1/1	0/1
Zinc	Soil	4	4	9.04–35.2	48.8	0/4	0/4
Zinc	Fill	5	5	3.74–52.5	48.8	1/5	0/5
Zinc	Qbo	1	1	10.7	40	0/1	0/1
Zinc	Qbt 1g	2	2	20.3–44.4	40	1/2	0/2
Zinc	Qbt 1v	1	1	10.8	84.6	0/1	0/1
Zinc	Qbt 2	5	5	6.99–19.4	63.5	0/5	0/5
Zinc	Qbt 3	160	160	3.9–181	63.5	5/160	0/160
Zinc	Qct	1	1	56	40	1/1	0/1
SWMU 21-018(b)							
Aluminum	Soil	2	2	4220–10000	29200	0/2	0/2
Aluminum	Fill	14	14	618–28400	29200	0/14	0/14
Aluminum	Qbt 3	8	8	218–8760	7340	1/8	0/8
Antimony	Soil	2	0	[0.21–0.37]	0.83	0/2	0/2
Antimony	Fill	4	0	[0.428–0.471]	0.83	0/4	0/4
Antimony	Qbt 3	6	0	[0.417–0.452]	0.5	0/6	0/6
Arsenic	Soil	2	1	1.1–[1.8]	8.17	0/2	0/2
Arsenic	Fill	14	14	0.901–5.55	8.17	0/14	0/4
Arsenic	Qbt 3	8	8	1.3–3.16	2.79	1/8	0/8
Barium	Soil	2	2	71.9–112	295	0/2	0/2
Barium	Fill	14	14	13–364	295	2/14	0/14

Table B-2.1-2 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Barium	Qbt 3	8	8	7.68–50.6	46	1/8	0/8
Beryllium	Soil	2	1	0.29–[0.63]	1.83	0/2	0/2
Beryllium	Fill	14	14	0.235–1.29	1.83	0/14	0/14
Beryllium	Qbt 3	8	8	0.258–1.25	1.21	1/8	0/8
Cadmium	Soil	2	0	[0.41–0.59]	0.4	0/2	2/2
Cadmium	Fill	14	1	0.383–[0.601]	0.4	0/14	13/14
Cadmium	Qbt 3	8	1	0.117–[0.563]	1.63	0/8	0/8
Calcium	Soil	2	2	2170–2590	6120	0/2	0/2
Calcium	Fill	14	14	387–7530	6120	1/14	0/14
Calcium	Qbt 3	8	8	184–1180	2200	0/8	0/8
Chromium	Soil	2	2	3.7–9	19.3	0/2	0/2
Chromium	Fill	14	14	2.16–20.6	19.3	1/14	0/14
Chromium	Qbt 3	8	7	[0.272]–3.97	7.14	0/8	0/8
Cobalt	Soil	2	1	1.7–[4.4]	8.64	0/2	0/2
Cobalt	Fill	14	14	0.248–9.78	8.64	2/14	0/14
Cobalt	Qbt 3	8	7	0.209–1.73	3.14	0/8	0/8
Copper	Soil	2	2	3.1–8.3	14.7	0/2	0/2
Copper	Fill	14	14	1.46–13.7	14.7	0/14	0/14
Copper	Qbt 3	8	8	0.849–4.84	4.66	1/8	0/8
Cyanide (Total)	Fill	14	4	0.142–[0.293]	0.5	0/14	0/14
Cyanide (Total)	Qbt 3	8	1	[0.239]–0.317	0.5	0/8	0/8
Iron	Soil	2	2	5000–10500	21500	0/2	0/2
Iron	Fill	14	14	2760–21100	21500	0/14	0/14
Iron	Qbt 3	8	8	2480–7940	14500	0/8	0/8
Lead	Soil	2	2	6.3–23.8	22.3	1/2	0/2
Lead	Fill	14	14	1.66–17.6	22.3	0/14	0/14
Lead	Qbt 3	8	6	[0.642]–9.29	11.2	0/8	0/8
Magnesium	Soil	2	2	970–1930	4610	0/2	0/2
Magnesium	Fill	14	14	235–5860	4610	2/14	0/14
Magnesium	Qbt 3	8	8	80.3–1130	1690	0/8	0/8
Manganese	Soil	2	2	184–301	671	0/2	0/2
Manganese	Fill	14	14	31.4–468	671	0/14	0/14
Manganese	Qbt 3	8	8	189–1030	482	1/8	0/8
Mercury	Soil	2	0	[0.02–0.02]	0.1	0/2	0/2
Mercury	Fill	14	14	0.0044–0.0553	0.1	0/14	0/14
Mercury	Qbt 3	8	5	0.0053–0.0154	0.1	0/8	0/8
Nickel	Soil	2	1	5.7–[7.2]	15.4	0/2	0/2

Table B-2.1-2 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Nickel	Fill	14	14	0.76–19.2	15.4	1/14	0/14
Nickel	Qbt 3	8	8	0.302–3.78	6.58	0/8	0/8
Nitrate	Fill	14	12	0.231–8.57	na	12/14	n/a
Nitrate	Qbt 3	8	5	0.323–1.54	na	5/8	n/a
Perchlorate	Fill	16	5	0.000806–[0.14]	na	5/16	n/a
Perchlorate	Qbt 3	14	1	0.000661–[0.135]	na	1/14	n/a
Potassium	Soil	2	2	462–1490	3460	0/2	0/2
Potassium	Fill	14	14	287–3760	3460	2/14	0/14
Potassium	Qbt 3	8	8	115–802	3500	0/8	0/8
Selenium	Soil	2	0	[0.62–0.64]	1.52	0/2	0/2
Selenium	Fill	14	2	0.987–[8.41]	1.52	0/14	12/14
Selenium	Qbt 3	8	0	[1.54–1.69]	0.3	0/8	8/8
Silver	Soil	2	0	[2.1]	1	0/2	2/2
Silver	Fill	14	11	0.0537–[0.217]	1	0/14	0/14
Silver	Qbt 3	8	3	0.0537–[0.214]	1	0/8	0/8
Sodium	Soil	2	1	105–[126]	915	0/2	0/2
Sodium	Fill	14	14	163–1350	915	1/14	0/14
Sodium	Qbt 3	8	8	87.4–228	2770	0/8	0/8
Thallium	Soil	2	0	[0.21]	0.73	0/2	0/2
Thallium	Fill	14	12	0.129–[1.07]	0.73	0/14	1/14
Thallium	Qbt 3	8	3	0.0924–[0.214]	1.1	0/8	0/8
Uranium	Soil	1	1	1.39	1.82	0/1	0/1
Vanadium	Soil	2	2	13.8–18.4	39.6	0/2	0/2
Vanadium	Fill	14	14	1.31–39.5	39.6	0/14	0/14
Vanadium	Qbt 3	8	8	0.562–6.99	17	0/8	0/8
Zinc	Soil	2	2	16.5–33.1	48.8	0/2	0/2
Zinc	Fill	14	14	7.07–51.9	48.8	1/14	0/14
Zinc	Qbt 3	8	8	15.6–49.2	63.5	0/8	0/8

Source: Background values from LANL (1998, 059730, Table 6.0-1, p. 44).

Note: Values in brackets are below detection limits.

[a] na = Not available.

[b] n/a = Not applicable.

Table B-2.1-3
Summary of Inorganic Chemicals above Background Values at SWMUs 21-018(a) and 21-018(b)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
SWMU 21-018(a)																												
AAA7567	21-02517	0.00–2.50	Soil	—[b]	—	—	—	—	—	—	—	—	—	—	—	40.1	—	—	—	—	—	—	—	—	0.93 (U)	10.8	—	—
AAA7568	21-02517	2.50–5.00	Qbt 3	—	—	32.1	—	—	—	—	—	—	—	—	—	97.4	—	—	—	—	—	—	0.91 (U)	—	—	132	—	—
AAA7569	21-02517	5.00–7.50	Qbt 3	—	—	2.8	—	—	—	3770	—	—	—	—	—	39.1	—	—	—	—	—	—	0.87 (U)	—	—	—	—	—
AAA7570	21-02517	7.50–10.00	Qbt 3	—	—	—	—	—	—	2350	—	—	—	—	—	37.5	—	—	—	—	—	—	0.87 (U)	—	1.2 (J)	3.84	—	—
AAA7571	21-02517	10.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	28.1	—	—	—	—	—	—	0.88 (U)	—	—	—	—	—
AAA7572	21-02517	12.50–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	28.4	—	—	—	—	—	—	0.88 (U)	—	—	3.21	—	—
AAA7573	21-02517	15.00–17.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	21.1	—	—	—	—	—	—	0.88 (U)	—	—	6.37	—	—
AAA7574	21-02517	20.00–25.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	19.4	—	—	—	—	—	—	0.89 (U)	—	—	6.31	—	—
AAA7575	21-02517	25.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	18.4	—	—	—	—	—	—	0.86 (U)	—	1.4 (J)	66.1	—	—
AAA7576	21-02517	30.00–35.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	14.4	—	—	—	—	—	—	0.87 (U)	—	—	—	—	—
AAA7577	21-02517	35.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	18.2	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAA7578	21-02517	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	11.6	—	—	—	—	—	—	0.88 (U)	—	1.2 (J)	—	—	—
AAA7579	21-02517	45.00–50.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	12.2	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAA7580	21-02517	50.00–55.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.89 (U)	—	1.3 (J)	—	—	—
AAA7581	21-02517	55.00–60.00	Qbt 3	—	—	—	—	—	—	—	8.4	—	—	—	—	—	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAA7582	21-02517	60.00–65.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	12.1	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAA7583	21-02517	65.00–70.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAA7584	21-02517	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.88 (U)	—	—	—	—	—
AAA7589	21-02517	95.00–100.00	Qbt 2	—	—	—	—	—	—	—	19.5	—	—	—	—	—	—	—	—	—	—	—	0.88 (U)	—	—	—	—	—
AAA7594	21-02517	120.00–125.00	Qbt 2	—	—	—	—	—	—	3220	—	—	—	—	—	—	—	—	—	—	—	—	0.89 (U)	—	—	—	—	—
AAB6660	21-02518	12.50–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	15.1 (J-)	—	—	—	—	—	—	0.61 (UJ)	—	—	—	—	—
AAB6661	21-02518	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	—	—	91.6 (J-)	—	—	12.9 (J-)	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6662	21-02518	20.00–25.00	Qbt 3	—	—	—	—	—	—	—	—	—	10.2 (J-)	—	—	—	—	—	—	—	—	—	0.61 (UJ)	—	—	—	—	—
AAB6663	21-02518	25.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	5.2 (J-)	—	—	—	—	—	—	—	—	—	0.61 (UJ)	—	—	—	—	—
AAB6664	21-02518	30.00–35.00	Qbt 3	—	—	—	—	—	—	—	—	—	4.8 (J-)	—	—	—	—	—	—	—	—	—	0.61 (UJ)	—	—	—	—	—
AAB6665	21-02518	35.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	138 (J-)	—	—	19.1 (J-)	—	—	—	—	—	—	0.6 (UJ)	—	—	—	—	—
AAB6666	21-02518	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	138 (J-)	—	—	25.2 (J-)	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6667	21-02518	45.00–50.00	Qbt 3	—	0.55 (J-)	—	—	—	—	—	9.7 (J-)	—	266 (J-)	—	—	33.2 (J-)	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6668	21-02518	50.00–55.00	Qbt 3	—	—	—	—	—	—	—	—	—	267 (J-)	—	—	32.1 (J-)	—	—	—	—	—	—	0.63 (UJ)	—	—	—	—	—
AAB6669	21-02518	55.00–60.00	Qbt 3	—	—	—	—	—	—	—	—	—	88 (J-)	—	—	14.1 (J-)	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6670	21-02518	60.00–65.00	Qbt 3	—	—	—	—	—	—	—	—	—	108 (J-)	—	—	15.9 (J-)	—	—	—	—	—	—	0.61 (UJ)	—	—	—	—	—
AAB6671	21-02518	65.00–70.00	Qbt 3	—	—	—	—	—	—	—	—	—	15.1 (J-)	—	—	—	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6672	21-02518	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	25.2 (J-)	—	—	—	—	—	—	—	—	—	0.62 (UJ)	—	—	—	—	—
AAB6678	21-02519	12.50–15.00	Qbt 3	—	—	5.7	—	—	—	—	—	—	—	—	—	74.8	—	—	—	—	—	—	0.62 (U)	—	—	4.6	—	—
AAB6679	21-02519	15.00–20.00	Qbt 3	—	1.7 (U)	—	—	—	—	—	—	—	1250	—	—	207	—	—	—	9	—	—	0.63 (U)	—	—	3.8	—	147
AAB6680	21-02519	20.00–25.00	Qbt 3	—	4.1 (U)	—	—	—	—	—	—	—	2820	—	—	323	—	—	—	35.6	—	—	0.62 (U)	—	—	3.9	—	181

Table B-2.1-3 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
AAB6681	21-02519	25.00–30.00	Qbt 3	—	3.5 (U)	—	—	—	—	—	—	—	2380	—	—	299	—	—	—	17.6	—	—	0.64 (U)	—	—	3.9	—	144
AAB6682	21-02519	30.00–35.00	Qbt 3	—	—	—	—	—	—	—	—	—	199	—	—	79.6	—	—	—	—	—	—	0.63 (U)	—	—	4	—	—
AAB6683	21-02519	35.00–40.00	Qbt 3	—	0.59 (U)	—	—	—	—	—	—	—	305	—	—	76.9	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	4	—	—
AAB6684	21-02519	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	70.4	—	—	97.1	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	4.4	—	—
AAB6685	21-02519	45.00–50.00	Qbt 3	—	0.86 (U)	—	—	—	—	—	—	—	474	—	—	80.6	—	—	—	—	—	—	0.62 (U)	2.1 (U)	—	4	—	—
AAB6686	21-02519	50.00–55.00	Qbt 3	—	—	—	—	—	—	—	—	—	217	—	—	62.9	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	4.1	—	—
AAB6687	21-02519	55.00–60.00	Qbt 3	—	1.5 (U)	—	—	—	—	—	—	—	836	—	—	116	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	3.9	—	—
AAB6688	21-02519	60.00–65.00	Qbt 3	—	0.52 (U)	—	—	—	—	—	—	—	276	—	—	60.1	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	3.9	—	—
AAB6689	21-02519	65.00–70.00	Qbt 3	—	—	—	—	—	—	—	—	—	53	—	—	42.5	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	4.2	—	—
AAB6690	21-02519	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	47.3	—	—	33.5	—	—	—	—	—	—	0.62 (U)	2.1 (U)	—	4	—	—
AAB6691	21-02520	0-00–2.50	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.3 (J)	—	—	—	—	—	—	—	—	—
AAB6696	21-02520	12.50–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	5.8	—	—
AAB6697	21-02520	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.65 (U)	2.2 (U)	—	4.2	—	—
AAB6698	21-02520	20.00–25.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	3.9	—	—
AAB6699	21-02520	25.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	3.8	—	—
AAB6700	21-02520	30.00–35.00	Qbt 3	—	—	—	—	—	—	—	7.8 (J)	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	3.7	—	—
AAB6701	21-02520	35.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	4	—	—
AAB6702	21-02520	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	3.8	—	—
AAB6703	21-02520	45.00–50.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.65 (U)	2.2 (U)	—	2.95	—	—
AAB6704	21-02520	50.00–55.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	2.46	—	—
AAB6705	21-02520	55.00–60.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.66 (U)	2.2 (U)	—	3.19	—	—
AAB6706	21-02520	60.00–65.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	2.56	—	—
AAB6707	21-02520	65.00–70.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.65 (U)	2.2 (U)	—	4.94	—	—
AAB6708	21-02520	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	3.19	—	—
AAB6714	21-02521	12.50–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	11.5	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	2.95	—	—
AAB6715	21-02521	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	20.9	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	2.86	—	—
AAB6716	21-02521	20.00–25.00	Qbt 3	—	—	—	—	—	—	—	23	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	—	—	—
AAB6717	21-02521	25.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.65 (U)	2.2 (U)	—	2.69	—	—
AAB6718	21-02521	30.00–35.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.66 (U)	2.2 (U)	—	2.49	—	—
AAB6719	21-02521	35.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.66 (J)	2.1 (U)	—	10.7	—	—
AAB6720	21-02521	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	3.26	—	—
AAB6721	21-02521	45.00–50.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	12.4	—	—	—	—	—	—	0.85 (U)	2.8 (U)	—	—	—	—
AAB6722	21-02521	50.00–55.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.77 (J)	2.2 (U)	—	3.54	—	—
AAB6723	21-02521	55.00–60.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.66 (J)	2.2 (U)	—	2.55	—	—
AAB6724	21-02521	60.00–65.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	2.64	—	—
AAB6725	21-02521	65.00–70.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (U)	2.1 (U)	—	—	—	—
AAB6726	21-02521	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	—	—	—
AAC0094	21-02522	12.50–15.00	Qbt 3	—	4.5 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table B-2.1-3 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
AAC0095	21-02522	15.00–20.00	Qbt 3	—	5.1 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.7 (J-)	—	—
AAC0096	21-02522	20.00–25.00	Qbt 3	—	6 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0097	21-02522	25.00–30.00	Qbt 3	8060	4.7 (U)	—	109	—	—	4290	12.3	8.9 (J)	9.5	—	18900 (J-)	—	3700	—	—	13.3	—	—	—	—	—	—	—	—
AAC0098	21-02522	30.00–35.00	Qbt 3	—	5.1 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0099	21-02522	35.00–40.00	Qbt 3	—	4.8 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0100	21-02522	40.00–45.00	Qbt 3	—	4.7 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0101	21-02522	45.00–50.00	Qbt 3	—	6.6 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0102	21-02522	50.00–55.00	Qbt 3	—	4.8 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0103	21-02522	55.00–60.00	Qbt 3	—	4.9 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0104	21-02522	60.00–65.00	Qbt 3	—	5.1 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0105	21-02522	65.00–70.00	Qbt 3	—	5 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAC0106	21-02522	70.00–75.00	Qbt 3	—	5.1 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB7043	21-02523	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64 (UJ)	—	—	—	—	—
AAB7063	21-02523	170.00–175.00	Qbt 1v	—	—	—	—	—	—	—	2.3	—	—	—	—	—	—	—	—	—	—	—	0.63 (U)	—	—	—	—	—
AAC0555	21-02523	225.20–227.50	Qbt 1g	—	—	1.1 (J)	—	—	—	—	—	—	—	—	4530	—	—	—	0.24	—	—	—	0.97 (U)	—	—	6.2	—	44.4
AAB7078	21-02523	245.00–250.00	Qbt 1g	—	—	0.96 (U)	33.5 (U)	—	0.56 (U)	9360	15.9	—	4.3 (U)	—	4830	—	—	—	—	2.9 (U)	—	—	0.68 (U)	2.3 (U)	—	11.4 (J)	—	—
MD21-05-59560	21-24524	8.00–10.00	Qbt 3	—	—	—	—	—	—	2550	—	—	—	—	—	—	—	—	—	—	2.82	0.000575 (J)	1.56 (U)	—	—	—	—	—
MD21-05-59561	21-24524	11.00–13.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7.81 (U)	—	—	—	—	—
MD21-05-59562	21-24524	23.00–25.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.000599 (J)	1.52 (U)	—	—	—	—	—
MD21-05-59563	21-24524	33.00–35.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.224 (J)	—	1.54 (U)	—	—	—	—	—
MD21-05-59564	21-24524	43.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59565	21-24524	93.00–95.00	Qbt 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	717	—	—	9.27	—	1.59 (U)	—	—	—	—	—
MD21-05-59566	21-24524	98.00–100.00	Qbt 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—	—
MD21-05-59567	21-24524	168.00–170.00	Qbt 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.55 (U)	—	—	—	—	—
MD21-05-60609	21-24524	339.50–340.00	Qct	6290	—	1.74 (U)	26	—	0.579 (U)	—	2.81	—	—	—	3920	—	1020	—	—	2.13 (J)	7.53 (J-)	—	1.74 (U)	—	—	—	5.45	56
MD21-05-60610	21-24524	378.00–380.00	Qbo	—	—	1.62 (U)	—	—	0.542 (U)	—	—	—	—	—	4170	—	—	—	—	—	—	—	1.62 (U)	—	—	—	—	—
MD21-05-59596	21-24528	3.00–5.00	Fill	—	—	—	—	—	0.456 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	1.75 (U)	—	—	—	—	—
MD21-05-59597	21-24528	14.00–16.00	Fill	—	—	—	—	—	0.533 (U)	—	—	—	—	—	—	—	—	—	—	—	—	0.000866 (J)	1.6 (U)	—	—	—	—	—
MD21-05-59598	21-24528	32.50–34.50	Qbt 3	—	—	12.8	—	—	—	—	—	—	8.24	—	25700	13.6	—	—	—	—	2.33	0.00421	8.11 (U)	—	—	—	52.4	—
MD21-05-59599	21-24528	36.00–38.00	Qbt 3	—	—	—	105	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00284	1.6 (U)	—	—	—	—	—
MD21-05-59600	21-24528	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00254	1.57 (U)	—	—	—	—	—
MD21-05-59655	21-24531	3.00–5.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.786 (J)	—	—	—	—	—
MD21-05-59656	21-24531	12.00–14.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59657	21-24531	62.00–64.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.58 (U)	—	—	—	—	—
MD21-05-59658	21-24531	78.00–80.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59664	21-24532	20.00–22.00	Fill	—	—	—	—	—	0.555 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MD21-05-59665	21-24532	28.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.545	—	—	—	—	—	—	—	—	1.62 (U)	—	—	—	—	—
MD21-05-59666	21-24532	31.50–33.50	Qbt 3	—	—	—	—	1.25	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00114 (J+)	1.64 (U)	—	—	—	—	—

Table B-2.1-3 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
MD21-05-59667	21-24532	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.29 (J-)	0.000647 (J+)	1.57 (U)	—	—	—	—	—
MD21-05-59673	21-24533	10.00–12.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59674	21-24533	28.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59675	21-24533	30.00–32.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—	—
MD21-05-59676	21-24533	58.00–60.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.57 (U)	—	—	—	—	—
MD21-05-59677	21-24533	83.00–85.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.56 (U)	—	—	—	—	—
MD21-05-59682	21-24534	3.00–5.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.52 (U)	—	—	—	—	—
MD21-05-59683	21-24534	8.00–10.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.57 (J-)	0.00313 (J+)	1.6 (U)	—	—	—	—	—
MD21-05-59684	21-24534	13.00–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.56 (U)	—	—	—	—	—
MD21-05-59685	21-24534	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.55 (U)	—	—	—	—	—
MD21-05-59691	21-24535	8.00–10.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.48 (U)	—	—	—	—	—
MD21-05-59692	21-24535	13.00–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.000532 (J)	1.51 (U)	—	—	—	—	—
MD21-05-59693	21-24535	20.00–22.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.795 (J)	—	1.56 (U)	—	—	—	—	—
MD21-05-59694	21-24535	30.00–32.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—	—
MD21-05-59695	21-24535	78.00–80.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.341 (J)	—	1.52 (U)	—	—	—	—	—
MD21-05-59750	21-24538	13.00–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	61.8	—	—	—	—	—	0.000885 (J+)	1.5 (U)	—	—	—	—	—
MD21-05-59751	21-24538	15.00–17.00	Qbt 3	—	—	—	—	—	—	2910 (J+)	—	—	—	—	—	39.5	—	—	—	—	—	0.00139 (J+)	1.5 (U)	—	—	—	—	—
MD21-05-59752	21-24538	28.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	15.5	—	—	—	—	—	0.00107 (J+)	1.5 (U)	—	—	—	—	—
MD21-05-59753	21-24538	37.00–39.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	28.9	—	—	—	—	—	—	0.624 (J)	—	—	—	—	—
MD21-05-59754	21-24538	42.00–44.00	Qbt 3	13700 (J+)	—	3.45	47.7	2.22	—	—	7.72	—	4.92	—	—	51.7	2390	—	—	—	—	0.00136 (J+)	1.6 (U)	—	1.61	—	—	—
MD21-05-59755	21-24538	53.00–55.00	Qbt 3	—	—	—	77.1	—	—	—	—	—	—	—	—	12.8	—	—	—	—	—	0.00101 (J+)	0.864 (J)	—	—	—	—	—
MD21-05-59759	21-24539	12.00–14.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.5 (U)	—	—	—	—	—
MD21-05-59760	21-24539	28.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59761	21-24539	40.00–42.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.52 (U)	—	—	—	—	—
MD21-05-59762	21-24539	78.00–80.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.53 (U)	—	—	—	—	—
MD21-05-59768	21-24540	9.00–11.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00232	1.54 (U)	—	—	—	—	—
MD21-05-59769	21-24540	26.00–28.00	Qbt 3	—	—	2.93	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.000914 (J)	1.52 (U)	—	—	—	—	—
MD21-05-59770	21-24540	31.00–33.00	Qbt 3	—	—	—	—	—	—	—	—	—	13.3	—	—	—	2420 (J)	—	—	—	—	0.00249	1.63 (U)	—	—	—	—	67.3
MD21-05-59771	21-24540	38.00–40.00	Qbt 3	15900 (J+)	—	5.59	134	1.67	—	2220	7.32	—	—	—	—	—	—	—	—	—	—	—	1.5 (U)	—	—	—	—	—
MD21-05-59777	21-24541	20.00–22.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00401	1.51 (U)	—	—	—	—	—
MD21-05-59778	21-24541	28.00–30.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00398	1.55 (U)	—	—	—	—	—
MD21-05-59779	21-24541	31.00–33.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.721 (J)	—	1.52 (U)	—	—	—	—	—
MD21-05-59780	21-24541	42.00–44.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.595 (J)	—	1.53 (U)	—	—	—	—	—
MD21-05-59781	21-24541	47.00–49.00	Qbt 3	7380	—	—	—	1.42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.57 (U)	—	—	—	—	—
MD21-05-59782	21-24541	78.00–80.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.751 (J)	—	1.53 (U)	—	—	—	—	—
MD21-05-59786	21-24542	2.00–4.00	Qbt 3	14700	—	5.06	194	—	—	6980	7.35	—	8.21	—	—	141	—	—	—	—	—	—	1.51 (U)	1.03 (U)	1.44	—	—	68.5
MD21-05-59787	21-24542	13.00–15.00	Qbt 3	—	—	3.1	—	—	—	—	—	—	5.59	—	—	11.6	2030	—	—	—	—	—	8.41 (U)	—	—	—	—	—
MD21-05-59788	21-24542	32.00–34.00	Qbt 3	—	—	3.29	—	—	—	—	—	—	—	—	—	15.7	—	—	—	—	—	—	1.56 (U)	—	—	—	—	—

Table B-2.1-3 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
MD21-05-59789	21-24542	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	13	—	—	—	—	—	—	1.57 (U)	—	—	—	—	—
MD21-05-59934	21-24554	2.00–3.00	Fill	—	—	—	—	—	0.518 (U)	—	—	—	—	—	—	—	—	—	—	—	5.84	0.00073 (J-)	1.56 (U)	—	—	—	—	—
MD21-05-59935	21-24554	4.00–5.00	Fill	—	—	—	—	—	0.507 (U)	—	—	—	—	—	—	—	—	—	—	—	10.6	0.00124 (J-)	—	—	—	—	—	—
MD21-05-59984	21-24569	2.00–2.50	Soil	—	—	—	—	—	0.505 (U)	—	—	—	—	—	—	—	—	—	—	—	2.94 (J-)	—	—	—	—	—	—	—
MD21-05-59985	21-24569	2.50–3.00	Soil	—	—	—	—	—	0.503 (U)	—	—	—	—	—	—	—	—	—	—	—	0.77 (J-)	—	—	—	—	—	—	—
MD21-06-70163	21-24585	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17.2	0.000571 (J)	1.54 (U)	—	—	—	—	—
MD21-06-70164	21-24593	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.01	—	1.52 (U)	—	—	—	—	—
MD21-06-70165	21-24595	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10.5	—	1.57 (U)	—	—	—	—	—
MD21-06-66647	21-25431	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	12.1	—	—	—	—	1.18 (J-)	—	1.47 (U)	—	—	—	—	—
MD21-06-66648	21-25432	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.37 (J-)	0.000517 (J)	1.44 (U)	—	—	—	—	—
MD21-06-66649	21-25433	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.67 (J-)	—	1.52 (U)	—	—	—	—	—
MD21-06-66650	21-25434	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.82 (J-)	—	1.57 (U)	—	—	—	—	—
MD21-06-66651	21-25435	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.73 (J-)	—	1.48 (U)	—	—	—	—	—
MD21-06-66652	21-25436	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.23 (J-)	—	1.52 (U)	—	—	—	—	—
MD21-06-66653	21-25437	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.48 (J-)	—	1.53 (U)	—	—	—	—	—
MD21-06-66654	21-25438	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.32 (J-)	—	1.66 (U)	—	—	—	—	—
MD21-06-66655	21-25439	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8.13 (J-)	—	1.52 (U)	—	—	—	—	—
MD21-06-66656	21-25440	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.11 (J-)	—	1.58 (U)	—	—	—	—	—
MD21-06-66657	21-25441	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.29 (J-)	—	1.51 (U)	—	—	—	—	—
MD21-06-66658	21-25442	12.00–12.50	Qbt 3	—	—	3.18	—	—	—	—	—	—	—	—	—	51	—	—	—	—	2.11 (J-)	—	4.79	—	—	—	—	—
MD21-06-66659	21-25443	15.00–15.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.03	—	1.51 (U)	—	—	—	—	—
MD21-06-66660	21-25444	15.50–16.00	Qbt 3	—	—	3.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.71	0.000587 (J)	1.52 (U)	—	—	—	—	—
MD21-06-66661	21-25445	12.00–12.50	Qbt 3	—	—	4.69	—	—	—	19100	—	—	—	—	—	—	—	—	—	—	1.27	—	1.45 (U)	—	—	—	—	—
MD21-06-66662	21-25446	12.00–12.50	Qbt 3	—	—	2.89	—	—	—	—	—	—	—	—	—	16.2	—	—	—	—	1.71	—	1.47 (U)	—	—	—	—	—
MD21-06-66663	21-25447	12.00–12.50	Qbt 3	—	—	3.17	—	—	—	—	—	—	—	—	—	20.8	—	—	—	—	1.06	—	1.47 (U)	—	—	—	—	—
MD21-06-66664	21-25448	12.00–12.50	Qbt 3	—	—	3	60.8	—	—	—	—	—	—	—	—	—	—	—	—	—	9.46	—	1.47 (U)	—	—	—	—	—
MD21-06-66665	21-25449	12.00–12.50	Qbt 3	—	—	—	50.7	—	—	—	—	—	—	—	—	—	—	—	—	—	6.47	—	1.47 (U)	—	—	—	—	—
MD21-06-66666	21-25450	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.102	—	4.34	—	1.51 (U)	—	—	—	—	—
MD21-06-70162	21-26273	12.00–12.50	Qbt 3	—	—	—	103 (J+)	—	—	—	—	—	4.71	—	—	—	—	—	0.178	—	4.92	0.001 (J)	1.53 (U)	—	—	—	—	—
AAB6974	21-01972	0.00–0.50	Soil	—	—	—	—	—	0.41 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—	—
AAB6975	21-01973	0.00–0.50	Soil	—	—	—	—	—	0.59 (U)	—	—	—	—	—	—	23.8	—	—	—	—	—	—	—	2.1 (U)	—	—	—	—
MD21-05-59570	21-24525	3.00–5.00	Fill	—	—	—	364	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8.41 (U)	—	—	—	—	—
MD21-05-59571	21-24525	13.00–15.00	Fill	—	—	—	—	—	0.549 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	1.65 (U)	—	—	—	—	—
MD21-05-59572	21-24525	20.00–22.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—	—
MD21-05-59573	21-24525	37.00–39.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.56 (U)	—	—	—	—	—
MD21-05-59581	21-24526	3.00–5.00	Fill	—	—	—	—	—	0.588 (U)	—	—	9.57	—	—	—	—	—	—	—	—	0.364 (J)	—	—	—	—	—	—	—
MD21-05-59578	21-24526	9.00–11.00	Qbt 3	—	—	—	50.6	—	—	—	—	—	4.84	0.317 (J+)	—	—	—	1030	—	—	0.323 (J)	—	1.69 (U)	—	—	—	—	—
MD21-05-59579	21-24526	32.00–34.00	Qbt 3	8760 (J+)	—	3.16	—	1.25	—	—	—	—	—	—	—	—	—	—	—	—	0.707 (J)	—	1.69 (U)	—	—	—	—	—

Table B-2.1-3 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na[a]**	**na**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**46**	**1.21**	**0.4**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**6.35**
Qbt 1v				**8170**	**0.5**	**1.81**	**26.5**	**1.7**	**0.4**	**3700**	**2.24**	**1.78**	**3.26**	**0.5**	**9900**	**18.4**	**780**	**408**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.24**	**6.22**	**4.48**	**84.6**
Qbt 1g, Qct, Qbo Background Value				**3560**	**0.5**	**0.56**	**257**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**0.5**	**3700**	**13.5**	**739**	**189**	**0.1**	**2**	**na**	**na**	**0.3**	**1**	**1.22**	**0.72**	**4.59**	**40**
MD21-05-59580	21-24526	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.833 (J)	—	1.61 (U)	—	—	—	—	—
MD21-05-59591	21-24527	3.00–5.00	Fill	—	—	—	—	—	0.586 (U)	—	—	9.78	—	—	—	—	—	—	—	—	0.231 (J)	—	—	—	—	—	—	—
MD21-05-59592	21-24527	8.50–10.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.427 (J)	—	1.64 (U)	—	—	—	—	—
MD21-05-59593	21-24527	12.00–14.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.54 (J-)	—	1.6 (U)	—	—	—	—	—
MD21-05-59594	21-24527	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.56 (U)	—	—	—	—	—
MD21-05-59925	21-24551	3.00–4.00	Fill	—	—	—	—	—	0.588 (U)	—	20.6	—	—	—	—	—	5860	—	—	—	1.33	—	1.76 (U)	—	—	—	—	51.9
MD21-05-59926	21-24551	5.00–6.00	Fill	—	—	—	—	—	0.579 (U)	—	—	—	—	—	—	—	—	—	—	—	1.11 (J)	—	1.74 (U)	—	—	—	—	—
MD21-05-59928	21-24552	2.50–3.50	Fill	—	—	—	318 (J+)	—	0.549 (U)	7530	—	—	—	—	—	—	5270	—	—	—	1.48	0.00171 (J)	1.65 (U)	—	—	—	—	—
MD21-05-59929	21-24552	4.50–5.50	Fill	—	—	—	—	—	0.537 (U)	—	—	—	—	—	—	—	—	—	—	—	1.93	0.00424 (J-)	1.61 (U)	—	—	—	—	—
MD21-05-59931	21-24553	3.00–4.00	Fill	—	—	—	—	—	0.514 (U)	—	—	—	—	—	—	—	—	—	—	—	0.965 (J)	0.0021 (J-)	1.54 (U)	—	—	—	—	—
MD21-05-59932	21-24553	5.00–6.00	Fill	—	—	—	—	—	0.601 (U)	—	—	—	—	—	—	—	—	—	—	—	1.66	—	1.8 (U)	—	—	—	—	—
MD21-05-59937	21-24555	3.00–4.00	Fill	—	—	—	—	—	0.574 (U)	—	—	—	—	—	—	—	—	—	—	—	8.57	—	1.72 (U)	—	—	—	—	—
MD21-05-59938	21-24555	5.00–6.00	Fill	—	—	—	—	—	0.568 (U)	—	—	—	—	—	—	—	—	—	—	—	6.28	—	1.7 (U)	—	—	—	—	—
MD21-05-59940	21-24556	3.00–4.00	Fill	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	—	—	—	—	—	2.12	0.000806 (J-)	1.62 (U)	—	1.07 (U)	—	—	—
MD21-05-59941	21-24556	5.00–6.00	Fill	—	—	—	—	—	0.535 (U)	—	—	—	—	—	—	—	—	—	—	—	1.65	0.000842 (J-)	1.6 (U)	—	—	—	—	—

Source: Background values from LANL (1998, 059730, Table 6.0-1, p. 44).
Note: Units are mg/kg. Data qualifiers are defined in Appendix A.
[a] na = Not available.
[b] A dash indicates that if analyzed, the sample result is less than background value.

Table B-2.2-1
Frequency of Radionuclides Detected or Detected above Background/Fallout Values at SWMUs 21-018(a) and 21-018(b)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background/ Fallout Value (pCi/g)	Frequency of Detects above Background/ Fallout Value
SWMU 21-018(a)						
Americium-241	Soil	3	1	[0.00551]–0.02	0.013[a]	1/3
Americium-241	Fill	5	2	[0.00155]–0.046	0.013[a]	2/5
Americium-241	Qbt 2	5	0	[-0.0886–0.0000184]	na[b]	0/5
Americium-241	Qbt 3	125	30	[-0.4285]–1.66	na	30/125
Cesium-134	Soil	2	0	[0.0597–0.0663]	na	0/2
Cesium-134	Fill	1	0	[0.0635]	na	0/1
Cesium-134	Qbt 3	34	5	[0.0278]–0.23	na	5/34
Cesium-137	Soil	2	0	[-0.0438–-0.00275]	1.65[a]	0/2
Cesium-137	Fill	5	1	[-0.0226]–0.143	1.65[a]	1/5
Cesium-137	Qbt 2	5	0	[-0.0837–0.055]	na	0/5
Cesium-137	Qbt 3	87	1	[-0.0356–0.15]	na	1/87
Cobalt-60	Soil	2	0	[-0.0395–0.028]	na	0/2
Cobalt-60	Fill	5	0	[-0.032–0.0481]	na	0/5
Cobalt-60	Qbt 2	3	0	[0.00113–0.0124]	na	0/3
Cobalt-60	Qbt 3	77	0	[-0.0345–0.0563]	na	0/77
Europium-152	Soil	2	0	[-0.0373–-0.0151]	na	0/2
Europium-152	Fill	5	0	[-0.057–0.031]	na	0/5
Europium-152	Qbt 2	3	0	[-0.0815– -0.0249]	na	0/3
Europium-152	Qbt 3	77	0	[-0.415–0.104]	na	0/77
Plutonium-238	Soil	4	0	[-0.0051–0.00632]	0.023[a]	0/4
Plutonium-238	Fill	5	0	[-0.0232–0.0108]	0.023[a]	0/5
Plutonium-238	Qbt 2	5	0	[-0.00906–0.0108]	na	0/5
Plutonium-238	Qbt 3	159	28	[-0.0222]–1.03	na	28/159
Plutonium-239	Soil	4	3	[0.0017]–0.414	0.054[a]	3/4
Plutonium-239	Fill	5	2	[0.00444]–0.735	0.054[a]	2/5
Plutonium-239	Qbt 2	5	0	[0–0.00302]	na	0/5
Plutonium-239	Qbt 3	156	74	[-0.0252]–41.6	na	74/156
Ruthenium-106	Fill	5	0	[-0.173–0.154]	na	0/5
Ruthenium-106	Fill	5	0	[-0.173–0.154]	na	0/5
Ruthenium-106	Qbt 2	3	0	[-0.0807–0.127]	na	0/3
Ruthenium-106	Qbt 3	77	0	[-0.319–0.516]	na	0/77
Sodium-22	Soil	2	0	[0.00361–0.019]	na	0/2
Sodium-22	Fill	5	0	[-0.0382–0.0189]	na	0/5
Sodium-22	Qbt 2	3	0	[-0.0271– -0.00181]	na	0/3

Table B-2.2-1 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background/ Fallout Value (pCi/g)	Frequency of Detects above Background/ Fallout Value
Sodium-22	Qbt 3	76	0	[-0.0432–0.0472]	na	0/76
Strontium-90	Soil	4	0	[-0.0143–0.04]	1.31[a]	0/4
Strontium-90	Fill	5	0	[-0.0801–0.0118]	1.31[a]	0/5
Strontium-90	Qbt 2	5	0	[-0.0828–0.145]	na	0/5
Strontium-90	Qbt 3	160	9	[-0.25]–2	na	9/160
Thorium-228	Qbt 3	2	0	[2.214–4.157]	2.52	0/2
Tritium	Soil	4	2	[6.40E-03]–[5.09E-02]	na	2/4
Tritium	Fill	5	2	[0.023]–0.11	na	2/5
Tritium	Qbt 2	5	5	1.07–2.21	na	5/5
Tritium	Qbt 3	160	130	[-0.0014]–54.57	na	130/160
Uranium-234	Soil	3	3	0.971–1.13	2.59	0/3
Uranium-234	Fill	5	5	0.811–1.44	2.59	0/5
Uranium-234	Qbt 2	3	3	1.24–1.41	1.98	0/3
Uranium-234	Qbt 3	90	90	0.396–7.15	1.98	9/90
Uranium-235	Soil	4	2	[0.06]–[0.2095]	0.20	0/4
Uranium-235	Fill	5	5	0.0527–0.0807	0.20	0/5
Uranium-235	Qbt 2	3	3	0.0999–0.171	0.09	3/3
Uranium-235	Qbt 3	118	77	[0.0265]–0.64	0.09	36/118
Uranium-238	Soil	3	3	1–1.07	2.29	0/3
Uranium-238	Fill	5	5	0.792–1.5	2.29	0/5
Uranium-238	Qbt 2	3	3	1.28–1.49	1.93	0/3
Uranium-238	Qbt 3	90	90	0.413–3.42	1.93	5/90
SWMU 21-018(b)						
Americium-241	Soil	1	1	0.012	0.013	0/1
Americium-241	Fill	14	0	[-0.00146–0.0208]	0.013[a]	0/14
Americium-241	Qbo	1	0	[0.0067]	na	0/1
Americium-241	Qbt 1g	1	0	[0.159]	na	0/1
Americium-241	Qbt 2	5	0	[-0.0886–0.0000184]	na	0/5
Americium-241	Qbt 3	125	30	[-0.4285]–1.66	na	30/125
Americium-241	Qbt 3	8	0	[-0.00529–0.0191]	na	0/8
Americium-241	Qct	1	0	[0.00199]	na	0/1
Cesium-134	Fill	4	0	[0.00301–0.0612]	na	0/4
Cesium-134	Qbt 1g	1	0	[0.116]	na	0/1
Cesium-134	Qbt 3	34	5	[0.0278]–0.23	na	5/34
Cesium-137	Fill	14	0	[-0.0216–0.0372]	1.65[a]	0/14
Cesium-137	Qbo	1	0	[0.014]	na	0/1

Table B-2.2-1 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background/ Fallout Value (pCi/g)	Frequency of Detects above Background/ Fallout Value
Cesium-137	Qbt 1g	1	0	[0.0094]	na	0/1
Cesium-137	Qbt 2	5	0	[-0.0837–0.055]	na	0/5
Cesium-137	Qbt 3	87	1	[-0.0356–0.15]	na	1/87
Cesium-137	Qbt 3	8	0	[-0.0339–0.0124]	na	0/8
Cesium-137	Qct	1	0	[0.0147]	na	0/1
Cobalt-60	Fill	14	0	[-0.015–0.0403]	na	0/14
Cobalt-60	Qbo	1	0	[0.00248]	na	0/1
Cobalt-60	Qbt 1g	1	0	[0.0105]	na	0/1
Cobalt-60	Qbt 2	3	0	[0.00113–0.0124]	na	0/3
Cobalt-60	Qbt 3	77	0	[-0.0345–0.0563]	na	0/77
Cobalt-60	Qbt 3	8	1	[-0.00966]–0.111	na	1/8
Cobalt-60	Qct	1	0	[0.00826]	na	0/1
Europium-152	Fill	14	0	[-0.124–0.0597]	na	0/14
Europium-152	Qbo	1	0	[0.0294]	na	0/1
Europium-152	Qbt 2	3	0	[-0.0815– -0.0249]	na	0/3
Europium-152	Qbt 3	77	0	[-0.415–0.104]	na	0/77
Europium-152	Qbt 3	8	0	[-0.0492–0.0514]	na	0/8
Europium-152	Qct	1	0	[0.00554]	na	0/1
Plutonium-238	Soil	2	0	[0.0013–0.005]	0.023[a]	0/2
Plutonium-238	Fill	14	0	[-0.00721–0.00936]	0.023[a]	0/14
Plutonium-238	Qbo	1	0	[0.0173]	na	0/1
Plutonium-238	Qbt 1g	2	1	[0.0006]–0.231	na	1/2
Plutonium-238	Qbt 1v	1	0	[0.0022]	na	0/1
Plutonium-238	Qbt 2	5	0	[-0.00906–0.0108]	na	0/5
Plutonium-238	Qbt 3	159	28	[-0.0222]–1.03	na	28/159
Plutonium-238	Qbt 3	8	0	[-0.00887–0.0251]	na	0/8
Plutonium-238	Qct	1	0	[0.00297]	na	0/1
Plutonium-239	Soil	2	2	0.1279–0.275	0.054[a]	2/2
Plutonium-239	Fill	14	6	[-0.00204]–0.153	0.054[a]	6/14
Plutonium-239	Qbo	1	0	[0.00157]	na	0/1
Plutonium-239	Qbt 1g	2	2	0.0157–0.0317	na	2/2
Plutonium-239	Qbt 1v	1	0	[0.0008]	na	0/1
Plutonium-239	Qbt 2	5	0	[0–0.00302]	na	0/5
Plutonium-239	Qbt 3	156	74	[-0.0252]–41.6	na	74/156
Plutonium-239	Qbt 3	8	0	[-0.0102–0.0167]	na	0/8
Plutonium-239	Qct	1	0	[0]	na	0/1

Table B-2.2-1 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background/ Fallout Value (pCi/g)	Frequency of Detects above Background/ Fallout Value
Ruthenium-106	Fill	14	0	[-0.223–0.17]	na	0/14
Ruthenium-106	Qbo	1	0	[0.0464]	na	0/1
Ruthenium-106	Qbt 1g	1	0	[0.335]	na	0/1
Ruthenium-106	Qbt 2	3	0	[-0.0807–0.127]	na	0/3
Ruthenium-106	Qbt 3	77	0	[-0.319–0.516]	na	0/77
Ruthenium-106	Qbt 3	8	0	[-0.119–0.113]	na	0/8
Ruthenium-106	Qct	1	0	[0.0813]	na	0/1
Sodium-22	Soil	1	1	0.27	na	1/1
Sodium-22	Fill	14	0	[-0.0231–0.0314]	na	0/14
Sodium-22	Qbo	1	0	[0.00776]	na	0/1
Sodium-22	Qbt 1g	1	0	[0.0165]	na	0/1
Sodium-22	Qbt 2	3	0	[-0.0271– -0.00181]	na	0/3
Sodium-22	Qbt 3	76	0	[-0.0432–0.0472]	na	0/76
Sodium-22	Qbt 3	8	0	[-0.0358–0.0189]	na	0/8
Sodium-22	Qct	1	0	[0.0166]	na	0/1
Strontium-90	Soil	2	0	[0.03–0.12]	1.31[a]	0/2
Strontium-90	Fill	14	0	[-0.0487–0.16]	1.31[a]	0/14
Strontium-90	Qbo	1	0	[0.0614]	na	0/1
Strontium-90	Qbt 1g	2	0	[0.22–0.488]	na	0/2
Strontium-90	Qbt 1v	1	0	[0.06]	na	0/1
Strontium-90	Qbt 2	5	0	[-0.0828–0.145]	na	0/5
Strontium-90	Qbt 3	160	9	[-0.25]–2	na	9/160
Strontium-90	Qbt 3	8	0	[-0.198–0.185]	na	0/8
Strontium-90	Qct	1	0	[0.0924]	na	0/1
Thorium-228	Qbt 3	2	0	[2.214–4.157]	2.52	0/2
Tritium	Soil	2	1	[0.010]–4.34E-02	na	1/2
Tritium	Fill	14	9	[-0.011]–1.31	na	9/14
Tritium	Qbo	1	1	0.85	na	1/1
Tritium	Qbt 1g	2	2	6.74–9.13	na	2/2
Tritium	Qbt 1v	1	1	0.11	na	1/1
Tritium	Qbt 2	5	5	1.07–2.21	na	5/5
Tritium	Qbt 3	160	130	[-0.0014]–54.57	na	130/160
Tritium	Qbt 3	8	3	[0.00309]–0.198	na	3/8
Tritium	Qct	1	1	0.78	na	1/1
Uranium-234	Fill	14	14	0.766–2.9	2.59	1/14
Uranium-234	Qbo	1	1	2.25	4.00	0/1

Table B-2.2-1 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background/ Fallout Value (pCi/g)	Frequency of Detects above Background/ Fallout Value
Uranium-234	Qbt 2	3	3	1.24–1.41	1.98	0/3
Uranium-234	Qbt 3	90	90	0.396–7.15	1.98	9/90
Uranium-234	Qbt 3	8	8	0.86–1.19	1.98	0/8
Uranium-234	Qct	1	1	1.47	4.00	0/1
Uranium-235	Soil	1	0	[0.27]	0.20	0/1
Uranium-235	Fill	14	13	[0.0649]–0.218	0.20	1/14
Uranium-235	Qbo	1	1	0.224	0.18	1/1
Uranium-235	Qbt 1g	1	1	0.327	0.18	1/1
Uranium-235	Qbt 2	3	3	0.0999–0.171	0.09	3/3
Uranium-235	Qbt 3	118	77	[0.0265]–0.64	0.09	36/118
Uranium-235	Qbt 3	8	7	0.0846–0.178	0.09	6/8
Uranium-235	Qct	1	1	0.198	0.18	1/1
Uranium-238	Fill	14	14	0.708–2	2.29	0/14
Uranium-238	Qbo	1	1	2.45	3.90	0/1
Uranium-238	Qbt 2	3	3	1.28–1.49	1.93	0/3
Uranium-238	Qbt 3	90	90	0.413–3.42	1.93	5/90
Uranium-238	Qbt 3	8	8	0.84–1.25	1.93	0/8
Uranium-238	Qct	1	1	1.57	3.90	0/1

Source: Background/fallout values from LANL (1998, 059730, Table 6.0-2, p. 45).

Note: Values in brackets are below detection limits.

[a] FV applies to samples collected from 0–6 in. only, all activities detected below 6 in. are reported.

[b] na = Not available.

Table B-2.2-2
Summary of Radionuclides Detected or Detected above Background/Fallout Values at SWMUs 21-018(a) and 21-018(b)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
SWMU 21-018(a)															
AAB6976	21-01974	0.00–0.50	Soil	0.02	—[d]	—	—	—	0.414	—	—	—	—	—	—
AAA7567	21-02517	0.00–2.50	Soil	—	—	—	—	—	0.1803	—	—	4.98E-02	—	—	—
AAA7568	21-02517	2.5–5	Qbt 3	—	—	—	—	—	—	—	—	5.96E-02	—	—	—
AAA7569	21-02517	5–7.5	Qbt 3	—	—	—	—	—	—	—	—	3.69E-02	—	—	—
AAA7570	21-02517	7.5–10	Qbt 3	—	—	—	—	—	—	—	—	6.96E-02	—	—	—
AAA7571	21-02517	10–12.5	Qbt 3	—	—	—	—	—	—	—	—	0.13	—	—	—
AAA7572	21-02517	12.5–15	Qbt 3	—	—	—	—	—	—	—	—	0.24	—	—	—
AAA7573	21-02517	15–17.5	Qbt 3	—	—	—	—	—	0.0133	—	—	0.68	—	—	—
AAA7574	21-02517	20–25	Qbt 3	—	—	—	—	—	—	—	—	0.88	—	—	—
AAA7575	21-02517	25–30	Qbt 3	—	—	—	—	—	—	—	—	1.33	—	—	—
AAA7576	21-02517	30–35	Qbt 3	—	—	—	—	—	—	—	—	1.52	—	—	—
AAA7577	21-02517	35–40	Qbt 3	—	—	—	—	—	—	—	—	1.95	—	—	—
AAA7578	21-02517	40–45	Qbt 3	—	—	—	—	0.0155	—	—	—	1.64	—	—	—
AAA7579	21-02517	45–50	Qbt 3	—	—	—	—	—	—	—	—	1.96	—	—	—
AAA7580	21-02517	50–55	Qbt 3	—	—	—	—	—	—	—	—	2.18	—	—	—
AAA7581	21-02517	55–60	Qbt 3	—	—	—	—	—	—	—	—	1.95	—	—	—
AAA7582	21-02517	60–65	Qbt 3	—	—	—	—	—	—	—	—	1.77	—	—	—
AAA7583	21-02517	65–70	Qbt 3	—	—	—	—	—	—	—	—	1.49	—	—	—
AAA7584	21-02517	70–75	Qbt 3	—	—	—	—	—	—	—	—	1.36	—	—	—
AAA7589	21-02517	95–100	Qbt 2	—	—	—	—	—	—	—	—	1.75	—	—	—
AAA7594	21-02517	120–125	Qbt 2	—	—	—	—	—	—	—	—	2.04	—	—	—
AAB6660	21-02518	12.5–15	Qbt 3	—	—	—	—	—	0.071	—	—	7.45E-02	—	—	—
AAB6661	21-02518	15–20	Qbt 3	—	—	—	—	—	0.049	—	—	6.04E-02	—	—	—
AAB6662	21-02518	20–25	Qbt 3	—	—	—	—	—	0.021	—	—	6.33E-02	—	—	—
AAB6663	21-02518	25–30	Qbt 3	—	—	—	—	—	—	—	—	0.034	—	0.18	—
AAB6664	21-02518	30–35	Qbt 3	—	—	—	—	—	—	—	—	2.42E-02	—	—	—
AAB6665	21-02518	35–40	Qbt 3	—	—	—	—	—	0.014	—	—	2.58E-02	—	—	—
AAB6666	21-02518	40–45	Qbt 3	—	—	—	—	—	0.011	—	—	2.92E-02	—	—	—
AAB6667	21-02518	45–50	Qbt 3	—	—	—	—	—	0.012	—	—	2.63E-02	—	0.1 (J-)	—
AAB6668	21-02518	50–55	Qbt 3	—	—	—	—	—	—	—	—	3.36E-02	—	0.12 (J-)	—

Table B-2.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
AAB6669	21-02518	55–60	Qbt 3	—	—	—	—	—	—	—	—	3.50E-02	—	—	—
AAB6670	21-02518	60–65	Qbt 3	—	—	—	—	—	—	—	—	0.029	—	0.17 (J-)	—
AAB6671	21-02518	65–70	Qbt 3	—	—	—	—	—	—	—	—	3.08E-02	—	—	—
AAB6672	21-02518	70–75	Qbt 3	—	—	—	—	—	—	—	—	2.71E-02	—	—	—
AAB6678	21-02519	12.5–15	Qbt 3	0.476	0.21	0.21	—	0.103	25.503	—	—	0.14	—	0.42	—
AAB6679	21-02519	15–20	Qbt 3	—	—	—	—	—	0.354	—	—	0.37	—	0.37	—
AAB6680	21-02519	20–25	Qbt 3	—	0.2	0.2	—	—	0.186	—	—	0.38	—	0.44	—
AAB6681	21-02519	25–30	Qbt 3	—	—	—	—	—	0.061	—	—	0.24	—	—	—
AAB6682	21-02519	30–35	Qbt 3	—	—	—	—	—	0.055	—	—	0.2	—	—	—
AAB6683	21-02519	35–40	Qbt 3	—	—	—	—	—	0.03	—	—	0.25	—	0.4	—
AAB6684	21-02519	40–45	Qbt 3	—	—	—	—	—	0.148	—	—	0.27	—	0.64	—
AAB6685	21-02519	45–50	Qbt 3	—	—	—	—	—	0.04	—	—	0.21	—	0.38	—
AAB6686	21-02519	50–55	Qbt 3	—	—	—	—	—	0.028	—	—	0.26	—	—	—
AAB6687	21-02519	55–60	Qbt 3	—	—	—	—	—	—	—	—	0.26	—	0.4	—
AAB6688	21-02519	60–65	Qbt 3	—	—	—	—	—	—	—	—	0.34	—	—	—
AAB6689	21-02519	65–70	Qbt 3	—	0.19	0.19	—	—	0.009	—	—	0.45	—	—	—
AAB6690	21-02519	70–75	Qbt 3	—	—	—	—	—	0.01	—	—	0.33	—	0.44	—
AAB6696	21-02520	12.5–15	Qbt 3	0.512	—	—	—	0.085	16.11	—	—	54.57	—	0.51	—
AAB6697	21-02520	15–20	Qbt 3	0.025	0.17	0.17	—	0.007	1.06	—	—	28.91	—	—	—
AAB6698	21-02520	20–25	Qbt 3	0.008	—	—	—	—	0.101	—	—	11.37	—	—	—
AAB6699	21-02520	25–30	Qbt 3	0.008	—	—	—	—	0.189	—	—	11.78	—	—	—
AAB6700	21-02520	30–35	Qbt 3	—	—	—	—	—	—	—	—	16.93	—	—	—
AAB6701	21-02520	35–40	Qbt 3	—	0.23	0.23	—	—	—	—	—	15.18	—	—	—
AAB6702	21-02520	40–45	Qbt 3	—	—	—	—	—	—	—	—	13.934	—	—	—
AAB6703	21-02520	45–50	Qbt 3	—	—	—	—	—	0.0165	—	—	18.06	—	—	—
AAB6704	21-02520	50–55	Qbt 3	—	—	—	—	—	0.2607	—	0.16	19.27	—	—	—
AAB6705	21-02520	55–60	Qbt 3	—	—	—	—	0.0068	0.539	—	0.14	9.83	—	—	—
AAB6706	21-02520	60–65	Qbt 3	—	—	—	—	0.0273	0.4067	—	0.2	2.07	—	—	—
AAB6707	21-02520	65–70	Qbt 3	—	—	—	—	0.0124	0.4127	—	1.34	1.44	—	—	—
AAB6708	21-02520	70–75	Qbt 3	—	—	—	—	0.0467	0.2049	—	—	1.23	—	—	—
AAB6714	21-02521	12.5–15	Qbt 3	0.7253	—	—	—	0.0659	13.41	—	—	0.23	—	—	—
AAB6715	21-02521	15–20	Qbt 3	—	—	—	—	0.0151	2.264	—	—	0.26	—	—	—

Table B-2.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
AAB6716	21-02521	20–25	Qbt 3	—	—	—	—	—	0.1386	—	—	0.28	—	—	—
AAB6717	21-02521	25–30	Qbt 3	—	—	—	—	—	0.0848	—	—	0.5	—	—	—
AAB6718	21-02521	30–35	Qbt 3	—	—	—	—	—	0.3682	—	—	1.03	—	—	—
AAB6719	21-02521	35–40	Qbt 3	—	—	—	—	—	0.249	—	—	0.85	—	—	—
AAB6720	21-02521	40–45	Qbt 3	—	—	—	—	—	0.0168	—	—	0.4	—	—	—
AAB6721	21-02521	45–50	Qbt 3	—	—	—	—	—	0.605	—	—	0.48	—	—	—
AAB6722	21-02521	50–55	Qbt 3	0.38	—	—	—	0.0416	4.276	—	—	0.47	—	—	—
AAB6723	21-02521	55–60	Qbt 3	—	—	—	—	—	0.2328	—	—	0.48	—	—	—
AAB6724	21-02521	60–65	Qbt 3	—	—	—	—	—	0.1943	—	—	0.34	—	—	—
AAB6725	21-02521	65–70	Qbt 3	—	—	—	—	—	0.2115	—	0.46	0.37	—	—	—
AAB6726	21-02521	70–75	Qbt 3	—	—	—	—	—	0.1371	—	—	0.24	—	—	—
AAC0094	21-02522	12.5–15	Qbt 3	—	—	—	—	—	0.0324 (J-)	—	—	0.24	—	—	—
AAC0095	21-02522	15–20	Qbt 3	—	—	—	—	0.016 (J-)	0.0777 (J-)	—	—	0.41	—	—	—
AAC0096	21-02522	20–25	Qbt 3	—	—	—	—	—	0.0222 (J-)	—	0.58	0.29	—	—	—
AAC0097	21-02522	25–30	Qbt 3	—	—	—	—	—	—	—	—	0.16	—	—	—
AAC0098	21-02522	30–35	Qbt 3	—	—	—	—	0.084 (J-)	—	—	0.38 (J+)	0.23	—	—	—
AAC0099	21-02522	35–40	Qbt 3	—	—	—	—	—	—	—	—	0.16	—	—	—
AAC0100	21-02522	40–45	Qbt 3	—	—	—	—	—	—	—	—	9.43E-02	—	—	—
AAC0101	21-02522	45–50	Qbt 3	—	—	—	—	0.0305	—	—	—	6.53E-02	—	—	—
AAC0102	21-02522	50–55	Qbt 3	—	—	—	—	—	0.0348	—	—	0.098	—	—	—
AAC0103	21-02522	55–60	Qbt 3	—	—	—	—	—	—	—	—	0.069	—	—	—
AAC0104	21-02522	60–65	Qbt 3	—	—	—	—	—	—	—	—	8.01E-02	—	—	—
AAC0105	21-02522	65–70	Qbt 3	—	—	—	—	—	0.0348	—	—	0.11	—	—	—
AAC0106	21-02522	70–75	Qbt 3	—	—	—	—	—	—	—	—	0.12	—	—	—
AAB7043	21-02523	70–75	Qbt 3	—	—	—	—	—	—	—	2	0.37	—	—	—
AAB7063	21-02523	170.00–175.00	Qbt 1v	—	—	—	—	—	—	—	—	0.11	—	—	—
AAB7078	21-02523	245.00–250.00	Qbt 1g	—	—	—	—	—	0.0317	—	—	9.13	—	—	—
AAC0555	21-02523	225.20–227.50	Qbt 1g	—	—	—	—	0.231	0.0157	—	—	6.74	—	0.327	—
MD21-05-59560	21-24524	8–10	Qbt 3	—	—	—	—	—	0.144	—	—	13.3	—	—	—
MD21-05-59561	21-24524	11–13	Qbt 3	—	—	—	—	—	—	—	—	13.5	—	—	—
MD21-05-59562	21-24524	23–25	Qbt 3	—	—	—	—	—	—	—	—	12	—	—	—
MD21-05-59563	21-24524	33–35	Qbt 3	—	—	—	—	—	—	—	—	15.8	—	—	—

Table B-2.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
MD21-05-59564	21-24524	43–45	Qbt 3	—	—	—	—	—	—	—	—	12.7	—	0.091	—
MD21-05-59565	21-24524	93–95	Qbt 2	—	—	—	—	—	—	—	—	1.07	—	0.0999	—
MD21-05-59566	21-24524	98–100	Qbt 2	—	—	—	—	—	—	—	—	1.23	—	0.149	—
MD21-05-59567	21-24524	168–170	Qbt 2	—	—	—	—	—	—	—	—	2.21	—	0.171	—
MD21-05-60609	21-24524	339.50–340.00	Qct	—	—	—	—	—	—	—	—	0.78	—	0.198	—
MD21-05-60610	21-24524	378.00–380.00	Qbo	—	—	—	—	—	—	—	—	0.85	—	0.224	—
MD21-05-59655	21-24531	3–5	Qbt 3	—	—	—	—	—	—	—	—	0.11	—	—	—
MD21-05-59656	21-24531	12–14	Qbt 3	—	—	—	—	—	—	—	—	1.22	—	—	—
MD21-05-59657	21-24531	62–64	Qbt 3	—	—	—	—	—	—	—	—	0.062	—	—	—
MD21-05-59658	21-24531	78–80	Qbt 3	—	—	—	—	—	—	—	—	0.11	—	0.127	—
MD21-05-59666	21-24532	31.5–33.5	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.105	—
MD21-05-59667	21-24532	38–40	Qbt 3	—	—	—	—	—	—	—	—	0.028	—	—	—
MD21-05-59673	21-24533	10–12	Qbt 3	—	—	—	—	—	—	—	—	0.067	—	—	—
MD21-05-59674	21-24533	28–30	Qbt 3	—	—	—	—	—	0.0652	—	—	0.25	—	—	—
MD21-05-59675	21-24533	30–32	Qbt 3	—	—	—	—	—	—	—	—	0.31	—	—	—
MD21-05-59676	21-24533	58–60	Qbt 3	—	—	—	—	—	—	—	—	0.32	—	—	—
MD21-05-59677	21-24533	83–85	Qbt 3	—	—	—	—	—	—	—	—	0.38	—	0.12	—
MD21-05-59682	21-24534	3–5	Qbt 3	—	—	—	—	—	—	—	—	0.056	—	—	—
MD21-05-59685	21-24534	38–40	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.121	—
MD21-05-59691	21-24535	8–10	Qbt 3	—	—	—	—	—	—	—	—	0.02	—	—	—
MD21-05-59692	21-24535	13–15	Qbt 3	—	—	—	—	—	—	—	—	0.0088	—	0.117	—
MD21-05-59693	21-24535	20–22	Qbt 3	—	—	—	—	—	—	—	—	0.058	—	—	—
MD21-05-59694	21-24535	30–32	Qbt 3	—	—	—	—	—	—	—	—	0.37	—	—	—
MD21-05-59695	21-24535	78–80	Qbt 3	—	—	—	—	—	—	—	—	0.82	—	0.094	—
MD21-05-59751	21-24538	15–17	Qbt 3	—	—	—	—	—	0.0902	—	—	0.013	—	—	—
MD21-05-59753	21-24538	37–39	Qbt 3	—	—	—	—	—	—	—	—	0.012	—	0.104	—
MD21-05-59755	21-24538	53–55	Qbt 3	—	—	—	—	—	—	—	—	0.062	—	—	—
MD21-05-59761	21-24539	40–42	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.175 (J-)	—
MD21-05-59771	21-24540	38–40	Qbt 3	1.66	—	—	—	1.03	0.584	—	—	—	—	—	—
MD21-05-59778	21-24541	28–30	Qbt 3	—	—	—	—	—	—	—	—	0.056	—	0.106	—
MD21-05-59779	21-24541	31–33	Qbt 3	—	—	—	—	—	—	—	—	0.011	—	—	—
MD21-05-59782	21-24541	78–80	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.108	—

Table B-2.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
MD21-05-59789	21-24542	38–40	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.0991	—
MD21-05-59934	21-24554	2.00–3.00	Fill	0.046	—	0.143	—	0.735	—	—	—	0.11	—	—	—
MD21-05-59935	21-24554	4.00–5.00	Fill	0.029	—	—	—	0.238	—	—	—	4.52E-02	—	—	—
MD21-05-59984	21-24569	2.00–2.50	Soil	—	—	—	—	0.0526	—	—	—	1.40E-02	—	—	—
MD21-06-70163	21-24585	12–12.5	Qbt 3	0.276	—	—	—	—	0.489	—	—	0.19	—	—	—
MD21-06-70164	21-24593	12–12.5	Qbt 3	—	—	—	—	—	0.661	—	—	0.59	—	—	—
MD21-06-70165	21-24595	12–12.5	Qbt 3	1.39 (J-)	—	—	—	0.148	41.6	—	—	0.3	3.83	0.24	2.65
MD21-06-66647	21-25431	12–12.5	Qbt 3	0.257	—	—	—	0.0461	11.6	—	—	2.95E-02	—	—	—
MD21-06-66648	21-25432	12–12.5	Qbt 3	0.181	—	—	—	0.0445	9.45	—	—	0.28	—	—	—
MD21-06-66649	21-25433	12–12.5	Qbt 3	0.0575	—	—	—	—	3.31	—	—	3.8	—	—	—
MD21-06-66650	21-25434	12–12.5	Qbt 3	0.188	—	—	—	—	12.3 (J-)	—	—	2.71	2.05 (J-)	0.184 (J-)	—
MD21-06-66651	21-25435	12–12.5	Qbt 3	0.157	—	—	—	—	5.62	—	—	0.88	3.84	0.141	2.42
MD21-06-66652	21-25436	12–12.5	Qbt 3	0.203	—	—	—	—	12.7	—	—	9.17E-02	—	—	—
MD21-06-66653	21-25437	12–12.5	Qbt 3	0.0644 (J-)	—	—	—	—	1.25	—	—	0.41	—	—	—
MD21-06-66654	21-25438	12–12.5	Qbt 3	0.12	—	—	—	—	2.95	—	—	0.14	—	—	—
MD21-06-66655	21-25439	12–12.5	Qbt 3	0.703 (J-)	—	—	—	0.0937	11.2	—	—	26.47	4.07	0.311	2.49
MD21-06-66656	21-25440	12–12.5	Qbt 3	0.116	—	—	—	0.0351	3.17	—	—	2.44	—	—	—
MD21-06-66657	21-25441	12–12.5	Qbt 3	0.306	—	—	—	0.0586	6.1	—	—	14.37	7.15	0.416	3.42
MD21-06-66658	21-25442	12–12.5	Qbt 3	0.0345	—	—	—	—	1.5	—	—	0.016	—	—	—
MD21-06-66659	21-25443	15–15.5	Qbt 3	0.523	—	—	—	0.1	19.6	—	—	0.46	2.53	0.151	—
MD21-06-66660	21-25444	15.5–16	Qbt 3	0.177	—	—	—	0.0337	8.29	—	—	0.16	—	0.0926	—
MD21-06-66661	21-25445	12–12.5	Qbt 3	—	—	—	—	—	2.99	—	—	0.11	—	—	—
MD21-06-66662	21-25446	12–12.5	Qbt 3	0.194	—	—	—	—	5.11	—	—	—	—	—	—
MD21-06-66663	21-25447	12–12.5	Qbt 3	0.359	—	—	—	0.0518	10.8	—	—	—	2.2	0.113	—
MD21-06-66664	21-25448	12–12.5	Qbt 3	0.623	—	—	—	0.0983	18.5	—	—	—	3.06	0.149	—
MD21-06-66665	21-25449	12–12.5	Qbt 3	0.308	—	—	—	0.0445	6.43	—	—	6.76E-02	—	—	—
MD21-06-66666	21-25450	12–12.5	Qbt 3	1.2	—	—	—	0.124	23.3	—	0.164	0.11	5.74	0.258	2.93
MD21-06-70162	21-26273	12–12.5	Qbt 3	0.332	—	—	—	0.0387	10.7	—	—	0.11	—	0.132	—
SWMU 21-018(b)															
AAB6974	21-01972	0.00–0.50	Soil	—	—	—	—	—	0.1279	—	—	—	—	—	—
AAB6975	21-01973	0.00–0.50	Soil	—	—	—	—	—	0.275	0.27	—	4.34E-02	—	—	—
MD21-05-59572	21-24525	20–22	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.1	—

Table B-2.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Sodium-22	Strontium-90	Tritium[a]	Uranium-234	Uranium-235	Uranium-238
Soil Background/Fallout Value				**0.013**[b]	**na**	**1.65**[b]	**na**	**0.023**[b]	**0.054**[b]	**na**	**1.31**[b]	**na**	**2.59**	**0.2**	**2.29**
Qbt 2,3,4 Background Value				**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
Qbt 1v Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3.12**	**0.14**	**3.05**
Qbt 1g, Qct, Qbo Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**4**	**0.18**	**3.9**
MD21-05-59578	21-24526	9–11	Qbt 3	—	—	—	0.111	—	—	—	—	—	—	0.164	—
MD21-05-59579	21-24526	32–34	Qbt 3	—	—	—	—	—	—	—	—	0.188	—	0.099	—
MD21-05-59580	21-24526	38–40	Qbt 3	—	—	—	—	—	—	—	—	0.198	—	0.128	—
MD21-05-59592	21-24527	8.5–10	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.178 (J-)	—
MD21-05-59593	21-24527	12–14	Qbt 3	—	—	—	—	—	—	—	—	0.0317	—	—	—
MD21-05-59594	21-24527	38–40	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.118	—
MD21-05-59925	21-24551	3.00–4.00	Fill	—	—	—	—	—	0.0189	—	—	1.31	2.9	0.218	—
MD21-05-59926	21-24551	5.00–6.00	Fill	—	—	—	—	—	0.0382	—	—	0.93	—	—	—
MD21-05-59928	21-24552	2.50–3.50	Fill	—	—	—	—	—	—	—	—	8.53E-02	—	—	—
MD21-05-59929	21-24552	4.50–5.50	Fill	—	—	—	—	—	—	—	—	0.11	—	—	—
MD21-05-59931	21-24553	3.00–4.00	Fill	—	—	—	—	—	0.116	—	—	3.07E-02	—	—	—
MD21-05-59937	21-24555	3.00–4.00	Fill	—	—	—	—	—	0.153	—	—	9.33E-02	—	—	—
MD21-05-59938	21-24555	5.00–6.00	Fill	—	—	—	—	—	—	—	—	7.91E-02	—	—	—
MD21-05-59940	21-24556	3.00–4.00	Fill	—	—	—	—	—	0.153	—	—	2.99E-02	—	—	—
MD21-05-59941	21-24556	5.00–6.00	Fill	—	—	—	—	—	0.0384	—	—	2.98E-02	—	—	—

Source: Background/fallout values from LANL 1998 (59730, Table 6.0-2, p. 45).

Note: Units are pCi/g.

[a] The analytical data for tritium were compared to background/fallout value based on the soil moisture content of the given sample. All results are presented in pCi/g for consistency.

[b] Value applies to samples collected from 0–6 in. only; all activities detected below 6 in. are reported.

[c] na = Not available.

[d] A dash indicates that if analyzed, the sample result is less than background/fallout value or is not detected.

Table B-2.3-1
Frequency of Organic Chemicals Detected at SWMUs 21-018(a) and 21-018(b)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
SWMU 21-018(a)					
Acetone	Qbt 3	69	3	[0.02]–0.034	3/69
Benzo(a)anthracene	Qbt 3	159	1	[0.001]–[0.53]	1/159
Benzo(a)pyrene	Qbt 3	159	1	[0.001]–[0.53]	1/159
Benzo(b)fluoranthene	Qbt 3	159	1	[0.001]–[0.53]	1/159
Benzo(g,h,I)perylene	Qbt 3	159	1	[0.001]–[0.53]	1/159
Bis(2-ethylhexyl)phthalate	Qbo	1	1	0.0889	1/1
Bis(2-ethylhexyl)phthalate	Qbt 3	159	4	[0.01]–[1.75]	4/159
Bis(2-ethylhexyl)phthalate	Qct	1	1	0.0949	1/1
Butylbenzylphthalate	Qbt 3	159	2	[0.01]–[3.51]	2/159
Carbon Disulfide	Qbt 3	69	1	0.004–[0.007]	1/69
Chloromethane	Qbt 3	69	1	0.003–[0.013]	1/69
Chrysene	Qbt 3	159	1	[0.001]–[0.53]	1/159
Diethylphthalate	Qbt 3	159	2	[0.01]–12	2/159
Di-n-butylphthalate	Qbt 3	159	1	[0.01]–[3.51]	1/159
Di-n-octylphthalate	Qbt 3	159	5	[0.01]–[3.51]	5/159
Fluoranthene	Qbt 3	159	4	[0.001]–[0.53]	4/159
Indeno(1,2,3-cd)pyrene	Qbt 3	159	1	[0.001]–[0.53]	1/159
Phenanthrene	Qbt 3	159	2	[0.001]–[0.53]	2/159
Pyrene	Qbt 3	159	4	[0.001]–[0.53]	4/159
Pyrene	Soil	4	1	0.0119–[0.36]	1/4
Styrene	Qbt 3	69	1	[0.005]–0.008	1/69
SWMU 21-018(b)					
Acenaphthene	Fill	14	1	0.0325–[0.0409]	1/14
Acenaphthylene	Fill	14	1	0.0334–[0.0409]	1/14
Anthracene	Fill	14	1	[0.0348]–0.0425	1/14
Benzo(a)anthracene	Fill	14	1	[0.013]–[0.0949]	1/14
Benzo(a)pyrene	Fill	14	1	[0.0348]–0.185	1/14
Benzo(b)fluoranthene	Fill	14	1	[0.0348]–0.171	1/14
Benzo(g,h,I)perylene	Fill	14	1	[0.0348]–0.107	1/14
Benzoic Acid	Fill	14	1	0.531–[0.818]	1/14
Bromophenyl-phenylether[4-]	Fill	14	1	0.0365–[0.409]	1/14
Chloro-3-methylphenol[4-]	Fill	14	1	0.0708–[0.409]	1/14
Chloronaphthalene[2-]	Fill	14	1	0.033–[0.0409]	1/14
Chrysene	Fill	14	1	[0.0348]–0.099	1/14
Fluoranthene	Fill	14	3	0.0126–0.123	3/14
Fluorene	Fill	14	1	0.033–[0.0409]	1/14

Table B-2.3-1 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
Indeno(1,2,3-cd)pyrene	Fill	14	1	[0.0348]–0.201	1/14
Methylnaphthalene[2-]	Fill	14	1	[0.0348]–[0.0409]	1/14
Naphthalene	Fill	14	1	[0.0348]–[0.0409]	1/14
Nitroaniline[3-]	Fill	14	1	0.239–[0.409]	1/14
Phenanthrene	Fill	14	1	[0.0348]–0.0816	1/14
Pyrene	Fill	14	2	0.013–0.16	2/14
Pyrene	Soil	2	1	0.084–[0.36]	1/2

Note: Values in brackets are below detection limits.

Table B-2.3-2
Summary of Organic Chemicals Detected at SWMUs 21-018(a) and 21-018(b)

Sample ID	Location ID	Depth (ft bgs)	Media	Acenaphthene	Acenaphthylene	Acetone	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Bromophenyl-phenylether[4-]	Butylbenzylphthalate	Carbon Disulfide	Chloro-3-methylphenol[4-]	Chloromethane	Chloronaphthalene[2-]	Chrysene	Diethylphthalate	Di-n-butylphthalate	Di-n-octylphthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Methylnaphthalene[2-]	Naphthalene	Nitroaniline[3-]	Phenanthrene	Pyrene	Styrene
SWMU 21-018(a)																																
AAB6663	21-02518	25.00–30.00	Qbt 3	—	—	—*	—	—	—	—	—	—	—	—	—	—	—	0.003 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6666	21-02518	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.31 (J)	—	—	—	—	—	—	—	—	—
AAB6667	21-02518	45.00–50.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	0.004 (J)	—	—	—	—	—	—	0.18 (J)	—	—	—	—	—	—	—	—	—
AAB6669	21-02518	55.00–60.00	Qbt 3	—	—	0.028	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6671	21-02518	65.00–70.00	Qbt 3	—	—	0.026	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.12 (J)	—	—	—	—	—	—	—	—	—
AAB6672	21-02518	70.00–75.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12 (J)	—	0.24 (J)	—	—	—	—	—	—	—	—	—
AAB6680	21-02519	20.00–25.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	0.18 (J)	—	—	—	—	—	6.8	—	—	—	—	—	—	—	—	—	—	0.008
AAB6682	21-02519	30.00–35.00	Qbt 3	—	—	0.034 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6697	21-02520	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	0.16 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6714	21-02521	12.50–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	0.32 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6715	21-02521	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	—	—	0.3 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB6720	21-02521	40.00–45.00	Qbt 3	—	—	—	—	—	—	—	—	—	0.22 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MD21-05-59560	21-24524	8.00–10.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0305 (J)	—	—	—	—	—	0.0154 (J)	—	—
MD21-05-60609	21-24524	339.50–340.00	Qct	—	—	—	—	—	—	—	—	—	0.0949 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60610	21-24524	378.00–380.00	Qbo	—	—	—	—	—	—	—	—	—	0.0889 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MD21-05-59684	21-24534	13.00–15.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0174 (J)	—
MD21-05-59691	21-24535	8.00–10.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0257 (J)	—	—	—	—	—	0.0163 (J)	0.022 (J)	—
MD21-05-59771	21-24540	38.00–40.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.298 (J)	—	—	—	—	—	—	—	—	—
MD21-05-59779	21-24541	31.00–33.00	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0147 (J)	—	—	—	—	—	—	0.0257 (J)	—
MD21-05-59984	21-24569	2.00–2.50	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0119 (J)	—
MD21-06-66659	21-25443	15.00–15.50	Qbt 3	—	—	—	—	—	—	—	—	—	0.11 (J)	—	—	—	—	—	—	—	—	0.054 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-06-66664	21-25448	12.00–12.50	Qbt 3	—	—	—	—	0.0228 (J)	0.0871	0.074	—	—	—	—	—	—	—	—	—	0.0326 (J)	—	—	—	0.0274 (J)	—	0.085	—	—	—	—	0.0203 (J)	—
MD21-06-70162	21-26273	12.00–12.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	0.734 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
SWMU 21-018(b)																																
AAB6974	21-01972	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.084 (J)	—
MD21-05-59925	21-24551	3.00–4.00	Fill	—	—	—	—	0.0137 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0126 (J)	—	—	—	—	—	—	0.013 (J)	—
MD21-05-59926	21-24551	5.00–6.00	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.013 (J)	—	—	—	—	—	—	—	—
MD21-05-59940	21-24556	3.00–4.00	Fill	0.0325 (J)	0.0334 (J)	—	0.043	—	0.185 (J)	0.171 (J)	0.107 (J)	0.531 (J)	—	0.0365 (J)	—	—	0.0708 (J)	—	0.033 (J)	0.099	—	—	—	0.123	0.033 (J)	0.201 (J)	0.038	0.04	0.239 (J)	0.0816	0.16	—

Note: Units are mg/kg. Data qualifiers are defined in Appendix A.
*A dash indicates that if analyzed, sample result is not detected.

Table B-2.4-1
Frequency of Organic Chemicals Detected in Pore Gas at Consolidated Unit 21-018(a)-99

Analyte	Number of Analyses	Number of Detects	Number of Detected Locations	Concentration Range	Location of Min Detected	Location of Max Detected	Minimum Detect	Mean of Detects	Maximum Detect
Ethylbenzene	59	9	7	[0.87]–21	21-24538 (84 ft)	21-24541 (79 ft)	1.3	5.12	21
Styrene	59	39	15	[0.85]–170	21-24541 (79 ft)	21-24527 (4.5 ft)	0.97	44.0	170
Dichloroethane[1,2-]	59	2	2	[0.81]–4.2	21-24541 (79 ft)	21-24535 (79 ft)	0.93	2.57	4.2
Vinyl acetate	10	1	1	[1.8]–4.2	21-24533 (84 ft)	21-24526 (4 ft)	4.2	4.2	4.2
Methyl-2-pentanone[4-]	59	4	4	[1.6]–5.9	21-24541 (79 ft)	21-24524 (379 ft)	2	3.95	5.9
Trimethylbenzene[1,3,5-]	59	2	2	1–30	21-24527 (4.5 ft)	21-24541 (79 ft)	1	15.5	30
Toluene	59	56	15	1.9–50	21-24532 (14 ft)	21-24524 (330 ft)	1.9	15.16	50
Tetrahydrofuran	55	3	3	[1.5]–[23]	21-24533 (84 ft)	21-24532 (14 ft)	5.9	9.13	12
Hexane	55	11	9	1.6–74	21-24525 (4 ft)	21-24524 (379 ft)	1.6	14.04	74
Propylene	49	8	8	[6]–310	21-24541 (19 ft)	21-24539 (79 ft)	8.3	77.54	310
Dioxane[1,4-]	49	1	1	[13]–25	21-24542 (14 ft)	21-24531 (14 ft)	25	25	25
Tetrachloroethene	59	24	12	1.4–20	21-24525 (4 ft)	21-24535 (79 ft)	1.4	8.120	20
Xylene (Total)	5	4	4	[2.2]–110	21-24538 (84 ft)	21-24541 (79 ft)	3.5	32.85	110
n-Heptane	49	5	5	[3.6]–36	21-24531 (51 ft)	21-24524 (379 ft)	6.4	14.62	36
Carbon Tetrachloride	59	21	12	1.6–21	21-24532 (14 ft)	21-24539 (79 ft)	1.6	7.9	21
Ethyltoluene[4-]	59	6	5	1.2–55	21-24525 (4 ft)	21-24541 (79 ft)	1.2	11.82	55
Ethanol	49	7	5	[6.6]–470	21-24541 (19 ft)	21-24525 (4 ft)	9.7	81.1	470
Methanol	49	2	2	[110]–340	21-24541 (19 ft)	21-24525 (4 ft)	120	230	340
Propanol[2-]	49	3	3	[8.6]–62	21-24541 (19 ft)	21-24525 (4 ft)	11	32.33	62
Acetone	59	58	15	[1.2]–680	21-24533 (84 ft)	21-24524 (379 ft)	12	91.10	680
Chloroform	59	29	12	[2.4]–120	21-24533 (84 ft)	21-24525 (39 ft)	2.7	24.05	120
Butanol[1-]	49	3	3	[11]–720	21-24542 (14 ft)	21-24525 (4 ft)	22	257.33	720
Benzene	59	9	8	0.73–[25]	21-24532 (14 ft)	21-24539 (79 ft)	0.73	3.96	14
Trichloroethane[1,1,1-]	59	43	15	[2.7]–170	21-24532 (14 ft)	21-24535 (79 ft)	5	17.55	170

Table B-2.4-1 (continued)

Analyte	Number of Analyses	Number of Detects	Number of Detected Locations	Concentration Range	Location of Min Detected	Location of Max Detected	Minimum Detect	Mean of Detects	Maximum Detect
Chloromethane	59	9	8	0.88–[8.5]	21-24541 (79 ft)	21-24524 (379 ft)	0.88	1.71	3.3
Vinyl Chloride	59	1	1	[0.51]–3.9	21-24541 (79 ft)	21-24542 (14 ft)	3.9	3.9	3.9
Methylene Chloride	59	2	2	[0.69]–11	21-24541 (79 ft)	21-24540 (11 ft)	0.82	5.91	11
Carbon Disulfide	59	12	9	[1.6]–27	21-24533 (84 ft)	21-24531 (14 ft)	2.9	7.81	27
Bromodichloromethane	59	1	1	[1.3]–[6.9]	21-24541 (79 ft)	21-24524 (379 ft)	1.7	1.7	1.7
Dichloroethane[1,1-]	59	2	2	[0.81]–[4.2]	21-24541 (79 ft)	21-24524 (379 ft)	1.9	2.95	4
Trichlorofluoromethane	59	7	6	1.7–[5.8]	21-24527 (39 ft)	21-24524 (379 ft)	1.7	2.3	2.9
Dichlorodifluoromethane	59	9	8	2.2–[5.1]	21-24527 (39 ft)	21-24524 (379 ft)	2.2	3.07	3.7
Trichloro-1,2,2-trifluoroethane[1,1,2-]	59	4	4	1.6–[7.9]	21-24527 (4.5 ft)	21-24524 (379 ft)	1.6	2.1	3.4
Dichloropropane[1,2-]	59	1	1	[0.92]–5.2	21-24541 (79 ft)	21-24535 (79 ft)	5.2	5.2	5.2
Butanone[2-]	59	44	15	[1.5]–120	21-24533 (84 ft)	21-24524 (379 ft)	2.8	12.88	120
Trichloroethene	59	56	15	1.1–260	21-24526 (4 ft)	21-24539 (79 ft)	1.1	36.06	260
Xylene[1,2-]	59	9	7	[0.87]–31	21-24538 (84 ft)	21-24541 (79 ft)	0.98	6.41	31
Trimethylbenzene[1,2,4-]	59	8	6	0.84–95	21-24527 (39 ft)	21-24541 (79 ft)	0.84	14.79	95
Xylene[1,3-]+Xylene[1,4-]	54	35	15	1.3–17	21-24532 (14 ft)	21-24525 (4 ft)	1.3	6.78	17

Notes: Values in brackets are below detection limits. Units are $\mu g/m^3$.

Table B-2.4-2
Summary of Organic Chemicals Detected in Pore Gas at Consolidated Unit 21-018(a)-99

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Acetone	21-24524	MD21-05-61752	16 (J)	14–15
Styrene	21-24524	MD21-05-61752	32	14–15
Toluene	21-24524	MD21-05-61752	7	14–15
Trichloroethene	21-24524	MD21-05-61752	9.5	14–15
Acetone	21-24524	MD21-05-61753	12	330–335
Styrene	21-24524	MD21-05-61753	6.8	330–335
Toluene	21-24524	MD21-05-61753	50	330–335
Trichloroethane[1,1,1-]	21-24524	MD21-05-61753	17	330–335
Trichloroethene	21-24524	MD21-05-61753	20	330–335
Xylene[1,3-]+Xylene[1,4-]	21-24524	MD21-05-61753	5.4	330–335
Acetone	21-24524	MD21-06-71201	680	379–380
Butanol[1-]	21-24524	MD21-06-71201	30	379–380
Butanone[2-]	21-24524	MD21-06-71201	120	379–380
Carbon Disulfide	21-24524	MD21-06-71201	21	379–380
Ethanol	21-24524	MD21-06-71201	14	379–380
Ethylbenzene	21-24524	MD21-06-71201	7.1	379–380
Ethyltoluene[4-]	21-24524	MD21-06-71201	5.5	379–380
Hexane	21-24524	MD21-06-71201	74	379–380
Methyl-2-pentanone[4-]	21-24524	MD21-06-71201	5.9	379–380
n-Heptane	21-24524	MD21-06-71201	36	379–380
Toluene	21-24524	MD21-06-71201	37	379–380
Trichloroethane[1,1,1-]	21-24524	MD21-06-71201	16	379–380
Trichloroethene	21-24524	MD21-06-71201	25	379–380
Xylene[1,2-]	21-24524	MD21-06-71201	4.4 (J)	379–380
Xylene[1,3-]+Xylene[1,4-]	21-24524	MD21-06-71201	9.5	379–380
Acetone	21-24525	MD21-05-61755	100	4–5
Butanol[1-]	21-24525	MD21-05-61755	720	4–5
Butanone[2-]	21-24525	MD21-05-61755	26	4–5
Carbon Disulfide	21-24525	MD21-05-61755	3.3	4–5
Chloroform	21-24525	MD21-05-61755	36	4–5
Ethanol	21-24525	MD21-05-61755	470	4–5
Ethylbenzene	21-24525	MD21-05-61755	5.2	4–5
Ethyltoluene[4-]	21-24525	MD21-05-61755	4.7	4–5
Methanol	21-24525	MD21-05-61755	340	4–5
Propanol[2-]	21-24525	MD21-05-61755	62	4–5
Styrene	21-24525	MD21-05-61755	74	4–5
Tetrachloroethene	21-24525	MD21-05-61755	7.1	4–5
Toluene	21-24525	MD21-05-61755	25	4–5
Trichloroethane[1,1,1-]	21-24525	MD21-05-61755	9	4–5
Trichloroethene	21-24525	MD21-05-61755	23	4–5

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Trimethylbenzene[1,2,4-]	21-24525	MD21-05-61755	7.2	4–5
Xylene[1,2-]	21-24525	MD21-05-61755	5.9	4–5
Xylene[1,3-]+Xylene[1,4-]	21-24525	MD21-05-61755	17	4–5
Acetone	21-24525	MD21-05-61754	100	26–27
Butanone[2-]	21-24525	MD21-05-61754	5.3	26–27
Chloroform	21-24525	MD21-05-61754	45	26–27
Styrene	21-24525	MD21-05-61754	38	26–27
Toluene	21-24525	MD21-05-61754	16	26–27
Trichloroethane[1,1,1-]	21-24525	MD21-05-61754	12	26–27
Trichloroethene	21-24525	MD21-05-61754	26	26–27
Xylene[1,3-]+Xylene[1,4-]	21-24525	MD21-05-61754	4.7	26–27
Acetone	21-24525	MD21-06-71204	52	4–5
Benzene	21-24525	MD21-06-71204	3.3	4–5
Butanone[2-]	21-24525	MD21-06-71204	13	4–5
Carbon Tetrachloride	21-24525	MD21-06-71204	2.8 (J)	4–5
Chloroform	21-24525	MD21-06-71204	11	4–5
Chloromethane	21-24525	MD21-06-71204	0.88 (J)	4–5
Dichlorodifluoromethane	21-24525	MD21-06-71204	3.7	4–5
Ethylbenzene	21-24525	MD21-06-71204	2.5	4–5
Ethyltoluene[4-]	21-24525	MD21-06-71204	1.2 (J)	4–5
Hexane	21-24525	MD21-06-71204	1.6 (J)	4–5
Styrene	21-24525	MD21-06-71204	0.98 (J)	4–5
Tetrachloroethene	21-24525	MD21-06-71204	1.4 (J)	4–5
Tetrahydrofuran	21-24525	MD21-06-71204	9.5	4–5
Toluene	21-24525	MD21-06-71204	15	4–5
Trichloroethene	21-24525	MD21-06-71204	7.4	4–5
Trichlorofluoromethane	21-24525	MD21-06-71204	2.6 (J)	4–5
Trimethylbenzene[1,2,4-]	21-24525	MD21-06-71204	2.7	4–5
Xylene[1,2-]	21-24525	MD21-06-71204	2.6	4–5
Xylene[1,3-]+Xylene[1,4-]	21-24525	MD21-06-71204	7.1	4–5
Acetone	21-24525	MD21-06-71203	260	39–40
Butanone[2-]	21-24525	MD21-06-71203	12	39–40
Carbon Tetrachloride	21-24525	MD21-06-71203	12	39–40
Chloroform	21-24525	MD21-06-71203	120	39–40
Ethanol	21-24525	MD21-06-71203	13	39–40
Hexane	21-24525	MD21-06-71203	7.2	39–40
Propylene	21-24525	MD21-06-71203	110	39–40
Tetrachloroethene	21-24525	MD21-06-71203	13	39–40
Toluene	21-24525	MD21-06-71203	12	39–40
Trichloroethane[1,1,1-]	21-24525	MD21-06-71203	27	39–40
Trichloroethene	21-24525	MD21-06-71203	110	39–40

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Acetone	21-24526	MD21-05-61757	76	4–5
Butanone[2-]	21-24526	MD21-05-61757	4.4	4–5
Carbon Tetrachloride	21-24526	MD21-05-61757	8.4	4–5
Chloroform	21-24526	MD21-05-61757	18	4–5
Styrene	21-24526	MD21-05-61757	96	4–5
Tetrachloroethene	21-24526	MD21-05-61757	7.1	4–5
Toluene	21-24526	MD21-05-61757	31	4–5
Trichloroethane[1,1,1-]	21-24526	MD21-05-61757	21	4–5
Trichloroethene	21-24526	MD21-05-61757	31	4–5
Xylene[1,3-]+Xylene[1,4-]	21-24526	MD21-05-61757	9.7	4–5
Acetone	21-24526	MD21-05-61756	60 (J)	24.2–25.2
Butanone[2-]	21-24526	MD21-05-61756	5	24.2–25.2
Carbon Tetrachloride	21-24526	MD21-05-61756	17	24.2–25.2
Chloroform	21-24526	MD21-05-61756	44	24.2–25.2
Styrene	21-24526	MD21-05-61756	65	24.2–25.2
Tetrachloroethene	21-24526	MD21-05-61756	8.4	24.2–25.2
Toluene	21-24526	MD21-05-61756	11	24.2–25.2
Trichloroethane[1,1,1-]	21-24526	MD21-05-61756	20	24.2–25.2
Trichloroethene	21-24526	MD21-05-61756	70	24.2–25.2
Xylene[1,3-]+Xylene[1,4-]	21-24526	MD21-05-61756	7.1	24.2–25.2
Acetone	21-24526	MD21-06-71206	200	4–5
Benzene	21-24526	MD21-06-71206	5.4	4–5
Butanone[2-]	21-24526	MD21-06-71206	21	4–5
Carbon Disulfide	21-24526	MD21-06-71206	7.6	4–5
Carbon Tetrachloride	21-24526	MD21-06-71206	1.7 (J)	4–5
Chloromethane	21-24526	MD21-06-71206	2.2	4–5
Dichlorodifluoromethane	21-24526	MD21-06-71206	3.6	4–5
Ethylbenzene	21-24526	MD21-06-71206	2 (J)	4–5
Hexane	21-24526	MD21-06-71206	2.7	4–5
Methyl-2-pentanone[4-]	21-24526	MD21-06-71206	2.7	4–5
Styrene	21-24526	MD21-06-71206	1.3 (J)	4–5
Tetrahydrofuran	21-24526	MD21-06-71206	12	4–5
Toluene	21-24526	MD21-06-71206	14	4–5
Trichloro-1,2,2-trifluoroethane[1,1,2-]	21-24526	MD21-06-71206	1.7 (J)	4–5
Trichloroethene	21-24526	MD21-06-71206	1.1 (J)	4–5
Trichlorofluoromethane	21-24526	MD21-06-71206	2.2 (J)	4–5
Trimethylbenzene[1,2,4-]	21-24526	MD21-06-71206	2.6	4–5
Vinyl acetate	21-24526	MD21-06-71206	4.2	4–5
Xylene[1,2-]	21-24526	MD21-06-71206	2.1 (J)	4–5
Xylene[1,3-]+Xylene[1,4-]	21-24526	MD21-06-71206	6.4	4–5
Acetone	21-24526	MD21-06-71205	120	39–40

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Butanone[2-]	21-24526	MD21-06-71205	4.2	39–40
Carbon Disulfide	21-24526	MD21-06-71205	4.1	39–40
Propylene	21-24526	MD21-06-71205	22	39–40
Toluene	21-24526	MD21-06-71205	7.2	39–40
Trichloroethane[1,1,1-]	21-24526	MD21-06-71205	21	39–40
Trichloroethene	21-24526	MD21-06-71205	17	39–40
Acetone	21-24527	MD21-05-61759	150	4.5–5.5
Butanone[2-]	21-24527	MD21-05-61759	24	4.5–5.5
Carbon Disulfide	21-24527	MD21-05-61759	6.2	4.5–5.5
Carbon Tetrachloride	21-24527	MD21-05-61759	8.9	4.5–5.5
Ethanol	21-24527	MD21-05-61759	30	4.5–5.5
Propanol[2-]	21-24527	MD21-05-61759	11	4.5–5.5
Styrene	21-24527	MD21-05-61759	170	4.5–5.5
Tetrachloroethene	21-24527	MD21-05-61759	7.4	4.5–5.5
Toluene	21-24527	MD21-05-61759	33	4.5–5.5
Trichloroethane[1,1,1-]	21-24527	MD21-05-61759	38	4.5–5.5
Trichloroethene	21-24527	MD21-05-61759	34	4.5–5.5
Xylene[1,2-]	21-24527	MD21-05-61759	5	4.5–5.5
Xylene[1,3-]+Xylene[1,4-]	21-24527	MD21-05-61759	16	4.5–5.5
Acetone	21-24527	MD21-05-61758	41	28–29
Butanol[1-]	21-24527	MD21-05-61758	22	28–29
Butanone[2-]	21-24527	MD21-05-61758	4.2	28–29
Carbon Disulfide	21-24527	MD21-05-61758	3.4	28–29
Carbon Tetrachloride	21-24527	MD21-05-61758	11	28–29
Chloroform	21-24527	MD21-05-61758	5.4	28–29
Ethanol	21-24527	MD21-05-61758	21	28–29
Styrene	21-24527	MD21-05-61758	71	28–29
Toluene	21-24527	MD21-05-61758	12	28–29
Trichloroethane[1,1,1-]	21-24527	MD21-05-61758	12	28–29
Trichloroethene	21-24527	MD21-05-61758	46	28–29
Xylene[1,3-]+Xylene[1,4-]	21-24527	MD21-05-61758	6.8	28–29
Acetone	21-24527	MD21-06-71208	140	4.5–5.5
Benzene	21-24527	MD21-06-71208	4.2	4.5–5.5
Butanone[2-]	21-24527	MD21-06-71208	16	4.5–5.5
Carbon Tetrachloride	21-24527	MD21-06-71208	2.4 (J)	4.5–5.5
Chloroform	21-24527	MD21-06-71208	22	4.5–5.5
Chloromethane	21-24527	MD21-06-71208	2.1	4.5–5.5
Dichlorodifluoromethane	21-24527	MD21-06-71208	3.3	4.5–5.5
Ethylbenzene	21-24527	MD21-06-71208	2.2	4.5–5.5
Ethyltoluene[4-]	21-24527	MD21-06-71208	1.3 (J)	4.5–5.5
Hexane	21-24527	MD21-06-71208	1.9	4.5–5.5

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Methyl-2-pentanone[4-]	21-24527	MD21-06-71208	2 (J)	4.5–5.5
Styrene	21-24527	MD21-06-71208	1.4 (J)	4.5–5.5
Tetrachloroethene	21-24527	MD21-06-71208	11	4.5–5.5
Tetrahydrofuran	21-24527	MD21-06-71208	5.9	4.5–5.5
Toluene	21-24527	MD21-06-71208	14	4.5–5.5
Trichloro-1,2,2-trifluoroethane[1,1,2-]	21-24527	MD21-06-71208	1.6 (J)	4.5–5.5
Trichloroethene	21-24527	MD21-06-71208	2.9	4.5–5.5
Trichlorofluoromethane	21-24527	MD21-06-71208	2.1 (J)	4.5–5.5
Trimethylbenzene[1,2,4-]	21-24527	MD21-06-71208	3	4.5–5.5
Trimethylbenzene[1,3,5-]	21-24527	MD21-06-71208	1 (J)	4.5–5.5
Xylene[1,2-]	21-24527	MD21-06-71208	2.2	4.5–5.5
Xylene[1,3-]+Xylene[1,4-]	21-24527	MD21-06-71208	6.9	4.5–5.5
Acetone	21-24527	MD21-06-71207	140	39–40
Benzene	21-24527	MD21-06-71207	14	39–40
Butanone[2-]	21-24527	MD21-06-71207	19	39–40
Carbon Disulfide	21-24527	MD21-06-71207	4	39–40
Carbon Tetrachloride	21-24527	MD21-06-71207	6.7	39–40
Chloroform	21-24527	MD21-06-71207	5.1	39–40
Chloromethane	21-24527	MD21-06-71207	3.3 (J-)	39–40
Dichlorodifluoromethane	21-24527	MD21-06-71207	2.2 (J)	39–40
Ethylbenzene	21-24527	MD21-06-71207	2.3	39–40
Hexane	21-24527	MD21-06-71207	19	39–40
Styrene	21-24527	MD21-06-71207	0.98 (J)	39–40
Tetrachloroethene	21-24527	MD21-06-71207	4.9	39–40
Toluene	21-24527	MD21-06-71207	16	39–40
Trichloroethane[1,1,1-]	21-24527	MD21-06-71207	10	39–40
Trichloroethene	21-24527	MD21-06-71207	41	39–40
Trichlorofluoromethane	21-24527	MD21-06-71207	1.7 (J)	39–40
Trimethylbenzene[1,2,4-]	21-24527	MD21-06-71207	0.84 (J)	39–40
Xylene (Total)	21-24527	MD21-06-71207	3.9 (J)	39–40
Acetone	21-24528	MD21-05-61761	43	4–5
Butanone[2-]	21-24528	MD21-05-61761	5.4	4–5
Chloroform	21-24528	MD21-05-61761	6	4–5
Styrene	21-24528	MD21-05-61761	99	4–5
Toluene	21-24528	MD21-05-61761	17	4–5
Trichloroethene	21-24528	MD21-05-61761	7.7	4–5
Xylene[1,3-]+Xylene[1,4-]	21-24528	MD21-05-61761	5.5	4–5
Acetone	21-24528	MD21-05-61760	41	26–27
Chloroform	21-24528	MD21-05-61760	6.8	26–27
Styrene	21-24528	MD21-05-61760	58	26–27
Toluene	21-24528	MD21-05-61760	11	26–27

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Trichloroethene	21-24528	MD21-05-61760	9.1	26–27
Xylene[1,3-]+Xylene[1,4-]	21-24528	MD21-05-61760	4	26–27
Acetone	21-24528	MD21-06-71210	150	4–5
Butanone[2-]	21-24528	MD21-06-71210	18	4–5
Hexane	21-24528	MD21-06-71210	7.3	4–5
n-Heptane	21-24528	MD21-06-71210	13	4–5
Styrene	21-24528	MD21-06-71210	8	4–5
Tetrachloroethene	21-24528	MD21-06-71210	6.6	4–5
Toluene	21-24528	MD21-06-71210	25	4–5
Trichloroethane[1,1,1-]	21-24528	MD21-06-71210	16	4–5
Trichloroethene	21-24528	MD21-06-71210	16	4–5
Xylene[1,3-]+Xylene[1,4-]	21-24528	MD21-06-71210	8.7	4–5
Acetone	21-24528	MD21-06-71209	88	39–40
Butanone[2-]	21-24528	MD21-06-71209	4.7	39–40
Carbon Tetrachloride	21-24528	MD21-06-71209	13	39–40
Chloroform	21-24528	MD21-06-71209	70	39–40
Propylene	21-24528	MD21-06-71209	44	39–40
Tetrachloroethene	21-24528	MD21-06-71209	7.2	39–40
Toluene	21-24528	MD21-06-71209	4.3	39–40
Trichloroethane[1,1,1-]	21-24528	MD21-06-71209	8.5	39–40
Trichloroethene	21-24528	MD21-06-71209	100	39–40
Acetone	21-24531	MD21-05-61763	32 (J)	14–15
Butanone[2-]	21-24531	MD21-05-61763	3.8	14–15
Chloroform	21-24531	MD21-05-61763	32	14–15
Dioxane[1,4-]	21-24531	MD21-05-61763	25	14–15
Styrene	21-24531	MD21-05-61763	66	14–15
Tetrachloroethene	21-24531	MD21-05-61763	7	14–15
Toluene	21-24531	MD21-05-61763	13	14–15
Trichloroethane[1,1,1-]	21-24531	MD21-05-61763	8.4	14–15
Trichloroethene	21-24531	MD21-05-61763	35	14–15
Xylene[1,3-]+Xylene[1,4-]	21-24531	MD21-05-61763	5.4	14–15
Acetone	21-24531	MD21-05-61762	31	51–52
Butanone[2-]	21-24531	MD21-05-61762	2.9	51–52
Chloroform	21-24531	MD21-05-61762	37	51–52
Methanol	21-24531	MD21-05-61762	120	51–52
Styrene	21-24531	MD21-05-61762	30	51–52
Toluene	21-24531	MD21-05-61762	8.4	51–52
Trichloroethene	21-24531	MD21-05-61762	38	51–52
Acetone	21-24531	MD21-06-71212	250	14–15
Butanone[2-]	21-24531	MD21-06-71212	34	14–15
Carbon Disulfide	21-24531	MD21-06-71212	27	14–15

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Chloroform	21-24531	MD21-06-71212	26	14–15
Hexane	21-24531	MD21-06-71212	3.9	14–15
n-Heptane	21-24531	MD21-06-71212	6.4	14–15
Styrene	21-24531	MD21-06-71212	11	14–15
Tetrachloroethene	21-24531	MD21-06-71212	7	14–15
Toluene	21-24531	MD21-06-71212	13	14–15
Trichloroethane[1,1,1-]	21-24531	MD21-06-71212	15	14–15
Trichloroethene	21-24531	MD21-06-71212	39	14–15
Xylene[1,3-]+Xylene[1,4-]	21-24531	MD21-06-71212	7	14–15
Acetone	21-24531	MD21-06-71211	100	79–80
Benzene	21-24531	MD21-06-71211	2.1	79–80
Bromodichloromethane	21-24531	MD21-06-71211	1.7	79–80
Butanone[2-]	21-24531	MD21-06-71211	23	79–80
Carbon Tetrachloride	21-24531	MD21-06-71211	8.4	79–80
Chloroform	21-24531	MD21-06-71211	31	79–80
Chloromethane	21-24531	MD21-06-71211	2.3	79–80
Dichlorodifluoromethane	21-24531	MD21-06-71211	3.3	79–80
Ethylbenzene	21-24531	MD21-06-71211	1.3	79–80
Methyl-2-pentanone[4-]	21-24531	MD21-06-71211	5.2 (J)	79–80
Styrene	21-24531	MD21-06-71211	1.2	79–80
Tetrachloroethene	21-24531	MD21-06-71211	6.2	79–80
Toluene	21-24531	MD21-06-71211	6.1	79–80
Trichloroethane[1,1,1-]	21-24531	MD21-06-71211	9.7	79–80
Trichloroethene	21-24531	MD21-06-71211	94	79–80
Trichlorofluoromethane	21-24531	MD21-06-71211	2.5	79–80
Trimethylbenzene[1,2,4-]	21-24531	MD21-06-71211	2.5	79–80
Xylene (Total)	21-24531	MD21-06-71211	3.5	79–80
Xylene[1,2-]	21-24531	MD21-06-71211	0.98	79–80
Acetone	21-24532	MD21-05-61765	200	14–15
Butanone[2-]	21-24532	MD21-05-61765	31	14–15
Dichloroethane[1,1-]	21-24532	MD21-05-61765	4	14–15
Propanol[2-]	21-24532	MD21-05-61765	24	14–15
Styrene	21-24532	MD21-05-61765	66	14–15
Toluene	21-24532	MD21-05-61765	20	14–15
Trichloroethane[1,1,1-]	21-24532	MD21-05-61765	37	14–15
Trichloroethene	21-24532	MD21-05-61765	9.4	14–15
Xylene[1,3-]+Xylene[1,4-]	21-24532	MD21-05-61765	8.7	14–15
Acetone	21-24532	MD21-05-61764	36 (J)	23.5–24.5
Chloroform	21-24532	MD21-05-61764	5.2	23.5–24.5
Styrene	21-24532	MD21-05-61764	56	23.5–24.5
Toluene	21-24532	MD21-05-61764	11	23.5–24.5

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Trichloroethane[1,1,1-]	21-24532	MD21-05-61764	5.6	23.5–24.5
Trichloroethene	21-24532	MD21-05-61764	15	23.5–24.5
Xylene[1,3-]+Xylene[1,4-]	21-24532	MD21-05-61764	4.8	23.5–24.5
Acetone	21-24532	MD21-06-71214	23	14–15
Benzene	21-24532	MD21-06-71214	0.73 (J)	14–15
Carbon Disulfide	21-24532	MD21-06-71214	5.5	14–15
Carbon Tetrachloride	21-24532	MD21-06-71214	1.6 (J)	14–15
Chloromethane	21-24532	MD21-06-71214	1.5	14–15
Dichlorodifluoromethane	21-24532	MD21-06-71214	3.4	14–15
Methylene Chloride	21-24532	MD21-06-71214	0.82 (J)	14–15
Toluene	21-24532	MD21-06-71214	1.9 (J)	14–15
Trichloro-1,2,2-trifluoroethane[1,1,2-]	21-24532	MD21-06-71214	1.7 (J)	14–15
Trichlorofluoromethane	21-24532	MD21-06-71214	2.1 (J)	14–15
Xylene[1,3-]+Xylene[1,4-]	21-24532	MD21-06-71214	1.3 (J)	14–15
Acetone	21-24532	MD21-06-71213	110	39–40
Butanone[2-]	21-24532	MD21-06-71213	4.4	39–40
Propylene	21-24532	MD21-06-71213	13	39–40
Toluene	21-24532	MD21-06-71213	5.3	39–40
Trichloroethane[1,1,1-]	21-24532	MD21-06-71213	11	39–40
Trichloroethene	21-24532	MD21-06-71213	9.2	39–40
Acetone	21-24533	MD21-05-61767	22	11–12
Carbon Disulfide	21-24533	MD21-05-61767	3.6	11–12
Chloroform	21-24533	MD21-05-61767	5.3	11–12
Styrene	21-24533	MD21-05-61767	35	11–12
Toluene	21-24533	MD21-05-61767	8.7	11–12
Trichloroethane[1,1,1-]	21-24533	MD21-05-61767	15	11–12
Trichloroethene	21-24533	MD21-05-61767	14	11–12
Xylene[1,3-]+Xylene[1,4-]	21-24533	MD21-05-61767	5.3	11–12
Acetone	21-24533	MD21-05-61766	43	55–56
Butanone[2-]	21-24533	MD21-05-61766	4.6	55–56
Chloroform	21-24533	MD21-05-61766	7.8	55–56
Styrene	21-24533	MD21-05-61766	46	55–56
Toluene	21-24533	MD21-05-61766	15	55–56
Trichloroethane[1,1,1-]	21-24533	MD21-05-61766	16	55–56
Trichloroethene	21-24533	MD21-05-61766	28	55–56
Xylene[1,3-]+Xylene[1,4-]	21-24533	MD21-05-61766	6.3	55–56
Acetone	21-24533	MD21-06-71216	19	11–12
Butanone[2-]	21-24533	MD21-06-71216	2.9	11–12
Trichloroethene	21-24533	MD21-06-71216	7.5	11–12
Carbon Tetrachloride	21-24533	MD21-06-71215	2.7 (J)	84–85
Tetrachloroethene	21-24533	MD21-06-71215	2.6 (J)	84–85

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Toluene	21-24533	MD21-06-71215	2.1	84–85
Trichloroethane[1,1,1-]	21-24533	MD21-06-71215	5	84–85
Trichloroethene	21-24533	MD21-06-71215	32	84–85
Acetone	21-24534	MD21-05-61769	51	14–15
Butanone[2-]	21-24534	MD21-05-61769	7.4	14–15
Styrene	21-24534	MD21-05-61769	59	14–15
Toluene	21-24534	MD21-05-61769	15	14–15
Trichloroethane[1,1,1-]	21-24534	MD21-05-61769	19	14–15
Trichloroethene	21-24534	MD21-05-61769	13	14–15
Xylene[1,3-]+Xylene[1,4-]	21-24534	MD21-05-61769	8.1	14–15
Acetone	21-24534	MD21-05-61768	120	22.5–23.5
Butanone[2-]	21-24534	MD21-05-61768	19	22.5–23.5
Styrene	21-24534	MD21-05-61768	86	22.5–23.5
Toluene	21-24534	MD21-05-61768	17	22.5–23.5
Trichloroethane[1,1,1-]	21-24534	MD21-05-61768	22	22.5–23.5
Trichloroethene	21-24534	MD21-05-61768	18	22.5–23.5
Xylene[1,3-]+Xylene[1,4-]	21-24534	MD21-05-61768	8.8	22.5–23.5
Acetone	21-24534	MD21-06-71218	36	14–15
Butanone[2-]	21-24534	MD21-06-71218	5.2	14–15
Toluene	21-24534	MD21-06-71218	6.4	14–15
Trichloroethene	21-24534	MD21-06-71218	11	14–15
Acetone	21-24534	MD21-06-71217	100	39–40
Butanone[2-]	21-24534	MD21-06-71217	7.6	39–40
Propylene	21-24534	MD21-06-71217	8.3	39–40
Toluene	21-24534	MD21-06-71217	5.2	39–40
Trichloroethane[1,1,1-]	21-24534	MD21-06-71217	10	39–40
Trichloroethene	21-24534	MD21-06-71217	14	39–40
Xylene[1,3-]+Xylene[1,4-]	21-24535	MD21-05-61771	5.1	14–15
Acetone	21-24535	MD21-05-61771	30 (J)	14–15
Styrene	21-24535	MD21-05-61771	47	14–15
Toluene	21-24535	MD21-05-61771	14	14–15
Trichloroethane[1,1,1-]	21-24535	MD21-05-61771	6.4	14–15
Trichloroethene	21-24535	MD21-05-61771	7.4	14–15
Acetone	21-24535	MD21-05-61770	31 (J)	45.2–46.2
Butanone[2-]	21-24535	MD21-05-61770	3.8	45.2–46.2
Chloroform	21-24535	MD21-05-61770	4.6	45.2–46.2
Styrene	21-24535	MD21-05-61770	47	45.2–46.2
Toluene	21-24535	MD21-05-61770	12	45.2–46.2
Trichloroethene	21-24535	MD21-05-61770	22	45.2–46.2
Acetone	21-24535	MD21-06-71220	35	14–15
Butanone[2-]	21-24535	MD21-06-71220	5.6	14–15

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Carbon Disulfide	21-24535	MD21-06-71220	2.9	14–15
Toluene	21-24535	MD21-06-71220	3.8	14–15
Trichloroethane[1,1,1-]	21-24535	MD21-06-71220	8.2	14–15
Trichloroethene	21-24535	MD21-06-71220	16	14–15
Acetone	21-24535	MD21-06-71219	170	79–80
Benzene	21-24535	MD21-06-71219	2.8	79–80
Butanone[2-]	21-24535	MD21-06-71219	8.8	79–80
Carbon Tetrachloride	21-24535	MD21-06-71219	4.4	79–80
Chloroform	21-24535	MD21-06-71219	6.6	79–80
Chloromethane	21-24535	MD21-06-71219	1.1	79–80
Dichlorodifluoromethane	21-24535	MD21-06-71219	2.4	79–80
Dichloroethane[1,1-]	21-24535	MD21-06-71219	1.9	79–80
Dichloroethane[1,2-]	21-24535	MD21-06-71219	4.2	79–80
Dichloropropane[1,2-]	21-24535	MD21-06-71219	5.2	79–80
Ethylbenzene	21-24535	MD21-06-71219	2.5	79–80
Ethyltoluene[4-]	21-24535	MD21-06-71219	3.2	79–80
Tetrachloroethene	21-24535	MD21-06-71219	20	79–80
Toluene	21-24535	MD21-06-71219	17	79–80
Trichloro-1,2,2-trifluoroethane[1,1,2-]	21-24535	MD21-06-71219	3.4	79–80
Trichloroethane[1,1,1-]	21-24535	MD21-06-71219	170	79–80
Trichloroethene	21-24535	MD21-06-71219	99	79–80
Trimethylbenzene[1,2,4-]	21-24535	MD21-06-71219	4.5	79–80
Xylene (Total)	21-24535	MD21-06-71219	14	79–80
Xylene[1,2-]	21-24535	MD21-06-71219	3.5	79–80
Acetone	21-24538	MD21-05-61773	12 (J)	14–15
Styrene	21-24538	MD21-05-61773	51	14–15
Toluene	21-24538	MD21-05-61773	7.8	14–15
Trichloroethene	21-24538	MD21-05-61773	13	14–15
Acetone	21-24538	MD21-05-61772	31 (J)	34.5–35.5
Butanone[2-]	21-24538	MD21-05-61772	3.8	34.5–35.5
Styrene	21-24538	MD21-05-61772	39	34.5–35.5
Toluene	21-24538	MD21-05-61772	9.7	34.5–35.5
Trichloroethene	21-24538	MD21-05-61772	15	34.5–35.5
Acetone	21-24538	MD21-06-71222	34	14–15
Butanone[2-]	21-24538	MD21-06-71222	5.2	14–15
Ethanol	21-24538	MD21-06-71222	9.7	14–15
Toluene	21-24538	MD21-06-71222	46	14–15
Trichloroethene	21-24538	MD21-06-71222	16	14–15
Xylene[1,3-]+Xylene[1,4-]	21-24538	MD21-06-71222	4.3	14–15
Acetone	21-24538	MD21-06-71221	190	84–85
Benzene	21-24538	MD21-06-71221	1.2	84–85

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Butanone[2-]	21-24538	MD21-06-71221	7.7	84–85
Carbon Tetrachloride	21-24538	MD21-06-71221	2.4	84–85
Chloroform	21-24538	MD21-06-71221	2.7	84–85
Chloromethane	21-24538	MD21-06-71221	1.1	84–85
Dichlorodifluoromethane	21-24538	MD21-06-71221	3.1	84–85
Dichloroethane[1,2-]	21-24538	MD21-06-71221	0.93	84–85
Styrene	21-24538	MD21-06-71221	0.97	84–85
Tetrachloroethene	21-24538	MD21-06-71221	6.9	84–85
Toluene	21-24538	MD21-06-71221	5.1	84–85
Trichloroethane[1,1,1-]	21-24538	MD21-06-71221	15	84–85
Trichloroethene	21-24538	MD21-06-71221	40	84–85
Acetone	21-24539	MD21-05-61775	16	14–15
Carbon Tetrachloride	21-24539	MD21-05-61775	5.7 (J)	14–15
Styrene	21-24539	MD21-05-61775	29	14–15
Toluene	21-24539	MD21-05-61775	8.8	14–15
Trichloroethane[1,1,1-]	21-24539	MD21-05-61775	6.1	14–15
Trichloroethene	21-24539	MD21-05-61775	37	14–15
Acetone	21-24539	MD21-05-61774	43	57.5–58.5
Styrene	21-24539	MD21-05-61774	41	57.5–58.5
Tetrachloroethene	21-24539	MD21-05-61774	6.4 (J)	57.5–58.5
Toluene	21-24539	MD21-05-61774	21	57.5–58.5
Trichloroethane[1,1,1-]	21-24539	MD21-05-61774	8.8	57.5–58.5
Trichloroethene	21-24539	MD21-05-61774	37	57.5–58.5
Xylene[1,3-]+Xylene[1,4-]	21-24539	MD21-05-61774	5.3	57.5–58.5
Acetone	21-24539	MD21-06-71224	36	14–15
Butanone[2-]	21-24539	MD21-06-71224	7.6	14–15
Toluene	21-24539	MD21-06-71224	13	14–15
Trichloroethane[1,1,1-]	21-24539	MD21-06-71224	7.2	14–15
Trichloroethene	21-24539	MD21-06-71224	37	14–15
Xylene[1,3-]+Xylene[1,4-]	21-24539	MD21-06-71224	4.6	14–15
Acetone	21-24539	MD21-06-71223	210	79–80
Butanone[2-]	21-24539	MD21-06-71223	17	79–80
Carbon Tetrachloride	21-24539	MD21-06-71223	21	79–80
Chloroform	21-24539	MD21-06-71223	26	79–80
Ethanol	21-24539	MD21-06-71223	10	79–80
Hexane	21-24539	MD21-06-71223	26	79–80
n-Heptane	21-24539	MD21-06-71223	11	79–80
Propylene	21-24539	MD21-06-71223	310	79–80
Tetrachloroethene	21-24539	MD21-06-71223	15	79–80
Toluene	21-24539	MD21-06-71223	29	79–80
Trichloroethane[1,1,1-]	21-24539	MD21-06-71223	25	79–80

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Trichloroethene	21-24539	MD21-06-71223	260	79–80
Xylene[1,3-]+Xylene[1,4-]	21-24539	MD21-06-71223	6.4	79–80
Acetone	21-24540	MD21-05-61777	49	11–12
Styrene	21-24540	MD21-05-61777	57	11–12
Tetrachloroethene	21-24540	MD21-05-61777	8.3	11–12
Toluene	21-24540	MD21-05-61777	26	11–12
Trichloroethane[1,1,1-]	21-24540	MD21-05-61777	10	11–12
Trichloroethene	21-24540	MD21-05-61777	17	11–12
Xylene[1,3-]+Xylene[1,4-]	21-24540	MD21-05-61777	7.5	11–12
Acetone	21-24540	MD21-05-61776	80	24–25
Butanone[2-]	21-24540	MD21-05-61776	4.5	24–25
Styrene	21-24540	MD21-05-61776	53	24–25
Tetrachloroethene	21-24540	MD21-05-61776	7.6	24–25
Toluene	21-24540	MD21-05-61776	34	24–25
Trichloroethane[1,1,1-]	21-24540	MD21-05-61776	12	24–25
Trichloroethene	21-24540	MD21-05-61776	19	24–25
Xylene[1,3-]+Xylene[1,4-]	21-24540	MD21-05-61776	9.5	24–25
Acetone	21-24540	MD21-06-71226	63	11–12
Butanone[2-]	21-24540	MD21-06-71226	7	11–12
Carbon Disulfide	21-24540	MD21-06-71226	5.1	11–12
Methylene Chloride	21-24540	MD21-06-71226	11	11–12
Styrene	21-24540	MD21-06-71226	5.5	11–12
Toluene	21-24540	MD21-06-71226	7.5	11–12
Trichloroethane[1,1,1-]	21-24540	MD21-06-71226	5.3	11–12
Xylene[1,3-]+Xylene[1,4-]	21-24540	MD21-06-71226	5.6	11–12
Acetone	21-24540	MD21-06-71225	120	39–40
Butanone[2-]	21-24540	MD21-06-71225	4.1	39–40
Propylene	21-24540	MD21-06-71225	19	39–40
Tetrachloroethene	21-24540	MD21-06-71225	8.4	39–40
Toluene	21-24540	MD21-06-71225	9.1	39–40
Trichloroethane[1,1,1-]	21-24540	MD21-06-71225	18	39–40
Trichloroethene	21-24540	MD21-06-71225	40	39–40
Acetone	21-24541	MD21-05-61779	26	19–20
Butanone[2-]	21-24541	MD21-05-61779	4	19–20
Styrene	21-24541	MD21-05-61779	15	19–20
Acetone	21-24541	MD21-05-61778	57	55–56
Butanone[2-]	21-24541	MD21-05-61778	2.8	55–56
Carbon Tetrachloride	21-24541	MD21-05-61778	7.8	55–56
Chloroform	21-24541	MD21-05-61778	6.3	55–56
Styrene	21-24541	MD21-05-61778	67	55–56
Tetrachloroethene	21-24541	MD21-05-61778	6.5	55–56

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Toluene	21-24541	MD21-05-61778	13	55–56
Trichloroethane[1,1,1-]	21-24541	MD21-05-61778	7.9	55–56
Trichloroethene	21-24541	MD21-05-61778	64	55–56
Xylene[1,3-]+Xylene[1,4-]	21-24541	MD21-05-61778	5.1	55–56
Acetone	21-24541	MD21-06-71228	160	19–20
Butanone[2-]	21-24541	MD21-06-71228	26	19–20
Hexane	21-24541	MD21-06-71228	3.8	19–20
n-Heptane	21-24541	MD21-06-71228	6.7	19–20
Toluene	21-24541	MD21-06-71228	12	19–20
Trichloroethane[1,1,1-]	21-24541	MD21-06-71228	6.3	19–20
Trichloroethene	21-24541	MD21-06-71228	16	19–20
Acetone	21-24541	MD21-06-71227	40	79–80
Benzene	21-24541	MD21-06-71227	1.9	79–80
Butanone[2-]	21-24541	MD21-06-71227	7.9	79–80
Carbon Tetrachloride	21-24541	MD21-06-71227	11	79–80
Chloroform	21-24541	MD21-06-71227	7.5	79–80
Chloromethane	21-24541	MD21-06-71227	0.88	79–80
Dichlorodifluoromethane	21-24541	MD21-06-71227	2.6	79–80
Ethylbenzene	21-24541	MD21-06-71227	21	79–80
Ethyltoluene[4-]	21-24541	MD21-06-71227	55	79–80
Tetrachloroethene	21-24541	MD21-06-71227	4.9	79–80
Toluene	21-24541	MD21-06-71227	7.5	79–80
Trichloroethane[1,1,1-]	21-24541	MD21-06-71227	10	79–80
Trichloroethene	21-24541	MD21-06-71227	110	79–80
Trichlorofluoromethane	21-24541	MD21-06-71227	2.9	79–80
Trimethylbenzene[1,2,4-]	21-24541	MD21-06-71227	95	79–80
Trimethylbenzene[1,3,5-]	21-24541	MD21-06-71227	30	79–80
Xylene (Total)	21-24541	MD21-06-71227	110	79–80
Xylene[1,2-]	21-24541	MD21-06-71227	31	79–80
Acetone	21-24542	MD21-05-61781	36	14–15
Carbon Tetrachloride	21-24542	MD21-05-61781	6	14–15
Chloroform	21-24542	MD21-05-61781	24	14–15
Styrene	21-24542	MD21-05-61781	52	14–15
Toluene	21-24542	MD21-05-61781	16	14–15
Trichloroethane[1,1,1-]	21-24542	MD21-05-61781	7	14–15
Trichloroethene	21-24542	MD21-05-61781	35	14–15
Xylene[1,3-]+Xylene[1,4-]	21-24542	MD21-05-61781	4.2	14–15
Acetone	21-24542	MD21-05-61780	31	23.5–24.5
Chloroform	21-24542	MD21-05-61780	15	23.5–24.5
Styrene	21-24542	MD21-05-61780	33	23.5–24.5
Toluene	21-24542	MD21-05-61780	16	23.50–24.50

Table B-2.4-2 (continued)

Analyte	Location ID	Sample ID	Concentration (µg/m³)	Depth (ft bgs)
Trichloroethane[1,1,1-]	21-24542	MD21-05-61780	8.2	23.50–24.50
Trichloroethene	21-24542	MD21-05-61780	19	23.50–24.50
Xylene[1,3-]+Xylene[1,4-]	21-24542	MD21-05-61780	4.2	23.5–24.5
Acetone	21-24542	MD21-06-71230	44	14–15
Butanone[2-]	21-24542	MD21-06-71230	3	14–15
Chloroform	21-24542	MD21-06-71230	7.2	14–15
Trichloroethene	21-24542	MD21-06-71230	6.3	14–15
Vinyl Chloride	21-24542	MD21-06-71230	3.9	14–15
Acetone	21-24542	MD21-06-71229	98	39–40
Carbon Tetrachloride	21-24542	MD21-06-71229	11	39–40
Chloroform	21-24542	MD21-06-71229	64	39–40
Hexane	21-24542	MD21-06-71229	7	39–40
Propylene	21-24542	MD21-06-71229	94	39–40
Tetrachloroethene	21-24542	MD21-06-71229	14	39–40
Toluene	21-24542	MD21-06-71229	15	39–40
Trichloroethane[1,1,1-]	21-24542	MD21-06-71229	22	39–40
Trichloroethene	21-24542	MD21-06-71229	120	39–40
Xylene[1,3-]+Xylene[1,4-]	21-24542	MD21-06-71229	4.9	39–40

Note: Data qualifiers are defined in Appendix A.

Table B-2.4-3
Frequency of Detection of Tritium in Pore Gas at Consolidated Unit 21-018(a)-99

Number of Analyses	Number of Detects	Number of Detected Locations	Concentration Range	Location of Min Detected	Location of Max Detected	Min of Detects	Mean of Detects	Max of Detects
60	42	15	[130]–132100	21-24525 (4 ft)	21-24524 (379 ft)	346	8324	132100

Notes: Values in brackets are below detection limits. Units are pCi/L.

Table B-2.4-4
Summary of Tritium Detected in Pore Gas at Consolidated Unit 21-018(a)-99

Location ID	Sample ID	Sample Concentration	Depth (ft bgs)
21-24524	MD21-05-61752	24570	14–15
21-24524	MD21-06-71202	64700	14–15
21-24524	MD21-06-71201	132100	379–380
21-24525	MD21-05-61755	8703	4–5
21-24525	MD21-06-71203	440	39–40
21-24526	MD21-05-61757	4698	4–5
21-24526	MD21-06-71206	470	4–5
21-24526	MD21-06-71205	566	39–40
21-24527	MD21-05-61759	470.7	4.5–5.5
21-24527	MD21-05-61758	479.6	28–29
21-24527	MD21-06-71208	1090	4.5–5.5
21-24527	MD21-06-71207	450	39–40
21-24528	MD21-06-71210	360	4–5
21-24528	MD21-06-71209	528	39–40
21-24531	MD21-05-61763	5717	14–15
21-24531	MD21-06-71212	2100	14–15
21-24531	MD21-06-71211	1010	79–80
21-24532	MD21-06-71214	3080	14–15
21-24532	MD21-06-71213	346	39–40
21-24533	MD21-05-61767	1187	11–12
21-24533	MD21-05-61766	2582	55–56
21-24533	MD21-06-71216	1890	11–12
21-24533	MD21-06-71215	1990	84–85
21-24534	MD21-05-61768	5933	22.5–23.5
21-24534	MD21-06-71218	1400	14–15
21-24534	MD21-06-71217	694	39–40
21-24535	MD21-05-61770	3898	45.2–46.2
21-24535	MD21-06-71220	3860	14–15
21-24535	MD21-06-71219	8080	79–80
21-24538	MD21-06-71222	1500	14–15
21-24538	MD21-06-71221	17400	84–85
21-24539	MD21-05-61774	1176	57.5–58.5
21-24539	MD21-06-71224	18500	14–15
21-24540	MD21-05-61776	2134	24–25
21-24540	MD21-06-71226	980	11–12
21-24540	MD21-06-71225	520	39–40

Table B-2.4-4 (continued)

Location ID	Sample ID	Sample Concentration	Depth (ft bgs)
21-24541	MD21-06-71228	19400	19–20
21-24541	MD21-06-71227	530	79–80
21-24542	MD21-05-61781	1416	14–15
21-24542	MD21-05-61780	1439	23.5–24.5
21-24542	MD21-06-71230	410	14–15
21-24542	MD21-06-71229	800	39–40

Note: Units are pCi/L.

Table B-2.5-1
Summary of COPCs at SWMUs 21-018(a) and 21-018(b) by Media

Media	Inorganic COPCs	Organic COPCs	Radionuclide COPCs
Soil/Fill	Nitrate	Acenaphthene	Americium-241
	Perchlorate	Acenaphthylene	Cesium-137
	Cobalt	Anthracene	Tritium
	Selenium	Benzo(a)anthracene	Sodium-22
	Silver	Benzo(a)pyrene	Plutonium-238
		Benzo(b)fluoranthene	Plutonium-239
		Benzo(g,h,i)perylene	Uranium-234
		Benzoic acid	Uranium-235
		Bis(2-ethylhexyl)phthalate	
		Bromophenyl-phenylether[4-]	
		Chloro-3-methylphenol[4-]	
		Chloronaphthalene[2-]	
		Chrysene	
		Fluoranthene	
		Fluorene	
		Indeno(1,2,3-cd)pyrene	
		Methylnaphthalene[2-]	
		Naphthalene	
		Nitroaniline[3-]	
		Phenanthrene	
		Pyrene	
Qbt 2 and Qbt 3	Cyanide	Acetone	Americium-241
	Nitrate	Benzo(a)anthracene	Cobalt-60
	Perchlorate	Benzo(a)pyrene	Cesium-134
	Aluminum	Benzo(b)fluoranthene	Cesium-137
	Antimony	Benzo(g,h,i)perylene	Tritium
	Arsenic	Bis(2-ethylhexyl)phthalate	Plutonium-238
	Barium	Butylbenzylphthalate	Plutonium-239
	Beryllium	Carbon Disulfide	Strontium-90
	Chromium	Chloromethane	Uranium-234
	Cobalt	Chrysene	Uranium-235
	Copper	Diethylphthalate	Uranium-238
	Iron	Di-n-butylphthalate	
	Lead	Di-n-octylphthalate	
	Manganese	Fluoranthene	
	Mercury	Indeno(1,2,3-cd)pyrene	
	Nickel	Phenanthrene	
	Selenium	Pyrene	

Table B-2.5-1 (continued)

Media	Inorganic COPCs	Organic COPCs	Radionuclide COPCs
	Silver	Styrene	
	Uranium		
	Vanadium		
	Zinc		
Qbt 1g, Qct, and Qbo	Nitrate	Bis(2-ethylhexyl)phthalate	Tritium
	Arsenic		Plutonium-238
	Barium		Plutonium-239
	Cadmium		Uranium-235
	Chromium		
	Copper		
	Iron		
	Nickel		
	Selenium		
	Silver		
	Uranium		
	Vanadium		
	Zinc		
Qbt 1v	Chromium	None	None
	Selenium		
Pore Gas	None	Acetone	Tritium
		Benzene	
		Bromodichloroethane	
		1-Butanol	
		2-Butanone	
		Carbon disulfide	
		Carbon tetrachloride	
		Chloroform	
		Chloromethane	
		Dichlorodifluoromethane	
		1,1-Dichloroethane	
		1,2-Dichloroethane	
		1,2-Dichloropropane	
		1,4-Dioxane	
		Ethanol	
		Ethylbenzene	
		4-Ethyltoluene	
		n-Heptane	
		Hexane	
		Methanol	

Table B-2.5-1 (continued)

Media	Inorganic COPCs	Organic COPCs	Radionuclide COPCs
		2-Methyl-4-pentanone	
		Methylene chloride	
		2-Propanol	
		Propylene	
		Styrene	
		Tetrachloroethene	
		Tetrahydrofuran	
		Toluene	
		1,1,1-Trichloroethane	
		Trichloroethane	
		1,2,2-Trichloro-1,1,2-trifluoroethane	
		Trichlorofluoromethane	
		1,2,4-Trimethylbenzene	
		1,3,5-Trimethylbenzene	
		Vinyl acetate	
		Vinyl chloride	
		Xylene (Total)	
		1,2-Xylene	
		1,3-Xylene+1,4-Xylene	

Table B-3.1-1
Frequency of Inorganic Chemicals Detected in
Soil and Sediment at SWMU 21-013(b) and AOC 21-013(g)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
SWMU 21-013(b)							
Aluminum	Soil	101	101	4.8–17500	29200	0/101	0/101
Antimony	Soil	101	6	0.114–0.839	0.83	1/101	0/101
Arsenic	Soil	101	84	[0.78]–4.3	8.17	0/101	0/101
Barium	Soil	101	97	3.04–295	295	0/101	0/101
Beryllium	Soil	101	82	0.167–1.55	1.83	0/101	0/101
Cadmium	Soil	101	6	[0.06]–2.5	0.4	1/101	92/101
Calcium	Soil	101	100	0.06–11100	6120	3/101	0/101
Chromium	Soil	101	94	[0.571]–27.1	19.3	4/101	0/101
Cobalt	Soil	101	78	0.2–6.73	8.64	0/101	0/101
Copper	Soil	101	89	0.713–20.4	14.7	1/101	0/101
Cyanide (Total)	Soil	82	14	0.131–0.297	0.5	0/82	0/101
Iron	Soil	101	100	4.85–14700	21500	0/101	0/101
Lead	Soil	101	97	[1.06]–25.7	22.3	4/101	0/101
Magnesium	Soil	101	88	1.08–2750	4610	0/101	0/101
Manganese	Soil	101	101	67.3–578	671	0/101	0/101
Mercury	Soil	94	89	0.0034–0.43	0.1	12/94	0/94
Nickel	Soil	101	82	0.439–15.1	15.4	0/101	0/101
Nitrate	Soil	82	59	0.515–15.5	na[a]	59/82	n/a[b]
Perchlorate	Soil	82	33	0.000281–0.00394	na	33/82	n/a
Potassium	Soil	101	82	127–2210	3460	0/101	0/101
Selenium	Soil	101	2	[0.54]–[1.89]	1.52	0/101	73/101
Silver	Soil	96	71	0.0416–14.4	1	1/96	10/96
Sodium	Soil	101	82	[13.3]–452	915	0/101	0/101
Thallium	Soil	101	35	0.0856–[1.05]	0.73	0/101	1/101
Uranium	Soil	19	17	[0]–5.95	1.82	10/19	0/19
Vanadium	Soil	101	88	1.18–26.8	39.6	0/101	0/101
Zinc	Soil	101	101	8.44–62.9	48.8	9/101	0/101
AOC 21-013(g)							
Aluminum	Soil	9	9	4200–9860	29200	0/9	0/9
Antimony	Soil	9	1	0.116–[0.452]	0.83	0/9	0/9
Arsenic	Soil	9	4	[1.3]–2.81	8.17	0/9	0/9
Barium	Soil	9	8	[40.6]–183	295	0/9	0/9
Beryllium	Soil	9	4	[0.36]–0.766	1.83	0/9	0/9

Table B-3.1-1 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Cadmium	Soil	9	1	[0.42]–0.91	0.4	1/9	8/9
Calcium	Soil	9	9	932–2680	6120	0/9	0/9
Chromium	Soil	9	9	3.1–27.6	19.3	1/9	0/9
Cobalt	Soil	9	4	1.34–[6.1]	8.64	0/9	0/9
Copper	Soil	9	4	[1.5]–9.6	14.7	0/9	0/9
Cyanide (Total)	Soil	4	0	[0.248–0.263]	0.5	0/4	0/4
Iron	Soil	9	9	4270–10300	21500	0/9	0/9
Lead	Soil	9	9	4.48–26.4	22.3	2/9	0/9
Magnesium	Soil	9	5	[7.94]–1310	4610	0/9	0/9
Manganese	Soil	9	9	203–516	671	0/9	0/9
Mercury	Soil	4	4	0.0163–0.0725	0.1	0/4	0/4
Nickel	Soil	9	4	[2.3]–6.74	15.4	0/9	0/9
Nitrate	Soil	4	3	[1.14]–5.12	na	3/4	n/a
Perchlorate	Soil	4	3	0.000815–[0.00223]	na	3/4	n/a
Potassium	Soil	9	5	667–1240	3460	0/9	0/9
Selenium	Soil	9	0	[0.63–1.69]	1.52	0/9	4/9
Silver	Soil	7	4	0.0699–[2.4]	1	0/7	3/7
Sodium	Soil	9	4	[53.2]–157	915	0/9	0/9
Thallium	Soil	9	3	0.102–[0.25]	0.73	0/9	0/9
Uranium	Soil	5	5	1.78–3.91	1.82	3/5	0/5
Vanadium	Soil	9	7	[4.7]–15.4	39.6	0/9	0/9
Zinc	Soil	9	9	18.4–45.8	48.8	0/9	0/9
Aluminum	Sediment	3	3	883–2490	15400	0/3	0/3
Antimony	Sediment	3	0	[0.2–0.21]	0.83	0/3	0/3
Arsenic	Sediment	3	0	[0.63–0.93]	3.98	0/3	0/3
Barium	Sediment	3	0	[10.8–28.4]	127	0/3	0/3
Beryllium	Sediment	3	0	[0.2–0.45]	1.31	0/3	0/3
Cadmium	Sediment	3	0	[0.41–0.42]	0.4	0/3	3/3
Calcium	Sediment	3	1	[351]–1070	4420	0/3	0/3
Chromium	Sediment	3	2	[1.9]–3.3	10.5	0/3	0/3
Cobalt	Sediment	3	0	[1.4–1.5]	4.73	0/3	0/3
Copper	Sediment	3	0	[0.81–1.6]	11.2	0/3	0/3
Iron	Sediment	3	3	915–2230	13800	0/3	0/3
Lead	Sediment	3	3	5.2–8.1	19.7	0/3	0/3
Magnesium	Sediment	3	0	[176–471]	2370	0/3	0/3
Manganese	Sediment	3	3	60.8–89.7	543	0/3	0/3

Table B-3.1-1 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Mercury	Sediment	3	0	[0.02–0.02]	0.1	0/3	0/3
Nickel	Sediment	3	0	[1.6–1.8]	9.38	0/3	0/3
Potassium	Sediment	3	0	[136–170]	2690	0/3	0/3
Selenium	Sediment	3	0	[0.61–0.63]	0.3	0/3	3/3
Silver	Sediment	3	0	[2–2.1]	1	0/3	3/3
Sodium	Sediment	3	0	[17.2–42.1]	1470	0/3	0/3
Thallium	Sediment	3	0	[0.2–0.21]	0.73	0/3	0/3
Uranium	Sediment	3	3	0.752–1.99	2.22	0/3	0/3
Vanadium	Sediment	3	0	[1.2–4.1]	19.7	0/3	0/3
Zinc	Sediment	3	3	5.6–8.3	60.2	0/3	0/3

Source: Background values from LANL (1998, 059730, Table 6.0-1, p. 44).

Note: Values in brackets are below detection limits.

[a] na = Not available.

[b] n/a = Not applicable.

Table B-3.1-2
Summary of Inorganic Chemicals above Background Values in Soil and Sediment at SWMU 21-013(b) and AOC 21-013(g)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Zinc
Soil Background Value				**0.83**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**0.1**	**na**[a]	**na**	**1.52**	**1**	**0.73**	**1.82**	**48.8**
Sediment Background Value				**0.83**	**0.4**	**4420**	**10.5**	**11.2**	**19.7**	**0.1**	**na**	**na**	**0.3**	**1**	**0.73**	**2.22**	**60.2**
SWMU 21-013(b)																	
AAA7528	21-01866	0.00–0.25	Soil	—[b]	—	—	—	—	—	0.3	—	—	—	—	—	—	—
AAA7529	21-01866	0.25–0.50	Soil	—	—	—	—	—	—	0.18	—	—	—	—	—	—	—
AAA7530	21-01866	0.50-1.00	Soil	—	—	—	—	—	—	0.35	—	—	—	—	—	—	—
AAA7531	21-01867	0.00–0.25	Soil	—	0.41 (U)	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
AAA7532	21-01867	0.25–0.50	Soil	—	0.61 (U)	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
AAA7533	21-01867	0.50–1.00	Soil	—	0.41 (U)	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
AAA7534	21-01868	0.00–0.25	Soil	—	0.43 (U)	—	—	—	—	0.12 (J)	—	—	—	2.1 (U)	—	—	—
AAA7535	21-01868	0.25–0.50	Soil	—	0.86 (U)	6270	—	—	—	0.16 (J)	—	—	—	2.2 (U)	—	—	—
AAA7536	21-01868	0.50–1.00	Soil	—	0.64 (U)	—	—	—	—	0.14 (J)	—	—	—	2.2 (U)	—	1.93 (J)	—
AAB8916	21-01875	0.00–0.42	Soil	—	0.42 (U)	—	—	—	—	—	—	—	—	2.1 (U)	—	2.61 (J)	—
AAB8932	21-01878	0.00–0.33	Soil	—	0.46 (U)	—	—	—	—	—	—	—	—	2.3 (U)	—	3.36 (J)	—
AAB8936	21-01879	0.00–0.42	Soil	—	0.52 (U)	—	—	—	—	—	—	—	—	—	—	5.95	—
AAB8946	21-01881	0.00–0.50	Soil	—	0.42 (U)	—	—	—	—	—	—	—	—	—	—	3.5	—
AAB8947	21-01881	0.50–0.83	Soil	—	0.42 (U)	—	—	—	—	—	—	—	—	—	—	3.6	—
AAB8956	21-01883	0.00–0.50	Soil	—	0.46 (U)	—	—	—	—	—	—	—	—	—	—	2	—
AAB8957	21-01883	0.50–1.00	Soil	—	0.42 (U)	—	—	—	—	—	—	—	—	—	—	—	—
AAB7287	21-02572	0.00–0.25	Soil	—	0.84 (U)	—	—	—	22.5	0.16 (J)	—	—	—	2.4 (U)	—	2.23 (J)	54.6
AAB7288	21-02572	0.25–0.50	Soil	—	0.9 (U)	—	—	—	24.2	0.16 (J)	—	—	—	2.4 (U)	—	3.63 (J)	53.7
AAB7289	21-02572	0.50–1.00	Soil	—	0.86 (U)	—	—	—	22.6	0.43 (J)	—	—	—	14.4	—	5.72 (J)	—
MD21-05-60367	21-24639	0.00–0.50	Soil	—	0.631 (U)	—	—	—	—	—	—	—	1.89 (U)	—	—	—	—
MD21-05-60368	21-24639	1.50–2.00	Soil	—	0.567 (U)	—	—	—	—	—	—	0.000329 (J-)	1.7 (U)	—	—	—	—
MD21-05-60370	21-24640	0.00–0.50	Soil	—	0.53 (U)	—	—	—	—	—	2.61	—	1.59 (U)	—	—	—	—
MD21-05-60371	21-24640	1.50–2.00	Soil	—	0.533 (U)	—	23.9	—	—	—	1.27	0.00105 (J-)	1.6 (U)	—	—	—	—
MD21-05-60373	21-24641	0.00–0.50	Soil	—	0.546 (U)	—	—	—	—	—	5.93	—	1.64 (U)	—	—	—	—
MD21-05-60374	21-24641	0.50–1.00	Soil	—	0.508 (U)	—	—	—	—	—	1.74	—	—	—	—	—	—
MD21-05-60375	21-24642	0.00–0.50	Soil	—	0.527 (U)	—	—	—	—	—	3.77	—	1.58 (U)	—	—	—	—
MD21-05-60377	21-24642	1.50–2.00	Soil	—	0.541 (U)	—	—	—	—	—	1.73	—	1.62 (U)	—	—	—	—
MD21-05-60379	21-24643	0.00–0.50	Soil	—	0.539 (U)	—	—	—	—	—	1.91 (J-)	—	1.62 (U)	—	—	—	—
MD21-05-60380	21-24643	1.50–2.00	Soil	—	0.535 (U)	—	—	—	—	—	—	0.000291 (J-)	1.6 (U)	—	—	—	—
MD21-05-60382	21-24644	0.00–0.50	Soil	—	0.542 (U)	—	—	—	—	—	1.34 (J-)	—	1.63 (U)	—	—	—	—
MD21-05-60383	21-24644	1.50–2.00	Soil	—	0.56 (U)	—	—	—	—	—	—	—	1.68 (U)	—	—	—	—
MD21-05-60385	21-24645	0.00–0.50	Soil	—	0.537 (U)	—	—	—	—	—	1.57 (J-)	0.000912 (J-)	1.61 (U)	—	—	—	—

Table B-3.1-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Zinc
Soil Background Value				**0.83**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**0.1**	**na**	**na**	**1.52**	**1**	**0.73**	**1.82**	**48.8**
Sediment Background Value				**0.83**	**0.4**	**4420**	**10.5**	**11.2**	**19.7**	**0.1**	**na**	**na**	**0.3**	**1**	**0.73**	**2.22**	**60.2**
MD21-05-60386	21-24645	1.50–2.00	Soil	—	0.527 (U)	—	—	—	—	—	1.99 (J-)	0.000722 (J-)	1.58 (U)	—	—	—	—
MD21-05-60388	21-24646	0.00–0.50	Soil	—	0.564 (U)	—	—	—	—	—	4.06 (J-)	—	1.69 (U)	—	—	—	—
MD21-05-60389	21-24646	1.50–2.00	Soil	—	0.511 (U)	—	—	—	—	—	0.85 (J-)	0.000281 (J-)	1.53 (U)	—	—	—	—
MD21-05-60391	21-24647	0.00–0.50	Soil	—	0.545 (U)	—	—	—	—	—	1.46 (J-)	0.000332 (J-)	1.63 (U)	—	—	—	—
MD21-05-60392	21-24647	1.50–2.00	Soil	—	0.524 (U)	—	—	—	—	—	—	0.0003 (J-)	1.57 (U)	—	—	—	—
MD21-05-60394	21-24648	0.00–0.50	Soil	—	0.52 (U)	—	—	—	—	—	2.22 (J-)	—	1.56 (U)	—	—	—	—
MD21-05-60395	21-24648	1.50–2.00	Soil	—	0.506 (U)	—	—	—	—	—	2.9 (J-)	0.00113	—	—	—	—	—
MD21-05-60397	21-24649	0.00–0.50	Soil	—	—	—	—	—	—	0.118	—	—	1.63 (U)	—	—	—	—
MD21-05-60398	21-24649	1.50–2.00	Soil	—	0.549 (U)	—	—	—	—	—	2.79	0.00107 (J)	1.65 (U)	—	—	—	—
MD21-05-60401	21-24650	1.50–2.00	Soil	—	—	—	—	—	—	0.148	2.02	—	1.68 (U)	—	—	—	—
MD21-05-60403	21-24651	0.00–0.50	Soil	—	0.542 (U)	—	—	—	—	—	3.43	—	1.63 (U)	—	—	—	—
MD21-05-60404	21-24651	1.50–2.00	Soil	—	0.574 (U)	—	—	—	—	—	1.39	0.000917 (J-)	1.72 (U)	—	—	—	—
MD21-05-60406	21-24652	0.00–0.50	Soil	—	0.519 (U)	—	—	—	—	—	2.6	—	1.56 (U)	—	—	—	—
MD21-05-60407	21-24652	1.50–2.00	Soil	—	0.52 (U)	—	—	—	—	—	2.26	0.000633 (J-)	1.56 (U)	—	—	—	50.9
MD21-05-60409	21-24653	0.00–0.60	Soil	—	0.536 (U)	—	—	—	—	—	6.52	0.000834 (J-)	1.61 (U)	—	—	—	55.5
MD21-05-60410	21-24653	1.50–2.00	Soil	—	0.535 (U)	—	—	—	—	—	11	0.000739 (J-)	1.6 (U)	—	—	—	—
MD21-05-60413	21-24654	1.50–2.00	Soil	—	0.529 (U)	—	21.3 (J)	—	—	—	7.25	0.00107 (J-)	1.59 (U)	—	—	—	—
MD21-05-60418	21-24656	0.00–0.50	Soil	—	0.538 (U)	—	—	—	—	—	3.78	0.0011 (J-)	1.61 (U)	—	—	—	—
MD21-05-60419	21-24656	1.50–2.00	Soil	—	0.551 (U)	—	—	—	—	—	1.33	0.000695 (J-)	1.65 (U)	—	—	—	—
MD21-05-60421	21-24657	0.00–0.50	Soil	—	0.54 (U)	—	—	—	—	—	2.35	—	1.62 (U)	—	—	—	54
MD21-05-60422	21-24657	1.50–2.00	Soil	—	0.54 (U)	—	—	—	—	—	6.4	0.00394 (J-)	1.62 (U)	—	—	—	—
MD21-05-60424	21-24658	0.00–0.50	Soil	—	—	—	—	—	—	—	1.97	—	1.62 (U)	—	—	—	—
MD21-05-60425	21-24658	1.50–2.00	Soil	—	0.524 (U)	—	—	—	—	—	0.785 (J)	—	1.57 (U)	—	—	—	—
MD21-05-60437	21-24659	0.00–0.50	Soil	—	0.561 (U)	—	—	—	—	—	15.5	0.000765 (J)	1.68 (U)	—	—	—	—
MD21-05-60436	21-24659	1.00–1.50	Soil	—	0.525 (U)	—	—	—	—	—	3.29	—	1.58 (U)	—	—	—	—
MD21-05-60440	21-24660	1.50–2.00	Soil	—	0.542 (U)	—	—	—	—	—	1.35	0.000981 (J)	1.63 (U)	—	—	—	—
MD21-05-60443	21-24661	1.50–2.00	Soil	—	0.512 (U)	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—
MD21-05-60445	21-24662	0.00–0.50	Soil	—	—	—	—	—	—	—	0.848 (J)	—	—	—	—	—	—
MD21-05-60446	21-24662	1.50–2.00	Soil	—	0.548 (U)	—	23.6 (J+)	—	—	—	—	0.000576 (J)	1.64 (U)	—	—	—	—
MD21-05-60448	21-24663	0.00–0.50	Soil	—	0.516 (U)	—	—	—	—	—	2.26	—	1.55 (U)	—	—	—	—
MD21-05-60449	21-24663	1.50–2.00	Soil	—	0.532 (U)	11100 (J+)	—	—	—	—	1.01 (J)	0.000977 (J)	—	—	—	—	—
MD21-05-60451	21-24664	0.00–0.50	Soil	—	0.537 (U)	—	—	—	25.7	—	3.01	—	1.61 (U)	—	—	—	—
MD21-05-60452	21-24664	1.50–2.00	Soil	—	0.53 (U)	—	—	—	—	—	—	—	1.59 (U)	—	—	—	—
MD21-05-60454	21-24665	0.00–0.50	Soil	—	0.527 (U)	—	—	—	—	—	5.59	—	1.58 (U)	—	—	—	62.9

Table B-3.1-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Zinc
Soil Background Value				**0.83**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**0.1**	**na**	**na**	**1.52**	**1**	**0.73**	**1.82**	**48.8**
Sediment Background Value				**0.83**	**0.4**	**4420**	**10.5**	**11.2**	**19.7**	**0.1**	**na**	**na**	**0.3**	**1**	**0.73**	**2.22**	**60.2**
MD21-05-60455	21-24665	1.50–2.00	Soil	—	0.534 (U)	—	—	—	—	—	4.68	0.000961 (J)	—	—	—	—	54.7
MD21-05-60457	21-24666	0.00–0.50	Soil	—	0.504 (U)	—	—	—	—	—	1.63	0.000992 (J)	—	—	—	—	—
MD21-05-60458	21-24666	1.50–2.00	Soil	—	0.52 (U)	—	—	—	—	—	0.645 (J)	—	1.56 (U)	—	—	—	—
MD21-05-60460	21-24667	0.00–0.50	Soil	—	0.508 (U)	—	—	—	—	—	2.78	—	—	—	—	—	—
MD21-05-60461	21-24667	1.50–2.00	Soil	—	0.495 (U)	—	—	—	—	—	0.515 (J)	—	—	—	—	—	—
MD21-05-60464	21-24668	1.50–2.00	Soil	—	0.527 (U)	—	—	—	—	—	1.02 (J)	0.00091 (J)	1.58 (U)	—	—	—	—
MD21-05-60466	21-24669	0.00–0.50	Soil	—	0.54 (U)	—	—	—	—	—	0.756 (J)	—	1.62 (U)	—	—	—	—
MD21-05-60467	21-24669	1.50–2.00	Soil	—	0.533 (U)	—	27.1	—	—	—	—	0.000666 (J)	1.6 (U)	—	—	—	—
MD21-05-60469	21-24670	0.00–0.50	Soil	—	0.505 (U)	—	—	—	—	—	0.811 (J)	—	—	—	—	—	—
MD21-05-60470	21-24670	1.50–2.00	Soil	—	0.54 (U)	—	—	—	—	—	0.561 (J)	—	1.62 (U)	—	—	—	—
MD21-05-60472	21-24671	0.00–0.50	Soil	—	0.522 (U)	—	—	—	—	—	0.908 (J)	—	1.57 (U)	—	—	—	—
MD21-05-60473	21-24671	1.50–2.00	Soil	—	0.532 (U)	7050 (J+)	—	—	—	—	—	—	1.6 (U)	—	—	—	—
MD21-05-60475	21-24672	0.00–0.50	Soil	—	0.512 (U)	—	—	—	—	—	2.06	—	1.54 (U)	—	—	—	56.9
MD21-05-60476	21-24672	1.50–2.00	Soil	—	0.528 (U)	—	—	—	—	—	—	0.000576 (J)	1.58 (U)	—	—	—	—
MD21-05-60478	21-24673	0.00–0.50	Soil	—	0.528 (U)	—	—	—	—	—	4.47	0.000985 (J)	1.58 (U)	—	—	—	—
MD21-05-60479	21-24673	1.50–2.00	Soil	—	0.522 (U)	—	—	—	—	—	—	0.000842 (J)	1.57 (U)	—	—	—	—
MD21-05-60481	21-24674	0.00–0.50	Soil	—	0.515 (U)	—	—	—	—	—	1.44	—	1.55 (U)	—	—	—	—
MD21-05-60482	21-24674	1.50–2.00	Soil	—	0.526 (U)	—	—	—	—	—	—	—	1.58 (U)	—	—	—	—
MD21-05-60484	21-24675	0.00–0.50	Soil	—	0.518 (U)	—	—	—	—	—	1.31	—	1.55 (U)	—	—	—	—
MD21-05-60485	21-24675	1.50–2.00	Soil	—	0.536 (U)	—	—	—	—	—	0.963 (J)	—	1.61 (U)	—	—	—	—
MD21-05-60487	21-24676	0.00–0.50	Soil	—	0.529 (U)	—	—	—	—	—	—	0.000578 (J)	1.59 (U)	—	—	—	—
MD21-05-60490	21-24677	0.00–0.50	Soil	—	0.521 (U)	—	—	—	—	—	—	—	1.56 (U)	—	—	—	—
MD21-05-60491	21-24677	1.50–2.00	Soil	—	0.555 (U)	—	—	—	—	—	—	—	1.66 (U)	—	—	—	—
MD21-05-60493	21-24678	0.00–0.50	Soil	—	0.543 (U)	—	—	—	—	—	—	—	1.63 (U)	—	—	—	—
MD21-05-60494	21-24678	1.50–2.00	Soil	—	0.538 (U)	—	—	—	—	0.2	9.83	0.00264	1.62 (U)	—	—	—	—
MD21-05-60568	21-24679	0.00–0.50	Soil	—	0.543 (U)	—	—	—	—	—	1.15	—	1.63 (U)	—	—	—	—
MD21-05-60569	21-24679	1.50–2.00	Soil	—	0.538 (U)	—	—	—	—	—	—	—	1.61 (U)	—	—	—	—
MD21-05-60571	21-24680	0.00–0.50	Soil	—	0.526 (U)	—	—	—	—	—	1.38	—	1.58 (U)	—	—	—	55
MD21-05-60572	21-24680	1.50–2.00	Soil	—	2.5	—	—	20.4	—	—	5.56	0.000778 (J)	1.62 (U)	—	—	—	—
MD21-05-60574	21-24681	0.00–0.50	Soil	—	0.513 (U)	—	—	—	—	—	—	—	1.54 (U)	—	—	—	—
MD21-05-60575	21-24681	1.50–2.00	Soil	—	0.516 (U)	—	—	—	—	—	—	—	1.55 (U)	—	1.05 (U)	—	—
MD21-05-60577	21-24682	0.00–0.50	Soil	—	—	—	—	—	—	—	1.94 (J-)	—	1.59 (U)	—	—	—	—
MD21-05-60578	21-24682	1.50–2.00	Soil	—	0.518 (U)	—	—	—	—	—	2.47 (J-)	0.000555 (J)	1.55 (U)	—	—	—	—
MD21-05-60580	21-24683	0.00–0.50	Soil	0.839	0.522 (U)	—	—	—	—	—	—	—	1.57 (U)	—	—	—	—

Table B-3.1-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Zinc
Soil Background Value				**0.83**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**0.1**	**na**	**na**	**1.52**	**1**	**0.73**	**1.82**	**48.8**
Sediment Background Value				**0.83**	**0.4**	**4420**	**10.5**	**11.2**	**19.7**	**0.1**	**na**	**na**	**0.3**	**1**	**0.73**	**2.22**	**60.2**
MD21-05-60581	21-24683	1.50–2.00	Soil	—	0.53 (U)	—	—	—	—	—	—	—	1.59 (U)	—	—	—	—
AOC 21-013(g)																	
AAB8911	21-01874	0.00–0.50	Soil	0.48 (U)	—	25.9	—	—	—	—	—	—	—	2.4 (U)	—	—	—
AAB8912	21-01874	0.50–1.00	Soil	0.91 (U)	—	—	—	—	—	—	—	—	—	2.3 (U)	—	2.3 (J)	—
AAB8913	21-01874	1.00–1.33	Soil	0.46 (U)	—	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
AAB9021	21-01896	0.00–0.50	Soil	0.51 (U)	—	—	—	—	—	—	—	—	—	—	—	3.91	—
AAB9022	21-01896	0.50–1.00	Soil	0.42 (U)	—	—	—	—	—	—	—	—	—	—	—	2.03	—
AAB7290	21-02573	0.00–0.25	Sediment	—	0.41 (U)	—	—	—	—	—	—	—	0.61 (U)	2 (U)	—	—	—
AAB7291	21-02573	0.25–0.50	Sediment	—	0.42 (U)	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	—	—
AAB7292	21-02573	0.50–1.00	Sediment	—	0.42 (U)	—	—	—	—	—	—	—	0.63 (U)	2.1 (U)	—	—	—
MD21-05-60415	21-24655	0.00–0.50	Soil	—	0.551 (U)	—	—	—	—	—	1.44	—	1.65 (U)	—	—	—	—
MD21-05-60416	21-24655	1.50–2.00	Soil	—	0.563 (U)	—	27.6 (J)	—	—	—	—	0.00152 (J-)	1.69 (U)	—	—	—	—
MD21-05-60442	21-24661	0.00–0.50	Soil	—	0.691	—	—	—	26.4	—	2.01	0.000985 (J)	1.59 (U)	—	—	—	—
MD21-05-60463	21-24668	0.00–0.50	Soil	—	0.532 (U)	—	—	—	—	—	5.12	0.000815 (J)	1.6 (U)	—	—	—	—

Source: Background values from LANL (1998, 059730, Table 6.0-1, p. 44).
Note: Units are mg/kg. Data qualifiers are defined in Appendix A.
[a] na = Not available.
[b] A dash indicates that if analyzed, sample result is less than background value.

Table B-3.2-1
Frequency of Radionuclides Detected or Detected above
Background/Fallout Values in Soil and Sediment at SWMU 21-013(b) and AOC 21-013(g)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background/ Fallout Value (pCi/g)	Frequency of Detects above Background/ Fallout Value
SWMU 21-013(b)						
Americium-241	Soil	96	56	[-0.163]–1.13	0.013[a]	55/96
Cesium-134	Soil	39	0	[0.0171–0.107]	na[b]	0/39
Cesium-137	Soil	90	37	[-0.0452]–1.77	1.65[a]	9/90
Cobalt-60	Soil	82	0	[-0.0623–0.0611]	na	0/82
Europium-152	Soil	82	0	[-0.127–0.103]	na	0/82
Plutonium-238	Soil	106	24	[-0.016]–0.997	0.023[a]	19/106
Plutonium-239	Soil	106	90	[-0.00422]–11.1	0.054[a]	88/106
Ruthenium-106	Soil	81	0	[-0.449–0.301]	na	0/81
Sodium-22	Soil	81	0	[-0.0532–0.0528]	na	0/81
Strontium-90	Soil	106	16	[-0.1]–0.52	1.31[a]	4/106
Thorium-228	Soil	2	2	1.32–1.69	2.28	0/2
Thorium-230	Soil	2	2	1.14–1.2	2.29	0/2
Thorium-232	Soil	2	2	1.39–1.53	2.33	0/2
Tritium	Soil	101	68	[2.70E-03]–0.52	na	68/101
Uranium-234	Soil	84	84	0.797–3.75	2.59	1/84
Uranium-235	Soil	84	66	[0.0404]–0.366	0.2	2/84
Uranium-238	Soil	84	84	0.727–4.35	2.29	3/84
AOC 21-013(g)						
Uranium-234	Fill	4	4	0.755–0.836	2.59	0/4
Uranium-235	Fill	4	4	0.033–0.041	0.2	0/4
Uranium-238	Fill	4	4	0.705–0.899	2.29	0/4
Americium-241	Soil	11	7	[-0.139]–1.05	0.013[a]	6/11
Cesium-134	Soil	1	0	[0.0768]	na	0/1
Cesium-137	Soil	9	7	[-0.0355]–1.64	1.65[a]	3/9
Cobalt-60	Soil	4	0	[-0.00908–0.0158]	na	0/4
Europium-152	Soil	4	0	[-0.208–0.0614]	na	0/4
Plutonium-238	Soil	11	6	[0.002]–0.114	0.023[a]	6/11
Plutonium-239	Soil	11	11	0.115–13.7	0.054[a]	11/11
Ruthenium-106	Soil	4	0	[-0.0373–0.125]	na	0/4
Sodium-22	Soil	4	0	[-0.0433–0.059]	na	0/4
Strontium-90	Soil	11	4	[-0.2]–0.494	1.31[a]	1/11
Tritium	Soil	9	7	2.13E-02–0.15	na	7/9
Uranium-234	Soil	4	4	1–2.68	2.59	1/4
Uranium-235	Soil	4	4	0.0575–0.272	0.2	1/4

Table B-3.2-1 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background/ Fallout Value (pCi/g)	Frequency of Detects above Background/ Fallout Value
Uranium-238	Soil	4	4	1.07–3.44	2.29	1/4
Plutonium-238	Sediment	3	0	[0.0027–0.0063]	0.006	0/3
Plutonium-239	Sediment	3	3	0.0411–0.410	0.068	2/3
Strontium-90	Sediment	3	2	[0.35]–0.52	1.04	0/3
Tritium	Sediment	3	0	[7.01E-03–1.17E-02]	0.093	0/3

Source: Background/fallout values from LANL (1998, 059730, Table 6.0-2, p. 45).
Note: Values in brackets are below detection limits.

[a] FV applies to samples collected from 0–6 in. only, all activities detected below 6 in. are reported.

[b] na = Not available.

Table B-3.2-2
Summary of Radionuclides Detected or Detected above
Background/Fallout Values in Soil and Sediment at SWMU 21-013(b) and AOC 21-013(g)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Sediment Background Value				**0.040**	**0.90**	**0.006**	**0.068**	**1.04**	**0.093**	**2.59**	**0.20**	**2.29**
SWMU 21-013(b)												
AAA0225	21-01056	0.00–0.08	Soil	—[c]	—	—	0.433	—	—	—	—	—
AAA0226	21-01056	0.00–0.50	Soil	0.05	—	—	0.921	—	—	—	—	—
AAA0235	21-01063	0.00–0.08	Soil	0.05	—	—	0.937	—	—	—	—	—
AAA0227	21-01292	0.00–0.08	Soil	0.023	—	—	0.2	—	—	—	—	—
AAA0228	21-01292	0.00–0.50	Soil	0.016	—	—	0.205	—	—	—	—	—
AAA7528	21-01866	0.00–0.25	Soil	—	—	—	0.3558	—	4.30E-02	—	—	—
AAA7529	21-01866	0.25–0.50	Soil	—	—	—	0.2391	—	3.91E-02	—	—	—
AAA7530	21-01866	0.50–1.00	Soil	—	—	—	0.2847	—	—	—	—	—
AAA7531	21-01867	0.00–0.25	Soil	—	—	—	0.2385	—	—	—	—	—
AAA7532	21-01867	0.25–0.50	Soil	—	—	—	0.23	—	—	—	—	—
AAA7533	21-01867	0.50–1.00	Soil	—	—	—	0.0708	—	—	—	—	—
AAA7534	21-01868	0.00–0.25	Soil	—	—	—	1.684	—	3.45E-02	—	—	—
AAA7535	21-01868	0.25–0.50	Soil	—	—	0.9967	2.046	—	—	—	—	—
AAA7536	21-01868	0.50–1.00	Soil	0.1773	—	0.013	2.604	0.52	3.67E-02	—	—	—
AAB8916	21-01875	0.00–0.42	Soil	—	—	—	0.185	—	0.11	—	—	—
AAB8932	21-01878	0.00–0.33	Soil	—	—	—	0.236	—	5.79E-02	—	—	—
AAB8936	21-01879	0.00–0.42	Soil	—	—	—	3.47	—	0.067	—	—	—
AAB8946	21-01881	0.00–0.50	Soil	—	—	—	0.376	—	0.035	—	—	—
AAB8947	21-01881	0.50–0.83	Soil	—	0.866	—	0.168	0.386	2.80E-02	—	—	—
AAB8956	21-01883	0.00–0.50	Soil	—	—	—	0.0565	—	5.63E-02	—	—	—
AAB8957	21-01883	0.50–1.00	Soil	—	—	—	0.0115	0.0802	—	—	—	—

Table B-3.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Sediment Background Value				**0.040**	**0.90**	**0.006**	**0.068**	**1.04**	**0.093**	**2.59**	**0.20**	**2.29**
AAB7287	21-02572	0.00–0.25	Soil	—	—	—	3.505	—	—	—	—	—
AAB7288	21-02572	0.25–0.50	Soil	0.3212	—	0.0341	6.108	—	3.40E-02	—	—	—
AAB7289	21-02572	0.50–1.00	Soil	0.2635	0.7128	0.0246	5.52	—	—	—	—	—
MD21-05-60367	21-24639	0.00–0.50	Soil	0.13	—	—	1.42	—	—	—	—	—
MD21-05-60368	21-24639	1.50–2.00	Soil	0.0347	—	—	0.286	—	—	—	—	—
MD21-05-60370	21-24640	0.00–0.50	Soil	0.0218	—	—	0.12	—	—	—	—	—
MD21-05-60371	21-24640	1.50–2.00	Soil	—	—	—	0.0195	—	2.34E-02	—	—	—
MD21-05-60373	21-24641	0.00–0.50	Soil	0.017	—	—	0.174	—	—	—	—	—
MD21-05-60375	21-24642	0.00–0.50	Soil	0.0375	—	—	0.526	—	—	—	—	—
MD21-05-60377	21-24642	1.50–2.00	Soil	—	—	—	0.038	—	—	—	—	—
MD21-05-60379	21-24643	0.00–0.50	Soil	0.0413	—	—	0.407	—	8.37E-02	—	—	—
MD21-05-60385	21-24645	0.00–0.50	Soil	0.0178	—	—	0.233	—	—	—	—	—
MD21-05-60386	21-24645	1.50–2.00	Soil	0.0204	—	—	0.0929	—	1.70E-02	—	—	—
MD21-05-60391	21-24647	0.00–0.50	Soil	0.0273	—	—	0.832	—	—	—	—	—
MD21-05-60392	21-24647	1.50–2.00	Soil	—	—	—	0.258	—	2.82E-02	—	—	—
MD21-05-60394	21-24648	0.00–0.50	Soil	0.0162	—	—	0.372	—	2.93E-02	—	—	—
MD21-05-60395	21-24648	1.50–2.00	Soil	—	—	—	—	—	3.33E-02	—	—	—
MD21-05-60397	21-24649	0.00–0.50	Soil	0.559	—	0.0556 (J+)	9.22 (J+)	—	3.63E-02	—	—	—
MD21-05-60398	21-24649	1.50–2.00	Soil	0.0212	—	—	0.369	—	0.13	—	—	—
MD21-05-60401	21-24650	1.50–2.00	Soil	0.0418	—	—	0.573	—	—	—	—	—
MD21-05-60403	21-24651	0.00–0.50	Soil	0.0745	—	—	1.52	—	3.63E-02	—	—	—
MD21-05-60404	21-24651	1.50–2.00	Soil	—	—	—	0.103	—	7.29E-02	—	—	—
MD21-05-60406	21-24652	0.00–0.50	Soil	0.0605	—	—	0.56	—	2.90E-02	—	—	—
MD21-05-60407	21-24652	1.50–2.00	Soil	0.0369	—	—	0.579	—	0.050	—	—	—

Table B-3.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Sediment Background Value				**0.040**	**0.90**	**0.006**	**0.068**	**1.04**	**0.093**	**2.59**	**0.20**	**2.29**
MD21-05-60409	21-24653	0.00–0.60	Soil	0.464	—	0.0557	6.54	—	0.15	—	—	—
MD21-05-60410	21-24653	1.50–2.00	Soil	0.178	—	0.0227	3.62	—	0.26	—	—	—
MD21-05-60413	21-24654	1.50–2.00	Soil	0.253	0.107	0.0191	2.64	—	7.19E-02	—	—	—
MD21-05-60418	21-24656	0.00–0.50	Soil	0.064	—	—	0.984	—	5.18E-02	—	—	—
MD21-05-60419	21-24656	1.50–2.00	Soil	—	—	—	0.145	—	5.41E-02	—	—	—
MD21-05-60421	21-24657	0.00–0.50	Soil	0.282	—	0.03	5.75	—	0.16	—	—	—
MD21-05-60422	21-24657	1.50–2.00	Soil	0.314	0.0786	0.0285	3.89	—	0.52	—	—	—
MD21-05-60424	21-24658	0.00–0.50	Soil	0.119	—	—	0.459	—	4.62E-02	—	—	—
MD21-05-60425	21-24658	1.50–2.00	Soil	0.0459	—	—	1.52	—	2.73E-02	—	—	—
MD21-05-60437	21-24659	0.00–0.50	Soil	0.452 (J+)	—	0.0497 (J+)	6.12 (J+)	—	6.64E-02	—	—	2.47
MD21-05-60436	21-24659	1.00–1.50	Soil	0.0361 (J+)	0.149	—	0.623	—	2.57E-02	—	—	—
MD21-05-60440	21-24660	1.50–2.00	Soil	1.13 (J+)	—	0.0979	11.1	0.0966	—	—	—	—
MD21-05-60443	21-24661	1.50–2.00	Soil	0.0163 (J+)	0.0916	—	0.136	—	1.13E-02	—	—	—
MD21-05-60445	21-24662	0.00–0.50	Soil	0.0223 (J+)	—	—	0.23	—	5.60E-02	—	—	—
MD21-05-60446	21-24662	1.50–2.00	Soil	—	—	—	0.0129	—	4.36E-02	—	—	—
MD21-05-60448	21-24663	0.00–0.50	Soil	0.0447 (J+)	—	—	0.615	—	1.81E-02	—	0.21	2.34
MD21-05-60449	21-24663	1.50–2.00	Soil	—	—	—	—	—	4.65E-02	—	—	—
MD21-05-60451	21-24664	0.00–0.50	Soil	—	1.77	0.0265	2.05	—	2.64E-02	3.75	0.366	4.35
MD21-05-60452	21-24664	1.50–2.00	Soil	—	—	—	0.0644	—	—	—	—	—
MD21-05-60454	21-24665	0.00–0.50	Soil	0.574 (J+)	—	0.0586	6.33	—	0.065	—	—	—
MD21-05-60455	21-24665	1.50–2.00	Soil	0.806 (J+)	0.116	0.0957 (J+)	8.31 (J+)	—	5.58E-02	—	—	—
MD21-05-60457	21-24666	0.00–0.50	Soil	—	—	—	0.101	—	1.25E-02	—	—	—
MD21-05-60458	21-24666	1.50–2.00	Soil	—	—	—	0.0886	—	1.47E-02	—	—	—
MD21-05-60460	21-24667	0.00–0.50	Soil	0.0327	—	—	0.213	—	1.92E-02	—	—	—

Table B-3.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Sediment Background Value				**0.040**	**0.90**	**0.006**	**0.068**	**1.04**	**0.093**	**2.59**	**0.20**	**2.29**
MD21-05-60461	21-24667	1.50–2.00	Soil	—	—	—	—	—	8.61E-03	—	—	—
MD21-05-60464	21-24668	1.50–2.00	Soil	0.0186	—	—	0.0306	—	0.026	—	—	—
MD21-05-60466	21-24669	0.00–0.50	Soil	0.0551	—	—	1.56	—	3.47E-02	—	—	—
MD21-05-60467	21-24669	1.50–2.00	Soil	0.0184	—	—	0.325	—	1.85E-02	—	—	—
MD21-05-60469	21-24670	0.00–0.50	Soil	0.0307	—	—	0.278	—	9.05E-03	—	—	—
MD21-05-60470	21-24670	1.50–2.00	Soil	—	—	—	—	—	2.88E-02	—	—	—
MD21-05-60472	21-24671	0.00–0.50	Soil	—	—	—	0.144	—	0.015	—	—	—
MD21-05-60473	21-24671	1.50–2.00	Soil	—	—	—	—	—	0.020	—	—	—
MD21-05-60475	21-24672	0.00–0.50	Soil	0.0237	—	—	0.242	—	1.87E-02	—	—	—
MD21-05-60476	21-24672	1.50–2.00	Soil	—	—	—	0.0289	—	0.040	—	—	—
MD21-05-60478	21-24673	0.00–0.50	Soil	0.222	—	—	1.98	—	0.030	—	—	—
MD21-05-60479	21-24673	1.50–2.00	Soil	—	—	—	—	—	1.21E-02	—	—	—
MD21-05-60481	21-24674	0.00–0.50	Soil	—	—	—	0.0973	—	—	—	—	—
MD21-05-60484	21-24675	0.00–0.50	Soil	0.0361	—	—	0.723	—	0.013	—	—	—
MD21-05-60485	21-24675	1.50–2.00	Soil	0.0177	—	—	0.376	—	—	—	—	—
MD21-05-60487	21-24676	0.00–0.50	Soil	—	—	—	0.111	—	2.61E-02	—	—	—
MD21-05-60490	21-24677	0.00–0.50	Soil	0.066	—	—	1.45	—	2.27E-02	—	—	—
MD21-05-60491	21-24677	1.50–2.00	Soil	—	—	—	0.242	—	3.68E-02	—	—	—
MD21-05-60493	21-24678	0.00–0.50	Soil	0.236	—	0.0315	4.12	—	8.91E-02	—	—	—
MD21-05-60494	21-24678	1.50–2.00	Soil	0.0848	—	0.0184	1.81	—	0.45	—	—	—
MD21-05-60568	21-24679	0.00–0.50	Soil	0.0271	—	—	0.281	—	2.84E-02	—	—	—
MD21-05-60569	21-24679	1.50–2.00	Soil	—	—	—	—	—	4.02E-02	—	—	—
MD21-05-60571	21-24680	0.00–0.50	Soil	0.534	—	0.0473 (J+)	5.05 (J+)	—	3.78E-02	—	—	—
MD21-05-60572	21-24680	1.50–2.00	Soil	0.451	0.0596	0.0312	3.33	—	5.17E-02	—	—	—

Table B-3.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Sediment Background Value				**0.040**	**0.90**	**0.006**	**0.068**	**1.04**	**0.093**	**2.59**	**0.20**	**2.29**
MD21-05-60574	21-24681	0.00–0.50	Soil	—	—	—	0.116	—	—	—	—	—
MD21-05-60577	21-24682	0.00–0.50	Soil	0.0479	—	—	0.628	—	—	—	—	—
MD21-05-60578	21-24682	1.50–2.00	Soil	—	—	—	—	—	2.39E-02	—	—	—
AOC 21-013(g)												
AAA0236	21-01069	0.00–0.08	Soil	0.027	—	—	0.274	—	—	—	—	—
AAA0237	21-01069	0.00–0.50	Soil	—	—	—	0.115	—	—	—	—	—
AAB8911	21-01874	0.00–0.50	Soil	0.805	—	0.0946	9.12	—	—	—	—	—
AAB8912	21-01874	0.50–1.00	Soil	1.05	0.173	0.114	13.7	—	—	—	—	—
AAB8913	21-01874	1.00–1.33	Soil	—	0.232	0.0343	3.36	—	2.84E-02	—	—	—
AAB9021	21-01896	0.00–0.50	Soil	—	—	0.0548	4.73	—	0.15	—	—	—
AAB9022	21-01896	0.50–1.00	Soil	—	0.384	0.0108	0.682	0.237	3.33E-02	—	—	—
AAB7291	21-02573	0.25–0.50	Sediment	—	—	—	0.0926	—	—	—	—	—
AAB7292	21-02573	0.50–1.00	Sediment	—	—	—	0.4104	—	—	—	—	—
MD21-05-60415	21-24655	0.00–0.50	Soil	0.106	—	—	1.2	—	4.11E-02	—	—	—
MD21-05-60416	21-24655	1.50–2.00	Soil	—	—	—	0.292	—	8.42E-02	—	—	—
MD21-05-60442	21-24661	0.00–0.50	Soil	0.099 (J+)	—	—	1.29	—	0.027	2.68	0.272	3.44
MD21-05-60463	21-24668	0.00–0.50	Soil	0.439	—	0.0308 (J+)	3.33 (J+)	—	2.13E-02	—	—	—

Source: Background/fallout values from LANL (1998, 059730, Table 6.0-2, p. 45).

Note: Units are pCi/g. Data qualifiers are defined in Appendix A.

[a] FV applies to samples collected from 0–6 in. only, all activities detected below 6 in. are reported.

[b] na = Not available.

[c] A dash indicates that if analyzed, sample result is less than background/fallout value or is not detected.

Table B-3.3-1
Frequency of Organic Chemicals Detected in Soil at SWMU 21-013(b) and AOC 21-013(g)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
SWMU 21-013(b)					
Anthracene	Soil	110	2	0.0108–[1.51]	2/110
Aroclor-1254	Soil	82	21	0.0013–[0.0757]	21/82
Aroclor-1260	Soil	82	20	0.0012–[0.0757]	20/82
Benzo(a)anthracene	Soil	110	1	0.0136–[1.46]	1/110
Benzo(a)pyrene	Soil	110	1	[0.0339]–[1.51]	1/110
Benzo(b)fluoranthene	Soil	110	4	0.0131–[1.51]	4/110
Benzo(k)fluoranthene	Soil	110	1	[0.0339]–[1.51]	1/110
Benzoic Acid	Soil	110	6	0.545–[30.3]	6/110
Bis(2-ethylhexyl)phthalate	Soil	110	7	0.0103–[15.1]	7/110
Chrysene	Soil	110	5	0.0171–[1.46]	5/110
Fluoranthene	Soil	110	13	0.011–[1.46]	13/110
Phenanthrene	Soil	110	10	0.0111–[1.46]	10/110
Pyrene	Soil	110	17	0.0031–[1.46]	17/110
AOC 21-013(g)					
Aroclor-1254	Soil	4	1	[0.0036]–0.0123	1/4
Aroclor-1260	Soil	4	3	0.0013–0.0083	3/4
Benzoic Acid	Soil	9	1	0.659–[2.2]	1/9
Fluoranthene	Soil	9	2	0.0132–[0.44]	2/9
Phenanthrene	Soil	9	1	0.017–[0.44]	1/9
Pyrene	Soil	9	2	0.0156–[0.44]	2/9

Note: Values in brackets are below detection limits.

Table B-3.3-2
Summary of Organic Chemicals Detected in Soil at SWMU 21-013(b) and AOC 21-013(g)

Sample ID	Location ID	Depth (ft bgs)	Media	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Chrysene	Fluoranthene	Phenanthrene	Pyrene
SWMU 21-013(b)																
MD21-05-60367	21-24639	0.00–0.50	Soil	—*	—	0.0115	—	—	—	—	—	—	—	—	—	—
MD21-05-60368	21-24639	1.50–2.00	Soil	—	—	0.0033 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60371	21-24640	1.50–2.00	Soil	—	—	—	0.0136 (J)	—	0.0157 (J)	—	—	—	0.0171 (J)	0.0218 (J)	0.0122 (J)	0.0275 (J)
MD21-05-60373	21-24641	0.00–0.50	Soil	0.0108 (J+)	—	—	—	—	0.0131 (J+)	—	0.0108 (J+)	—	—	0.0167 (J+)	—	0.0164 (J+)
MD21-05-60374	21-24641	0.50–1.00	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60375	21-24642	0.00–0.50	Soil	—	—	0.0033 (J)	—	—	—	—	—	0.084 (J)	—	0.011 (J)	—	—
MD21-05-60379	21-24643	0.00–0.50	Soil	—	—	0.0036 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60394	21-24648	0.00–0.50	Soil	—	—	—	—	—	—	—	—	8.88 (J)	—	—	—	—
MD21-05-60397	21-24649	0.00–0.50	Soil	—	0.0236 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60401	21-24650	1.50–2.00	Soil	—	—	—	—	—	—	—	—	—	0.506 (J-)	0.925 (J)	0.56 (J)	0.826 (J)
MD21-05-60406	21-24652	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	0.0173 (J)	0.0111 (J)	0.0193 (J)
MD21-05-60407	21-24652	1.50–2.00	Soil	—	0.0506 (J)	0.039 (J)	—	0.0851	0.0286 (J)	—	—	—	—	0.0375	0.0302 (J)	0.0367
MD21-05-60409	21-24653	0.00–0.60	Soil	—	0.0217 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60410	21-24653	1.50–2.00	Soil	—	0.0196 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60419	21-24656	1.50–2.00	Soil	—	0.0015 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60421	21-24657	0.00–0.50	Soil	—	0.0227 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60422	21-24657	1.50–2.00	Soil	—	0.0208 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60424	21-24658	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	0.0339 (J)	0.0508	0.0199 (J)	0.0772
MD21-05-60436	21-24659	1.00–1.50	Soil	—	—	0.0014 (J)	—	—	—	—	—	0.0117 (J)	—	—	—	0.0031 (J)
MD21-05-60437	21-24659	0.00–0.50	Soil	—	—	0.0071	—	—	—	—	—	—	—	0.0175 (J)	—	0.0188 (J)
MD21-05-60440	21-24660	1.50–2.00	Soil	—	0.0029 (J)	0.0018 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60445	21-24662	0.00–0.50	Soil	—	0.0052	0.0051	—	—	—	—	—	—	—	—	—	—
MD21-05-60448	21-24663	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	—	—	0.0095 (J)
MD21-05-60449	21-24663	1.50–2.00	Soil	—	—	—	—	—	—	—	—	0.0451 (J)	—	—	—	—
MD21-05-60451	21-24664	0.00–0.50	Soil	—	0.007	0.0073	—	—	—	—	0.556 (J)	—	—	0.0359	0.0199 (J)	0.0303 (J)
MD21-05-60455	21-24665	1.50–2.00	Soil	0.0124 (J)	0.028 (J)	—	—	—	—	—	—	0.0336 (J)	0.0301 (J)	0.0471	0.0434	0.0744 (J)
MD21-05-60458	21-24666	1.50–2.00	Soil	—	—	—	—	—	—	—	—	0.0103 (J)	—	—	—	—
MD21-05-60464	21-24668	1.50–2.00	Soil	—	0.0039	0.0046	—	—	—	—	—	0.0131 (J)	—	—	—	—
MD21-05-60466	21-24669	0.00–0.50	Soil	—	—	—	—	—	—	—	0.59 (J)	—	—	—	—	—
MD21-05-60467	21-24669	1.50–2.00	Soil	—	—	0.0012 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60469	21-24670	0.00–0.50	Soil	—	0.0032 (J)	0.0018 (J)	—	—	—	—	—	—	—	—	—	—

Table B-3.3-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Chrysene	Fluoranthene	Phenanthrene	Pyrene
MD21-05-60472	21-24671	0.00–0.50	Soil	—	0.0071	0.0032 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60476	21-24672	1.50–2.00	Soil	—	0.0021 (J)	0.0024 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60478	21-24673	0.00–0.50	Soil	—	0.0021 (J)	0.0016 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60481	21-24674	0.00–0.50	Soil	—	—	—	—	—	—	—	0.648 (J)	—	—	—	—	—
MD21-05-60482	21-24674	1.50–2.00	Soil	—	—	0.0015 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60484	21-24675	0.00–0.50	Soil	—	0.0013 (J)	0.0015 (J)	—	—	—	—	—	—	—	—	—	0.0115 (J)
MD21-05-60487	21-24676	0.00–0.50	Soil	—	—	—	—	—	—	—	0.545 (J)	—	—	—	—	—
MD21-05-60490	21-24677	0.00–0.50	Soil	—	—	0.0274 (J)	—	—	—	—	—	—	—	—	—	0.0119 (J)
MD21-05-60491	21-24677	1.50–2.00	Soil	—	—	0.0254 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60493	21-24678	0.00–0.50	Soil	—	0.0184 (J)	—	—	—	—	—	—	—	—	—	—	0.0164 (J)
MD21-05-60568	21-24679	0.00–0.50	Soil	—	0.0387 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60571	21-24680	0.00–0.50	Soil	—	0.0454 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60572	21-24680	1.50–2.00	Soil	—	0.0017 (J)	—	—	—	—	—	—	—	—	—	—	—
MD21-05-60577	21-24682	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	0.018 (J)	0.0128 (J)	0.0145 (J)
RE21-07-597	21-600102	0.00–0.50	Soil	—	—	—	—	—	0.708 (J)	0.0491 (J)	—	—	0.0726 (J)	0.110 (J)	0.121 (J)	0.137 (J)
RE21-07-608	21-600102	1.50–2.00	Soil	—	—	—	—	—	—	—	—	—	—	0.0437 (J)	0.0524 (J)	0.115 (J)
AOC 21-013(g)																
MD21-05-60415	21-24655	0.00–0.50	Soil	—	—	0.0013 (J)	—	—	—	—	—	—	—	—	—	—
MD21-05-60442	21-24661	0.00–0.50	Soil	—	0.0123	0.0083	—	—	—	—	0.659 (J)	—	—	0.0305 (J)	0.017 (J)	0.0401
MD21-05-60463	21-24668	0.00–0.50	Soil	—	—	0.0024	—	—	—	—	—	—	—	0.0132 (J)	—	0.0156 (J)

Note: Units are mg/kg. Data qualifiers are defined in Appendix A.
*A dash indicates that if analyzed, sample result is not detected.

Table B-3.4-1
Summary of COPCs at SWMU 21-013(b) and AOC 21-013(g) by Media

Media	Inorganic COPCs	Organic COPCs	Radionuclide COPCs
Soil/Sediment	Nitrate	Anthracene	Americium-241
	Perchlorate	Aroclor-1254	Cesium-137
	Copper	Aroclor-1260	Plutonium-238
	Lead	Benzo(a)anthracene	Plutonium-239
	Mercury	Benzo(a)pyrene	Strontium-90
	Selenium	Benzo(b)fluoranthene	Tritium
	Silver	Benzo(k)fluoranthene	Uranium-234
	Thallium	Benzoic acid	Uranium-235
	Uranium	Bis(2-ethylhexyl)phthalate	Uranium-238
		Chrysene	
		Fluoranthene	
		Phenanthrene	
		Pyrene	

Table B-4.1-1
Frequency of Inorganic Chemicals above Background Values at SWMU 21-023(c)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Aluminum	Soil	55	55	948–16300	29200	0/55	0/55
Aluminum	Qbt 3	6	6	304–8930	7340	2/6	0/6
Antimony	Soil	49	12	0.111–[5.3]	0.83	1/49	1/49
Antimony	Qbt 3	6	0	[0.2–0.412]	0.5	0/6	0/6
Arsenic	Soil	55	52	0.945–3.97	8.17	0/55	0/55
Arsenic	Qbt 3	6	3	[0.82]–4.85	2.79	2/6	0/6
Barium	Soil	55	55	4.47–142	295	0/55	0/55
Barium	Qbt 3	6	6	1.4–37.7	46	0/6	0/6
Beryllium	Soil	55	52	0.21–1.06	1.83	0/55	0/55
Beryllium	Qbt 3	6	3	[0.2]–0.38	1.21	0/6	0/6
Cadmium	Soil	55	13	0.131–1.2	0.4	4/55	42/55
Cadmium	Qbt 3	6	0	[0.501–0.64]	1.63	0/6	0/6
Calcium	Soil	55	55	391–4260	6120	0/55	0/55
Calcium	Qbt 3	6	6	394–1040	2200	0/6	0/6
Chromium	Soil	55	55	0.898–48.1	19.3	2/55	0/55
Chromium	Qbt 3	6	6	1.9–30.5	7.14	4/6	0/6
Cobalt	Soil	55	51	0.351–5.45	8.64	0/55	0/55
Cobalt	Qbt 3	6	3	0.547–[1.9]	3.14	0/6	0/6
Copper	Soil	55	54	1.2–22.6	14.7	1/55	0/55
Copper	Qbt 3	6	3	[0.61]–6.32	4.66	1/6	0/6
Cyanide (Total)	Soil	50	6	0.148–5.78	0.5	1/50	0/2

Table B-4.1-1 (continued)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects above Background Value	Frequency of Nondetects above Background Value
Cyanide (Total)	Qbt 3	3	0	[0.263–0.268]	0.5	0/3	0/3
Iron	Soil	55	55	2380–13500	21500	0/55	0/55
Iron	Qbt 3	6	6	1190–9690	14500	0/6	0/6
Lead	Soil	55	55	1.43–43.3	22.3	8/55	0/55
Lead	Qbt 3	6	6	1.2–28.2	11.2	2/6	0/6
Lithium	Soil	2	2	3.6–8.5	na[a]	2/2	n/a[b]
Lithium	Qbt 3	3	1	[1.2]–1.5	na	1/3	n/a
Magnesium	Soil	55	55	169–2570	4610	0/55	0/55
Magnesium	Qbt 3	6	6	71.4–1050	1690	0/6	0/6
Manganese	Soil	55	55	71–494	671	0/55	0/55
Manganese	Qbt 3	6	6	82.4–207	482	0/6	0/6
Mercury	Soil	53	49	0.0042–0.782	0.1	14/53	0/53
Mercury	Qbt 3	3	3	0.0649–1.06	0.1	2/3	0/3
Molybdenum	Soil	2	0	[2.5–6.1]	na	0/2	n/a
Molybdenum	Qbt 3	3	0	[5.9–6.2]	na	0/3	n/a
Nickel	Soil	55	53	0.384–13.4	15.4	0/55	0/55
Nickel	Qbt 3	6	5	[2.3]–6.4	6.58	0/6	0/6
Nitrate	Soil	50	43	0.462–3.2	na	43/50	n/a
Nitrate	Qbt 3	3	2	0.943–[1.04]	na	2/3	n/a
Perchlorate	Soil	40	14	0.000593–0.00491	na	14/40	n/a
Perchlorate	Qbt 3	3	3	0.00133–0.00572	na	3/3	n/a
Potassium	Soil	55	55	317–2290	3460	0/55	0/55
Potassium	Qbt 3	6	3	[218]–992	3500	0/6	0/6
Selenium	Soil	55	1	[0.34]–[1.85]	1.52	0/55	47/55
Selenium	Qbt 3	6	6	0.41–0.94	0.3	6/6	0/6
Silver	Soil	55	40	0.0412–24.5	1	6/55	4/55
Silver	Qbt 3	6	3	0.0466–[1.1]	1	0/6	2/6
Sodium	Soil	54	51	[58.9]–325	915	0/54	0/55
Sodium	Qbt 3	3	3	123–215	2770	0/3	0/3
Strontium	Soil	2	2	14.4–24.9	na	2/2	n/a
Strontium	Qbt 3	3	3	0.49–1.1	na	3/3	n/a
Thallium	Soil	55	22	0.0881–[1.04]	0.73	0/55	1/55
Thallium	Qbt 3	6	2	0.0917–[0.21]	1.1	0/6	0/6
Vanadium	Soil	55	54	1.77–24.4	39.6	0/55	0/55
Vanadium	Qbt 3	6	4	[1.1]–13.2	17	0/6	0/6
Zinc	Soil	55	55	8.56–105	48.8	6/55	0/55
Zinc	Qbt 3	6	6	8.5–34.3	63.5	0/6	0/6

Source: Background values from LANL (1998, 059730, Table 6.0-1, p. 44).
Note: Values in brackets are below detection limits.
[a] na = Not available.
[b] n/a = Not applicable.

Table B-4.1-2
Summary of Inorganic Chemicals above Background Values at SWMU 21-023(c)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Cadmium	Chromium	Copper	Cyanide (Total)	Lead	Lithium	Mercury	Nitrate	Perchlorate	Selenium	Silver	Strontium	Thallium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**0.4**	**19.3**	**14.7**	**0.5**	**22.3**	**na**[a]	**0.1**	**na**	**na**	**1.52**	**1**	**na**	**0.73**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**0.4**	**7.14**	**4.66**	**0.5**	**11.2**	**na**	**0.1**	**na**	**na**	**0.3**	**1**	**na**	**1.1**	**63.5**
AAA0629	21-01340	0.00–0.50	Soil	—[b]	5.3 (U)	—	1.2	48.1	—[b]	—	36.3	8.5	—	—	—	—	—	24.9	—	—
MD21-06-70174	21-01611	0.70–1.20	Qbt 3	8930 (J+)	—	4.85	—	30.5	6.32	—	28.2	—	1.06	0.943 (J)	0.00133 (J)	0.738 (J)	—	—	—	—
AAA4093	21-01665	0.00–5.00	Soil	—	—	—	0.63 (U)	—	—	—	—	3.6	—	—	—	—	1.1 (U)	14.4	—	—
AAA4094	21-01665	5.00–9.00	Qbt 3	—	—	—	—	13.3	—	—	—	—	—	—	—	0.41	—	1.1	—	—
AAA4095	21-01665	10.00–15.00	Qbt 3	—	—	—	—	11.2	—	—	—	—	—	—	—	0.53	1.1 (U)	0.49	—	—
AAA4096	21-01665	15.00–20.00	Qbt 3	—	—	—	—	—	—	—	—	1.5	—	—	—	0.49	1.1 (U)	0.64	—	—
AAB6979	21-01977	0.00–0.50	Soil	—	—	—	0.42 (U)	—	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
AAB6981	21-01979	0.00–0.50	Soil	—	—	—	0.68 (U)	—	—	—	23.1	—	—	—	—	—	2.2 (U)	—	—	—
AAB6982	21-01980	0.00–0.50	Soil	—	—	—	0.45 (U)	—	—	—	—	—	—	—	—	—	2.1 (U)	—	—	—
MD21-05-59987	21-24570	2.50–3.00	Soil	—	—	—	0.512 (U)	—	—	—	43.3	—	0.218	0.516 (J+)	0.00146 (J)	1.54 (U)	—	—	—	—
MD21-05-59988	21-24570	3.00–3.50	Soil	—	—	—	0.526 (U)	—	—	—	—	—	—	0.501 (J+)	—	1.58 (U)	—	—	—	—
MD21-05-59990	21-24571	2.50–3.00	Soil	—	—	—	0.523 (U)	—	—	—	—	—	0.117	0.497 (J+)	—	1.57 (U)	—	—	—	—
MD21-05-59991	21-24571	3.00–3.50	Soil	—	—	—	0.521 (U)	—	—	—	—	—	—	0.484 (J+)	—	1.56 (U)	—	—	—	—
MD21-05-59993	21-24572	2.00–2.50	Soil	—	—	—	0.522 (U)	—	—	—	—	—	—	0.504 (J+)	—	1.57 (U)	—	—	—	—
MD21-05-59994	21-24572	2.50–3.00	Soil	—	—	—	0.506 (U)	—	—	—	—	—	—	0.49 (J+)	—	—	—	—	—	—
MD21-05-59996	21-24573	2.00–2.50	Soil	—	—	—	0.544 (U)	—	—	—	—	—	—	0.512 (J+)	—	1.63 (U)	—	—	—	—
MD21-05-59997	21-24573	2.50–3.00	Soil	—	—	—	0.522 (U)	—	—	—	—	—	—	0.505 (J+)	—	1.57 (U)	—	—	—	—
MD21-05-59999	21-24574	3.00–3.50	Soil	—	—	—	0.549 (U)	—	—	—	—	—	—	0.519 (J+)	—	1.65 (U)	—	—	—	—
MD21-05-60000	21-24574	3.50–4.00	Soil	—	—	—	0.537 (U)	—	—	—	—	—	—	0.995 (J+)	—	1.61 (U)	—	—	—	—
MD21-05-60002	21-24575	2.00–2.50	Soil	—	—	—	0.514 (U)	—	—	—	—	—	0.247	0.658 (J+)	—	1.54 (U)	—	—	—	—
MD21-05-60003	21-24575	2.50–3.00	Soil	—	—	—	0.525 (U)	—	—	—	—	—	0.782	0.54 (J+)	—	1.58 (U)	—	—	—	—
MD21-05-60005	21-24576	0.00–0.50	Soil	—	—	—	0.557 (U)	—	—	—	24.6	—	—	3.2	—	1.67 (U)	—	—	—	—
MD21-05-60006	21-24576	1.50–2.00	Soil	—	—	—	0.527 (U)	—	—	—	—	—	—	0.503 (J)	—	1.58 (U)	—	—	—	—
MD21-05-60008	21-24577	0.00–0.50	Soil	—	—	—	0.553 (U)	—	—	—	22.7	—	—	2.01	0.00261	1.66 (U)	—	—	—	—
MD21-05-60009	21-24577	1.50–2.00	Soil	—	—	—	0.518 (U)	—	—	—	—	—	—	0.462 (J)	0.00121 (J)	1.55 (U)	—	—	—	—
MD21-05-60011	21-24578	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	0.528 (J)	0.00491	1.74 (U)	—	—	—	—
MD21-05-60012	21-24578	1.50–2.00	Soil	—	—	—	0.533 (U)	—	—	—	—	—	—	—	0.00408	1.6 (U)	—	—	—	—
MD21-06-70177	21-24579	2.00–2.50	Qbt 3	8280 (J+)	—	2.88	—	15.6	—	—	14.2	—	0.105	—	0.00572	0.665 (J)	—	—	—	—
MD21-06-70170	21-25412	2.00–2.50	Qbt 3	—	—	—	—	—	—	—	—	—	—	0.967 (J)	0.00234	0.94 (J)	—	—	—	—
MD21-06-66261	21-25413	0.00–0.50	Soil	—	—	—	0.515 (U)	—	—	—	—	—	0.123	1.44 (J-)	0.00418	1.54 (U)	—	—	—	—
MD21-06-66262	21-25413	1.50–2.00	Soil	—	—	—	0.55 (U)	—	—	—	—	—	—	—	0.000853 (J)	1.65 (U)	—	—	—	—
MD21-06-66264	21-25414	0.00–0.50	Soil	—	—	—	0.514 (U)	—	—	—	—	—	0.103	3.17 (J-)	0.0033	1.54 (U)	—	—	—	—
MD21-06-66265	21-25414	1.50–2.00	Soil	—	—	—	0.542 (U)	—	—	—	—	—	—	1.39 (J-)	0.00176 (J)	1.63 (U)	—	—	—	—

Table B-4.1-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Aluminum	Antimony	Arsenic	Cadmium	Chromium	Copper	Cyanide (Total)	Lead	Lithium	Mercury	Nitrate	Perchlorate	Selenium	Silver	Strontium	Thallium	Zinc
Soil Background Value				**29200**	**0.83**	**8.17**	**0.4**	**19.3**	**14.7**	**0.5**	**22.3**	**na[a]**	**0.1**	**na**	**na**	**1.52**	**1**	**na**	**0.73**	**48.8**
Qbt 2,3,4 Background Value				**7340**	**0.5**	**2.79**	**0.4**	**7.14**	**4.66**	**0.5**	**11.2**	**na**	**0.1**	**na**	**na**	**0.3**	**1**	**na**	**1.1**	**63.5**
MD21-06-66267	21-25415	0.00–0.50	Soil	—	—	—	0.543 (U)	—	—	—	—	—	—	2.19 (J-)	0.00161 (J)	1.63 (U)	—	—	—	—
MD21-06-66268	21-25415	1.50–2.00	Soil	—	—	—	0.577 (U)	—	—	—	—	—	—	—	—	1.73 (U)	—	—	—	—
MD21-06-66270	21-25416	0.00–0.50	Soil	—	1.34 (J-)	—	0.527 (U)	—	—	—	—	—	0.127	2.91 (J-)	—	1.58 (U)	—	—	—	—
MD21-06-66271	21-25416	1.50–2.00	Soil	—	—	—	0.554 (U)	—	—	—	—	—	—	0.972 (J-)	—	1.66 (U)	—	—	—	—
MD21-06-66273	21-25417	0.00–0.50	Soil	—	—	—	0.578 (U)	—	—	—	—	—	—	—	0.000669 (J)	1.73 (U)	—	—	—	—
MD21-06-66274	21-25417	1.50–2.00	Soil	—	—	—	0.53 (U)	—	—	—	—	—	—	—	—	1.59 (U)	—	—	—	—
MD21-06-66276	21-25418	0.00–0.50	Soil	—	—	—	0.505 (U)	—	—	—	—	—	—	2.58 (J-)	—	—	—	—	—	—
MD21-06-66277	21-25418	1.50–2.00	Soil	—	—	—	0.54 (U)	—	—	—	—	—	0.663	1.27 (J-)	—	1.62 (U)	—	—	—	—
MD21-06-66280	21-25419	0.00–0.50	Soil	—	—	—	0.555 (U)	—	—	—	—	—	—	0.653 (J-)	0.000593 (J)	1.66 (U)	—	—	—	—
MD21-06-66279	21-25419	1.50–2.00	Soil	—	—	—	0.532 (U)	—	—	—	—	—	—	1.45 (J-)	0.00159 (J)	1.59 (U)	—	—	—	—
MD21-06-66282	21-25420	0.00–0.50	Soil	—	—	—	0.504 (U)	—	—	—	—	—	—	1.9 (J-)	—	—	—	—	—	—
MD21-06-66283	21-25420	1.50–2.00	Soil	—	—	—	0.529 (U)	—	—	—	—	—	—	0.683 (J-)	—	1.59 (U)	—	—	—	—
MD21-06-66285	21-25421	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	1.44	—	1.67 (U)	—	—	—	—
MD21-06-66286	21-25421	1.50–2.00	Soil	—	—	—	0.548 (U)	21.7	—	—	—	—	—	1.31	—	1.64 (U)	—	—	—	—
MD21-06-66288	21-25422	0.00–0.50	Soil	—	—	—	0.516 (U)	—	—	—	—	—	—	1.08	—	1.55 (U)	—	—	—	—
MD21-06-66289	21-25422	1.50–2.00	Soil	—	—	—	0.524 (U)	—	—	—	—	—	—	—	—	1.57 (U)	—	—	—	—
MD21-06-66291	21-25423	0.00–0.50	Soil	—	—	—	0.515 (U)	—	—	—	—	—	—	1.26	—	1.54 (U)	—	—	—	—
MD21-06-66292	21-25423	1.50–2.00	Soil	—	—	—	0.523 (U)	—	—	—	—	—	—	—	0.000841 (J)	1.57 (U)	—	—	1.04 (U)	—
MD21-06-68044	21-25622	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	1.98	—	1.56 (U)	—	—	—	—
MD21-06-68045	21-25622	1.50–2.00	Soil	—	—	—	—	—	—	—	24.3	—	—	1.19	—	1.62 (U)	—	—	—	—
MD21-06-68046	21-25623	0.00–0.50	Soil	—	—	—	0.846	—	22.6	—	39.1	—	0.765	1.28	—	1.72 (U)	24.5	—	—	105
MD21-06-68047	21-25623	1.50–2.00	Soil	—	—	—	0.414 (J)	—	—	—	—	—	0.304	0.871 (J)	—	1.62 (U)	10.4	—	—	54.7
MD21-06-68048	21-25624	0.00–0.50	Soil	—	—	—	—	—	—	—	24.3	—	0.279	1.45	—	1.84 (U)	8.43	—	—	60.4
MD21-06-68049	21-25624	1.50–2.00	Soil	—	—	—	—	—	—	5.78	—	—	0.429	0.904 (J)	—	1.7 (U)	11.9	—	—	—
MD21-06-68050	21-25625	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	1.06 (J)	—	1.76 (U)	—	—	—	52.1
MD21-06-68051	21-25625	1.50–2.00	Soil	—	—	—	—	—	—	—	—	—	0.103	0.98 (J)	—	1.84 (U)	3.08	—	—	60.9
MD21-06-68052	21-25626	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	0.863 (J)	—	1.64 (U)	—	—	—	—
MD21-06-68053	21-25626	1.50–2.00	Soil	—	—	—	0.519 (J)	—	—	—	—	—	0.379	0.988 (J)	—	1.85 (U)	2.05	—	—	70.5

Source: Background values from LANL (1998, 059730, Table 6.0-1, p. 44).

Note: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] na = Not available.

[b] A dash indicates that if analyzed, sample result is less than background value.

Table B-4.2-1
Frequency of Radionuclides Detected or
Detected above Background/Fallout Values at SWMU 21-023(c)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (pCi/g)	Background/ Fallout Value (pCi/g)	Frequency of Detects above Background/ Fallout Value
Americium-241	Soil	63	45	[-0.0102]–15.78	0.013[a]	45/63
Cesium-134	Soil	25	0	[0.0114–0.19]	na[b]	0/25
Cesium-137	Soil	54	28	[-0.04]–2.65	1.65[a]	10/54
Cobalt-60	Soil	50	0	[-0.0435–0.0657]	na	0/50
Europium-152	Soil	50	0	[-0.0993–0.111]	na	0/50
Plutonium-238	Soil	63	10	[-0.0222]–[0.22]	0.023[a]	8/63
Plutonium-239	Soil	64	59	[0]–28.85	0.054[a]	58/64
Ruthenium-106	Soil	50	0	[-0.471–0.362]	na	0/50
Sodium-22	Soil	50	0	[-0.0445–0.041]	na	0/50
Strontium-90	Soil	64	8	[-0.0875]–[0.7]	1.31[a]	2/64
Tritium	Soil	61	34	[-6.58E-03]–0.56	na	34/61
Uranium-234	Soil	58	58	0.868–6.51	2.59	3/58
Uranium-235	Soil	61	39	[0.0377]–0.44	0.2	6/61
Uranium-238	Soil	58	58	0.731–5.67	2.29	4/58
Americium-241	Qbt 3	11	11	0.016–44.4	na	11/11
Cesium-137	Qbt 3	3	0	[-0.0195–0.0584]	na	0/3
Cobalt-60	Qbt 3	3	0	[-0.0223–0.0295]	na	0/3
Europium-152	Qbt 3	3	0	[-0.0733–0.00144]	na	0/3
Plutonium-238	Qbt 3	11	3	[0.001]–[0.163]	na	3/11
Plutonium-239	Qbt 3	11	10	[0.003]–28.407	na	10/11
Ruthenium-106	Qbt 3	3	0	[-0.0545–0.19]	na	0/3
Sodium-22	Qbt 3	3	0	[-0.0325–0.00797]	na	0/3
Strontium-90	Qbt 3	6	1	[-0.04]–[0.0647]	na	1/6
Tritium	Qbt 3	6	5	[5.61E-03]–0.601	na	5/6
Uranium-234	Qbt 3	6	6	0.941–1.27	1.98	0/6
Uranium-235	Qbt 3	6	0	[0.00885–0.0856]	0.09	0/6
Uranium-238	Qbt 3	6	6	0.916–1.53	1.93	0/6

Source: Background/fallout values from LANL (1998, 059730, Table 6.0-2, p. 45).
Note: Values in brackets are below detection limits.

[a] FV applies to samples collected from 0–6 in. only, all activities detected below 6 in. are reported.

[b] na = Not available.

Table B-4.2-2
Summary of Radionuclides Detected or Detected above Background/Fallout Values at SWMU 21-023(c)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium–241	Cesium–137	Plutonium–238	Plutonium–239	Strontium–90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Qbt 2,3,4 Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
AAA0223	21-01055	0.00–0.08	Soil	0.041	—[c]	—	0.339	—	—	—	—	—
AAA0224	21-01055	0.00–0.50	Soil	—	—	—	0.735	—	—	—	—	—
MD21-06-73257	21-01337	3.70–4.00	Qbt 3	8.71	—	—	8.85	—	—	—	—	—
AAA0629	21-01340	0.00–0.50	Soil	15.78	—	—	28.85	—	—	—	—	—
MD21-06-73256	21-01607	3.00–3.30	Qbt 3	2.24	—	—	2.90	—	—	—	—	—
AAA4042	21-01608	0.00–0.33	Soil	10.727	—	0.072	7.767	—	6.86E-02	—	—	—
AAA4043	21-01609	0.00–0.42	Soil	0.197	2.15	—	1.246	—	0.18	—	—	2.696
MD21-06-73254	21-01610	3.50–3.80	Qbt 3	28.3	—	0.145	13.82	—	—	—	—	—
MD21-06-70174	21-01611	0.70–1.20	Qbt 3	19.4	—	—	24.8	—	—	—	—	—
AAA4048	21-01612	0.50–1.00	Soil	10.988 (J-)	—	0.099 (J-)	15.235 (J-)	—	—	—	—	—
AAA4049	21-01612	1.00–1.50	Soil	0.604 (J-)	—	—	1.261 (J-)	—	0.34 (J-)	—	—	—
AAA4050	21-01613	0.00–0.50	Soil	0.336	2.65	—	9.09	—	7.92E-02	—	—	—
AAA4051	21-01613	0.50–1.00	Soil	0.024	—	—	0.47	—	0.055	—	—	—
AAA4054	21-01613	1.00–1.50	Soil	0.022	—	—	0.313	0.26	0.56	—	—	—
MD21-06-73255	21-01614	4.20–4.50	Qbt 3	44.4	—	0.125	17.38	—	—	—	—	—
AAA4093	21-01665	0.00–5.00	Soil	0.07	—	0.012	1.368	—	2.02E-02	—	—	—
AAA4094	21-01665	5.00–9.00	Qbt 3	0.036	—	—	0.037	0.05	0.31	—	—	—
AAA4095	21-01665	10.00–15.00	Qbt 3	0.016	—	—	0.015	—	0.60	—	—	—
AAA4096	21-01665	15.00–20.00	Qbt 3	0.021	—	—	—	—	0.37	—	—	—
AAB6979	21-01977	0.00–0.50	Soil	0.078	—	—	0.536	—	3.13E-02	—	0.38	—
AAB6981	21-01979	0.00–0.50	Soil	0.041	—	—	0.729	—	4.63E-02	—	0.36	—

Table B-4.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium–241	Cesium–137	Plutonium–238	Plutonium–239	Strontium–90	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Value				**0.013**[a]	**1.65**[a]	**0.023**[a]	**0.054**[a]	**1.31**[a]	**na**[b]	**2.59**	**0.20**	**2.29**
Qbt 2,3,4 Background Value				**na**	**na**	**na**	**na**	**na**	**na**	**1.98**	**0.09**	**1.93**
AAB6982	21-01980	0.00–0.50	Soil	0.05	—	—	0.915	—	5.13E-02	—	0.44	—
MD21-05-59987	21-24570	2.50–3.00	Soil	2.38	—	—	1.26	—	1.83E-02	—	—	—
MD21-05-59988	21-24570	3.00–3.50	Soil	1.02	—	—	0.325	—	1.62E-02	—	—	—
MD21-05-59990	21-24571	2.50–3.00	Soil	0.493	—	—	0.854	—	—	—	—	—
MD21-05-59991	21-24571	3.00–3.50	Soil	0.156	—	—	0.562	—	—	—	—	—
MD21-05-59993	21-24572	2.00–2.50	Soil	—	—	—	0.0505	—	1.93E-02	—	—	—
MD21-05-59994	21-24572	2.50–3.00	Soil	—	—	—	—	—	1.59E-02	—	—	—
MD21-05-59999	21-24574	3.00–3.50	Soil	0.125	—	—	0.251	—	—	—	—	—
MD21-05-60000	21-24574	3.50–4.00	Soil	—	—	—	0.335	—	—	—	—	—
MD21-05-60002	21-24575	2.00–2.50	Soil	1.14	—	—	1.19	—	—	—	—	—
MD21-05-60003	21-24575	2.50–3.00	Soil	3.43	—	—	4.06	0.191	—	—	—	—
MD21-05-60005	21-24576	0.00–0.50	Soil	1.64	—	—	3.98	—	—	—	0.275	—
MD21-05-60006	21-24576	1.50–2.00	Soil	0.782	—	—	0.572	—	—	—	—	—
MD21-05-60008	21-24577	0.00–0.50	Soil	2.15	—	—	3.11	—	2.88E-02	—	—	—
MD21-05-60009	21-24577	1.50–2.00	Soil	2.8	—	—	0.673	—	—	—	—	—
MD21-05-60011	21-24578	0.00–0.50	Soil	0.0561	—	—	0.417 (J+)	—	—	—	—	—
MD21-05-60012	21-24578	1.50–2.00	Soil	—	—	—	0.0439	—	2.07E-02	—	—	—
MD21-06-70177	21-24579	2.00–2.50	Qbt 3	3.67	—	—	2.08	—	1.38E-02	—	—	—
MD21-06-73253	21-25411	4.00–4.30	Qbt 3	39.6	—	0.156	28.41	—	—	—	—	—
MD21-06-70170	21-25412	2.00–2.50	Qbt 3	2.52	—	—	1.66	—	4.46E-02	—	—	—
MD21-06-66261	21-25413	0.00–0.50	Soil	12.5	—	0.0534	6.7	—	1.79E-02	—	—	—
MD21-06-66262	21-25413	1.50–2.00	Soil	1.13	—	—	0.995	—	—	—	—	—

Table B-4.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium–241	Cesium–137	Plutonium–238	Plutonium–239	Strontium–90	Tritium	Uranium-234	Uranium-235	Uranium-238
MD21-06-66264	21-25414	0.00–0.50	Soil	11.2	—	0.0386	5.6	—	1.65E-02	—	—	—
MD21-06-66265	21-25414	1.50–2.00	Soil	6.47	—	—	7.03	—	—	—	—	—
MD21-06-66267	21-25415	0.00–0.50	Soil	—	—	—	0.396	—	—	—	—	—
MD21-06-66268	21-25415	1.50–2.00	Soil	—	0.158	—	1.25	—	—	—	—	—
MD21-06-66270	21-25416	0.00–0.50	Soil	9.31	—	—	5.36	—	1.83E-02	—	—	—
MD21-06-66271	21-25416	1.50–2.00	Soil	0.555	—	—	0.343	—	—	—	—	—
MD21-06-66273	21-25417	0.00–0.50	Soil	1.02	—	—	1.59	—	—	—	—	—
MD21-06-66274	21-25417	1.50–2.00	Soil	0.18	—	—	0.375	—	—	—	—	—
MD21-06-66276	21-25418	0.00–0.50	Soil	5.56	—	—	4.87	—	—	—	—	—
MD21-06-66277	21-25418	1.50–2.00	Soil	9.14	0.225	0.0423	8.59	—	—	—	—	—
MD21-06-66280	21-25419	0.00–0.50	Soil	—	—	—	0.967	—	—	—	—	—
MD21-06-66279	21-25419	1.50–2.00	Soil	—	0.419	—	0.498	—	2.12E-02	—	—	—
MD21-06-66282	21-25420	0.00–0.50	Soil	4.31	—	—	4.79	—	6.41E-03	—	—	—
MD21-06-66283	21-25420	1.50–2.00	Soil	0.182	—	—	0.288	—	—	—	—	—
MD21-06-66285	21-25421	0.00–0.50	Soil	—	—	—	0.408 (J-)	—	0.15	—	—	—
MD21-06-66286	21-25421	1.50–2.00	Soil	—	—	—	0.0934	—	—	—	—	—
MD21-06-66288	21-25422	0.00–0.50	Soil	—	—	—	0.0815	—	1.84E-02	—	—	—
MD21-06-66291	21-25423	0.00–0.50	Soil	—	—	—	—	—	1.82E-02	—	—	—
MD21-06-66292	21-25423	1.50–2.00	Soil	—	—	—	—	—	1.62E-02	—	—	—
MD21-06-68044	21-25622	0.00–0.50	Soil	3.26	—	0.0303	3.87	—	5.85E-02	—	—	—
MD21-06-68045	21-25622	1.50–2.00	Soil	1.04	0.12	—	1.42	—	0.074	—	—	—
MD21-06-68046	21-25623	0.00–0.50	Soil	—	—	—	2.4	—	9.79E-02	6.51	0.32	5.67
MD21-06-68047	21-25623	1.50–2.00	Soil	—	0.166	—	0.831	—	2.35E-02	3.56	0.222	3.26
MD21-06-68048	21-25624	0.00–0.50	Soil	1.42	—	—	4.11	—	0.40	2.87	—	2.65

Table B-4.2-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Americium–241	Cesium–137	Plutonium–238	Plutonium–239	Strontium–90	Tritium	Uranium-234	Uranium-235	Uranium-238
MD21-06-68049	21-25624	1.50–2.00	Soil	0.613	0.188	—	3.43	—	3.14E-02	—	—	—
MD21-06-68050	21-25625	0.00–0.50	Soil	0.314	—	—	0.834	—	0.052	—	—	—
MD21-06-68051	21-25625	1.50–2.00	Soil	0.157	0.332	—	0.832	—	—	—	—	—
MD21-06-68052	21-25626	0.00–0.50	Soil	0.095	—	—	2.06	—	3.08E-02	—	—	—
MD21-06-68053	21-25626	1.50–2.00	Soil	0.365	0.316	0.0559	10.1	—	6.23E-02	—	—	—

Source: Background values from LANL (1998, 059730, Table 6.0-2, p. 45).

Note: Units are pCi/g. Data qualifiers are defined in Appendix A.

[a] FV applies to samples collected from 0–6 in. only, all activities detected below 6 in. are reported.

[b] na = Not available.

[c] A dash indicates that if analyzed, sample result is less than background value or is not detected.

Table B-4.3-1
Frequency of Organic Chemicals Detected at SWMU 21-023(c)

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Frequency of Detects
Anthracene	Soil	59	2	0.00918–[0.66]	2/59
Aroclor-1242	Soil	10	1	[0.00357]–[0.0857]	1/10
Aroclor-1254	Soil	10	3	0.002–[0.0857]	3/10
Aroclor-1260	Soil	10	6	0.0019–[0.0857]	6/10
Benzo(a)pyrene	Soil	59	2	0.0339–[0.66]	2/59
Benzo(b)fluoranthene	Soil	59	5	0.0124–[0.66]	5/59
Benzoic acid	Soil	59	2	0.654–[3.3]	2/59
Bis(2-ethylhexyl)phthalate	Soil	59	2	0.0912–[0.803]	2/59
Chrysene	Soil	59	5	0.0138–[0.66]	5/59
Di-n-butylphthalate	Soil	59	1	0.26–[1.61]	1/59
Fluoranthene	Soil	59	13	0.0118–[0.66]	13/59
Methylnaphthalene[2-]	Soil	59	2	0.0309–[0.66]	2/59
Naphthalene	Soil	59	2	0.014–[0.66]	2/59
Pentachlorophenol	Soil	59	1	[0.187]–[3.3]	1/59
Phenanthrene	Soil	59	5	0.0131–[0.66]	5/59
Pyrene	Soil	59	11	0.0116–[0.66]	11/59
Aroclor-1260	Qbt 3	3	1	0.0015—[0.00355]	1/3

Note: Values in brackets are below detection limits.

Table B-4.3-2
Summary of Organic Chemicals Detected at SWMU 21-023(c)

Sample ID	Location ID	Depth (ft bgs)	Media	Anthracene	Aroclor-1242	Aroclor-1254	Aroclor-1260	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzoic acid	Bis(2-ethylhexyl)phthalate
MD21-06-70174	21-01611	0.70–1.20	Qbt 3	—*	—	—	0.0015 (J)	—	—	—	—
AAB6982	21-01980	0.00–0.50	Soil	—	—	—	—	—	—	—	—
MD21-05-59994	21-24572	2.50–3.00	Soil	—	—	—	—	—	—	0.654 (J)	—
MD21-05-60005	21-24576	0.00–0.50	Soil	—	—	—	—	—	—	—	—
MD21-06-66267	21-25415	0.00–0.50	Soil	0.00918 (J)	—	—	—	0.0339 (J)	0.0216 (J)	—	—
MD21-06-66271	21-25416	1.50–2.00	Soil	—	—	—	—	—	—	—	—
MD21-06-66273	21-25417	0.00–0.50	Soil	—	—	—	—	—	—	—	—
MD21-06-66276	21-25418	0.00–0.50	Soil	—	—	—	—	—	0.0124 (J)	—	—
MD21-06-66277	21-25418	1.50–2.00	Soil	—	—	—	—	—	0.0234 (J)	—	—
MD21-06-66279	21-25419	1.50–2.00	Soil	—	—	—	—	—	0.0222 (J)	—	—
MD21-06-66283	21-25420	1.50–2.00	Soil	—	—	—	—	—	—	—	0.0921 (J)
MD21-06-68044	21-25622	0.00–0.50	Soil	—	—	0.002 (J)	0.0019 (J)	—	—	—	0.0912 (J)
MD21-06-68045	21-25622	1.50–2.00	Soil	—	—	0.0028 (J)	0.002 (J)	—	—	—	—
MD21-06-68046	21-25623	0.00–0.50	Soil	—	—	—	0.0281	—	—	—	—
MD21-06-68047	21-25623	1.50–2.00	Soil	—	0.0065	—	0.0073	—	—	—	—
MD21-06-68048	21-25624	0.00–0.50	Soil	—	—	—	0.0044	—	—	—	—
MD21-06-68049	21-25624	1.50–2.00	Soil	—	—	—	0.0108	—	—	—	—
MD21-06-68050	21-25625	0.00–0.50	Soil	—	—	—	—	—	—	—	—
MD21-06-68051	21-25625	1.50–2.00	Soil	—	—	0.0033 (J)	—	—	—	0.659 (J)	—
MD21-06-68053	21-25626	1.50–2.00	Soil	0.0152 (J)	—	—	—	0.0654 (J)	0.123 (J)	—	—

Table B-4.3-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Chrysene	Di-n-butylphthalate	Fluoranthene	Methylnaphthalene[2-]	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene
MD21-06-70174	21-01611	0.70–1.20	Qbt 3	—	—	—	—	—	—	—	—
AAB6982	21-01980	0.00–0.50	Soil	—	0.26 (J)	—	—	—	—	—	—
MD21-05-59994	21-24572	2.50–3.00	Soil	—	—	—	—	—	—	—	—
MD21-05-60005	21-24576	0.00–0.50	Soil	0.0854 (J)	—	0.171	—	—	—	0.0981 (J)	0.146 (J)
MD21-06-66267	21-25415	0.00–0.50	Soil	0.0138 (J)	—	0.0189 (J)	—	—	—	—	0.0167 (J)
MD21-06-66271	21-25416	1.50–2.00	Soil	—	—	—	—	—	0.212 (J)	—	—
MD21-06-66273	21-25417	0.00–0.50	Soil	—	—	0.0118 (J)	—	—	—	—	—
MD21-06-66276	21-25418	0.00–0.50	Soil	—	—	0.0134 (J)	—	—	—	—	0.0116 (J)
MD21-06-66277	21-25418	1.50–2.00	Soil	0.0189 (J)	—	—	—	—	—	—	0.016 (J)
MD21-06-66279	21-25419	1.50–2.00	Soil	0.0141 (J)	—	0.0208 (J)	—	—	—	—	0.0228 (J)
MD21-06-66283	21-25420	1.50–2.00	Soil	—	—	—	—	—	—	—	—
MD21-06-68044	21-25622	0.00–0.50	Soil	—	—	0.225 (J)	—	—	—	0.0131 (J)	0.0253 (J)
MD21-06-68045	21-25622	1.50–2.00	Soil	—	—	0.223 (J)	—	—	—	—	0.0119 (J)
MD21-06-68046	21-25623	0.00–0.50	Soil	—	—	0.236 (J)	0.0495	0.0237 (J)	—	0.0175 (J)	—
MD21-06-68047	21-25623	1.50–2.00	Soil	—	—	—	—	—	—	—	—
MD21-06-68048	21-25624	0.00–0.50	Soil	—	—	0.27 (J)	—	—	—	—	0.0156 (J)
MD21-06-68049	21-25624	1.50–2.00	Soil	—	—	0.235 (J)	0.0309 (J)	0.014 (J)	—	—	—
MD21-06-68050	21-25625	0.00–0.50	Soil	—	—	0.257 (J)	—	—	—	—	0.0173 (J)
MD21-06-68051	21-25625	1.50–2.00	Soil	—	—	0.258 (J)	—	—	—	0.0163 (J)	0.0177 (J)
MD21-06-68053	21-25626	1.50–2.00	Soil	0.0642	—	0.325 (J)	—	—	—	0.0576	0.103

Note: Units are mg/kg. Data qualifiers are defined in Appendix A.
*A dash indicates that if analyzed, sample result is not detected.

Table B-4.4-1
Summary of COPCs at SWMU 21-023(c) by Media

Media	Inorganic COPCs	Organic COPCs	Radionuclide COPCs
Soil	Cyanide	Anthracene	Americium-241
	Nitrate	Aroclor-1242	Cesium-137
	Perchlorate	Aroclor-1254	Plutonium-238
	Antimony	Aroclor-1260	Plutonium-239
	Cadmium	Benzo(a)pyrene	Strontium-90
	Chromium	Benzo(b)fluoranthene	Tritium
	Copper	Benzoic acid	Uranium-234
	Lead	Bis(2-ethylhexyl)phthalate	Uranium-235
	Lithium	Chrysene	Uranium-238
	Mercury	Di-n-butylphthalate	
	Selenium	Fluoranthene	
	Silver	Methylnaphthalene[2-]	
	Strontium	Naphthalene	
	Thallium	Pentachlorophenol	
	Zinc	Phenanthrene	
		Pyrene	
Qbt 2 and Qbt 3	Nitrate	Aroclor-1260	Americium-241
	Perchlorate		Plutonium-238
	Aluminum		Plutonium-239
	Arsenic		Strontium-90
	Chromium		Tritium
	Copper		
	Lead		
	Lithium		
	Mercury		
	Selenium		
	Silver		
	Strontium		

Appendix C

Field Methods

C-1.0 INTRODUCTION

This appendix summarizes field methods used at Consolidated Unit 21-018(a)-99, Material Disposal Area (MDA) V, Technical Area (TA) 21, at Los Alamos National Laboratory (the Laboratory) for characterization and remediation activities that occurred from May 2005 to May 2006. All activities were conducted in accordance with the most current versions of applicable Environmental Programs (EP) standard operating procedures (SOPs) and quality procedures (QPs), available at the following URL: http://erproject.lanl.gov/documents/VL/procedures. The QPs and SOPs used during the 2005–2006 field activities are listed in Table 3.0-1 of the investigation report.

The activities undertaken at Consolidated Unit 21-018(a)-99 were conducted from May 2005 to May 2006 and are described in the approved investigation work plan (LANL 2004, 087358; NMED 2005, 090174). The May 2007 sampling activities were based on NMED comments to the investigation report (NMED 2007, 096393; NMED 2007, 094854). Photographs of site operations are provided in Attachment C-1.

- Borehole drilling activities and analytical sampling of borehole core material were conducted from May 10 to June 10, 2005.
- Geophysical logging and pore-gas sampling were conducted from June to August 2005, as boreholes became available. A second pore-gas sampling event was conducted in May 2006.
- Hillslope debris was removed from July 18 to August 4, 2005. Debris sizing for bin loading was completed on August 8, 2005. From August 24 to September 16, 2005, all slope debris was loaded into waste bins, and the slope grid was laid out and sampled.
- Distribution lines in absorption beds 2 and 3 were removed from August 9 to August 16, 2005. Bed-material characterization samples were collected at the same time the distribution lines was removed from absorption beds 2 and 3. Distribution lines in absorption bed 1 were not removed until bed materials were excavated to avoid disturbing the most contaminated materials any more than necessary.
- Distribution lines associated with the laundry facility (building 21-020) were removed from August 18 to August 23, 2005, and the site was prepared for excavating absorption bed material, loading, and shipping off-site.
- From September 19, 2005, to May 17, 2006, absorption bed material was excavated, direct-loaded or packaged, and shipped off-site. Backfilling operations of the excavated absorption beds, which occurred after each bed was cleared of material and confirmation samples in tuff were collected, were completed on May 31, 2006.
- Trenching and confirmation sampling of the septic system tank, inlet line, and outlet line were conducted from December 5 to December 9, 2005. Outfall characterization sampling occurred on December 7, 2005, February 2, 2006, and, along the BV channel, on March 27, 2006. Outfall sediments found to be contaminated based on confirmation sampling results were removed with a Super Vac vacuum truck from April 17 to April 20, 2006. A second round of outfall sediment was removed with the vacuum truck on August 16, 2006, followed by a final round of confirmation sampling.
- Confirmation sampling on May 11, 2007, in the northwest portion of SWMU 21-013(b) to determine extent of polycyclic aromatic hydrocarbon (PAHs) at and downgradient from location 21-24650.

Table C-1.0-1 provides general information on the field methods used; the following sections describe specific field methods used in the characterization and remediation activities at Consolidated Unit 21-018(a)-99.

C-2.0 EXPLORATORY DRILLING CHARACTERIZATION

Fifteen boreholes were completed using a CME 85 drill rig equipped with 9-in. hollow-stem augers using continuous split-spoon sampling. The approved investigation work plan for Consolidated Unit 21-018(a)-99 discussed the potential need to use a more advanced rotary drilling method for the deep borehole (BH) 21-24524 (BH-01) to reach the target depth of 380 ft below ground surface (bgs). However, the hollow-stem auger method was successfully used to drill all 15 boreholes.

C-2.1 Borehole Logging

Continuous borehole lithologic logs were completed for all boreholes during site characterization. All boreholes were continuously cored and logged in 5-ft intervals in accordance with SOP-12.01, Field Logging, Handling, and Documentation of Borehole Materials. Information recorded in field logs included footage and recovery in feet, lithology, sample collection depth, field-screening results for radioactivity and organic vapors, completion time of core logging, and other relevant observations.

The lithologic description for each core interval included the following:

- color (using a Munsell Soil Color Chart)
- ash matrix size
- degree of welding of matrix
- presence and size of phenocrysts
- presence of pumice clasts (in tuff) with color, size, alteration, and color, size, and nature of phenocrysts
- staining and/or presence of clay-filled fracture zones
- angle, thickness, and density of fractures, if present
- qualitative description of moisture presence
- any other information pertinent to the geology of the core recovered

Logs for boreholes completed in 2005 as well as historical borehole logs from 1995 are presented in Appendix D of the investigation report. Geophysical logs for the 2005 characterization drilling activities are also presented in Appendix D.

C-2.2 Borehole Abandonment

Following drilling, the 2005 boreholes were left open to allow for geophysical logging and two rounds of pore-gas sampling. The open boreholes were covered with 2-ft × 2-ft plywood boards and marked with an orange pylon cone for safety purposes. Once geophysical logging and pore-gas sampling was conducted and all results from the analytical laboratories had been received, the boreholes were permanently abandoned in accordance with the approved work plan (LANL 2004, 087358; NMED 2005, 090174). Documentation of borehole abandonment was submitted to the Records Processing Facility (RPF). This documentation provides the details for borehole abandonment, including amount/type of material used,

date, time, and other relevant information pertinent to proper nonaquifer-penetrating borehole abandonment.

C-3.0 FIELD-SCREENING METHODS

This section summarizes the field-screening methods used during the 2005–2006 drilling, sampling, and remediation activities at Consolidated Unit 21-018(a)-99. Field-screening results collected during drilling are provided in the borehole logs in Appendix D and summarized in section 7.0 of the investigation report.

The weather was variable enough that field-screening background levels changed significantly from morning to afternoon. As a result, background levels were measured twice daily, once in the morning and once in the afternoon. The target for collecting additional analytical samples based on radioactivity field-screening results was 3 times the background level; The target for collecting additional analytical samples based on organic-vapor field screening results was 2 times the background level, or greater than 5.0 parts per million (ppm) if the background level was less than 5 ppm.

C-3.1 Field Screening for Organic Vapors

Organic vapor screening was conducted using a MiniRAE 2000 portable volatile organic compound (VOC) monitor model PGM-7600 photoionization detector (PID). Field screening for VOCs was conducted on each core by a level 2 site safety officer (SSO) according to SOP-06.33, Headspace Vapor Screening with a Photoionization Detector. The PID was equipped with an 11.7-electron volt (eV) lamp with sensitivity to 1 ppm. Background levels for the PID were obtained by sealing air in a plastic bag, allowing it to sit for 5 min, and then measuring the background level with the PID inserted into the plastic bag.

During drilling, screening was performed by removing sample material from either the connection “shoe” of the core barrel base before the core barrel or the grab sample was opened, sealing it in a plastic bag, letting it sit for approximately 5 min, and measuring organic vapors with the PID inserted into the plastic bag. A new sterile bag was used for each screening test performed to avoid potential cross-contamination. All readings were recorded in ppm.

Although the approved investigation work plan for Consolidated Unit 21-018(a)-99 (LANL 2004, 090801; NMED 2005, 090611) specified field screening core for organic vapors once every 10 ft, screening was conducted every 5 ft for consistency with field screening for radioactivity and collection of core samples for laboratory analysis. However, because of an oversight, organic vapor field screening was not conducted for BH-03, BH-04, or the first 100 ft of BH-01. Surface samples were not screened for organic vapors because it is unlikely that measurable quantities of volatile chemicals will be encountered in surface samples, given the volatile nature of the compounds.

C-3.2 Field Screening for Radioactivity

Immediately upon separating the split-spoon core barrel, each core was screened for alpha- and beta/gamma-emitting radionuclides by a Laboratory radiological control technician (RCT) using an Eberline E-600 radiation meter with an SHP-380AB alpha/beta scintillation detector held within 1 in. of the core barrel. The Eberline E-600 with attachment SHP-380AB consists of a dual phosphor plate covered by two mylar windows housed in a light-excluding metal body. The phosphor plate is a plastic scintillator for detecting beta emissions and is thinly coated with zinc sulfide for detecting alpha emissions. The operational range varies from trace emissions to 1 mil disintegrations per minute (dpm).

Local background levels for radioactivity were measured in ambient air. However, local background levels of radioactivity in ambient air are not directly applicable to background levels in subsurface material. Minerals in the soil, rock, and fill underlying Consolidated Unit 21-018(a)-99 contain naturally occurring radionuclides that result in screening measurements consistently in the range of 1000 to 3000 dpm and that do not necessarily indicate the presence of contamination.

Local background levels in air were calculated daily using the following procedure. Minimum detectable activity describes the instrument's lower detection limit. A background reading using the SHP-380AB attachment was taken in the field to determine the minimum detectable activity. The minimum detectable activity was calculated as follows:

$$\text{minimum detectable activity} = \frac{2.71 + 4.65/(R_b \times 0.2)}{0.2}$$

where R_b is the background rate in counts per minute (cpm). Minimum detectable activity was then converted from cpm to dose per minute as follows:

$$\text{dose per minute} = \frac{\text{corrected cpm}}{\text{efficiency}}$$

where efficiency was assumed to be 20% for the SHP-380AB attachment based on the manufacturer's specifications. All field-screening results for radioactivity were recorded in dose per minute.

Swipe samples were collected and analyzed by a Laboratory RCT before characterization sample containers were removed from the site. Samples were transported to the Sample Management Office (SMO) in sealed coolers before they were shipped to the analytical laboratory. Personnel at the SMO reviewed and approved the SCLs and COC forms and accepted custody of the samples, after which the samples were shipped to the laboratory for analysis.

C-4.0 FIELD INSTRUMENT CALIBRATION

Instrument calibration was completed twice daily, once in the morning and again in the afternoon. Several environmental factors affected the instrument's integrity, including air temperature, atmospheric pressure, wind speed, and humidity. The PID was calibrated by the SSO, and the Eberline E-600 was calibrated by the RCT. All calibrations were performed according to the manufacturers' specifications and requirements.

C-4.1 PID Calibration

The PID was calibrated both to ambient air and a standard reference gas (100 ppm isobutylene). The ambient-air calibration determined the zero point of the instrument sensor calibration curve in ambient air. Calibration with the standard reference gas determined a second point of the sensor calibration curve. Each calibration was within 3% of 100 ppm isobutylene, qualifying the instrument for use.

The following calibration information was recorded daily in the health and safety-site logbook:

- instrument identification (ID) number
- initial and final span settings
- date and time

- concentration and type of calibration gas used (isobutylene at 100 ppm)
- name of the SSO performing the calibration.

All daily calibration procedures for the MiniRAE 2000 PID met the manufacturer's specifications for standard reference gas calibration and the requirements of QP-5.2, Control of Measuring and Test Equipment.

C-4.2 Eberline E-600 Instrument Calibration

The Eberline E-600 was calibrated daily by the RCT before local background levels for radioactivity were measured and recorded by the RCT on independent field documentation. The instrument was calibrated using plutonium-239 and chloride-36 sources for alpha and beta/gamma emissions, respectively. The following five checks were performed as part of the calibration procedures: date of calibration, signs of physical damage, battery function, response to a source of radioactivity, and background level. All calibrations performed for the Eberline E-600 met the manufacturer's specifications, the requirements of QP-5.2, and the applicable radiation detection instrument manual.

C-5.0 SURFACE AND SUBSURFACE SAMPLING

This section summarizes the methods used for collecting samples for laboratory analysis, including surface soil and fill, subsurface rock, and subsurface pore-gas samples. The samples were collected according to the approved investigation work plan for Consolidated Unit 21-018(a)-99 (LANL 2004, 087358; NMED 2005, 090174).

C-5.1 Surface and Shallow Subsurface Soil and Fill Sampling Methods

Surface and shallow subsurface samples were collected from soil and fill using a spade and scoop or hand augers. All sampling was performed in accordance with SOP-06.09 and SOP-06.10, respectively.

C-5.2 Rock Sampling Methods

In 2005, rock samples were collected from boreholes at Consolidated Unit 21-018(a)-99 in accordance with SOP-06.26, Core Barrel Sampling for Subsurface Earth Materials, for fixed-laboratory analysis. Borehole samples were contained in a stainless-steel, split-spoon, core-barrel sampler that retrieved core in 5-ft intervals.

The goal of borehole sampling was to define the extent of potential contaminant migration associated with low-level radioactive waste. Target sampling intervals included the following:

- interval of highest field-screening detection
- interval of the deepest field-screening detection
- interval immediately beneath any structure of concern
- interval at the total depth (TD) of the borehole

Additional samples were collected based on the presence of staining and/or fracture clay-fill zones, elevated field-screening levels, and lithologic contacts.

Core retrieved from the subsurface was field screened and visually inspected to help determine the specific 2-ft section of core to be sampled. The section was then removed from the core barrel, placed in

a decontaminated stainless-steel bowl, and homogenized. The material was crushed with a decontaminated rock hammer and stainless-steel spoon to allow core material to fit into sample containers. The samples were placed in sterile sample containers, sealed, and labeled with the borehole number, date, time, depth interval, and type of material.

All core and drill cuttings that remained after the completion of sampling and logging were placed into plastic waste bags and then placed in either sealed 85-gal. or 55-gal. steel drums and stored on site until all final waste disposal was completed. A total of 70 drums containing investigation-derived waste (IDW) were removed from the site and taken to Area G at TA-54 on September 22 and September 26, 2005. The waste disposal information is provided in Appendix G of this investigation report.

C-5.3 Subsurface Pore-Gas Sampling Methods

Subsurface pore-gas samples were collected from boreholes at Consolidated Unit 21-018(a)-99 from July to August 2005. A second round of pore-gas sampling was conducted from May to June 2006, as required by the work plan, based on the results of the initial round data that indicated the presence of some vapor-phase constituents. Pore-gas samples were collected in accordance with the most current version of SOP-06.31, Sampling of Subatmospheric Air.

In both rounds, pore-gas samples were collected from two depth intervals: one at the approximate depth of nearby disposal units, and one at the bottom of the borehole. During the first pore-gas sampling round, the deeper interval was sampled at the open depth of the borehole, which was shallower than the original TD of the borehole because of sloughing. During the second pore-gas sampling event, the augers were left in place to ensure samples could be collected from TD. Section 3.1 and Table 3.1-3 of the investigation report present more information on pore-gas sampling depths.

Before sampling began, each sampling interval was purged using a Brüel and Kjaer (B&K) multigas analyzer until measurements of carbon dioxide and oxygen were stable, thus indicating natural subsurface conditions. A PID was used to field screen for VOCs in pore gas. Subsurface pore-gas samples were collected in 6-L SUMMA canisters and submitted to the SMO to ship to the laboratory for VOC analysis using U.S. Environmental Protection Agency (EPA) Method TO-15. Samples were also collected in silica gel sample tubes for tritium analysis using EPA Method 906.0.

C-5.4 Quality Assurance/Quality Control Samples

Quality assurance (QA)/quality control (QC) samples for soils and rock were collected in accordance with SOP-01.05, Field Quality Control Samples. Field duplicate samples were collected at a frequency of at least one duplicate sample for every ten samples collected. Field rinsate samples were collected from sampling equipment at a frequency of at least 1 rinsate sample for every 20 samples. Field trip blanks were also collected at a frequency of 1 for every 20 samples. Data for QA/QC samples for soil and rock are included in Appendix F (on CD).

QA/QC samples for VOCs in pore gas consisted of one equipment blank and two field duplicates. The equipment blank was collected by pulling zero gas (99.9% ultrahigh-purity nitrogen) through the packer sampling apparatus and was used to evaluate field decontamination procedures. The QA/QC samples were collected in accordance with SOP-01.05, Field Quality Control Samples, and are summarized in Table 3.1-3.

C-5.5 Sample Documentation and Handling

Field personnel completed a sample collection log (SCL) and associated chain-of-custody (COC) form for each sample set. The sample containers were sealed with signed COC seals and placed into coolers to maintain a temperature of approximately 4°C. The samples were packaged with preservatives, as necessary, depending on the analytical method to be used, packed, handled, and shipped in accordance with SOP-01.03, Handling, Packaging, and Transporting Field Samples, and SOP-01.02, Sample Containers and Preservation.

Swipe samples were collected and analyzed by the RCT before the characterization sample containers were removed from the site. Samples were transported to the SMO where personnel reviewed and approved the SCLs and COC forms and accepted custody of the samples. The samples were then packaged and shipped to the laboratory for analysis.

C-5.6 Decontamination of Sampling Equipment

The split-spoon, core-barrel, and all other sampling equipment that came into, or may have come into, contact with sample materials were decontaminated after each 5-ft core was retrieved and logged. Decontamination included wiping the equipment with a household-strength cleaning spray and paper towels. Dry decontamination of the drilling equipment was done with wire brushes before the drill rig was mobilized to another borehole to avoid cross-contamination between samples and borehole locations. Decontamination activities were performed in accordance with SOP-01.08, Field Decontamination of Drilling and Sampling Equipment, and SOP-01.05, Field Quality Control Samples.

C-6.0 GEOPHYSICAL LOGGING

Geophysical logging was conducted at Consolidated Unit 21-018(a)-99 from July 14 to July 25, 2005. BH-01 through BH-15 were logged using a neutron probe for measuring soil-moisture content, a natural gamma meter for measuring gamma radiation, a three-arm caliper for measuring borehole diameter, and a downhole camera for recording borehole wall imagery, such as orientation and character of potential fracture zones. SOP-04.04, Contract Geophysical Logging, and SOP-05.08, Operation of Borehole Logging Equipment, were followed for all geophysical logging activities.

Data were collected during geophysical logging with Mount Sopris Instruments (MSI). Soil-moisture content was measured using an MSI model number 2NUA-1000 neutron-thermal detector. Gamma radiation was measured using an MSI model number 2PGA-1000 gamma/SP/SPR meter. The borehole diameter was measured using an MSI model number 2PCA-1000 three-arm caliper. Video logging of the borehole was recorded using an MSI model number OBI-40 ALT optical televiewer.

Geophysical logs showing calculated percent moisture content are presented in Appendix D.

C-7.0 GEODETIC SURVEYING

Geodetic surveys of all boreholes and sample locations were performed by a Laboratory surveyor using a Trimble RTK 5700 differential global positioning system (DGPS), referenced from published and monumented external Laboratory survey control points in the vicinity. All borehole and sample locations were surveyed according to SOP-03.11, Coordinating and Evaluating Geodetic Surveys. Horizontal accuracy of the monumented control points are within 0.1 ft. The DGPS instrument referenced from Laboratory control points is accurate within 0.2 ft.

C-8.0 WASTE STORAGE AND DISPOSAL

Waste generated during this investigation consisted of drill cuttings, personal protective equipment (PPE), and sampling supplies and plastics. All IDW generated during the Consolidated Unit 21-018(a)-99 field investigation was managed in accordance with the procedures described in Appendix C of the approved investigation work plan (LANL 2004, 087358; NMED 2005, 090174) and applicable SOPs, which incorporate the requirements of all applicable EPA and New Mexico Environment Department (NMED) regulations, U.S. Department of Energy (DOE) orders, and Laboratory implementation requirements. The SOPs applicable to the characterization and management of IDW at Consolidated Unit 21-018(a)-99 are as follows:

- SOP-01.06, Management of Environmental Restoration Project Waste
- SOP-01.10, Waste Characterization

Before field investigation activities were undertaken, a waste characterization strategy form (WCSF) was prepared and approved, as required by SOP-01.10. The WCSF provided information on IDW characterization, management, containerization, and estimated volumes. The IDW characterization was completed by reviewing existing data and documentation, reviewing analytical data from samples collected from the media being investigated (subsurface soil and tuff), and direct sampling of containerized waste. The WCSF and related waste management documentation, such as the waste profile form and chemical waste disposal requests, are included in Appendix G of this investigation report.

The selection of waste containers was based on appropriate U.S. Department of Transportation requirements, waste types, and estimated volumes of IDW to be generated. Immediately following containerization, each waste container was individually labeled with a unique ID number and information regarding waste classification, contents, radioactivity, and date generated. The wastes were staged in clearly marked and appropriately constructed waste accumulation areas. Waste accumulation area postings, regulated storage duration, and inspection requirements were based on the type of IDW and its classification. Container and storage requirements were detailed in the WCSF and approved before waste was generated.

C-9.0 DEVIATIONS FROM APPROVED WORK PLAN

Deviations from the approved investigation work plan for Consolidated Unit 21-018(a)-99 (LANL 2004, 087358; NMED 2005, 090174) include the following.

- Moisture content was to be collected at 5-ft intervals in the upper 40 ft of each borehole and at 10-ft intervals below 40 ft. During characterization activities, the moisture content was measured continuously by neutron logging as part of geophysical characterization. This approach provided a more complete determination of the moisture profile within each borehole.
- The approved investigation work plan for Consolidated Unit 21-018(a)-99 (LANL 2004, 087358; NMED 2005, 090174) specified using a model 139 rate meter for measuring gross-alpha radioactivity and an ESP-1 for measuring gross-beta and -gamma radioactivity; instead, the Eberline E-600 was used because the specified instruments are outdated and less accurate than the Eberline E-600, which can detect alpha and beta emissions separately and can reduce the amount of background beta emissions. (The background of beta emissions from cosmic rays can obscure the relatively small alpha signal from plutonium or uranium; therefore, eliminating the cosmic-ray background allows for the detection of smaller amounts of alpha-emitting material.)

- Field screening for organic vapors was to be conducted at 10-ft intervals. During the characterization drilling activities, field screening for organic vapors was conducted at 5-ft intervals, as explained in section C-4.1. However, BH-03, BH-04, and the first 100 ft of BH-01 (location 21-24524) were inadvertently not screened for organic vapors. BH-01 was screened for organic vapors from 100 to 380 ft bgs, and the remaining 12 boreholes drilled in 2005 were screened for organic vapors from the ground surface to TD (ranging from 40 to 85 ft bgs).
- The approved investigation work plan (LANL 2004, 087358; NMED 2005, 090174) called for using brass sleeves to collect geotechnical samples from the deep borehole because they provide stability and maintain the integrity of deep geotechnical samples. Instead, plastic lexan tubes were used because of their availability and flexibility of use. Lexan tubes also maintain the integrity of geotechnical samples and did not affect analysis of geotechnical properties.
- According to the investigation work plan (LANL 2004, 087358, p. 49), core collected during the investigation of Consolidated Unit 21-018(a)-99 would be curated. All core was logged, screened, and photographed as it came out of the borehole; therefore there was no need to curate the remaining core. This deviation was approved via email by NMED on May 13, 2006 (NMED 2006, 094086). All core material was disposed of as low level radioactive waste at TA-54.
- The predicted volume of concrete and asphalt slope debris described in the approved investigation work plan (LANL 2004, 087358; NMED 2005, 090174) was exceeded by a factor of 20 during removal activities. During debris removal, it became apparent that a very large volume of fill, including asphalt, had been emplaced in a small embayment in the canyon wall in the vicinity of SWMU 21-013(b). The presence of this fill material, which exceeded 10 ft in thickness in some places, made removing it down to the natural surface impracticable and prevented sampling of the preoperational substrate. However, relatively undisturbed material was available for sampling on all sides of the fill material, particularly towards the canyon bottom and on the eastern half of the slope. Also, based on the topography and the distribution of contamination within MDA V, it is expected that potential overflows from the absorption beds would have been more likely to impact the eastern half of the slope. Additionally, although the concrete construction debris is known to date from 1965, the time of emplacement of the underlying fill material is unknown.
- During the first round of pore-gas sampling, slough in the bottom of the boreholes prevented collection of a true TD pore-gas sample. The augers were kept in the borehole during the second round of pore-gas sampling to prevent slough and allow a true TD pore-gas sample to be collected. Table 3-1.3 in the investigation report gives the interval of the deepest pore gas sample in each borehole and the TD.
- According to the approved work plan (LANL 2004, 087358; NMED 2005, 090174), if VOCs were detected in samples from the first round of pore-gas sampling, a second round of pore-gas samples were to be collected 30 days later. Because of the heavy equipment traffic on the site during remediation, many of the boreholes were inaccessible and/or partially collapsed. In accordance with direction from NMED (Chamberlain 2005, 094086), the second round of pore-gas sampling was delayed until remediation was completed, approximately 1 yr after the first sampling round had been conducted.
- During the second round of pore-gas sampling, one of the SUMMA canisters submitted for analysis of VOCs was found to have leaked during shipment to the analytical laboratory. The sample could not be recovered. As a result, no VOC data are available for the pore-gas samples collected from the shallow interval of BH-01 (location 21-24524, 14–15 ft bgs). The first round of pore-gas data is complete, and VOC data are available from the second round for all boreholes

surrounding location 21-24524 as well as from the deep interval from that location. Therefore, the available data are adequate to characterize pore gas at Consolidated Unit 21-018(a)-99.

- Perchlorate analysis was inadvertently omitted from samples collected at five locations at the bottom of BV Canyon. However, perchlorate data were collected on a grid covering the entire slope into BV Canyon [SWMU 21-013(b) and AOC 21-013(g)] as well as down the entire drainage at SWMU 21-023(c). Perchlorate was consistently detected at trace levels (i.e., generally below the estimated quantitation limit) at all other locations within Consolidated Unit 21-018(a)-99. No release or a source of perchlorate is indicated by its distribution, and samples collected from the bottom of BV Canyon are expected to exhibit the same trace levels of perchlorate seen everywhere else at Consolidated Unit 21-018(a)-99.

C-10.0 REFERENCES

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in text citations. ER ID numbers are assigned by the EP Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau; the U.S. Department of Energy–Los Alamos Site Office; EPA, Region 6; and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

Chamberlain, K., May 13, 2005. Re: Slight Deviation from MDA V Work Plan. Email message to R. Coel-Roback (LANL) from K. Chamberlain (NMED HWB), May 13, 2005, Santa Fe, New Mexico. (Chamberlain 2005, 094086)

LANL (Los Alamos National Laboratory), June 2004. "Investigation Work Plan for Solid Waste Management Unit 21-018(a)-99, Material Disposal Area V, at Technical Area 21," Los Alamos National Laboratory report LA-UR-04-3699, Los Alamos, New Mexico (LANL 2004, 087358)

NMED (New Mexico Environment Department), November 2004. "Approval with Modifications for Investigation Work Plan for Solid Waste Management Unit 21-018(a)-99, Material Disposal Area V, at Technical Area 21, Hazardous Waste Bureau, Santa Fe, New Mexico. (NMED 2004, 090174)

NMED (New Mexico Environment Department), January 8, 2007. "Notice of Disapproval, Investigation Report for Consolidated Unit 21-018(a)-99, Material Disposal Area V, at Technical Area 21," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED HWB), Santa Fe, New Mexico. (NMED 2007, 094854)

NMED (New Mexico Environment Department), February 20, 2007. "Direction to Modify the Investigation Report for Material Disposal Area V, Consolidated Unit 21-018(a)-99, at Technical Area 21," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED HWB), Santa Fe, New Mexico. (NMED 2007, 096393)

Table C-1.0-1
Description of Investigation Methods

Method	Summary
Spade-and-Scoop Collection of Soil Samples	This method was used for collection of surface (i.e., 0–6 in.) soil or fill samples. A hole was dug to the desired depth, as prescribed in the work plan, and a discrete grab sample was collected. The sample was homogenized in a decontaminated stainless-steel bowl before it was transferred to the appropriate sample containers.
Split-Spoon Core-Barrel Sampling	The split-spoon core barrel is a cylindrical barrel split lengthwise so that the two halves can be separated to expose the core sample. The stainless-steel core barrel (3-in.-inner-diameter and 5-ft long) is pushed directly into the subsurface media using a hollow-stem auger drilling rig. A continuous length of core is extracted with the core barrel. Once it was extracted, the section of core was screened for radioactivity and organic vapors, photographed, and described in a lithologic log. If it was located within a targeted sample interval, a portion of the core was collected for fixed laboratory analysis.
Field Logging, Handling, and Documentation of Borehole Materials	Upon reaching the surface, core barrels were immediately opened for field screening, logging, and sampling. Logging of borehole materials included run number, core recovery in feet, depth interval (in 5-ft increments), field-screening results, lithological and structural description, and a photograph. Once the core material was logged, selected samples were taken from discrete intervals of the core. All borehole material not sampled was then disposed of as waste. No material from the boreholes at Consolidated Unit 21-018(a)-99 was archived.
Headspace Vapor Screening	Samples from each 5-ft core interval were field screened for VOCs by placing a portion of the sample in a plastic sample bag. The bag was sealed and gently shaken and allowed to equilibrate for approximately 5 min. The sample was then screened by inserting a PID probe equipped with an 11.7-eV lamp into the container. The results were recorded in units of ppm.
Sampling of Subatmospheric Air	Subsurface pore-gas samples were collected from two discrete zones within each borehole (estimated base of disposal unit and TD of borehole, minus sloughed footage for first round of pore-gas sampling). The boreholes were reamed out for a second round of pore-gas sampling to obtain samples at TD. During field measurements, subsurface vapor samples were monitored for carbon dioxide during purging with a B&K multigas monitor (Type 1302). Analytical samples were collected only after readings stabilized. Vapor samples were collected using a SUMMA canister and analyzed by EPA Method TO-15. All instruments used during field screening were calibrated daily following the manufacturers' specifications.
Handling, Packaging, and Shipping of Samples	Samples were sealed and labeled before being packed in ice, and sample and transport containers were examined to ensure they were free of external contamination. Samples were packaged to minimize the possibility of breakage during transport. After environmental samples were collected, packaged, and preserved, they were transported to the SMO. A split of each sample was sent to an SMO-approved radiation-screening laboratory under COC. Once radiation-screening results were received, the SMO sent the corresponding analytical samples to fixed laboratories for full analysis.
Containers and Preservation of Samples	Specific requirements/processes for sample containers, preservation techniques, and holding times were based on EPA guidance for environmental sampling, preservation, and QA. Specific requirements for each sample were printed in the SCLs provided by the SMO (size and type of container, preservatives, etc.). All samples were preserved by placing them in insulated containers with ice to maintain a temperature of 4°C.

Table C-1.0-1 (continued)

Method	Summary
Subsurface Moisture Measurements Using a Neutron Probe	Moisture measurements were collected with a CPN 503 DR run through the Laboratory-owned borehole logging system. Moisture measurements were taken at approximately 2-in. intervals for the entire open length of the borehole, and the data were recorded on a laptop computer connected to the probe. Calibration and operation of the neutron probe were conducted according to the manufacturer's specifications.
Operation of Laboratory-Owned Borehole Logging Trailer	Laboratory-owned geophysical logging equipment, including caliper, gamma, neutron, and 360-degree camera surveys, was used for postdrilling characterization of the subsurface. The boreholes were logged over the maximum available depth.
Sample Control and Field Documentation	The collection, screening, and transport of samples were documented on standard forms generated by the SMO. These forms included SCLs, COC forms, and sample container labels. Collection logs were completed at the time the samples were collected and were signed by the sampler and a reviewer who verified that the logs were complete and accurate. Corresponding labels were initialed and applied to each sample container, and custody seals were placed around container lids or openings. The COC forms were completed and assigned to verify that the samples were not left unattended.
Coordinating and Evaluating Geodetic Surveys	Geodetic surveys focused on obtaining survey data of acceptable quality to use during project investigations. Geodetic surveys were conducted with a Trimble 5700 DGPS. The survey data conformed to Laboratory Information Architecture (IA) project standards IA-CB02, "GIS Horizontal Spatial Reference System," and IA-D802, "Geospatial Positioning Accuracy Standard for A/E/C/ and Facility Management." All coordinates are expressed as State Plane Coordinate System, North American Datum 83, New Mexico Central Zone, U.S. survey ft. All elevation data are reported relative to the National Geodetic Vertical Datum of 1983.
Management, Characterization, and Storage of Investigation-Derived Waste (IDW)	The IDW was managed, characterized, and stored in accordance with an approved WCSF that documents site history, field activities, and the characterization approach for each waste stream managed. Waste characterization complied with on-site or off-site waste acceptance criteria, as appropriate. All stored IDW was marked with appropriate signs and labels. Drums containing IDW were stored on pallets to prevent the containers from deteriorating. The means to store, control, and transport each potential waste type and classification of the waste were determined before field operations began. A waste storage area was established before waste was generated. Each waste generated container was individually labeled with waste classification, item ID, and radioactivity (if applicable) immediately following containerization. All waste was segregated by classification and compatibility to prevent cross-contamination.
Field Quality Control Samples	Field QC samples were collected as directed in the Consent Order as follows: *Field Duplicate*: At a frequency of 10%; collected at the same time as a regular sample and submitted for the same analyses. *Equipment Rinsate Blank*: At a frequency of 5%; collected by rinsing sampling equipment with deionized water that is collected in a sample container and submitted for laboratory analysis. *Trip Blanks*: Required for all field events that include collecting samples for VOC analysis. Trip-blank containers consist of certified clean sand that are opened and kept with the other sample containers during the sampling process.
Field Decontamination of Drilling and Sampling Equipment	Dry decontamination was the preferred method at Consolidated Unit 21-018(a)-99 to minimize generating liquid waste. Dry decontamination included the using a wire brush or other tool to remove soil or other material adhering to the sampling equipment, followed by applying a commercial cleaning agent (nonacid, waxless cleaners) and paper wipes.

Attachment C-1

Photo Log



Photo 1 Characterization drilling of step-out borehole south of MDA V



Photo 2 Borehole core screening, logging, and sampling station



Photo 3 Pore-gas sampling of borehole west of MDA V



Photo 4 Absorption bed pipe excavation [SWMU 21-018(a)]



Photo 5 Absorption bed pipe removal [SWMU 21-018(a)]



Photo 6 Absorption bed material excavation [SWMU 21-018(a)]



Photo 7 Direct loading of absorption bed material for shipment to TA-54



Photo 8 Loading operations of supersacks with absorption bed material



Photo 9 Loading of supersacks for shipment to EnviroCare



Photo 10 Loading operations of supersacks with absorption bed material for shipment to TA-54



Photo 11 Absorption bed 2 after excavation and confirmation sampling



Photo 12 Absorption bed backfilling operations [SWMU 21-018(a)]



Photo 13 View to the east of MDA V following bed material removal, backfilling, and regrading



Photo 14 Excavation of concrete debris on slope south of MDA V [SWMU 21-013(b)]



Photo 15 Debris sizing for bin loading of slope concrete [SWMU 21-013(b)]



Photo 16 View to the west of slope following debris removal and regrading [SWMU 21-013(b)]



Photo 17 Sampling operations



Photo 18 Sample-preparation station



Photo 19 Vacuum truck set up for outfall sediment removal operations [SWMU 21-023(c)]



Photo 20 Sediment removal with vacuum truck [SWMU 21-023(c)]



Photo 21 Concrete debris from slope



Photo 22 Distribution pipe removed from absorption bed



Photo 23 Rolloff bins staged for shipment off-site



Photo 24 Supersacks staged for shipment off-site

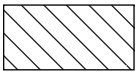
Appendix D

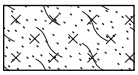
Borehole Logs and Geophysical Logs

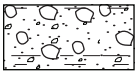
BOREHOLE LOG LEGEND

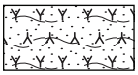
Listed below are explanations for each column in the Lithologic Logs for each borehole drilled, historically and in 2005 as well as the graphical representation of each unit encountered.

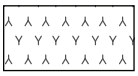
Run No.	Each 5 ft core retrieved, in numerical order
Recovery	The amount of sample recovered in each run, expressed in feet
Depth	Depth of important lithological features, expressed in feet below ground surface (ft bgs)
Graphic	The graphical picture of each lithologic unit see legend below
Description	Narrative description of each lithologic unit
Alpha	Radionuclide field screen for alpha emitters, expressed in dose per minute (dpm)
Beta	Radionuclide field screen for beta emitters, expressed in dose per minute (dpm)
PID	Organic Vapor field screen, expressed in parts per million (ppm)
Comments	Sample depth interval collected, justification for sampling, and the LANL sample identification number

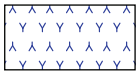

Fill

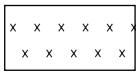

Fracture Zone

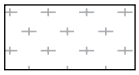

Tsankawi Pumice Bed

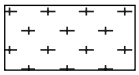

Staining Zone

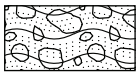

Qbt 3

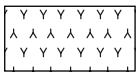

Qbt 3 NONWELDED Zone


Qbt 2


Qbt 1v - vapor phase


Qbt 1g - glass phase


Qct


Qbo

Lithologic Drilling Log of Borehole: BH-01

Location ID: 21-24524

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(a)

Date Started: 5/13/2005
Date Completed: 5/25/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Graphic	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				SILT with CLAY (7.5YR 4/4) brown; soft; low plasticity; dry				
1	3.5	5			41	1018	NA	
				FRACTURE ZONE (7.5YR 4/6) strong brown, clay-filled fracture, 60°, 6.5-7.0 ft bgs and 8.0-9.0 ft bgs, < 5 cm width				Fracture Zone, 8-10 ft, **MD21-05-59560**
2	5	10			36	761	NA	Geotechnical, 10-11 ft, **MD21-05-59560**
3	4.5	15		(Qbt 3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1-1 cm, 5%	<85.3	698	NA	Base Structure, 11-13 ft, **MD21-05-59561**
4	5	20			<108.7	<1866	NA	Geotechnical, 13-14 ft, **MD21-05-59561**
								Qbt3, 23-25 ft, **MD21-05-59562**
5	3.5	25			41	398	NA	Geotechnical, 25-26 ft, **MD21-05-59562**
6	2.5	30			<59	<1797	NA	Qbt3, 33-35 ft, **MD21-05-59563**
7	4	35			130	800	NA	Geotechnical, 35-36 ft, **MD21-05-59563**
8	2.8	40			48	400	NA	Fracture Zone, 43-45 ft, **MD21-05-59564**
								Geotechnical, 45-46 ft, **MD21-05-59564**
9	3.5	45		FRACTURE ZONE (7.5YR 4/6) strong brown, clay-filled, 60°, 5 cm width	28	700	NA	
10	3	50		(Qbt 3) TUFF (5YR 7/1) light gray grading to (5YR 6/1) gray; SLIGHTLY welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, dark gray, <1 cm, 10%; staining, orange brown, 10% throughout interval	<43	<1000	NA	
11	5	55			<43	<1000	NA	
12	5	60			<43	<1000	NA	
13	5	65			<43	<1000	NA	
14	0.5	70		(Qbt 3) TUFF (5YR 7/1) light gray; NON welded; very fine ash matrix; trace phenocrysts; pumice fragments, dark gray, <1 cm, 5%; lithics present toward bottom of interval	<43	<1000	NA	Low recovery due to contact zone with very fine ash matrix
15	4	75			<43	<1000	NA	
16	4	80			<52	<1741	NA	

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/8/06

Lithologic Drilling Log of Borehole: BH-01

Location ID: 21-24524

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(a)

Date Started: 5/13/2005
Date Completed: 5/25/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Graphic	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
17	3	85			<52	<1741	NA	
18	4	90			<52	<1741	NA	
19	3.5	95			<71	<853	NA	Base Qbt 3, 93-95 ft, **MD21-05-59565** Geotechnical, 95-96 ft, **MD21-05-59565**
20	5	100		(Qbt 2) TUFF (5YR 6/2) pinkish gray grading to (5YR 5/1) gray; MODERATELY welded; medium ash matrix; phenocrysts (sanidine), <1-2 mm, 5%; pumice fragments, gray to dark gray, <1-1 cm, 5%; lithics present to 3 cm, 5%	54	1107	NA	Geotechnical, 97.5-98 ft, **MD21-05-59566**
21	4.5	105			44	652	3.2	Top Qbt 2, 98-100 ft, **MD21-05-59566**
22	5	110			54	1026	4.9	
23	5	115			17	729	5.3	
24	0	120			NA	NA	NA	No sample core, difficult drilling
25	4	125			44	532	NA	
26	4.5	130			49	253	NA	
27	5	135			107	640	NA	
28	5	140			17	259	NA	
29	5	145		STAINING ZONE, light reddish brown, 20% matrix	64	265	NA	
30	5	150		(Qbt 2) TUFF (5YR 6/2) pinkish gray; MODERATELY welded; medium ash matrix; phenocrysts (sanidine), <1-2 mm, 5%; pumice fragments, gray to dark gray, <1-1 cm, 5%; lithics present to 3 cm, 5%; gradational contact from 165-170 ft bgs with Qbt1v	17	513	0.6	
31	5	155			NA	NA	NA	
32	5	160			28	748	1.0	

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/8/06

Lithologic Drilling Log of Borehole: BH-01

Location ID: 21-24524

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(a)

Date Started: 5/13/2005
Date Completed: 5/25/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Graphic	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
33	5	165			33	762	0.9	
34	5	170			38	1117	0.6	Elevated Field Screen, 168-170 ft, **MD21-05-59567**
35	5	175		(Qbt 1v) TUFF (5YR 7/1) light gray; NON welded; very fine ash matrix; phenocrysts, 1-3 mm, 5%; pumice, gray to white, elongated, 1-3 cm, 5%	13	753	1.2	Geotechnical, 170-170.5 ft, **MD21-05-59567**
36	5	180			<44	936	0.9	
37	5	185			28	906	0.6	
38	5	190			65	1088	0.6	
39	4	195			65	954	0.0	
40	4	200			28	960	0.6	
41	4.5	205			38	1064	1.4	
42	4.5	210			28	777	0.9	
43	4.5	215			44	580	1.6	
44	4.5	220			1	642	1.4	
45	4.5	225			1	677	0.9	
46	5	230			12	719	1.9	
47	5	235		(Qbt 1v) COLONNADE TUFF (5YR 5/4) reddish brown; SLIGHTLY welded; medium ash matrix; phenocrysts 1-3 mm, 5%; pumice fragments, altered, reddish brown, 1-4 cm, 5%	60	508	0.9	
48	4.5	240			<33	1007	0.4	

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/8/06

Lithologic Drilling Log of Borehole: BH-01

Location ID: 21-24524

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(a)

Date Started: 5/13/2005
Date Completed: 5/25/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Graphic	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
49	5	245			22	777	0.0	
50	5	250		(Qbt 1g) TUFF (5YR 6/3) light reddish brown grading to (5YR 6/2) pinkish gray; NON welded; fine ash matrix; trace phenocrysts; pumice fragments, altered gray and reddish brown <1-3 cm, 5%; lithics, 1 cm, 5%, increasing toward bottom of interval	56	1149	1.9	
51	5	255			59	280	0.8	
52	4.5	260			69	257	1.5	
53	4.5	265			48	248	0.9	
54	3.5	270			85	271	1.0	
55	5	275			42	258	0.9	
56	5	280			80	251	1.6	
57	5	285			91	270	0.3	
58	5	290			112	259	2.0	
59	5	295			75	273	4.2	
60	5	300		PUMICE RICH ZONE (5YR 7/1) light gray pumaceous ash and pumice fragments to 3 cm, 50%	85	261	4.2	
61	4.5	305			59	262	2.5	
62	4.5	310		(Qct) interval of interbedded clays and silts, tuffaceous sands, gravels and primary ash flow deposits.	128	253	5.5	
63	4.5	315		306-306.7 ft bgs CLAY (5YR 5/4) reddish brown;	80	248	3.2	Geotechnical, 312.5-313.5 ft, **MD21-05-60605**
64	5	320		306.8-308.5 ft bgs GRAVEL subrounded, and native lithics, to 1 cm;	69	242	7.2	

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/8/06

Lithologic Drilling Log of Borehole: BH-01

Location ID: 21-24524

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(a)

Date Started: 5/13/2005
Date Completed: 5/25/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Graphic	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
65	3	325		308.5-310 ft bgs CLAY (5YR 5/4) reddish brown;	91	251	6.0	Geotechnical/Duplicate, 314-315 ft, **MD21-05-60606**
66	4	330		310-317 ft bgs TUFFACEOUS SAND (5YR 6/2) pinkish gray, coarse grained, subrounded interbedded with (5YR 5/4) reddish brown SILTY SAND, subrounded, medium to coarse; surge beds fingering with altered white pumaceous ash	91	242	6.2	
67	3	335			<54	437	4.6	Geotechnical, 333.5-334 ft, **MD21-05-60607**
68	3	340		317-322.5 ft bgs SAND (5YR 6/4) light reddish brown, coarse grained, subangular, with native lithics	54	950	3.7	Geotechnical/Duplicate, 334-334.5 ft, **MD21-05-60608**
69	3.5	345		322.5-355 ft bgs ASH FLOW TUFF (5YR 8/1) white to (to 5YR 7/2) pinkish gray; SLIGHTLY welded, medium pumaceous matrix; phenocrysts, 1-2 mm, 3%; interbedded with SAND with GRAVEL (5YR 6/3) reddish brown to light reddish brown; native lithics present throughout	65	720	4.1	Qct, 337.5-339.5 ft, **MD21-05-60609**
70	5	350			17	1046	2.0	Geotechnical, 339.5-340 ft, **MD21-05-60609**
71	4.5	355			22	959	2.0	
72	5	360		355-360 ft bgs TUFFACEOUS SAND with GRAVEL (10YR 6/4) light yellowish brown, with interbedded bands of brownish yellow SAND with SILT, zone 1 cm thick, approximately 1-2 ft apart; gravel size and percent increases with depth	60	1199	7.0	
73	5	365			27	1060	5.7	
74	4.8	370			38	1084	13.2	
75	5	375		(Qbo) TUFF (5YR 6/4) light reddish brown; NON welded; fine ash matrix; phenocrysts, 1-2 mm, 5%; pumice fragments, 1-2 cm, 3%; minor lithics increasing with depth	11	1113	7.0	Geotechnical/Duplicate, 375.5-376 ft, **MD21-05-60610**
76	3.5	380		**TOTAL DEPTH 380 FT BGS**	33	930	6.3	Total Depth, 376-380 ft, **MD21-05-60610**

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

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MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/8/06

Lithologic Drilling Log of Borehole: BH-02

Location ID: 21-24525

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(b)

Date Started: 6/8/2005
Date Completed: 6/8/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
1	4.5	5		FILL CLAY with SILT (7.5YR 4/4) brown; firm; high plasticity; moist, 3-5 ft bgs	54	2570	1.7	Base Structure, 3-5 ft, **MD21-05-59570**
2	1.5	10		FILL fine SAND (7.5YR 4/4) brown; well rounded; loose; moist	72	2890	1.7	
3	3.5	15		(Qbt3) TUFF (5YR 6/2) pinkish gray; SLIGHTLY welded; fine ash matrix; phenocrysts, <1-2 mm, 5%; pumice fragments, slightly altered, 1-2 cm, 5%	30	2940	1.2	Base Structure, 13-15 ft, **MD21-05-59571**
4	5	20		(Qbt3) TUFF (5YR 6/1) gray; MODERATELY welded; medium ash matrix; phenocrysts <1-2 mm, 5%, decreasing down interval; pumice fragments, 1-3 cm, 3%	42	2860	1.4	Qbt3, 20-22 ft, **MD21-05-59572**
5	5	25			42	3210	1.9	
6	5	30			84	3050	1.2	
7	5	35		(Qbt3) TUFF (5YR 7/1) light gray; MODERATELY welded; medium ash matrix; phenocrysts 1-2 mm, 5%; pumice fragments, 1-2 cm, <3%	66	3180	1.8	Field Duplicate, 37-39 ft, **MD21-05-59577**
8	5	40		**TOTAL DEPTH 40 FT BGS**	60	3520	1.9	Total Depth, 37-39 ft, **MD21-05-59573**

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 3/31/06

Lithologic Drilling Log of Borehole: BH-03

Location ID: 21-24526

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(b)

Date Started: 5/13/2005
Date Completed: 5/13/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				ASPHALT				
1	3	5		FILL CLAY with SILT (7.5YR 4/4) brown; firm; moderate plasticity; moist from 0.25 to 1 ft bgs	10.44	396	NA	Base Structure, 3-5 ft, **MD21-05-59581**
2	3.5	10		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1 cm, <5%	26.2	751	NA	Base Structure, 9-11 ft, **MD21-05-59578**
3	5	15			10.44	619	NA	
4	4	20			10.44	921	NA	
5	5	25			15.70	804	NA	
6	5	30		STAINING ZONE, orange-red, 20% increasing to 50% matrix down interval	84.1	619	NA	Staining Zone, 32-34 ft, **MD21-05-59579**
7	5	35		(Qbt3) TUFF (5YR 6/1) gray; MODERATELY welded; medium ash matrix; trace phenocrysts; pumice fragments, <1cm, 5%; lithic minerals, 1 cm, <5%; staining, orange-red, 15% matrix	26.2	959	NA	
8	5	40		**TOTAL DEPTH 40 FT BGS**	42.0	697	NA	Total Depth, 38-40 ft, **MD21-05-59580**

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/5/06

Lithologic Drilling Log of Borehole: BH-04

Location ID: 21-24527

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(b)

Date Started: 5/12/2005
Date Completed: 5/12/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				ASPHALT				
1	4	5		FILL CLAY with SILT (7.5YR 4/4) brown; firm; moderate plasticity; moist	<89.6	62	NA	Base Structure, 3-5 ft **MD21-05-59591**
2	5	10		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; pumice fragments <1 cm, 5%; native lithics, 5%, <1 cm, 35-40 ft bgs	<89.6	675	NA	Base Structure, 8.5-10 ft **MD21-05-59592**
3	2	15			<89.6	1118	NA	Highest Field Screen, 12-14 ft **MD21-05-59593**
4	5	20			<89.6	374	NA	
5	5	25			6	489	NA	
6	5	30			1	652	NA	
7	5	35			<89.6	484	NA	
8	5	40			<89.6	355	NA	Total Depth, 38-40 ft **MD21-05-59594**
				TOTAL DEPTH 40 FT BGS				

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 3/31/06

Lithologic Drilling Log of Borehole: BH-05

Location ID: 21-24528

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(b)

Date Started: 6/8/2005
Date Completed: 6/8/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
1	4	5		FILL SILT with CLAY (7.5YR 4/4) brown; soft; loose; moist to 3 ft bgs	42	2520	0.5	Base Structure, 3-5 ft, **MD21-05-59596**
2	4.5	10		TUFFACEOUS SAND (7.5YR 4/4 to 6/2) brown to pinkish gray; well rounded; medium grained; trace angular lithics toward bottom of interval; clay lense, white, at 22.5 ft bgs	78	2870	1.4	
3	3	15			96	3590	0.8	Base Structure, 14-16 ft, **MD21-05-59597** Field Duplicate, 14-16 ft, **MD21-05-59604**
4	3	20			84	3410	1.7	
5	4.5	25		GRAVEL with SAND (7.5YR 6/2) pinkish gray; sub-angular; 1-4 cm cobbles of welded tuff nodules, reddish pink granite, and blue/gray native lithics	72	3110	1.4	
6	3	30		(Qbt3) TUFF (5YR 6/1) gray; SLIGHTLY welded; medium ash matrix; phenocrysts, recrystallized quartz, 1-2 mm, 5%; pumice fragments, altered, 1-3 cm, 5%; iron staining from 31-32 ft bgs; lithics, angular, 1-3 cm present at 39 ft bgs	72	3080	1.6	Fracture Zone, 32.5-34.5 ft, **MD21-05-59598**
7	3	35		FRACTURE ZONE, clay-filled, reddish brown, 60-degrees, 4 cm	66	2850	1.8	Fracture Zone, 36-38 ft, **MD21-05-59599**
8	5	40		FRACTURE ZONE, clay-filled, reddish brown, 60-degrees, 4 cm (Qbt3) TUFF (5YR 7/1) light gray; NON welded; fine ash matrix; phenocrysts, 1-2 mm, 5%; pumice fragments, altered, 1-3 cm, 5%; lithics, angular, 1-3 cm present at 39 ft bgs	60	2830	1.7	Total Depth, 38-40 ft, **MD21-05-59600**
				TOTAL DEPTH 40 FT BGS				

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 3/31/06

Lithologic Drilling Log of Borehole: BH-06

Location ID: 21-24531

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(a)

Date Started: 6/9/2005
Date Completed: 6/9/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				SILT with CLAY (7.5YR 4/4) brown; soft; low plasticity; dry				
1	4.5	5		(Qbt3) TUFF (5YR 6/2) pinkish gray grading to (5YR 6/1) gray to bottom of interval; SLIGHTLY welded; fine ash matrix; friable; phenocrysts <1-2 mm, 5%; pumice fragments, gray and white, <1-2 cm, 3%	84	3270	4.0	Base Structure, 3-5 ft, **MD21-05-59655**
2	5	10			60	2860	3.5	
3	5	15			90	3220	5.3	Base Structure, 12-14 ft, **MD21-05-59656** Field Duplicate, 12-14 ft, **MD21-05-59663**
4	5	20			115	3250	3.0	
5	5	25			90	3100	4.2	
6	5	30			78	3240	3.2	
7	5	35			90	3180	4.7	
8	5	40			33	1170	3.8	
9	5	45			64	1072	1.8	
10	5	50			39	1146	2.0	
11	5	55			58	1053	2.9	
12	5	60		STAINING ZONE light brown, 25% matrix	64	1216	2.4	Staining Zone, 62-64 ft, **MD21-05-59657**
13	5	65			33	83	2.6	
14	5	70			15	1072	1.8	
15	5	75		(QBT3) TUFF (5YR 7/1) light gray; NON welded; very fine ash matrix; trace phenocrysts; pumice fragments, altered, white to light gray, <1-2 cm, 3%	27	917	1.3	
16	5	80		**TOTAL DEPTH 80 FT BGS**	52	1108	0.8	Total Depth, 78-80 ft, **MD21-05-59658**

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/3/06

Lithologic Drilling Log of Borehole: BH-07

Location ID: 21-24532

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: North of SWMU 21-018(a)

Date Started: 6/3/2005
Date Completed: 6/3/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
1	4	5		FILL SAND with SILT and CLAY (7.5YR 4/4) brown; well rounded, coarse grained to 0.5 mm; moist 4-5 ft bgs and 10 ft bgs	45	291	3.2	
2	2	10			0	340	4.8	No enough recovery to sample in upper interval
3	3	15			3	1107	3.2	
4	1.5	20			21	849	4.1	Base Structure, 20-22 ft, **MD21-05-59664**
5	5	25		(Qbt3) TUFF (5YR 5/2) reddish gray; MODERATELY welded; phenocrysts, <1-2 mm; pumice fragments, <1-2 cm; reddish brown staining, 3%; grading to (5YR 6/1) gray at bottom of interval	9	911	2.8	
6	5	30			21	1009	4.9	Field Screen, 28-30 ft, **MD21-05-59665**
				FRACTURE ZONE (5YR 6/1) 45°, clay-filled, reddish brown				Fracture Zone, 31.5-33.5 ft, **MD21-05-59666**
7	5	35		(Qbt3) TUFF (5YR 6/1) gray; MODERATELY welded; medium ash matrix; phenocrysts, <1-2 mm, 5%; pumice fragments <1-4 cm; minor staining, 5%, 36 ft bgs	35	954	4.1	
8	5	40			57	825	4.5	Total Depth, 38-40 ft, **MD21-05-59667**
				TOTAL DEPTH 40 FT BGS				

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/5/06

Lithologic Drilling Log of Borehole: BH-08

Location ID: 21-24533

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: East of SWMU 21-018(a)

Date Started: 6/2/2005
Date Completed: 6/2/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				SILT with CLAY (7.5YR 4/4) brown; soft; low plasticity; dry				
1	5	5		(Qbt3) TUFF (5YR 5/3) reddish brown; MODERATELY welded; medium ash matrix; trace phenocrysts, <3%; pumice fragments, <1 cm, 5%	37	1722	0.5	
2	5	10			49	1458	1.7	Base Structure, 10-12 ft, **MD21-05-59673**
3	5	15		STAINING ZONE light reddish brown, 20%	37	1544	1.8	
4	5	20			19	1145	2.3	
5	5	25			37	1520	2.1	
6	5	30		STAINING ZONE light reddish brown, 25% matrix	13	1569	4.8	Staining Zone, 28-30 ft, **MD21-05-59674**
7	5	35		FRACTURE ZONE; dark reddish brown; fracture, 45°, clay-filled, 2 cm	13	1173	2.6	Fracture Zone, 30-32 ft, **MD21-05-59675**
8	5	40		(Qbt3) TUFF (5YR 6/1) gray; MODERATELY welded; medium ash matrix; trace phenocrysts; pumice fragments, <1 cm, 5%; reddish brown staining, 10%, 35-36.5 ft bgs;	19	1293	4.2	
9	5	45		light brown staining, 10%, 42.5-47.5 ft bgs	73	1962	4.4	
10	5	50			19	1717	3.8	
11	5	55		(Qbt3) TUFF (5YR 6/2) pinkish gray; MODERATELY welded; phenocrysts, <1-2 mm, 3%; pumice fragments, reddish brown, <1-3 cm, 3%	25	1225	3.2	
12	5	60			13	1323	9.8	Deepest Field Screen, 58-60 ft, **MD21-05-59676**
13	5	65			55	1587	1.2	
14	5	70		(Qbt3) NONWELDED ZONE (5YR 7/1) light gray; very fine ash matrix; friable; phenocrysts, 1-3 mm, 5%; pumice fragments, <1-2 cm; minor large pumice fragments,	33	1821	1.4	
15	4.5	75		altered white, to 4 cm	37	1508	3.7	
16	4	80			19	1489	3.5	
17	4	85			37	1821	3.7	Total Depth, 83-85 ft, **MD21-05-59677**
				TOTAL DEPTH 85 FT BGS				

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 3/31/06

Lithologic Drilling Log of Borehole: BH-09

Location ID: 21-24534

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: East of SWMU 21-018(a)

Date Started: 6/3/2005
Date Completed: 6/3/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				FILL SILT with CLAY (7.5YR 4/4) brown; soft; low plasticity; dry				
1	5	5		(Qbt3) TUFF (5YR 5/3) reddish brown; MODERATELY welded; medium ash matrix; phenocrysts, <1-1 mm, < 3%; pumice fragments, <1 cm, 3%	9	393	3.5	Base Structure, 3-5 ft, **MD21-05-59682**
				FRACTURE ZONE; 60°, reddish brown, clay-filled, 2 cm				
2	5	10		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1 cm, <3% Staining, light brown, 10%, 35 ft bgs	27	860	4.2	Base Structure, 8-10 ft, **MD21-05-59683**
3	5	15			64	301	2.5	Staining Zone, 13-15 ft, **MD21-05-59684**
4	5	20			39	227	4.2	
5	5	25			15	1160	3.5	
6	5	30			27	516	2.7	
7	5	35			27	583	2.7	
8	5	40		**TOTAL DEPTH 40 FT BGS**	45	411	3.2	Total Depth, 38-40 ft, **MD21-05-59685**

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 3/31/06

Lithologic Drilling Log of Borehole: BH-10

Location ID: 21-24535

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: South of SWMU 21-018(a)

Date Started: 5/31/2005
Date Completed: 6/1/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				SILT with CLAY (7.5YR 4/4) brown; soft; loose; dry				
1	5	5		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; trace phenocrysts; pumice fragments <1 cm, 3%	43	1287	7.1	
2	3.5	10			43	1679	17.1	Base Structure, 8-10 ft, **MD21-05-59691**
3	4	15			13	617	11.2	Base Structure, 13-15 ft, **MD21-05-59692**
4	4.5	20		STAINING ZONE; light reddish brown, 25% matrix	19	1870	10.2	Staining Zone, 20-22 ft, **MD21-05-59693**
5	3.5	25		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1-2 cm, 5%	25	1643	16.3	
6	3	30		STAINING ZONE light reddish brown, 20% matrix	37	1870	9.4	Staining Zone, 30-32 ft, **MD21-05-59694**
7	4	35		(Qbt3) TUFF (5YR 7/2) pinkish gray; SLIGHTLY welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1-3 cm, <5%	25	1747	10.6	
8	4.5	40			55	1692	10.2	
9	4.5	45			25	1508	8.8	
10	5	50			25	1661	7.1	
11	4	55			55	1808	2.5	
12	4.5	60			55	1925	2.3	
13	4	65			67	1551	3.4	
14	4	70		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; very fine ash matrix; friabe; trace phenocrysts; pumice fragments, <1-1 cm, 3%	25	1569	3.7	
15	4	75			67	1759	3.2	
16	4	80			25	1747	2.7	Total Depth, 78-80 ft, **MD21-05-59695**
				TOTAL DEPTH 80 FT BGS				

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/3/06

Lithologic Drilling Log of Borehole: BH-11

Location ID: 21-24538

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: South of SWMU 21-018(a)

Date Started: 5/31/2005
Date Completed: 6/1/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				SILT with CLAY (7.5 4/4) brown; soft; loose; dry				
1	4	5		(Qbt3) TUFF (5YR 6/1) gray grading to (5YR 7/2) pinkish gray; MODERATELY welded; fine ash matrix grading to medium toward bottom of interval; friable; trace phenocrysts; pumice fragments, light gray <1-3 cm, 5%	68	1489	2.4	
2	3.5	10			55	1237	5.8	
3	3.5	15			37	1563	8.2	Base Structure, 13-15 ft, **MD21-05-59750** Base Structure, 15-17 ft, **MD21-05-59751**
4	3.5	20			37	1864	7.2	
5	4.5	25			55	1587	5.9	
6	4	30			25	1446	7.2	Deepest PID Screen, 28-30 ft, **MD21-05-59752**
7	4	35			19	1422	5.8	
				(Qbt3) STAINING ZONE, light brown, 25% matrix				Staining Zone, 37-39 ft, **MD21-05-59753**
8	4.9	40			43	1600	5.8	Field Duplicate, 37-39 ft, **MD21-05-59758**
				(Qbt3) FRACTURE ZONE; 60°, 4 cm, dark reddish brown, clay-filled				Fracture Zone, 42-44 ft, **MD21-05-59754**
9	4	45		(Qbt3) TUFF (5YR 7/2) pinkish gray; MODERATELY welded; medium ash matrix; phenocrysts, 1-3 mm, 5%; pumice fragments, altered reddish brown, <1-3 cm, 5%	49	1329	5.6	
10	5	50			13	1323	5.4	
11	5	55			43	1581	5.7	Total Depth, 53-55 ft, **MD21-05-59755**
				TOTAL DEPTH 55 FT BGS				

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/3/06

Lithologic Drilling Log of Borehole: BH-12

Location ID: 21-24539

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: West of SWMU 21-018(a)

Date Started: 6/6/2005
Date Completed: 6/6/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				SILT with CLAY (7.5YR 4/4) brown; soft; loose; dry				
1	3.5	5		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1-2 cm, 5%	21	714	1.0	
2	5	10			69	1206	0.6	
3	5	15			27	1261	0.8	Base Structure, 12-14 ft, **MD21-05-59759** Field Duplicate, 12-14 ft, **MD21-05-59767**
4	5	20			27	1083	2.1	
5	5	25			15	1089	2.2	
6	5	30		(Qbt3) STAINING ZONE, light brown, 25% matrix (Qbt3) TUFF (5YR 7/1) light gray; NON welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, altered reddish brown, <1-2 cm, 5%	51	1095	1.4	Staining Zone, 28-30 ft, **MD21-05-59760**
7	5	35			27	1212	1.9	
8	5	40		FRACTURE ZONE; 60°, reddish brown, clay-filled, 2 cm	33	991	1.6	Fracture Zone, 40-42 ft, **MD21-05-59761**
9	5	45		(Qbt3) TUFF (5YR 6/1) gray grading to (5YR 6/2) pinkish gray; MODERATELY welded; medium ash matrix; phenocrysts, <1-3 mm, 3%; pumice fragments, dark gray, <1 cm, 3%	27	1077	2.5	
10	5	50			39	1322	2.1	
11	5	55			27	1058	1.9	
12	5	60			33	806	2.4	
13	4.5	65		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; very fine ash matrix; phenocrysts, <1-3 mm, 5%, decreasing toward bottom of interval; pumice fragments, dark gray, <1 cm, 5%	21	825	2.3	
14	4.5	70			81	1028	1.6	
15	4.5	75			45	856	2.2	
16	4	80		**TOTAL DEPTH 80 FT BGS**	45	1144	1.1	Total Depth, 78-80 ft, **MD21-05-59762**

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

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MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/3/06

Lithologic Drilling Log of Borehole: BH-13

Location ID: 21-24540

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: West of SWMU 21-018(a)

Date Started: 6/7/2005
Date Completed: 6/7/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				SILT with CLAY; (7.5YR 4/4) brown; soft; loose; dry				
1	3	5		(Qbt3) TUFF (5YR 6/2) pinkish gray grading to (5YR 6/1) gray ; SLIGHTLY welded; fine ash matrix; friable; phenocrysts, 1-3 mm, 5%; pumice fragments, altered dark gray and olive gray, <1-3 cm, 3%	127	3030	3.6	
2	5	10			36	3510	3.6	Base Structure, 9-11 ft, **MD21-05-59768** Field Duplicate, 9-11 ft, **MD21-05-59776**
3	5	15			66	3220	3.8	
4	5	20			72	3000	2.2	
5	5	25			60	3490	3.2	
6	5	30		(Qbt3) STAINING ZONE; dark reddish brown, 25% (Qbt3) TUFF (5YR 6/2) pinkish gray; MODERATELY welded; medium ash matrix; phenocrysts, <1-2 mm, 3%; pumice fragments, highly altered, dark reddish brown, 1-4 cm, 5%	102	2990	3.8	Staining Zone, 26-28 ft, **MD21-05-59769**
7	5	35			115	3370	3.8	Deepest Field Screen, 31-33 ft, **MD21-05-59770**
8	5				139	3050	4.4	Total Depth, 38-40 ft, **MD21-05-59771**
9	2	40		**TOTAL DEPTH 40 FT BGS**	102	3080	4.2	

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/3/06

Lithologic Drilling Log of Borehole: BH-14

Location ID: 21-24541

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SW Corner SWMU 21-018(a)

Date Started: 5/26/2005
Date Completed: 5/27/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
				FILL SAND with SILT and reworked TUFF (5YR 5/1) gray; well rounded; dry				
1	2.5	5		FILL broken ASPHALT chunks; 1-4 inches; dry	60	414	3.6	
				FILL GRAVEL, well rounded native rock to 4 cm mixed with SILT and SAND; well rounded; dry				
2	2.5	10			75	384	5.1	
3	5	15		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; phenocrysts, <1-2 mm, 5%; pumice fragments, gray, <1-2 cm, 5%; staining, orange brown, increasing toward bottom of interval. Possible reworked tuff/fill to 20 ft bgs	85	579	4.9	
4	1	20			65	498	5.0	Base Structure, 20-22 ft, **MD21-05-59777**
5	5	25			43	545	2.7	
6	5	30		FRACTURE ZONE, vertical, with root zone (near canyon edge) present, to 4 cm	NA	NA	4.7	Fracture Zone, 28-30 ft, **MD21-05-59778**
7	5	35		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; phenocrysts, <1-2 mm, 3%; pumice fragments, dark gray. 1-2 cm, 3%; orange brown staining, 10%, throughout	50	1072	2.5	Fracture Zone, 31-33 ft, **MD21-05-59779** Field Duplicate, 31-33 ft, **MD21-05-59785**
8	5	40			68	939	3.2	
9	5	45		STAINING ZONE, orange brown, 30% matrix (Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; phenocrysts, <1-2 mm, 3%; pumice fragments, dark gray. 1-2 cm, 3%; orange brown staining, 10%, throughout	80	846	1.3	Staining Zone, 42-44 ft, **MD21-05-59780**
10	5	50			38	686	1.2	Fracture Zone, 47-49 ft, **MD21-05-59781**
11	5	55		(Qbt3) FRACTURE ZONE, 45 degrees, to 4 cm	20	1005	2.0	
12	3	60		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; phenocrysts, <1-2 mm, 3%; pumice fragments, dark gray. 1-2 cm, 3%; orange brown staining, 10%, throughout	44	1185	1.7	
13	4	65			44	1311	0.2	
14	4	70		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; very fine ash matrix; phenocrysts, <1-3 mm, 5%, decreasing toward bottom of interval; pumice fragments, dark gray, <1 cm, 5%	56	833	2.6	
15	4	75			62	959	1.7	
16	3	80		**TOTAL DEPTH 80 FT BGS**	44	1039	0.2	Total Depth, 78-80 ft, **MD21-05-59782**

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/3/06

Lithologic Drilling Log of Borehole: BH-15

Location ID: 21-24542

Los Alamos National Laboratory, Los Alamos, NM
Project Name: MDA V Site Characterization
PRS ID: 21-018(a)-99
Borehole Location: SWMU 21-018(a)

Date Started: 6/8/2005
Date Completed: 6/8/2005
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon 3.0"

Run No.	Recovery (ft)	Depth (ft)	Lithology	Lithological Description	Alpha (dpm)	Beta (dpm)	PID (ppm)	Comments
1	4.2	5		FILL SILT with CLAY and reworked TUFF (7.5YR 4/4) brown grading to (5YR 7/1) light gray; dry; reddish brown staining, 10%, at bottom of interval	102	2910	0.7	Base Structure, 2-4 ft, **MD21-05-59786**
2	5	10		(Qbt3) TUFF (5YR 6/2) pinkish gray; SLIGHTLY welded; phenocrysts, 1-3 mm, 5%; pumice fragments, dark gray, 1-2 cm, 5%	102	2980	0.9	
3	5	15			84	3180	0.6	Base Structure, 13-15 ft, **MD21-05-59787**
4	5	20			54	3280	0.2	
5	5	25			54	2820	0.7	
6	5	30			84	3120	NA	
7	5	35		(Qbt3) STAINING ZONE reddish brown, 20% matrix (Qbt3) TUFF (5YR 6/2) pinkish gray; SLIGHTLY welded; phenocrysts, 1-3 mm, 5%; pumice fragments, dark gray, 1-2 cm, 5%; staining, reddish brown, decreasing toward bottom of interval	66	3240	NA	Staining Zone, 32-34 ft, **MD21-05-59788** Field Duplicate, 32-34 ft, **MD21-05-59794**
8	5	40		**TOTAL DEPTH 40 FT BGS**	90	3030	NA	Total Depth, 38-40 ft, **MD21-05-59789**

Field Geologist: A. Bowman, Shaw E & I
Driller: D. Starnes, Spectrum Exploration

Shaw® Shaw Environmental, Inc.

MDA U BOREHOLES (REVISED) MDA V BOREHOLE LOGS.GPJ MDAU.GDT 4/3/06

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 21-3518 TA/OU 21/1106 Drill Depth From 0 To 10' Page 1 of 3

Driller Layne Box #(s) _____ Start Date/Time 7/18/94 1700 End Date/Time 7/19/94 0830

Drilling Equip./Method Failing F-10 / AUGER Sampling Equip./Method Split core barrel / cont. / core

Depth (Feet)	Recovery (feet per foot or %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology • Petrology • Soil	Graphic Log	Lithologic Unit	Notes
			Backfilled.		0-2.0 Silt and Sand with Rounded Pebbles to ~½", Pale yellowish brn (10YR 6/2) DRY		Fill material	
					2.0-2.5 Fine Silt with ~20% Sand and rare pebbles, DRY lt brn gy (5YR 6/1)			
					2.5-4.5 Silt and clay with ~20% sand, DRY, cohesive but crumbles in hand. Rare pebbles and stringers of silty Gy material			
					4.5-7.5 Coarse pebbles & cobbles			Logged from cuttings no recovery.
					7.5-10 devitrified (partially to non-welded) tuff, ~5% pumice most ~1cm, 10-15% cryst, in ash matrix, some brownish staining		Bandelier Tuff Unit 3	

Prepared By D. Stanger Date 7/19/94 Checked By [signature] Date 1/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 21-2518 TA/OU 21/1106 Drill Depth From 10 To 40' Page 2 of 3

Driller Layne Box #(s) _____ Start Date/Time 7/19/0830 End Date/Time 7/19/1100

Drilling Equip./Method Failing F-10/Auger Sampling Equip./Method Split core barrel/cont. core

Depth (Feet)	Recovery (feet per feet / %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			Backged.		10-15 As above, Red-brn Stringers of clayey material Present, dry some staining of tuff to lt. brn gy (5YR 6/1) 15-20 as above, Stringers absent some discoloration @ ~19 FT to Grey brn. 20-25 As above (7.5-10') Brn Stringers of material present. 25-30 As above 30-35 As above 35-40, 35-37 no recovery non to Partially welded Tuff with tuffaceous pumice 1-2cm grey green to med gy 10% crystals in ash matrix dry, med gy (N5) to lt. gy (N7) @ 37.5-40 FT Red brn Stringers in tuff.		Unit 3 Bandelier Tuff	

Prepared By D. Harper Date 7/19/94 Checked By [illegible] Date 1/3/95

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 21-2518 TA/OU 21/1106 Drill Depth From 40 To 75' Page 3 of 3

Driller Layne Box #(s) _____ Start Date/Time 7/19/1100 End Date/Time 7/19 1730

Drilling Equip./Method Failing F-10/Auger Sampling Equip./Method Split core barrel/cont core.

Depth (Feet)	Recovery (feet per feet / %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			Background		40-45 As above (35-40). @ 42.5-45 numerous Stringers & mottled staining 45-50 As above but Tuff soft/ve more friable. 50-55 as above 55-60 As above 60-65 Mod welded devitrified tuff 5-10% Grey pumice 10% Qtz & Sanidine cryst. Rare Lithics in ash matrix lt. gy (N7) Dry. Slight alteration. Tuff is softer than 10-45 ft above. 65-70 As above (60-65 ft) 70-75 As above T.D = 75 ft.			

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 21-2519 TA/OU 21/1106 Drill Depth From 0 To 25 Page 1 of 2

Driller Layne Box #(s) _____ Start Date/Time 7/20/1500 End Date/Time 7/21/0900

Drilling Equip./Method Failing F-10/Augers Sampling Equip./Method Split core barrel/cont. core

Depth (Feet)	Recovery (Feet per Foot %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			Background.		0-2.0 Silty sand with ~10-20% pebbles 2.0-3.0' lt gray tuff, loose dry 3.0-5.0 Coarse pebbles and cobbles to 4-5" dia. Rounded 5.0-10' As above (3-5') 10-15' non to partially welded tuff with ~5% Grey pumice and 10% otz & sanidine crystal in ash matrix. med lt. gy (N7), Dry. Lithics rare to absent. some Stringers of brownish "Oxidation" 15-20 As above, Large glassy Lithic @ 18' "oxidation" Stringers absent. 20-25 As above		Fill material Unit 3 Bandelier Tuff	3-10 PT no Recovery logged From Cuttings

Prepared By D. Shapiro Date 7/21/04 Checked By [signature] Date 1/5/05

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 21-2519 TA/OU 21/1106 Drill Depth From 25 To 75 Page 2 of 2

Driller Layne Box #(s) _____ Start Date/Time 7/21/0900 End Date/Time 7/21/1500

Drilling Equip./Method Baling F-10/auger Sampling Equip./Method Split ~~core~~ barrel/cont. core

Depth (Feet)	Recovery (feet per foot %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			Background		25-30 AS above 30-35 AS above 35-40 AS above 40-45 AS above, but mottled colored "oxidation" zone 42.5-43.0' Tuff clay, crumbly 45-50 AS above 50-55 AS above 55-60 AS above 60-65 AS above 65-70 AS above 70-75 AS above T.D = 75'		Unit 3 Bandelier Tuff	

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 21-2520 TA/OU 21/1106 Drill Depth From 0 To 20 Page 1 of 3

Driller Layne Box #(s) _____ Start Date/Time 7/22/0700 End Date/Time 7/22/1000

Drilling Equip./Method Failing F-10/auger Sampling Equip./Method: Split core barrel/cont. core

Depth (Feet)	Recovery (feet per liner %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			Background		0-3.2' Silt and Sand with ~10% rounded pebbles, roots present, mod yellowish brn (10yr 5/4), dry to moist. 3.2-5.0' loose volcanic tuff mixed with silt & sand material ~40% Tuff lt olive gy (5y 6/1) to Lt gy (N7) and ~60% silt & Sand material, Mod yel brn (10yr 5/4) 5-10' Rounded to subrounded Pebbles, cobbles 4-10" dia. 10-15' non to partially welded devitrified Tuff with ~15% Qtz & Sanidine cryst, Grey Pumice and Rare lithics in Ash matrix. Lithics are Rounded. "Oxidation" Zone @ 14.5' 15-20 as above. "oxidation" Zone @ 19.8'		Fill material Unit 3 Bandelier Tuff	5-10 no Rec. Logged from cuttings

Prepared By D Stoker Date 7/22/94 Checked By J Gilletin Date 11/8/95

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 21-2520 TA/OU 21/1106 Drill Depth From 20 To 65 Page 2 of 3

Driller Layne Box #(s) _____ Start Date/Time 7/22/1000 End Date/Time 7/25/0915

Drilling Equip./Method Failing F-10 / Auger Sampling Equip./Method Split core barrel / cont. core

Depth (Feet)	Recovery (feet per foot %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			Background		20-25 as above, "oxidation" ~ 24.8 FT. 25-30 as above 30-35 as above, "oxidation" zone 32.0 - 32.5 FT. 35-40 as above. 40-45 Tuff becoming more pomice rich (20-25%) 1-3cm in dia. Tuff more dense, hardrive Fractures @ 41.8 and 42.3 FT. 45-50 non to Partially welded Tuff as 10-15' above. 50-55 as above (45-50') 55-60 as above 60-65 as above.		Unit 3 bandelier Tuff.	

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 21-2520 TA/OU 21/1106 Drill Depth From 65 To 75 Page 3 of 3

Driller Layne Box #(s) _____ Start Date/Time 7/22/0915 End Date/Time 7/22/1015

Drilling Equip./Method Failing F-10/Auger Sampling Equip./Method Split core barrel/cont. core

Depth (Feet)	Recovery (feet per 5 feet %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			Backfilled.		65-70 as above 70-75 as above fracture and 'oxidation' zone 72-73FT T.D = 75 FT		Bandelier Tuff Unit 3	

Prepared By D. Stanger Date 7/22/94 Checked By J. Alexander Date 1/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 21-25521 TA/OU 21/1106 Drill Depth From 0 To 11.5 Page 1 of 4

Driller Layne Box #(s) 1 & 2 Start Date/Time 8/8/0945 End Date/Time 8/8/1030

Drilling Equip./Method CME 750/Auger Sampling Equip./Method Split core barrel/cont. core

Depth (Feet)	Recovery (feet per 5 feet) %	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	2.5/5 50%		Background		0 - 0.7 Silty and Sand with some clay and pebbles slighty moist to dry red brn (5YR 4/4)			
					0.7 - 5.0 soft, loose, crumbly Tuff slighty moist to dry Lt. Brn Grey (5YR 6/1). 2.5 - 5.0 no recovery.			
					5.0 - 7.1 As above			
	0/0 0%				7.1 - 7.5 Pebbles & cobbles 2-4" DIA rounded. Basalts Quartzites.		Fill Material	
					7.5 - 11.5 as above no recovery Logged from cuttings			Drilled 7.5 - 11.5' Through gravel Layer with center bit. NO SAMPLE.

Prepared By D. Stroup Date 8/8/94 Checked By [illegible] Date 1/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 2521 TA/OU 21/1106 Drill Depth From 11.5 To 35 Page 2 of 4

Driller Layne Box #(s) 2-4 Start Date/Time 8/5 1030 End Date/Time 8/8/1145 1994

Drilling Equip./Method CME 750 / AUGER Sampling Equip./Method Split core hanced / cont. core.

Depth (Feet)	Recovery (feet per feet/ %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	2.5/3.5 71%		Back-ground		11.5 - 15.0 non to partially welded Tuff with ~10% Qtz & Sanidine cryst. 1-2% Grey pomices in Ash matrix. Absent to Rare Lithics, Dry, Crumble to mod. Cohesion, Mel lt. gy (N6) to Med. gy (N5) @ ~15.0 Stringers of Slighty Alteration in Tuff.			
	2.5/5.0 50%				15-20 As Above Alteration Stays ~ 15.5. dense lense @ 19.5 - 19.7 FT.			
	2.5/5.0 50%				20-25 as above some 1 cm pumice Silvin-grey in color.			
	2.5/5.0 50%				25-30 same as above		Unit 3 Bandelier Tuff.	
	2.5/5.0 50%				30-35 same as Above @ 34.2-35 FT. mottled Alteration from Grey color to dull brn. Stringers			

Prepared By G. Stoopes Date 8/8/94 Checked By J Shuter Date 1/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 9521 TA/OU 21/1106 Drill Depth From 35 To 60 Page 3 of 4

Driller Layne Boring No. 4-8 Start Date/Time 8/8/1145 End Date/Time 8/8/1530 94

Drilling Equip./Method CME 750 / Auger Sampling Equip./Method Split core barrel / coil core

Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
35-40 Same as above			
40-45 Same as above except more abundant pumice - 15% up to 3 cm in dia. Pumice dark Grey Ash matrix Pinkish gy (5YR 8/1) non to partially welded Tuff. Slightly moist in pores.			
45-50 Same as above @ ~49 FT Tuff becomes U SOFT. Non welded.		Bandelier Tuff	~50' Transition To non-welded member of bandelier Tuff
50-55 - Non welded Tuff with STRINGERS and zones of Altered Tuff Dull Red brn color Clayey material Present, Slightly moist in places.		Unit 3	
55-60 - Same as above, fractured & mottled staining. Some fractures filled with Red brn clay.			

Prepared By G Stoops Date 8/8/94 Checked By [signature] Date 1/3/95

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 2521 TA/OU 21/1106 Drill Depth From 60 To 75 Page 4 of 4

Driller Layne Box #(s) 9-11 Start Date/Time 8/8 1530 End Date/Time 8/8 / 1630 MST

Drilling Equip./Method CME 750 / AUGER Sampling Equip./Method Split core barrel / cont. core

Depth (Feet)	Recovery (feet per feet/ %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	36/37.0 72%		Back-ground		60 - 65 Same as above Rusty colored STAining of Tuff Through out, To ~63ft. Then more fresh looking non-welded Tuff, V H. gy to H. gy (10) soft, ~ Day 65 - 70 non welded Tuff, same as above except no STAining or clayey material present. 70 - 75 As above Stopped Drilling @ 75 FT.		non-welded member Bandelier Tuff	START To pull AUGERS @ 1630

Prepared By G. Stoopes Date 8/8/94 Checked By [signature] Date 9/3/95

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 21-2522 TA-0U-211106 Drill Depth From 0 To 10 Page 1 of 4

Driller Layne Box #(s) 182 Start Date/Time 9/28/1600 End Date/Time 9/28/1620

Drilling Equip./Method CME 750/Auger Sampling Equip./Method Split core barrel/cont. core

Depth (Feet)	Recovery (feet per feet / %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			Back-ground.		0 - 0.6' Silty Sandy soil with some pebbles, Roots present ~pale yel. brn 10YR 6/2			
					0.6 - 2.5 Grey Tuff fill, cumumbly, DRY			
					0.25 - 3.5 Silty Sandy "soil" with some clay, dry to moist Mod yel brn 10YR 5/4			
	5/5 100%				3.5 - 5.0 "Bandelier Tuff" H gray (N7) to Med H. gy (N6) < cm size pomice with 10% cmpts. in ash matrix, Partially to non-welded Vapor phase altered Tuff. DRY. Hard to crumbly, Fill		Fill Material Tuff admixture Bed	
	3/5 60%				5.0 - 6.2 As above.			
					6.2 - 10.0 pebble & cobbles, Rounded to sub rd. in matrix of coarse sand & silt. dry to moist, cobble Fill. Unmon lithologies			

Prepared By G. Stoupes Date 9/28/94 Checked By J. Hunter Date 12/7/95

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 21-2522 TA/OU 21/1106 Drill Depth From 10 To 30 Page 2 of 4

Driller Layne Box #(s) 3-6 Start Date/Time 9/28/1620 End Date/Time 9/28/1720

Drilling Equip./Method CME 750 AUGER Sampling Equip./Method split core barrel / cont. core

Depth (Feet)	Recovery (feet per level %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	5/5 100%		Back-ground.		10 - 10.2 pebble & cobble fill. As above.		Fill	
					10.2 - 15.0 Partially to non-welded Tuff with < cm size Pumice ~5% - 10% cryst in Gray Ashy matrix. Lithic Rare to Absent. lt gy (N7) Hard to crumbly, DRY.		Bandelier Tuff unit 3	
15	15 100%				15-20 as above, Root Fracture zone ~14-15'			
	5/5 100%				20-25 as above Tuff less cohesive. more crumbly			
	5/5 100%				25-30 As above Tuff powdery DRY. U. crumbly.			

Prepared By D. Draper Date 9/28/94 Checked By [signature] Date 1/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 21-2522 TA/OU 21/1106 Drill Depth From 30 To 65 Page 2 3 of 4

Driller Layne Box #(s) 7-13 Start Date/Time 9/29/0800 End Date/Time 9/29/0925

Drilling Equip./Method CME 750/AUGER Sampling Equip./Method SPLIT core barrel/Smt. Core

Depth (Feet)	Recovery (feet per feet of ft)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	5/5 100%		Background		30-35 Partially to non welded Tuff, DRY soft, crumbly. Pinkish Grey 5YR 8/1 to LT gy N7 Small linear tan zones at alteration mm-cm wide		Bandelier Tuff Unit 3	
	5/5 100%				35-40 AS above oxidation "spots" Throughout core			
	5/5 100%				40-45 AS above			
	5/5 100%				45-50 AS above less alteration @ 49 Fracture with alteration -cm wide			
	5/5 100%				50-55 soft crumbly Tuff, non welded to Partially welded. 11 gy(N7)			
	5/5 100%				55-60 mostly non-welded Tuff, Slight alteration @ 56.8'			
	5/5 100%				60-65 non welded Tuff		non-welded Tuff	

Prepared By D. Stevens Date 9/29/94 Checked By J. Matter Date 1/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 21-2522 TA/OU 21/1106 Drill Depth From 65 To 75 Page 4 of 4

Driller Layne Box #(s) 14 & 15 Start Date/Time 9/29/0925 End Date/Time 9/29/1005

Drilling Equip./Method CME 750 / AUGER Sampling Equip./Method Split core barrel / cont. core

Depth (Feet)	Recovery (feet per feet / %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	4/5 80%		Background		65-70 non welded Tuff V. soft crumbly alteration absent. 70-75 As above. T.D. = 75'		non-welded Tuff	

Prepared By [signature] Date 9/29/94 Checked By [signature] Date 1/3/95

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 2523 TA/OU 21/1106 Drill Depth From 0 To 39 Page 1 of ____

Driller Layne Box #(s) 1-8 Start Date/Time 7/26/1700 End Date/Time 7/27/0930

Drilling Equip./Method Failing F-10/Auger Sampling Equip./Method Split core barrel/Cont. core

Depth Feet	Recovery (Feet per Run)	Field Duplicate Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			RAD 0-15 FT 100 cpm more than Background.		0-0.5 Silt & Sand with some coarse sand, pebbles, slightly moist. Mod yell. brn (10yr 5/4) 0.5-5.0 non to partially welded Vapor phase altered Tuff, dry to slightly moist with ~15% qtz & Sanidine crysts, ~5% 1-2 cm Grey pumice, rare lithics in ash matrix Very lt. gy (N8) to lt. gy (N7) @ ~6.4 FT & 7.0 Fracture filled with Red brn clay/altered Tuff. 5.0-20 FT. same as above no fractures on altered zone: @ ~7.6 FT & 8.3 FT. 20-39 FT non to partially welded Tuff Soft & Crumbly to Dense and hard ~20% crysts ~5% Grey pumice, DRY, Unit 3 ~75% ash matrix		0-5 FT UNIT 3 Tshirege member Bandelier Tuff	elevated Beta-Gamma Readings 0-15 FT. ~100 cpm more than back Ground. Background 180-200 cpm
			15 FT ↓ Back-ground.					

Prepared By G. Stoops Date 7/26/94 Checked By [signature] Date 11/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 2523 TA/OU 21/1106 Drill Depth From 39 To 102 Page 2 of ____

Driller Layne Box #(s) 8-19 Start Date/Time 7/26 0800 End Date/Time 7/28/1400

Drilling Equip./Method Failing F-10/Auger Sampling Equip./Method Split core barrel/cont. core

Depth (Feet)	Recovery (feet per foot) (%)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			Back-Ground		39-40 Same as above except softer more crumbly. 7/27/94 40-~~70~~65 Same as above except more abundant & larger pumice 1-5cm Grey to Greenish Grey & whitish @ 50 ft Tuff is much softer crumbly to ~ 55.2 FT.		Unit 3 Tsh member	
					65-90 Same as above Except non-welded Tuff, Soft crumbly		Non-welded member	65~95 FT. non-welded unit of Tsh. member
					90-95- Tuff becoming more welded, perse, hoeder.			
					95-102 partially welded Tuff color change to Gray org. pink (5YR 7/2).		Unit 2 Tsh member	@ ~ 95 FT probable start of unit 2 Tsh member.

Prepared By G. Stoops Date 7/28/94 Checked By [signature] Date 1/3/95

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 1523 TA/OU 21/1106 Drill Depth From 102 To 135 Page 3 of ____

Driller Layne Box #(s) #1 - 22 Start Date/Time 7/29/0900 End Date/Time 8/1/____

Drilling Equip./Method Failing F-10/Auger Sampling Equip./Method Split core barrel/cont. core.

Depth in Feet	Recovery (feet and tenths)	Field Screening Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	9ft	1	Background		102 - 110 Mod. to densely welded Tuff - 20% qtz & sanidine cryst. ~5% Grey pumice 1-2 cm, some are slightly to well compacted (flamme), rare lithics in ~75% ash matrix, dense, hard pry, grey orange pink (5YR 7/2)		Unit 2 Tshirege member Bandelier Tuff	Hand Drilling brake down 7/29
					110 - 115 Same as above			From 115 to 129.8 Alternating layers of partially welded Tuff with more densely welded Tuff.
					115 - 120 as above but much less welded, softer material			
					120 - 125 - AS above, Densely welded lense @ 122-122.5 & 124 - 124.5			
					125 - 130 AS above, more dense welding 122.5 - 128.0 & 129.8 - 130			
					130 - 135 No Recovery Assume as 109 - 110 above			Much Hand drilling @ 130 ft.

Prepared By G. Stoyes Date 8/1/94 Checked By [signature] Date 8/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 2523 TA/OU 21/1106 Drill Depth From 135 To _____ Page 4 of _____

Driller Layne Box #(s) 22-28 Start Date/Time 8/2/0800 End Date/Time 8/2/1400

Drilling Equip./Method Failing F-10/AUGER Sampling Equip./Method Split core barrel/cont. core

Depth (Feet)	Recovery (feet per liner/ %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
			Background		135-140 mod. to densely welded Tuff as above 102-110 FT. 140-150 as above 150-155 as above, @ ~155 FT fracture with Red brown clayey material present with Relict texture of Tuff. 155-160 same as above Fracture cont. To 157 FT. Frac. Approx. 2 FT long cut diag. through core. few mm wide filled with Red brown clayey material with Relict Tuff texture 160-165 same as above - no Fracture(s) dense welded Tuff. 165-170 color change to lt grey (N7) as above mod. welded Tuff		Unit 2 Tshirege member Banderling Tuff	Sample of Fracture 155.2-155.7 possible start of unit 1V

Prepared By G. S Rogers Date 8/2/94 Checked By _____ Date 1/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 2523 TA/OU 21/1106 Drill Depth From 170 To 190 Page 5 of ____

Driller Layne Box #(s) 29-31 Start Date/Time 8/3/1400 End Date/Time 8/3/0930

Drilling Equip./Method Failing F-10/auger Sampling Equip./Method Split core barrel/cont. core

Depth From	Recovery (Feet per Foot %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	5/5 100%		Background		170-175 · same as above except less welded, softer material - partially welded Tuff. no texture changes		Unit 1V Tshirege member Bandelier Tuff	easier drilling Transition zone to devitrified non-welded Tuff of unit 1v
	5/5 100%				175-180 non-welded Tuff texture - same as above, grey pumice 1-2 cm, ~15% crysts. crumbly core, dry.			
	5/5 100%				180-185 - partially to non welded Tuff, ~10% qtz & sand. crysts, Dante Grey pumice ~2-3% ~1-0.5 cm in ~85 ash matrix, dry crumbly ~182 FT more coherent 183-185 devitrified Tuff			
	5/5 100%				185-190 same as above, more abundant grey pumice 1-2 cm and larger ~3cm 5-10% pumice. Color change to Grayish org. Pink (10R 8/2) ~189 FT more pumice rich ~15-20%			

Prepared By G. Stoops Date ____ Checked By [signature] Date 8/3/05

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 2323 TA/OU 21/1106 Drill Depth From 190 To 220 Page 6 of ____

Driller Coyne Box #(s) 32-38 Start Date/Time 8/3/0930 End Date/Time 8/3/1600

Drilling Equip./Method Failing F-10/Auger Sampling Equip./Method Split core barrel/cont core

Box No.	Recovery, Run No. and Depth	Field Screening Results	Location of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	9/10 90%	Background		190 - 200 Slightly to mod welded Devitrified Tuff, pumice ~ 20% 1-3cm or more. lt To DK Grey. - 5-10% crysts, Lithics Rare to absent in ~ 70% ash matrix, DRY, crumbly, color As Above. - to			
	5/5 100%			200 - 205 As Above, color Change To lt gy (N7) pumice Ash Grey to Reddish hue.			
	4/5 72%			205 - 210 AS above pumices becoming more Red brn to chnl. brn in color			
	4/5 93%			210 - 215 Same as above color Pinkish Grey (5YR 8/1)			
	5/5 100%			215 - 220 - pumice Rich Some pumice more than 1" dia. pumices matrix color Grayish ORANGE (10YR 7/4).			@ 220 FT near vapor phase. notch @ unit 1G

Prepared By G Stoops Date 8/3/94 Checked By [signature] Date 1/3/95

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 2523 TA/OU 21/1106 Drill Depth From 220 To 240 Page 7 of ____

Driller Layne Box #(s) 39-42 Start Date/Time 8/3/1600 End Date/Time 8/4/0900

Drilling Equip./Method Failing F-10/Auger Sampling Equip./Method Split core barrel/cont. core

Depth (feet)	Recovery (feet per Run/%)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	5/5 100%		Back-ground		220-225 as above to ~ 224 FT @ 224 FT color change to Lt. Brn (5YR 6/4) 1-2% Gray Lithics (Dacites/andesites) Large pumice ~4cm pumice becoming grey in color instead of chocl. Brn. AT Vapor phase notch and Transition to unit 1G Vitric non-welded Tuff.		Vapor phase notch / Unit 1V	Vapor phase notch 224-225 FT.
	5/5 100%				225-230 Vitric non-welded Tuff, Slightly moist, Lt. brn (5YR 6/4) Soft to mod Hard crumbly. Lt. gray pumice~1cm 1-2% gray lithics, ~10% cryst. may be Rare epx & Hbl. in Ash matrix, "fresh pumice"		Unit 1G Tsh member Bandelier	
	4.5/5 90%				230-235 same as above more coherent 232.5-235			
	3.4/5 72%				235-240 As Above			

Prepared By G. Stoopes Date 8/4/94 Checked By [signature] Date 1/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 2523 TA/OU 21/1104 Drill Depth From 240 To 270 Page 8 of ____

Driller Layne Box #(s) 43-48 Start Date/Time 8/4/0900 End Date/Time 8/4/1600

Drilling Equip./Method Failing F-10/Auger Sampling Equip./Method Split core barrel/soil core.

Sample Number	Interval	Core Recovery/Sample Volume	Field Screening Results	Depth in Feet	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
24/5 68%			Background		240 - 245 Same as above. Soft crumbly		Unit 1G of Tshirege member Bandelier Tuff	Unit 1G is generally soft crumbly in core & slightly moist.
23/5 66%					245 - 250 Same as above some pumice ~3 cm in Dia Color - Grey color			
24/5 68%					250 - 255 Same as above Large ~4cm Pumice present			
4/5 80%					255 - 260 Same as above, some, 0.5 to 1" Lithics dull purple in color may be Altered Rhy.			
4/5 80%					260 - 265 - As above, color slightly more "Greyish mottled" less pumice.			
23/5 86%					265 - 270 0 ~ 265 color change to Pinkish grey 5 YR 8/1 Tuff here is pumice poor & more lithic rich - lithics ~3% or more consist of altered lavas Grey to Reddish in color, ~10% crysts v soft to not soft in core			

Prepared By G. Stoopes Date 8/4/94 Checked By [signature] Date 1/3/95

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 2523 TA/OU 21/1106 Drill Depth From 270 To 297.7 Page 9 of ____

Driller Coyne Box #(s) 49 - 54 Start Date/Time 8/4/1600 End Date/Time 8/5/0900

Drilling Equip/Method Failing F-10 / casing Sampling Equip/Method Split core barrel / (cont. core)

Sample Interval	Recovery	Fracture Density	Lithology - Paleology - Soil	Graphic Log	Lithologic Unit	Notes
270 - 275	6/6	Background	270 - 275' as above (265 - 270) non-welled vitric Tuff.			
275 - 280	5/5	Background	275-280' As above			
			280 - 285' as above color very pale orange (10YR 8/2)			
285 - 290	4/5		285 - 290' same as above			
290 - 295	5/5		290 - 295' same as above			
295 - 297.7	2.7/2.7		297.7 ASL 8/5/94 295 - 300 no recv. 295 - 296.8 @ 296.8 - 297.7 same as above "sandy" part of unit 16 90% ash matrix		unit 16 of Tshirege member Bandelier Tuff	End of unit 16

Logged By G. Stoopes Date 8/5/94 Checked By [signature] Date 1/6/95

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 2523 TA/OU 21/1106 Drill Depth From 297.7 To 305 Page 10 of ____

Driller Layne Box #(s) 54-55 Start Date/Time 8/5/0900 End Date/Time 8/5/1000

Drilling Equip./Method Failing F-10/Auger Sampling Equip./Method Split core barrel/cont. core

Depth Feet	Recovery (feet per run) %	Field Screening Results	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	3.2/5 64%	Background	297.7 - 300 FT. Tsankawi pumice with inner ash fall unit @ 298.0 - 298.2 - pale yellowish brn (10YR 6/2) moist. Pumice fall has rare lithics, most pumice 1-2cm or less (breakage occurred during drilling) one large pumice ~ 4cm in dia @ ~ 299' slight pink in color. Pumice V. lt. gy (N8)		Tsankawi Pumice	
	3.3/5		NO rec 300 - 301.7 ; 301.7 - 302.8 epiclastic deposit reworked pumice sub ang to sub rd clasts. (10YR 6/2) @ 302.8 - 304.8 Fresh pumice, pumice fall unit of cerro Toledo Fm lt gy (N7) to Pale yel brn 10YR 6/2 pumice less than 1cm in size. @ 304.8 - 305 Ash unit (may be soil) with 1-2% cpx on Hbl cryst, and RARE grey lithics max in size Mod. brn 5YR 4/4		Cerro Toledo Fm.	→ Pale yel brn. clasts - 0.5cm or less in size. pumice unit 302.8 - 304.8 has pale yel brn (10YR 6/2) "Tuffaceous sand" bet 303.5 - 304.2

Prepared By G. Stoopes Date 8/5/94 Checked By J. Slate Date 1/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 2523 TA/OU 21/1106 Drill Depth From 305 To ~320 Page 11 of ____

Driller Layne Box #(s) 56 - 58 Start Date/Time 8/5/1000 End Date/Time 8/10/0900

Drilling Equip/Method Failing F-10/Auger Sampling Equip/Method Split core barrel/cont. core

Run #	Depth (ft)	Recovery (ft)	Penetration Rate (min/ft)	Top/Bottom of Core in Box	Lithology - Paleology - Soil	Graphic Log	Lithologic Unit	Notes
	25/5 70%		Poor-Ground		No Recv. 305 - 306.5 306.5 - 307.0 epiclastic Tuffeous sand similar to 308.7 - 309.8 307.0 - 309.9 - mod brn 5YR 4/4 To lt. brn (5YR 5/6) tuffeous sand clasts minor less in size lenses of m lithic rock clasts. @ ~ 309.9 - Large 2-3cm pumice clasts in bottom of shoe.			Top part of bed 306.5 → may be soil Took additional sample of soil for moisture cont.
	25/5 50%				310 - 315 epiclastic beds consist. of Grey to lt. brn tuffeous sands, with subang pumice to 1-4 cm, and a variety of lithics No Recv. 310 - 312.5 OR some compaction in sampler			Rod String Drop @ 225 FT - drove sampler down into B.H. @ 1130 8/5/94 on 8/9/94 @ 1100, pulled rod string on unsuccessful attempt to fish Rod String From B.H.
	30/30 70%				315 - 320 ~316 - 319.1 epiclastic unit, Tuffeous sands, pebbles (lithic) to 0.5 cm, sub ang to sub Rd clasts mod brn 5YR 3/4 to DK yel brn 10YR 4/2 319.1 - 320 lt. gy (N7) tuffeous sands			

Prepared By G. Stoops Date 8/5/94 Checked By [signature] Date 1/3/95

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 2523 TA/OU 21/1106 Drill Depth From 320 To _____ Page 12 of _____

Driller Layne Box #(s) 59- Start Date/Time 8/10/0900 End Date/Time _____

Drilling Equip./Method Foiling F-10/Auger Sampling Equip./Method Split core barrel / cont. core

Depth (ft bgs)	Recovery (feet per run)	Field Screening Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes

Prepared By G. Stoopes Date _____ Checked By [signature] Date 11/3/95

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | BIT CUTTINGS LOG

Borehole ID 22-2523 Sample Type — From 320.0 To 660.0 Page 1 of 67pc

By J. Crocker Date(s) 5/11/95 to 6/5/95 Checked By R. Blagg Date 5/23/95

TA/OU FWL TA-21 Box #(s) — Drilling Equip. I.R. T4W w/ODEX

Depth or Depth Interval	Amount recovered (No. of bags collected)	Sample Splits Amount, requester, organization	Lithology	Comment	
320-323 Lights 5-1-95	1	—	Cerro Toledo	5YR 6/1 to 5Y 5/1 Ns Pumice preserved: N 5%-7% dark grains (mafics?)/(cumulates?).	x=0 βT 118
323-326 Lights 5-1-95	1	—	"	yellow grey cuttings 5Y 7/2. Coarser grain size; Abundant dark grains 20-15% Ns Pumice fragments observed.	x=0 βT 118
326-329	1	—	"	Same as Above	
329-330	1	—	"	Same As Above	
330-333	1	—	Cerro Toledo/ Otowi	330-333 Same as above, 332-333 Contact w/ Otowi. Sharp Color change. Reddish Brown 10R5/4. N 7% dark grains, Ns Pumice Preserved.	x=0 βT=100
333-340	1	—	Otowi	333-337' Same as above 337-340 Pale Yellow-Brown Fewer dark grains Ns Pumice Preserved.	x=0 βT=178
340-349 PC 5-2-95 349	1	—	Otowi	Brownish grey 5YR6/1 Coarse Lithics in Matrix, ~5% dark grains w/ possible Pumice fragments to ~5mm.	x=0 βT=176

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

BIT CUTTINGS LOG

Borehole ID 21-3523 Sample Type · — From 320.0 To 660.0 Page 2 of 6 7pc

By J. Crocker Date(s) 5/1/95 TO 5/5/95 Checked By R. Blye Date 5/23/95

TA-21 Pad 1/F4-1 Box #(s) — Drilling Equip. IR, T4W w/ODEX

Depth or depth interval	Amount recovered (No. of bags collected)	Sample Splits Amount, requester, organization	Lithology	Comment	
350-356 5-2-95	1	—	0 NONI	Cole Yellowish-Brown 10YR 6/2. No Pumice Fragments Apparent. Dark grains Tr ~ 1-2%	α=0 βγ=135
356-360 5-2-95	1		11	Few cuttings Returned. Brownish gray 5YR 4/1 N 10% Dark grains No apparent Pumice.	α=0 βγ=134
360-363 5-3-95	1	—	11	As above. But cuttings are coarser,	α=0 βγ=134
363-365	1	—	11	As above.	α=0 βγ=171
365-367	1	—	11	cuttings are mudcaked. Pale Reddish Brown 10R5/4. Fewer Dark grains ~7% No Apparent Pumice	α=0 βγ=177
367-369	1	—	11	As above	α=0 βγ=177
369-370	1	—	11	As Above	α=0 βγ=177
370-376				As above but Somewhat Lighter in Color 10R6/2 and perhaps 10% dark grains.	α=0 βγ=146
376-380	1		11	376-377 as above. 377-380 reddish Brown 10R 5/4. Fewer dark grains ~5-7%	α=0 βγ=146

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

BIT CUTTINGS LOG

Borehole ID 21-3523 Sample Type ____ From ~~330.0~~ 330.0 To 660.0 Page 3 of 6 7

By J. Creaker Date(s) ~~5/3/95~~ 5/1/95 - 5/5/95 Checked By RPM Date 5/23/95

TA/OU FH1/18.21 Box #(s) ____ Drilling Equip. IR 7HW w/Reverse

Depth or Depth Interval	Amount recovered (No. of bags collected)	Sample Splits Amount, requester, organization	Lithology	Comment	
380-386	1	—	OTOWi	Reddish Brown 10R 5/4, ~5% dark grains; No apparent pumice glass preserved.	αL=0 βT=152
386-390 1000 hrs	1	—	OTOWi	Pale Red 10R 6/2 2-3% dark grains very fine grained cuttings. No pumice apparent	α=0 βT=152
390-403	1	—	OTOWi	Orange-red 10R 7/2 cuttings still very fine grained. Dark grains/lithic ~2%. No apparent pumices.	α=0 βT=156
403-410	1	—	11	Orange-red 10R 7/2 as above w/ an increase in dark grains TC ~5%	α=0 βT=146
410-426	1	—	11	Reddish-Brown 10R4/4 dark grains 10~5%. No pumice fragments observed.	α=0 βT=180
426-430 1315 hrs	1	—	11	As above, but light orange-pink 10R 8/4. Cuttings are still very fine grained	α=0 βT=183
430-440				As Above.	α=0 βT=137

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | BIT CUTTINGS LOG

Borehole ID 21-2523 Sample Type cuttings From 440 (350.0) To 660.6 Page 4 of 6 (8C)

By J. Crocker. Date(s) 5-3-95 (5-1-95) 5-6-95 Checked By R Blegen Date 5/15/95

TA/OU FH-VTA51 Box #(s) — Drilling Equip. I.R. TH w/ ODEX

Depth or depth interval	Amount recovered (No. of bags collected)	Sample Splits Amount, requester, organization	Lithology	Comment	
440-450	1	—	ottowi	Same as above. Lithics/dark grains increasing in abundance to ~10%.	α=0 βγ=139
450-455	1	—	Ottowi	10R 6/2 5-7% Lithics/dark grains. A few scattered silicy pumice fragments to ~5mm diam. On the whole, cuttings are coarser.	α=0 βγ=180
455-460 1440 MS 5-3-95	1	—	"	5R 5/2 3-4% Dark grains. No Pumice fragments.	α=0 βγ=180
460-465	1	—	"	5R 5/2 as above	α=0 βγ=144
465-470	1	—		5R 7/2 Very fine cuttings. No pumice clasts observed. 1-2% Dark grains.	α=0 βγ=144
470-473	1	—	"	5R 7/2 same as above.	α=0 βγ=138
473-479	1	—	"	Med. greyish orange. 10R 7/2. Very fine grained cuttings. No Pumice. Increased dark grains to ~5%	α=0 βγ=138
479-480	1	—	"	Greyish orange 5YR 7/1 ~5% Dark grains. No Pumice. observed.	α=0 βγ=138
480-485	1	—	"	Greyish orange 10R 7/2. ~3-5% dark grains w/ = red grey Pumice fragments to ~3mm.	α=0 βγ=149
492-495	2	—	"	as above.	α=0 βγ=154
—	—	—	—	—	

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

BIT CUTTINGS LOG

Borehole ID 21-5573 Sample Type — From 513 To — Page 5 of 7

By J Chisholm Date(s) 5-4-95 Checked By R. Blay Date 5/23/95

TA/OU FWI TA 21 Box #(s) — Drilling Equip. —

Depth or depth interval	Amount recovered (No. of bags collected)	Sample Splits Amount, requester, organization	Lithology	Comment	
520-525	1	—	CTWJ	Same as above	∝=0 βδ=32
523-530 approx 5-4-95	4	—	"	10R6/2 Pale red cuttings ~3% dark grains w/ rare fragments of gray pumice to ~3mm.	∝=0 βδ=32
530-542	5	—	"	Pale Red (10R6/2) Very Fine grained cuttings. ~3%-5% dark grains. Small grey pumice fragments to ~3mm. cuttings are somewhat moist but not as moist as first two buckets of drilling.	∝=0 βδ=29
542-573	8	—	"	Pale greyish Red 5R7/2. Very Fine grained cuttings. Cuttings are fairly dry compared to early on. As above but lighter color (less water). ~3%-5% Dark grains, Rare <3mm pumice fragments	∝=0 βδ=358
573-580	2	—	"	as Above. This portion of ottowi has shown almost no variability	∝=0 βδ=354

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

BIT CUTTINGS LOG

Borehole ID 25-2305 Sample Type — From 560.0 To 660.0 Page 56 of 167

By J CROCKER Date(s) 5-1-95 5-5-95 Checked By R. Blye Date 5/23/95

TA/OU FU-VE-21 Box #(s) — Drilling Equip. IR T4W w/ DDH

Depth or depth interval	Amount recovered (No. of bags collected)	Sample Splits Amount, requester, organization	Lithology	Comment	
560-590	3	—	Ditto	10R 7/2. Fine grained cuttings Pale orangish Pink Rare Pumice To 4mm 6% dark grains	$\alpha = 0$ $\beta\gamma = 301$
590-600 5-4-95	3	—	"	Same as above.	$\alpha = 0$ $\beta\gamma = 371$
600-603 5-5-95	1	—	"	Greyish Red 10R 4/2 Fine grained cuttings 5% dark grains; No Pumice fragments Fairly dry cuttings	$\alpha = 0$ $\beta\gamma = 305$
603-606	1	—	"	Greyish-Red 10R 4/2, Fine grained cuttings 5%-7% Dark grains No Pumice Fragments	$\alpha = 0$ $\beta\gamma = 305$
606-610	1		"	Light Brownish-Grey Fine grained cuttings 5YR 6/1. 5%-7% dark grains. a few very small 1-2mm Pumice fragment.	$\alpha = 0$ $\beta\gamma = 305$
610-612	1	—	"	Greyish-Red 10R 4/2. Fine grained cuttings 6-7% Dark grains. No Pumice fragments.	$\alpha = 0$ $\beta\gamma = 360$
612-615	1	—	"	Greyish-Red 10R 4/2. Fine grained cuttings ~6% dark grains No Pumice	$\alpha = 0$ $\beta\gamma = 360$
615-617	1	—	"	10R 4/2. 7% dark grains. a few Pumice Fragments To 3mm	$\alpha = 0$ $\beta\gamma = 360$
617-620	1	—	"	Same as Above.	$\alpha = 0$ $\beta\gamma = 360$

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

BIT CUTTINGS LOG

Borehole ID 21-25523 Sample Type — From 620 To 660 Page 5 of 6

By J. Crooker Date(s) 5-1-95 TO 5-5-95 Checked By R. Bhyan Date 5/23/95

TA/OU 21/EU-1 Box #(s) — Drilling Equip. IR THW drilling odex

Depth or depth interval	Amount recovered (No. of bags collected)	Sample Splits Amount, requester, organization	Lithology	Comment	
620-624 5-5-95	1	—	OVBNI	10YR 6/2 Greyish Red Cuttings 5-6% dark grains. No pumice	∝=0 βγ=30
624-626	1	—	"	Greyish Red Cuttings 10YR 6/2, 6% dark grains, Rare Pumice To ~3mm	∝=0 βγ=30
626-630	1	—	"	10YR 6/2, 6% dark grains, Pumice shards 1-2 mm	∝=0 βγ=305
630-633	1	—	"	10YR 6/2. 6% dark grains Rare pumice as large as 2mm.	∝=0 βγ=320
633-640	2	—	"	Greyish Red cuttings 10R 6/2. 6%-7% dark grains. Pumice fragments to 4mm.	∝=0 βγ=32
640-646	2	—	"	10R 7/2 greyish pink cuttings. 6% dark grains Pumice fragments to 3 mm.	∝=0 βγ=31
646-650	1	—	"	10R 7/2. 4-5% dark grains Pumice to 2mm	∝=0 βγ=31
650-656	1	—	"	10R 6/2 Pale red. 6%-7% dark grains, 1-3 mm Pumice fragments	∝=0 βγ=300
656-660 5-5-95	2	—	"	10R 6/2 7-8% dark grains as large as 3mm. No Pumice fragments observed	∝=0 βγ=300

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 2522-99 TA/OU 21/1106 Drill Depth From 0 To 7.5 Page 1 of 1

Driller Layne 21-2380 Box #(s) 1-N/A-DP Start Date/Time 8/9/0830 End Date/Time 8/9/1030

Drilling Equip./Method CME 750 / Auger Sampling Equip./Method split core barrel / cont. core.

Depth (Feet)	Recovery (feet per feet / %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	100%		BACK-ground		0-0.6 silty Sand with ~20% clay, soil some pebbles. Slightly moist 0.6-1.6 non welded Tuff soft crumbly. use all of Tuff For sample. 2.5 - 5 FT cobbles - some Large - 5-6". 5-7.5 - used Punch sampler To collect samples for Rad, metals, etc. - non welded Tuff. T.D = 7.5' STOPPED Drilling		Soil Fill	STOPPED drilling H.I cobble Layer - still in abs. bed #3. Hole collapsed

Prepared By G. Stoops Date 8/8/94 Checked By Jeffrey Wilt Date 2/26/95

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 21-2517 TA/OU 21/1106 Drill Depth From 0 To 25 Page 1 of 4

Driller Layne Box #(s) 1-5 Start Date/Time 9/27/0900 End Date/Time 9/27/1100

Drilling Equip./Method CME 750/AUGER Sampling Equip./Method SPLIT CORE BARREL/cont. CORE

Depth (Feet)	Recovery (feet per feet/ %)	Field Borehole Anaytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	5/5 100%		BACK-GROUND		0-0.3 Silty sandy soil, DRY Mod yel brn 10YR 5/4 0.3-0.8 Clayey zone with Roots Mod brn 5YR 4/4 0.8-5.0 Partially welded Tuff, Hard, DRY, crumbly in places Grey Pomice - 1cm 5-10% ± 15% cryst in Grey Ash matrix 11.9y (N7)		Tshirege member Bandelier Tuff. Unit 3	
	5/5 100%				5-10 As above Partially welded Vapor phase altered Tuff, small Amount of ~~th~~ caliche (whitish Residue) @ 5-5.2'			
	5/5 100%				10-15 As above			
	5/5 100%				15-20 As above			
	5/5 100%				20-25 As above			

Prepared By [signature] Date 9/27/94 Checked By [signature] Date 9/3/95

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 21-257 TA/OU 21/1106 Drill Depth From 25 To 60 Page 2 of 4

Driller Layne Box #(s) 6-12 Start Date/Time 9/27/1100 End Date/Time 9/27/1430

Drilling Equip./Method CME 750 / AUGER Sampling Equip./Method Split core barrel / cont. core

Depth (Feet)	Recovery (feet per feet/ %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	5/5 100%		BKG 12 4 rad.		25-30 As above Tuff consistant in Texture & hardness		Non-welded member Unit 3 Tshirege member Bandelier Tuff	
	5/5 100%				30-35 As above.			
	5/5 100%				35-40 As above			
	5/5 100%				40-45 As above.			
	5/5 100%				45-50 Tuff becoming softer more crumbly, some Silver-Gray Pumice.			
	5/5 100%				50-55 Non-welded Tuff to Partially welded, Crumbly Dizy Tuff. @ 51' Non welded unit of Bandelian Tuff			
	5/5 100%				55-60 Non welded Tuff. Silver-Gray Pumice ~ 5% ~1% Lithics in Soft Ash matrix			

Prepared By D. Hooper Date 9/27/94 Checked By Jeff Date 1/3/95

A1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 21-2517 TA/OU 21/1106 Drill Depth From 60 To 95 Page 3 of 4

Driller Layne Box #(s) 13-19 Start Date/Time 9/27/1430 End Date/Time 9/27/1635

Drilling Equip./Method CME 750/AUGER Sampling Equip./Method Split core barrel/ core

Depth (Feet)	Recovery (feet per feet / %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	5/5 100%		Back-ground		60-65 Tuff V SOFT crumbly. DRY		Unit 2 Tshirege member Bandelier Tuff. NON-welded member Bandelier Tuff.	
	5/5 100%				65-70 AS above			
	5/5 100%				70-75 AS above			
	5/5 100%				75-80 AS above			
	5/5 100%				80-85 AS above			
	5/5 100%				85-90 ~86 FT Tuff becomes slightly hard but still crumbly slight color change @~89' to Pinkish GY 5YR 8/1			
	5/5 100%				90-95 Tuff NON to Partially welded texture AS above Color Pinkish GY 5YR 8/1			

Prepared By D Stevens Date 9/27/94 Checked By Jeffrey Abbott Date 1/3/95

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 21-2517 TA/OU 21/1106 Drill Depth From 95 To 122.5 Page 4 of 4

Driller LAYNE Box #(s) 19-25 Start Date/Time 9/26/0800 End Date/Time 9/28/1000

Drilling Equip./Method CME 750/AUGER Sampling Equip./Method Split core barrel/cont. core

Depth (Feet)	Recovery (feet per feet/ %)	Field Borehole Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
95	5/5 100%		Bx/12-grave		95-100 mod welded To Partially welded Tuff, color as above ~5% Grey pumice in ash matrix 10-15% cryst. Tuff alternates from soft To Hard & dense.		Unit 2 Tshirege member Banelier Tuff.	Hand Drilling Bit is Grinding Rock so Good Recovery but Tuff is not coming out as "Solid core". no option To Technique.
100	5/5 100%				100-105 as above			
105	5/5 100%				105-110 as above			
110	5/5 100%				110-115 as above			
115	5/5 70%				115-120 as above, Tuff becoming soft @ ~118'			
120	2.5/2.5 100%				120-122.5, as above, zones of Hardened dense Tuff T.D = 122.5' → Refusal			projected T.D. = 125' Stopped @ 122.5'

Prepared By [illegible] Date 9/28/94 Checked By [illegible] Date 1/3/95

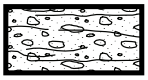
R1

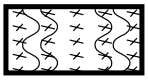
GEOPHYSICAL LOG LEGEND

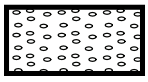
Listed below are explanations for each column in the Geophysical Logs for each borehole logged in 2005 as well as the graphical representation of each unit encountered.

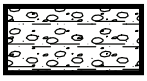
PID	Field Screen levels for organic vapors, measured in parts per million.
CO2	Carbon dioxide levels reached to ensure stabilization during pore gas sampling, measured in parts per million
Sample ID	Laboratory Sample Identification, beginning with MD21-05-XXXXX
Depth	Depth of important lithological features, expressed in feet below ground surface (ft bgs)
Contact Depth	Depth of important lithological contacts, expressed in feet below ground surface (ft bgs)
Graphic	The graphical picture of each lithologic unit, see legend below, with moisture content
Lithologic Description	Narrative description of each lithologic unit
Borehole Image	Video image recorded during geophysical logging
Neutron	Neutron log of soil moisture content, expressed in counts per second (cps)
Gamma	Gamma log of gamma emitters, expressed in counts per second (cps)

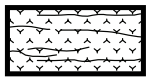

Cobble Zone


Fill

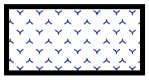

Fracture Zone

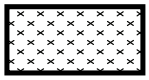

Moisture Zone

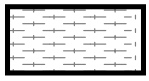

Pumice Rich Zone

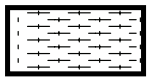

Staining Zone

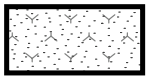

Qbt3


Qbt3/ Qbt2 NON welded Contact Zone


Qbt2


Qbt1v - vapor phase


Qbt1g - glass phase


Qct


Qto

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-01

LOCATION ID: 21-24524

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 5/13/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	LITHOLOGIC DESCRIPTION
				SILT with CLAY (7.5YR 4/4) brown; soft; low plasticity; dry
0	0	61752	25	
				FRACTURE ZONE (7.5YR 4/6) strong brown, clay-filled fracture, 60°, 6.5-7.0 ft bgs and 8.0-9.0 ft bgs
				FRACTURE ZONE (7.5YR 4/6) strong brown, clay-filled, 60°, 5 cm
			50	(Qbt3) TUFF (5YR 7/1) light gray grading to (5YR 6/1) gray; SLIGHTLY welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, dark gray, <1 cm, 10%; staining, orange brown, 10% throughout interval
			75	
				(Qbt3) TUFF (5YR 7/1) light gray; NON welded; very fine ash matrix; trace phenocrysts; pumice fragments, dark gray, <1 cm, 5%; lithics present toward bottom of interval
			100	
				(Qbt2) TUFF (5YR 6/2) pinkish gray grading to (5YR 5/1) gray; MODERATELY welded; medium ash matrix; phenocrysts (sanidine), <1-2 mm, 5%; pumice fragments, gray to dark gray, <1-1 cm, 5%; lithics present to 3 cm, 5%
			125	
				STAINING ZONE, light reddish brown, 20% matrix
			150	(Qbt2) TUFF (5YR 6/2) pinkish gray; MODERATELY welded; medium ash matrix; phenocrysts (sanidine), <1-2 mm, 5%; pumice fragments, gray to dark gray, <1-1 cm, 5%; lithics present to 3 cm, 5%; gradational contact from 165-170 ft bgs with Qbt1v
			175	
				(Qbt1v) TUFF (5YR 7/1) light gray; NON welded; very fine ash matrix; phenocrysts, 1-3 mm, 5%; pumice, gray to white, elongated, 1-3 cm, 5%
			200	
			225	
				(Qbt1v) COLONNADE TUFF (5YR 5/4) reddish brown; SLIGHTLY welded; medium ash matrix; phenocrysts 1-3 mm, 5%; pumice fragments, altered, reddish brown, 1-4 cm, 5%
			250	
				(Qbt1g) TUFF (5YR 6/3) light reddish brown grading to (5YR 6/2) pinkish gray; NON welded; fine ash matrix; trace phenocrysts; pumice fragments, altered gray and reddish brown <1-3 cm, 5%; lithics, 1 cm, 5%, increasing toward bottom of interval
			275	
			300	PUMICE RICH ZONE (5YR 7/1) light gray pumaceous ash and pumice fragments to 3 cm, 50%
				(Qct) interval of interbedded clays and silts, tuffaceous sands, gravels and primary ash flow deposits.
0	0	61753	325	
0	0	61783		**GEOPHYSICAL LOGGING TOTAL DEPTH 335 FT BGS**

GRAPHIC LOG
Volumetric Water Content (%)

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500

LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/8/06

Shaw Environmental and Infrastructure, Inc.

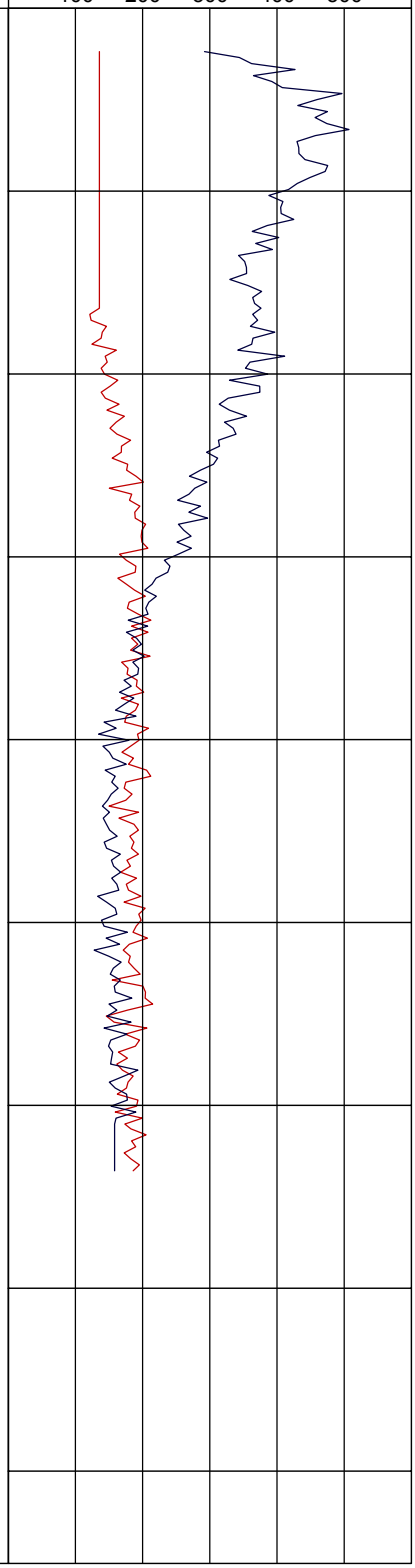
Geophysical Log of Borehole: BH-02

LOCATION ID: 21-24525

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: South of SWMU 21-018(b)
Logged by: Apogen Technologies
Drilling Start Date: 6/8/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
0	0	61755	0		FILL CLAY with SILT (7.5YR 4/4) brown; firm; high plasticity; moist, 3-5 ft bgs
			5		FILL fine SAND (7.5YR 4/4) brown; well rounded; loose; moist
			10		
			15		(Qbt3) TUFF (5YR 6/2) pinkish gray; SLIGHTLY welded; fine ash matrix; phenocrysts, <1-2 mm, 5%; pumice fragments, slightly altered, 1-2 cm, 5%
			20		
			25		
0	0.6	61754			(Qbt3) TUFF (5YR 6/1) gray; MODERATELY welded; medium ash matrix; phenocrysts <1-2 mm, 5%, decreasing down interval; pumice fragments, 1-3 cm, 3%
			30		**GEOPHYSICAL LOGGING TOTAL DEPTH 32 FT BGS**



LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/6/06

Shaw Environmental and Infrastructure, Inc.

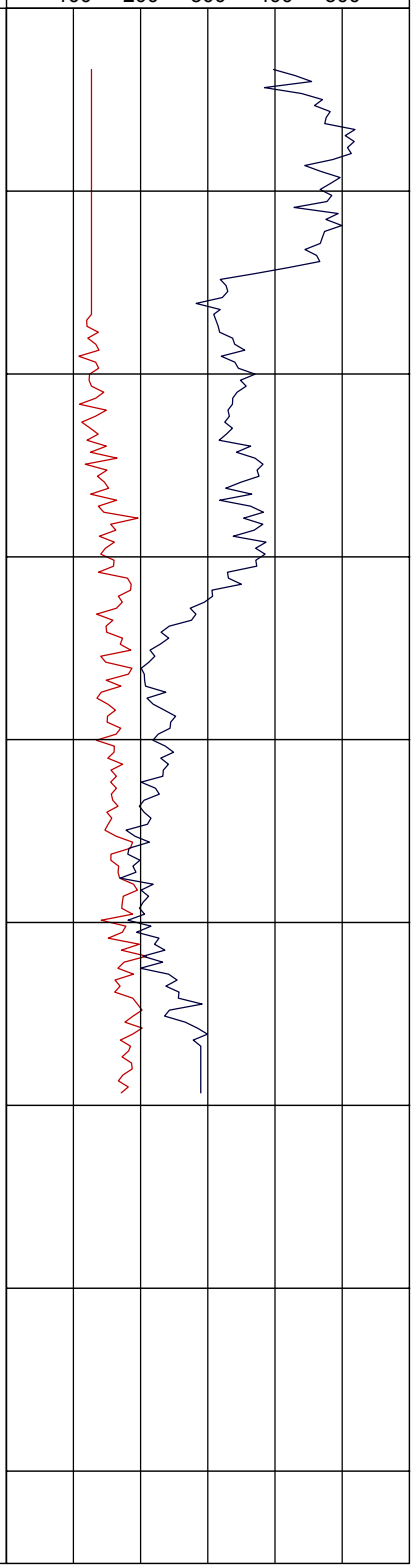
Geophysical Log of Borehole: BH-03

LOCATION ID: 21-24526

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: SWMU 21-018(b)
Logged by: Apogen Technologies
Drilling Start Date: 5/13/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
			0		ASPHALT
0	0.4	61757	5		FILL CLAY with SILT (7.5YR 4/4) brown; firm; moderate plasticity; moist from 0.25 to 1 ft bgs
			10		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1 cm, <5%
			15		
			20		
0	1.1	61756	25		STAINING ZONE, orange-red, 20% increasing to 50% matrix down interval
			30		**GEOPHYSICAL LOGGING TOTAL DEPTH 30.5 FT BGS**



LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/6/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-04

LOCATION ID: 21-24527

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: SWMU 21-018(b)
Logged by: Apogen Technologies
Drilling Start Date: 5/12/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
0	0.5	61759	0		ASPHALT
					FILL CLAY with SILT (7.5YR 4/4) brown; firm; moderate plasticity; moist
			5		
			10		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; pumice fragments <1 cm, 5%; native lithics, 5%, <1 cm, 35-40 ft bgs
			15		
			20		
			25		
0	1.1	61758	30		**GEOPHYSICAL LOGGING TOTAL DEPTH 33 FT BGS**

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500

LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/6/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-05

LOCATION ID: 21-24528

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: South of SWMU 21-018(b)
Logged by: Apogen Technologies
Drilling Start Date: 6/8/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
0	0	61761	0–5		FILL SILT with CLAY (7.5YR 4/4) brown; soft; loose; moist to 3 ft bgs
			5–10		TUFFACEOUS SAND (7.5YR 4/4 to 6/2) brown to pinkish gray; well rounded; medium grained; trace angular lithics toward bottom of interval; clay lense, white, at 22.5 ft bgs
			10–15		
			15–20		
			20–25		GRAVEL with SAND (7.5YR 6/2) pinkish gray; sub-angular; 1-4 cm cobbles of welded tuff nodules, reddish pink granite, and blue/gray native lithics
0	0	61760	25–30		
			30		(Qbt3) TUFF (5YR 6/1) gray; SLIGHTLY welded; medium ash matrix; phenocrysts, recrystallized quartz, 1-2 mm, 5%; pumice fragments, altered, 1-3 cm, 5%; iron staining from 31-32 ft bgs
					GEOPHYSICAL LOGGING TOTAL DEPTH 31 FT BGS

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500

LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/6/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-06

LOCATION ID: 21-24531

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: North SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 6/9/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION	Neutron (counts per second) Gamma (counts per second) 100 200 300 400 500
0	0.6	61763	5 10 15 20 25 30 35 40 45 50 55		SILT with CLAY (7.5YR 4/4) brown; soft; low plasticity; dry (Qbt3) TUFF (5YR 6/2) pinkish gray grading to (5YR 6/1) gray to bottom of interval; SLIGHTLY welded; fine ash matrix; friable; phenocrysts <1-2 mm, 5%; pumice fragments, gray and white, <1-2 cm, 3%	
0	0.6	61762			**GEOPHYSICAL LOGGING TOTAL DEPTH 56 FT BGS**	

LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/7/06

Shaw Environmental and Infrastructure, Inc.

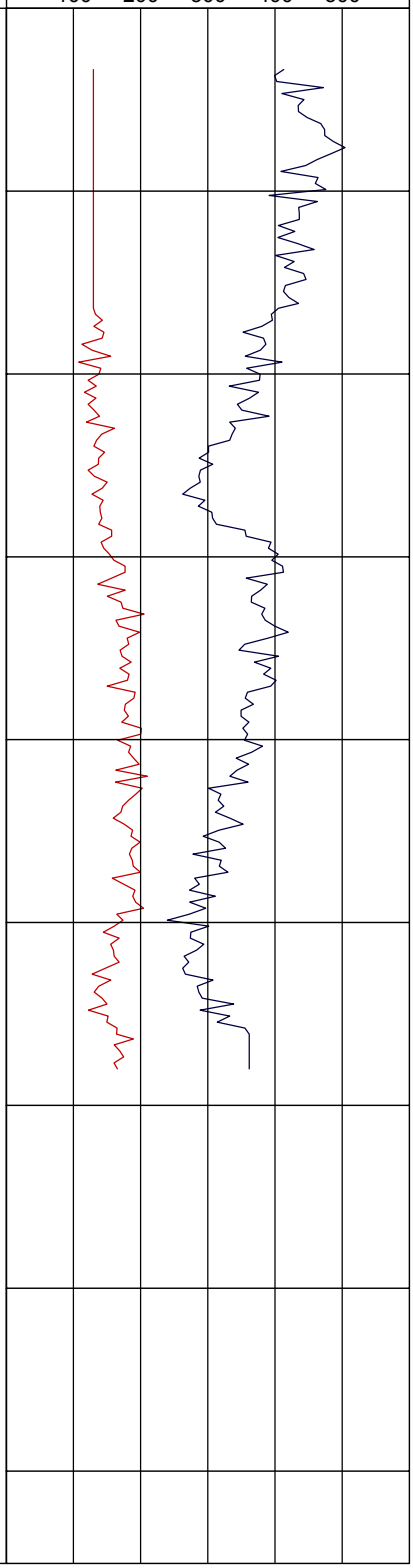
Geophysical Log of Borehole: BH-07

LOCATION ID: 21-24532

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: North of SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 6/3/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
			0		
			5		FILL SAND with SILT and CLAY (7.5YR 4/4) brown; well rounded, coarse grained to 0.5 mm; moist 4-5 ft bgs and 10 ft bgs
			10		
0	0.3	61765	15		
			20		
0	0.1	61764	25		(Qbt3) TUFF (5YR 5/2) reddish gray; MODERATELY welded; phenocrysts, <1-2 mm; pumice fragments, <1-2 cm; reddish brown staining, 3%; grading to (5YR 6/1) gray at bottom of interval
0	0.1	61782			
					GEOPHYSICAL LOGGING TOTAL DEPTH 29 FT BGS



LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/6/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-08

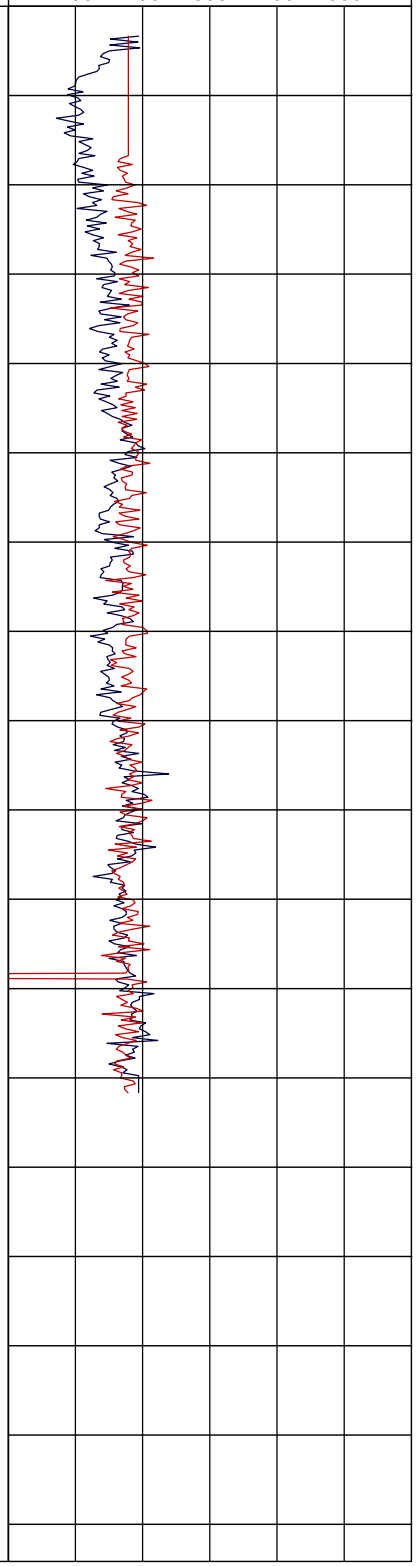
LOCATION ID: 21-24533

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: East of SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 6/2/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
0	0.5	61767	0		SILT with CLAY (7.5YR 4/4) brown; soft; low plasticity; dry
			5		(Qbt3) TUFF (5YR 5/3) reddish brown; MODERATELY welded; medium ash matrix; trace phenocrysts, <3%; pumice fragments, <1 cm, 5%
			10		STAINING ZONE light reddish brown, 20% matrix
			15		(Qbt3) TUFF (5YR 6/1) gray; MODERATELY welded; medium ash matrix; trace phenocrysts, <1-2 mm, 3%; pumice fragments <1-2 cm, 3%
			20		
			25		
			30		STAINING ZONE light reddish brown, 25% matrix
					FRACTURE ZONE; dark reddish brown; fracture, 45°, clay-filled, 2 cm
			35		(Qbt3) TUFF (5YR 6/1) gray; MODERATELY welded; medium ash matrix; trace phenocrysts; pumice fragments, <1 cm, 5%; reddish brown staining, 10%, 35-36.5 ft bgs; light brown staining, 10%, 42.5-47.5 ft bgs
			40		
			45		
			50		
0	0.8	61766	55		(Qbt3) TUFF (5YR 6/2) pinkish gray; MODERATELY welded; phenocrysts, <1-2 mm, 3%; pumice fragments, reddish brown, <1-3 cm, 3%
			60		**GEOPHYSICAL LOGGING TOTAL DEPTH 61 FT BGS**

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500



LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/7/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-09

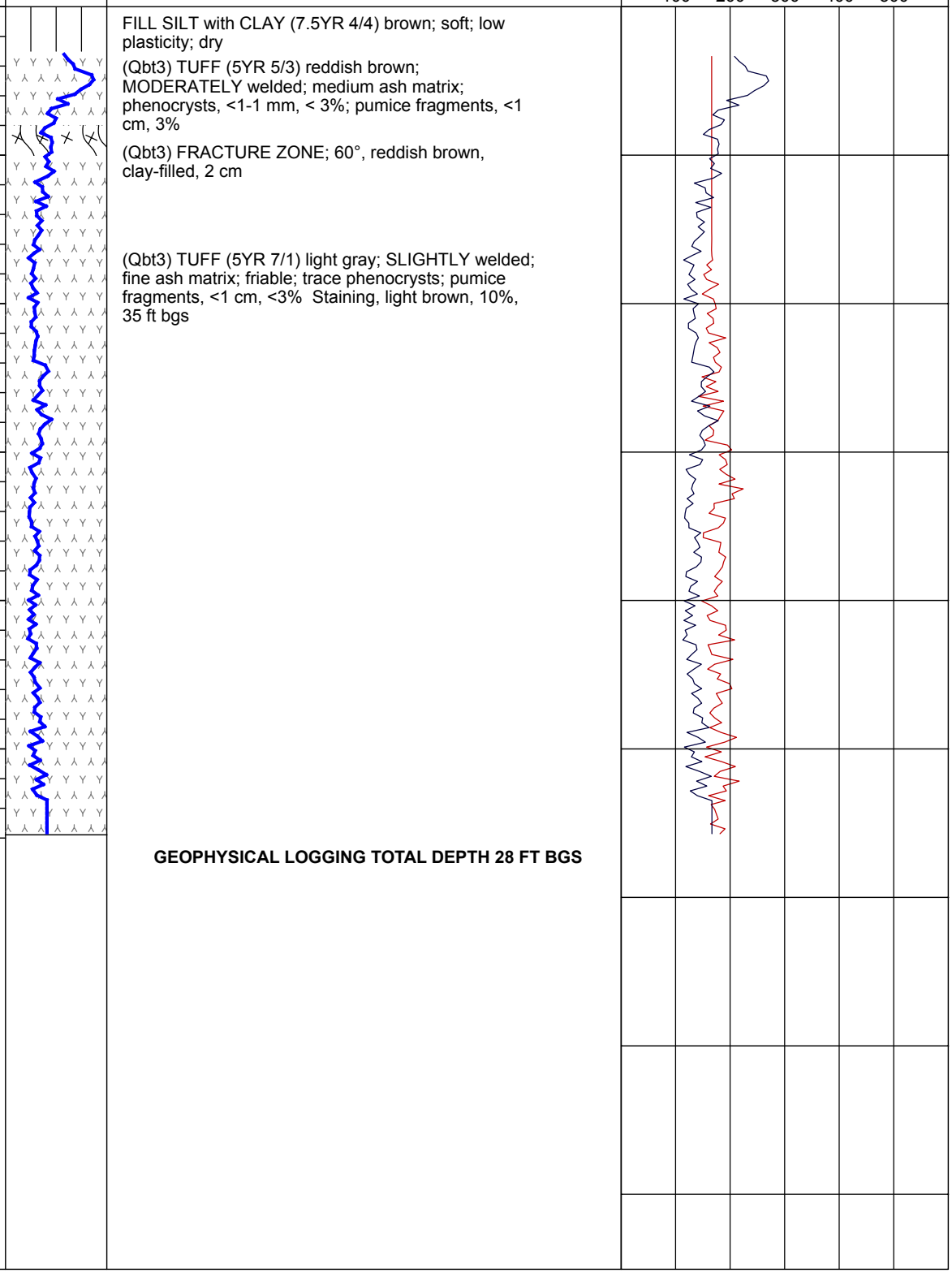
LOCATION ID: 21-24534

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: East of SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 6/3/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
			0		FILL SILT with CLAY (7.5YR 4/4) brown; soft; low plasticity; dry
					(Qbt3) TUFF (5YR 5/3) reddish brown; MODERATELY welded; medium ash matrix; phenocrysts, <1-1 mm, < 3%; pumice fragments, <1 cm, 3%
			5		(Qbt3) FRACTURE ZONE; 60°, reddish brown, clay-filled, 2 cm
			10		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1 cm, <3% Staining, light brown, 10%, 35 ft bgs
0	0.7	61769	15		
			20		
0	1	61768	25		
					GEOPHYSICAL LOGGING TOTAL DEPTH 28 FT BGS

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500



LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/6/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-10

LOCATION ID: 21-24535

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: South of SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 5/31/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
			0		SILT with CLAY (7.5YR 4/4) brown; soft; loose; dry
			5		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; trace phenocrysts; pumice fragments <1 cm, 3%
			10		
0	0.7	61771	15		
			20		STAINING ZONE; light reddish brown, 25% matrix
			25		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1-2 cm, 5%
			30		STAINING ZONE light reddish brown, 20% matrix
			35		(Qbt3) TUFF (5YR 7/2) pinkish gray; SLIGHTLY welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1-3 cm, <5%
			40		
			45		
0	0.4	61770	50		**GEOPHYSICAL LOGGING TOTAL DEPTH 50 FT BGS**

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500

LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/7/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-11

LOCATION ID: 21-24538

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: South of SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 6/1/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	LITHOLOGIC DESCRIPTION
0	0.1	61773	0–5	SILT with CLAY (7.5 4/4) brown; soft; loose; dry
			5–40	(Qbt3) TUFF (5YR 6/1) gray grading to (5YR 7/2) pinkish gray; MODERATELY welded; fine ash matrix grading to medium toward bottom of interval; friable; trace phenocrysts; pumice fragments, light gray <1-3 cm, 5%
0	0.4	61772	35	STAINING ZONE, light brown, 25% matrix
			40	**GEOPHYSICAL LOGGING TOTAL DEPTH 40 FT BGS**

GRAPHIC LOG: Volumetric Water Content (%)

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500

LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/7/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-12

LOCATION ID: 21-24539

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: West of SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 6/6/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
0	0.4	61775	0		SILT with CLAY (7.5YR 4/4) brown; soft; loose; dry
			5		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, <1-2 cm, 5%
			10		
			15		
			20		
			25		STAINING ZONE, light brown, 25% matrix
			30		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; fine ash matrix; friable; trace phenocrysts; pumice fragments, altered reddish brown, <1-2 cm, 5%
			35		
			40		FRACTURE ZONE; 60°, reddish brown, clay-filled, 2 cm
			45		(Qbt3) TUFF (5YR 6/1) gray grading to (5YR 6/2) pinkish gray; MODERATELY welded; medium ash matrix; phenocrysts, <1-3 mm, 3%; pumice fragments, dark gray, <1 cm, 3%
			50		
			55		
0	0	61774	60		**GEOPHYSICAL LOGGING TOTAL DEPTH 61 FT BGS**

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500

LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/7/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-13

LOCATION ID: 21-24540

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: West of SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 6/7/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
			0		SILT with CLAY; (7.5YR 4/4) brown; soft; loose; dry
			5		(Qbt3) TUFF (5YR 6/2) pinkish gray grading to (5YR 6/1) gray ; SLIGHTLY welded; fine ash matrix; friable; phenocrysts, 1-3 mm, 5%; pumice fragments, altered dark gray and olive gray, <1-3 cm, 3%
0	0	61777	10		
			15		
			20		
0	0.5	61776	25		(Qbt3) STAINING ZONE; dark reddish brown, 25%
					GEOPHYSICAL LOGGING TOTAL DEPTH 28 FT BGS

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500

LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/6/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-14

LOCATION ID: 21-24541

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: SW Corner SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 5/26/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
			0		FILL SAND with SILT and reworked TUFF (5YR 5/1) gray; well rounded; dry
			5		FILL broken ASPHALT chunks; 1-4 inches; dry
					FILL GRAVEL, well rounded native rock to 4 cm mixed with SILT and SAND; well rounded; dry
			10		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; phenocrysts, <1-2 mm, 5%; pumice fragments, gray, <1-2 cm, 5%; staining, orange brown, increasing toward bottom of interval
			15		
0	0.7	61779	20		
			25		
			30		FRACTURE ZONE, vertical, with root zone (near canyon edge) present, to 4 cm
			35		(Qbt3) TUFF (5YR 7/1) light gray; SLIGHTLY welded; fine ash matrix; friable; phenocrysts, <1-2 mm, 3%; pumice fragments, dark gray. 1-2 cm, 3%; orange brown staining, 10%, throughout
			40		STAINING ZONE, orange brown, 30% matrix
			45		(Qbt3) FRACTURE ZONE, 45 degrees, to 4 cm
			50		
0	0.6	61778	55		(Qbt3) TUFF (5YR 7/1) light gray; NON welded; very fine ash matrix; phenocrysts, <1-3 mm, 5%, decreasing toward bottom of interval; pumice fragments, dark gray, <1 cm, 5%
					GEOPHYSICAL LOGGING TOTAL DEPTH 59.5 FT BGS

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500

LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/7/06

Shaw Environmental and Infrastructure, Inc.

Geophysical Log of Borehole: BH-15

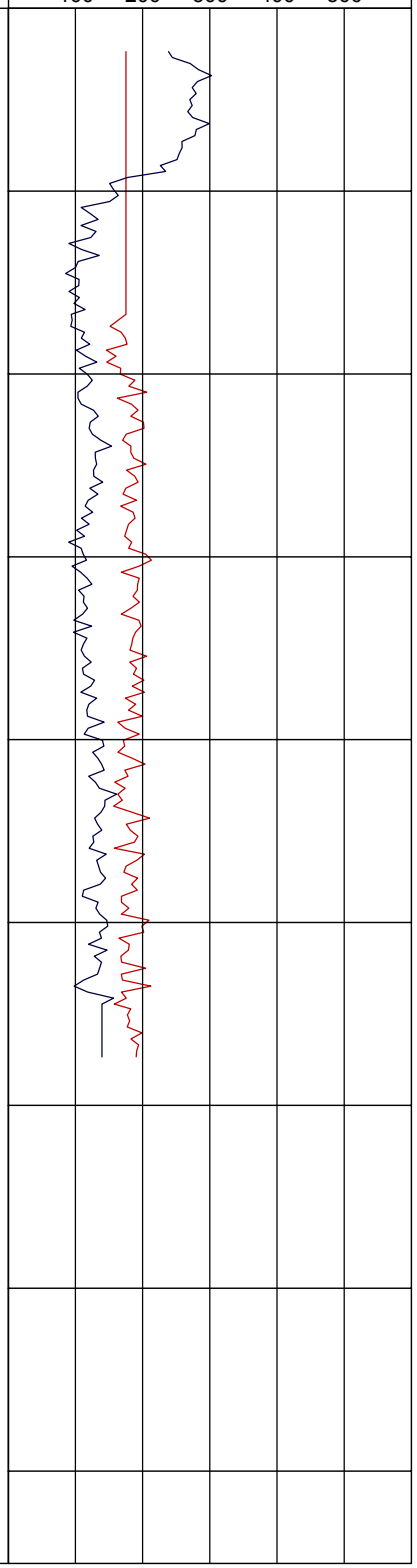
LOCATION ID: 21-24542

Los Alamos National Laboratory

Project Name: MDA V Geophysical Logging
Location: North of SWMU 21-018(a)
Logged by: Apogen Technologies
Drilling Start Date: 6/8/2005

PID (ppm)	CO2 (ppm)	Sample ID (MD21-05-XXXXX)	DEPTH (ft.)	GRAPHIC LOG: Volumetric Water Content (%)	LITHOLOGIC DESCRIPTION
			0		FILL SILT with CLAY and reworked TUFF (7.5YR 4/4) brown grading to (5YR 7/1) light gray; dry; reddish brown staining, 10%, at bottom of interval
			5		
			10		(Qbt3) TUFF (5YR 6/2) pinkish gray; SLIGHTLY welded; phenocrysts, 1-3 mm, 5%; pumice fragments, dark gray, 1-2 cm, 5%
0	0.6	61781	15		
			20		
0	1.1	61780	25		
					GEOPHYSICAL LOGGING TOTAL DEPTH 29.5 FT BGS

Neutron (counts per second)
Gamma (counts per second)
100 200 300 400 500



LAENGN01 MDA V GEOPHYSICAL LOGS.GPJ LAENGN01.GDT 4/6/06

Appendix E

Analytical Program

E-1.0 INTRODUCTION

This appendix discusses analytical methods and the data quality review for all of the samples collected in investigations conducted at Material Disposal Area (MDA) V, Consolidated Unit 21-018(a)-99 at Los Alamos National Laboratory (the Laboratory).

Quality assurance (QA), quality control (QC), and data validation procedures were implemented in accordance with the "Quality Assurance Project Plan Requirements for Sampling and Analysis" (LANL 1996, 054609), and the statement of work (SOW) for analytical laboratories (LANL 2000, 071233). The results of the QA/QC procedures were used to estimate the accuracy, bias, and precision of the analytical measurements. Samples for QC include method blanks, matrix spikes (MS), laboratory-control samples (LCSs), internal standards, initial and continuing calibrations, surrogates, and tracers.

The type and frequency of laboratory QC analyses are described in the analytical laboratories SOW (LANL 1995, 049738; LANL 2000, 071233) along with the applicable analytical methods. Other QC factors, such as sample preservation and holding times, were also assessed in accordance with the requirements outlined in Standard Operating Procedure (SOP) 01.02, Rev. 1, ICN 1, "Sample Containers and Preservation." A focused data validation was performed for each data package and included a more detailed review of the data generated by the analytical laboratory. The analytical data, including the all-analytes, QC samples, and rejected sample data tables, the data packages, chain-of-custody forms, and sample collection logs are provided in Appendix F (on DVD).

Analytical data were reviewed and evaluated based on U.S. Environmental Protection Agency (EPA) national functional guidelines for inorganic and organic chemical data review, where applicable (EPA 1999, 066649; EPA 1994, 048639). As a result of the data validation and assessment efforts, data qualifiers are assigned to the analytical records as appropriate. The qualifiers used in the data validation procedures are defined in Table E-1.0-1.

E-2.0 SUMMARY OF INORGANIC CHEMICAL ANALYSIS

Samples collected at MDA V in 1992, 1993, 1994, 1996, 2005, and 2006 were analyzed for inorganic chemicals. The analytical methods used are listed in Table E-2.0-1.

E-3.0 SUMMARY OF INORGANIC CHEMICAL QUALITY ASSURANCE/QUALITY CONTROL

All procedures were followed as required by the analytical laboratories SOW (LANL 2000, 071233) and applicable corresponding EPA SW-846 methodologies. Several sample results were qualified as estimated (J) because the results were less than the estimated detection limit (EDL) but greater than the method detection limit (MDL).

E-3.1 Maintenance of Chain of Custody

Chain-of-custody forms were maintained properly for all samples (Appendix F).

E-3.2 Sample Documentation

Samples were properly documented on the sample collection logs in the field (Appendix F).

E-3.3 Sample Dilutions

Samples were not diluted for analyses.

E-3.4 Sample Preservation

Preservation criteria were met for all samples.

E-3.5 Holding Times

Holding times were exceeded for some samples. A total of 60 sample results were qualified as estimated and biased low (J-) because the samples were analyzed less than 2 times past their holding time. A total of 37 sample results were qualified as estimated not detected (UJ) because the samples were analyzed less than 2 times past their holding time. A total of 175 sample results for mercury and 11 sample results for nitrate were rejected (R) because the samples were analyzed more than 2 times past the holding time. Despite the large number of rejected sample results, approximately 240 and 320 samples results of good quality remain for nitrate and mercury, respectively, to characterize the consolidated unit.

E-3.6 Initial and Continuing Calibration Verifications

Initial calibration verification (ICV) and continuing calibration verification (CCV) were met for all but 10 samples. The results for the 10 samples were qualified as estimated and biased high (J+) because the associated ICV or CCV was recovered above the upper warning limit but less than or equal to the upper acceptance limit (UAL).

E-3.7 Analyte Identification

Analyte identification criteria were met for all samples, except for one. One sample result for perchlorate was rejected (R) because the isotope ratio was greater than 2 times the theoretical value.

E-3.8 Interference Check Sample and/or Serial Dilutions

A total of 14 sample results were qualified as estimated (J) because the serial dilution sample relative percent difference (RPD) was greater than 10% and the sample result was greater than 50 times the MDL. Eight samples analyzed for perchlorate were qualified as estimated and biased high (J+) because the interference check sample recovery was high.

E-3.9 Laboratory Duplicates

A total of 83 sample results were qualified as estimated (J) [1 sample result was qualified as estimated and biased low (J-)] because both the sample and laboratory duplicate results were greater than or equal to 5 times the reporting limit and the duplicate RPD was greater than 35%. Nine sample results were qualified as estimated not detected (UJ) because both the sample and laboratory duplicate results were greater than or equal to 5 times the reporting limit and the duplicate RPD was greater than 35%. Thirteen sample results were qualified as estimated (J) because either the sample or laboratory duplicate results or both were greater than or equal to 5 times the reporting limit and the difference between the samples was greater than 2 times the reporting limit. One sample result was qualified as estimated (J) because the laboratory duplicate sample was analyzed on a non-Laboratory sample. Three sample results were qualified as estimated not detected (UJ) because the laboratory duplicate sample was analyzed on a non-Laboratory sample.

E-3.10 Method Blanks

Method blank results were within acceptable the range for the majority of the samples, except for 36 samples. A few target analyte results were detected in the method blanks at less than or equal to 5 times the amount associated in the method blank. The results are qualified as not detected (U).

E-3.11 Matrix Spikes

A total of 71 sample results were qualified as estimated and biased high (J+) because the analyte was recovered above 150% in the associated spike sample. Four sample results were qualified as estimated not detected (UJ) because the analyte was recovered above 150% in the associated spike sample.

A total of 154 sample results were qualified as estimated and biased high (J+) because the analyte was recovered above the UAL but less than 150% in the associated spike sample.

A total of 110 sample results were qualified as estimated and biased low (J-) because the analyte was recovered below the lower acceptance level (LAL) but greater than 30% in the associated spike sample. A total of 176 sample results were qualified as estimated not detected (UJ) because the analyte was recovered below the LAL but greater than 30% in the associated spike sample.

One sample result was qualified as estimated (J) because the MS was analyzed on a non-Laboratory sample. Six sample results were qualified as estimated not detected (UJ) because the MS was analyzed on a non-Laboratory sample.

A total of 13 sample results were qualified as estimated and biased high (J+) because the MS recovery was high. Four sample results were qualified as estimated and biased low (J-) because the MS recovery was low. Nine sample results were qualified as estimated not detected (UJ) because the MS recovery was low.

A total of 152 sample results for several inorganic chemicals were rejected (R) because the associated MS recovery was less than 30%. Despite the large number of rejected inorganic chemical sample results, sufficient good quality data remain (over 300 sample results) for the affected inorganic chemicals to characterize the consolidated unit. One sample result for uranium was rejected (R) because the MS was not analyzed with the sample for unspecified reasons.

E-3.12 Laboratory Control Sample Recoveries

A total of 101 sample results were estimated and biased high (J+) because the associated LCS recovery was above the upper warning limit. Twelve sample results were estimated and biased low (J-) because the associated LCS recovery was below the lower warning limit but greater than or equal to the lower acceptable limit. Twelve sample results were estimated not detected (UJ) because the associated LCS recovery was below the lower warning limit but greater than or equal to the LAL.

E-3.13 Laboratory Duplicates

Laboratory duplicates collected for inorganic chemical analysis indicated acceptable precision for all sample results.

E-4.0 SUMMARY OF ORGANIC CHEMICAL ANALYSIS

Samples collected at MDA V in 1993, 1994, 2005, 2006, and 2007 were analyzed for organic chemicals. The analytical methods used are listed in Table E-4.0-1.

E-5.0 SUMMARY OF ORGANIC CHEMICAL QUALITY ASSURANCE/QUALITY CONTROL

All procedures were followed as required by the analytical laboratory SOW (LANL 2000, 071233) and applicable corresponding EPA SW-846 methodologies.

E-5.1 Maintenance of Chain of Custody

Chain-of-custody forms were maintained properly for all samples (Appendix F).

E-5.2 Sample Documentation

Samples were properly documented on the sample collection logs in the field (Appendix F).

E-5.3 Sample Dilutions

One sample was qualified as estimated not detected (UJ) because the laboratory diluted the sample for matrix interferences.

E-5.4 Sample Preservation

Preservation criteria were met for all samples.

E-5.5 Holding Times

The results for two samples analyzed for semivolatile organic compounds (SVOCs) were estimated not detected (UJ) because the extraction holding time was exceeded by less than 2 times the holding time.

The results for 13 samples analyzed for SVOCs were rejected (R) because the extraction holding time was exceeded by more than 2 times the holding time.

E-5.6 Initial and Continuing Calibration Verifications

The results for 1 sample analyzed for volatile organic compounds (VOCs) and for 11 samples analyzed for SVOCs were qualified as estimated (J) because the percent relative standard deviation or percent difference (%RSD/%D) in the ICV/CCV exceeded criteria. The results for 58 samples analyzed for VOCs and for 270 samples analyzed for SVOCs were estimated not detected (UJ) because %RSD/%D in the ICV/CCV exceeded criteria.

The results for two samples analyzed for polychlorinated biphenyls (PCBs) were qualified as estimated not detected (UJ) because the associated (%RSD/%D) exceeded criteria in the ICV or CCV standards.

The results for one sample analyzed for SVOCs were qualified as estimated (J) because the sample exceeded the calibration range.

E-5.7 Analyte Identification

The results for 10 samples analyzed for SVOCs were qualified as not detected (U) because the associated mass spectrum did not meet method specifications.

One sample result for Aroclor-1242 was qualified as not detected (U) because the peak did not match multianalyte peak in CCV.

E-5.8 Method Blanks

The results for 18 samples analyzed for SVOCs were qualified as not detected (U) because the associated sample concentration was less than 5 or 10 times the amount in the method blank.

E-5.9 Surrogate Recoveries and Internal Standard Responses

The results for one sample analyzed for VOCs were qualified as estimated not detected (UJ) because the associated internal standard area counts were less than 50% but greater than 10% of the previous continuing calibration standard.

The results for two samples analyzed for SVOCs were qualified as estimated not detected (UJ) because the associated internal standard area counts showed less than 50% recovery or greater than 200% recovery when compared to the area counts in the applicable continuing calibration. The results for six samples analyzed for SVOCs were qualified as estimated (J) because the associated internal standard area counts were less than 50% but greater than 10% recovery when compared to the area counts in the applicable continuing calibration standard. The results for 15 samples analyzed for SVOCs were qualified as estimated not detected (UJ) because the associated internal standard area counts were less than 50% but greater than 10% recovery when compared to the area counts in the applicable continuing calibration standard.

The results for one sample analyzed for SVOCs were qualified as estimated and biased high (J+) because two or more surrogate recoveries in the same fraction were greater than the UAL. Two samples analyzed for SVOCs were qualified as estimated not detected (UJ) because the surrogate recoveries were less than the LAL but greater than 10%.

The results for eight samples analyzed for SVOCs were rejected (R) because at least one surrogate recovery was less than 10%.

E-5.10 Laboratory Control Sample Recoveries

The results for one sample analyzed for SVOCs were qualified as estimated and biased low (J-) because the associated LCS recovery was less than the LAL but greater than 10%. The results for 13 samples analyzed for SVOCs were qualified as estimated not detected (UJ) because the associated LCS recovery was less than the LAL but greater than 10%.

The results for 20 samples analyzed for VOCs were rejected (R) because an LCS was not analyzed. The appropriate QCs to evaluate the samples were not available.

E-5.11 Laboratory Duplicates

Laboratory duplicates collected for organic chemical analyses indicated acceptable precision for all.

E-6.0 SUMMARY OF RADIONUCLIDE ANALYSIS

Samples collected at MDA V in 1992, 1993, 1994, 1996, 2005 and 2006 were analyzed for radionuclides. The methods used are listed in Table E-6.0-1.

E-7.0 SUMMARY OF RADIONUCLIDE QUALITY ASSURANCE/QULAITY CONTROL

All procedures were followed as required by the analytical laboratory SOW (LANL 2000, 071233). Some sample results were qualified as not detected (U) because the associated sample concentration was less than or equal to the minimum detectable concentration (MDC). Some sample results were also qualified as not detected (U) because the associated sample concentration was less than or equal to 3 times the 1-sigma total propagated uncertainty.

E-7.1 Maintenance of Chain of Custody

Chain-of-custody forms were properly maintained for all samples (Appendix F).

E-7.2 Sample Documentation

Samples were properly documented on the sample collection logs in the field (Appendix F).

E-7.3 Sample Dilutions

Samples were not diluted for analyses.

E-7.4 Sample Preservation

Preservation criteria were met for all samples.

E-7.5 Holding Times

Six sample results were qualified as estimated and biased low (J-) because the samples were analyzed less than 2 times past the holding time.

E-7.6 Analyte Identification

A total of 207 sample results for several radionuclides were rejected (R) because spectral interference prevented positive identification of the analytes. Despite the large number of rejected sample results, sufficient good quality data remain (approximately 100 to 390 sample results) for the affected radionuclides to characterize the consolidated unit.

E-7.7 Method Blanks

A total of 9 sample results were qualified as not detected (U) because the associated sample concentration was less than 5 times the amount in the method blank.

A total of 16 sample results were rejected (R) because the method blanks were not analyzed. The appropriate QCs to evaluate the samples were missing.

E-7.8 Matrix Spikes

The MS recoveries for radionuclide analyses were within acceptable limits for all the analyses.

E-7.9 Carrier and Tracer Recoveries

A total of 10 sample results were qualified as estimated and biased low (J-) because the associated tracer recovery was less than 30% but greater than 10%. Five sample results were qualified as estimated not detected (UJ) because the associated tracer recovery was less than 30% but greater than 10%.

Six sample results were qualified as estimated and biased high (J+) because the associated tracer recovery was greater than 105%.

Five sample results for americium-241 were rejected (R) because the associated tracer recovery was less than 10%.

E-7.10 Laboratory Control Sample Recoveries

Ten sample results were qualified as estimated and biased high (J+) because the associated LCS recovery was greater than 120%. One sample result was qualified as estimated and biased low (J-) because the associated LCS recovery was less than 80% but greater than or equal to 10%. Six sample results were qualified as estimated not detected (UJ) because the associated LCS recovery was less than 80% but was greater than 10%.

E-7.11 Laboratory Duplicates

A total of 14 sample results were rejected (R) because the associated laboratory duplicate sample has a duplicate error ratio (DER) of greater than 4.

A total of 208 sample results for several radionuclides were rejected (R) because MDC documentation was missing. Despite the large number of rejected sample results, sufficient good quality data remain (approximately 100 to 390 sample results) for the affected radionuclides to characterize the consolidated unit.

E-8.0 REFERENCES

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in text citations. ER ID numbers are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the Directorate's master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau; the U.S. Department of Energy–Los Alamos Site Office; the U.S. Environmental Protection Agency, Region 6; and the Directorate's. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

EPA (U.S. Environmental Protection Agency), February 1, 1994. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," OSWER 9240.1-35, EPA540/R-94-013, Washington, D.C. (EPA 1994, 048639)

EPA (U.S. Environmental Protection Agency), October 1, 1999. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," OSWER 9240.1-05A-P, PB99-963506, EPA540/R-99-008, Washington, D.C. (EPA 1999, 066649)

LANL (Los Alamos National Laboratory), July 1995. "Statement of Work–Analytical Support, Revision 2," Los Alamos National Laboratory document RFP No. 9-XS1-Q4257, Los Alamos, New Mexico. (LANL 1995, 049738)

LANL (Los Alamos National Laboratory), March 1996. "Quality Assurance Project Plan Requirements for Sampling and Analysis," Los Alamos National Laboratory document LA-UR-96-441, Los Alamos, New Mexico. (LANL 1996, 054609)

LANL (Los Alamos National Laboratory), December 1, 2000. "University of California Los Alamos National Laboratory (LANL), 18980SOW0-8S Statement of Work for Analytical Laboratories, December 2000, Revision 1," Los Alamos National Laboratory document, Los Alamos, New Mexico. (LANL 2000, 071233)

Table E-1.0-1
Definition of Data Qualifiers

Qualifier	Definition
U	The analyte was analyzed for but not detected. Reported value is the sample-specific estimated quantitation limit or detection limit.
J	The reported value should be regarded as estimated detect.
J+	The reported value should be regarded as estimated detect and biased high.
J-	The reported value should be regarded as estimated detect and biased low.
UJ	The analyte was analyzed for but regarded as estimated nondetect. Reported value is an estimate of the sample-specific quantitation or detection limit.
R	The sample results were rejected because of serious deficiencies in the ability to analyze the sample and meet QC criteria; presence or absence cannot be verified.

Table E-2.0-1
Inorganic Chemical Analytical Methods

Analytical Method	Analytical Description	Target Compound List
SW-846: 6010, 6010B	Inductively coupled plasma emission spectroscopy—atomic emission spectroscopy	Aluminum, antimony, arsenic, barium, beryllium, boron, calcium, cadmium, cobalt, chromium, copper, iron, lead, lithium, magnesium, manganese, mercury, nickel, potassium, selenium, silicon, silver, sodium, thallium, titanium, uranium, vanadium, and zinc (TAL metals)
SW-846: 6020	Inductively coupled plasma mass spectrometry	Aluminum, antimony, arsenic, barium, beryllium, boron, calcium, cadmium, cobalt, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silicon, silver, sodium, thallium, titanium, vanadium, and zinc
EPA Method: 300.0, 314.0	Ion chromatography	Anions, perchlorate
SW-846: 7060	Graphite furnace atomic absorption (GFAA)	Arsenic
SW-846: 9012A	Colorimetric ultraviolet method	Cyanide (total)
SW-846: 7420	Colorimetric method	Lead
SW-846: 7470A, 7471A	Cold vapor atomic absorption (CVAA)	Mercury
SW-846: 8321A	High-pressure liquid chromatography mass spectrometry	Perchlorate
SW-846: 7740	GFAA	Selenium
SW-846: 7840	GFAA	Thallium
Generic: uranium kinetic phosphorescence analysis (KPA)	KPA	Uranium

Table E-4.0-1
Organic Chemical Analytical Methods

Analytical Method	Analytical Description	Target Compound List
SW-846: 8260	VOCs	See analytical services SOW (LANL 2000, 071233)
SW-846: 8270 SW-846: 8270C	SVOCs	See analytical services SOW (LANL 2000, 071233)
SW-846: 8082	PCBs	See analytical services SOW (LANL 2000, 071233)

Table E-6.0-1
Radionuclide Analytical Methods

Analytical Method	Analytical Description	Target Compound List
HASL-300: Am-241	Alpha spectroscopy	Americium-241
EPA Method: 901.1 Generic: gamma spectroscopy	Gamma spectroscopy	Americium-241, cesium-137, cesium-134, cobalt-60, europium-152, ruthenium-106, sodium-22, uranium-235
EPA Method: 906.0 LA-10300-M, Vol. 1: R230	Liquid scintillation	Tritium
HASL-300: ISOPU	Alpha spectroscopy	Isotopic plutonium
HASL-300: ISOTH	Alpha spectroscopy	Isotopic thorium
HASL-300: ISOU	Alpha spectroscopy	Isotopic uranium
EPA Method: 905.0 ASTM:D5811-95M	Gas proportional counting	Strontium-90

Appendix F

Analytical Reports
(on DVD included with this document)

Appendix G

Waste Disposal and Documentation
(on CD included with this document)

The investigation-derived waste (IDW) streams associated with the investigation of Material Disposal Area V, Consolidated Unit 21-018(a)-99, are identified in Table G-1 and are briefly described below. The table also summarizes the waste types, the estimated volumes, the characterization methods, the methods of on-site management, and the path for disposing of each of the following waste streams.

- *Borehole Drill Cuttings:* This waste stream was generated during drilling activities. Based on previous site investigations, waste was considered low-level waste and was managed in a radioactive waste staging area and stored in 55-gal. drums. Characterization of the drill cuttings was based on a combination of historical and analytical data generated during the 2005–2006 site characterization activities. The estimated volume is approximately 30 yd^3 stored in either 85- or 55-gal. drums. The waste was disposed of as low-level waste at Area G of Technical Area (TA) 54 in February 2006.

- *Plastics, Personal Protective Equipment (PPE), and Sampling Wastes*: This waste stream included various types of plastics, disposable gloves and coveralls, and sampling supplies such as plastic scoops, plastic bags, jars, and dry decontamination waste. Contamination of these contact wastes generated during field activities was conservatively assumed to be identical to those found in the associated environmental media. Therefore, characterization of this waste was based on the results of the laboratory analysis of the characterization samples from the boreholes. The analytical results indicated that the boreholes may contain low-level radioactive material; thus, this waste stream was managed on-site as low-level waste. The estimated volume of this waste is approximately 1 to 2 yd^3 stored in either 85- or 55-gal. drums. This waste was disposed of at Area G of TA-54 in February 2006.

- *PPE and Sampling Wastes (2007 Sampling)*: This waste stream was generated during the 2007 sampling and included disposable gloves and sampling supplies such as plastic scoops, plastic bags, and dry decontamination waste. The estimated volume of this waste stream is approximately 5 gal. Contamination of these contact wastes was conservatively assumed to be identical to those found in the associated media and characterization was based on the laboratory analysis of the characterization samples; although the final disposition of waste generated during the 2007 sampling has not been completed as of the writing of this report, it is expected to be handled and disposed of at a non-hazardous/commercial facility.

- *Concrete, Asphalt, and Metal Debris*: This waste stream was generated during canyon slope debris removal activities. Based on waste characterization samples collected from the concrete and asphalt and because it was originally part of the laundry facility, the debris was considered low-level nonhazardous radioactive waste.

Documentation for the management, storage, and disposal of IDW from Consolidated Unit 21-018(a)-99 is presented in Attachments G-1 and G-2 of this appendix. Documentation of the disposition of waste generated during the 2007 slope sampling at SWMU 21-013(b) will be provided to New Mexico Environment Department (NMED) under separate cover when complete.

Table G-1
Summary of IDW Generation and Management

Waste Stream	Waste Type	Volume	Characterization Method	On-Site Management	Disposition
Drill cuttings	Nonhazardous, low-level radioactive waste	30 yd^3	Acceptable knowledge (analytical results for 2005 borehole samples)	55-gal. drums	Disposal at TA-54, Area G
Spent PPE and disposable sampling supplies	Nonhazardous, low-level radioactive waste	1–2 yd^3	Acceptable knowledge (analytical results for 2005 samples)	55 and 85-gal. drums	Disposal at TA-54, Area G
Septic System Outfall		10 yd^3 sediment	Characterization samples of outfall sediments, confirmation samples of weathered tuff following removal	20-yd^3 rolloff bin	Disposal at TA-54, Area G
Hillslope Debris Removal		1000 yd^3; 920 yd^3 concrete, 140 yd^3asphalt, 50 yd^3metal	Waste characterization samples of concrete and asphalt; gamma spec of concrete debris	46 bins concrete; 7 bins asphalt; 3 bins metal	Disposal at TA-54, Area G
Absorption Beds		14,000 yd^3 bed fill material	Waste characterization samples of absorption bed fill material during pipe removal	Direct load into end-dump trucks; load into super sacks for off-site shipment	Disposal at TA-54, Area G; disposal at EnviroCare
2007 Spent PPE and disposable sampling supplies	Nonhazardous	5 gal.	Acceptable knowledge (analytical results for 2007 samples)	55-gal. drum	To be determined

Attachment G-1

LANL Receiving Reports
(on CD included with this document)

Attachment G-2

Off-Site Waste Manifests
(on CD included with this document)

Appendix H

Risk Assessments

EXECUTIVE SUMMARY

This appendix presents the results of the human health and ecological risk screening assessments performed in support of the remediation activities conducted at Consolidated Unit 21-018(a)-99, which consists of four inactive solid waste management units (SWMUs) and one area of concern (AOC): SWMUs 21-018(a) and 21-018(b), the three absorption beds and laundry facility south of DP Road, respectively; SWMU 21-013(b) and AOC 21-013(g), debris disposal areas south of the absorption beds on the south-facing hillslope of BV Canyon; and SWMU 21-023(c), a septic system and outfall immediately west of the surface disposal areas and also on the south-facing hillslope of BV Canyon.

The total estimated excess cancer risk for SWMUs 21-018(a) and 21-018(b) is approximately 1×10^{-5}, with arsenic contributing most of the cancer risk (approximately 83%). The total estimated excess cancer risk for these SWMUs is equivalent to the New Mexico Environment Department (NMED) target level of 10^{-5}. The exposure point concentrations for the noncarcinogenic COPCs do not exceed the respective residential soil screening levels (SSLs). The hazard index (HI) for SWMUs 21-018(a) and 21-018(b) is 0.9, which is below the NMED target level of 1.0. The total dose for SWMUs 21-018(a) and 21-018(b) is 1.6 mrem/yr, which is less than the U.S. Department of Energy's (DOE's) target dose of 15 mrem/yr.

The total estimated excess cancer risk for SWMU 21-013(b) and AOC 21-013(g) is approximately 1×10^{-5}, with arsenic contributing much of the cancer risk (approximately 72%). The total estimated excess cancer risk for this SWMU and AOC is equivalent to the NMED target level of 10^{-5}. The exposure point concentrations for the noncarcinogenic COPCs also do not exceed the respective residential SSLs, except for uranium. The HI for SWMU 21-013(b) and AOC 21-013(g) is approximately 2.0, with uranium contributing the majority of the risk (approximately 85%). The uranium HQ is the result of a single sample result, which overstimates the potential exposure and risk to a resident. The HI without this uranium result is 0.3, which is below the NMED target level of 1.0. The total dose for SWMU 21-013(b) and AOC 21-013(g) is 3.0 mrem/yr, which is less than DOE's target dose of 15 mrem/yr. In May 2007, eight additional surface and near-surface samples were collected and analyzed for semivolatile organic compounds (SVOCs) in the northwest area of the hillslope to confirm the effectiveness of a small removal action at and downgradient from location 21-24650 to determine if concentrations of benzo(a)anthracene are less than the residential SSL. Benzo(a)anthracene was not detected, and other detected SVOC concentrations in the 2007 samples did not exceed their respective SSLs, indicating that the removal action at location 21-24650 was successful.

The total estimated excess cancer risk for SWMU 21-023(c) is approximately 9×10^{-6}, with arsenic contributing the majority of the cancer risk. The total estimated excess cancer risk for this SWMU is less than the NMED target level of 10^{-5}. The exposure point concentrations for the noncarcinogenic COPCs do not exceed the respective residential SSLs. The HI for SWMU 21-023(c) is 0.4, which is below the NMED target level of 1.0. The total dose is 10.3 mrem/yr, which is less than DOE's target dose of 15 mrem/yr.

The human health risk assessment includes an evaluation of the potential risk to residential receptors from chemicals detected in pore gas via an indoor air pathway. Benzene, carbon tetrachloride, chloroform, tetrachloroethene, and trichloroethene were retained and evaluated using the Johnson and Ettinger "Model of Indoor Air Exposure." All the chemicals evaluated are carcinogens and, therefore, an HI was not calculated. The cumulative cancer risks do not exceed 1×10^{-5} for any of the indoor air model site conditions evaluated.

Based on a residential scenario, overall, the uncertainties associated with the evaluation of chemicals of potential concern (COPCs) at Consolidated Unit 21-018(a)-99 overestimate potential exposure and risk to human receptors. In conclusion, concentrations of COPCs in soil, tuff, and pore gas at Consolidated Unit

21-018(a)-99 do not pose a potential unacceptable risk to human health under a residential scenario. Therefore, no further investigation or corrective action is warranted based on the evaluation of potential human health risks.

An ecological screening assessment was also conducted for Consolidated Unit 21-018(a)-99 to evaluate the potential risk to ecological receptors. Based on the assessment, several chemicals of potential ecological concern (COPECs) were identified. All COPECs were eliminated by analyzing the following factors: background concentrations, the potential effects to populations (or individuals for threatened and endangered [T&E] species), the relative toxicity of related compounds, the detected concentrations, and the infrequency of detection. The results of the ecological risk screening assessment indicate no potential risk to ecological receptors at Consolidated Unit 21-018(a)-99.

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Attachments

Attachment H-1 Total Uranium Analytical Result for Location 21-02517
Attachment H-2 Ecological Scoping Checklist

H-1.0 INTRODUCTION

This appendix presents the results of the human health and ecological risk screening assessments performed in support of the remediation and investigation activities at Consolidated Unit 21-018(a)-99, located on Delta Prime (DP) Mesa within Technical Area (TA) 21 of Los Alamos National Laboratory (LANL or the Laboratory). Field activities at Consolidated Unit 21-018(a)-99 consisted of remediation and site characterization activities, as specified in the investigation work plan (LANL 2004, 087358) and the New Mexico Environment Department's (NMED's) approval with modifications letter dated November 5, 2004 (NMED 2004, 090174). Consolidated Unit 21-018(a)-99 consists of four inactive solid waste management units (SWMUs) and one area of concern (AOC) consolidated in 1999 according to their related operational history and their proximity to one another (Figure 1.1-3 of the investigation report). The following SWMUs and AOC comprise Consolidated Unit 21-018(a)-99: SWMUs 21-018(a) and 21-018(b), the three absorption beds and laundry facility south of DP Road, respectively; SWMU 21-013(b) and AOC 21-013(g), debris disposal areas south of the absorption beds on the south-facing hillslope of BV Canyon (the canyon located directly below Material Disposal Areas [MDAs] B and V); and SWMU 21-023(c), a septic system and outfall immediately west of the surface disposal areas and also on the south-facing hillslope of BV Canyon.

The current land use for Consolidated Unit 21-018(a)-99 is industrial and is expected to remain industrial for the reasonably foreseeable future. However, the decision scenario for cleanup and the associated risk is a residential scenario.

The risk screening assessments evaluated chemicals of potential concern (COPCs) in soil and tuff at Consolidated Unit 21-018(a)-99. This site was potentially contaminated with hazardous and radioactive constituents as a result of past facility operations.

The main features of the risk screening assessments for Consolidated Unit 21-018(a)-99 are as follows:

- descriptions of historical operations at the site, site features, historical releases, and contamination sources (sections H-1.1 through H-1.3)
- development of a conceptual site model (CSM) for both human and ecological receptors (section H-3.0)
- comparison of inorganic chemical, organic chemical, and radionuclide COPCs to human health and ecological screening levels (sections H-4.0 and H-5.0, respectively)
- uncertainty analyses relevant to the risk screening results (sections H-4.2 and H-5.4)
- conclusions of the risk screening assessments (section H-6.0).

Potential adverse effects to both human and ecological receptors are evaluated based on exposure to COPCs in surface soil and subsurface soil and tuff at Consolidated Unit 21-018(a)-99. The human health risk screening assessment is performed based on NMED and U.S. Environmental Protection Agency (EPA) Region 6 guidance (NMED 2006, 092513; EPA 2005, 091002). The ecological risk screening assessment is performed in accordance with the methodology presented in "Screening Level Ecological Risk Assessment Methods, Revision 2" (LANL 2004, 087630).

H-1.1 Site Background

From 1945 to 1978, TA-21 was used primarily for plutonium research, metal production, and related activities. Since 1978, various administrative and chemical research activities have been conducted at TA-21. In general, the historical operations at Consolidated Unit 21-018(a)-99 included activities related to

wastewater treatment and disposal and surface debris disposal. Specific historical operations at the individual SWMUs and AOC in the consolidated unit are summarized in section H-1.2.

H-1.2 Site Description and Operational History

Consolidated Unit 21-018(a)-99 is located on the south side of DP Road just west of the main gate to the Laboratory's TA-21 operational facilities and is currently inactive (Figures 1.1-1 and 1.1-2). The site consists of four inactive SWMUs and one AOC consolidated in 1999 according to their related operational history as well as their proximity to one another and include the following:

- SWMU 21-018(a) (MDA V)—three wastewater absorption beds that received effluent from 1945 to 1961, located on the mesa south of the laundry facility
- SWMU 21-018(b)—a former laundry facility for radioactively contaminated clothing that operated from 1945 to 1961, located immediately south of DP Road and directly north of the absorption beds
- SWMU 21-023(c)—a waste treatment laboratory septic system and outfall that received effluent from 1948 to 1965. The septic tank and inlet are located primarily on the mesa, and the outfall is located on the south-facing hillslope of BV Canyon
- SWMU 21-013(b)—a surface disposal area emplaced in 1965 during demolition of the laundry facility consisting of building debris downslope of the absorption beds on the south-facing hillslope of BV Canyon
- AOC 21-013(g)—a surface disposal area emplaced post-1965 consisting of building debris located on the south-facing hillslope of BV Canyon

SWMUs 21-018(a) and (b) are located on the mesa top. SWMU 21-013(b) and AOC 21-013(g) are located on the slope leading into BV Canyon. The SWMU 21-023(c) septic system is located primarily on the mesa top; the outfall is located on the slope leading into BV Canyon, west of SWMU 21-013(b) and AOC 21-013(g).

SWMU 21-018(a) (MDA V), Liquid Waste Absorption Beds

SWMU 21-018(a), MDA V, is located immediately south of the former laundry facility location (Figure 1.1-3) and consists of three interconnected liquid waste absorption beds. MDA V was constructed to receive radioactive liquid waste derived from washing radioactively contaminated clothes in the laundry facility, and the beds were designed to enhance the infiltration of liquids into the tuff bedrock. The absorption beds were situated with the long axis east-west-trending, placed side by side, and staggered, with absorption bed 3 (south) farther east than absorption bed 1 (north). Based on the 2005–2006 removal activities, each absorption bed was excavated into tuff to a depth of approximately 10–12 ft and was approximately 30 ft in width and 250 ft in length. The beds were bermed on the downgradient (south) side with a minimum 1-ft-high by 6-ft-wide embankment (Drawing ENG-C 2218, LANL 2004, 085559).

Absorption bed 1, the most northern and topographically highest bed, was the only bed to receive effluent directly from the laundry facility. Two gravity-fed overflow pipes on the downgradient side of absorption bed 1 led to distribution pipes in absorption bed 2, the middle bed. One gravity-fed overflow pipe connected to a distribution pipe in the eastern half of absorption bed 3, the southernmost and lowest bed. The western half of absorption bed 3 contained a distribution line with no apparent connection to the eastern half of bed 3 or to absorption bed 2. The infiltration medium of the absorption beds consisted of

approximately 10 ft of 3- to 12-in.-diameter cobbles (although some were as large as 3 ft in diameter) overlain by a 1-ft layer of gravel. The infiltration medium was capped with a 1-ft layer of soil or crushed tuff (Drawing ENG-C 2218, LANL 2004, 085559). The design was intended to allow absorption bed 1 to fill with effluent to a depth of approximately 2 ft from the bottom of the pit before the overflow pipes distributed water to the downgradient absorption beds.

The three liquid waste absorption beds were constructed in 1945 and operated until 1961. They remained on stand-by status until September 1963, when they were completely removed from service (LANL 1991, 007529, p. 16-223). In January 1984, a chain-link fence was constructed around the absorption-bed area. Minor surface stabilization work, including the installation of a soil cover, was completed in 1985 to repair erosion damage (LANL 1986, 007419, p. 69). It is not known whether a soil cover was installed over the site before the work was conducted in 1985 (LANL 1991, 007529, p. 16-223). No record of additional activities at the site after 1985 is available.

SWMU 21-018(b), Former Laundry Facility

SWMU 21-018(b), the former laundry facility housing building 21-20, was located at the eastern end and south of DP Road, immediately west of the security fence that encloses active TA-21 facilities to the east (Figure 1.1-3). Operational from 1945 to 1961, the laundry facility was used to wash personal protective clothing and other reusable cloth items used in both research and production operations involving radioactive materials at TA-21.

The laundry facility was a wood-frame structure with both concrete slab and wood-framing-on-pier floors. The eastern portion of the building was used to radiation-screen, sort, mend, fold, and store clean laundry. Offices were also located in this portion of the building. The western portion of the building contained a boiler room and a storage room and was used for receiving, washing, and drying radioactively contaminated laundry. The wet-laundry room (room 2002) contained a concrete trough that carried wastewater from the laundry machines to a concrete well. A 6-in., cast-iron drainpipe led from the concrete well to the MDA V absorption beds. Floor drains in rooms 2014 (drying), 2015 (storage), and 2016 (receiving) were also connected to the 6-in., cast-iron drainpipe (Drawing A-5-C33, LANL 2004, 085559). The boiler room contained equipment that generated hot water for washing machines and space heating in the laundry. The boiler equipment and floor drains in the boiler room were connected to a blow-down sump located outside the south wall of the boiler room. The blow-down sump was connected to a drainpipe that ran south approximately 50 ft to the surface of DP Mesa north of MDA V.

The laundry facility was connected to the DP steam plant through the overhead steam line and condensate return line, so the boiler did not need to be used. The exact date the facility was connected to the steam system has not been established with certainty. Therefore, it is not known whether boiler operations at the facility ever generated a waste stream.

The wood portions of the building were decommissioned, decontaminated, and demolished in 1965 and taken to MDA G, where the debris was burned. The concrete foundation and associated piping were bulldozed over the edge of DP Mesa and still remain on the south-facing slope of BV Canyon. This debris was later designated SWMU 21-013(b) and AOC 21-013(g).

SWMU 21-013(b) and AOC 21-013(g), Surface Disposal Areas

SWMU 21-013(b) and AOC 21-013(g) are located on the southern edge of DP Mesa, immediately south of the MDA V absorption beds on the south-facing hillslope leading into BV Canyon (Figure 1.1-3). Based on a site visit, it is apparent no clear demarcation exists between the SWMU and AOC. The

material disposed of at SWMU 21-013(b) is contiguous with material from AOC 21-013(g) (LANL 2004, 087358). The SWMU 21-013(b) debris field extends farther south and east than previously delineated and AOC 21-013(g) is of limited extent (Figure 1.1-3). SWMU 21-013(b) contained the external concrete piers and other building debris produced from the 1965 demolition of a waste treatment laboratory (building 21-33, SWMU 21-009) and the laundry facility (LANL 1991, 007680, pp. 17–29). Other debris on the slope includes asphalt and concrete poured onto the slope before it solidified, broken asphalt, concrete, piping, and miscellaneous building materials. The origin of the additional debris is not documented. AOC 21-013(g) consists of two discarded drainlines and miscellaneous building materials, also of unknown origin.

Although not documented, it is likely both these surface disposal sites originally resulted from the demolition of the waste treatment laboratory and laundry facility in 1965. In 1990, sections of discarded pipe and building debris were observed during an Environmental Restoration (ER) Project site visit, and SWMU and AOC numbers were subsequently assigned. It is not known how long these sites received building debris; however, they did not receive wastes after 1994.

SWMU 21-023(c), Former Waste Treatment Laboratory Septic System

SWMU 21-023(c) is a former septic system consisting of a tank (structure 21-62), drainlines, and an outfall and served the waste treatment laboratory (building 21-33). Building 21-33, designated as SWMU 21-009, was located immediately west of MDA V and north of the septic tank. It had one waste line at an unknown depth that carried sewage from the building to the septic tank.

The septic tank was located immediately west of the MDA V absorption beds (Drawing A5-C142, LANL 2004, 085559). The septic tank was constructed of reinforced concrete, 3.5 ft wide $\times$ 7 ft long $\times$ 5.8 ft deep. The drainline was a 4-in. vitrified clay pipe that surfaced 40 ft southwest from the tank, approximately 30 ft from the canyon edge above BV Canyon (Drawings ENG-R-1191 and ENG-R-1193, LANL 2004, 085559). The septic system drainage outfall area extends south into BV Canyon.

The waste treatment laboratory septic system was put into service in 1948. Sewage was pumped from a sump in building 21-33 through the septic tank to the outfall. Wastewater discharged from the septic tank flowed downslope to BV Canyon.

The tank was removed in 1965 and taken to MDA G. Trenching activities performed during the 2005–2006 investigation indicated that no additional infrastructure (septic tank, lines, etc.) remained at the site.

H-1.3 Historical Releases and Contamination Sources

SWMU 21-018(a) (MDA V), Liquid Waste Absorption Beds

Observations as early as 1946 indicated the absorption beds were not functioning properly, causing large amounts of effluent to pool on the ground surface. Also, effluent was reported to have overflowed absorption bed 3 at one time (Abrahams 1962, 001306, p. 22). These performance issues may have resulted in the release of radioactive contaminants onto the BV Canyon hillslope downgradient from MDA V.

The MDA V performance issues were most likely to the result of an overestimate of the bedrock percolation rate. The absorption beds were designed to manage 8250 gal./day of wastewater based on an assumed percolation rate of 0.5 gal./ft^2/day (Veltman 1945, 001305, p. 2). Later estimates indicated that the actual saturated conductivity or percolation rate was only 0.125 gal./ft^2/day (LANL 1991, 007529, p. 16-222). Abrahams also indicated that the absorption bed distribution system or underlying tuff may

have silted-up over time (Abrahams 1962, 001306, p. 22). Finally, it is possible the effluent volume discharged to the absorption beds exceeded the design basis; one report indicates wastewater volumes may have exceeded 22,000 gal./day (LANL 2000, 070037, p. 4).

SWMU 21-018(b), Former Laundry Facility

The laundry facility probably discharged in the range of 22,710 to 30,280 L (6000 to 8000 gal.) per day, approximately 7.57 million L (2 million gal.) per yr, or 151.4 million L (40 million gal.) of effluent over the operating life of the facility (LANL 1991, 007529, p. 16-222).

Effluent from the laundry facility consisted of wastewater from washing machines. Plutonium was the predominant radioactive material present in the laundry wastes (Mead and Newell 1952, 006203). Historical documents indicated that approximately 3 Ci of strontium-89, barium-140, and lanthanum-140 (now decayed to undetectable levels), and 0.034 Ci of strontium-90 were released to the absorption beds (Christensen 1973, 037840, pp. 8–9). Christensen (1973, 037840, p. 7) estimated approximately 0.035 Ci of plutonium (most of which was plutonium-239) was released to the absorption beds from 1952 to 1961. No information is available on amounts of radioactive material released from the laundry facility between 1945 and 1951. The amount of uranium released to the absorption beds is not known. Compounds associated with synthetic detergents are not suspected because it was determined that ordinary soaps would adequately decontaminate the radioactively contaminated clothing (Mead and Newell 1952, 006203, pp. 14 and 15).

No information is available regarding the amount of effluent (if any) discharged from the blow-down sump to the drainpipe and subsequently to the surface of DP Mesa.

During razing activities for building 21-20, evidence of widespread radioactive contamination on the interior of the building was found. Loose radioactive contamination was reported in the exhaust ductwork, in the ventilators on the roof, and in overhead pipes. Fixed radioactive contamination was detected on walls, insulated steam lines and in the concrete floor trenches (Romero 1965, 000370, p. 1).

SWMU 21-013(b) and AOC 21-013(g), Surface Disposal Areas

No releases to the environment from either site are documented. However, overflow from the MDA V absorption beds would have run on to these surface disposal areas, into BV Canyon, and subsequently into Los Alamos Canyon.

SWMU 21-023(c), Former Waste Treatment Laboratory Septic System

Documentation of the volume of discharge or flow rate of the septic system has not been found. The system was intended for sanitary waste; however, radioactive materials were handled in the facility, and components and laboratory furniture were contaminated with plutonium dust. Perchloric acid was also used and may have contaminated the exhaust hoods. In addition, the septic system outfall drainage area may have been impacted by wastewater overflows from MDA V.

H-2.0 INVESTIGATION SAMPLING AND COPC DETERMINATION

Historical investigation and sampling at Consolidated Unit 21-018(a)-99 fall into one of three categories: (1) pre-RCRA Facility Investigation (RFI) activities conducted between 1945 and 1992; (2) historical RFI activities conducted between 1992 and 2000; and (3) recent activities conducted between May 2005

and May 2007. A total of 402 soil, fill, rock (tuff), and sediment samples collected from Consolidated Unit 21-018(a)-99 during historical and recent investigations are evaluated in this report.

For ecological receptors, Consolidated Unit 21-018(a)-99 is evaluated as a single exposure area. For the human health risk assessment, Consolidated Unit 21-018(a)-99 is evaluated as the following units in the exposure and risk calculations:

- The laundry building footprint [SWMU 21-018(b)] and the absorption beds [SWMU 21-018(a)] are evaluated as a single unit because both sites have the same contaminant source (i.e., the laundry), both have the same terrain/habitat (i.e., developed mesa top), and the sampling approach is designed to cover both sites (i.e., 15 boreholes to cover the mesa-top portion of the consolidated unit).
- The two debris disposal sites [SWMU 21-013(b) and AOC 21-013(g)] on the slope to the south of MDA V were evaluated as a single unit because the two sites cannot be clearly differentiated, the materials disposed of at the site are similar (concrete, asphalt, etc.), and the terrain/habitat is similar.
- The septic system/outfall [SWMU 21-023(c)] is evaluated as a single unit. All samples collected are specific to this SWMU and were not intended to characterize contamination from the other SWMUs or AOC. Further, the source of contamination (the waste research laboratory, AOC 21-009) is unique, and the individual SWMU boundary is distinct from the other individual SWMUs and AOC within Consolidated Unit 21-018(a)-99.

Table H-2.0-1 summarizes the COPCs evaluated in the risk assessment for each SWMU and AOC. Appendix B summarizes the COPCs selection process and provides a complete data summary. The COPCs presented in Appendix B may be slightly different then those summarized in Table H-2.0-1 because of the depth intervals used in the risk screening assessments (i.e., Appendix B is based on total depth analyzed). For example, iron was retained as a COPC in Appendix B because it was above BV in some tuff samples. However, it was not above BV in the 0–10-ft-depth interval and is therefore not assessed for risk in this appendix. Calcium, magnesium, potassium, and sodium are essential nutrients and are within or only slightly above the background concentrations (within 2 times the BVs or the maximum background concentrations), with the exception of calcium in one sample. Calcium exceeded the Qbt 3 background in one sample by approximately a factor of 3. All of the essential nutrients are eliminated from the risk evaluation because they are present at concentrations only slightly above naturally occurring levels (EPA 1989, 008021).

The area of elevated radioactivity identified in the 2006 radiological walkover survey in the area of borehole location 21-02523 was not evaluated in the risk assessments for Consolidated Unit 21-018(a)-99; it is expected that the removal action will effectively remove residual radiological contamination in this area (to concentrations that will not pose unacceptable risk). The results of the removal action will be presented in a supplemental Consolidated Unit 21-018(a)-99 investigation report.

H-3.0 CONCEPTUAL SITE MODEL

H-3.1 Receptors and Exposure Pathways

The current and future land use within Consolidated Unit 21-018(a)-99 is industrial. However, the primary objective of remediation activities performed in 2005 and 2006 was to remove infrastructure and environmental media with concentrations of COPCs exceeding residential screening action levels (SALs)

for radionuclide COPCs or soil screening levels (SSLs) for inorganic and organic COPCs. Therefore, a residential exposure was evaluated as the primary decision scenario for the risk assessment.

The potential pathways for human exposure to surface soil and tuff are dermal contact, inhalation of vapors or fugitive dust, incidental soil ingestion, and external irradiation. Pathways from subsurface contamination to potential human receptors are complete only if contaminated soil or tuff is excavated and brought to the surface. The potential pathways are similar to those of a surface soil release (i.e., dermal contact, inhalation of vapors or fugitive dust, incidental soil ingestion, and external irradiation). Surface water is not evaluated in the human health screening assessment because no perennial surface water exists at the site.

For ecological receptors, pathways from subsurface contamination to potential surface-dwelling animals are complete only if contaminated soil or tuff is excavated and brought to the surface. The potential pathways are similar to those of a surface soil release (i.e., dermal contact, inhalation of vapors or fugitive dust, incidental ingestion of soil, uptake by plants, food web transport, and external irradiation). Pathways from subsurface releases may be complete for plants. Surface water is not evaluated in the ecological screening assessment because no perennial surface water exists at the site.

Weathering of tuff is the only viable natural process that may result in the exposure of receptors to COPCs in tuff; because of the slow rate of weathering expected for tuff, exposure to COPCs in tuff is negligible, although it is included in the assessments.

For the human health risk evaluation, a 0- to 10-ft-depth interval is used to assess human health risk under a residential scenario. A 0- to 5-ft-depth interval is used to assess risk to terrestrial ecological receptors. All soil and tuff samples from these depth intervals are included in the assessments.

The potential exposure pathways for the human health and ecological receptors are presented in the CSM diagram (Figure H-3.1-1).

H-3.2 Transport Pathways

The primary mechanisms of contaminant release from Consolidated Unit 21-018(a)-99 are related to the historical operations and releases discussed in section H-1.3. Surface and subsurface soil and tuff are the media of concern at the site.

Downward migration of contaminants in the vadose zone is limited by a lack of hydrostatic pressure. The lack of saturated conditions in the area restricts both horizontal and vertical migration. No perched aquifers have been identified in the area of Consolidated Unit 21-018(a)-99, nor are there springs or seeps nearby that would indicate the presence of perched aquifers. A complete pathway to the groundwater, including the regional aquifer, which is located approximately 1300 ft (396 m) below ground surface (bgs) from the mesa top, is unlikely. The evaluation of transport properties and mobility of each COPC, including potential impact to groundwater is discussed in section H-3.0. In addition, pore-gas samples screened to evaluate whether concentrations of volatile organic compounds (VOCs) in the subsurface pore gas are of concern as a potential source of groundwater contamination is addressed in section H-3.4. No permanent surface water exists at Consolidated Unit 21-018(a)-99. Occasional surface water runoff occurs as a result of usually brief, but often intense, seasonal thunderstorms that can produce significant rainfall in short time periods. Runoff may be generated during the winter as a result of snowmelt. Runoff from the narrow mesa top may contribute small amounts of flow to surface runoff on the slope. Surface runoff on the Consolidated Unit 21-018(a)-99 slope is most likely to occur as channelized flow in moderately steep and incised drainage channels.

Diffusion of vapor-phase and volatile contaminants is a natural extension of the gas-phase release mechanism. VOCs in the vapor phase move from higher to lower concentrations. The surface and the underlying Cerros del Rio basalts serve as "zero concentration" boundaries or infinite sinks for VOCs. Transport through the media may result strictly from diffusion or may include an advective component as well. For example, barometric conditions (involving alternating periods of high and low pressure) may affect the rate of subsurface VOC migration to the surface or basalt. Contaminants transported to the surface diffuse directly into the atmosphere.

H-3.3 Environmental Fate and Transport

The evaluation of environmental fate addresses the chemical processes affecting the persistence of a chemical in the environment, and the evaluation of transport addresses the physical processes affecting mobility along a migration pathway. Transport through soil and tuff depends on soil pH, the precipitation or snowmelt, soil moisture, and soil hydraulic properties. Joints and fractures in the tuff may provide additional pathways for moisture and chemicals to enter the subsurface.

Consolidated Unit 21-018(a)-99 lies on a dry mesa top, approximately 1300 ft above the regional aquifer. Saturated conditions currently do not exist in the soil and tuff beneath Consolidated Unit 21-018(a)-99. Current measurements of the gravimetric water content in the upper 75 ft of the soil column indicate that soil on the mesa is relatively dry, and no evidence of a saturated subsurface zone has been found. Downward migration in the vadose zone is also limited by the lack of both hydrostatic pressure and a source for the continued release of contamination.

The nature and extent of contamination at Consolidated Unit 21-018(a)-99 have been defined (Appendix B). The results from the deepest samples collected showed either no detected concentrations of COPCs or low/trace level concentrations of only a few inorganic, radionuclide, and/or organic COPCs in tuff. Also, no source(s) continues to release contamination into the subsurface beneath the site. Because the vertical extent of contamination has been defined for Consolidated Unit 21-018(a)-99, it is apparent that no migration to groundwater has occurred. The limited extent of contamination is related to the absence of the key factors that contribute to migration, as discussed above.

Inorganic Chemicals

The physical and chemical factors that determine the distribution of inorganic COPCs within the soil and tuff at Consolidated Unit 21-018(a)-99 are the soil-water partition coefficient (K_d) of the inorganic chemicals, the pH of the soil, soil characteristics (such as sand or clay content), and redox potential. The interaction of these factors is complex, but the K_d values can provide a general assessment of the potential for migration through the subsurface: chemicals with higher K_d values are less likely to be mobile that those with lower ones. Table H-3.3-1 presents the K_d values for the inorganic COPCs at Consolidated Unit 21-018(a)-99 (NMED 2006, 092513); these values match the K_d values recommended by EPA for the default pH of 6.8 for evaluation of Superfund sites (EPA 1996, 059902) and represent conservative values applicable to a wide range of sites. Chemicals with K_d values greater than 40 are not likely to migrate through soil towards the water table (Kincaid et al. 1998, 093270). Based on this K_d criterion, aluminum, antimony, barium, beryllium, cadmium, cobalt, chromium, lead, mercury, nickel, thallium, vanadium, and zinc have a very low potential for migration to groundwater at Consolidated Unit 21-018(a)-99. The K_d values were not available for lithium, perchlorate, and uranium. Lithium was only analyzed for in three samples, the concentrations detected are probably naturally occurring levels, and its extent was defined (Appendix B).

The K_d values for arsenic, copper, cyanide, iron, manganese, selenium, silver, and strontium given in Table H-3.3-1 indicate that these inorganic chemicals are relatively immobile in soil. Other factors, besides the K_d values, such as speciation in soil and oxidation/reduction potential (Eh) potential, also play a role in the likelihood that inorganic chemicals will migrate. Information about the fate and transport properties of inorganic chemicals was obtained from individual chemical profiles published by the Agency for Toxic Substances and Disease Registry (ATSDR) (ATSDR 1997, 056531). The information for these inorganic chemicals is also available from the ATSDR website at http://www.atsdr.cdc.gov/toxprofiles.

Because many arsenic compounds tend to partition to soil or sediment under oxidizing conditions, leaching usually does not result in the transport of arsenic to any great depth. Most copper deposited in soil is strongly adsorbed and remains in the upper few centimeters of soil. In general, the copper adsorbs to organic matter, carbonate minerals, clay minerals, or hydrous iron and manganese oxides. The soil at Consolidated Unit 21-018(a)-99 is close to neutral pH and does not exhibit a high rate of leaching for copper. Selenium is not often found in the environment in its elemental form but is usually combined with sulfide minerals or with silver, copper, lead, and nickel minerals. In soil, pH and Eh are determining factors in the transport and partitioning of selenium. In soil with a pH of greater than 7.5, selenates, which have high solubility and a low tendency to adsorb onto soil particles, are the major selenium species and are very mobile. The soil pH at Consolidated Unit 21-018(a)-99 is much lower than 7.5, which indicates that selenium is not likely to migrate in this soil. Iron is naturally occurring in soil and tuff and may be relatively mobile under reducing conditions. The extent of iron is defined and migration to groundwater has not occurred. Silver sorbs onto soil and sediments and tends to form complexes with inorganic chemicals and humic substances in soils. The presence of organic matter complexes with silver reduces its mobility. Silver compounds tend to leach from well-drained soil so that it may potentially migrate into the subsurface. However, the extent of silver is defined at depth, and migration to groundwater has not occurred. For strontium, a major portion of stable and radioactive strontium in soil dissolves in water, so it might move deeper into the subsurface. However, the K_d value of 35 indicates that strontium is unlikely to readily migrate in the subsurface. Cyanide, perchlorate, and nitrate are soluble in water and may migrate with water molecules in saturated soil. The extent of cyanide, perchlorate and nitrate has been defined; cyanide and nitrate were not detected in the deepest samples from any of the boreholes and perchlorate, if detected, was at trace concentrations (less than µg/kg levels). In addition, the subsurface of Consolidated Unit 21-018(a)-99 has a low moisture content, which causes cyanide, nitrate, and perchlorate to be relatively immobile.

For manganese, two mechanisms are involved in explaining the retention by soil of manganese in the environment. First, through cation exchange reactions, manganese ions and the charged surface of soil particles form manganese oxides, hydroxides, and oxyhydroxides, which, in turn, form adsorption sites for other metals. Second, manganese can be adsorbed to other oxides, hydroxides, and oxyhydroxides through ligand exchange reactions. When the soil solution becomes saturated, these manganese oxides, hydroxides, and oxyhydroxides can precipitate into a new mineral phase and act as a new surface to which other substances can adsorb. The extent of manganese is defined at depth, and manganese was not above BV in the deepest borehole samples.

The mobility of uranium in soil depends on the properties of the soil such as pH, oxidation-reduction potential, concentration of complexing anions, porosity of the soil, soil particle size, and sorption properties, as well as the amount of water available. Retention of uranium by the soil may be the result of adsorption, chemisorption, ion exchange, or a combination of mechanisms. Any soil property that alters the sorption mechanism also alters the mobility of uranium in the soil. The sorption of uranium in most soils is such that it does not leach readily, particularly in soils containing clay and iron oxide. The extent of uranium is defined at depth, and uranium was not substantially above BV in the deepest borehole samples.

Radionuclides

For radionuclides, an examination of K_d values also provides an assessment of whether a radionuclide is likely to be mobile in the subsurface at Consolidated Unit 21-018(a)-99. The K_d values for radionuclide COPCs at Consolidated Unit 21-018(a)-99 presented in Table H-3.3-2 are from the Superfund chemical data matrix (EPA 1996, 064708). Radionuclides with K_d values greater than 40 are very unlikely to migrate to groundwater (Kincaid et al. 1998, 093270). Based on K_d values, americium-241, cesium-134, cesium-137, plutonium-238, and plutonium-239 have a very low potential to migrate towards groundwater at Consolidated Unit 21-018(a)-99.

For sodium-22, no K_d was available. However, sodium-22 was only detected in a single surface soil sample. The extent of sodium-22 is defined, and no potential for migration to groundwater exists. A major portion of stable and radioactive strontium in soil dissolves in water, so it might move deeper into the subsurface. However, the K_d value of 35 indicates that strontium-90 is relatively immobile in the subsurface. Strontium-90 was not detected at depth (below 75 ft), and the extent is defined.

Tritium's initial behavior in the environment is determined by the source. If it is released as a gas or vapor to the atmosphere, substantial dispersion can be expected, and the rapidity of deposition is dependent on climatic factors. If tritium is released in liquid form, it is diluted in surface water and is subject to physical dispersion, percolation, and evaporation (Whicker and Schultz 1982, 058209, p. 147). Tritium concentrations in the subsurface at Consolidated Unit 21-018(a)-99 are low (< 1 pCi/g) indicating that Consolidated Unit 21-018(a)-99 is not a significant source of tritium, although this radionuclide is relatively mobile. Because tritium migrates in association with moisture, the low moisture content of the subsurface limits the potential for tritium to migrate to groundwater.

Natural uranium is primarily a mixture of three isotopes: uranium-234, uranium-235, and uranium- 238. All three isotopes behave the same chemically, but they are different radioactive materials with different radioactive properties. The half-lives of uranium isotopes are very long (244,000 yr for uranium-234; 710 million yr for uranium-235; and 4.5 billion yr for uranium-238). Uranium-234, uranium-235, and uranium 238 were detected above BVs in tuff at Consolidated Unit 21-018(a)-99 and generally demonstrated decreasing concentrations with depth. The extent of uranium-234, uranium-235, and uranium 238 is defined, and these radionuclides were either not detected above BV or were slightly above BV in the deepest borehole samples. Therefore, isotopic uranium is present at naturally occurring levels at depth and is not migrating to groundwater.

Organic Chemicals

Table H-3.3-3 presents the physical and chemical properties (organic carbon-water partition coefficient [K_{oc}], logarithm to the base octanol/water partition coefficient [log K_{ow}], and solubility) of the organic COPCs at Consolidated Unit 21-018(a)-99. The physical and chemical properties of organic chemicals are important when evaluating fate and transport. The K_{oc} and solubility values were obtained from either Table B-1 of NMED guidance (NMED 2006, 092513), EPA Region 6 (EPA 2005, 091002), or Risk Assessment Information System (RAIS) database (http://rais.ornl.gov/). Log K_{ow} values were obtained from the RAIS database. Other information is presented to illustrate some aspects of the fate and transport tendencies of the COPCs (Ney 1995, 058210).

Water solubility is an important chemical characteristic to indicate the mobility of organic chemicals. The higher the water solubility of a chemical, the more likely it is to be mobile and the less likely it is to accumulate, bioaccumulate, volatilize, or persist in the environment. A highly soluble chemical (water

solubility greater than 1000 mg/L) is prone to biodegradation and metabolism that may detoxify the parent chemical. Benzoic acid, 3-nitroaniline, and pentachlorophenol have solubilities greater than 1000 mg/L.

The remaining organic COPCs at Consolidated Unit 21-018(a)-99 (except acenaphthylene, 2-chloronaphthalene, di-n-butlyphthalate, 2-methylnaphthalene, and naphthalene) have solubilities of less than 10 mg/L (i.e., these COPCs are relatively insoluble). Acenaphthylene, 2-chloronaphthalene, di-n-butlyphthalate, 2-methylnaphthalene, and naphthalene are relatively soluble, but none of these chemicals was detected in the tuff, with the exception of di-n-butylphthalate detected in a single sample. The lower the water solubility of a chemical (especially less than 10 mg/L), the more likely it will be immobilized by adsorption. Chemicals with lower water solubilities tend to be more likely to accumulate or bioaccumulate and persist in the environment, are slightly prone to biodegradation, and may be metabolized in plants and animals.

Chemicals with high vapor pressures (>0.01 mmHg) are likely to volatilize and therefore their concentrations at the site are reduced over time; vapors of these chemicals are more likely to travel toward the atmosphere and not migrate towards groundwater. Naphthalene is likely to volatilize because it has a vapor pressure greater than 0.01 mmHg.

The soil K_{oc} measures the tendency of a chemical to adsorb to organic carbon in soil. K_{oc} values greater than 500 cm^3/g indicate a strong tendency to adsorb to soil (NMED 2006, 092513). Table H-3.3-3 provides the K_{oc} values for organic COPCs at Consolidated Unit 21-018(a)-99. Only two COPCs have K_{oc} values less than 500 cm^3/g: benzoic acid and 3-nitroaniline.

Table H-3.3-3 shows the log K_{ow} for organic COPCs at Consolidated Unit 21-018(a)-99. With the exception of benzoic acid and 3-nitroaniline, all the chemicals have a log K_{ow} greater than 3; indicating that most of the organic COPCs likely sorb to soil and are relatively immobile. Benzoic acid and 3-nitroaniline are confined to soil/fill (benzoic acid was not detected below 3 ft, and 3-nitroanilina was detected in one sample at 3–4 ft), both organic chemicals were not detected in tuff, and extent has been defined. Therefore, based on the limited extent, benzoic acid and 3-nitroaniline have a very low potential to migrate to groundwater.

Summary

Saturation is the primary factor in determining the potential for COPCs to migrate to groundwater. Based on investigation results, saturated conditions are not present within Consolidated Unit 21-018(a)-99 site. Downward migration in the vadose zone is also limited by the lack of both hydrostatic pressure and a source for the continued release of contamination. Without sufficient moisture and a source, little or no potential migration of materials can occur through the vadose zone to groundwater.

The nature and extent of contamination at Consolidated Unit 21-018(a)-99 is defined, and no source(s) continues to release contamination into the subsurface beneath the site. The lack of saturated conditions and hydrostatic pressure severely limits the movement of contamination toward groundwater at Consolidated Unit 21-018(a)-99. The relative solubilities and/or the partitioning properties also limit the mobility of the COPCs at Consolidated Unit 21-018(a)-99. As a result, the potential for COPC migration to groundwater is very low, based on the site conditions, the physical and chemical properties of the COPCs, the distance to the regional aquifer below the site, and the absence of a source for continued releases into the subsurface.

H-3.4 Evaluation of Pore-Gas Screening Levels

The VOC results from pore-gas sampling were screened to evaluate whether concentrations in the subsurface pore gas are of concern as a potential source of groundwater contamination. Because no screening levels for pore gas that address the potential for groundwater contamination are available, the screening evaluation is based on groundwater cleanup levels contained in the Compliance Order on Consent (the Consent Order) and Henry's Law Constants that describe the equilibrium relationship between vapor and water concentrations. The source of the Henry's Law Constants was the NMED guidance (NMED 2006, 092513). If Henry's Law Constants were not available from this source, they were obtained from the Pennsylvania Department of Environmental Protection chemical and physical properties database (http://www.dep.state.pa.us/physicalproperties/Default.htm). The following dimensionless form of Henry's Law Constant was used:

$$H' = \frac{C_{air}}{C_{water}} \qquad \textbf{Equation 1}$$

where C_{air} is the volumetric concentration of contaminant in air and C_{water} is the volumetric concentration of contaminant in water. Equation 1 can be used to calculate the following screening value:

$$SV = \frac{C_{air}}{1000 \times H' \times SL} \qquad \textbf{Equation 2}$$

where C_{air} is the concentration of VOC in the pore-gas sample (µg/m^3), H' is the dimensionless Henry's Law Constant, SL is the screening level (µg/L) and 1000 is a conversion factor from L to m^3. The screening levels are groundwater cleanup levels specified in the Consent Order. These are the EPA maximum contaminant level (MCL) or New Mexico Water Quality Control Commission (NMWQCC) groundwater standard, whichever is lower. As specified in the Consent Order, if no MCL or NMWQCC standard exists, the EPA Region 6 tap water screening level is used (adjusted to 10^{-5} risk for carcinogens). The numerator in Equation 2 is the actual concentration of VOC in pore gas, and the denominator represents the concentration in pore gas that would be necessary to exceed the screening level. Therefore, if screening value is less than 1, the concentration of VOCs in pore gas would not be sufficiently high to cause the water screening level to be exceeded, even if the VOC plume were in contact with groundwater.

Equation 2 was used to screen the maximum concentrations of VOCs detected in pore-gas samples from the investigation at MDA V. As shown in Table H-3.4-1, 34 VOCs having MCLs, NMWQCC standards, or tap water screening levels were detected at MDA V. These results show that the screening value is less than 1 in all cases, with the exception of the screening value for 1,4-dioxane (1.11), which slightly exceeds 1. The chemical 1,4-dioxane was detected in borehole location 21-24531 from 14–15 ft bgs in August 2005. No 1,4-dioxane was detected in the lower depth interval sampled at 51–52 ft bgs, and no other detections of 1,4-dioxane occurred. Borehole location 21-24531 was resampled in June 2006, and no 1,4-dioxane was detected. The results of this screening indicate that VOCs in subsurface pore gas at MDA V are not a potential source of groundwater contamination.

H-3.5 Exposure Point Concentration Calculations

An exposure point concentration was calculated for each COPC. The exposure point concentration used in the risk screening assessments is the 95% upper confidence limit (UCL) of the arithmetic mean or maximum detected concentration for each COPC. The 95% UCL of each COPC in soil and tuff was

calculated according to EPA guidance (EPA 2002, 085640). A separate exposure point concentration was determined for each COPC from 0–10 ft (residential receptor) and 0–5 ft (ecological receptors).

Tests were performed using EPA ProUCL (EPA 2004, 090033) to select the statistical distribution and related parameters that describe each data set. These tests determine whether a normal, lognormal, or nonparametric distribution should be used to describe the data sets and ensure that the assumptions inherent in the UCL calculations are valid.

ProUCL computes a (1-α) 100% UCL of the population mean using a variety of methods. The following procedures were used in the derivation of 95% UCL exposure point concentrations (depending on the distribution test results):

- Student's-t-statistical procedure—normal distributions
- Chebyshev (mean, standard deviation) procedure—nonparametric distributions
- H-UCL procedure—lognormal distributions

The Student's-t statistic, t, is given by

$$t = \frac{\bar{x} - \mu_1}{s_x / \sqrt{n}}, \qquad \textbf{Equation 3}$$

where $\bar{x}$ = Sample mean

s_x = Sample standard deviation

μ_1 = Population mean

n = Number of samples.

If the data are a random sample from a normal population with mean, μ_1, and standard deviation, σ_1, then the distribution of this statistic is the Student's-t distribution with n-1 degrees of freedom; $t_{\alpha, n-1}$ is the upper α quantile of the Student's-t distribution with n-1 degrees of freedom.

A (1-α) 100% UCL of the population mean, μ_1, is given by

$$UCL = \bar{x} + t_{\alpha, n-1} s_x / \sqrt{n}. \qquad \textbf{Equation 4}$$

For a normally distributed population (when the skew is about 0), the Student's-t-statistic provides the best way of computing a 95% UCL concentration.

The Chebyshev (1-α)100% UCL of the population mean is calculated using the following equation (nonparametric distributions):

$$UCL = \bar{x} + \sqrt{((1/\alpha) - 1) s_x} / \sqrt{n} \qquad \textbf{Equation 5}$$

where x = Sample mean

s_x = Sample standard deviation

n = Number of samples

α − 1 = Confidence coefficient.

Because this method requires no distributional assumptions about the data, this procedure is nonparametric and may be used as an estimate of the UCL of the population mean when data are neither normal nor lognormal, especially when the standard deviation (or its estimate) approach and exceed 1.5 (EPA 2004, 090033).

For skewed data sets, there is no one way to compute a UCL of the population mean. For lognormal distributions, the skew is a function of the standard deviation, and recommendations for the computation of the UCL of the population mean based upon the standard deviation are provided in the ProUCL output. These recommendations include using the UCL calculated by one of the following methods: Student's-t test, Chebyshev (mean, standard deviation), Land's based on the H-statistic (H-UCL), or the Chebyshev (minimum variance unbiased estimate) (EPA 2004, 090033). For the lognormal distributions at this site, all recommended distributions were based on the H-statistic. The Student's t and Chebyshev (mean, standard deviation) calculation procedures are described above.

The H-UCL is calculated using the following equation:

$$UCL = \exp(\bar{x} + 0.5 s_x^2 + s_x H_{1-\alpha} / \sqrt{(n-1)})$$

Equation 6

where H 1- α = H-statistic for the given confidence level.

The results of the distribution testing of the combined soil and tuff data at Consolidated Unit 21-018(a)-99 are shown in Tables H-3.5-1 through H-3.5-3 for the human health evaluations and Table H-3.5-4 for the ecological risk evaluation. One-half of the detection limit was substituted as the concentration of the COPC in all statistical calculations for nondetects (EPA 1989, 008021). The maximum detected concentrations were used as the exposure point concentration if too few samples were available to calculate a 95% UCL (i.e., the 95% UCL exceeded the maximum concentration).

H-4.0 HUMAN HEALTH RISK SCREENING ASSESSMENT

A human health risk screening assessment was conducted to determine whether COPC concentrations in soil and tuff at Consolidated Unit 21-018(a)-99 might pose a potential unacceptable risk to human receptors. The assessment assumes residential land use to support corrective action decisions at the Consolidated Unit 21-018(a)-99.

H-4.1 Screening Evaluation

The human health risk screening assessment compares COPC concentrations with SSLs for chemicals and SALs for radionuclides. The comparison is based on the 95% UCL of the mean concentration or the maximum detected concentration of each COPC at each of the three areas evaluated at Consolidated Unit 21-018(a)-99.

The SSL comparison is presented separately for noncarcinogenic chemicals, carcinogenic chemicals, and radionuclides. SSLs for noncarcinogens are based on a hazard quotient (HQ) of 1.0; SSLs for carcinogens are based on a target cancer risk of 10^{-5}. Cumulative cancer risk and a hazard index (HI) are provided for each area evaluated. The ratio of each COPC exposure, calculated as the 95% UCL concentration or maximum detected concentration divided by the respective SSL, is the HQ; the sum of all HQs is the HI. The residential chemical SSLs are from NMED guidance (NMED 2006, 092513), but if NMED does not have an SSL for a chemical, EPA Region 6 guidance (EPA 2005, 091002) or Region 9 values (http://www.epa.gov/region09/waste/sfund/prg/) are used, adjusted to 10^{-5} risk for carcinogens. The SALs for radionuclides are based on a dose of 15 mrem/yr and are derived according to the

"Derivation and Use of Radionuclide Screening Action Levels, Revision 1" (LANL 2005, 088493) using RESRAD (residual radioactive material [computer code]), Version 6.21.

The parameters used to derive the residential SSLs for chemicals are presented in Table H-4.1-1. The parameters used to derive the residential SALs for radionuclides are presented in Table H-4.1-2.

SWMUs 21-018(a) and SWMU 21-018(b)

For SWMUs 21-018(a) and 21-018(b), the exposure point concentrations for carcinogenic COPCs do not exceed the respective residential SSLs (Table H-4.1-3). The total estimated excess cancer risk is approximately 1×10^{-5}, with arsenic contributing most of the cancer risk (approximately 83%). The cancer risk is therefore equivalent to NMED's target level of 1×10^{-5} (NMED 2006, 092513). The exposure point concentrations for the noncarcinogenic COPCs also do not exceed the respective residential SSLs (Table H-4.1-4). The HI for SWMUs 21-018(a) and 21-018(b) is 0.9, which is less than the NMED target level of an HI of 1.0 (NMED 2006, 092513). The total dose is 1.6 mrem/yr (Table H-4.1-5), which is less than DOE's target level of 15 mrem/yr (DOE 2000, 067489).

SWMU 21-013(b) and AOC 21-013(g)

For SWMU 21-013(b) and AOC 21-013(g), the exposure point concentrations for carcinogenic COPCs do not exceed the respective residential SSLs (Table H-4.1-6). The total estimated excess cancer risk is approximately 1×10^{-5}, with arsenic contributing the majority of the cancer risk (approximately 72%). The cancer risk is therefore equivalent to NMED's target level of 1×10^{-5} (NMED 2006, 092513). The HI is approximately 2.0, with uranium contributing the majority of the risk (approximately 85%) (Table H-4.1-7), which is slightly above NMED's target levels of an HI of 1.0 (NMED 2006, 092513). The total dose is 3.0 mrem/yr (Table H-4.1-8), which is less than DOE's target level of 15 mrem/yr (DOE 2000, 067489).

In May 2007, eight additional surface and near-surface samples were collected and analyzed for semivolatile organic compounds (SVOCs) in the northwest area of the hillslope to determine if benzo(a)anthracene is below the SSL and to confirm the effectiveness of a small removal action at and downgradient from location 21-24650. Benzo(a)anthracene was not detected, and of those detected, none of the maximum concentrations in the 2007 samples exceed their respective residential SSLs (Table H-4.1-9), indicating that the removal action at location 21-24650 was successful. The 2007 data are compared to the 2005–2006 data in Table H-4.1-9; none of the 2007 maximum detected concentrations exceed the 2005–2006 95% UCLs, except for benzo(b)fluoranthene (0.708 mg/kg), which is well below the SSL (6.21 mg/kg).

SWMU 21-023(c)

For SWMU 21-023(c), the exposure point concentrations for carcinogenic COPCs do not exceed the respective residential SSLs (Table H-4.1-10). The total estimated excess cancer risk is approximately 9×10^{-6}, which is less than NMED's target level of 1×10^{-5} (NMED 2006, 092513). The exposure point concentrations for the noncarcinogenic COPCs also do not exceed the respective residential SSLs (Table H-4.1-11). The HI for SWMU 21-023(c) is 0.4, which is less than the NMED target level of an HI of 1.0 (NMED 2006, 092513). The total dose is 10.3 mrem/yr (Table H-4.1-12), which is less than DOE's target dose of 15 mrem/yr (DOE 2000, 067489).

H-4.2 Evaluation of Pore Gas Vapor Intrusion, Indoor-Air Pathway

A residential risk screening evaluation was conducted to determine whether organic chemicals detected in soil pore gas at Consolidated Unit 21-018(a)-99 might pose a potential unacceptable risk to receptors via an indoor-air vapor intrusion pathway. The assessment assumes future residential land use to support corrective action decisions at Consolidated Unit 21-018(a)-99. COPCs in soil pore gas are determined in Appendix B. This risk screening assessment was conducted in two phases following the "OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)" (EPA 2002, 094114). The first phase compares concentrations of soil pore gas COPCs to the respective screening levels. The second phase is a site-specific assessment evaluation using the Johnson and Ettinger model for subsurface vapor intrusion into buildings for the COPCs with soil pore gas concentrations exceeding one-tenth the respective screening levels (EPA 2002, 094114).

H-4.2.1 Pore Gas Screening Evaluation

The risk screening assessment compares concentrations of soil pore gas COPCs to the respective screening levels (EPA 2002, 094114). The exposure point concentrations used in the comparison are either the 95% UCL of the mean concentration (95%UCL) or the maximum detected concentration of each COPC detected in soil pore gas at Consolidated Unit 21-018(a)-99 (the maximum detected concentration is used if the 95% UCL exceeds the maximum). Per EPA guidance (EPA 2002, 094114, Table 2b), two exposure depths are evaluated in the screening assessment:

- Shallow soil pore gas—soil pore gas samples taken at 5 ft bgs or less from the base of the building foundation, conservatively assumed to intrude into indoor air spaces with an attenuation factor of 0.1.
- Deep soil pore gas—soil pore gas samples taken at depths greater than 5 ft bgs from the base of the building foundation, conservatively assumed to intrude into indoor air spaces with an attenuation factor of 0.01.

The COPC exposure point concentrations in the shallow and deep horizons are shown in Tables H-4.2-1 and H-4.2-2, respectively. The screening evaluations for noncarcinogenic and carcinogenic chemicals are presented separately. Screening values are based on a HQ of 1.0 for noncarcinogens and a target cancer risk of 10^{-5} for carcinogens (EPA 2002, 094114, Table 2b).

As summarized in Table H-4.2-3, the exposure point concentrations for carcinogenic COPCs exceed one-tenth the respective residential vapor intrusion screening levels for benzene, carbon tetrachloride, chloroform, tetrachloroethene, and trichloroethene in the shallow soil pore gas horizon; and chloroform and trichloroethene in the deep soil pore gas horizon. None of the noncarcinogenic COPC exposure point concentrations exceed one-tenth the respective residential screening levels (Table H-4.2-3). Benzene, carbon tetrachloride, chloroform, tetrachloroethene, and trichloroethene are retained as COPCs for further evaluation using the Johnson and Ettinger model (EPA 2002, 094114). Site-specific information was used in the model, where available.

H-4.2.2 Johnson and Ettinger Model for Subsurface Vapor Intrusion

Phase two of the screening evaluation is a site-specific assessment that may include one or more of the following (EPA 2002, 094114):

- Direct measurement of building foundation air concentrations,
- Direct measurement of indoor air concentrations after removal of potential indoor air sources, or
- Site-specific mathematical modeling, such as the Johnson and Ettinger model.

Consolidated Unit 21-018(a)-99 has no on-site buildings within which direct measurements can be taken. Therefore, site-specific mathematical modeling is the only approach that can be used to evaluate potential risk to residential receptors from COPCs in soil pore gas at the site.

The Johnson and Ettinger model was used to evaluate soil pore gas COPCs with exposure point concentrations exceeding the one-tenth the respective screening levels: benzene, carbon tetrachloride, chloroform, tetrachloroethene, and trichloroethene for the shallow soil pore gas horizon; and chloroform, and trichloroethene for the deep soil pore gas horizon.

Three Johnson and Ettinger model site condition assumptions were evaluated; two for the shallow horizon and one for the deep horizon. The first model site condition assumes that soil pore gas exposure point concentrations are at the shallowest sampling depth and the soil between the slab and sample depth is clean fill. This conservatively estimates potential risk because a large portion of Consolidated Unit 21-018(a)-99 has been remediated, and therefore, the surface soil is clean fill. The second model site condition assumes that the soil pore gas exposure point concentrations represent the entire horizon (i.e., COPCs at the exposure point concentration are in contact with the building foundation). For the deep horizon, the model site condition assumes that soil pore gas exposure point concentrations represent the entire deep horizon between 5 and 100 ft bgs (the shallowest soil pore gas sample within this horizon is 11 ft bgs).

For all evaluations, default input parameters are used in the calculations, with the exception of the following:

- Total porosity of 54.3%, based on data from the shallowest available sampling depth (8 ft bgs) at the site.
- Bulk density of 1.21 g/cm^3, based on data from the shallowest available sampling depth (8 ft bgs) at the site.
- Water-filled porosity of 0.26 cm^3/cm^3, based on NMED guidance (NMED 2006, 092513).

The model results are summarized in Table H-4.2-4. All of the evaluated COPCs are carcinogens, and therefore, HQ and HI values are not calculated. The cumulative cancer risk is approximately 1×10^{-6} and 5×10^{-6}, respectively, for the two shallow soil pore-gas model site conditions summarized above. For the deep soil pore gas, the cumulative cancer risk is approximately 2×10^{-6}. Thus, the calculated risk for Consolidated Unit 21-018(a)-99 potential future residential vapor intrusion is less than the NMED target level of 1×10^{-5} (NMED 2006, 092513) for both the shallow and deep pore gas model site conditions.

H-4.3 Uncertainty Analysis

The analyses presented in human health risk screening assessments are subject to varying degrees and types of uncertainty. Aspects of data evaluation and COPC identification, exposure assessment, toxicity

assessment, and the additive approach all contribute to uncertainties in the risk assessment process. Uncertainties associated with the potential risk from vapor intrusion to indoor air are also discussed.

H-4.3.1 Data Evaluation and COPC Identification Process

A primary uncertainty associated with the COPC identification process is the possibility that a chemical may be inappropriately identified as a COPC. It is unlikely that inorganic chemicals were inappropriately excluded as COPCs because the only inorganic chemicals excluded were those with concentrations determined to be less than the background value (BV) or within the range of background concentrations (LANL 1998, 059730). Organic chemicals were appropriately excluded as COPCs because all detected organic chemicals were retained for analysis.

Uncertainties associated with the inorganic and organic chemicals and radionuclide data include sampling errors, laboratory analysis errors, and data analysis errors. For Consolidated Unit 21-018(a)-99, these uncertainties have no effect on the results, although many detected concentrations of organic COPCs were J-qualified, indicating the values were less than estimated quantitation limits and could only be estimated.

Borehole samples collected at Consolidated Unit 21-018(a)-99 in 1993/1994 were analyzed for total uranium by kinetic phosphoresence analysis (KPA) and uranium-235 by gamma spectroscopy. These samples were not analyzed for isotopic uranium by alpha spectroscopy (gamma spectroscopy results for uranium-235 are known to be biased high relative to alpha spectroscopy data).

Two total uranium results from borehole location 21-02517, drilled in 1994 and located on the mesa top immediately south of the MDA V boundary and approximately 25 ft north of the BV Canyon slope, were significantly elevated relative to the BV of 2.4 mg/kg for Qbt 3 (LANL 1998, 059730). The total uranium result in the sample collected from 2.5 to 5 ft bgs (sample AAA7568) at this location is 132 mg/kg, which is over 50 times the BV. The uranium-235 gamma spectroscopy result for the same sample is 0.18 mg/kg, which is approximately twice the Qbt 3 BV of 0.09 pCi/g. The elevated total uranium result in the sample collected from 25 to 30 ft bgs (sample AAA7575) at location 21-02517 is 66.1 mg/kg, which is nearly 30 times the BV; uranium-235 was not detected above BV in this sample. The equivalent isotopic uranium levels in the samples with elevated total uranium concentrations are.44 pCi/g (uranium-234), 2.03 pCi/g (uranium-235), and 44 pCi/g (uranium-238) for sample AAA7568, and 22 pCi/g (uranium-234), 1.01 pCi/g (uranium-235), and 22 pCi/g (uranium-238) for sample AAA7575.

In 1996, a sample from the 25–30-ft-depth interval of borehole location 21-02517 was collected from archived core and analyzed for isotopic uranium. Uranium-234 was reported at 0.61 pCi/g; uranium-235 was reported at 0.049 pCi/g; and uranium-238 was reported at 0.665 pCi/g, which are below their respective Qbt 3 BVs (1.98 pCi/g; 0.09 pCi/g; 1.93 pCi/g, respectively). The estimated isotopic uranium concentrations presented above are substantially higher (1 to 2 orders of magnitude difference) than the isotopic uranium results (1996) for AAA7575 and the uranium-235 result (1994) for AAA7568. A sample was also collected from archived core from the 5–7.5-ft-depth interval (immediately below the 132 mg/kg total uranium result) and analyzed for isotopic uranium. The total uranium concentration from this depth interval in the 1994 sample was 2.3 mg/kg; in the 1996 sample, the concentrations for uranium-234, uranium-235, and uranium-238 were 0.86 pCi/g, 0.034 pCi/g, and 0.697 pCi/g, respectively. Based on the concentrations of isotopic uranium from the two samples of archived core being less than Qbt 3 BVs as well as the 1:1 ratio of uranium-234 to uranium-238, the uranium appears to be naturally occurring.

The similarity of the isotopic uranium concentrations between the two samples of archived core does not agree with the difference in total uranium concentrations between these two samples (66.1 mg/kg vs. 2.3 mg/kg; the concentrations of total uranium should be equivalent to isotopic uranium levels. The total

uranium concentrations for the two 1996 samples based on the specific activities of the isotopes are 2.09 mg/kg (5–7.5 ft) and 2.00 mg/kg (25–30 ft), which are below the uranium Qbt 2, 3, 4 BV of 2.4 mg/kg.

In addition to the disagreement between the total uranium and isotopic uranium results for borehole location 21-02517, elevated isotopic uranium results are not found in any of the surrounding sample locations. In 1996, four samples (location 21-04501, 21-04502, 21-04503, and 21-04504) were collected from within several feet of location 21-02517 at a depth of 1.5 ft, and one sample was collected in 2005 (location 21-24656) from a depth of 2 ft in the vicinity of location 21-02517 and analyzed for isotopic uranium. The sample results indicated that isotopic uranium was below BVs in each sample and was similar to what was reported in the archived core. Further, elevated isotopic uranium results were seen only in absorption bed 1, immediately adjacent to the inlet from the laundry facility.

Location 21-02517 at a depth of 2.5 to 3.75 ft was resampled in September 2006 and and the samples analyzed for total uranium using EPA SW-846 Method 3050S/6020 (inductively coupled plasma-mass spectroscopy). The analytical result for this sample is 0.564 mg/kg (Attachment H-1). This concentration is less than the uranium BV of 2.4 mg/kg for Qbt 3, and the result provides additional evidence that the 1994 sample result of 132 mg/kg for total uranium is not accurate.

Based on data analysis and the results of resampling, it appears that the total uranium analyses using KPA is not accurate and substantially overestimates the concentrations of total uranium in core at location 21-02517. Uranium concentrations should be similar to background concentrations in this area of the consolidated unit. Based on this information, the elevated total uranium result of 132 mg/kg is not representative of the core sampled at location 21-02517 and should not be included in the calculation of the HI for SWMU 21-013(b) and AOC 21-013(g). The HI without the total elevated uranium concentration (132 mg/kg) for sample ID AAA7568 is approximately 0.3 and is representative of the area.

H-4.3.2 Exposure Assessment

The following uncertainties result in a conservative (overestimation) of potential risk to human receptors from COPCs in soil and tuff at Consolidated Unit 21-018(a)-99:

- **Identification of Receptors.** The current and proposed future land use is industrial. However, the primary objective of remediation activities performed in 2005 and 2006 was to remove infrastructure and environmental media with concentrations of COPCs exceeding residential SALs for radionuclides or SSLs for inorganic and organic chemicals. Therefore, residential receptors were evaluated as the primary receptors within this risk assessment.

- **Exposure Pathways.** A number of assumptions are made relative to exposure pathways, including input parameters, whether or not a given pathway is complete, the contaminated media to which an individual may be exposed, and intake rates for different routes of exposure. In the absence of site-specific data, the exposure assumptions used were consistent with default values (NMED 2006, 092513). When several upper-bound values (as are found in NMED 2006, 092513) are combined to estimate exposure for any one pathway, the resulting risk can exceed the 99th percentile of “expected risk” and therefore can exceed the range of risk that may be reasonably expected. Also, the assumption that residual concentrations of chemicals in the tuff are available and cause exposure in the same manner as if they were in soil overestimates the potential risk to receptors.

- **Exposure Point Concentrations.** Some uncertainty is introduced in the concentration aggregation of data for estimating the exposure point concentrations. Risk from a single location

or area with relatively high COPC concentrations may overestimate exposure. The use of the 95% UCL or maximum detected concentration is intended to provide a protective, upper-bound (e.g., conservative) average of the COPC concentration at the site, which may lead to an overestimation of exposure to a COPC across the site. SWMU 21-013(b) and AOC 21-013(g) has an HI of approximately 2.0, with uranium contributing 85% of the risk. The uranium exposure point concentration is driven by a single sample with an elevated concentration in tuff at depth (132 mg/kg at a depth of 2.5–5 feet, location 21-02517); the concentration of uranium decreases to 2.3 mg/kg at 5–7.5 ft, 2.27 mgkg at 10–12.5 ft and 3.25 mg/kg at 12.5–15 ft in this borehole. In addition, as noted in the CSM (section H-3.1) exposure to COPCs in tuff is negligible (i.e., the ingestion and inhalation pathways are eliminated). Based on the above discussion, the total uranium results are not accurate and representative of uranium concentrations at this location. Therefore, the HI of 2.0 substantially overestimates the potential exposure and risk to a resident. If this isolated smple result is removed from the exposure point concentration calculation, the 95% UCL for uranium is 3.1 mg/kg, which is representative of background concentrations. Using this more representative exposure point concentration for total uranium, the HI is approximately 0.3, which does not indicate a potential unacceptable risk to human health under a residential scenario at SWMU 21-013(b) and AOC 21-013(g).

- **Similarity to Background Concentrations.** Exposure point concentrations for inorganic COPCs may be similar to background concentrations and may therefore overestimate the potential exposure and risk to a receptor. The exposure point concentration for arsenic, the primary contributor to the carcinogenic risk for the three areas evaluated for potential human health risk, is similar to background concentrations for soil and tuff. Because exposure across each site is similar to background, arsenic can be eliminated as a COPC. The risk calculations without arsenic reduce the total estimated excess cancer risks to below the NMED target level of 10^{-5} for each area (approximately 3×10^{-6} to 1×10^{-6}). Similarly, HI calculations without arsenic reduce the HIs to 0.7, 1.8, and 0.3 for the three sites evaluated.

H-4.3.3 Toxicity Assessment

The primary uncertainty associated with the SSLs is related to the derivation of toxicity values used in their calculation. Toxicity values (reference doses [RfDs] and slope factors [SFs]) were used to derive the SSLs used in this risk screening assessment (NMED 2006, 092513). Uncertainties were identified in three areas with respect to the toxicity values, as discussed in this section: extrapolation from animals to humans; extrapolation from one route of exposure to another route of exposure; and individual variability in the human population.

- **Extrapolation from Animals to Humans**. The SFs and RfDs are often determined by extrapolation from animal data to humans, which may result in uncertainties in toxicity values because differences exist in chemical absorption, metabolism, excretion, and toxic responses between animals and humans. Differences in body weight, surface area, and pharmacokinetic relationships between animals and humans are taken into account to address these uncertainties in the dose-response relationship; however, conservatism is usually incorporated into each of these steps, resulting in the overestimation of potential risk.

- **Extrapolation from One Route of Exposure to Another Route of Exposure.** The SFs and RfDs often contain extrapolations from one exposure route to another that result in additional conservatism in the risk calculations. For example, an extrapolation from the oral route to the inhalation and/or the dermal route was used in this assessment (NMED 2006, 092513), and

differences between the two exposure pathways contribute to the uncertainty in the estimation of potential risk at this site.

- **Individual Variability in the Human Population.** For noncarcinogenic effects, the degree of variability in human physical characteristics is important both in determining the risks that can be expected at low exposures and in defining the no-observed-adverse-effect level (NOAEL). The NOAEL uncertainty factor approach incorporates a 10-fold factor to reflect individual variability within the human population that can contribute to uncertainty in the risk assessment; this factor of 10 is generally considered to result in a conservative estimate of risk to noncarcinogenic COPCs.

- **COPCs without Toxicity Data.** Bromophenyl phenylether[4-] does not have any toxicity data or a surrogate that can be used in the screening assessment. This organic chemical was detected in one sample at SWMU 21-013(b) and AOC 21-013(g) at a concentration of 0.036 mg/kg, which is below the estimated quantitation limit of 0.38 mg/kg. Because it was detected infrequently and at a trace concentration, 4-bromophenyl phenylether does not impact the risk for this SWMU and AOC.

- **Use of Surrogate Chemicals.** The use of surrogates for COPCs that do not have EPA-approved or provisional toxicity values also contributes to uncertainty in risk assessment. In this assessment, surrogates were used to establish toxicity values for acenaphthylene, benzo(g,h,i) perylene, 4-chloro-3-methylphenol, chloronaphthalene, 2-methylnaphthalene, and 3-nitroaniline based on structural similarity. The overall impact of surrogates on the risk assessment is minimal because the six COPCs listed were detected at trace concentrations (less than 1 mg/kg) and the HQs were each less than 0.002.

H-4.3.4 Additive Approach

For noncarcinogens, the effects of exposure to multiple chemicals are generally not known, and possible interactions could be synergistic or antagonistic, resulting in either an overestimation or underestimation of the potential risk. Additionally, RfDs used in the risk calculations typically are not based on the same endpoints with respect to severity, effects, or target organs. Therefore, the potential for noncarcinogenic effects may be overestimated for individual COPCs that act by different mechanisms and on different target organs but are addressed additively.

H-4.3.5 Vapor Intrusion

The primary uncertainty associated with the vapor intrusion pathway is the use of the Johnson and Ettinger model (EPA 2002, 094114) to estimate the potential residential indoor air exposure and risk. Uncertainties associated with the Johnson and Ettinger input parameters are addressed in a publication by the EPA (EPA 2005, 096912), which found that the uncertainty introduced from all the input parameters in simulated cancer risk may be as much as 1285%. Additionally, the single parameter with the greatest contribution to uncertainty is the building air exchange rate which, because no buildings are at the site, cannot be calibrated or validated at Consolidated Unit 21-018(a)-99. Uncertainty analyses by the EPA (EPA 2005, 096912) lend themselves to the conclusion that potential risk from vapor intrusion is overestimated using the Johnson and Ettinger model (EPA 2002, 094114). The potential source of the soil pore gas has been removed based on the remediation of the absorption beds, and soil pore gas concentrations will decrease with time. Therefore, based on the uncertainties associated with the vapor intrusion pathway, the Johnson and Ettinger soil pore-gas evaluation overestimates the potential future residential indoor air exposure and risk at Consolidated Unit 21-018(a)-99.

H-4.4 Results of Human Health Screening Analysis

SWMUs 21-018(a) and SWMU 21-018(b)

The total estimated excess cancer risk is approximately 1×10^{-5}, with arsenic contributing most of the cancer risk (approximately 83%). Because the exposure point concentration for arsenic is similar to background concentrations, exposure across the site is equivalent to background. The total estimated excess cancer risk without arsenic is approximately 1×10^{-6}. The cancer risk for SWMUs 21-018(a) and 21-018(b) is less than or equivalent to the NMED target level of 10^{-5} (NMED 2006, 092513). The exposure point concentrations for the noncarcinogenic COPCs do not exceed the respective residential SSLs. The HI for SWMUs 21-018(a) and 21-018(b) is 0.9, which is below the NMED target level of 1.0 (NMED 2006, 092513). The total dose is 1.6 mrem/yr, which is less than DOE's target dose limit of 15 mrem/yr (DOE 2000, 067489). This dose corresponds to a radiological risk of approximately 5×10^{-6} based on a comparison with EPA radionuclide preliminary remediation goals (PRGs) for a residential receptor (http://epa-prgs.ornl.gov/radionuclides/download/rad_master_prg_table_pci.xls).

SWMU 21-013(b) and AOC 21-013(g)

The total estimated excess cancer risk is approximately 1×10^{-5}, with arsenic contributing the majority of the cancer risk (approximately 72%). Because the exposure point concentration for arsenic is similar to background concentrations, exposure across the site is equivalent to background. The total estimated excess cancer risk without arsenic is approximately 3×10^{-6}. The cancer risk for SWMU 21-013(b) and AOC 21-013(g) is less than or equivalent to the NMED target level of 10^{-5} (NMED 2006, 092513). Except for uranium, the exposure point concentrations for the noncarcinogenic COPCs also do not exceed the respective residential SSLs. The HI is approximately 2.0, with uranium contributing 85% of the risk. The uranium HQ is the result of a single sample result, which overstimates the potential exposure and risk to a resident. The HI without this uranium result is 0.3, which is below the NMED target level of 1.0 (NMED 2006, 092513). In May 2007, eight additional surface and near-surface samples were collected and analyzed for SVOCs in the northwest area of the hillslope to confirm the effectiveness of a small removal action at and downgradient from location 21-24650. Benzo(a)anthracene was not detected and the concentrations of SVOCs detected in the 2007 samples did not exceed their respective residential SSLs, indicating that the removal action at location 21-24650 was successful. The total dose is 3.0 mrem/yr, which is less than DOE's target dose limit of 15 mrem/yr (DOE 2000, 067489). This dose corresponds to a radiological risk of approximately 1×10^{-5} based on a comparison with EPA radionuclide PRGs for a residential receptor (http://epa-prgs.ornl.gov/radionuclides/download/rad_master_prg_table_pci.xls).

SWMU 21-023(c)

The total estimated excess cancer risk is approximately 9×10^{-6}, with arsenic contributing the majority of the cancer risk. The cancer risk for SWMU 21-023(c) is therefore less than the NMED target level of 10^{-5} (NMED 2006, 092513).The exposure point concentrations for the noncarcinogenic COPCs do not exceed the respective residential SSLs. The HI for SWMU 21-023(c) is 0.4, which is below the NMED target level of 1.0 (NMED 2006, 092513). The total dose is 10.3 mrem/yr, which is less than DOE's target dose limit of 15 mrem/yr (DOE 2000, 067489). This dose corresponds to a radiological risk of approximately 3×10^{-5} based on a comparison with EPA radionuclide PRGs for a residential receptor (http://epa-prgs.ornl.gov/radionuclides/download/rad_master_prg_table_pci.xls).

Pore-Gas Analysis

The human health risk assessment includes an evaluation of the potential risk to chemicals detected in pore gas via an indoor air pathway for a resident. Benzene, carbon tetrachloride, chloroform, tetrachloroethene, and trichloroethene were retained and evaluated using the Johnson and Ettinger model of indoor air exposure (EPA 2002, 094114). All the chemicals evaluated are carcinogens and, therefore, an HI was not calculated. The cumulative cancer risks do not exceed 1×10^{-5} for any of the indoor air model site conditions evaluated.

Overall, the uncertainties associated with the evaluation of COPCs at Consolidated Unit 21-018(a)-99 based on a residential scenario overestimate potential exposure and risk to human receptors. The concentrations of COPCs in soil and tuff at Consolidated Unit 21-018(a)-99 do not pose a potential unacceptable risk, hazard, or dose to human health under a residential scenario.

H-5.0 ECOLOGICAL SCREENING ASSESSMENT

An ecological screening assessment was conducted to determine whether COPCs at Consolidated Unit 21-018(a)-99 pose a potential unacceptable risk to ecological receptors. The approach used to evaluate ecological risk is described in "Screening Level Ecological Risk Assessment Methods, Revision 2" (LANL 2004, 087630) The framework for the ecological screening assessment is provided in the ecological checklist completed for this site, which summarizes the sources and mechanisms of releases at the site, including the primary impacted media and transport pathways (Figure H-3.1-1 and Attachment H-2).

H-5.1 Scoping Evaluation

The scoping evaluation establishes the breadth and focus of the ecological screening assessment. The ecological checklist (Attachment H-2) organizes existing ecological information about the site for the scoping evaluation and forms the basis for the determination of key aspects of the CSM—habitat type and quality, potential receptor exposure, and contaminant transport pathways.

Consolidated Unit 21-018(a)-99 is highly disturbed and consists primarily of bare soil and rock and/or roadways and regraded areas where demolition and removal actions have taken place. The dominant overstory vegetation type surrounding the area is ponderosa pine, with minor vegetation components of fir (white and Douglas) and piñon pine. The understory surrounding the site contains mostly native and nonnative grasses and ruderal species indicative of disturbance, with a few shrubs and forbs. The general habitat quality in undisturbed areas surrounding the site is sufficient to support grazing and foraging by terrestrial receptors. However, the habitat within the site boundary is of relatively poor quality because of significant disturbance from the removal activities conducted at the site. No threatened and endangered (T&E) species habitat is present at the site.

Surface water runoff terminates to the south/southwest of the site in BV Canyon. SWMU 21-013(b) and AOC 21-013(g) are partially located along the steep slope to, and within, the canyon. No potential for exposure to aquatic receptors exists because no persistent aquatic habitat or perennial source of water occurs in the canyon. Additionally, the depth of the regional aquifer (approximately 1300 ft bgs) and the semiarid climate provide for minimal hydrologic head and precludes migration of COPCs to groundwater. Thus, exposure to groundwater is not evaluated in the screening-level ecological assessment for Consolidated Unit 21-018(a)-99.

The potential exposure of terrestrial receptors to COPCs in surface soil and unconsolidated tuff is by root uptake, dust inhalation, soil ingestion, external irradiation, dermal exposure, and food web transport (Figure H-3.1-1). Exposure pathways to receptors from COPCs in consolidated tuff are incomplete because COPCs in tuff are generally immobilized and become available to receptors only as a function of the slow rates of weathering of the tuff. Plant exposure to COPCs in tuff is largely limited to fractures near the surface, which does not produce sufficient biomass to support an herbivore population. Consequently, COPCs in tuff are not available to the extent necessary to cause adverse population-level effects.

Potentially complete pathways for exposure of terrestrial receptors to COPCs exist at the site. The potential risk is evaluated quantitatively in this risk screening assessment for the following ecological receptors, representing several feeding guilds and trophic levels:

- plants
- soil-dwelling invertebrates (represented by the earthworm)
- deer mouse (mammalian omnivore)
- Montane shrew (mammalian insectivore)
- desert cottontail (mammalian herbivore)
- fox (mammalian carnivore)
- American robin (avian insectivore, omnivore, and herbivore)
- American kestrel (avian insectivore and carnivore); surrogate for avian T&E species
- Botta's pocket gopher (burrowing animal)

Of the terrestrial receptors being evaluated, only the Montane shrew is not expected to be present at Consolidated Unit 21-018(a)-99 because it requires free water for survival—surface water does not exist at the site. However, because the shrew represents the insectivorous feeding guild for mammals, which is not specifically represented by any of the other terrestrial receptors, the shrew is evaluated in this risk screening assessment.

H-5.2 Assessment Endpoints

An assessment endpoint is an "explicit expression of the actual environmental value that is to be protected, operationally defined by an ecological entity and its attributes" (EPA 1998, 062809). Assessments should include ecologically relevant endpoints that help to sustain the natural structure, function, and biodiversity of an ecosystem or its components. In this screening assessment, the assessment endpoints are the populations and communities of the terrestrial receptors listed in this section, and the assessment is consistent with EPA guidance (EPA 1997, 059370).

The screening process is designed to be protective of biotic populations and ecological communities rather than individual organisms, except for "special status species," which include listed or candidate T&E species or treaty-protected species (EPA 1999, 070086). The American kestrel is evaluated as a surrogate for the Mexican spotted owl, a special status avian receptor (listed T&E species) known to live on, and near, Laboratory property.

In accordance with EPA guidance on assessment endpoints, the Laboratory developed generic assessment endpoints to ensure that valued and ecologically relevant receptors at all levels within a given ecological community are considered in the screening process (LANL 1999, 064137). These endpoints are evaluated by measuring potential impacts to reproduction, growth, and survival that may

adversely affect populations. The specific receptors chosen for the screening evaluation represent feeding guilds and thus exposure scenarios for each ecological functional group within the terrestrial communities expected at the site. Receptor species are chosen because of their presence at the site, potential sensitivity to the COPCs, and potential for exposure to those COPCs. In summary, the screening evaluation is designed to be protective of the selected receptors and other species within the same feeding guilds and occupying similar ecological niches as the selected receptors.

H-5.3 Screening Evaluation

The ecological screening evaluation identifies chemicals of potential ecological concern (COPECs) in soil and tuff from 0–5 ft bgs and is based on the comparison of exposure point concentrations (95% UCL of the mean or maximum detected concentrations) at the site with ecological screening levels (ESLs). The exposure point concentrations used in this assessment are presented in Table H-3.5-4. The comparison is summarized in the calculation of HQs for each COPC and screening receptor. Potential ecological risks associated with aluminum in soils are based on soil pH in accordance with EPA guidance (EPA 2003, 085645). Aluminum is retained as a COPEC only in those soils with pH lower than 5.5. Aluminum was eliminated as a COPEC because the mean soil pH within the Consolidated Unit 21-018(a)-99 is approximately 7.0.

The HQ is defined as the ratio of the exposure point concentration in the exposure medium being investigated to the concentration that has been determined to be acceptable to a given ecological receptor. The higher the contaminant levels relative to the ESLs, the higher the potential risk to receptors; conversely, the higher the ESLs relative to the contaminant levels, the lower the potential risk to receptors. The analysis begins with a comparison of the minimum ESL with the exposure point concentration for a given COPC (Table H-5.3-1). COPCs with HQs greater than 0.3 are used to identify COPECs requiring further evaluation (LANL 2004, 087630). COPECs are carried forward in the analysis and receptor-specific ESLs are compared with the exposure point concentrations, resulting in an HQ for each COPEC/receptor combination. Individual HQs for a receptor are summed to derive an HI; an HI greater than 1.0 is an indication of potential adverse impacts to a given receptor from exposure to multiple COPECs at a site. Additionally, chemicals without ESLs are retained as COPECs and are evaluated further in the uncertainty section. The HQ/HI analysis is a conservative indication of potential adverse effects and is designed to minimize the potential of overlooking possible COPECs at the site.

The calculation of exposure point concentrations is summarized in section H-3.5. ESLs were obtained from the ECORISK Database, Version 2.2 (LANL 2005, 090032), as presented in Table H-5.3-2 for COPECs requiring further analysis based on the final ESL screen. The ESLs are based on similar species and are derived from experimentally determined NOAELs, lowest-observed-adverse-effect levels (LOAELs), or doses determined lethal to 50% of the test population. Information relevant to the calculation of ESLs, including concentration equations, dose equations, bioconcentration factors, transfer factors, and toxicity reference values are presented in the ECORISK Database, Version 2.2 (LANL 2005, 090032).

Of the COPCs identified for evaluation of ecological risk at Consolidated Unit 21-018(a)-99, 26 COPCs were eliminated from further evaluation because the minimum ESL analysis indicated that HQs for all receptors were less than 0.3 (Table H-5.3-1). A total of 26 COPCs (16 inorganic chemicals, 8 SVOCs, and 2 polychlorinated biphenyls [PCBs]) were identified as COPECs. Seven COPCs could not be evaluated for any receptor because ESLs are not available: lithium, nitrate, perchlorate, strontium, 4-bromophenyl-phenylether, 4-chloro-3-methylphenol, and 3-nitroaniline (Table H-5.3-2). As presented in Table H-5.3-3, the HIs for the terrestrial receptors range from 0.8 (red fox) to 581 (plant).

In May 2007, eight additional surface and near-surface samples were collected and analyzed for SVOCs in the northwest area of the hillslope of SWMU 21-013(b) to confirm the effectiveness of a small removal action at and downgradient from location 21-24650. Benzo(a)anthracene was not detected, and none of the maximum detected concentrations in the 2007 samples exceed their respective ESLs (Table H-5.3-4), indicating no potential risk to ecological receptors in the area of location 21-24650. The 2007 data are compared to the 2005–2006 data in Table H-5.3-4; none of the 2007 maximum detected concentrations exceed the 2005–2006 95% UCLs, except for benzo(b)fluoranthene (0.708 mg/kg), which is below the minimum ESL (18 mg/kg) (LANL 2005, 090032).

Because burrowing animals may be present at Consolidated Unit 21-018(a)-99, exposure to burrowing animals from VOCs in subsurface soil was assessed. The VOC pore-gas data from the shallowest depth from all boreholes (range of 4 to 20 ft bgs) were used for this assessment. The data are presented in Appendix B. The ESLs for the inhalation pathway were obtained from ECORISK Database, Version 2.2 (LANL 2005, 090032) and are based on Botta's pocket gopher as the burrowing receptor. The ESLs for some of the VOCs detected in pore gas are not available and are discussed further in the uncertainty section. For those VOCs having ESLs, the maximum detected pore-gas concentrations were assumed to be in equilibrium within an animal burrow and used in the comparison (Table H-5.3-5). All of the HQs (range of 0.0000014 to 0.0018) and the HI (0.006) are less than 1.0.

H-5.4 Uncertainty Analysis

This section provides an evaluation of the ecological screening assessment results in the context of assumptions used in the screening process to determine whether the results are ecologically meaningful, indicating potential risk to ecological receptors and requiring additional analysis.

A variety of factors contribute to the uncertainty associated with the ecological screening evaluation. Uncertainty is inherent in all aspects of the risk screening process, including the estimation of exposure to receptors, the characterization of potential ecological effects related to this exposure, and the final evaluation of potential risk to the receptors. The screening analysis is designed such that the uncertainties do not lead to an underestimation of the actual risk to the ecological receptors at the site but rather probably overestimate the potential risk posed by COPECs. When multiple conservative biases are used, the result is a multiplicative effect on the overestimation of risk. The uncertainties identified for the ecological screening assessment for Consolidated Unit 21-018(a)-99 are summarized in this section.

H-5.4.1 Chemical Form

Toxicological data are typically based on the most toxic and bioavailable chemical species of a COPC, conditions not likely to occur in the environment. The inorganic, radiological, and organic COPCs identified for Consolidated Unit 21-018(a)-99 are generally not 100% bioavailable (as assumed in the screening evaluation) to receptors in the environment because of a number of factors, including adsorption to matrix surfaces (e.g., soil) and rapid oxidation or reduction changes that render chemical species unavailable to biota. This uncertainty leads to an overestimation of potential risk to ecological receptors.

H-5.4.2 Exposure Assumptions

The following assumptions made regarding the exposure for terrestrial receptors lead to an overestimation of potential risk to ecological receptors:

- The area around Consolidated Unit 21-018(a)-99 is an active industrial area and has been substantially disturbed by the removal activities at the site. Thus, little of the area is available as habitat for ecological receptors.
- Exposure point concentrations used in the HQ calculations are the 95% UCLs in the soil and/or tuff to a depth of 5 ft, assumed to represent the site-wide concentrations of COPCs at the site.
- Receptors are assumed to ingest 100% of their food and spend 100% of their time at the site.
- COPCs in tuff were included in the 95% UCLs although they are not available to receptors.

In addition, the assessment assumes that the COPECs are distributed uniformly across the site. COPECs detected once or only in a few locations are unlikely to impact a receptor population.

Acenaphthene, acenaphthylene, di-n-butylphthalate, and pentachlorophenol were each detected in only one of 212 samples and naphthalene was detected in three of 212 samples collected in the 0–5-ft-depth interval. The detected concentration of each COPEC was less than the estimated quantitation limit. Based on the infrequent detections and the trace concentrations, acenaphthene, acenaphthylene, di-n-butylphthalate, naphthalene, and pentachlororphenol do not pose a potential risk to receptors and are not retained as COPECs.

H-5.4.3 Toxicity Values

The HQs were calculated using ESLs that are based on NOAELs as threshold-effect levels; actual risk for a given COPEC/receptor combination occurs at a higher level, somewhere between the NOAEL-based threshold and the threshold based on the LOAEL. Using NOAELs leads to an overestimation of potential risk to ecological receptors. The ESLs are based on laboratory studies requiring extrapolation to wildlife receptors. Laboratory studies are typically based on artificial and maintained populations with genetically similar individuals and are limited to single chemical exposures in isolated and controlled conditions using a single exposure pathway. Wild species are concomitantly exposed to a variety of chemical and environmental stressors, potentially rendering them more susceptible to chemical stress. On the other hand, wild populations are probably more genetically diverse than laboratory populations, making wild populations, as a whole, less sensitive to chemical exposure than laboratory populations. The uncertainties associated with the ESLs may under- or overestimate potential risk.

H-5.4.4 Background Concentrations

The ecological screening is based on the exposure of ecological receptors to contamination to a depth of 5 ft. Table H-5.4-1 presents the exposure point concentrations for inorganic COPECs and the range of soil and tuff background concentrations (LANL 1998, 059730). All inorganic COPECs, except uranium, had exposure point concentrations either within the range of background concentrations or less than twice the maximum background concentration. Based on the comparison of the exposure point concentrations and the range of background concentrations, antimony, arsenic, barium, cadmium, chromium, copper, cyanide, lead, manganese, mercury, thallium, silver, vanadium, and zinc were eliminated as COPECs because exposure is similar to background across the site and is not likely to pose a potential ecological risk.

H-5.4.5 Area Use Factors

In addition to the direct comparison of the exposure point concentration with the ESLs, area use factors (AUFs) are used to account for the amount of time that a receptor is likely to spend within the contaminated areas based on the size of the receptor's home range. The AUFs for individual organisms were developed by dividing the size of the site by the home range (HR) for that receptor. The area of Consoldiated Unit 21-018(a)-99 is approximately 2.05 hectare (ha). The HR for the Mexican spotted owl is 366 ha; therefore, the AUF for the Mexican spotted owl is 0.006 (Table H-5.4-2). Based on the application of the AUF for the Mexican spotted owl to the HI for the carnivorous kestrel, which is a surrogate for the owl, no potential for ecological risk to the Mexican spotted owl (HI=0.09) exists.

H-5.4.6 Population Area Use Factors

According to the HI analysis (Table H-5.3-3), all terrestrial receptors except the red fox had HI values greater than 1.0. EPA guidance is to manage the ecological risk to populations rather than to individuals, with the exception of T&E species (EPA 1999, 070086). One approach to assessing potential effects on populations at Consolidated Unit 21-018(a)-99 is to estimate the spatial extent of the areas inhabited by the wildlife populations.

The population area for each receptor is based on the individual receptor HR and its dispersal distance (Bowman et al. 2002, 073475). Bowman et al. (2002, 073475) estimate that the median dispersal distance for mammals is seven times the linear dimension of the HR (i.e., the square root of the HR area). If only the dispersal distances for the mammals with HRs within the range of the screening receptors are used, the median dispersal distance becomes 3.6 times the square root of the HR (R^2=0.91; Bowman et al. 2002, 073475). If it is assumed that the receptors can disperse the same distance in any direction, the population area is circular and the dispersal distance is the radius of the circle. Therefore, the population area for each receptor is approximately 40HR.

The area of Consolidated Unit 21-018(a)-99 is estimated as 2.05 ha. The population area use factor (PAUF) is calculated by dividing the site area of 2.05 ha by the population area of the receptor (Table H-5.4-2). The resulting value is multiplied by the receptor HI to determine whether a potential impact may occur on the population. The HI values for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs from which PAUFs can be calculated.

The adjusted HIs for all receptors, except the American robin (insectivore and omnivore) and the deer mouse are equal to or less than 1.0 (Table H-5.4-3). The HI for the plant is not adjusted and is approximately 1.0 as a result of uranium. The HI values in Table H-5.4-3 are adjusted for population area use; inorganic COPECs with exposure point concentrations similar to background concentrations; and infrequently detected organic COPECs. The HIs for the American robin at approximately 4 and 2 for the insectivore and omnivore, respectively, and are from relatively high HQs for bis(2-ethylhexyl)phthalate. The deer mouse and shrew HIs of 2 and 3, respectively, are primarily from HQs for benzoic acid (1.2 and 1.5, respectively).

Bis(2-ethylhexyl)phthalate was detected in 9 of 212 samples at a maximum concentration of 8.88 mg/kg. This sample result overestimates the exposure point concentration because the next highest concentration of bis(2-ethylhexyl)phthalate is 0.32 mg/kg, and the other detected concentrations are 0.3 mg/kg or less. If 0.32 mg/kg is used as the exposure point concentration, the HQs are reduced by approximately 50%.

Benzoic acid was detected in 10 of 212 samples at a maximum concentration of 0.676 mg/kg. If the maximum detected concentration is used rather than the 95% UCL (1.51 mg/kg), the HQs for the deer mouse and shrew are approximately 0.5 and 0.7, respectively.

If the more representative exposure point concentrations indicated above for bis(2-ethylhexyl)phthalate are used to calculate the HQs, the modified HIs (with PAUFs applied) are reduced to approximately 2 and 1 for the insectivorous and omnivorous robin, respectively (Table H-5.4-4). Similarly, if the more representative exposure point concentrations for benzoic acid are used to calculate the HQs, the modified HIs (with PAUFs applied) are reduced to approximately 0.6 and 0.2 for the deer mouse and shrew, respectively (Table H-5.4-4). Dourson and Stara (1983, 073474) conducted a study of uncertainty factors incorporated in calculating ESLs for ecological receptors. Based on their study, the LOAEL to NOAEL adjustment indicates that HIs up to 10 may not adversely affect ecological receptors. To maintain conservatism, they state that HIs less than 3 do not adversely affect ecological receptors. Based on the infrequent detection of benzoic acid and bis(2-ethylhexyl)phthalate (9 or 10 detections out of 212 samples collected from the 0-5 ft depth interval), the generally low concentrations detected, and the conclusion from the Dourson and Stara (1983, 073474) study, the HIs for the robin, deer mouse, and shrew do not indicate a potential unacceptable ecological risk.

H-5.4-7 COPECs without ESLs

Seven COPECs (four inorganic chemicals and three SVOCs) do not have ESLs for any terrestrial receptor. A brief discussion of these COPECs follows.

Inorganic Chemicals

Four inorganic chemicals (lithium, strontium, nitrate, and perchlorate) detected in surface soil and tuff do not have ESLs.

Lithium was detected in two samples within the 0–5-ft-depth interval at concentrations of 3.6 mg/kg and 8.5 mg/kg. These lithium concentrations are probably naturally occurring levels. A comparison of the maximum detected lithium concentration (8.5 mg/kg) with the EPA Region 6 residential SSL of 1600 mg/kg indicates that potential toxicity to lithium is very low. Lithium is eliminated as a COPEC.

Strontium was detected in two samples within the 0–5-ft-depth interval at concentrations of 14/9 mg/kg and 24.9 mg/kg. These concentrations are probably naturally occurring levels of strontium. A comparison of the maximum detected strontium concentration (24.9 mg/kg) with the NMED residential SSL of 46,900 mg/kg indicates that potential toxicity to strontium is very low. Strontium is eliminated as a COPEC.

Nitrate was detected in 120 of 150 samples with a maximum concentration of 15.5 mg/kg. A comparison of the maximum detected nitrate concentration with the NMED residential SSL of 100,000 mg/kg indicates that potential toxicity to nitrate is very low. Nitrate is eliminated as a COPEC.

Perchlorate was detected in 60 of 148 samples with a maximum detected concentration of 0.07 mg/kg. A comparison of the maximum detected perchlorate concentration with the EPA Region 6 residential SSL of 55 mg/kg indicates that potential toxicity to perchlorate is very low. Perchlorate is eliminated as a COPEC.

SVOCs

Three SVOCs detected in surface soil and tuff at Consolidated Unit 21-018(a)-99 (4-chloro-3-methylphenol, 3-nitroaniline, and 4-bromophenyl-phenylether) do not have ESLs. Each of these

chemicals was detected in only one sample, indicating these organic COPECs are not a concern for ecological receptors at the site.

Chloro-3-methylphenol[4-] was detected in only one sample a concentration of 0.071 mg/kg. If phenol is used as a surrogate for 4-chloro-3-methylphenol, the minimum ESL is 0.79 for the plant. The HQ using this ESL is approximately 0.1 and indicates that 4-chloro-3-methylphenol is not a COPEC. Based on the infrequent detection and low potential for toxicity, 4-chloro-3-methylphenol is not retained as a COPEC.

Nitroaniline[3-] was detected in only one sample at a concentration of 0.239 mg/kg. A comparison of the maximum detected 3-nitroaniline concentration with the EPA Region 6 residential SSL of 180 mg/kg (using 2-nitroaniline as a surrogate) indicates that potential toxicity to 3-nitroaniline is very low. Because of the single detection and the very low potential toxicity, 3-nitroaniline is not retained as a COPEC.

Bromophenyl-phenylether[4-] was detected in only one sample at a concentration of 0.036 mg/kg. This COPEC does not have a surrogate or residential SSL for comparison. However, based on the single trace level detection, 4-bromophenyl-phenylether is not likely to be a concern for ecological receptors. Therefore, 4-bromophenyl-phenylether is not retained as a COPEC

Pore-Gas COPECs

Twenty-one VOCs detected in the shallow pore-gas samples do not have inhalation ESLs (the number of detections are given in parentheses): butanol[1-] (1); butanone[2-] (21); carbon disulfide (8); dioxane[1,4-] (1); ethanol (3); ethylbenzene (4); ethyltoluene[4-] (3); n-heptane (3); hexane (6); methanol (1); methyl-2-pentanone[4-] (2); propanol[2-] (3); styrene (11); tetrahydrofuran (3); trichloro-1,2,2-trifluoroethane[1,1,2-] (3); trimethylbenzene[1,2,4-] (4); trimethylbenzene[1,3,5-] (1); vinyl acetate (1); vinyl chloride (1); xylene[1,2-] (5); and xylene[1,3-]+xylene[1,4-] (20). Of the 21 without inhalation ESLs, 16 were detected in six or fewer of the 21 boreholes at trace or estimated concentrations. The remaining five VOCs are not as volatile as those for which ESLs are available and therefore are less likely to volatilize into animal burrows. In addition, they are relatively less toxic than the VOCs with ESLs evaluated (tetrachloroethene and trichloroethene) based on human health SSLs (NMED 2006, 092513). Tritium was also detected in pore gas samples at a maximum concentration of 64,700 pCi/L. An inhalation ESL for tritium is not available, but the lowest soil ESL for tritium is 48,000 pCi/g for the earthworm. Thus, the maximum detected concentration of tritium in pore gas is not a potential risk to burrowing animals. In summary, it is unlikely that excluding the VOCs without inhalation ESLs from the screening assessment substantially underestimates the potential risk to burrowing animals.

H-5.4-8 DOE Tier I Bioconcentration Guides

The DOE Tier I bioconcentration guide (BCG) is a lower value for cesium-137 (20.8 pCi/g) than the ECORISK Database final ESL (680 pCi/g). If the DOE Tier I BCG is used, the HQ increases to 0.016 for the wildlife receptors. The DOE BCG incorporates bioaccumulation factors that are orders of magnitude higher than those in the ECORISK Database. Environmental surveillance and monitoring at the Laboratory indicate that bioaccumulation factors are not as high as those used by DOE (Bennett 1996, 056035). Therefore, the ESL comparison is more representative than the BCG comparison.

The DOE Tier I BCG is a lower value for strontium-90 (22.5 pCi/g) than the ECORISK Database final ESL (560 pCi/g). If the DOE Tier I BCG is used, the HQ increases to 0.005 for the wildlife receptors. The DOE BCG incorporates bioaccumulation factors that are orders of magnitude higher than those in the ECORISK Database. Environmental surveillance and monitoring at the Laboratory indicate that

bioaccumulation factors are not as high as those used by DOE (Bennett 1996, 056035). Therefore, the ESL comparison is more representative than the BCG comparison.

H-5.5 Results of Ecological Screening Analysis

Based on the ecological screening assessment for Consolidated Unit 21-018(a)-99, several COPECs (including some COPECs without ESLs) were identified. All COPECs were eliminated by analyzing a number of factors that resulted in HIs that do not indicate a potential risk to receptors. The HI from the inhalation ESL comparison to pore-gas VOCs (0.006) indicates no potential risk to burrowing animals.

H-6.0 CONCLUSIONS

H-6.1 Human Health Risk

SWMUs 21-018(a) and SWMU 21-018(b)

The total estimated excess cancer risk is approximately 1×10^{-5}, with arsenic contributing most of the cancer risk (approximately 83%). The exposure point concentration for arsenic is similar to background, and exposure across the site is similar to background for arsenic. The total estimated excess cancer risk without arsenic is approximately 1×10^{-6}. Therefore, the total estimated excess cancer risk for SWMUs 21-018(a) and 21-018(b) is less than or equivalent to the NMED target level of 10^{-5} (NMED 2006, 092513). The exposure point concentrations for the noncarcinogenic COPCs do not exceed the respective residential SSLs. The HI for SWMUs 21-018(a) and 21-018(b) is 0.9, which is below the NMED target level of 1.0 (NMED 2006, 092513). The total dose is 1.6 mrem/yr, which is less than DOE's target dose limit of 15 mrem/yr (DOE 2000, 067489). This dose corresponds to a radiological risk of approximately 5×10^{-6}, based on a comparison with EPA radionuclide PRGs for a residential receptor (http://epa-prgs.ornl.gov/radionuclides/download/rad_master_prg_table_pci.xls).

SWMU 21-013(b) and AOC 21-013(g)

The cumulative cancer risk is approximately 1×10^{-5}, with arsenic contributing most of the cancer risk (approximately 72%). Because the exposure point concentration for arsenic is similar to background concentrations, exposure across the site is equivalent to background. The total estimated excess cancer risk without arsenic is approximately 3×10^{-6}. The cancer risk for SWMU 21-013(b) and AOC 21-013(g) is less than or equivalent to the NMED target level of 10^{-5} (NMED 2006, 092513). The exposure point concentrations for the noncarcinogenic COPCs also do not exceed the respective residential SSLs, except for uranium. The HI is approximately 2.0, with uranium contributing 85% of the risk. The uranium HQ is the result of a single sample result, which overestimates the potential exposure and risk to a resident. The HI without this uranium result is 0.3, which is below the NMED target level of 1.0 (NMED 2006, 092513). In May 2007, eight additional surface and near-surface samples were collected and analyzed for SVOCs in the northwest area of the hillslope to confirm the effectiveness of a small removal action at and downgradient from location 21-24650. Benzo(a)anthracene was not detected and the maximum concentrations of SVOCs detected in the 2007 samples did not exceed their respective residential SSLs, indicating that the removal action at location 21-24650 was successful. The total dose is 2.7 mrem/yr, which is less than DOE's target dose limit of 15 mrem/yr (DOE 2000, 067489). This dose corresponds to a radiological risk of approximately 1.0×10^{-5} based on a comparison with EPA radionuclide PRGs for a residential receptor (http://epa-prgs.ornl.gov/radionuclides/download/rad_master_prg_table_pci.xls).

SWMU 21-023(c)

The cumulative cancer risk is approximately 9×10^{-6}, with arsenic contributing most of the cancer risk. The cancer risk for SWMU 21-023(c) is therefore less than the NMED target level of 10^{-5} (NMED 2006, 092513).The exposure point concentrations for the noncarcinogenic COPCs do not exceed the respective residential SSLs. The HI for SWMU 21-023(c) is 0.4, which is below the NMED target level of 1.0 (NMED 2006, 092513). The total dose is 10.0 mrem/yr, which is less than DOE's target dose limit of 15 mrem/yr (DOE 2000, 067489). This dose corresponds to a radiological risk of approximately 3×10^{-5} based on a comparison with EPA radionuclide PRGs for a residential receptor (http://epa-prgs.ornl.gov/radionuclides/download/rad_master_prg_table_pci.xls).

Pore-Gas Analysis

The human health risk assessment includes an evaluation of the potential risk to chemicals detected in pore gas via an indoor air pathway to a resident. Benzene, carbon tetrachloride, chloroform, tetrachloroethene, and trichloroethene were retained and evaluated using the Johnson and Ettinger model of indoor air exposure (EPA 2002, 094114). All the chemicals evaluated are carcinogens, and, therefore, an HI was not calculated. The cumulative cancer risks do not exceed 1×10^{-5} for any of the indoor-air model site conditions.

Overall, the uncertainties associated with the evaluation of COPCs at Consolidated Unit 21-018(a)-99 are based on a residential scenario that overestimates potential exposure and risk to human receptors. Concentrations of COPCs in soil and tuff at Consolidated Unit 21-018(a)-99 do not pose a potential unacceptable risk to human health under a residential scenario. Therefore, no further investigation or corrective action is warranted, based on the evaluation of potential human health risks.

H-6.2 Ecological Risk

Based on the ecological screening assessment, COPECs were identified. All COPECs were eliminated in the uncertainty analysis by analyzing the following factors: background concentrations, the potential effects to populations (or individuals for T&E species), the relative toxicity of related compounds, the detected concentrations, and the infrequency of detection. The results of the ecological risk screening assessment indicate no potential risk to ecological receptors at Consolidated Unit 21-018(a)-99, and further investigation or corrective action is not warranted based on ecological risk.

H-7.0 REFERENCES

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in text citations. ER ID numbers are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau; the U.S. Department of Energy–Los Alamos Site Office; EPA, Region 6; and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

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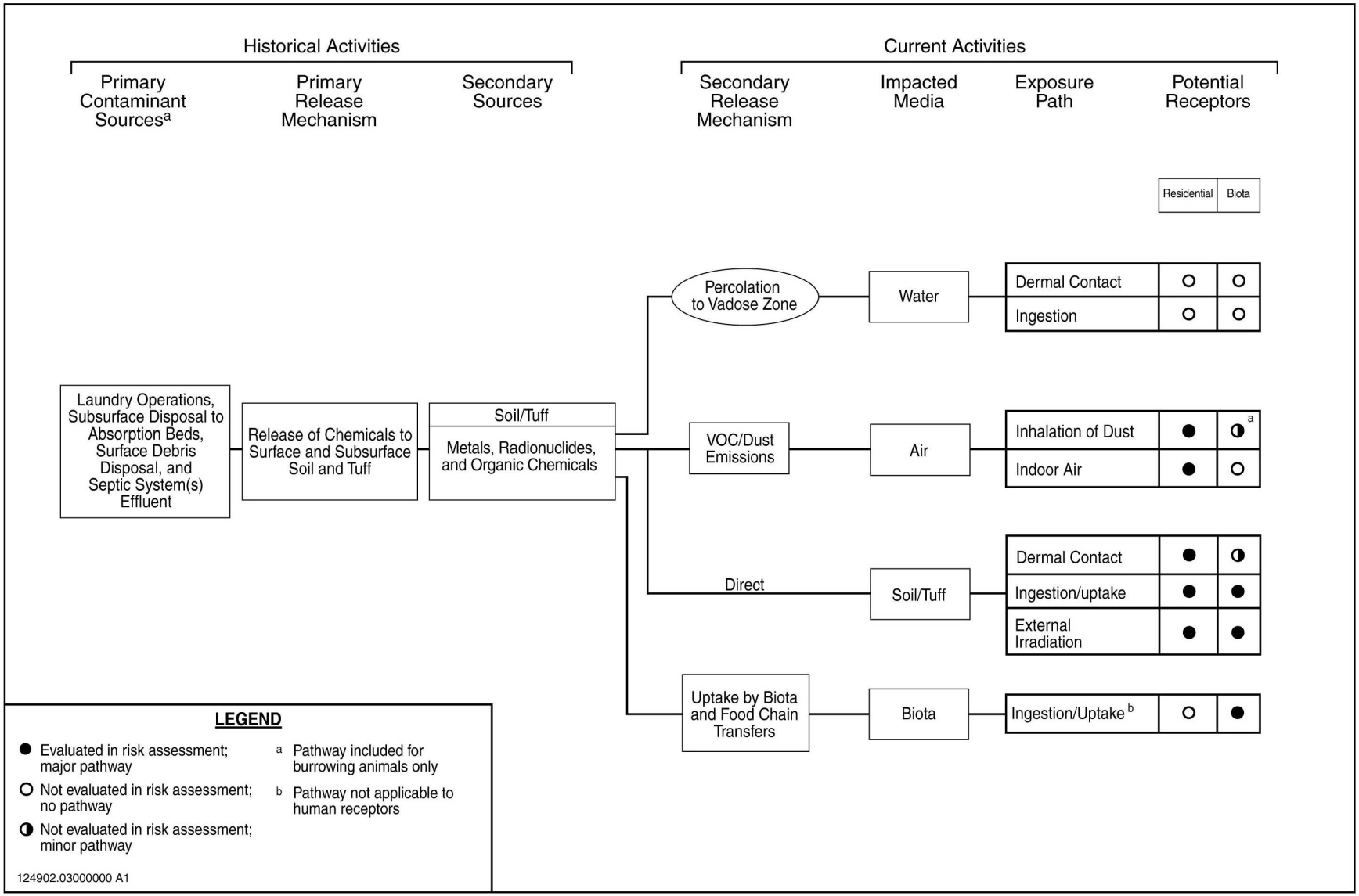


Figure H-3.1-1 Conceptual site model flow diagram for Consolidated Unit 21-018(a)-99

Table H-2.0-1
Summary of COPCs at Consolidated Unit 21-018(a)-99 Evaluated in the Risk Assessments

SWMU 21-018(a) and SWMU 21-018(b) Residential (0 to 10 ft)	SWMU 21-013(b) and AOC 21-013(g) Residential (0 to 10 ft)	SWMU 21-023(c) Residential (0 to 10 ft)	Ecological (0 to 5 ft)
Inorganic Chemicals			
Aluminum Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Cyanide (total) Lead Manganese Nickel Nitrate Perchlorate Selenium Silver Vanadium Zinc	Arsenic Cadmium Chromium Copper Cyanide (total) Lead Mercury Nitrate Perchlorate Selenium Silver Thallium Uranium	Aluminum Antimony Arsenic Cadmium Chromium Copper Cyanide (total) Lead Lithium Mercury Nitrate Perchlorate Selenium Silver Strontium Zinc	Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Cyanide (total) Lead Lithium Manganese Mercury Nickel Nitrate Perchlorate Selenium Silver Strontium Thallium Uranium Vanadium Zinc
Organic Chemicals			
Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzoic acid Bromophenyl-phenylether[4-] Chloro-3-methylphel[4-] Chloronaphthalene[2-] Chrysene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Methylnaphthalene[2-] Naphthalene Nitroaniline[3-] Phenanthrene Pyrene	Anthracene Aroclor-1254 Aroclor-1260 Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzoic acid Bis(2-ethylhexyl)phthalate Chrysene Fluoranthene Phenanthrene Pyrene	Anthracene Aroclor-1242 Aroclor-1254 Aroclor-1260 Benzo(a)pyrene Benzo(b)fluoranthene Benzoic acid Bis(2-ethylhexyl)phthalate Chrysene Di-n-butylphthalate Fluoranthene Methylnaphthalene[2-] Naphthalene Yes Phenanthrene Pyrene	Acenaphthene Acenaphthylene Anthracene Aroclor-1242 Aroclor-1254 Aroclor-1260 Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzoic acid Bis(2-ethylhexyl)phthalate Bromophenyl-phenylether[4-] Chloro-3-methylphel[4-] Chloronaphthalene[2-] Chrysene Di-n-butylphthalate Fluoranthene Fluorene Inde(1,2,3-cd)pyrene Methylnaphthalene[2-] Naphthalene Nitroaniline[3-] Pentachlorophenol Phenanthrene Pyrene

Table H-2.0-1 (continued)

Radionuclides			
Americium-241 Cesium-137 Cobalt-60 Plutonium-239 Sodium-22 Tritium Uranium-234 Uranium-235	Americium-241 Cesium-137 Plutonium-238 Plutonium-239 Strontium-90 Tritium Uranium-234 Uranium-235 Uranium-238	Americium-241 Cesium-137 Plutonium-238 Plutonium-239 Strontium-90 Tritium Uranium-234 Uranium-235 Uranium-238	Americium-241 Cesium-137 Plutonium-238 Plutonium-239 Sodium-22 Strontium-90 Tritium Uranium-234 Uranium-235 Uranium-238

Table H-3.3-1
K_d Values for Inorganic COPCs at Consolidated Unit 21-018(a)-99

COPC	K_d[a] (cm^3/g)
Aluminum	1500
Antimony	45
Arsenic	29
Barium	41
Beryllium	790
Cadmium	75
Chromium[b]	1800000
Cobalt	45
Copper	35
Cyanide (total)	9.9
Iron	25
Lead	900
Lithium	na[c]
Manganese	65
Mercury	52
Nickel	65
Nitrate	na
Perchlorate	na
Selenium	5
Silver	8.3
Strontium	35
Thallium	71
Uranium	na
Vanadium	1000
Zinc	62

[a] K_d values from NMED 2006, 092513.

[b] K_d values for chromium(III), the predominant species for chromium, used.

[c] na = Not available.

Table H-3.3-2
K_d Values for Radionuclide COPCs at Consolidated Unit 21-018(a)-99

COPC	K_d[a] (cm^3/g)
Americium-241	680
Cesium-134	1000
Cesium-137	1000
Plutonium-238	4500
Plutonium-239	4500
Sodium-22	na [b]
Strontium-90	35
Tritium	na
Uranium-234	0.4
Uranium-235	0.4
Uranium-238	0.4

[a] K_d values from EPA 1996, 064708.

[b] na = Not available.

Table H-3.3-3
Chemical Properties of Organic COPCs at Consolidated Unit 21-018(a)-99

COPCs	K_{oc}[a] (cm^3/g)	Solubility[a] (mg/L)	Log K_{ow}[b] (unitless)
Acenaphthene	4.90E+03	4.24E+00	3.92E+00
Acenaphthylene	6.12E+03[b]	1.61E+01[b]	3.94E+00
Anthracene	2.95E+04	4.34E-02	4.45E+00
Aroclor-1242	4.48E+04	2.77E-01	6.29E+00
Aroclor-1254	5.30E+05	2.77E-01	6.79E+00
Aroclor-1260	5.30E+05	2.77E-01	8.27E+00
Benzo(a)anthracene	3.98E+05	9.40E-03	5.76E+00
Benzo(a)pyrene	1.02E+06	1.62E-03	6.13E+00
Benzo(b)fluoranthene	1.23E+06	1.50E-03	5.78E+00
Benzo(g,h,i)perylene	2.68E+06[b]	2.60E-04[b]	6.63E+00
Benzoic acid	1.45E+01[b]	3.40E+03[b]	1.87E+00
Bis(2-ethylhexyl)phthalate	1.51E+07	3.40E-01	7.60E+00
Bromophenyl-phenylether[4-]	na[c]	na	na
Chloro-3-methylphenol[4-]	na	na	na
Chloronaphthalene[2-]	1.60E+03	1.2E+01	3.98E+00
Chrysene	3.98E+05	1.60E-03	5.81E+00
Di-n-butylphthalate	3.39E+04	1.12E+01	4.50E+00
Fluoranthene	1.07E+05	2.06E-01	5.16E+00
Fluorene	7.90E+03	1.90E+00	4.18E+00
Indeno(1,2,3-cd)pyrene	3.47E+06	2.20E-05	6.70E+00
Methylnaphthalene[2-]	2.98E+03[b]	2.46E+01[b]	3.86E+00
Naphthalene	2.00E+03	3.10E+01	3.30E+00
Nitroaniline[3-]	5.16E+01[b]	1.20E+03[b]	1.37E+00
Pentachlorophenol	5.92E+02	1.95E+03	5.12E+00
Phenanthrene	1.40E+04	1.15E+00	4.46E+00
Pyrene	6.80E+04	1.35E-01	4.88E+00

[a] NMED Revision 4.0 value (NMED 2006, 092513) unless otherwise noted.

[b] RAIS database value.

[c] na = Not available.

Table H-3.4-1
Results of Pore-Gas Screening for Consolidated Unit 21-018(a)-99

Volatile Organic Compound	Max C^{air} ($\mu g/m^3$)	H' (Dimensionless)	H' Source[a]	SL ($\mu g/L$)	SL Source[b]	Screening Value (Dimensionless)
Acetone	680	1.60E-03	NMED	5.50E+03	EPA Region 6	7.73E-02
Benzene	14	2.28E-01	NMED	5.00E+00	EPA MCL	1.23E-02
Bromodichloromethane	1.7	6.56E-02	NMED	1.80E+00	EPA Region 6	1.44E-02
Butanol[1-]	720	3.47E-04	PDEP	3.70E+03	EPA Region 6	5.61E-01
Butanone[2-]	120	1.10E-03	NMED	7.10E+03	EPA Region 6	1.56E-02
Carbon disulfide	27	1.20E+00	NMED	1.00E+03	EPA Region 6	2.25E-05
Carbon tetrachloride	21	1.25E+00	NMED	5.00E+00	EPA MCL	3.36E-03
Chloroform	120	1.50E-01	NMED	1.00E+02	NMWQCC	8.00E-03
Chloromethane	3.3	9.80E-01	NMED	2.10E+01	EPA Region 6	1.60E-04
Dichlorodifluoromethane	3.7	4.10E+00	NMED	3.90E+02	EPA Region 6	2.31E-06
Dichloroethane[1,1-]	4	2.30E-01	NMED	2.50E+01	NMWQCC	6.96E-04
Dichloroethane[1,2-]	4.2	4.01E-02	NMED	5.00E+00	EPA MCL	2.09E-02
Dichloropropane[1,2-]	5.2	1.10E-01	NMED	5.00E+00	EPA MCL	9.45E-03
Dioxane[1,4-]	25	3.70E-04	PDEP	6.10E+01	EPA Region 6	**1.11E+00**[c]
Ethanol	470	2.56E-04	PDEP	na[d]	na	na
Ethylbenzene	21	3.23E-01	NMED	7.00E+02	EPA MCL	9.29E-05
Ethyltoluene[4-]	55	2.02E-01	PDEP	na	na	na
Heptane[n-]	36	8.32E+01	PDEP	na	na	na
Hexane	74	5.00E+00	NMED	4.20E+02	EPA Region 6	3.52E-05
Methanol	340	1.81E-04	PDEP	1.80E+04	EPA Region 6	1.04E-01
Methyl-2-pentanone[4-]	5.9	5.70E-03	NMED	2.00E+03	EPA Region 6	5.18E-04
Methylene chloride	11	9.00E-02	NMED	5.00E+00	EPA MCL	2.44E-02
Propanol[2-]	62	3.46E-04	PDEP	na	na	na
Propylene	310	na	na	na	na	na
Styrene	170	1.10E-01	NMED	1.00E+02	EPA MCL	1.55E-02

Table H-3.4-1 (continued)

Volatile Organic Compound	Max C^{air} (µg/m³)	H' (Dimensionless)	H' Source[a]	SL (µg/L)	SL Source[b]	Screening Value (Dimensionless)
Tetrachloroethene	20	7.54E-01	NMED	5.00E+00	EPA MCL	5.31E-03
Tetrahydrofuran	12	2.89E-03	PDEP	8.80E+01	EPA Region 6	4.73E-02
Toluene	50	2.72E-01	NMED	7.50E+02	NMWQCC	2.45E-04
Trichloro-1,2,2-trifluoroethane[1,1,2-]	3.4	2.14E+01	NMED	5.90E+04	EPA Region 6	2.69E-09
Trichloroethane[1,1,1-]	170	7.05E-01	NMED	6.00E+01	NMWQCC	4.02E-03
Trichloroethene	260	4.22E-01	NMED	5.00E+00	EPA MCL	1.23E-01
Trichlorofluoromethane	2.9	4.00E+00	NMED	1.30E+03	EPA Region 6	5.58E-07
Trimethylbenzene[1,2,4-]	95	2.30E-01	NMED	1.20E+01	EPA Region 6	3.44E-02
Trimethylbenzene[1,3,5-]	30	3.20E-01	NMED	1.20E+01	EPA Region 6	7.81E-03
Vinyl acetate	4.2	2.10E-02	NMED	4.10E+02	EPA Region 6	4.88E-04
Vinyl chloride	3.9	1.11E+00	NMED	1.00E+00	NMWQCC	3.51E-03
Xylene (total)	110	3.00E-01	NMED	6.20E+02	NMWQCC	5.91E-04
Xylene[1,2-]	31	2.13E-01	NMED	1.40E+03	EPA Region 6	1.04E-04
Xylene[1,3-]+Xylene[1,4-][e]	17	3.01E-01	NMED	2.10E+02	EPA Region 6	2.69E-04

[a] Sources for H':
NMED = Table B of New Mexico Environment Department technical background document for development of soil screening levels, Revision 4.0.
PDEP = Pennsylvania Department of Environmental Protection Chemical and Physical Properties Database.

[b] Sources for screening levels (SLs):
NMWQCC = NMAC 20.6.2.3103.
EPA MCL = EPA National Primary Drinking Water Standards.
EPA Region 6 = Tap Water values from EPA (2005, 091002).
EPA Region 9 = Tap Water values from Region 9 PRG Table (http//:www.epa.gov/region09/waste/sfund/prg/files/04physchem.pdf)

[c] Bold indicates screening value exceeded.

[d] na = Not available.

[e] Properties for xylene[1,3-] used.

Table H-3.5-1
SWMUs 21-018(a) and 21-018(b) Residential COPC Statistics

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	95% UCL Method
Inorganic Chemicals								
Aluminum	30/30	Nonparametric	329	28400	11123	9669	18818	Chebyshev
Arsenic	30/28	Lognormal	1.8(U)*	5.55	2.71	1.46	3.33	H-UCL
Barium	30/30	Nonparametric	3.42	364	112	94.8	188	Chebyshev
Beryllium	30/28	Nonparametric	0.249	1.40	0.655	0.397	0.971	Chebyshev
Cadmium	30/3	Nonparametric	0.05(U)	0.456	0.274	0.065	0.326	Chebyshev
Chromium	30/30	Nonparametric	0.35	20.6	7.60	6.05	12.4	Chebyshev
Cobalt	30/26	Lognormal	0.221	9.78	3.12	2.92	6.57	H-UCL
Copper	30/29	Nonparametric	0.685	13.7	5.60	3.91	8.70	Chebyshev
Cyanide (total)	27/7	Nonparametric	0.24(U)	0.317	0.154	0.047	0.193	Chebyshev
Lead	30/29	Normal	0.551	23.8	9.44	5.89	11.3	Student's-t
Manganese	30/30	Lognormal	99.3	1030	292	190	350	H-UCL
Nickel	30/28	Lognormal	0.692	19.2	6.12	4.57	9.47	H-UCL
Nitrate	27/21	Lognormal	0.231	10.6	2.33	2.99	4.06	H-UCL
Perchlorate	32/8	Nonparametric	0.0007	0.14(U)	0.012	0.024	0.030	Chebyshev
Selenium	30/3	Nonparametric	0.62(U)	8.41(U)	1.01	0.889	1.72	Chebyshev
Silver	30/18	Nonparametric	0.07(U)	2.1(U)	0.16	0.257	0.364	Chebyshev
Vanadium	30/30	Nonparametric	0.816	39.5	14.9	11.9	24.4	Chebyshev
Zinc	30/30	Lognormal	9.04	52.5	28.9	11.5	33.7	H-UCL
Semivolatile Organic Compounds								
Acenaphthene	30/1	Nonparametric	0.033(U)	0.36(U)	0.035	0.048	0.073	Chebyshev
Acenaphthylene	30/1	Nonparametric	0.033(U)	0.36(U)	0.035	0.048	0.073	Chebyshev
Anthracene	30/1	Nonparametric	0.033(U)	0.36(U)	0.035	0.048	0.073	Chebyshev
Benzo(a)anthracene	30/1	Nonparametric	0.013(U)	0.36(U)	0.035	0.049	0.073	Chebyshev
Benzo(a)pyrene	30/1	Nonparametric	0.033(U)	0.185	0.040	0.056	0.084	Chebyshev

Table H-3.5-1 (continued)

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	95% UCL Method
Benzo(b)fluoranthene	30/1	Nonparametric	0.033(U)	0.36(U)	0.039	0.054	0.083	Chebyshev
Benzo(g,h,i)perylene	30/1	Nonparametric	0.033(U)	0.36(U)	0.037	0.050	0.077	Chebyshev
Benzoic acid	30/1	Nonparametric	0.668(U)	1.89(U)	0.423	0.155	0.546	Chebyshev
Bromophenyl-phenylether[4-]	30/1	Nonparametric	0.036	0.41(U)	0.178	0.029	0.201	Chebyshev
Chloro-3-methylphenol[4-]	30/1	Nonparametric	0.071	0.41(U)	0.179	0.023	0.197	Chebyshev
Chloronaphthalene[2-]	30/1	Nonparametric	0.033(U)	0.36(U)	0.035	0.048	0.073	Chebyshev
Chrysene	30/1	Nonparametric	0.033(U)	0.36(U)	0.037	0.050	0.076	Chebyshev
Fluoranthene	30/5	Nonparametric	0.013	0.36(U)	0.038	0.051	0.079	Chebyshev
Fluorene	30/1	Nonparametric	0.033(U)	0.36(U)	0.035	0.048	0.073	Chebyshev
Indeno(1,2,3-cd)pyrene	30/1	Nonparametric	0.033(U)	0.201	0.040	0.057	0.086	Chebyshev
Methylnaphthalene[2-]	30/1	Nonparametric	0.033(U)	0.36(U)	0.035	0.048	0.073	Chebyshev
Naphthalene	30/1	Nonparametric	0.033(U)	0.36(U)	0.035	0.048	0.073	Chebyshev
Nitroaniline[3-]	30/1	Nonparametric	0.334(U)	0.87(U)	0.210	0.075	0.269	Chebyshev
Phenanthrene	30/3	Nonparametric	0.015	0.36(U)	0.036	0.049	0.075	Chebyshev
Pyrene	30/5	Nonparametric	0.012	0.36(U)	0.036	0.048	0.074	Chebyshev
Radionuclides (pCi/g)								
Americium-241	29/4	Lognormal	0.002(U)	0.046	0.010	0.011	0.019	H-UCL
Cesium-137	27/1	Nonparametric	0.002(U)	0.143	0.023	0.026	0.045	Chebyshev
Cobalt-60	27/1	Nonparametric	0.001(U)	0.111	0.021	0.022	0.039	Chebyshev
Plutonium-239	30/13	Lognormal	0.001(U)	0.735	0.087	0.158	0.558	H-UCL
Sodium-22	28/1	Lognormal	0.001(U)	0.27	0.026	0.050	0.052	H-UCL
Tritium	30/20	Nonparametric	0.002(U)	13.3	0.556	2.42	2.49	Chebyshev
Uranium-234	28/28	Nonparametric	0.396	2.9	1.08	0.456	1.45	Chebyshev
Uranium-235	29/26	Lognormal	0.06(U)	0.218	0.093	0.045	0.111	H-UCL

*Minimum or maximum concentrations are nondetects (U-qualified) and the values are the detection limits. One-half of the detection limit was used to calculate the 95% UCLs.

Table H-3.5-2
SWMU 21-013(b) and AOC 21-013(g) Residential COPC Statistics

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	95% UCL Method
Inorganic Chemicals								
Arsenic	117/92	Nonparametric	0.63(U)*	32.1	2.07	2.96	3.26	Chebyshev
Cadmium	117/10	Nonparametric	0.06(U)	2.5	0.273	0.223	0.363	Chebyshev
Chromium	117/109	Lognormal	0.571(U)	27.6	6.47	5.38	8.03	H-UCL
Copper	117/95	Nonparametric	0.54(U)	20.4	4.27	3.22	5.56	Chebyshev
Cyanide (total)	86/14	Nonparametric	0.232(U)	0.297	0.137	0.031	0.152	Chebyshev
Lead	117/113	Nonparametric	0.106(U)	97.4	12.2	10.8	16.6	Chebyshev
Mercury	86/82	Lognormal	0.003	0.2	0.032	0.032	0.038	H-UCL
Nitrate	86/62	Nonparametric	0.958(U)	15.5	2.24	2.53	3.43	Chebyshev
Perchlorate	86/36	Nonparametric	0.0003	0.0039	0.001	0.0005	0.012	Chebyshev
Selenium	117/2	Nonparametric	0.54(U)	1.89(U)	0.678	0.206	0.761	Chebyshev
Silver	110/75	Nonparametric	0.042	14.4	0.371	1.40	0.952	Chebyshev
Thallium	117/40	Nonparametric	0.086	1.2	0.148	0.139	0.204	Chebyshev
Uranium	29/29	Nonparametric	0.752	132	7.19	24.1	26.7	Chebyshev
Semivolatile Organic Compounds								
Anthracene	94/2	Nonparametric	0.011	1.51(U)	0.082	0.138	0.144	Chebyshev
Benzo(a)anthracene	117/1	Nonparametric	0.014	1.46(U)	0.094	0.117	0.142	Chebyshev
Benzo(a)pyrene	117/1	Nonparametric	0.034(U)	1.51(U)	0.099	0.130	0.151	Chebyshev
Benzo(b)fluoranthene	117/3	Nonparametric	0.013	1.51(U)	0.098	0.130	0.150	Chebyshev
Benzoic Acid	117/7	Nonparametric	0.677(U)	30.3(U)	1.24	2.41	2.21	Chebyshev
Bis(2-ethylhexyl)phthalate	117/7	Nonparametric	0.01	8.88	0.553	1.31	1.08	Chebyshev
Chrysene	117/4	Nonparametric	0.019(U)	1.46(U)	0.096	0.121	0.145	Chebyshev
Fluoranthene	117/13	Nonparametric	0.011	0.925	0.100	0.138	0.156	Chebyshev
Phenanthrene	117/9	Nonparametric	0.011	1.46(U)	0.097	0.122	0.146	Chebyshev
Pyrene	117/17	Nonparametric	0.003	0.826	0.100	0.133	0.153	Chebyshev

Table H-3.5-2 (continued)

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	95% UCL Method
PCBs								
Aroclor-1254	86/22	Nonparametric	0.001	0.051	0.010	0.014	0.016	Chebyshev
Aroclor-1260	86/23	Nonparametric	0.001	0.039	0.012	0.014	0.017	Chebyshev
Radionuclides (pCi/g)								
Americium-241	104/63	Lognormal	0.001(U)	1.13	0.119	0.217	0.274	H-UCL
Cesium-137	98/108	Nonparametric	0.004(U)	1.77	0.209	0.346	0.362	Chebyshev
Plutonium-238	124/30	Nonparametric	0.001(U)	0.997	0.020	0.091	0.055	Chebyshev
Plutonium-239	124/105	Nonparametric	0.001(U)	13.7	1.38	2.45	2.34	Chebyshev
Strontium-90	119/22	Nonparametric	0.001(U)	0.52	0.080	0.112	0.125	Chebyshev
Tritium	117/79	Nonparametric	0.003(U)	0.525	0.042	0.070	0.070	Chebyshev
Uranium-234	93/93	Lognormal	0.755	3.75	1.26	0.439	1.32	H-UCL
Uranium-235	95/75	Nonparametric	0.04(U)	0.366	0.088	0.051	0.110	Chebyshev
Uranium-238	93/93	Nonparametric	0.697	4.35	1.32	0.558	1.57	Chebyshev

*Minimum or maximum concentrations are nondetects (U-qualified) and the values are the detection limits. One-half of the detection limit was used to calculate the 95% UCLs.

Table H-3.5-3
SWMU 21-023(c) Residential COPC Statistics

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	95% UCL Method
Inorganic Chemicals								
Aluminum	59/59	Lognormal	418	16300	6196	3661	7913	H-UCL
Antimony	53/12	Nonparametric	0.2(U)[a]	5.3(U)	0.260	0.373	0.484	Chebyshev
Arsenic	59/55	Normal	0.82(U)	4.85	2.17	0.826	2.35	Student's-t
Cadmium	59/13	Nonparametric	0.131	1.2	0.293	0.151	0.378	Chebyshev
Chromium	59/59	Lognormal	0.898	48.1	8.33	7.71	10.9	H-UCL
Copper	59/57	Lognormal	0.61(U)	22.6	4.62	3.51	5.64	H-UCL
Cyanide (total)	53/6	Nonparametric	0.233(U)	5.78	0.255	0.777	0.719	Chebyshev
Lead	59/59	Lognormal	1.2	43.3	13.4	9.10	17.3	H-UCL
Lithium	3/2	n/a[b]	1.2(U)	8.5	3.6	n/a	8.5	Maximum Detect Used
Mercury	53/52	Lognormal	0.004	1.06	0.135	0.222	0.214	H-UCL
Nitrate	53/45	Nonparametric	0.462	3.2	1.07	0.713	1.50	Chebyshev
Perchlorate	43/17	Nonparametric	0.0006	0.0057	0.0016	0.0011	0.0023	Chebyshev
Selenium	59/5	Nonparametric	0.34(U)	0.94	0.763	0.154	0.850	Chebyshev
Silver	59/43	Nonparametric	0.041	24.5	1.18	3.85	3.36	Chebyshev
Strontium	3/3	n/a	1.1	24.9	14.4	n/a	24.9	Maximum Detect Used
Zinc	59/59	Lognormal	8.5	105	31.7	16.0	35.7	H-UCL
Semivolatile Organic Compounds								
Anthracene	65/1	Nonparametric	0.009	0.66(U)	0.075	0.110	0.134	Chebyshev
Benzo(a)pyrene	65/2	Nonparametric	0.034(U)	0.66(U)	0.076	0.109	0.135	Chebyshev
Benzo(b)fluoranthene	65/5	Nonparametric	0.012	0.66(U)	0.077	0.109	0.136	Chebyshev
Benzoic acid	65/2	Nonparametric	0.682(U)	3.3(U)	0.696	0.523	0.979	Chebyshev
Bis(2-ethylhexyl)phthalate	65/2	Nonparametric	0.17(U)	0.803(U)	0.159	0.111	0.219	Chebyshev
Chrysene	65/5	Nonparametric	0.014	0.66(U)	0.076	0.109	0.135	Chebyshev
Di-n-butylphthalate	65/1	Nonparametric	0.34(U)	1.6(U)	0.264	0.179	0.359	Chebyshev

Table H-3.5-3 (continued)

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	95% UCL Method
Fluoranthene	65/13	Nonparametric	0.016(U)	0.66(U)	0.105	0.122	0.171	Chebyshev
Methylnaphthalene[2-]	65/2	Nonparametric	0.034(U)	0.66(U)	0.076	0.109	0.135	Chebyshev
Naphthalene	65/2	Nonparametric	0.014	0.66(U)	0.075	0.110	0.134	Chebyshev
Pentachlorophenol	65/1	Nonparametric	0.187(U)	3.3(U)	0.456	0.515	0.734	Chebyshev
Phenanthrene	65/5	Nonparametric	0.013	0.66(U)	0.076	0.110	0.135	Chebyshev
Pyrene	65/11	Nonparametric	0.012	0.66(U)	0.077	0.110	0.137	Chebyshev
PCBs								
Aroclor-1242	13/1	Nonparametric	0.003(U)	0.086(U)	0.011	0.017	0.031	Chebyshev
Aroclor-1254	13/3	Nonparametric	0.003(U)	0.086(U)	0.011	0.017	0.031	Chebyshev
Aroclor-1260	13/7	Nonparametric	0.002	0.086(U)	0.014	0.017	0.034	Chebyshev
Radionuclides (pCi/g)								
Americium-241	72/54	Lognormal	0.002(U)	44.4	3.79	8.28	8.04	Chebyshev[c]
Cesium-137	57/28	Lognormal	0.001(U)	2.65	0.237	0.463	0.853	H-UCL
Plutonium-238	72/13	Lognormal	0.001(U)	0.156	0.021	0.034	0.035	H-UCL
Plutonium-239	73/68	Nonparametric	0.005(U)	28.9	3.65	6.17	6.80	Chebyshev
Strontium-90	68/9	Lognormal	0.01(U)	0.53	0.079	0.092	0.107	H-UCL
Tritium	60/37	Lognormal	0.004(U)	0.56	0.054	0.103	0.073	H-UCL
Uranium-234	62/62	Nonparametric	0.868	6.51	1.43	0.822	1.88	Chebyshev
Uranium-235	65/39	Lognormal	0.009(U)	0.44	0.097	0.091	0.123	H-UCL
Uranium-238	62/62	Nonparametric	0.731	5.67	1.44	0.738	1.85	Chebyshev

[a] Minimum or maximum concentrations are nondetects (U-qualified) and the values are the detection limits. One-half of the detection limit was used to calculate the 95% UCLs.

[b] n/a = Not applicable.

[c] The H-UCL exceeded the maximum activity; therefore, the Chebyshev distribution was used to estimate the 95% UCL.

Table H-3.5-4
Consolidated Unit 21-018(a)-99 Ecological COPC Statistics

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	95% UCL Method
Inorganic Chemicals								
Aluminum	193/193	Nonparametric	4.8	28400	6751	5183	8378	Chebyshev
Antimony	177/19	Nonparametric	0.2(U)[a]	5.3(U)	0.214	0.214	0.284	Chebyshev
Arsenic	193/163	Nonparametric	0.63(U)	32.1	2.19	2.41	2.95	Chebyshev
Barium	193/185	Lognormal	3.04	364	67.3	58.2	80.8	H-UCL
Beryllium	193/159	Lognormal	0.2(U)	1.55	0.474	0.243	0.503	H-UCL
Cadmium	193/25	Nonparametric	0.05(U)	2.5	0.281	0.193	0.342	Chebyshev
Chromium	193/185	Lognormal	0.571(U)	48.1	7.31	6.27	8.68	H-UCL
Cobalt	193/154	Lognormal	0.2	9.78	1.91	1.69	2.20	H-UCL
Copper	193/171	Lognormal	0.81(U)	22.6	4.63	3.38	5.29	H-UCL
Cyanide (total)	156/24	Nonparametric	0.232(U)	5.78	0.178	0.454	0.337	Chebyshev
Iron	193/192	Nonparametric	6.1(U)	21100	7163	3811	8358	Chebyshev
Lead	193/189	Nonparametric	1.06(U)	97.4	12.3	9.54	15.3	Chebyshev
Lithium	2/2	n/a[b]	3.6	8.5	6.05	n/a	8.5	Maximum Detect Used
Manganese	193/193	Normal	22.4	578	241	95.7	253	Student's-t
Mercury	156/151	Lognormal	0.003	1.06	0.066	0.140	0.067	H-UCL
Nickel	193/162	Lognormal	0.63(U)	19.2	3.92	2.94	4.40	H-UCL
Nitrate	156/120	Nonparametric	0.231	15.5	1.86	2.23	2.64	Chebyshev
Perchlorate	148/60	Nonparametric	0.0003	0.14(U)	0.002	0.008	0.005	Chebyshev
Selenium	193/9	Nonparametric	0.34(U)	8.41(U)	0.753	0.405	0.880	Chebyshev
Silver	186/131	Nonparametric	0.07(U)	24.5	0.611	2.44	1.39	Chebyshev
Strontium	2/2	n/a	14.4	24.9	19.7	n/a	24.9	Maximum Detect Used
Thallium	193/77	Nonparametric	0.086	1.07(U)	0.140	0.082	0.166	Chebyshev
Uranium	28/28	Nonparametric	0.752	132	7.28	24.5	27.5	Chebyshev

Table H-3.5-4 (continued)

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	95% UCL Method
Vanadium	193/174	Nonparametric	1.2(U)	39.5	10.2	7.53	12.5	Chebyshev
Zinc	193/192	Nonparametric	5.6	105	30.7	13.2	34.8	Chebyshev
Semivolatile Organic Compounds								
Acenaphthene	212/1	Nonparametric	0.034(U)	1.51(U)	0.082	0.117	0.117	Chebyshev
Acenaphthylene	212/1	Nonparametric	0.034(U)	1.51(U)	0.082	0.117	0.117	Chebyshev
Anthracene	212/5	Nonparametric	0.009	1.51(U)	0.082	0.117	0.117	Chebyshev
Benzo(a)anthracene	212/2	Nonparametric	0.014(U)	1.46(U)	0.080	0.109	0.113	Chebyshev
Benzo(a)pyrene	212/4	Nonparametric	0.034(U)	1.51(U)	0.083	0.117	0.118	Chebyshev
Benzo(b)fluoranthene	212/9	Nonparametric	0.012	1.51(U)	0.083	0.117	0.118	Chebyshev
Benzo(g,h,i)perylene	212/1	Nonparametric	0.034(U)	1.51(U)	0.085	0.123	0.122	Chebyshev
Benzoic acid	212/10	Nonparametric	0.674(U)	30.3(U)	0.958	1.84	1.51	Chebyshev
Bis(2-ethylhexyl)phthalate	212/9	Nonparametric	0.01	8.88	0.378	0.995	0.676	Chebyshev
Bromophenyl-phenylether[4-]	212/1	Nonparametric	0.036	15.1(U)	0.409	0.923	0.686	Chebyshev
Chloro-3-methylphenol[4-]	212/1	Nonparametric	0.071	15.1(U)	0.417	0.923	0.693	Chebyshev
Chloronaphthalene[2-]	212/1	Nonparametric	0.034(U)	1.51(U)	0.082	0.117	0.117	Chebyshev
Chrysene	212/10	Nonparametric	0.019(U)	1.46(U)	0.081	0.111	0.115	Chebyshev
Di-n-butylphthalate	212/1	Nonparametric	0.33(U)	15.1(U)	0.410	0.923	0.687	Chebyshev
Fluoranthene	212/28	Nonparametric	0.016(U)	0.925	0.093	0.019	0.131	Chebyshev
Fluorene	212/1	Nonparametric	0.034(U)	1.51(U)	0.082	0.117	0.117	Chebyshev
Indeno(1,2,3-cd)pyrene	212/1	Nonparametric	0.034(U)	1.51(U)	0.085	0.123	0.121	Chebyshev
Methylnaphthalene[2-]	212/3	Nonparametric	0.034(U)	1.51(U)	0.082	0.117	0.117	Chebyshev
Naphthalene	212/3	Nonparametric	0.014	1.51(U)	0.082	0.117	0.117	Chebyshev
Nitroaniline[3-]	212/1	Nonparametric	0.337(U)	15.1(U)	0.522	0.949	0.806	Chebyshev
Pentachlorophenol	212/1	Nonparametric	0.187(U)	15.1(U)	0.521	0.950	0.805	Chebyshev
Phenanthrene	212/15	Nonparametric	0.011	1.46(U)	0.082	0.112	0.115	Chebyshev
Pyrene	212/32	Nonparametric	0.003	0.826	0.084	0.119	0.119	Chebyshev

Table H-3.5-4 (continued)

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)	95% UCL Method
PCBs								
Aroclor-1242	99/1	Nonparametric	0.003(U)	0.086(U)	0.011	0.015	0.017	Chebyshev
Aroclor-1254	99/25	Nonparametric	0.001	0.051	0.010	0.014	0.016	Chebyshev
Aroclor-1260	99/30	Nonparametric	0.001	0.086(U)	0.011	0.014	0.017	Chebyshev
Radionuclides (pCi/g)								
Americium-241	194/120	Nonparametric	0.001(U)	44.4	1.47	5.33	3.14	Chebyshev
Cesium-137	172/73	Nonparametric	0.001(U)	2.65	0.200	0.376	0.325	Chebyshev
Plutonium-238	213/43	Nonparametric	0.001(U)	0.997	0.019	0.072	0.041	Chebyshev
Plutonium-239	214/182	Nonparametric	0.001(U)	28.9	2.06	4.22	3.31	Chebyshev
Sodium-22	156/1	Nonparametric	0.001(U)	0.27	0.025	0.025	0.033	Chebyshev
Strontium-90	204/30	Nonparametric	0.001(U)	0.53	0.077	0.102	0.108	Chebyshev
Tritium	194/125	Lognormal	0.003(U)	1.31	0.052	0.119	0.056	H-UCL
Uranium-234	171/171	Nonparametric	0.396	6.51	1.30	0.620	1.51	Chebyshev
Uranium-235	177/130	Nonparametric	0.009(U)	0.44	0.092	0.067	0.114	Chebyshev
Uranium-238	171/171	Nonparametric	0.413	5.67	1.33	0.622	1.54	Chebyshev

[a] Minimum or maximum concentrations are nondetects (U-qualified) and the values are the detection limits. One-half of the detection limit was used to calculate the 95% UCLs.

[b] n/a = Not applicable.

Table H-4.1-1
Parameters Used to Calculate Chemical SSLs

Parameters	Residential Values
Target hazard quotient	1
Target cancer risk	10^{-5}
Averaging time (carcinogen)	70 yr x 365 days
Averaging time (noncarcinogen)	ED x 365 days
Skin absorption factor	SVOC = 0.1 / Chemical-specific
Adherence factor–child	0.2 mg/cm^2
Body weight–child	15 kg (0–6 years of age)
Cancer slope factor–oral (chemical-specific)	(mg/kg-day)$^{-1}$
Cancer slope factor–inhalation (chemical-specific)	(mg/kg-day)$^{-1}$
Exposure frequency	350 day/yr
Exposure duration–child	6 yr (0–6 years of age)
Age-adjusted ingestion factor	114 mg-yr/kg-day
Age-adjusted inhalation factor	11 m^3-yr/kg-day
Inhalation rate–child	10 m^3/day
Soil ingestion rate–child	200 mg/day
Particulate emission factor	6.61 x 10^9 m^3/kg
Reference dose–oral (chemical-specific)	(mg/kg-day)
Reference dose–inhalation (chemical-specific)	(mg/kg-day)
Exposed surface area–child	2800 cm^2/day (head, hands, forearms, lower legs, feet)
Age-adjusted skin contact factor for carcinogens	360 mg-yr/kg-day
Volatilization factor for soil (chemical-specific)	(m^3/kg)
Body weight–adult	70 kg
Exposure duration*	30 yr
Adherence factor–adult	0.07 mg/cm^2
Soil ingestion rate–adult	100 mg/day
Exposed surface area–adult	5700 cm^2/day (head, hands, forearms, lower legs)
Inhalation rate–adult	20 m^3/day

Source: NMED 2006, 092513.

* Exposure duration for lifetime resident is 30 yr. For carcinogens, the exposures are combined for child (6 yr) and adult (24 yr).

Table H-4.1-2
Parameters Used in the SAL Calculations for Radionuclides, Residential

Parameters	Residential, Child	Residential, Adult
Inhalation rate (m^3/yr)	3652.5[a]	7305[b]
Mass loading (g/m^3)	1.5 x 10^{-7} [c]	1.5 x 10^{-7} [c]
Outdoor time fraction	0.2236[d]	0.0599[e]
Indoor time fraction	0.7347[f]	0.8984[g]
Soil ingestion (g/yr)	73[h]	36.5[i]

[a] Calculated as [10 m^3/day x 350 day/yr] / [indoor + outdoor time fractions], where 10 m^3/day is the daily inhalation rate of a child (NMED 2006, 092513).

[b] Calculated as [20 m^3/day x 350 day/yr] / [indoor + outdoor time fractions], where 20 m^3/day is the daily inhalation rate of an adult (NMED 2006, 092513).

[c] Calculated as [1/ 6.6 x 10+9 m^3/kg) x 1000 g/kg, where 6.6 x 10+9 m^3/kg is the particulate emission factor (NMED 2006, 092513).

[d] Calculated as [5.6 hr/day x 350 day/yr] / 8766 hr/yr, where 5.6 hr/day is an estimate of time spent outdoors for a 3–11 yr old child (EPA 1997, 066598, Section 15.4-1).

[e] Calculated as [1.5 hr/day x 350 day/yr] / 8766 hr/yr, where 1.5 hr/day is an estimate of time spent outdoors for an adult 12 yr and older (EPA 1997, 066598, Section 15.4-1).

[f] Calculated as [24-5.6 hr/day x 350 day/yr] / 8766 hr/yr.

[g] Calculated as [24-1.5 hr/day x 350 day/yr] / 8766 hr/yr.

[h] Calculated as [0.2 g/day x 350 day/yr] / [indoor + outdoor time fractions], where 0.2 g/day is the child soil ingestion rate (NMED 2006, 092513).

i Calculated as [0.1 g/day x 350 day/yr] / [indoor + outdoor time fractions], where 0.1 g/day is the adult soil ingestion rate (NMED 2006, 092513).

Table H-4.1-3
SWMU 21-018(a) and SWMU 21-018(b) Carcinogenic Screening Evaluation

COPC	95% UCL 0 to 10 ft bgs (mg/kg)	Residential SSL[a] (mg/kg)	Residential Cancer Risk
Inorganic Chemicals			
Arsenic	3.33	3.9	8.54E-06
Chromium (total)	12.4	2100[b]	5.90E-08
Semivolatile Organic Compounds			
Benzo(a)anthracene	0.073	6.21	1.18E-07
Benzo(a)pyrene	0.084	0.621	1.35E-06
Benzo(b)fluoranthene	0.083	6.21	1.34E-07
Chrysene	0.076	615	1.24E-09
Indeno(1,2,3-cd)pyrene	0.086	6.21	1.38E-07
		Total Excess Cancer Risk	**1.03E-05**

[a] SSLs from NMED 2006, 092513, unless otherwise noted.

[b] Value from Region 6 EPA 2005, 091002.

Table H-4.1-4
SWMU 21-018(a) and SWMU 21-018(b) Noncarcinogenic Screening Evaluation

COPC	95% UCL 0 to 10 ft bgs (mg/kg)	Residential SSL[a] (mg/kg)	Residential HQ
Inorganic Chemicals			
Aluminum	18818	77800	0.242
Arsenic	3.33	22[b]	0.151
Barium	188	15600	0.012
Beryllium	0.971	156	0.0062
Cadmium	0.326	39	0.0084
Cobalt	6.57	1520	0.0043
Copper	8.70	3130	0.0028
Cyanide (total)	0.193	1220	0.0002
Lead	11.3	400	0.028
Manganese	350	3590	0.097
Nickel	9.47	1560	0.0061
Nitrate	4.06	100000	0.00004
Perchlorate	0.030	55[b]	0.0005
Selenium	1.72	391	0.0044
Silver	0.364	391	0.0009
Vanadium	24.4	78.2	0.312
Zinc	33.7	23500	0.0014
Semivolatile Organic Compounds			
Acenaphthene	0.073	3730	0.00002
Acenaphthylene[c]	0.073	2290	0.00003
Anthracene	0.073	22000	0.000003
Benzo(g,h,i)perylene[c]	0.077	2290	0.00003
Benzoic acid	0.546	100000[b]	0.000005
Bromophenyl-phenylether[4-]	0.201	No SSL	n/a[d]
Chloro-3-methylphenol[4-][e]	0.197	166	0.0012
Chloronaphthalene[2-][f]	0.073	79.5	0.00092
Fluoranthene	0.079	2290	0.00003
Fluorene	0.073	2660	0.00003
Methylnaphthalene[2-][f]	0.073	79.5	0.00092
Naphthalene	0.073	79.5	0.00092
Nitroaniline[3-][g]	0.269	180[b]	0.0015

Table H-4.1-4 (continued)

COPC	95% UCL 0 to 10 ft bgs (mg/kg)	Residential SSLa (mg/kg)	Residential HQ
Phenanthrene	0.075	1830	0.00004
Pyrene	0.074	2290	0.00003
		HI	**0.9**

[a] SSLs from NMED 2006, 092513, unless otherwise noted.

[b] Value from Region 6 EPA (2005, 091002).

[c] Pyrene was used as a surrogate compound based on structural similarity.

[d] n/a = Not applicable

[e] Chlorophenol was used as a surrogate compound based on structural similarity.

[f] Naphthalene was used as a surrogate compound based on structural similarity.

[g] 2-Nitroaniline was used as a surrogate compound based on structural similarity.

Table H-4.1-5
SWMU 21-018(a) and SWMU 21-018(b) Radionuclide Screening Evaluation

COPC	95% UCL 0 to 10 ft bgs (pCi/g)	Residential SAL* (pCi/g)	Residential Dose (mrem/yr)
Americium-241	0.019	30	0.0095
Cesium-137	0.045	5.6	1.2
Cobalt-60	0.039	1.3	0.450
Plutonium-239	0.558	33	0.254
Sodium-22	0.052	1.6	0.488
Tritium	2.49	750	0.050
Uranium-234	1.45	170	0.128
Uranium-235	0.111	17	0.098
		Total Dose	**1.6**

*SALs from LANL 2005, 088493.

Table H-4.1-6
SWMU 21-013(b) and AOC 21-013(g) Carcinogenic Screening Evaluation

COPC	95% UCL 0 to 10 ft bgs (mg/kg)	Residential SSL[a] (mg/kg)	Residential Cancer Risk
Inorganic Chemicals			
Arsenic	3.26	3.9	8.36E-06
Chromium (total)	8.03	2100[b]	3.82E-08
Semivolatile Organic Compounds			
Benzo(a)anthracene	0.142	6.21	2.29E-07
Benzo(a)pyrene	0.151	0.621	2.43E-06
Benzo(b)fluoranthene	0.150	6.21	2.42E-07
Bis(2-ethylhexyl)phthalate	1.08	347	3.11E-08
Chrysene	0.145	615	2.36E-09
PCBs			
Aroclor-1254	0.016	2.2[b]	7.27E-08
Aroclor-1260	0.017	2.2[b]	7.73E-08
		Total Excess Cancer Risk	**1.2E-05**

[a] SSLs from NMED 2006, 092513, unless otherwise noted.

[b] Value from Region 6 EPA (2005, 091002).

Table H-4.1-7
SWMU 21-013(b) and AOC 21-013(g) Noncarcinogenic Screening Evaluation

COPC	95% UCL 0 to 10 ft bgs (mg/kg)	Residential SSL[a] (mg/kg)	Residential HQ
Inorganic Chemicals			
Arsenic	3.26	22[b]	0.15
Cadmium	0.363	39	0.0093
Copper	5.56	3130	0.0018
Cyanide (total)	0.152	1220	0.00012
Lead	16.6	400	0.0415
Mercury	0.038	23[b]	0.0017
Nitrate	3.43	100000	0.00003
Perchlorate	0.012	55[b]	0.00022
Selenium	0.761	391	0.0019
Silver	0.952	391	0.0024
Thallium	0.204	5.16	0.0395
Uranium	26.7	16[c]	1.67
Semivolatile Organic Compounds			
Anthracene	0.144	22000	0.000007
Benzoic acid	2.21	100000[b]	0.00002
Fluoranthene	0.156	2290	0.00007
Phenanthrene	0.146	1830	0.00008
Pyrene	0.153	2290	0.00007
PCBs			
Aroclor-1254	0.016	1.12	0.014
Aroclor-1260	0.017	1.12	0.015
		HI	**1.96**

[a] SSLs from NMED 2006, 092513, unless otherwise noted.

[b] Value from Region 6 EPA (2005, 091002).

[c] Value from Region 9 EPA (http://www.epa.gov/region09/waste/sfund/prg/).

Table H-4.1-8
SWMU 21-013(b) and AOC 21-013(g) Radionuclide Screening Evaluation

COPC	95% UCL 0 to 10 ft bgs (pCi/g)	Residential SAL* (pCi/g)	Residential Dose (mrem/yr)
Americium-241	0.274	30	0.137
Cesium-137	0.362	5.6	0.970
Plutonium-238	0.055	37	0.022
Plutonium-239	2.34	33	1.064
Strontium -90	0.125	5.7	0.329
Tritium	0.070	750	0.001
Uranium-234	1.32	170	0.116
Uranium-235	0.110	17	0.097
Uranium-238	1.57	86	0.274
		Total Dose	**3.0**

*SALs from LANL 2005, 088493.

Table H-4.1-9
SWMU 21-013(b) 2007 Slope Sampling Results, Comparison to 2005–2006 Data and SSLs

Semivolatile Organic Compound	Range of Concentrations (mg/kg)	Maximum Detected Concentrations (mg/kg)	2005–2006 95% UCL (mg/kg)	SSL[a] (mg/kg)
Benzo(b)fluoranthene	[0.138]–0.708 (J)	0.708 (J)	0.150	6.21
Benzo(k)fluoranthene	0.0491 (J)–[0.144]	0.0491 (J)	n/a[b]	6.21
Chrysene	0.0726 (J)–[0.144]	0.0726 (J)	0.145	615
Fluoranthene	0.0437 (J)–[0.144]	0.11 (J)	0.156	2290
Phenanthrene	0.0524 (J)–[0.144]	0.121 (J)	0.146	1830
Pyrene	0.115 (J)–[0.144]	0.137 (J)	0.153	2290

[a] SSLs from (NMED 2006, 092513).

[b] n/a = Not applicable; benzo(k)fluoranthene not detected in 2005–2006 samples.

Table H-4.1-10
SWMU 21-023(c) Carcinogenic Screening Evaluation

COPC	95% UCL 0 to 10 ft bgs (mg/kg)	Residential SSL[a] (mg/kg)	Residential Cancer Risk
Inorganic Chemicals			
Arsenic	2.35	3.9	6.03E-06
Chromium (total)	10.9	2100[b]	5.19E-08
Semivolatile Organic Compounds			
Benzo(a)pyrene	0.135	0.621	2.17E-06
Benzo(b)fluoranthene	0.136	6.21	2.19E-07
Bis(2-ethylhexyl)phthalate	0.219	347	6.31E-09
Chrysene	0.135	615	2.20E-09
Pentachlorophenol	0.734	29.8	2.46E-07
PCBs			
Aroclor-1242	0.031	2.2[b]	1.41E-07
Aroclor-1254	0.031	2.2[b]	1.41E-07
Aroclor-1260	0.034	2.2[b]	1.55E-07
		Total Cancer Risk	**9.2E-06**

[a] SSLs from NMED 2006, 092513, unless otherwise noted.

[b] Value from Region 6 EPA (2005, 091002).

Table H-4.1-11
SWMU 21-023(c) Noncarcinogenic Screening Evaluation

COPC	95% UCL 0 to 10 ft bgs (mg/kg)	Residential SSL[a] (mg/kg)	Residential HQ
Inorganic Chemicals			
Aluminum	7913	77800	0.102
Antimony	0.484	31.3	0.0155
Arsenic	2.35	22[b]	0.11
Cadmium	0.378	39	0.0097
Copper	5.64	3130	0.0018
Cyanide (total)	0.719	1220	0.0006
Lead	17.3	400	0.0433
Lithium	8.5[c]	1600[b]	0.0053
Mercury	0.214	23[b]	0.0093
Nitrate	1.5	100000	0.00002
Perchlorate	0.0023	55[b]	0.00004
Selenium	0.850	391	0.0022
Silver	3.36	391	0.0086
Strontium	24.9[b]	46900	0.0005
Zinc	35.7	23500	0.0015
Semivolatile Organic Compounds			
Anthracene	0.134	22000	0.000006
Benzoic acid	0.979	100000[b]	0.00001
Di-n-butyl phthalate	0.359	6110	0.00006
Fluoranthene	0.171	2290	0.00007
Methylnaphthalene[2-][d]	0.135	79.5	0.0017
Naphthalene	0.134	79.5	0.0017
Phenanthrene	0.135	1830	0.00007
Pyrene	0.137	2290	0.00006
PCBs			
Aroclor-1242	0.031	1.12	0.028
Aroclor-1254	0.031	1.12	0.028
Aroclor-1260	0.034	1.12	0.030
		HI	**0.4**

[a] SSLs from NMED 2006, 092513, unless otherwise noted.

[b] Value from Region 6 EPA (2005, 091002).

[c] Maximum detected concentration used.

[d] Naphthalene was used as a surrogate compound based on structural similarity.

Table H-4.1-12
SWMU 21-023(c) Radionuclide Screening Evaluation

COPC	95% UCL 0 to 10 ft bgs (pCi/g)	Residential SAL* (pCi/g)	Residential Dose (mrem/yr)
Americium-241	8.04	30	4.02
Cesium-137	0.853	5.6	2.28
Plutonium-238	0.035	37	0.01
Plutonium-239	6.80	33	3.09
Strontium-90	0.107	5.7	0.282
Tritium	0.073	750	0.00
Uranium-234	1.88	170	0.17
Uranium-235	0.123	17	0.11
Uranium-238	1.85	86	0.32
		Total Dose	**10.3**

*SALs from LANL 2005, 088493.

Table H-4.2-1
Consolidated Unit 21-018(a)-99 Pore Gas 0- to 5-ft COPC Statistics

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (µg/m³)	Maximum Concentration (µg/m³)	Mean Concentration (µg/m³)	Standard Deviation (µg/m³)	95% UCL (µg/m³)	95% UCL Method
Acetone	8/8	Lognormal	43	200	114	55.0	197	H-UCL
Benzene	8/3	Lognormal	1.45	5.4	3.00	1.52	5.02	H-UCL
Butanol[1-]	5/1	Nonparametric	5.5	720	149	319	359	Standard Bootstrap
Butanone[2-]	8/8	Lognormal	4.4	26	16.0	8.01	20.3	Standard Bootstrap
Carbon Disulfide	8/3	Lognormal	0.8	7.6	2.88	2.63	6.66	Chebyshev (MVUE)
Carbon Tetrachloride	8/5	Nonparametric	1.7	8.9	4.13	2.82	8.48	Chebyshev
Chloroform	8/5	Lognormal	1.2	36	12.4	12.3	31.3	Chebyshev
Chloromethane	8/3	Nonparametric	0.88	3.95	3.05	1.17	3.69	Standard Bootstrap
Dichlorodifluoromethane	8/3	Nonparametric	2.25	3.7	2.80	0.65	3.11	Standard Bootstrap
Ethanol	5/2	Lognormal	3.45	470	102	206	280	Chebyshev (MVUE)
Ethylbenzene	8/4	Nonparametric	2	5.2	2.49	1.11	4.20	Chebyshev
Ethyltoluene[4-]	8/3	Lognormal	1.2	4.7	2.20	1.13	3.31	H-UCL
Heptane[n-]	5/1	Nonparametric	1.85	13	4.10	4.98	7.42	Standard Bootstrap
Hexane	8/4	Nonparametric	1.6	7.3	2.50	1.98	5.54	Chebyshev
Methanol	5/1	Nonparametric	60	340	116	125	199	Standard Bootstrap
Methyl-2-pentanone[4-]	8/2	Nonparametric	1	2.7	1.89	0.46	2.60	Chebyshev
Propanol[2-]	5/2	Nonparametric	4.5	62	17.4	25.1	33.6	Standard Bootstrap
Styrene	8/8	Lognormal	0.98	170	56.3	63.3	154	Chebyshev
Tetrachloroethene	8/6	Lognormal	1.4	11	5.68	3.32	10.8	Chebyshev
Tetrahydrofuran	8/3	Nonparametric	1.35	12	5.33	4.48	7.70	Standard Bootstrap
Toluene	8/8	Lognormal	14	33	21.8	7.76	29.4	H-UCL
Trichloro-1,2,2-trifluoroethane[1,1,2-]	8/2	Nonparametric	1.6	3.65	2.88	0.96	3.39	Standard Bootstrap

Table H-4.2-1 (continued)

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (µg/m³)	Maximum Concentration (µg/m³)	Mean Concentration (µg/m³)	Standard Deviation (µg/m³)	95% UCL (µg/m³)	95% UCL Method
Trichloroethane[1,1,1-]	8/4	Lognormal	1.35	38	11.3	13.1	37.0	Chebyshev (MVUE)
Trichloroethene	8/8	Lognormal	1.1	34	15.4	12.7	22.4	Standard Bootstrap
Trichlorofluoromethane	8/3	Nonparametric	2.1	2.7	2.49	0.22	2.61	Standard Bootstrap
Trimethylbenzene[1,2,4-]	8/4	Nonparametric	2.25	7.2	3.08	1.69	5.68	Chebyshev
Trimethylbenzene[1,3,5-]	8/1	Nonparametric	1	2.35	1.87	0.59	2.20	Standard Bootstrap
Vinyl acetate	3/1	na[a]	0.9	4.2	2.0	na	4.2[b]	na
Xylene[1,2-]	8/5	Nonparametric	2	5.9	2.99	1.55	5.38	Chebyshev
Xylene[1,3-]+Xylene[1,4-]	8/8	Lognormal	5.5	17	9.66	4.43	13.9	H-UCL

[a] na = Not available.

[b] Maximum detected value.

Table H-4.2-2
Consolidated Unit 21-018(a)-99 Pore Gas 5- to 100-ft COPC Statistics

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (µg/m³)	Maximum Concentration (µg/m³)	Mean Concentration (µg/m³)	Standard Deviation (µg/m³)	95% UCL (µg/m³)	95% UCL Method
Acetone	49/48	Nonparametric	0.6	260	75.1	64.4	115	Chebyshev
Benzene	49/6	Nonparametric	0.73	14	2.22	2.48	3.77	Chebyshev
Bromodichloromethane	49/1	Nonparametric	0.65	3.35	2.85	0.70	3.29	Chebyshev
Butanol[1-]	42/8	Nonparametric	5.5	22	6.04	2.53	7.74	Chebyshev
Butanone[2-]	49/35	Nonparametric	0.75	34	6.91	7.85	11.8	Chebyshev
Carbon Disulfide	49/8	Nonparametric	0.8	27	2.40	3.74	4.73	Chebyshev
Carbon Tetrachloride	49/16	Nonparametric	1.6	21	4.85	4.11	7.41	Chebyshev
Chloroform	49/24	Nonparametric	1.2	120	13.4	22.6	27.5	Chebyshev
Chloromethane	49/6	Nonparametric	0.5	4.15	3.51	0.90	4.07	Chebyshev
Dichlorodifluoromethane	49/6	Nonparametric	1.25	3.4	2.33	0.30	2.52	Chebyshev
Dichloroethane[1,1-]	49/2	Nonparametric	0.41	4.0	1.78	0.52	2.11	Chebyshev
Dichloroethane[1,2-]	49/2	Nonparametric	0.41	4.2	1.80	0.52	2.12	Chebyshev
Dichloropropane[1,2-]	49/1	Nonparametric	0.46	5.2	2.04	0.65	2.44	Chebyshev
Dioxane[1,4-]	42/1	Nonparametric	6.5	25	7.08	2.84	8.99	Chebyshev
Ethanol	42/4	Nonparametric	3.3	21	4.43	3.28	6.64	Chebyshev
Ethylbenzene	49/4	Nonparametric	0.44	21	2.33	2.74	4.04	Chebyshev
Ethyltoluene[4-]	49/2	Nonparametric	1.0	55	3.26	7.56	7.97	Chebyshev
Heptane[n-]	42/3	Nonparametric	1.8	11	2.33	1.70	3.48	Chebyshev
Hexane	45/6	Nonparametric	0.9	26	2.87	4.52	5.81	Chebyshev
Methanol	42/1	Nonparametric	55	120	61.9	9.37	68.2	Chebyshev
Methyl-2-pentanone[4-]	49/1	Nonparametric	0.8	5.2	1.84	0.59	2.21	Chebyshev
Methylene Chloride	49/2	Nonparametric	0.35	11	1.65	1.42	2.53	Chebyshev
Propanol[2-]	42/1	Nonparametric	4.3	24	5.04	3.00	7.06	Chebyshev

Table H-4.2-2 (continued)

COPC	Number of Analyses/ Detects	Distribution Type	Minimum Concentration (µg/m³)	Maximum Concentration (µg/m³)	Mean Concentration (µg/m³)	Standard Deviation (µg/m³)	95% UCL (µg/m³)	95% UCL Method
Propylene	42/18	Nonparametric	3.0	310	17.4	51.3	51.8	Chebyshev
Styrene	49/30	Nonparametric	0.43	86	26.4	26.6	42.9	Chebyshev
Tetrachloroethene	49/18	Nonparametric	1.7	20	5.10	3.69	7.40	Chebyshev
Toluene	49/46	Nonparametric	1.7	46	12.1	8.44	17.4	Chebyshev
Trichloro-1,2,2-trifluoroethane[1,1,2-]	49/2	Nonparametric	1.55	3.85	3.33	0.63	3.72	Chebyshev
Trichloroethane[1,1,1-]	49/37	Lognormal	1.35	170	13.6	24.1	16.9	H-UCL
Trichloroethene	49/46	Lognormal	1.35	260	37.9	45.0	57.1	H-UCL
Trichlorofluoromethane	49/4	Nonparametric	1.1	2.9	2.49	0.38	2.73	Chebyshev
Trimethylbenzene[1,2,4-]	49/4	Nonparametric	0.84	95	4.13	13.3	12.4	Chebyshev
Trimethylbenzene[1,3,5-]	49/1	Nonparametric	1.0	30	2.71	4.00	5.20	Chebyshev
Vinyl Chloride	49/1	Nonparametric	0.26	3.9	1.13	0.49	1.43	Chebyshev
Xylene (Total)	5/4	Lognormal	1.1	110	26.5	46.9	84.0	Chebyshev (MVUE)
Xylene[1,2-]	49/6	Nonparametric	0.44	31	2.53	4.18	5.13	Chebyshev
Xylene[1,3-]+Xylene[1,4-]	44/44	Nonparametric	1.3	9.5	4.16	2.35	5.70	Chebyshev

Table H-4.2-3
Comparison of Pore-Gas Concentrations to Screening Values, Consolidated Unit 21-018(a)-99

COPC	95 % UCL 0 to 5 ft (µg/m^3)	Target Shallow Soil Gas Concentration (R=10^{-5}, HI=1)[a]	Hazard Quotient	Cancer Risk	95 % UCL 5 to 100 ft (µg/m^3)	Target Deep Soil Gas Concentration (R=10^{-5}, HI=1)[a]	Hazard Quotient	Cancer Risk
Acetone	197	3500 NC[b]	0.056	—[c]	115	35000 NC	0.003	—
Benzene	5.02	31 C[d]	—	**1.6E-06**	3.77	310 C	—	1.2E-07
Bromodichloromethane	ND[e]	14 C	—	—	3.29	140 C	—	2.4E-07
Butanol[1-]	359	na[f]	—	—	7.74	na	—	—
Butanone[2-]	20.3	na	—	—	11.8	na	—	—
Carbon Disulfide	6.66	7000 NC	0.001	—	4.73	70000 NC	0.0001	—
Carbon Tetrachloride	8.48	16 C	—	**5.3E-06**	7.41	160 C	—	4.6E-07
Chloroform	31.3	11 C	—	**2.8E-05**	27.5	110 C	—	**2.5E-06**
Chloromethane	3.69	240 C	—	1.5E-07	4.07	2400 C	—	1.7E-08
Dichlorodifluoromethane	3.11	2000 NC	0.002	—	2.52	20000 NC	0.0001	—
Dichloroethane[1,1-]	ND	5000 NC	—	—	2.11	50000 NC	0.00004	—
Dichloroethane[1,2-]	ND	9.4 C	—	—	2.12	94 C	—	2.3E-07
Dichloropropane[1,2-]	ND	40 NC	—	—	2.44	400 NC	0.006	—
Dioxane[1,4-]	ND	na	—	—	8.99	na	—	—
Ethanol	280	na	—	—	6.64	na	—	—
Ethylbenzene	4.20	220 C	—	1.9E-07	4.04	2200 C	—	1.8E-08
Ethyltoluene[4-]	3.31	na	—	—	7.97	na	—	—
Heptane[n-]	7.42	na	—	—	3.48	na	—	—
Hexane	5.54	2000 NC	0.003	—	5.81	20000 NC	0.0003	—
Methanol	199	na	—	—	68.2	na	—	—
Methyl-2-pentanone[4-]	2.60	na	—	—	2.21	na	—	—
Methylene Chloride	ND	520 C	—	—	2.53	5200 C	—	4.9E-09

Table H-4.2-3 (continued)

COPC	95 % UCL 0 to 5 ft (µg/m³)	Target Shallow Soil Gas Concentration (R=10⁻⁵, HI=1)[a]	Hazard Quotient	Cancer Risk	95 % UCL 5 to 100 ft (µg/m³)	Target Deep Soil Gas Concentration (R=10⁻⁵, HI=1)[a]	Hazard Quotient	Cancer Risk
Propanol[2-]	33.6	na	—	—	7.06	na	—	—
Propylene	na	na	—	—	51.8	na	—	—
Styrene	154	10000 NC	0.015	—	42.9	100000 NC	0.0004	—
Tetrachloroethene	10.8	81 C	—	**1.3E-06**	7.40	810 C	—	9.1E-08
Tetrahydrofuran	7.70	na	—	—	ND	na	—	—
Toluene	29.4	4000 NC	0.007	—	17.4	40000 NC	0.0004	—
Trichloro-1,2,2-trifluoroethane[1,1,2-]	3.39	300000 NC	0.00001	—	3.72	3000000 NC	0.000001	—
Trichloroethane[1,1,1-]	37.0	22000 NC	0.002	—	16.9	220000 NC	0.0001	—
Trichloroethene	22.4	2.2 C	—	**1.0E-04**	57.1	22 C	—	**2.6E-05**
Trichlorofluoromethane	2.61	7000 NC	0.0004	—	2.73	70000 NC	0.00004	—
Trimethylbenzene[1,2,4-]	5.68	60 NC	0.095	—	12.4	600 NC	0.021	—
Trimethylbenzene[1,3,5-]	2.20	60 NC	0.037	—	5.20	600 NC	0.009	—
Vinyl acetate	4.2	2000 NC	0.002	—	ND	20000 NC	—	—
Vinyl Chloride	na	28 C	—	—	1.43	280 C	—	5.1E-08
Xylene (Total)	na	70000 NC	—	—	84.0	700000 NC	0.0001	—
Xylene[1,2-]	5.38	70000 NC	0.0001	—	5.13	700000 NC	0.00001	—
Xylene[1,3-]+Xylene[1,4-]	13.9	70000 NC	0.0002	—	5.70	700000 NC	0.00001	—

Note: Bold denotes value exceeded a hazard quotient of 0.1 or a cancer risk of 1 x 10^{-06}.

[a] Source: (EPA 2002, 094114).

[b] NC = Noncarcinogen.

[c] — = Hazard quotient or cancer risk not calculated because COPC was either not detected or a screening value was not available.

[d] C = Carcinogen.

[e] ND = Analyte not detected in the given horizon.

[f] na = Not available.

Table H-4.2-4
Johnson and Ettinger Vapor Intrusion Indoor Air Risk Results, Consolidated Unit 21-018(a)-99

COPC	Shallow Soil Pore Gas			Deep Soil Pore Gas	
	95 % UCL 0 to 5 ft (µg/m^3)	Cancer Risk (soil gas depth 4 ft)	Cancer Risk (soil gas depth 0 ft)	95 % UCL 0 to 100 ft (µg/m^3)	Cancer Risk
Benzene	5.02	1.6E-08	5.2E-08	ND[a]	na[b]
Carbon Tetrachloride	8.48	4.8E-08	1.7E-07	ND	na
Chloroform	31.3	3.3E-07	9.6E-07	2.75E+01	2.5E-07
Tetrachloroethene	10.8	2.3E-08	8.5E-08	ND	na
Trichloroethene	22.4	9.4E-07	3.3E-06	5.71E+01	2.0E-06
Total		**1E-06**	**5E-06**	**n/a[c]**	**2E-06**

[a] ND = Not detected.

[b] na = Not available.

[c] n/a = Not applicable.

Table H-5.3-1
Final ESL Comparisons for Consolidated Unit 21-018(a)-99

COPC	95% UCL (mg/kg)	Final ESL[a] (mg/kg)	Hazard Quotient	Final ESL Receptor
Inorganic Chemicals				
Antimony	0.284	0.05	**5.68**	Plant
Arsenic	2.95	6.8	**0.43**	Earthworm (invertebrate)
Barium	80.8	110	**0.73**	Plant
Beryllium	0.503	2.4	0.21	Montane shrew (insectivore)
Cadmium	0.342	0.27	**1.27**	Montane shrew (insectivore)
Chromium[b]	8.68	0.34	**25.5**	Earthworm (invertebrate)
Cobalt	2.2	13	0.17	Plant
Copper	5.29	10	**0.53**	Plant
Cyanide (total)	0.337	0.1	**3.37**	American robin (herbivore, insectivore, omnivore)
Lead	15.3	14	**1.09**	American robin (insectivore)
Manganese	253	50	**5.06**	Plant
Mercury	0.067	0.013	**5.15**	American robin (insectivore)
Nickel	4.4	20	0.22	Plant
Selenium	0.88	0.1	**8.80**	Plant
Silver	1.39	0.05	**27.8**	Plant
Thallium	0.166	0.032	**5.19**	Montane shrew (insectivore)
Uranium	27.5	25	**1.10**	Plant
Vanadium	12.5	0.025	**500**	Plant
Zinc	34.8	10	**3.48**	Plant
Semivolatile Organic Compounds				
Acenaphthene	0.117	0.25	**0.47**	Plant
Acenaphthylene	0.117	0.25	**0.47**	Plant
Anthracene	0.117	210	0.001	Montane shrew (insectivore)
Benzo(a)anthracene	0.113	3	0.04	Montane shrew (insectivore)
Benzo(a)pyrene	0.118	9.6	0.01	Montane shrew (insectivore)
Benzo(b)fluoranthene	0.118	18	0.01	Plant
Benzo(k)fluoranthene[c]	0.049	62	0.0008	Montane shrew (insectivore)
Benzo(g,h,i)perylene	0.122	24	0.01	Montane shrew (insectivore)
Benzoic acid	1.51	1	**1.51**	Montane shrew (insectivore)
Bis(2-ethylhexyl)phthalate	0.676	0.02	**33.8**	American robin (insectivore)
Chloronaphthalene[2-][d]	0.117	0.34	**0.34**	Deer mouse (omnivore)
Chrysene	0.115	2.4	0.05	Montane shrew (insectivore)
Di-n-butylphthalate	0.687	0.011	**62.45**	American robin (insectivore)
Fluoranthene	0.131	22	0.01	Montane shrew (insectivore)
Fluorene	0.117	4.1	0.03	Earthworm (invertebrate)

Table H-5.3-1 (continued)

COPC	95% UCL (mg/kg)	Final ESL[a] (mg/kg)	Hazard Quotient	Final ESL Receptor
Indeno(1,2,3-cd)pyrene	0.121	62	0.003	Montane shrew (insectivore)
Methylnaphthalene[2-]	0.117	2.5	0.05	Montane shrew (insectivore)
Naphthalene	0.117	0.34	**0.34**	Deer mouse (omnivore)
Pentachlorophenol	0.805	0.36	**2.24**	American robin (insectivore)
Phenanthrene	0.115	10	0.01	Montane shrew (insectivore)
Pyrene	0.119	18	0.01	Earthworm (invertebrate)
PCBs				
Aroclor-1242	0.017	0.041	**0.41**	American robin (insectivore)
Aroclor-1254	0.016	0.041	**0.39**	American robin (insectivore)
Aroclor-1260	0.017	0.14	0.12	Red fox (top carnivore)
Radionuclides (pCi/g)				
Americium-241	3.14	44	0.07	Earthworm (invertebrate)
Cesium-137	0.325	680	0.001	Red fox (top carnivore)
Plutonium-238	0.041	44	0.001	Earthworm (invertebrate)
Plutonium-239	3.31	47	0.07	Earthworm (invertebrate)
Sodium-22	0.033	3400	0.00001	Red fox (top carnivore)
Strontium-90	0.108	560	0.0002	Red fox (top carnivore)
Tritium	0.056	3600	0.02	Plant
Uranium-234	1.51	51	0.03	Earthworm (invertebrate)
Uranium-235	0.114	55	0.002	Earthworm (invertebrate)
Uranium-238	1.54	55	0.03	Earthworm (invertebrate)

Note: Bold denotes HQ exceeds 0.3.

[a] ESLs from ECORISK Database Version 2.2 (LANL 2005, 090032).

[b] ESL for hexavalent chromium.

[c] Maximum detected value.

[d] ESL for naphthalene.

Table H-5.3-2
ESLs for COPECs at Consolidated Unit 21-018(a)-99

COPEC	ESL (mg/kg)[a]										
	American kestrel (intermediate carnivore)	American kestrel (top carnivore)	American robin (herbivore)	American robin (insectivore)	American robin (omnivore)	Deer mouse (omnivore)	Desert cottontail (herbivore)	Earthworm (invertebrate)	Plant	Montane shrew (insectivore)	Red fox (top carnivore)
Inorganic Chemicals											
Antimony	na[b]	na	na	na	na	0.48	2.9	78	0.05	0.26	45
Arsenic	160	1100	42	18	26	32	160	6.8	18	15	810
Barium	11000	37000	820	1000	930	1800	3300	330	110	1300	41000
Cadmium	2	580	4.4	0.29	0.54	0.51	9.9	140	32	0.27	510
Chromium[c]	2200	5400	280	190	220	530	1900	0.34	0.35	170	4400
Copper	88	1200	28	11	16	59	250	13	10	34	3500
Cyanide (total)	0.61	1.4	0.1	0.1	0.1	340	740	na	na	310	5200
Lead	120	810	21	14	16	120	370	1700	120	72	3700
Manganese	110000	290000	4600	10000	6400	1200	1700	na	50	1300	35000
Mercury	0.082	0.28	0.07	0.013	0.022	3	22	0.05	34	1.7	46
Selenium	8.5	140	1.5	1.1	1.3	1.1	3	7.7	0.1	0.92	110
Silver	52	2200	30	7.2	11	77	490	na	0.05	44	13000
Thallium	6.6	75	9.2	0.9	1.6	0.068	2.8	na	0.1	0.032	2.8
Uranium	21000	39000	1900	1600	1700	750	2000	na	25	220	4800
Vanadium	84	170	8.9	6.7	7.6	480	1500	na	0.025	140	3300
Zinc	180	1400	200	27	48	290	3000	190	10	160	10000

Table H-5.3-2 (continued)

COPEC	ESL (mg/kg)[a]										
	American kestrel (intermediate carnivore)	American kestrel (top carnivore)	American robin (herbivore)	American robin (insectivore)	American robin (omnivore)	Deer mouse (omnivore)	Desert cottontail (herbivore)	Earthworm (invertebrate)	Plant	Montane shrew (insectivore)	Red fox (top carnivore)
Semivolatile Organic Compounds											
Acenaphthene	na	na	na	na	na	160	490	na	0.25	120	6200
Acenaphthylene	na	na	na	na	na	160	500	na	na	120	5200
Benzoic acid	na	na	na	na	na	1.3	4.2	na	na	1	350
Bis(2-ethylhexyl)phthalate	0.045	0.033	20	0.02	0.04	1.1	2700	na	na	0.59	1.2
Chloronaphthalene [2-]	1100	6300	37	170	61	0.34	0.45	na	1	0.96	5800
Di-n-butylphthalate	0.068	0.24	0.39	0.011	0.021	370	16000	na	160	180	5000
Naphthalene	1100	6300	37	170	61	0.34	0.45	na	1	0.96	42
Pentachlorophenol	2	5	31	0.36	0.72	1.6	170	31	5	0.81	13
PCBs											
Aroclor-1242	0.26	1.4	1	0.041	0.079	0.76	30	na	na	0.38	16
Aroclor-1254	0.17	0.22	1.3	0.041	0.08	0.88	52	na	160	0.44	0.15

[a] ESLs from ECORISK Database Version 2.2 (LANL 2005, 090032).

[b] na = Not available.

[c] Hexavalent chromium ESLs used.

Table H-5.3-3
Hazard Index Analysis for Consolidated Unit 21-018(a)-99

COPEC	95% UCL (mg/kg)	HQ										
		American kestrel (intermediate carnivore)	American kestrel (top carnivore)	American robin (herbivore)	American robin (insectivore)	American robin (omnivore)	Deer mouse (omnivore)	Desert cottontail (herbivore)	Earthworm (invertebrate)	Plant	Montane shrew (insectivore)	Red fox (top carnivore)
Inorganic Chemicals												
Antimony	0.284	na [a]	na	na	na	na	0.592	0.098	0.004	**5.68**	**1.09**	0.006
Arsenic	2.95	0.018	0.003	0.070	0.164	0.113	0.092	0.018	0.434	0.164	0.197	0.004
Barium	80.8	0.007	0.002	0.099	0.081	0.087	0.045	0.024	0.245	0.735	0.062	0.002
Cadmium	0.342	0.171	0.001	0.078	**1.18**	0.633	0.671	0.035	0.002	0.011	**1.27**	0.001
Chromium[b]	8.68	0.004	0.002	0.031	0.046	0.039	0.016	0.005	**25.5**	**24.8**	0.051	0.002
Copper	5.29	0.060	0.004	0.189	0.481	0.331	0.090	0.021	0.407	0.529	0.156	0.002
Cyanide (total)	0.337	0.552	0.241	**3.37**	**3.37**	**3.37**	0.001	0.001	na	na	0.001	0.0001
Lead	15.3	0.128	0.019	0.729	**1.09**	0.956	0.128	0.041	0.009	0.128	0.213	0.004
Manganese	253	0.002	0.001	0.055	0.025	0.040	0.211	0.149	na	**5.06**	0.195	0.007
Mercury	0.067	0.817	0.239	0.957	**5.15**	**3.05**	0.022	0.003	**1.34**	0.002	0.039	0.001
Selenium	0.88	0.104	0.006	0.587	0.800	0.677	0.800	0.293	0.114	**8.80**	0.957	0.008
Silver	1.39	0.027	0.001	0.046	0.193	0.126	0.018	0.003	na	**27.8**	0.032	0.0001
Thallium	0.166	0.025	0.002	0.018	0.184	0.104	**2.44**	0.059	na	**1.66**	**5.19**	0.059
Uranium	27.5	0.001	0.001	0.014	0.017	0.016	0.037	0.014	na	**1.10**	0.125	0.006
Vanadium	12.5	0.149	0.074	**1.40**	**1.87**	**1.65**	0.026	0.008	na	**500**	0.089	0.004
Zinc	34.8	0.193	0.025	0.174	**1.29**	0.725	0.120	0.012	0.183	**3.48**	0.218	0.003

Table H-5.3-3 (continued)

COPEC	95% UCL (mg/kg)	HQ										
		American kestrel (intermediate carnivore)	American kestrel (top carnivore)	American robin (herbivore)	American robin (insectivore)	American robin (omnivore)	Deer mouse (omnivore)	Desert cottontail (herbivore)	Earthworm (invertebrate)	Plant	Montane shrew (insectivore)	Red fox (top carnivore)
Semivolatile Organic Compounds												
Acenaphthene	0.117	na	na	na	na	na	0.001	0.0002	na	0.468	0.001	0.00002
Acenaphthylene	0.117	na	na	na	na	na	0.001	0.0002	na	na	0.001	0.00002
Benzoic acid	1.51	na	na	na	na	na	**1.16**	0.360	na	na	**1.51**	0.004
Bis(2-ethylhexyl)phthalate	0.676	**15.0**	**20.5**	0.034	**33.8**	**16.9**	0.615	0.0003	na	na	**1.15**	0.563
Chloronaphthalene[2-]	0.117	0.0001	0.00002	0.003	0.001	0.002	0.344	0.260	na	0.117	0.122	0.00002
Di-n-butylphthalate	0.687	**10.1**	**2.86**	**1.76**	**62.5**	**32.7**	0.002	0.00004	na	0.004	0.004	0.00002
Naphthalene	0.117	0.0001	0.00002	0.003	0.001	0.002	0.344	0.260	na	0.117	0.122	0.003
Pentachlorophenol	0.805	0.403	0.161	0.026	**2.24**	**1.12**	0.503	0.005	0.026	0.161	0.994	0.062
PCBs												
Aroclor-1242	0.017	0.065	0.012	0.017	0.415	0.215	0.022	0.0006	na	na	0.045	0.001
Aroclor-1254	0.016	0.094	0.073	0.012	0.390	0.200	0.018	0.0003	na	0.0001	0.036	0.107
HI		**28**	**24**	**10**	**115**	**63**	**8**	**2**	**28**	**581**	**14**	0.8

Note: Bold denotes HQ or HI exceeds 1.0.

[a] na = Not available.

[b] Hexavalent chromium ESLs used.

Table H-5.3-4
SWMU 21-013(b) 2007 Slope Sampling Results, Comparison to 2005–2006 Data and ESLs

Semivolatile Organic Compound	Range of Concentrations (mg/kg)	Maximum Detected Concentrations (mg/kg)	2005–2006 95% UCL (mg/kg)	Final ESL[a] (mg/kg)
Benzo(b)fluoranthene	[0.138]–0.708 (J)	0.708 (J)	0.150	18
Benzo(k)fluoranthene	0.0491 (J)–[0.144]	0.0491 (J)	n/a[b]	62
Chrysene	0.0726 (J)–[0.144]	0.0726 (J)	0.145	2.4
Fluoranthene	0.0437 (J)–[0.144]	0.11 (J)	0.156	22
Phenanthrene	0.0524 (J)–[0.144]	0.121 (J)	0.146	10
Pyrene	0.115 (J)–[0.144]	0.137 (J)	0.153	18

[a] ESLs from ECORISK Database Version 2.2 (LANL 2005, 090032).

[b] n/a = Not applicable; benzo(k)fluoranthene not detected in 2005–2006 samples.

Table H-5.3-5
Comparison of VOC Pore-Gas Concentrations with Inhalation ESLs

Analyte	Exposure Point Concentration[a] (µg/m^3)	Inhalation ESL[b] (µg/m^3)	HQ
Acetone	250	530000	4.7E-04
Benzene	5.4	25000	2.2E-04
Carbon tetrachloride	8.9	5700	1.6E-03
Chloroform	36	20000	1.8E-03
Chloromethane	2.2	21000	1.1E-04
Dichlorodifluoromethane	3.7	2600000	1.4E-06
Dichloroethane[1,1-]	117	5600000	2.1E-05
Methylene chloride	11	1300000	8.5E-06
Tetrachloroethene	11	73000	1.5E-04
Toluene	33	60000	5.5E-04
Trichloroethane[1,1,1-]	38	240000	1.6E-04
Trichloroethene	39	19000	2.1E-04
Trichlorofluoromethane	29	820000	3.5E-05
Xylene[1,3-]+Xylene[1,4-]	16	87000	1.8E-04
Xylene[1,2-]	5.9	87000	6.8E-05
		HI	**0.0056**

[a] Maximum detected concentration of shallowest sample depth interval from all boreholes (range of 4 to 20 ft bgs).

[b] Inhalation ESLs obtained from ECORISK Database, Version 2.2 (LANL 2005, 090032).

Table H-5.4-1
Comparison of 95% UCLs to Background Concentrations

COPEC	95% UCL (mg/kg)	Soil Background Concentrations[a] (mg/kg)	Tuff Background Concentrations[a] (mg/kg)
Antimony	0.284	0.1–1	0.05–0.4
Arsenic	2.95	0.3–9.3	0.25–5
Barium	80.8	21–410	1.4–51.6
Cadmium	0.342	0.2–2.6	0.1–1.5
Chromium	8.68	1.9–36.5	0.25–13
Copper	5.29	0.25–16	0.25–6.2
Cyanide (total)	0.337	0.5[b]	0.5[b]
Iron	8358	3300–36000	190–19500
Lead	15.3	2–28	1.6–15.5
Manganese	253	76–1100	22–752
Mercury	0.067	0.05–0.1	0.1[b]
Selenium	0.88	0.1–1.7	0.1–0.105
Silver	1.39	1.0[b]	0.2–1.9
Thallium	0.166	0.063–1	0.05–1.7
Uranium	27.5	0.2–3.6	0.2–5
Vanadium	12.5	4–56.5	0.25–21
Zinc	34.8	14–75.5	5.5–65.6

[a] Source: LANL 1998, 059730.

[b] No background data set; value is the BV.

Table H-5.4-2
PAUFs for Ecological Receptors

Receptor	Home Range[a] (ha)	Population Area (ha)	PAUF[b]
American robin	0.42	16.8	0.122
American kestrel	106	4240	0.0005
Deer mouse	0.077	3	0.683
Desert cottontail	3.1	124	0.017
Montane shrew	0.39	15.6	0.131
Mexican spotted owl	366	n/a[c]	0.006[d]

[a] Source: EPA 1993, 059384.

[b] PAUF is calculated as the the area of Consolidated Unit 21-018(a)-99 (2.05 ha) divided by the population area.

[c] n/a = Not applicable.

[d] Value for the Mexican spotted owl is the AUF based on individual HR.

Table H-5.4-3
COPEC and PAUF-Adjusted Hazard Index Analysis for Consolidated Unit 21-018(a)-99

COPEC	95% UCL (mg/kg)	HQ									
		American kestrel (intermediate carnivore)	American kestrel (top carnivore)	American robin (herbivore)	American robin (insectivore)	American robin (omnivore)	Deer mouse (omnivore)	Desert cottontail (herbivore)	Earthworm (invertebrate)	Plant	Montane shrew (insectivore)
Inorganic Chemicals											
Uranium	27.5	0.001	0.001	0.014	0.017	0.016	0.037	0.014	na*	**1.10**	0.125
Semivolatile Organic Compounds											
Benzoic acid	1.51	na	na	na	na	na	**1.16**	0.36	na	na	**1.51**
Bis(2-ethylhexyl)phthalate	0.676	**15.0**	**20.5**	0.034	**33.8**	**16.9**	0.615	<0.001	na	na	**1.15**
PCBs											
Aroclor-1242	0.017	0.065	0.012	0.017	0.415	0.215	0.022	0.001	na	na	0.045
Aroclor-1254	0.016	0.094	0.073	0.012	0.390	0.200	0.018	<0.001	na	0.0001	0.036
HI		**15**	**21**	0.1	**35**	**17**	**2**	0.4	na	**1.1**	**3**
PAUF-adjusted HI		0.01	0.01	0.01	**4**	**2**	1	0.006	na	**1.1**	0.4

Note: Bold denotes HQ or HI exceeds 1.0.
*na = Not available.

Table H-5.4-4
Modified Hazard Index Analysis for Consolidated Unit 21-018(a)-99

COPEC	Exposure Point Concentrations (mg/kg)	HQ									
		American kestrel (Intermediate carnivore)	American kestrel (top carnivore)	American robin (herbivore)	American robin (insectivore)	American robin (omnivore)	Deer mouse (omnivore)	Desert cottontail (herbivore)	Earthworm (invertebrate)	Plant	Montane shrew (insectivore)
Inorganic Chemicals											
Uranium	27.5	0.001	0.001	0.014	0.017	0.016	0.037	0.014	na[a]	**1.10**	0.125
Semivolatile Organic Compounds											
Benzoic acid	0.676[b]	na	na	na	na	na	0.52	0.16	na	na	0.68
Bis(2-ethylhexyl)phthalate	0.32[c]	**7.1**	**9.7**	0.016	**16**	**8**	0.29	0.00012	na	na	0.54
PCBs											
Aroclor-1242	0.017	0.065	0.012	0.017	0.415	0.215	0.022	0.001	na	na	0.045
Aroclor-1254	0.016	0.094	0.073	0.012	0.390	0.200	0.018	<0.001	na	0.0001	0.036
Modified HI		**7.3**	**9.8**	**0.06**	**16.8**	**8.4**	**0.9**	**0.2**	**na**	**1.1**	**1.4**
PAUF-adjusted HI		0.004	0.005	0.007	**2.0**	1.0	0.6	0.003	na	**1.1**	0.2

Note: Bold denotes HQ or HI exceeds 1.0.

[a] na = Not available.

[b] Maximum detected concentration used.

[c] Second highest detected concentration used to represent the majority of detected concentrations.

Attachment H-1

Total Uranium Analytical Result for Location 21-02517

GENERAL ENGINEERING LABORATORIES, LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Los Alamos National Laboratories
Address : PO Box 1663
TA-3, Bldg. 1237, Drop Pt. 03U
Los Alamos, New Mexico 87545
Contact: Ms. Joylene Valdez
Project: **LANL ER Project**

Report Date: October 11, 2006

Client Sample ID: MD21-07-73998
Sample ID: 173457001
Matrix: Soil
Collect Date: 05-OCT-06 12:00
Receive Date: 06-OCT-06
Collector: Client
Moisture: 10.3%

Project: LANL00600
Client ID: LANL006

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS											
3050S/6020 Uranium Federal											
Uranium		564	10.9	43.6	ug/kg	2	PRB	10/11/06	1125	576883	1

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	FGA	10/10/06	1230	576882

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3050B/6020	

Notes:
The Qualifiers in this report are defined as follows :

* A quality control analyte recovery is outside of specified acceptance criteria
< Result is less than value reported
> Result is greater than value reported
A The TIC is a suspected aldol-condensation product
B Target analyte was detected in the associated blank
BD Results are either below the MDC or tracer recovery is low
C Analyte has been confirmed by GC/MS analysis
D Results are reported from a diluted aliquot of the sample
E Metals--%difference of sample and SD is >10%. Sample concentration must meet flagging criteria
H Analytical holding time was exceeded
J Value is estimated
N/A Spike recovery limits do not apply. Sample concentration exceeds spike concentration by 4X or more
R Sample results are rejected
U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.
UI Gamma Spectroscopy--Uncertain identification
X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y QC Samples were not spiked with this compound
^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL
h Preparation or preservation holding time was exceeded

The above sample is reported on a dry weight basis except where prohibited by the analytical procedure.

GENERAL ENGINEERING LABORATORIES, LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Los Alamos National Laboratories
Address : PO Box 1663
TA-3, Bldg. 1237, Drop Pt. 03U
Los Alamos, New Mexico 87545
Contact: Ms. Joylene Valdez
Project: **LANL ER Project**

Report Date: October 11, 2006

Client Sample ID: MD21-07-73998
Sample ID: 173457001

Project: LANL00600
Client ID: LANL006

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Valerie Davis.

_____
Reviewed by

Attachment H-2

Ecological Scoping Checklist

H2-1.0 PART A—SCOPING MEETING DOCUMENTATION

Site ID	Consolidated Unit 21-018(a)-99
Form of site releases (solid, liquid, vapor). Describe all relevant known or suspected mechanisms of release (spills, dumping, material disposal, outfall, explosive testing, etc.) and describe potential areas of release. Reference locations on a map as appropriate.	Consolidated Unit 21-018(a)-99 is located on Delta Prime (DP) Mesa within Technical Area (TA-) 21 of Los Alamos National Laboratory. TA-21 was primarily used for plutonium research, metal production, and related activities from 1945 to 1978. In general, historical releases at Consolidated Unit 21-018(a)-99 were from activities related to wastewater treatment and disposal and surface debris disposal. Consolidated Unit 21-018(a)-99 is comprised of four individual Solid Waste Management Units (SWMUs) and one Area of Concern (AOC) (Figure 1.1-3): • SWMU 21-018(a), Material Disposal Area (MDA) V (three wastewater absorption beds). The primary mechanism of release at 21-018(a) was liquid waste disposal; • SWMU 21-018(b), a former laundry facility for radioactively contaminated clothing. The primary mechanism of release at 21-018(b) was liquid waste; • SWMU 21-023(c), a waste treatment laboratory septic system and outfall. The primary mechanism of release at 21-023(c) was liquid waste effluent to the septic system and the associated outfall; • SWMU 21-013(b), a surface disposal area consisting of building debris. The primary mechanism of release at 21-013(b) was solid waste disposal; and • AOC 21-013(g), a surface disposal area consisting of building debris. The primary mechanism of release at 21-013(b) was solid waste disposal.
List of Primary Impacted Media **(Indicate all that apply.)**	**Surface soil – X** **Surface water/sediment –** **Subsurface – X** **Groundwater –** **Other, explain –**
Vegetation class based on GIS vegetation coverage **(Indicate all that apply.)**	**Water** – **Bare Ground/Unvegetated** – **X** **Spruce/fir/aspen/mixed conifer** – **Ponderosa pine –** **Piñon juniper/juniper savannah** – **Grassland/shrubland** – **X** **Developed** – **X** **Burned –** Consolidated Unit 21-018(a)-99 is highly disturbed and consists primarily of bare soil, fill, and regraded areas where removal actions have taken place. Vegetation surrounds Consolidated Unit 21-018(a)-99, consisting of native shrubs, grasses, and forbs typical of disturbed soils. Vegetation at, and surrounding the site, is dominated by the shrub chamisa (*Chrysothamnus nauseosus*). The current conditions at the site and vegetation surrounding Consolidated Unit 21-018(a)-99 are shown in Photos H-1 and H-2, provided as attachments to this Scoping Checklist.

Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	There is no T&E habitat present at the site, per LANL's Ecology Group prior to the initiation of removal actions and sampling activities in 2005.
Provide list, of Neighboring/ Contiguous/ Upgradient sites, includes a brief summary of COPCs and the form of releases for relevant sites and reference a map as appropriate. **(Use this information to evaluate the need to aggregate sites for screening.)**	Other SWMUs and AOCs adjacent and/or otherwise related to Consolidated Unit 21-018(a)-99 include the following: • Consolidated Unit 21-027(d)-99—a former aboveground fuel tank and secondary containment (AOC C-21-028) and stormwater drainline and outfall [SWMU 21-027(d)], which borders the western edge of Consolidated Unit 21-018(a)-99. • AOC 21-009—a former waste treatment laboratory (Building 21-33) located to the west of Consolidated Unit 21-018(a)-99. • SWMU 21-015 (MDA B)—an inactive 6.03-acre disposal site located west of Consolidated Unit 21-018(a)-99. • AOC C-21-015—a former waste treatment laboratory (Building 21-45) located on the north side of DP Road, across from Consolidated Unit 21-018(a)-99. • AOC 21-030—a concrete sump located within the footprint of former Building 21-45 (AOC C-21-015), north of Consolidated Unit 21-018(a)-99. • SWMU 21-024(f)—a former septic system (including outfall) located across DP Road (north) from Consolidated Unit 21-018(a)-99. • SWMU 21-024(e)—an inactive septic system located east of MDA V.
Surface Water Erosion Potential Information **Summarize information from SOP 2.01, including the total score and the run-off subscore (maximum of 46); terminal point of surface water transport; slope; and surface water run-on sources.**	The Laboratory's Environmental Programs has developed a procedure to assess the potential for erosion and sediment transport at individual sites (Standard Operating Procedure [SOP] 2.01). Erosion potential is numerically rated from 1 to 100 using a matrix system. Sites that score greater than 60 have a high erosion potential. Following are the erosion potential scores for the individual SWMUs and AOC that comprise Consolidated Unit 21-018(a)-99: • SWMU 21-018(a) was given a score of 18.1 in 1999, indicating a low potential for erosion. • SWMU 21-018(b) was given a score of 15.8 in 1997, indicating a low potential for erosion. • SWMU 21-023(c) was given a score of 35.5 in 1999, indicating a medium potential for erosion. • SWMU 21-013(b) and AOC 21-013(g) were given scores of 67.0 in 1998, indicating a high potential for erosion.

H2-2.0 PART B—SITE VISIT DOCUMENTATION

Site ID	Consolidated Unit 21-018(a)-99
Date of Site Visit	April 18, 2006
Site Visit Conducted by	Sharon Wirth

Receptor Information:

Estimate cover	**Relative vegetative cover (high, medium, low, none)** = low **Relative wetland cover (high, medium, low, none)** = none **Relative structures/asphalt, etc., cover (high, medium, low, none)** = medium to high
Field notes on the GIS vegetation class to assist in verifying the Arcview information	Consolidated Unit 21-018(a)-99 is highly disturbed and consists primarily of bare soil, fill, and regraded areas where removal actions have taken place. Vegetation surrounds Consolidated Unit 21-018(a)-99, consisting of native shrubs, grasses, and forbs typical of disturbed soils. Vegetation at, and surrounding the site, is dominated by the shrub chamisa (*Chrysothamnus nauseosus*). Vegetation at the site is comprised primarily of two vegetation classes: bare ground/unvegetated and grassland/shrubland.
Are ecological receptors present at the site? **(yes/no/uncertain)** **Describe the general types of receptors present at the site (terrestrial and aquatic), and make notes on the quality of habitat present at the site.**	Potentially. Vegetation surrounding the site is mature and the habitat quality appears sufficient for supporting foraging and nesting by terrestrial receptors. Terrestrial receptors may visit Consolidated Unit 21-018(a)-99, though significant foraging or nesting activities within the site boundaries is minimal.

Contaminant Transport Information:

Surface water transport **Field notes on the erosion potential, including a discussion of the terminal point of surface water transport (if applicable).**	Surface water transport and erosion potential on the mesa top is considered low because of the relatively flat terrain (<10% slope). Surface water transport and erosion potential is considerably higher on the steep slopes. The terminal point of surface water transport is in BV Canyon to the south/southwest of the site.
Are there any off-site transport pathways (surface water, air, or groundwater)? **(yes/no/uncertain)** **Provide explanation**	**Surface Water**: Yes. Runoff from the site may occur, the amount of which is expected to be in direct proportion to the amount and intensity of precipitation events. **Air**: Yes. Transport of potential contamination in surface soil at the site may occur. **Groundwater**: No. Depth to groundwater at the site (~1,300 ft) precludes this transport pathway.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	There has been major physical disturbance from removal activities at Consolidated Unit 21-018(a)-99. The surface has been regraded and is substantially void of vegetation.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Yes. The disturbance from historical operations and recent removal activities at the site has negatively impacted the habitat quality at the site. The site is scheduled for restoration/reseeding in September 2006, but this had not yet occurred as of the preparation of this checklist.

No Exposure/Transport Pathways:

If there are no complete exposure pathways to ecological receptors onsite and no transport pathways to off-site receptors, the remainder of the checklist should not be completed. Stop here and provide additional explanation/justification for proposing an ecological No Further Action recommendation (if needed). At a minimum, the potential for future transport should include the likelihood that future construction activities could make contamination more available for exposure or transport.

Adequacy of Site Characterization:

Do existing or proposed data provide information on the nature and extent of contamination? **(yes/no/uncertain)** **Provide explanation** **(Consider if the maximum value was captured by existing sample data.)**	Yes. The approved work plan was designed to identify the nature and extent of any potential contamination at Consolidated Unit 21-018(a)-99.
Do existing or proposed data for the site address potential transport pathways of site contamination? **(yes/no/uncertain)** **Provide explanation** **(Consider if other sites should be aggregated to characterize potential ecological risk.)**	Yes. The approved work plan was designed to identify any potential contamination at downgradient locations that may have received contamination from Consolidated Unit 21-018(a)-99 via erosion or surface water transport (i.e., the canyon slopes) and potential contamination in the subsurface.

Additional Field Notes:

Provide additional field notes on the site setting and potential ecological receptors. No additional notes are provided.

H2-3.0 PART C—ECOLOGICAL PATHWAYS CONCEPTUAL EXPOSURE MODEL

Provide answers to Questions A to V to develop the Ecological Pathways Conceptual Exposure Model

Question A:

Could soil contaminants reach receptors through vapors?

- **Volatility of the hazardous substance (volatile chemicals generally have Henry's Law constant >10^{-5} atm-m^3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely.

Provide explanation: Based on historical data, volatile organic chemicals (VOCs) are not expected to be present at Consolidated Unit 21-018(a)-99, except perhaps at trace levels (e.g., estimated values slightly greater than the quantitation limits).

Question B:

Could the soil contaminants reach receptors through fugitive dust carried in air?

- **Soil contamination would have to be on the actual surface of the soil to become available for dust.**
- **In the case of dust exposures to burrowing animals, the contamination would have to occur in the depth interval where these burrows occur.**

Answer (likely/unlikely/uncertain): Likely transport, unlikely exposure.

Provide explanation: Air transport via fugitive dust of potential surface contamination is possible at Consolidated Unit 21-018(a)-99. Dust exposure to burrowing animals is unlikely, however, because of the shallow soils on the mesa top (too shallow for significant burrowing activities to occur) and the highly disturbed, erosion-prone steep slopes at the remainder of the site (too instable for burrows to be maintained).

Question C:

Can contaminated soil be transported to aquatic ecological communities (use SOP 2.01 run-off score and terminal point of surface water runoff to help answer this question)?

- **If the SOP 2.01 run-off score* for each SWMU and/or AOC included in the site is equal to zero, this suggests that erosion at the site is not a transport pathway. (* note that the runoff score is not the entire erosion potential score, rather it is a subtotal of this score with a maximum value of 46 points).**
- **If erosion is a transport pathway, evaluate the terminal point to see if aquatic receptors could be affected by contamination from this site.**

Answer (likely/unlikely/uncertain): Unlikely.

Provide explanation: There are no nearby aquatic communities that could be impacted by runoff from the site.

Question D:

Is contaminated groundwater potentially available to biological receptors through seeps or springs or shallow groundwater?

Known or suspected presence of contaminants in groundwater.

- **The potential for contaminants to migrate through groundwater and discharge into habitats and/or surface waters.**
- **Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone.**
- **Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.**

Answer (likely/unlikely/uncertain): Unlikely.

Provide explanation: Migration of contaminant to groundwater is unlikely due to depth of groundwater beneath the site (~1,300 ft). Surface discharge of groundwater does not occur at the site. There are no seeps or springs present at the site.

Question E:

Is infiltration/percolation from contaminated subsurface material a viable transport and exposure pathway?

- **The potential for contaminants to migrate to groundwater.**
- **The potential for contaminants to migrate through groundwater and discharge into habitats and/or surface waters.**
- **Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone.**
- **Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.**

Answer (likely/unlikely/uncertain): Unlikely.

Provide explanation: Migration of contaminant to groundwater is unlikely due to depth of groundwater beneath the site (~1,300 ft). Surface discharge of groundwater does not occur at the site.

Question F:

Might erosion or mass wasting events be a potential release mechanism for contaminants from subsurface materials or perched aquifers to the surface?

- **This question is only applicable to release sites located on or near the mesa edge.**
- **Consider the erodability of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Unlikely.

Provide explanation: Potential contamination at Consolidated Unit 21-018(a)-99 is limited to the near-surface soil and tuff and, thus, mass wasting would not contribute to transport of contamination from the site at a rate or in an amount greater than that expected from erosion.

Question G:

Could airborne contaminants interact with receptors through the respiration of vapors?

- **Contaminants must be present as volatiles in the air.**
- **Consider the importance of the inhalation of vapors for burrowing animals.**
- **Foliar uptake of vapors is typically not a significant exposure pathway**.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 1

Terrestrial Animals: 1

Provide explanation: VOCs are not expected to be present at Consolidated Unit 21-018(a)-99, except perhaps at trace levels (e.g., estimated values slightly greater than the quantitation limits). Also, the shallow soils on the mesa top and highly disturbed soils on the steep slopes limit burrowing activities and subsequent exposure to burrowing animals.

Question H:

Could airborne contaminants interact with plants through the deposition of particulates or with animals through the inhalation of fugitive dust?

- **Contaminants must be present as particulates in the air or as dust for this exposure pathway to be complete.**
- **Exposure through the inhalation of fugitive dust is particularly applicable to ground-dwelling species that would be exposed to dust disturbed by their foraging or burrowing activities or by wind movement**.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Terrestrial Animals: 2

Provide explanation: Deposition of particulates on plants and foraging activities by animals may expose terrestrial receptors to contaminants in fugitive dust. Dust exposure to burrowing animals is considered unlikely because the shallow soils on the mesa top and highly disturbed soils on the steep slopes limit burrowing activities and subsequent exposure to burrowing animals. Finally, exposure to contaminants in tuff is considered an unlikely pathway because of the weathering that must occur to the tuff prior to exposure.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soils?

- **Contaminants in bulk soil may partition into soil solution, making them available to roots.**
- **Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces by rain striking contaminated soils (i.e., rain splash).**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 3

Provide explanation: Residual contaminants in soil could be taken up through plant roots. Additionally, rain splash from surface soils could be deposited on the aboveground portions of plants.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soils?

- **The chemicals may bioaccumulate in animals.**
- **Animals may ingest contaminated food items.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 3

Provide explanation: The following bioaccumulating chemicals (as defined by the EPA's Persistent Bioaccumulative and Toxic Chemical Program) were detected in samples from Consolidated Unit 21-018(a)-99: benzo(a)pyrene, mercury, and PCBs (Aroclor-1242, -1254, and -1260).

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soils?

- **Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil, or while grooming themselves clean of soil.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 3

Provide explanation: Foraging and grooming activities may result in exposure to animals via incidental ingestion.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soils?

- **Significant exposure through dermal contact would generally be limited to organic contaminants that are lipophilic and can cross epidermal barriers.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 1

Provide explanation: Exposure via dermal contact is possible for animals, but is considered unlikely because of the minimal amount of burrowing expected at the site and because organic chemicals detected in soil and tuff at the site are not considered lipophilic nor can they cross epidermal barriers.

Question M:

Could contaminants interact with plants or animals through external irradiation?

- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **Burial of contamination attenuates radiological exposure.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Terrestrial Animals: 2

Provide explanation: Low concentrations of gamma-emitting radionuclides (primarily cesium-137), have been detected at Consolidated Unit 21-018(a)-99.

Question N:

Could contaminants interact with plants through direct uptake from water and sediment or sediment rain splash?

- **Contaminants may be taken up by terrestrial plants whose roots are in contact with surface waters.**
- **Terrestrial plants may be exposed to particulates deposited on leaf and stem surfaces by rain striking contaminated sediments (i.e., rain splash) in an area that is only periodically inundated with water.**
- **Contaminants in sediment may partition into soil solution, making them available to roots.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Provide explanation: No surface water or sediment is present at Consolidated Unit 21-018(a)-99.

Question O:

Could contaminants interact with receptors through food-web transport from water and sediment?

- **The chemicals may bioconcentrate in food items.**
- **Animals may ingest contaminated food items.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: No surface water or sediment is present at Consolidated Unit 21-018(a)-99.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediments?

- **If sediments are present in an area that is only periodically inundated with water, terrestrial receptors may incidentally ingest sediments.**
- **Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: No surface water or sediment is present at Consolidated Unit 21-018(a)-99.

Question Q:

Could contaminants interact with receptors through dermal contact with water and sediment?

- **If sediments are present in an area that is only periodically inundated with water, terrestrial species may be dermally exposed during dry periods.**
- **Terrestrial organisms may be dermally exposed to water-borne contaminants as a result of wading or swimming in contaminated waters.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: No surface water or sediment is present at Consolidated Unit 21-018(a)-99.

Question R:

Could suspended or sediment-based contaminants interact with plants or animals through external irradiation?

- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **Burial of contamination attenuates radiological exposure.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: No surface water or sediment is present at Consolidated Unit 21-018(a)-99.

Question S:

Could contaminants bioconcentrate in free-floating aquatic, attached aquatic plants, or emergent vegetation?

- **Aquatic plants are in direct contact with water.**
- **Contaminants in sediment may partition into pore water, making them available to submerged roots.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Plants/Emergent Vegetation: 0

Provide explanation: No surface water is present at Consolidated Unit 21-018(a)-99.

Question T:

Could contaminants bioconcentrate in sedimentary or water-column organisms?

- **Aquatic receptors may actively or incidentally ingest sediment while foraging.**
- **Aquatic receptors may be directly exposed to contaminated sediments or may be exposed to contaminants through osmotic exchange, respiration, or ventilation of sediment pore waters.**
- **Aquatic receptors may be exposed through osmotic exchange, respiration, or ventilation of surface waters.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Animals: 0

Provide explanation: No surface water or sediment is present at Consolidated Unit 21-018(a)-99.

Question U:

Could contaminants bioaccumulate in sedimentary or water column organisms?

- **Lipophilic organic contaminants and some metals may concentrate in an organism's tissues.**
- **Ingestion of contaminated food items may result in contaminant bioaccumulation through the food web.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Animals: 0

Provide explanation: No surface water or sediment is present at Consolidated Unit 21-018(a)-99.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

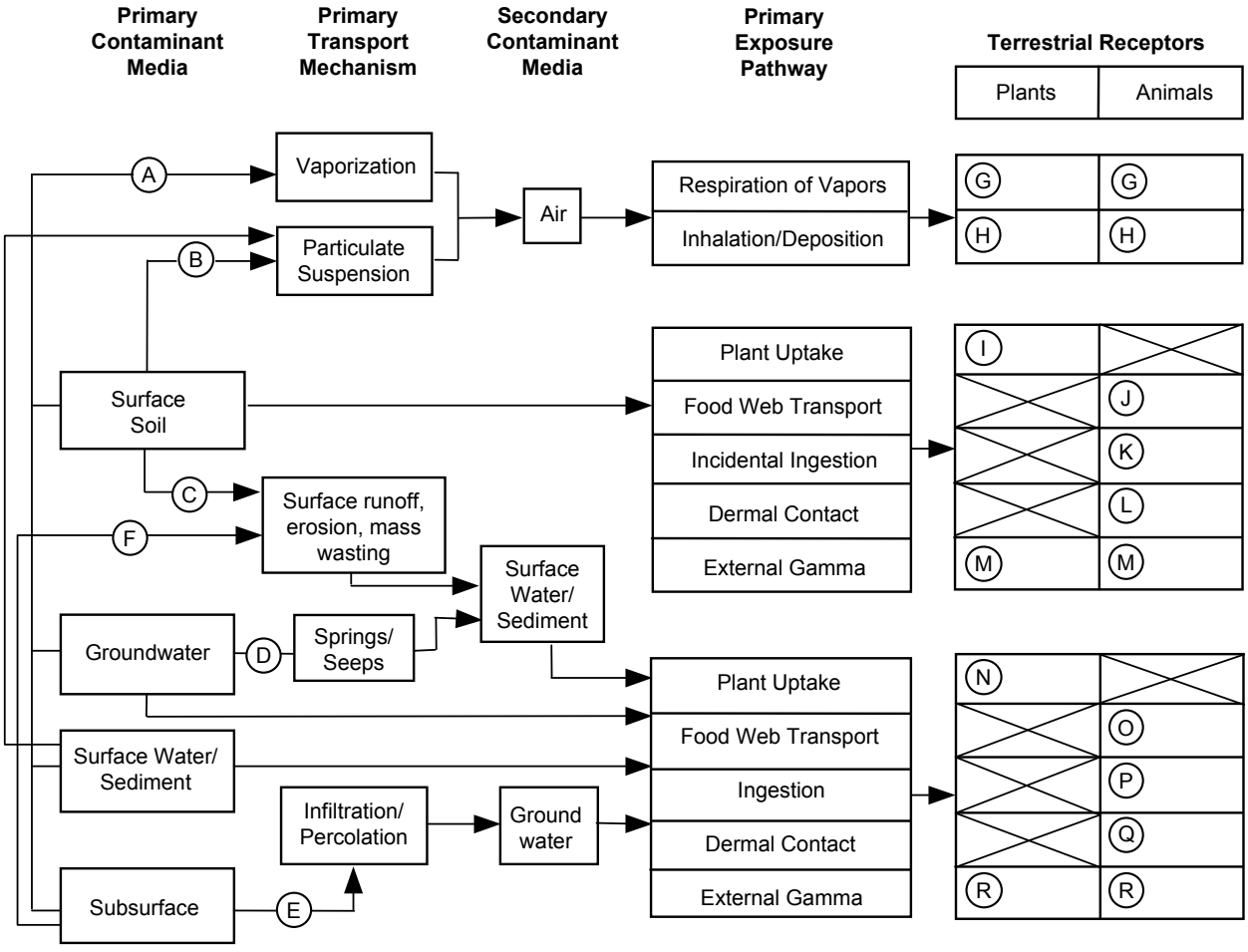
Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No surface water or sediment is present at Consolidated Unit 21-018(a)-99.

Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model

NOTE:
Letters in circles refer to questions on the Scoping Checklist



Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model

NOTE:
Letters in circles refer to questions on the Scoping Checklist

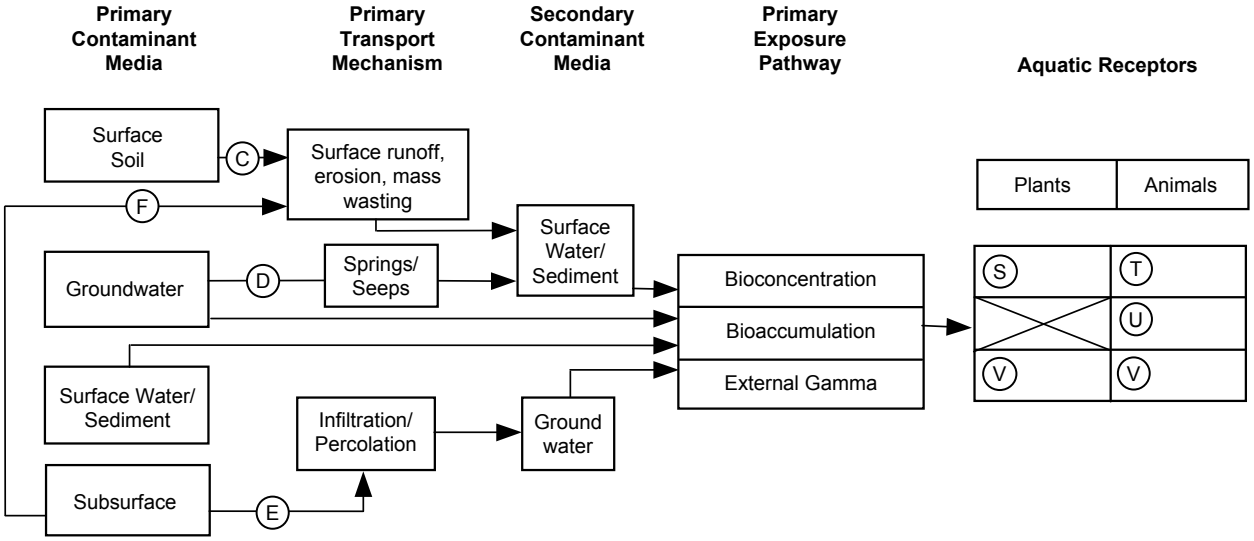




Photo H-1 Current Condition of Consolidated Unit 21-018(a)-99 (mesa top), view to the west (photograph taken 09-08-06)



Photo H-2 Current Condition of Consolidated Unit 21-018(a)-99 (south slope), view to the west (photograph taken 09-08-06)

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Sharon R. Wirth, Ecologist

Name (signature): 

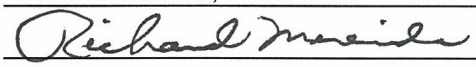
Organization: Shaw Environmental

Phone number: 505-262-8936

Date completed: September 28, 2006

Verification by another party (provide name, organization and phone number):

Name (printed): Richard Mirenda, Ph.D.

Name (signature): 

Organization: Los Alamos National Laboratory, EP-ERSS

Phone number: 505-665-6953