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Supplemental Investigation Report for Potrillo and Fence Canyons Aggregate Area

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Prepared by the Environmental Programs Directorate

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Supplemental Investigation Report for Potrillo and Fence Canyons Aggregate Area

September 2015

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EXECUTIVE SUMMARY

This supplemental investigation report evaluates the nature and extent of contamination and potential human health and ecological risks for 16 solid waste management units (SWMUs) and areas of concern (AOCs) in the Potrillo and Fence Canyons Aggregate Area at Los Alamos National Laboratory (LANL or the Laboratory). The SWMUs and AOCs addressed in this report are located in Technical Area 15 (TA-15) and TA-36. These sites were investigated in 2010, and the investigation results were documented in the revised Potrillo and Fence Canyons Aggregate Area investigation report, submitted to the New Mexico Environment Department (NMED) in November 2011. The approved investigation report concluded that additional sampling to define the extent of contamination was needed for 16 SWMUs and AOCs. Eleven additional sites were included in the approved investigation report but are not addressed in this supplemental investigation report. Of those 11 sites, 1 site is a duplicate of another site and was not investigated, 7 sites are deferred per Table IV-2 of the Compliance Order on Consent (the Consent Order), 2 sites are located within a deferred site and therefore are delayed, and 1 site is delayed because of active open detonation operations at the site.

After the investigation report had been approved, NMED and the U.S. Department of Energy (DOE) entered into a framework agreement for the realignment of environmental priorities at the Laboratory. Under the framework agreement, NMED and DOE agreed to review characterization efforts undertaken to date pursuant to the Consent Order to identify those sites where the nature and extent of contamination have been adequately characterized. Pursuant to the framework agreement, the Laboratory reviewed its data evaluation process with respect to U.S. Environmental Protection Agency (EPA) guidance and the framework agreement principles and concluded that the process could be revised to complete site characterization more efficiently, while providing full protection of human health and the environment. Specifically, the process for evaluating data to define extent of contamination was revised to provide a greater emphasis on risk reduction, consistent with EPA guidance.

The 2010 and previous decision-level investigation data for the 16 sites requiring additional sampling to define extent were evaluated using the revised process. The revised process does not affect the status of the 11 sites approved for delayed/deferred investigation. Based on the evaluation of investigation results using the revised process, the extent of contamination has been defined (or no further sampling for extent is warranted) at 7 sites, and additional sampling for extent is necessary at 8 sites. Human health and ecological risk assessments were performed for all 16 sites. Five sites were found to have potential unacceptable human health risks or doses under one or more scenarios. Two sites were found to have potential ecological risks.

Based on the results of data evaluations presented in this supplemental investigation report, the Laboratory recommends the following:

- Corrective action complete without controls is recommended for six sites for which extent is defined and which pose no potential unacceptable human health risk under any scenario and no unacceptable ecological risk.
- Corrective action complete with controls is recommended for one site for which extent is defined and which pose no potential unacceptable human health risk under the industrial and construction worker scenarios and no unacceptable ecological risk.
- Additional sampling for extent is recommended for eight sites.
- Remediation and sampling are recommended for three sites, which pose potential unacceptable human health risk or dose under one or more scenarios and of which two sites also pose potential ecological risks.

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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, 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 site covers 36 mi^2 of the Pajarito Plateau, which consists of a series of fingerlike mesas that are separated by deep canyons containing perennial and intermittent streams running from west to east. Mesa tops range in elevation from approximately 6200 ft to 7800 ft above mean sea level.

The Laboratory 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 Laboratory's efforts is to ensure past operations do not threaten human or environmental health and safety in and around Los Alamos County, New Mexico. To achieve this goal, the Laboratory is currently investigating sites potentially contaminated by past Laboratory operations. These sites are designated as either solid waste management units (SWMUs) or areas of concern (AOCs).

This supplemental investigation report addresses SWMUs and AOCs within the Potrillo and Fence Canyons Aggregate Area at the Laboratory (Plate 1). These sites are potentially contaminated with hazardous chemicals and radionuclides. The New Mexico Environment Department (NMED), pursuant to the New Mexico Hazardous Waste Act, regulates cleanup of hazardous wastes and hazardous constituents. DOE regulates cleanup of radioactive contamination, pursuant to DOE Order 458.1, Administrative Change 3, Radiation Protection of the Public and the Environment, and DOE Order 435.1, Radioactive Waste Management. 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.

Corrective actions at the Laboratory are subject to a Compliance Order on Consent (the Consent Order). This supplemental investigation report describes work activities that were completed in accordance with the Consent Order.

1.1 General Site Information

The Potrillo and Fence Canyons Aggregate Area, located primarily in Technical Area 15 (TA-15), TA-36, and TA-71 at the Laboratory (Figures 1.1-1 and 1.1-2), consists of 18 SWMUs and 24 AOCs. TA-71 is a buffer area and has not been used for Laboratory operations. Of the 42 sites in the aggregate area, 15 have been previously investigated and/or remediated and have been approved for no further action (NFA). The remaining 27 SWMUs and AOCs were addressed in the approved investigation work plan for the Potrillo and Fence Canyons Aggregate Area (LANL 2009, 106657.8; NMED 2009, 106677). These sites were investigated in 2010 and the results documented in the approved investigation report for Potrillo and Fence Canyons Aggregate Area (LANL 2011, 208336; NMED 2011, 208825). Of the 27 sites addressed during the 2010 investigation, the nature and extent of contamination were not defined for 16 SWMUs or AOCs, where additional sampling to define extent was required per the approved investigation report. One site was a duplicate of another site and was not investigated. Complete investigations were not conducted at 10 of the sites that were (1) deferred per Table IV-2 of the Consent Order, (2) delayed because they are located within 1 of the deferred sites, or (3) delayed because of ongoing open detonation (OD) activities at the site. Sampling was conducted at these sites only to determine if contaminants are migrating off-site. At 1 additional site, sampling was conducted for planning remediation activities, and excavation and removal activities were suspended at 1 other site because of

health and safety concerns. Table 1.1-1 identifies the 27 SWMUs and AOCs, including the 16 sites discussed in this report, in the Potrillo and Fence Canyons Aggregate Area and their status.

1.2 Purpose of the Supplemental Investigation Report

Twenty-seven SWMUs and AOCs within the Potrillo and Fence Canyons Aggregate Area were addressed during the 2010 investigation because these sites are potentially contaminated with hazardous chemicals and/or radionuclides and final assessments of site contamination, associated risks, and recommendations for additional corrective actions remained incomplete. For each site, the objectives of the 2010 investigation were to (1) establish the nature and extent of contamination; (2) determine whether current site conditions pose a potential unacceptable risk to human health or the environment; and (3) assess whether any additional sampling and/or corrective actions are required.

Based on the data evaluation guidelines the Laboratory used at the time the investigation report was prepared, the Laboratory concluded that the extent of contamination was not defined for 16 SWMUs or AOCs. After the investigation report had been approved, NMED and DOE entered into a framework agreement for the realignment of environmental priorities at the Laboratory. Under the framework agreement, NMED and DOE agreed to review characterization efforts undertaken to date pursuant to the Consent Order to identify those sites where the nature and extent of contamination have been adequately characterized. The framework agreement also stipulated the use of U.S. Environmental Protection Agency (EPA) guidance in this process, except in cases where EPA guidance was not supported by sound science. Pursuant to the framework agreement, the Laboratory reviewed its data evaluation process with respect to EPA guidance and the framework agreement principles and concluded that this process could be revised to complete site characterization more efficiently, while providing full protection of human health and the environment. Specifically, the process for evaluating data to define the extent of contamination was revised to provide a greater emphasis on risk/dose reduction, consistent with EPA guidance. Key changes to the data evaluation process are as follows:

- Initially identify chemicals of potential concern (COPCs) to focus efforts on the constituents of most concern.
- Screen COPCs against soil screening levels (SSLs) and screening action levels (SALs) during determination of extent to focus efforts on characterizing contamination potentially posing a risk/dose and requiring corrective action.
- Perform screening level risk/dose evaluations on all sites, even if extent is not defined, to incorporate risk/dose reduction into recommendations for further actions.

The 2010 investigation data for the 16 sites proposed for Phase II investigations were reevaluated using this revised process, and the results are presented in this supplemental investigation report. The revised data evaluation process does not affect the conclusions or recommendations for the delayed/deferred sites.

All analytical data collected from the 2010 investigation activities are presented and evaluated in this report along with decision-level data from previous investigations.

1.3 Document Organization

This report is organized in 10 sections, including this introduction, with multiple supporting appendixes. Section 2 provides details on the aggregate area site conditions (surface and subsurface). Section 3 provides an overview of the scope of the activities performed during the implementation of the work plan. Section 4 describes the regulatory criteria used to evaluate potential risk/dose to ecological and human

receptors. Section 5 describes the data review methods. Sections 6 and 7 present an overview of the operational history of each site, historical releases, summaries of previous investigations, results of the field activities performed during the 2010 investigation, site contamination, evaluation of the nature and extent of contamination, and summaries of the results of the human health and ecological risk-screening assessments for TA-15 and TA-36. Section 8 presents the conclusions of the nature and extent of contamination investigation and risk-screening assessments. Section 9 discusses recommendations based on applicable data and the risk-screening assessments. Section 10 includes a list of references cited and the map data sources used in all the figures and plates.

The appendixes include acronyms and abbreviations, a metric conversion table, and definitions of the data qualifiers used in this report (Appendix A); field methods (Appendix B); investigation-derived waste (IDW) management (Appendix C); radiological survey results (Appendix D); geophysical survey results (Appendix E); analytical program descriptions and summaries of data quality (Appendix F); analytical suites and results and analytical reports (Appendix G) provided on DVD; box plots and statistical comparisons (Appendix H); risk-screening assessments (Appendix I); and site photographs (Appendix J).

2.0 AGGREGATE AREA SITE CONDITIONS

2.1 Surface Conditions

2.1.1 Soil

Soil on the Pajarito Plateau was initially mapped and described by Nyhan et al. (1978, 005702). The soil on the slopes between the mesa tops and canyon floors was mapped as mostly steep rock outcrops consisting of approximately 90% bedrock outcrop and patches of shallow, weakly developed colluvial soil. South-facing canyon walls are generally steep and usually have shallow soil in limited, isolated patches between rock outcrops. In contrast, the north-facing canyon walls generally have more extensive areas of shallow, dark-colored soil under thicker forest vegetation. The canyon floors generally contain poorly developed, deep, well-drained soil on floodplain terraces or small alluvial fans (Nyhan et al. 1978, 005702).

The soil in the bottom of Potrillo and Fence Canyons consists of deep, well-drained soil of the Totavi series, which formed in alluvium in canyon bottoms. The surface soil is a brown gravelly loamy sand, or sandy loam, with 15% to 20% gravel. The permeability of this soil is high, runoff is very slow, and erosion hazard rating is low (Nyhan et al. 1978, 005702, p. 31).

The eastern half of the top of Mesita del Potrillo is classified as rock outcrop, mesic land type, which is found on moderately sloping to steep mesa tops and edges and consists of about 65% tuff rock outcrop with small areas of very shallow undeveloped soil. The western half of the top of Mesita del Potrillo consists of very shallow to shallow, well-drained soil of the Hackroy series; a Hackroy rock outcrop complex; moderately deep, well-drained soil of the Nyjack series; and deep well-drained soil of the fine-loamy Typic Eutroboralfs (LANL 1994, 034756, p. 3-23). The surface layer of the Hackroy soil is a brown sandy loam or loam that has medium runoff and moderate erosion hazard. The Hackroy rock outcrop complex has moderate to severe erosion hazard and medium to high runoff (Nyhan et al. 1978, 005702, p. 25). The surface layer of the Nyjack soil is a brown loam, very fine sandy loam, or sandy loam. This soil has moderate permeability, slow runoff, and slight erosion hazard (Nyhan et al. 1978, 005702, p. 25). The surface layer of the fine-loamy Typic Eutroboralfs soil is a very dark grayish-brown loam, sandy loam, or very fine sandy loam. This soil exhibits slow runoff and moderate erosion hazard (Nyhan et al. 1978, 005702, p. 32).

2.1.2 Surface Water

Most surface water in the Los Alamos area occurs as ephemeral, intermittent, or interrupted streams in canyons cut into the Pajarito Plateau. Springs on the flanks of the Jemez Mountains, west of the Laboratory's western boundary, supply flow to the upper reaches of Cañon de Valle and to Guaje, Los Alamos, Pajarito, and Water Canyons (Purtymun 1975, 011787; Stoker 1993, 056021). These springs discharge water perched in the Bandelier Tuff and Tschicoma Formation at rates from 2 to 135 gal./min (Abeele et al. 1981, 006273). The volume of flow from the springs maintains natural perennial reaches of varying lengths in each of the canyons.

Mesas of the Pajarito Plateau are generally dry, both on the surface and within the bedrock forming the mesas. The surface water and alluvial groundwater hydrology of the south canyons watersheds is related to several primary factors, including the location and discharge volume of natural and anthropogenic water sources, seasonal events (e.g., snowmelt runoff and storm water runoff), and general regional climatic conditions. Surface water flow in the south canyons system is generally ephemeral and occurs primarily as short-duration storm water runoff. Locally persistent surface water has been observed in bedrock pools or where alluvial groundwater discharges from springs or seeps. Intermittent flow also occurs during snowmelt runoff or is associated with the discharge of alluvial groundwater from stream beds. Surface water supports small wetlands in three locations in the south canyons watersheds: in Fishladder Canyon, in S-Site Canyon, and in an additional mesa-top location in TA-16 (USACE 2005, 092220).

Most stream channels that drain the south canyons watersheds are dry for most of the year and are characterized by ephemeral or intermittent flow with only localized areas of perennial flow. In the south canyons watersheds, only Cañon de Valle and Water Canyon support perennial flow. Perennial flow is derived from springs in the eastern Jemez Mountains or the western Pajarito Plateau, but the volume is insufficient to maintain surface flows across the Laboratory before the water is depleted by evaporation, transpiration, and infiltration (LANL 2005, 091523, p. 24). In Water Canyon, snowmelt runoff can extend from the Jemez Mountains to the Rio Grande following heavy winter snowfalls. Storm water runoff also occasionally extends across the Laboratory to the Rio Grande in the south canyons but is transient and associated with heavy rainfall events.

The mesa-top portion of the Potrillo and Fence Canyons Aggregate Area is currently an industrially developed area. No natural surface water is present in this area. During summer thunderstorms and spring snowmelt, runoff flows from the mesa top down the hillsides and into the ephemeral streams in Potrillo and Fence canyons. Surface runoff from the mesa top enters both canyons by way of several drainages (LANL 1992, 007672).

Potrillo Canyon has a relatively small drainage area (3.4 mi^2) that originates at TA-15 at an elevation of approximately 7280 ft. The canyon extends southeast from TA-15 to the Rio Grande for a distance of approximately 6.5 mi. Stream flow in Potrillo Canyon is ephemeral and results primarily from natural runoff. The Potrillo Canyon watershed has no perennial springs or tributaries on Laboratory property (LANL 1997, 055622, p. 3-27). Fence Canyon also has a small drainage area (1.1 mi^2) that originates near the boundary between TA-36 and TA-68 at an elevation of approximately 7094 ft. The canyon extends southeast before joining Potrillo Canyon in TA-71. Stream flow in Fence Canyon is ephemeral and results primarily from natural runoff. The Fence Canyon watershed has no perennial springs or tributaries on Laboratory property (LANL 1997, 055622, p. 3-27).

2.1.3 Land Use

Currently, land use of the Potrillo and Fence Canyons Aggregate Area is industrial. TA-15 has been used since the 1940s, and TA-36 has been used from the 1950s to the present for explosives experiments. The TAs are remote, with small office and Laboratory buildings, utilities, paved and unpaved roads, and firing site structures scattered throughout the area. Most of the sites in this aggregate area are located on the mesa top of Mesita del Potrillo on the northern and southern edges of Potrillo Canyon. The Lower Slobbovia Firing Site, also known as the Skunk Works Firing Site, and three burn pits in central TA-36 are located in Potrillo Canyon. Fence Canyon borders the southern half of TA-36. TA-15 and TA-36 are located within the high explosives (HE) areas, and access is controlled and restricted to Laboratory badge holders. Public access is controlled through physical and administrative controls such as fencing and access control.

2.2 Subsurface Conditions

2.2.1 Stratigraphic Units of the Bandelier Tuff

The stratigraphy of the Potrillo and Fence Canyons Aggregate Area is summarized in this section. Additional information on the geologic setting of the area and information on the Pajarito Plateau can be found in the hydrogeologic conceptual site model for the Laboratory (LANL 2014, 256728).

The bedrock at or near the surface of the mesa top is the Bandelier Tuff (Qbt). There are approximately 1250 ft of volcanic and sedimentary materials between any potential contaminant-bearing units at the mesa-top surface and the regional aquifer. The stratigraphic units encountered during investigation of the Potrillo and Fence Canyons Aggregate Area are described briefly in the following sections. The descriptions begin with the oldest (deepest) and proceed to the youngest (topmost). The stratigraphic units encountered during the Potrillo and Fence Canyons Aggregate Area investigation were Qbt 4, Qbt 3, and Qbt 2 of the Tshirege Member of the Bandelier Tuff (LANL 2014, 256728). Stratigraphic units comprising the Bandelier Tuff are shown in Figure 2.2-1.

2.2.1.1 Guaje Pumice Bed

The Guaje Pumice Bed occurs at the base of the Otowi Member, making a significant and extensive marker horizon. The Guaje Pumice Bed (Bailey et al. 1969, 021498; Self et al. 1986, 021579) contains well-sorted pumice fragments whose mean size varies between 0.8 and 1.6 in. Its thickness averages approximately 28 ft below most of the Pajarito Plateau, with local areas of thickening and thinning. Its distinctive white color and texture make it easily identifiable in borehole cuttings and core, and it is an important marker bed for the base of the Bandelier Tuff.

2.2.1.2 Otowi Member

Griggs and Hem (1964, 092516); Smith and Bailey (1966, 021584); Bailey et al. (1969, 021498); and Smith et al. (1970, 009752) described the Otowi Member. It consists of moderately consolidated (indurated), porous, and nonwelded vitric tuff (ignimbrite) that forms gentle colluvium-covered slopes along the base of canyon walls. The Otowi ignimbrites contain light gray to orange pumice that is supported in a white to tan ash matrix (Broxton et al. 1995, 050121; Broxton et al. 1995, 050119; Goff 1995, 049682). The ash matrix consists of glass shards, broken pumice, crystal fragments, and fragments of perlite.

2.2.1.3 Tephra and Volcaniclastic Sediment of the Cerro Toledo Interval

The Cerro Toledo interval is an informal name given to a sequence of volcaniclastic sediment and tephra of mixed provenance that separates the Otowi and Tshirege Members of the Bandelier Tuff (Broxton et al. 1995, 050121; Broxton and Reneau 1995, 049726; Goff 1995, 049682). Although it is located between the two members of the Bandelier Tuff, it is not considered part of that formation (Bailey et al. 1969, 021498). The unit contains primary volcanic deposits described by Smith et al. (1970, 009752) as well as reworked volcaniclastic sediment. The occurrence of the Cerro Toledo interval is widespread; however, its thickness is variable, ranging between several feet to more than 100 ft.

The predominant rock types in the Cerro Toledo interval are rhyolitic tuffaceous sediment and tephra (Heiken et al. 1986, 048638; Stix et al. 1988, 049680; Broxton et al. 1995, 050121; Goff 1995, 049682). The tuffaceous sediment is the reworked equivalent of Cerro Toledo rhyolite tephra. Oxidation and clay-rich horizons indicate at least two periods of soil development occurred within the Cerro Toledo deposits. Because the soil is rich in clay, it may act as a barrier to the movement of vadose zone moisture. Some of the deposits contain both crystal-poor and crystal-rich varieties of pumice. The pumice deposits tend to form porous and permeable horizons within the Cerro Toledo interval and locally may provide important pathways for moisture transport in the vadose zone. A subordinate lithology within the Cerro Toledo interval includes clast-supported gravel, cobble, and boulder deposits derived from the Tschicoma Formation (Broxton et al. 1995, 050121; Goff 1995, 049682; Broxton and Reneau 1996, 055429).

2.2.1.4 Tshirege Member

The Tshirege Member of the Bandelier Tuff is the upper member and is the most widely exposed bedrock unit of the Pajarito Plateau (Griggs and Hem 1964, 092516; Smith and Bailey 1966, 021584; Bailey et al. 1969, 021498; Smith et al. 1970, 009752). Emplacement of this unit occurred during eruptions of the Valles Caldera approximately 1.2 million years ago (Izett and Obradovich 1994, 048817; Spell et al. 1996, 055542). The Tshirege Member is a multiple-flow, ash-and-pumice sheet that forms the prominent cliffs in most of the canyons on the Pajarito Plateau. It is a cooling unit whose physical properties vary vertically and laterally. The consolidation in this member is largely from compaction and welding at high temperatures after the tuff was emplaced. Its light brown, orange-brown, purplish, and white cliffs have numerous, mostly vertical fractures that may extend from several feet up to several tens of feet. The Tshirege Member includes thin but distinctive layers of bedded, sand-sized particles called surge deposits that demark separate flow units within the tuff. The Tshirege Member is generally over 200 ft thick.

The Tshirege Member differs from the Otowi Member most notably in its generally greater degree of welding and compaction. Time breaks between the successive emplacement of flow units caused the tuff to cool as several distinct cooling units. For this reason, the Tshirege Member consists of at least four cooling subunits that exhibit variable physical properties vertically and horizontally (Smith and Bailey 1966, 021584; Crowe et al. 1978, 005720; Broxton et al. 1995, 050121). The welding and crystallization variability in the Tshirege Member produce recognizable vertical variations in its properties, such as density, porosity, hardness, composition, color, and surface-weathering patterns. The subunits are mappable based on a combination of hydrologic properties and lithologic characteristics.

Broxton et al. (1995, 050121) provide extensive descriptions of the Tshirege Member cooling units. The following paragraphs describe, in ascending order, subunits of the Tshirege Member present at the Potrillo and Fence Canyons Aggregate Area.

The Tsankawi Pumice Bed forms the base of the Tshirege Member. Where exposed, it is commonly 20 to 30 in. thick. This pumice-fall deposit contains moderately well-sorted pumice lapilli (diameters reaching about 2.5 in.) in a crystal-rich matrix. Several thin ash beds are interbedded with the pumice-fall deposits.

Subunit Qbt 1g is the lowermost tuff subunit of the Tshirege Member. It consists of porous, nonwelded, and poorly sorted ash-flow tuff. This unit is poorly indurated but nonetheless forms steep cliffs because of a resistant bench near the top of the unit; the bench forms a harder protective cap over the softer underlying tuff. A thin (4 to 10 in.) pumice-poor surge deposit commonly occurs at the base of this unit.

Subunit Qbt 1v forms alternating clifflike and sloping outcrops composed of porous, nonwelded, crystallized tuff. The base of this unit is a thin horizontal zone of preferential weathering that marks the abrupt transition from glassy tuff below (in unit Qbt 1g) to the crystallized tuff above. This feature forms a widespread marker horizon (locally termed the vapor-phase notch) throughout the Pajarito Plateau. The lower part of Qbt 1v is orange-brown, resistant to weathering, and has distinctive columnar (vertical) joints; hence, the term “colonnade tuff” is appropriate for its description. A distinctive white band of alternating cliff- and slope-forming tuffs overlies the colonnade tuff. The tuff of Qbt 1v is commonly nonwelded (pumices and shards retain their initial equant shapes) and has an open, porous structure.

Unit Qbt 2 forms a distinctive medium-brown vertical cliff that stands out in marked contrast to the slope-forming, lighter-colored tuff above and below. It displays the greatest degree of welding in the Tshirege Member. A series of surge beds commonly mark its base. It typically has low porosity and permeability relative to the other units of the Tshirege Member.

Unit Qbt 3 is a nonwelded to partially welded, vapor-phase altered tuff that forms the upper cliffs. Its base consists of a purple-gray, unconsolidated, porous, and crystal-rich nonwelded tuff that forms a broad, gently sloping bench developed on top of Qbt 2. Abundant fractures extend through the upper units of the Bandelier Tuff, including the ignimbrite of Qbt 3 of the Tshirege. The origin of the fractures has not been fully determined, but the most probable cause is brittle failure of the tuff caused by cooling contraction soon after initial emplacement (Vaniman 1991, 009995.1; Wohletz 1995, 054404).

Unit Qbt 4 consists of a series of variably welded vitric to devitrified ash-flow tuffs characterized by localized thin, discontinuous, crystal-rich, fine- to coarse-grained, volcanic surge deposits. The lower, more indurated parts of Qbt 4 are also significantly fractured. These fractures and surge beds are potential groundwater pathways (LANL 2006, 091698).

2.2.2 Hydrogeology

The hydrogeology of the Pajarito Plateau is generally separable in terms of mesas and canyons forming the plateau. Mesas are generally devoid of water, both on the surface and within the rock forming the mesa. Canyons range from wet to relatively dry; the wettest canyons contain continuous streams and contain perennial groundwater in the canyon-bottom alluvium. Dry canyons have only occasional streamflow and may lack alluvial groundwater. Intermediate-perched groundwater has been found at certain locations on the plateau at depths ranging between 100 and 700 ft. The regional aquifer is found at depths of about 600 to 1200 ft (Collins et al. 2005, 092028).

The hydrogeologic conceptual site model for the Laboratory (LANL 2014, 256728) shows that, under natural conditions, relatively small volumes of water move beneath mesa tops because of low rainfall, high evaporation, and efficient water use by vegetation. Atmospheric evaporation may extend into mesas, further inhibiting downward flow.

2.2.2.1 Groundwater

In the Los Alamos area, groundwater occurs as (1) water in shallow alluvium in some of the larger canyons, (2) intermediate-perched groundwater (a perched groundwater body lies above a less permeable layer and is separated from the underlying aquifer by an unsaturated zone), and (3) the

regional aquifer (Collins et al. 2005, 092028). Numerous wells have been installed at the Laboratory and in the surrounding area to investigate the presence of groundwater in these zones and to monitor groundwater quality.

The Laboratory formulated a comprehensive groundwater protection plan for an enhanced set of characterization and monitoring activities. The Laboratory's Interim Facility-Wide Groundwater Monitoring Plan (LANL 2014, 256728) details the implementation of extensive groundwater characterization across the Pajarito Plateau within an area potentially affected by past and present Laboratory operations.

Alluvial Groundwater

Intermittent and ephemeral stream flows in the canyons of the Pajarito Plateau have deposited alluvium that can be as thick as 100 ft. The alluvium in canyons of the Jemez Mountains is generally composed of sand, gravel, pebbles, cobbles, and boulders derived from the Tschicoma Formation and Bandelier Tuff. The alluvium in canyons of the Pajarito Plateau is finer grained, consisting of clay, silt, sand, and gravel derived from the Bandelier Tuff (Purtymun 1995, 045344).

In contrast to the underlying volcanic tuff and sediment, alluvium is relatively permeable. Ephemeral runoff in some canyons infiltrates the alluvium until downward movement is impeded by the less permeable tuff and sediment, which results in the buildup of a shallow alluvial groundwater body. Depletion by evapotranspiration and movement into the underlying rock limit the horizontal and vertical extent of the alluvial water (Purtymun et al. 1977, 011846). The limited saturated thickness and extent of the alluvial groundwater preclude its use as a viable source of water for municipal and industrial needs. Lateral flow of the alluvial perched groundwater is in an easterly, downcanyon direction (Purtymun et al. 1977, 011846).

Regional Aquifer

The regional aquifer for the Los Alamos area is the only aquifer capable of large-scale municipal water supply (Purtymun 1984, 006513). The surface of the regional aquifer rises westward from the Rio Grande within the Santa Fe Group into the lower part of the Puye Formation beneath the central and western part of the Pajarito Plateau. The depths to groundwater below the mesa tops range between about 1200 ft along the western margin of the plateau and about 600 ft at the eastern margin. The locations of wells and the generalized water-level contours on top of the regional aquifer are described in the Interim Facility-Wide Groundwater Monitoring Plan (LANL 2014, 256728). The regional aquifer is typically separated from the alluvial groundwater and intermediate-perched groundwater by 350 to 620 ft of tuff, basalt, and sediment (LANL 1993, 023249).

Groundwater in the regional aquifer flows east-southeast toward the Rio Grande. The velocity of groundwater flow ranges from about 20 to 250 ft/yr (LANL 1998, 058841, pp. 2–7). Details of depths to the regional aquifer, flow directions and rates, and well locations are presented in various Laboratory documents (Purtymun 1995, 045344; LANL 1997, 055622; LANL 2000, 066802).

2.2.2.2 Vadose Zone

The unsaturated zone from the mesa surface to the top of the regional aquifer is referred to as the vadose zone. The source of moisture for the vadose zone is precipitation, but much of it runs off, evaporates, or is absorbed by plants. The subsurface vertical movement of water is influenced by properties and conditions of the materials that make up the vadose zone.

Although water moves slowly through the unsaturated tuff matrix, it can move rapidly through fractures if saturated conditions exist (Hollis et al. 1997, 063131). Fractures may provide conduits for fluid flow but probably only in discrete, disconnected intervals of the subsurface. Because they are open to the passage of both air and water, fractures can have both wetting and drying effects, depending on the relative abundance of water in the fractures and the tuff matrix.

The Bandelier Tuff is very dry and does not readily transmit moisture. Most of the pore spaces in the tuff are of capillary size and have a strong tendency to hold water against gravity by surface-tension forces. Vegetation is very effective at removing moisture near the surface. During the summer rainy season when rainfall is highest, near-surface moisture content is variable because of higher rates of evaporation and of transpiration by vegetation, which flourishes during this time.

The various units of the Bandelier Tuff tend to have relatively high porosities. Porosity ranges between 30% and 60% by volume, generally decreasing for more highly welded tuff. Permeability varies for each cooling unit of the Bandelier Tuff. The moisture content of native tuff is low, generally less than 5% by volume throughout the profile (Kearl et al. 1986, 015368; Purtymun and Stoker 1990, 007508).

3.0 SCOPE OF ACTIVITIES

This section presents an overview of field activities performed during the implementation of the approved investigation work plan for Potrillo and Fence Canyons Aggregate Area (LANL 2009, 106657.8; NMED 2009, 106677); field investigation results are presented in detail in sections 6 and 7 and in the Appendixes D and E. The scope of activities for the 2010 investigation included site access and premobilization activities; geodetic, geophysical, and radiological surveys; surface and shallow subsurface sampling; landfill excavation, and surface debris removal; health and safety monitoring; and waste management activities.

All activities were conducted in accordance with the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677). The applicable field methods are summarized below and are detailed in Appendix B. Any deviations from the approved investigation work plan are noted in sections 6 and 7 and are described in detail in Appendix B.

3.1 Site Access and Premobilization Activities

The area encompassing the Potrillo and Fence Canyons Aggregate Area is currently used for Laboratory operations and some areas are used by Laboratory personnel for road and foot traffic. Before field mobilization, the issue of Laboratory worker access (e.g., traffic control plan, notifications) was reviewed as part of the management self-assessment process. All efforts were made to provide a secure and safe work area and to reduce impacts to Laboratory personnel, cultural resources, and the environment.

3.2 Field Activities

The following sections describe the field activities conducted during the 2010 investigation, including surface surveys, field screening, surface and shallow subsurface sampling, landfill excavation, and surface debris and septic tank removals. Details regarding the field methods and procedures used to perform these field activities are presented in Appendix B.

3.2.1 Geodetic Survey

Geodetic surveys were conducted during the Potrillo and Fence Canyons Aggregate Area investigation to locate surface and subsurface sampling locations. Initial geodetic surveys were performed to establish and mark the planned sampling locations in the field. Geodetic surveys were conducted in accordance with Standard Operating Procedure (SOP) 5028, Coordinating and Evaluating Geodetic Surveys, using a Trimble 5700 differential global positioning system (GPS). The surveyed coordinates for all sampling locations are presented in Table 3.2-1. All geodetic coordinates are expressed as State Plane Coordinate System 1983, New Mexico Central, U.S.

3.2.2 Radiological Surveys

A radiological survey was performed at the site of two inactive landfills [SWMUs 15-007(a) and 36-001] to identify anomalies to locate and define the landfill boundaries and, at an inactive firing site [SWMU 15-004(f)], to identify all areas with elevated radioactivity from depleted uranium (DU) and radiologically contaminated metals. Multiple radiological instruments and methods were used to optimize the survey including a Trimble Pro XRS mapping-grade GPS, an Alpha Spectra Field Instrument for Detection of Low-Energy Radiation (FIDLER) detector, a Ludlum Model 44-10 2-in. by 2-in. sodium iodide detector, and a Ludlum Model 2221 ratemeter/scaler. Formal surveying was conducted over spatial control and data acquisition grids, which were established using a GPS. Survey results at SWMU 15-007(a) showed a small area near the middle of the SWMU with elevated radiological readings above background. Survey results at SWMU 15-004(f) showed that the maximum count rates above background were located at the firing-site soil berms (mounds) and east of the mounds. Survey results at SWMU 36-001 showed four locations with values above background. Appendix D presents the radiological report with individual profile results.

3.2.3 Geophysical Surveys

A geophysical survey was performed at the site of two inactive landfills [SWMUs 15-007(a) and 36-001] to identify anomalies to locate and define the landfill boundaries. Multiple geophysical instruments and methods were used to optimize the survey, including a Geometrics, Inc., G-858 magnetometer, Geonics Ltd. EM-31 ground conductivity meter, Geonics Ltd. EM-61 high-resolution metal detector, Sensors & Software Ltd. 250-MHz ground-penetrating radar (GPR), and Advanced Geosciences, Inc., MiniSting Memory Earth resistivity and induced polarization meter. Formal surveying was conducted over spatial control and data-acquisition grids, which were established using a transit and tape. Survey results at SWMU 15-007(a) showed buried wastes and disturbed soil wider (east-west) and shorter (north-south) than the anticipated landfill boundaries. Survey results at SWMU 36-001 showed three distinct landfill trenches containing significant buried metal. Appendix E presents the geophysics report with individual profile results.

3.2.4 Field Screening

Field screening for organic vapors and radioactivity was conducted for health and safety purposes and to guide sampling if elevated readings were encountered. Field screening for metals and explosive compounds was performed in accordance with the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677) to guide sample collection. The field-screening results are discussed below.

3.2.4.1 Organic Vapor

Environmental samples were field-screened for headspace organic vapors with a MiniRAE 2000 photoionization detector equipped with an 11.7-electronvolt lamp. Calibration was performed in accordance with the manufacturer's specifications and SOP-06.33, Headspace Vapor Screening with a Photoionization Detector, and recorded in the field logbook. After it was collected, the sample was placed in a sealed plastic bag for approximately 5 min before it was screened. Screening measurements were recorded on the field sample collection logs (SCLs) and in the field logbook. The SCLs are provided on DVD in Appendix G. The organic vapor field-screening results are presented in Table 3.2-2. No additional samples were collected based on elevated organic vapor field-screening results.

3.2.4.2 Radioactivity

All samples collected were field-screened for radioactivity before they were submitted to the Laboratory's Sample Management Office (SMO). A Laboratory radiological control technician (RCT) conducted radiological screening using an Eberline E-600 radiation meter with an SHP-380AB alpha/beta scintillation detector held within 1 in. of the sample. All field results for alpha and beta/gamma radioactivity were recorded in disintegrations per minute (dpm) on the field SCL/chain of custody (COCs). The SCLs and COC forms are provided on DVD in Appendix G. The radiological-screening results are presented in Table 3.2-2.

If elevated radioactivity was encountered during field screening, samples were submitted to the American Radiation Services, Inc., laboratory in White Rock, New Mexico, for gross-alpha, -beta, and -gamma analyses before shipment by the SMO to ensure compliance with U.S. Department of Transportation requirements.

3.2.4.3 Metals

All samples collected from SWMUs 15-004(b), 15-004(c), 15-007(a), 15-008(a), 36-001, and 36-006 were field-screened for barium, copper, lead, and uranium using a handheld Thermo Fisher Scientific Niton XL3t 600 x-ray fluorescence (XRF) analyzer. A subset of the samples collected from SWMU 15-004(f) was also field-screened for barium, copper, lead, and uranium using a handheld Thermo Fisher Scientific Niton XL3t 600 XRF analyzer. Calibration was performed in accordance with the manufacturer's specifications and recorded in the field logbook. The metals-screening results are presented in Table 3.2-2 and Appendix B (Table B-3.0-1). Additional samples were collected if XRF results for barium, copper, lead, or uranium exceeded 2 times the background value (BV) of the sample matrix.

3.2.4.4 Explosive Compounds

All samples collected from SWMUs 15-002, 15-004(b), 15-004(c), 15-007(a), 15-008(a), 15-010(a), 36-001, 36-005, and 36-006 were field-screened quantitatively for RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) and 2,4,6-trinitrotoluene (TNT) using Strategic Diagnostics, Inc., ENSYS immunoassay test kits. A subset of samples collected from SWMU 15-004(f) was also field-screened for RDX and TNT. The screening results for explosive compounds are presented in Table 3.2-2 and Appendix B (Table B-3.0-1). No TNT or RDX results exceeded industrial SSLs (NMED 2009, 108070); therefore, no additional samples were collected based on field screening for explosive compounds.

3.2.5 Surface and Shallow Subsurface Soil Investigation

Samples were collected according to the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677). Surface samples were collected using the spade-and-scoop method in accordance with SOP-06.09, Spade and Scoop Method for Collection of Soil Samples, or with a hand auger in accordance with SOP-06.10, Hand Auger and Thin-Wall Tube Sampler. The samples were collected in stainless-steel bowls and transferred to sample collection bottles with a stainless-steel spoon. No exploratory drilling characterization was conducted during the 2010 investigation; therefore, no borehole abandonment activities were conducted.

All surface and shallow subsurface samples were placed in appropriate sample containers and submitted to the analytical laboratory for the analyses specified by the approved investigation work plan. Standard quality assurance/quality control samples (field duplicates, field trip blanks, and rinsate blanks) were also collected in accordance with SOP-5059, Field Quality Control Samples.

All sample collection activities were coordinated with the SMO. After the samples were collected, they remained in the controlled custody of the field team at all times until they were delivered to the SMO. Sample custody was then relinquished to the SMO for delivery to a preapproved off-site analytical laboratory (SCLs and COC forms on DVD in Appendix G).

3.2.6 Landfill Excavation and Debris Pile Surface Removals

Remediation of the inactive landfill at SWMU 15-007(a) (Material Disposal Area [MDA] N) and confirmation sampling were completed in accordance with the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677). An excavator was used to remove concrete, soil and tuff, rebar, wire, and conduit pipe from the inactive landfill at SWMU 15-007(a). Following the removal and stockpiling of soil, tuff, concrete, and debris, confirmation samples were collected from 10 locations (LANL 2009, 106657.8; NMED 2009, 106677).

Removal of surface debris at the SWMU 15-008(a) surface disposal areas and confirmation sampling were completed in accordance with the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677). Surface debris consisting of metal, concrete, cable, and wire was removed from two surface disposal areas; confirmation samples were collected from 12 locations.

During the 2010 investigation, the landfill at SWMU 36-001 (MDA AA) could not be removed because of unanticipated elevated radioactivity encountered during excavation of test pits and associated health and safety issues. In lieu of conducting the excavation and removal of debris at SWMU 36-001, characterization samples were collected (LANL 2010, 111304; NMED 2010, 111464) (see section 7.2 and deviations in Appendix B).

Removal of surface debris at SWMU 36-006 surface disposal area and confirmation sampling were completed in accordance with the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677). A long-reach excavator was used to remove concrete, soil, rebar, pipe, and other metal debris from the hillslope; confirmation samples were collected from 11 locations.

Management of waste generated from the remediation activities described above and associated IDW is described in Appendix C.

3.2.7 Septic Tank Removal

During the 2010 investigation, the decommissioned septic tank at SWMU 15-010(a) was not found at the location indicated in the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677).

Test pits were excavated at and around the anticipated location of the septic tank and confirmed that the septic tank was not present. Subsequent discussions with knowledgeable site personnel confirmed the septic tank had been removed. The excavation area was backfilled and characterization samples were collected from five locations around the former septic tank location (see deviations in Appendix B).

3.2.8 Equipment Decontamination

All field equipment that could have come in contact with potentially contaminated environmental media (e.g., hand augers, sampling scoops, bowls, breaker bars) was decontaminated between sample collection and between sampling locations to prevent cross-contamination of samples and sampling equipment. Decontamination was performed in accordance with SOP-5061, Field Decontamination of Equipment. Rinsate blanks were collected on sampling equipment to check the effectiveness of decontamination. The dry decontamination methods used are described in Appendix B. All field equipment and heavy equipment used in the posted beryllium areas at SWMUs 15-004(f), 15-008(a), and 36-001 also underwent dry decontamination and were swiped for beryllium before they were released from the site. Beryllium swipes were analyzed by Test America and equipment was released from the site when detected concentrations of beryllium were at or below the beryllium release criteria of 0.2 µg/100 cm^2.

3.2.9 Chemical and Radiological Sample Analyses

All samples were shipped by the SMO to contract analytical laboratories for the requested analyses. The analyses requested were as specified by the approved work plan (LANL 2009, 106657.8; NMED 2009, 106677). The samples were analyzed for all or a subset of the following: target analyte list (TAL) metals, total cyanide, nitrate, perchlorate, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), explosive compounds, dioxins/furans, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), isotopic uranium, isotopic thorium, isotopic plutonium, gamma-emitting radionuclides, and americium-241. Samples collected from SWMU 36-001 were also analyzed for gross-alpha/beta radioactivity, strontium-90, and toxicity characteristic leaching procedure (TCLP) metals.

3.2.10 Health and Safety Measures

All 2010 investigation activities were conducted in accordance with a site-specific health and safety plan and an integrated work document that detailed work steps, potential hazards, hazard controls, and required training to conduct work. These health and safety measures included using modified Level D personal protective equipment in areas where elevated radioactivity was expected and field monitoring for organic vapor, gross-alpha and gross-beta/gamma radiation, and dust-particulate matter using both portable and personal air-monitoring systems.

3.2.11 IDW Storage and Disposal

All IDW generated during the Potrillo and Fence Canyons Aggregate Area investigation was managed in accordance with SOP-5238, Characterization and Management of Environmental Program Waste. This procedure incorporates the requirements of all applicable EPA and NMED regulations, DOE orders, and Laboratory implementation requirements, policies, and/or procedures. IDW was also managed in accordance with the approved waste characterization strategy form (WCSF). Details of IDW management for the Potrillo and Fence Canyons Aggregate Area investigation are presented in Appendix C.

The waste streams associated with the investigation included contact waste; excavated environmental media consisting of overburden spoils of soil and rock removed from within or next to areas excavated; excavated manmade debris consisting of concrete, metal, wire, connectors, and miscellaneous metal; municipal solid waste; and spent explosives test kits consisting of spent solvent (acetone, water, and soil-crushed tuff). Each waste stream was containerized and placed in an accumulation area appropriate for the regulatory classification of the waste, in accordance with the approved WCSF (Appendix C).

3.3 Deviations

Deviations occurred while field activities were conducted as defined in the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677). The deviations resulted in a delay of the remediation at SWMU 36-001 and a delay in determining the nature and extent of contamination beneath the structures and drainline at SWMUs 15-009(e) and 36-003(b). Specific deviations are summarized in sections 6 and 7 and are described in Appendix B, section B-11.

4.0 REGULATORY CRITERIA

This section describes the criteria used to screen COPCs and evaluate potential risks to ecological and human receptors. Regulatory criteria identified in the Consent Order include cleanup standards, risk-based screening levels, and risk-based cleanup goals for each pertinent medium at the subject sites.

Human health risk-screening evaluations were conducted for the Potrillo and Fence Canyons Aggregate Area using NMED guidance (NMED 2015, 600575). Ecological risk-screening assessments were performed with the use of Laboratory guidance (LANL 2014, 262559).

4.1 Current and Future Land Use

The specific screening levels used in the risk evaluation and corrective action decision process at a site depend on the current and reasonably foreseeable future land use. The current and reasonably foreseeable future land use for a site determines the receptors and exposure scenarios used to select screening and cleanup levels. The land use within and surrounding the Potrillo and Fence Canyons Aggregate Area is currently industrial and is expected to remain industrial for the reasonably foreseeable future. The construction worker scenario is evaluated because underground sewer lines are present near or within the boundaries of the consolidated units and maintenance or repair on these lines is a reasonable possibility in the foreseeable future. The residential scenario is evaluated for comparison purposes per the Consent Order and is the decision scenario for sites that do not require future controls.

4.2 Screening Levels

Human health and ecological risk-screening evaluations were conducted for the COPCs detected in solid media at sites within the Potrillo and Fence Canyons Aggregate Area. The human health risk-screening assessments (Appendix I) were performed on inorganic and organic COPCs using NMED SSLs for the industrial, construction worker, and residential scenarios (NMED 2015, 600575). If SSLs were not available from NMED guidance, EPA regional screening levels were used (http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm) The EPA SSLs for carcinogens were multiplied by 10 to adjust from a 10^{-6} cancer risk level to the NMED target cancer risk level of 10^{-5}. Radionuclides were assessed using the Laboratory SALs for the same scenarios (LANL 2014, 600064). Surrogate SSLs were used for some COPCs for which no SSLs were available based on structural similarity or breakdown products.

NMED has developed screening guidelines for TPH (NMED 2015, 600575). The values used to screen TPH–diesel range organics (TPH-DRO) results are for diesel No. 2/crankcase oil. Unlike SSLs, the TPH-DRO screening guidelines are not strictly risk-based and were developed using assumed product compositions that may or may not represent the product that was actually released at a site or the constituents present after weathering. Because of the different basis for toxicity, the TPH-DRO results are screened and presented separately from the other chemical results. Results of the TPH-DRO sampling, in conjunction with the chemical analyses, are used when making cleanup decisions. Potential human health and ecological risk are evaluated primarily based on the petroleum-related contaminants detected at a site, as determined by analysis of samples for SVOCs and VOCs. If samples were analyzed only for TPH-DRO and screening guidelines are exceeded, additional sampling and analysis for SVOCs and VOCs is recommended.

Recent NMED guidance includes total chromium SSLs for the residential, industrial, and construction worker scenarios (NMED 2015, 600575). Because the toxicity of chromium strongly depends on its oxidation state, NMED and EPA also have SSLs for trivalent chromium and hexavalent chromium. For screening purposes, the NMED SSLs for total chromium are used for comparison unless there is a known or suspected source of hexavalent chromium at the SWMU or AOC or site conditions could alter the speciation of chromium in the environment. Total chromium screening levels are appropriate for low-level releases to soil from sources not associated with hexavalent chromium. However, NMED and EPA recommend collecting valence-specific data for chromium if chromium is likely to be an important contaminant at a site and when hexavalent chromium may exist (NMED 2015, 600575; http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm). Otherwise, total chromium data are used.

Site conditions that could alter the speciation of chromium in the environment do not exist within and around the SWMUs/AOCs within the Potrillo and Fence Canyons Aggregate Area. The soil pH is circumneutral, which tends to stabilize chromium as trivalent chromium and forms chromium hydroxide. The redox conditions of the soil enhance and maintain the stability of trivalent chromium and prevent oxidation to hexavalent chromium. Furthermore, iron and manganese are generally present at background concentrations and the iron concentrations are greater than the manganese concentrations, which favors reducing conditions and the formation of trivalent chromium.

There are no known sources of hexavalent chromium use at SWMUs and AOCs in the Potrillo and Fence Canyons Aggregate Area. SWMUs and AOCs included in this supplemental investigation report were analyzed for total chromium only. Total chromium results for these sites are screened using the NMED total chromium SSLs. The sampling and analysis approach was presented in the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677).

4.3 Ecological Screening Levels

The ecological risk-screening assessments (Appendix I) were conducted using ecological screening levels (ESLs) obtained from the ECORISK Database, Version 3.2 (LANL 2014, 262559). The ESLs are based on similar species and are derived from experimentally determined no observed adverse effect levels, lowest observed adverse effect levels, 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 3.2 (LANL 2014, 262559).

4.4 Cleanup Goals

As specified in the Consent Order, SSLs for inorganic and organic chemicals (NMED 2015, 600575) are used as soil cleanup levels unless they are determined to be impracticable or values do not exist for the current and reasonably foreseeable future land uses. SALs are used as soil cleanup levels for radionuclides (LANL 2014, 600064). Screening assessments compare COPC concentrations for each site with industrial, residential, and construction worker SSLs and SALs.

The cleanup goals specified in Section VIII of the Consent Order are a target risk of 1×10^{-5} for carcinogens or a hazard index (HI) of 1 for noncarcinogens. For radionuclides, the target dose is 25 mrem/yr as authorized by DOE Order 458.1. The SSLs/SALs used for the risk-screening assessments in Appendix I are based on these cleanup goals.

5.0 DATA REVIEW METHODOLOGY

The purpose of the data review is to define the nature and extent of contaminants for each SWMU or AOC in the Potrillo and Fence Canyons Aggregate Area. The nature of a contaminant refers to the specific contaminants that are present, the affected media, and associated concentrations. The nature of contamination is defined through identification of COPCs, which is discussed in section 5.1. The identification of a chemical or radionuclide as a COPC does not mean the constituent(s) is related to the site and a result of site operations. A COPC is identified because it is present at a site based on the criteria discussed below but might be present because of adjacent and/or upgradient operations, and/or infrastructure typical of industrial and metropolitan development. If such origins are evident, the constituents might be excluded from the data analyses and risk assessments. The extent of contamination refers to the spatial distribution of COPCs, with an emphasis on the distribution of COPCs potentially posing a risk or requiring corrective action. The process for determining the extent of contamination and for concluding no further sampling for extent is warranted is discussed in section 5.2.

5.1 Identification of COPCs

COPCs are chemicals and radionuclides that may be present as a result of releases from SWMUs or AOCs. Inorganic chemicals and some radionuclides occur naturally and inorganic chemicals and radionuclides detected because of natural background are not considered COPCs. Similarly, some radionuclides may be present as a result of fallout from historical nuclear weapons testing and these radionuclides are also not considered COPCs. The Laboratory has collected data on background concentrations of many inorganic chemicals, naturally occurring radionuclides, and fallout radionuclides. These data have been used to develop media-specific BVs and fallout values (FVs) (LANL 1998, 059730). For inorganic chemicals and radionuclides for which BVs or FVs exist, identification of COPCs involves background comparisons, which are described in sections 5.1.1 and 5.1.2. If no BVs or FVs are available or if samples are collected where FVs are not appropriate (i.e., greater than 1-ft depth or in rock), COPCs are identified based on detection status (i.e., if the inorganic chemical or radionuclide is detected, it is identified as a COPC unless information indicates it is not present as a result of a release from the SWMU or AOC).

Organic chemicals may also be present as a result of anthropogenic activities unrelated to the SWMU or AOC or, to a lesser extent, from natural sources. Because no background data are available for organic chemicals, background comparisons cannot be performed in the same manner as for inorganic chemicals or radionuclides. Therefore, organic COPCs are identified on the basis of detection status (i.e., the organic chemical is detected). When the nature of contamination is assessed, the history of site operations may be evaluated to determine whether an organic COPC is present because of a release

from a SWMU or AOC or is present from non-site-related sources. Organic chemicals that are clearly present from sources other than releases from a SWMU or AOC (e.g., polycyclic aromatic hydrocarbons [PAHs]) may be eliminated as COPCs and not evaluated further.

5.1.1 Inorganic Chemical and Radionuclide Background Comparisons

The COPCs are identified for inorganic chemicals and radionuclides following EP-SOP-10071, Background Comparisons for Inorganic Chemicals, and EP-SOP-10073, Background Comparisons for Radionuclides. Inorganic COPCs are identified by comparing site data with BVs and using statistical comparisons, as applicable (LANL 1998, 059730). Radionuclides are identified as COPCs based on background comparisons and statistical methods if BVs or FVs are available or based on detection status if BVs or FVs have not been established.

Background data are generally available for inorganic chemicals in soil, sediment, and tuff (LANL 1998, 059730). However, some analytes (e.g., nitrate, perchlorate) have no BVs. A BV may be either a calculated value from the background data set (upper tolerance limit [UTL] or the 95% upper confidence bound on the 95th quantile) or a detection limit (DL). When a BV is based on a DL, there is no corresponding background data set for that analyte/media combination.

For inorganic chemicals, data are evaluated by sample media to facilitate the comparison with media-specific background data. To identify inorganic COPCs, the first step is to compare the sampling result with BVs. If sampling results are above the BV and sufficient data are available (eight or more sampling results and five or more detections), statistical tests are used to compare the site sample data with the background data set for the appropriate media. If statistical tests cannot be performed because of insufficient data or a high percentage of nondetections, the sampling results are compared with the BV for the appropriate media. If at least one sampling result is above the BV, the inorganic chemical is identified as a COPC unless lines of evidence can be presented to establish the inorganic chemical is not a COPC. Such lines of evidence include, but are not limited to, comparison to the maximum background concentrations, number of detects above the BV, number of nondetects in the data set, and site history. The same evaluation is performed using DLs when an inorganic chemical is not detected but has a DL above the BV. If no BV is available, detected inorganic chemicals are identified as COPCs.

Radionuclides are identified as COPCs based on comparisons to BVs for naturally occurring radionuclides or to FVs for fallout radionuclides. Thorium-228, thorium-230, thorium-232, uranium-234, uranium-235/236, and uranium-238 are naturally occurring radionuclides. Americium-241, cesium-137, plutonium-238, plutonium-239/240, strontium-90, and tritium are fallout radionuclides.

Naturally occurring radionuclides detected at activities above their respective BVs are identified as COPCs. These radionuclides have no background data sets. If there is no associated BV or FV and the radionuclide is detected, it is retained as a COPC.

The FVs for the fallout radionuclides apply to the top 0.0–1.0 ft of soil and fill and to sediment regardless of depth. If a fallout radionuclide is detected in soil or fill samples collected below 1.0 ft or in tuff samples, the radionuclide is identified as a COPC. For soil and fill samples from 1.0 ft below ground surface (bgs) or less, if the activity of a fallout radionuclide is greater than the FV, comparisons of the top 0.0–1.0-ft sample data are made with the fallout data set and the radionuclide is eliminated as a COPC if activities are similar to fallout activities or lines of evidence can be presented to establish the radionuclide is not a COPC. Sediment results are evaluated in the same manner, although all data are included, not just the data from 0.0–1.0 ft bgs.

The FV for tritium in surface soil (LANL 1998, 059730) is in units of pCi/mL. This FV requires using sample percent moisture to convert sample tritium data from pCi/g (as provided by analytical laboratories) to the corresponding values in units of pCi/mL. Because sample percent moisture historically has been determined using a variety of methods, often undocumented, the Laboratory has adopted the conservative approach of identifying tritium in soil as a COPC based on detection status.

Sample media encountered during investigations at Potrillo and Fence Canyons Aggregate Area include soil (all soil horizons, designated by the media code ALLH or SOIL); fill material (media code FILL); alluvial sediment (media code SED); and Bandelier Tuff (media codes Qbt2, Qbt3, and Qbt4). Because no separate BVs are available for fill material, fill samples are evaluated by comparison with soil BVs (LANL 1998, 059730). In this report, the discussions of site contamination in soil include fill samples with soil samples in sample counts and comparisons to background. Fill samples are not discussed separately from soil. The units of the upper Bandelier Tuff (Qbt2, Qbt3, and Qbt4) are likewise evaluated together with respect to background (LANL 1998, 059730).

5.1.2 Statistical Methods Overview

A variety of statistical methods may be applied to each of the data sets. The use of any of these methods depends on how appropriate the method is for the available data. The results of the statistical tests are presented in Appendix H tables.

5.1.2.1 Distributional Comparisons

Comparisons between site-specific data and Laboratory background data are performed using a variety of statistical methods. These methods begin with a simple comparison of site data with an UTL estimated from the background data (UTL or the 95% upper confidence bound on the 95th quantile). The UTLs are used to represent the upper end of the concentration distribution and are referred to as BVs. The UTL comparisons are then followed, when appropriate, by statistical tests that evaluate potential differences between the distributions. These tests are used for testing hypotheses about data from two potentially different distributions (e.g., a test of the hypothesis that site concentrations are elevated above background levels). Nonparametric tests most commonly performed include the Gehan test (modification of the Wilcoxon Rank Sum test) and the quantile test (Gehan 1965, 055611; Gilbert and Simpson 1990, 055612).

The Gehan test is recommended when between 10% and 50% of the data sets are nondetections. It handles data sets with nondetections reported at multiple DLs in a statistically robust manner (Gehan 1965, 055611; Millard and Deverel 1988, 054953). The Gehan test is not recommended if either of the two data sets has more than 50% nondetections. If there are no nondetected concentrations in the data, the Gehan test is equivalent to the Wilcoxon Rank Sum test. The Gehan test is the preferred test because of its applicability to a majority of environmental data sets and its recognition and recommendation in EPA-sponsored workshops and publications.

The quantile test is better suited to assessing shifts in a subset of the data. The quantile test determines whether more of the observations in the top chosen quantile of the combined data set come from the site data set than would be expected by chance, given the relative sizes of the site and background data sets. If the relative proportion of the two populations being tested is different in the top chosen quantile of the data than in the remainder of the data, the distributions may be partially shifted because of a subset of site data. This test is capable of detecting a statistical difference when only a small number of concentrations are elevated (Gilbert and Simpson 1992, 054952). The quantile test is the most useful distribution shift test where samples from a release represent a small fraction of the overall data collected. The quantile test is applied at a pre-specified quantile or threshold, usually the 80th percentile. The test cannot be performed if more than 80% (or, in general, more than the chosen percentile) of the combined

data are nondetected values. It can be used when the frequency of nondetections is approximately the same as the quantile being tested. For example, in a case with 75% nondetections in the combined background and site data set, application of a quantile test comparing 80th percentiles is appropriate. However, the test cannot be performed if nondetections occur in the top chosen quantile. The threshold percentage can be adjusted to accommodate the detection rate of an analyte or to look for differences further into the distribution tails. The quantile test is more powerful than the Gehan test for detecting differences when only a small percentage of the site concentrations are elevated.

If the differences between two distributions appear to occur far into the tails, the slippage test might be performed. This test evaluates the potential for some of the site data to be greater than the maximum concentration in the background data set if, in fact, the site data and background data came from the same distribution. This test is based on the maximum concentration in the background data set and the number ("n") of site concentrations that exceed the maximum concentration in the background set (Gilbert and Simpson 1990, 055612, pp. 5–8). The result (p-value) of the slippage test is the probability that "n" (or more) site samples exceed the maximum background concentration by chance alone. The test accounts for the number of samples in each data set (number of samples from the site and number of samples from background) and determines the probability of "n" (or more) exceedances if the two data sets came from identical distributions. This test is similar to the BV comparison in that it evaluates the largest site measurements but is more useful than the BV comparison because it is based on a statistical hypothesis test, not simply on a statistic calculated from the background distribution.

For all statistical tests, a p-value less than 0.05 was the criterion for accepting the null hypothesis that site sampling results are not different from background.

5.1.2.2 Graphical Presentation

Box plots are provided to give a visual representation of the data and to help illustrate the presence of outliers or other anomalous data that might affect statistical results and interpretations. The plots allow a visual comparison among data distributions. The differences of interest may include an overall shift in concentration (shift of central location) or, when the centers are nearly equal, a difference between the upper tails of the two distributions (elevated concentrations in a small fraction of one distribution). The plots may be used in conjunction with the statistical tests (distributional comparisons) described above. Unless otherwise noted, the nondetected concentrations are included in the plots at their reported DL.

The box plots presented in Appendix H of this report consist of a box, a line across the box, whiskers (lines extended beyond the box and terminated with a short perpendicular line), and points outside the whiskers. The box area of the plot is the region between the 25th percentile and the 75th percentile of the data, the interquartile range or middle half of the data. The horizontal line within the box represents the median (50th percentile) of the data. The whiskers extend to the most extreme point that is not considered an outlier, with a maximum whisker length of 1.5 times the interquartile range, outside of which data may be evaluated for their potential to be outliers. The concentrations are plotted as points overlying the box plot. When a data set contains both detected concentrations and nondetected concentrations reported as DLs, the detected concentrations are plotted as Xs and the nondetected concentrations are plotted as Os.

5.2 Extent of Contamination

Spatial concentration trends are initially used to determine whether the extent of contamination is defined. Evaluation of spatial concentration data considers the conceptual site model of the release and subsequent migration. Specifically, the conceptual site model should define where the highest concentrations would be expected if a release had occurred and how these concentrations should vary

with distance and depth. If the results are different from the conceptual site model, it could indicate that no release has occurred or other sources of contamination exist.

In general, both laterally and vertically decreasing concentrations are used to define extent. If concentrations are increasing or not changing, other factors are considered to determine whether extent is defined or if additional extent sampling is warranted. These factors include:

- the magnitude of concentrations and rate of increase compared with SSLs/SALs,
- the magnitude of concentrations of inorganic chemicals or radionuclides compared with the maximum background concentrations for the medium,
- concentrations of organic chemicals compared with estimated quantitation limits (EQLs), and
- results from nearby sampling locations.

The primary focus for defining the extent of contamination is characterizing contamination that potentially poses a potential unacceptable risk and might require additional corrective actions. As such, comparison with SSLs/SALs is used as an additional step following a determination of whether extent is defined by decreasing concentrations with depth and distance and whether concentrations are below EQLs or DLs. The initial SSL/SAL comparison is conducted using the residential SSL/SAL (regardless of whether the current and reasonably foreseeable future land use is residential) because this value is typically the most protective. If the current and reasonably foreseeable future land use is not residential, comparison with the relevant SSL/SAL may also be conducted if the residential SSL/SAL is exceeded or otherwise similar to COPC concentrations. For all SWMUs and AOCs in Potrillo and Fence Canyons Aggregate Area, the current and reasonably foreseeable future land use is industrial (section 4.1).

The SSL/SAL comparison is not necessary if all COPC concentrations are decreasing with depth and distance. If, however, concentrations increase with depth and distance or do not display any obvious trends, the SSLs/SALs are used to determine whether additional sampling for extent is warranted. If the COPC concentrations are sufficiently below the SSL/SAL (e.g., the residential and/or industrial SSL/SAL is 10 times [an order of magnitude]) or more than all concentrations], the COPC does not pose a potential unacceptable risk and no further sampling for extent is warranted. The validity of the assumption that the COPC does not pose a risk is confirmed using the results of the risk-screening assessment. The calculation of risk also assists in determining whether additional sampling is warranted to define the extent of contamination that requires additional corrective actions.

Calcium, magnesium, potassium, and sodium may be COPCs for some sites. These constituents are essential nutrients and their maximum concentrations are compared with NMED's essential nutrient screening levels (NMED 2015, 600575). If the maximum concentration is less than the screening level(s), no additional sampling for extent is warranted and the inorganic chemical is eliminated from further evaluation in the risk assessment.

6.0 TA-15 BACKGROUND AND FIELD-INVESTIGATION RESULTS

6.1 Background TA-15

TA-15, also known as R-Site, occupies portions of Threemile Mesa on the Pajarito Plateau near the southwestern boundary of the Laboratory in a roughly rectangular area approximately 1.3 mi wide by 1.5 mi long. TA-15 occupies approximately 1200 acres and is bounded by TA-66 and TA-67 to the north, TA-14, TA-16, TA-37, and TA-49 to the west and south, and TA-36 to the east. The eastern portion of

TA-15 is located within the Potrillo and Fence Canyons Aggregate Area; Potrillo Canyon intersects the eastern half of TA-15 (Figures 1.1-1 and 1.1-2; Plate 1).

6.1.1 Operational History

TA-15 has been used from the mid-1940s to the present for explosives experiments. In that capacity, test explosions ranging from a few kilograms of HE to as much as 650 kg were conducted. These experiments used natural uranium metal, DU metal, lesser quantities of beryllium, and other metals. In most cases, the tests were carried out aboveground, which resulted in the test materials being scattered over areas. Based on Laboratory records, it is estimated that some 75 metric tons of natural uranium and DU have been expended at the TA-15 firing sites since the mid-1940s (LANL 1993, 020946, pp. E2, E9). TA-15 was used for HE research, development, and testing, primarily through hydrodynamic testing and dynamic experimentation. TA-15 contains the Pulsed High-Energy Radiographic Machine Emitting X-rays (PHERMEX) facility, the Dual Axis Radiographic Hydrodynamic Test (DARHT) facility, and building 15-0206, all of which are or were formerly used for testing weapons under development. Other activities at TA-15 include the investigation of weapons functioning and systems behavior in nonnuclear testing.

6.1.2 Summary of Releases

Potential contaminants at TA-15 may have been released into the environment through drainages downgradient of active firing sites, inactive landfills, inactive surface disposal areas, former firing sites, former septic systems, former storage areas, former transformer platforms, or former building locations.

6.1.3 Current Site Usage and Status

Much of TA-15 is undeveloped and has been used since the 1940s to the present for explosives experiments. TA-15 is remote with small office and Laboratory buildings, utilities, paved and unpaved roads, and firing site–structures scattered throughout the area. TA-15 is located within the HE area and access is controlled and restricted to Laboratory badge holders.

6.2 SWMU 15-002, Former Burn Pits

6.2.1 Site Description and Operational History

SWMU 15-002 is described in the 1990 SWMU report as an inactive burn pit west of E-F Firing Site at TA-15 (LANL 1990, 007512, p. 88) (Figure 6.2-1). This burn pit (south pit) was surrounded on three sides by a 3-ft-high, 10-ft-diameter earthen berm (LANL 1993, 020946, p. 8-28). A recent review of engineering drawings and aerial photographs demonstrates that SWMU 15-002 actually consists of two former burn pits. The burn pit originally identified in the 1990 SWMU report is located south of building 15-0534. The second burn pit (north pit) is an approximate 5- to 10-ft rectangular area located east of former buildings 15-0001 and 15-0023.

The originally identified south pit is shown on a 1948 engineering drawing (ENG C-15208) and aerial photographs taken between 1946 and 1974 (SNL 1946, 015400; LASL 1948, 105275; USAF 1958, 015825; LASL 1974, 017204). The 1948 aerial photograph shows a bermed area surrounding the pit on three sides (north, west, and south). A small dirt road led to this bermed area. Aerial photographs taken in 1958 still show the bermed area; however, in the photograph the road appears not to have been used for some time and is overgrown with vegetation, indicating the burn site was no longer used (USAF 1958,

015825). Although former employees were not able to provide the exact location for this burn pit, they described it as a site used to burn oil/uranium mixtures and HE (DOE 1986, 036409, p. TA15-7).

Engineering drawings ENG-C 1481 and SK-1301 show the north burn pit east of former buildings 15-0001 and 15-0023 (LASL 1951, 105277; LASL 1951, 105278).

6.2.2 Relationship to Other SWMUs and AOCs

The SWMU 15-002 south burn pit was located south of building 15-0534 and the north burn pit, located east of former building 15-0001, is approximately 10 ft north of SWMU 15-010(a) and approximately 50 ft northwest of SWMU 15-007(a). Together SWMUs 15-007(a) and 15-002 make up Consolidated Unit 15-002-00.

6.2.3 Summary of Previous Investigations

An aerial radiological survey conducted in 1982 by EG&G Energy Measurements detected no radionuclides at levels above background at the burn pit south of building 15-0534 (LANL 1993, 020946, p. 8-28).

During the 1995 and 1996 Phase I Resource Conservation and Recovery Act (RCRA) facility investigations (RFIs) conducted at the burn pit south of building 15-0534, a radiological survey was conducted at the site and samples were collected from depths of 0.0–0.5 ft and 1.5–2.0 ft bgs at each of two locations from within the pit (LANL 1996, 054977, pp. 5-6–5-8). All four samples were submitted for analysis of TAL metals and SVOCs; the two subsurface samples were also analyzed for VOCs. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the historical investigation report (HIR) (LANL 2009, 105251). Screening-level data showed inorganic chemicals detected above BVs, detected VOCs, and isotopic thorium detected above the BVs.

6.2.4 Site Contamination

6.2.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- All samples were field-screened for organic vapors; gross-alpha, -beta, and -gamma radioactivity; and explosive compounds (TNT and RDX). Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2.
- A total of 30 samples were collected from 10 locations (5 locations at each of the former burn pits) from 0.0–1.0 ft, 3.0–4.0 ft, and 6.0–7.0 ft bgs.
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, dioxins/furans, explosive compounds, VOCs, SVOCs, TPH-DRO, TPH–gasoline range organics (GRO), isotopic uranium, and isotopic thorium. Two of the 30 samples (1 from each of the two former burn pits) were also analyzed for PCBs.

Sampling locations with decision-level data for SWMU 15-002 are shown in Figure 6.2-1. Table 6.2-1 presents the samples collected and analyses requested for SWMU 15-002. The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.2.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at SWMU 15-002, no organic vapors were detected. No radiological-screening results exceeded twice the maximum site background levels. No screening results for explosive compounds exceeded industrial SSLs. The field-screening results are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the field-screening results.

6.2.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 15-002 consisted of 30 samples (16 soil and 14 tuff) collected from 10 locations. The pits are not collocated and therefore are discussed separately below.

Inorganic Chemicals—Former North Burn Pit

Fifteen samples (eight soil and seven tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.2-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Plate 2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Aluminum was detected above the Qbt 2,3,4 BV (7340 mg/kg) in two tuff samples with a maximum concentration of 12,200 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (8370 mg/kg). Aluminum is retained as a COPC.

Antimony was not detected above the soil BV (0.83 mg/kg) but had a DL (0.73 mg/kg) above the Qbt 2,3,4 BV (0.5 mg/kg) in 1 sample. The DL was only 0.23 mg/kg above the BV and antimony was not detected in the other 14 samples. Antimony is not a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in 1 tuff sample at a concentration of 3.2 mg/kg. The concentration was only 0.41 mg/kg above the BV and 0.8 mg/kg and 1.8 mg/kg below the 2 highest Qbt 2,3,4 background concentrations (4 mg/kg and 5 mg/kg). Arsenic was not detected above BVs in the other 14 samples. Arsenic is not a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in three tuff samples with a maximum concentration of 139 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (51.6 mg/kg). Barium is retained as a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in four tuff samples with a maximum concentration of 9850 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (2230 mg/kg). Calcium is retained as a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in six tuff samples with a maximum concentration of 10.2 mg/kg. The concentrations were approximately 0.5 mg/kg to 3 mg/kg above the BV and approximately 3 mg/kg to 5 mg/kg below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium was not detected above BVs in the other nine samples. Chromium is not a COPC.

Cobalt was detected above the soil and Qbt 2,3,4 BVs (8.64 mg/kg and 3.14 mg/kg) in two soil samples and one tuff sample with a maximum concentration of 23.6 mg/kg. The Gehan and quantile tests indicated site concentrations of cobalt in soil are not statistically different from background (Figure H-1 and Table H-1). The tuff concentration (3.8 mg/kg) was only 0.66 mg/kg above the BV and maximum Qbt 2,3,4 background concentration (3.14 mg/kg). Cobalt was not detected above the BV in the other six tuff samples and was not statistically different from soil background. Cobalt is not a COPC.

Copper was detected above the Qbt 2,3,4 BV (4.66 mg/kg) in one sample at a concentration of 7.4 mg/kg. The concentration was above the maximum Qbt 2,3,4 background concentration (6.2 mg/kg). Copper is retained as a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.51 mg/kg to 0.55 mg/kg) above the BVs in 12 samples. The DLs were only 0.01 mg/kg to 0.05 mg/kg above the BV. Cyanide was not detected or was detected below the BVs in all samples (detected below the soil BV in three samples). Cyanide is not a COPC.

Lead was detected above the soil and Qbt 2,3,4 BVs (22.3 mg/kg and 11.2 mg/kg) in two soil samples and six tuff samples with a maximum concentration of 50.1 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are statistically different from background (Figure H-2 and Table H-1). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in 2 samples with a maximum concentration of 2370 mg/kg. The concentrations were 360 mg/kg and 680 mg/kg above the BV and 770 mg/kg and 450 mg/kg below the 2 highest Qbt 2,3,4 background concentrations (2720 mg/kg and 2820 mg/kg). Magnesium was not detected above BVs in the other 13 samples. Magnesium is not a COPC.

Manganese was detected above the soil BV (671 mg/kg) in two samples at with a maximum concentration of 2400 mg/kg. The Gehan and slippage tests indicate site concentrations of manganese in soil are statistically different from background (Figure H-3 and Table H-1). Manganese is retained as a COPC.

Mercury was detected above the soil and Qbt 2,3,4 BVs (0.1 mg/kg) in six soil samples and six tuff samples with a maximum concentration of 1.29 mg/kg. Mercury is retained as a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in 3 samples with a maximum concentration of 7.8 mg/kg. The concentrations were 0.32 mg/kg to 1.8 mg/kg above the BV and either equivalent to or 0.8 mg/kg above the maximum Qbt 2,3,4 background concentration (7 mg/kg). Nickel was not detected above BVs in the other 12 samples. Nickel is not a COPC.

Nitrate was detected in 14 samples with a maximum concentration of 5.2 mg/kg. Nitrate is naturally occurring and the concentrations reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Perchlorate was detected in one sample at a concentration of 0.0032 mg/kg. Perchlorate is retained as a COPC.

Selenium was detected above the Qbt 2,3,4 BVs (0.3 mg/kg) in seven tuff samples with a maximum concentration of 2.2 mg/kg. Selenium is retained as a COPC.

Thallium was detected above the Qbt 2,3,4 BV (1.1 mg/kg) in 1 sample at a concentration of 1.3 mg/kg. The concentration was 0.2 mg/kg above the BV, equivalent to the second highest Qbt 2,3,4 background concentration (1.3 mg/kg), and 0.4 mg/kg below the maximum Qbt 2,3,4 background concentration (1.7 mg/kg). Thallium was not detected in the other 14 samples. Thallium is not a COPC.

Vanadium was detected above the Qbt 2,3,4 BV (17 mg/kg) in 1 sample at a concentration of 18.7 mg/kg. The concentration was 1.7 mg/kg above the BV and 2.3 mg/kg below the maximum Qbt 2,3,4 background concentration (21 mg/kg). Vanadium was not detected above the BVs in the other 14 samples. Vanadium is not a COPC.

Organic Chemicals—Former North Burn Pit

Fifteen samples (eight soil and seven tuff) were analyzed for explosive compounds, SVOCs, VOCs, dioxins/furans, TPH-DRO, and TPH-GRO. One tuff sample was also analyzed for PCBs. Table 6.2-3 presents the detected organic chemicals. Plate 3 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at the former north pit of SWMU 15-002 include acetone; bis(2-ethylhexyl)phthalate; diethylphthalate; di-n-butylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; and TPH-DRO. All detected organic chemicals are retained as COPCs.

Radionuclides—Former North Burn Pit

Fifteen samples (eight soil and seven tuff) were analyzed for isotopic thorium and isotopic uranium. Radionuclides were not detected above BVs at the former north burn pit of SWMU 15-002.

Inorganic Chemicals—Former South Burn Pit

Fifteen samples (eight soil and seven tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.2-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Plate 2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Aluminum was detected above the Qbt 2,3,4 BV (7340 mg/kg) in two tuff samples with a maximum concentration of 12,500 mg/kg. Concentrations were above the maximum Qbt 2,3,4 background concentration (8370 mg/kg). Aluminum is retained as a COPC.

Antimony was detected above the soil BV (0.83 mg/kg) in one soil sample at a concentration of 12.5 mg/kg and had a DL (0.68 mg/kg) above the Qbt 2,3,4 BV (0.5 mg/kg) in one tuff sample. Antimony is retained as a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in three tuff samples with a maximum concentration of 6 mg/kg. The maximum concentration was above the maximum Qbt 2,3,4 background concentration (5 mg/kg). Arsenic is retained as a COPC.

Barium was detected above the soil and Qbt 2,3,4 BVs (295 mg/kg and 46 mg/kg) in three soil samples and three tuff samples with a maximum concentration of 18,200 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in soil are statistically different from background (Figure H-4 and Table H-2). Barium is retained as a COPC.

Beryllium was detected above the Qbt 2,3,4 BV (1.21 mg/kg) in one tuff sample at a concentration of 2.2 mg/kg. The concentration was above the maximum Qbt 2,3,4 background concentration (1.8 mg/kg). Beryllium is retained as a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in two tuff samples with a maximum concentration of 3180 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (2230 mg/kg). Calcium is retained as a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in six tuff samples with a maximum concentration of 32.6 mg/kg. The maximum concentration was above the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium is retained as a COPC.

Cobalt was detected above the soil and Qbt 2,3,4 BVs (8.64 mg/kg and 3.14 mg/kg) in one soil sample and two tuff samples with a maximum concentration of 9.2 mg/kg. The Gehan and quantile tests indicated site concentrations of cobalt in soil are not statistically different from background (Figure H-5 and Table H-2). The tuff concentrations were only 0.16 mg/kg and 0.26 mg/kg above the BV and maximum Qbt 2,3,4 background concentration (3.14 mg/kg). Cobalt was not detected above the BV in the other five tuff samples and was not statistically different from soil background. Cobalt is not a COPC.

Copper was detected above the soil and Qbt 2,3,4 BVs (14.7 mg/kg and 4.66 mg/kg) in one soil sample and two tuff samples with a maximum concentration of 795 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in soil are statistically different from background (Figure H-6 and Table H-2). Copper is retained as a COPC.

Cyanide was detected above the soil BV (0.5 mg/kg) in 1 soil sample at a concentration of 1.9 mg/kg and had DLs (0.51 mg/kg to 0.68 mg/kg) above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) in 12 samples. Cyanide is retained as a COPC.

Iron was detected above the Qbt 2,3,4 BV (14,500 mg/kg) in 1 tuff sample at a concentration of 15,300 mg/kg. The concentration was 800 mg/kg above the BV and 5000 mg/kg below the maximum Qbt 2,3,4 background concentration (19,500 mg/kg). Iron was not detected above BVs in the other 14 samples. Iron is not a COPC.

Lead was detected above the soil and Qbt 2,3,4 BVs (22.3 mg/kg and 11.2 mg/kg) in two soil samples and three tuff samples with a maximum concentration of 170 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are statistically different from background (Figure H-7 and Table H-2). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in two tuff samples with a maximum concentration of 3200 mg/kg. The maximum concentration was above the maximum Qbt 2,3,4 background concentration (2820 mg/kg). Magnesium is retained as a COPC.

Mercury was detected above the soil and Qbt 2,3,4 BVs (0.1 mg/kg) in two soil samples and one tuff sample with a maximum concentration of 1120 mg/kg. Mercury is retained as a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in five tuff samples with a maximum concentration of 21 mg/kg. Three concentrations were above the maximum Qbt 2,3,4 background concentration (7 mg/kg). Nickel is retained as a COPC.

Nitrate was detected in 14 samples with a maximum concentration of 4.6 mg/kg. Nitrate is naturally occurring and the concentrations reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Perchlorate was detected in two samples with a maximum concentration of 0.0029 mg/kg. Perchlorate is retained as a COPC.

Potassium was detected above the soil and Qbt 2,3,4 BVs (3460 mg/kg and 3500 mg/kg) in one soil sample and one tuff sample with a maximum concentration of 4440 mg/kg. The Gehan and quantile tests indicated site concentrations of potassium in soil are not statistically different from background (Figure H-8 and Table H-2). The maximum tuff concentration (3520 mg/kg) was 20 mg/kg above the BV and 1200 mg/kg below the maximum Qbt 2,3,4 background concentration (4720 mg/kg). Potassium was not detected above the BV in the other six tuff samples and was not statistically different from soil background. Potassium is not a COPC.

Selenium was detected above the soil and Qbt 2,3,4 BVs (1.52 mg/kg and 0.3 mg/kg) in four soil samples and seven tuff samples with a maximum concentration of 2.9 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure H-9 and Table H-2). Selenium is retained as a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in one sample at a concentration of 112 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are statistically different from background (Figure H-10 and Table H-2). Zinc is retained as a COPC.

Organic Chemicals—Former South Burn Pit

Fifteen samples (eight soil and seven tuff) were analyzed for explosive compounds, SVOCs, VOCs, dioxins/furans, TPH-DRO, and TPH-GRO. One tuff sample was also analyzed for PCBs. Table 6.2-3 presents the detected organic chemicals. Plate 3 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at the former south pit of SWMU 15-002 include 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; bis(2-ethylhexyl)phthalate; 3,5-dinitroaniline; 2,4-dinitrotoluene; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzodioxin; 1,2,3,6,7,8-hexachlorodibenzodioxin; 1,2,3,7,8,9-hexachlorodibenzodioxin; 2,3,4,6,7,8-hexachlorodibenzofuran; HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine); 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 1,2,3,7,8-pentachlorodibenzodioxin; RDX; 2,3,7,8-tetrachlorodibenzodioxin; TPH-DRO; 1,3,5-trinitrobenzene; and 2,4,6-trinitrotoluene. All detected organic chemicals are retained as COPCs.

Radionuclides—Former South Burn Pit

Fifteen samples (eight soil and seven tuff) were analyzed for isotopic thorium and isotopic uranium. Radionuclides were not detected above BVs at the former south burn pit of SWMU 15-002.

6.2.4.4 Nature and Extent of Contamination

The nature and extent of inorganic and organic COPCs of each pit at SWMU 15-002 are discussed below. Because the two former burn pits are not in the vicinity of each other (they are over 600 ft apart), extent was evaluated for each pit separately. Data from sampling locations 15-613318 through 15-613322 were used to evaluate the former north burn pit and data from sampling locations 15-613671 through 15-613675 were used to evaluate the former south burn pit.

Inorganic COPCs at SWMU 15-002 (former north and south burn pits combined) include aluminum, antimony, arsenic, barium, beryllium, calcium, chromium, copper, cyanide, lead, magnesium, manganese, mercury, nickel, perchlorate, selenium, and zinc.

Inorganic Chemicals—Former North Burn Pit

Aluminum was detected above the Qbt 2,3,4 BV in two samples at the former north burn pit with a maximum concentration above the BV of 12,200 mg/kg. Aluminum concentrations decreased with depth at locations 15-613318 and 15-613322. Concentrations decreased laterally. The lateral and vertical extent of aluminum are defined.

Barium was detected above the Qbt 2,3,4 BV in three tuff samples at the former north burn pit with a maximum concentration of 139 mg/kg. Barium concentrations decreased with depth at all locations (concentrations in the shallower samples at location 15-613320 [167 mg/kg and 165 mg/kg] were below the soil BV but above the concentration in the deeper tuff sample [Appendix F, Inorganic Chemicals Table]). Concentrations decreased or did not change substantially laterally. The concentration at location 15-613322 (139 mg/kg) was 17 mg/kg higher than the sample within the former north burn pit (location 15-613318). The residential SSL was approximately 112 times the concentration at location 15-613322. The vertical extent of barium is defined, and further sampling for lateral extent is not warranted.

Calcium was detected above the Qbt 2,3,4 BV in four samples at the former north burn pit with a maximum concentration of 9850 mg/kg. Calcium concentrations decreased with depth at locations 15-613320 and 15-613322 (concentration in the shallower sample at location 15-613320 [2950 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]). Calcium concentrations increased with depth at location 15-613318 and to the north at location 15-613322. Calcium concentrations decreased laterally at all other locations. The NMED residential essential nutrient SSL was approximately 1320 times the maximum concentration. Further sampling for extent of calcium is not warranted.

Copper was detected above the Qbt 2,3,4 BV in one sample at the former north burn pit at a concentration of 7.4 mg/kg. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of copper are defined.

Lead was detected above the soil and Qbt 2,3,4 BVs in two soil samples and six tuff samples at the former north burn pit with a maximum concentration of 50.1 mg/kg. Lead concentrations decreased with depth at all locations. Concentrations decreased to the south and did not change substantially to the east (3.9 mg/kg). Concentrations increased slightly to the west, but the concentration (32.6 mg/kg) was only 4.6 mg/kg above the maximum soil background concentration (28 mg/kg). Concentrations increased to the north at location 15-613322 but decreased around AOC C-15-006 (locations 15-613306 and 15-613307) (Plate 2). The residential SSL was approximately 9 times and the industrial SSL was approximately 16 times the maximum concentration. The lateral and vertical extent of lead are defined.

Manganese was detected above the soil BV in two samples at the former north burn pit with a maximum concentration of 2400 mg/kg. Manganese concentrations decreased with depth and decreased laterally, except to the east at location 15-613321. The vertical extent of manganese is defined, and the lateral is not defined to the east.

Mercury was detected above the soil and Qbt 2,3,4 BVs in six soil samples and six tuff samples at the former north burn pit with a maximum concentration of 1.29 mg/kg. Concentrations decreased with depth at locations 15-613318, 15-613319, and 15-613322 and did not change substantially with depth at locations 15-613320 and 15-613321 (0.056 mg/kg and 0.091 mg/kg). The residential SSL was approximately 68 times the maximum concentration at these two locations. Concentrations decreased laterally. The lateral extent of mercury is defined, and further sampling for vertical extent is not warranted.

Perchlorate was detected in one sample at the former north burn pit at a concentration of 0.0032 mg/kg. The concentration was below the estimated detection limit (EDL), decreased with depth and did not change substantially laterally (0.0032 mg/kg or less). The residential SSL was approximately 17,000 times the maximum concentration. Further sampling for extent of perchlorate is not warranted.

Selenium was detected above the Qbt 2,3,4 BV in seven samples at the former north burn pit with a maximum concentration of 2.2 mg/kg. Concentrations did not change substantially with depth or laterally (0.6 mg/kg). The residential SSL was approximately 180 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Inorganic Chemicals—Former South Burn Pit

Aluminum was detected above the Qbt 2,3,4 BV in two samples at the former south burn pit with a maximum concentration above the BV of 12,500 mg/kg. Aluminum concentrations decreased with depth at location 15-613671 (the concentration in the shallower sample was 15,300 mg/kg [Appendix F, Inorganic Chemicals Table]) and did not substantially change with depth at location 15-613675 (concentration in the shallower sample was 12,600 mg/kg [Appendix F, Inorganic Chemicals Table]). The residential SSL was approximately 6 times the maximum concentration above the BV at location 15-613675 (the concentration is 65,500 mg/kg below the residential SSL). Concentrations decreased laterally. The lateral and vertical extent of aluminum are defined.

Antimony was detected above the soil BV in one sample at a concentration of 12.5 mg/kg and had a DL (0.68 mg/kg) above the Qbt 2,3,4 BV in one sample at the former south burn pit. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of antimony are defined.

Arsenic was detected above the Qbt 2,3,4 BV in three samples at the former south burn pit with a maximum concentration of 6 mg/kg. Concentrations decreased with depth at location 15-613674 and did not change substantially with depth at location 15-613671 (concentrations in the shallower samples (3.4 mg/kg and 2.5 mg/kg) were below the soil BV [Appendix F, Inorganic Chemicals Table]) and was below the maximum Qbt 2,3,4 background concentration (5 mg/kg). Concentrations increased laterally at location 15-613674. The maximum concentration was approximately 2 mg/kg above the NMED residential SSL (0.7 mg/kg below the EPA regional residential SSL of 6.7 mg/kg) but only 1 mg/kg above the maximum Qbt 2,3,4 background concentration. The NMED industrial SSL was approximately 3.6 times the maximum concentration (the EPA industrial SSL of 30 mg/kg was 5 times the maximum concentration). The vertical extent of arsenic is defined, and further sampling for lateral extent is not warranted.

Barium was detected above the soil and Qbt 2,3,4 BVs in three soil samples and three tuff samples at the former south burn pit, with a maximum concentration of 18,200 mg/kg. Barium concentrations decreased with depth at all locations (the concentrations in the shallower samples at location 15-613675 [182 mg/kg and 148 mg/kg] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations decreased laterally. The lateral and vertical extent of barium are defined.

Beryllium was detected above the Qbt 2,3,4 BV in one sample at the former south burn pit with a maximum concentration of 2.2 mg/kg. Concentrations increased with depth at location 15-613671. The residential SSL was approximately 71 times the maximum concentration, which was 1 mg/kg above the BV and 0.4 mg/kg above the maximum Qbt 2,3,4 background concentration (1.8 mg/kg). Concentrations decreased laterally. The lateral extent of beryllium is defined, and further sampling for vertical extent is not warranted.

Calcium was detected above the Qbt 2,3,4 BV in two samples at the former south burn pit with a maximum concentration of 3180 mg/kg. Calcium concentrations decreased with depth at location 15-613674. Calcium concentrations increased with depth at location 15-613671 and increased laterally to the east at location 15-613674. Calcium concentrations decreased laterally at all other locations. The NMED residential essential nutrient SSL was approximately 4100 times the maximum concentration. Further sampling for extent of calcium is not warranted.

Chromium was detected above the Qbt 2,3,4 BV in six samples at the former south burn pit with a maximum concentration of 32.6 mg/kg. Chromium concentrations decreased with depth at 15-613673 and 15-613674 and did not change substantially with depth at locations 15-613672 (1.9 mg/kg). Concentrations increased with depth at locations 15-613675 and 15-613671, and the concentration at location 15-613675 was similar to the maximum Qbt 2,3,4 background concentration (13 mg/kg). As

discussed in section 4.2, there is no known use of hexavalent chromium at this site, and no site conditions would have produced hexavalent chromium. Therefore, the total chromium results represent trivalent chromium concentrations. The trivalent chromium residential SSL was approximately 3590 times the maximum concentration. Chromium concentrations decreased laterally. The lateral extent of chromium is defined, and further sampling for vertical extent is not warranted.

Copper was detected above the soil and Qbt 2,3,4 BVs in one soil sample and two tuff samples at the former south burn pit with a maximum concentration of 795 mg/kg. Concentrations increased with depth at locations 15-613671 and 15-613675. The concentration at depth at location 15-613675 was only 0.14 mg/kg above the BV and was below the maximum Qbt 2,3,4 background concentration (6.2 mg/kg). The residential SSL was approximately 4 times and the industrial SSL was approximately 65 times the maximum concentration. Concentrations decreased laterally. The lateral extent of copper is defined, and further sampling for vertical extent is not warranted.

Cyanide was detected above the soil BV in one sample with a concentration of 1.9 mg/kg. Cyanide was not detected but had DLs above the BV in 12 samples. The DLs were 0.01 mg/kg to 0.18 mg/kg above the BV (0.5 mg/kg). Concentrations decreased with depth and laterally. The lateral and vertical extent of cyanide are defined.

Lead was detected above the soil and Qbt 2,3,4 BVs in two soil samples and three tuff samples at the former south burn pit with a maximum concentration of 170 mg/kg. Concentrations decreased with depth at locations 15-613671 and 15-613674. Concentrations at location 15-613672 did not change substantially with depth (2.6 mg/kg) (concentrations in the shallower samples at location 15-613672 (17.2 mg/kg and 19.7 mg/kg) were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations decreased laterally. The lateral and vertical extent of lead are defined.

Magnesium was detected above the Qbt 2,3,4 BV in two samples at the former south burn pit with a maximum concentration of 3200 mg/kg. Concentrations did not change substantially (30 mg/kg) with depth at location 15-613671, and the concentration was below the maximum Qbt 2,3,4 background concentration (2820 mg/kg). Concentrations increased with depth at location 15-613675. The NMED residential essential nutrient SSL was approximately 110 times the maximum concentration. Concentrations decreased laterally. The lateral extent of magnesium is defined, and further sampling for vertical extent is not warranted.

Mercury was detected above the soil and Qbt 2,3,4 BVs in two soil samples and one tuff sample at the former south burn pit with a maximum concentration of 1120 mg/kg. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of mercury are defined.

Nickel was detected above the Qbt 2,3,4 BV in five samples at the former south burn pit with a maximum concentration of 21 mg/kg. Concentrations decreased with depth at locations 15-613673 and 15-613674. Concentrations increased with depth at locations 15-613671 and 15-613675. The residential SSL was approximately 74 times the maximum concentration. Concentrations decreased laterally. The lateral extent of nickel is defined, and further sampling for vertical extent is not warranted.

Perchlorate was detected in two samples at the former south burn pit with a maximum concentration of 0.0029 mg/kg. Perchlorate concentrations decreased with depth and were below the EDLs. The concentration did not change substantially laterally (0.0029 mg/kg). The residential SSL was approximately 18900 times the maximum concentration. Further sampling for extent of perchlorate is not warranted.

Selenium was detected above the soil and Qbt 2,3,4 BVs in four soil samples and seven tuff samples at the former south burn pit with a maximum concentration of 2.9 mg/kg. Concentrations did not change substantially with depth or laterally (1.3 mg/kg or less). The residential SSL was approximately 135 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Zinc was detected above the soil BV in one sample at the former south burn pit at a concentration of 112 mg/kg. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of zinc are defined.

Organic Chemicals

Organic COPCs at SWMU 15-002 (former north and south burn pits combined) include acetone; 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; bis(2-ethylhexyl)phthalate; diethylphthalate; di-n-butylphthalate; 3,5-dinitroaniline; 2,4-dinitrotoluene; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran,;1,2,3,4,7,8-hexachlorodibenzodioxin; 1,2,3,6,7,8-hexachlorodibenzodioxin; 1,2,3,7,8,9-hexachlorodibenzodioxin; 2,3,4,6,7,8-hexachlorodibenzofuran; HMX; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 1,2,3,7,8-pentachlorodibenzodioxin; RDX; 2,3,7,8-tetrachlorodibenzodioxin; TPH-DRO; 1,3,5-trinitrobenzene; and 2,4,6-trinitrotoluene.

Organic Chemicals—Former North Burn Pit

Acetone was detected in one sample at the former north burn pit at a concentration of 0.083 mg/kg. Acetone concentrations decreased with depth and decreased laterally. The lateral and vertical extent of acetone are defined.

Bis(2-ethylhexyl)phthalate was detected in seven samples at the former north burn pit with a maximum concentration of 0.18 mg/kg. Concentrations decreased with depth at location 15-613322 and did not change substantially with depth at locations 15-6133818, 15-613319, 15-613320, and 15-613321 (0.016 mg/kg to 0.18 mg/kg). Concentrations were below the EQLs. The residential SSL was approximately 2111 times the maximum concentration at these four locations. Bis(2-ethylhexyl)phthalate concentrations did not change substantially laterally (0.04 mg/kg). The residential SSL was approximately 2100 times the maximum concentration. Further sampling for extent of bis(2-ethylhexyl(phthalate) is not warranted.

Diethylphthalate was detected in one sample at the former north burn pit at a concentration of 0.18 mg/kg. The concentration decreased with depth, was below the EQL, and decreased laterally. The lateral and vertical extent of diethylphthalate are defined.

Di-n-butylphthalate was detected in two samples at the former north burn pit with a maximum concentration of 0.69 mg/kg. Concentrations decreased with depth, were below the EQLs, and decreased laterally. The lateral and vertical extent of di-n-butylphthalate are defined.

TPH-DRO was detected in one sample at the former north burn pit at a concentration of 8.1 mg/kg. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of TPH-DRO are defined.

Four dioxin/furan congeners were detected in 6 to 14 samples at the former north burn pit. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of dioxin/furans are defined.

Organic Chemicals—Former South Burn Pit

Amino-2,6-dinitrotoluene[4-] and 2-amino-4,6-dinitrotoluene were detected in three and two samples at the former south burn pit with maximum concentrations of 0.15 mg/kg and 0.12 mg/kg, respectively. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of 4-amino-2,6-dinitrotoluene and 2-amino-4,6-dinitrotoluene are defined.

Bis(2-ethylhexyl)phthalate was detected in two samples at the former south burn pit with a maximum concentration of 0.13 mg/kg. Concentrations did not change substantially with depth at location 15-613672 (0.062 mg/kg). Concentrations were below the EQLs. The residential SSL was approximately 2111 times the maximum concentration. Bis(2-ethylhexyl)phthalate concentrations decreased laterally. The lateral extent of bis(2-ethylhexyl)phthalate is defined, and further sampling for vertical extent is not warranted.

Dinitroaniline{3,5-] was detected in three samples at the former south burn pit with a maximum concentration of 0.037 mg/kg. Concentrations did not change substantially with depth (approximately 0.03 mg/kg), were below the EQLs, and decreased laterally. The lateral and vertical extent of 3,5-dinitroaniline are defined.

Dinitrotoluene[2,4-] was detected in one sample at the former south burn pit at a concentration of 0.012 mg/kg. Concentrations decreased with depth and laterally. The lateral and vertical extent of 2,4-dinitrotoluene are defined.

HMX was detected in three samples at the former south burn pit with a maximum concentration of 0.6 mg/kg. HMX concentrations did not change substantially with depth (0.5 mg/kg) and decreased laterally. The residential SSL was approximately 6400 times the maximum concentration. The lateral extent of HMX is defined, and further sampling for vertical extent is not warranted.

RDX was detected in three samples at the former south burn pit with a maximum concentration of 2.6 mg/kg. RDX concentrations did not change substantially with depth (1.3 mg/kg) and decreased laterally. The residential SSL was approximately 24 times the maximum concentration. The lateral extent of RDX is defined, and further sampling for vertical extent is not warranted.

TPH-DRO was detected in three samples at the former south burn pit with a maximum concentration of 18 mg/kg. Concentrations decreased with depth, were below the EQLs, and decreased laterally. The lateral and vertical extent of TPH-DRO are defined.

Trinitrobenzene[1,3,5-] was detected in one sample at the former south burn pit at a concentration of 0.0097 mg/kg. The concentration decreased with depth, was below the EQL, and decreased laterally. The lateral and vertical extent of 1,3,5-trinitrobenzene are defined.

Trinitrotoluene[2,4,6-] was detected in one sample at the former south burn pit at a concentration of 0.11 mg/kg. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of 2,4,6-trinitrotoluene are defined.

Ten dioxin/furan congeners were detected in one to seven samples at the former south burn pit. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of dioxin/furans are defined.

Radionuclides

Radionuclides were not detected above BVs at SWMU 15-002.

6.2.5 Summary of Human Health Risk Screening

The two former burn pits are not in the vicinity of each other and therefore were evaluated for potential risk and dose separately.

Former North Burn Pit

Industrial Scenario

The total excess cancer risk for the industrial scenario is 6×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.06, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

TPH-DRO was identified as a COPC. The New Mexico state industrial screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO exposure point concentration (EPC). The industrial HI is 0.003, which is below the NMED target HI of 1 (NMED 2015, 600575).

Construction Worker Scenario

The construction worker HI is 3, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese. As discussed in the uncertainty analysis (section I-4.4.2), the potential construction worker risk from manganese at the site is similar to naturally occurring concentrations and does not indicate any potential risk to the construction worker at the former north burn pit. No carcinogenic or radionuclide COPCs were identified for the construction worker scenario.

TPH-DRO was identified as a COPC. The New Mexico state industrial screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The construction worker HI for TPH-DRO is 0.003, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 2×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

TPH-DRO was identified as a COPC. The New Mexico state residential screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The residential HI for TPH-DRO is 0.008, which is below the NMED target HI of 1 (NMED 2015, 600575).

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the residential, industrial, and construction worker scenarios at the former north burn pit of SWMU 15-002.

Former South Burn Pit

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 3, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from mercury. No radionuclide COPCs were identified for the industrial scenario

TPH-DRO was identified as a COPC. The New Mexico state industrial screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The industrial HI for TPH-DRO is 0.006, which is below the NMED target HI of 1 (NMED 2015, 600575).

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 8, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from barium and mercury. No carcinogenic or radionuclide COPCs were identified for the construction worker scenario.

TPH-DRO was identified as a COPC. The New Mexico state industrial screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The construction worker HI for TPH-DRO is 0.001, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-5} (7×10^{-6} using the EPA regional screening value for arsenic), which is equivalent to (or less than) the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 19, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from barium and mercury. No radionuclide COPCs were identified for the residential scenario.

TPH-DRO was identified as a COPC. The New Mexico state residential screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The residential HI for TPH-DRO is 0.004, which is below the NMED target HI of 1 (NMED 2015, 600575).

Based on the risk-screening assessment results, no potential unacceptable cancer risks or doses exist for the residential, industrial, and construction worker scenarios at the former south burn pit of SWMU 15-002. However, potential unacceptable noncancer risks exist under all three scenarios.

6.2.6 Summary of Ecological Risk Screening

The two former burn pits are not in the vicinity of each other and therefore were evaluated for potential ecological risk separately.

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for threatened and endangered [T&E] species), lowest observed adverse effect level (LOAEL) analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks exist at the former north burn pit of SMWU 15-002. However, potential ecological risk exists at the former south burn pit of SMWU 15-002 for several receptors.

6.3 SWMU 15-007(a), MDA N

6.3.1 Site Description and Operational History

SWMU 15-007(a), the former location of an inactive landfill known as MDA N, was located west of buildings 15-0563 and 15-0565 and east of R-Site Road at TA-15 (Figure 6.3-1). MDA N was reported to be approximately 300 ft long × 30 ft wide (LASL 1974, 038450). MDA N was used between 1962 and 1965 to dispose of debris from the demolition of buildings 15-0001 and 15-0007 (LANL 1993, 020946, p. 9-2). Building 15-0001 housed a laboratory and shop, and building 15-0007 housed a control room and

darkroom. Hazardous materials known to be present in these buildings included thorium in building 15-0001 and mercury and photographic chemicals in building 15-0007. Based on a 1965 aerial photograph, MDA N was closed by 1965 (Koogle and Pouls Engineering 1965, 016374). MDA N was excavated and removed during the 2010 investigation (section 6.3.4.1).

6.3.2 Relationship to Other SWMUs and AOCs

SWMU 15-007(a) is located southeast of AOC C-15-005 and south of SWMU 15-010(a) and the north burn pit at SWMU 15-002. Together SWMUs 15-002 and 15-007(a) comprise Consolidated Unit 15-002-00.

6.3.3 Summary of Previous Investigations

An aerial radiological survey of SWMU 15-007(a) was conducted in 1982. The survey identified no radiation above background at this site (LANL 1993, 020946, p. 9-2).

During the 1995 and 1996 Phase I RFIs conducted at SWMU 15-007(a), sampling was preceded by a surface radiological survey and geophysical surveys (magnetometry, electromagnetic [EM], and resistivity) intended to define the boundaries of the landfill. One surface and two subsurface samples were collected from each of seven locations identified based on the geophysical survey results (LANL 1996, 054977, pp. 5-11, 5-16). Twenty-two samples were collected from seven locations from depth intervals ranging from 0.0–0.5 ft to 50.0–56.0 ft bgs. Thirteen samples were submitted for analysis of isotopic thorium, TAL metals, VOCs, and SVOCs. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2009, 105251). Based on a review of the 1951 TA-15 Structure Location Plan and engineering drawing ENG-R4470, MDA N was determined to be located east-southeast of former building 15-0023, not to the north as concluded from the previous geophysical survey (LASL 1951, 105389; LASL 1974, 038450). Therefore, the 1995 and 1996 RFI sampling for MDA N was conducted at the incorrect location, and the samples are not representative of this site.

6.3.4 Site Contamination

6.3.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- The landfill boundary was defined and excavated in accordance with the approved work plan (LANL 2009, 106657.8; NMED 2009, 106677). When excavated, the actual boundaries of MDA N were approximately 170 ft long × 50 ft × 4 to 5 ft deep. Management of waste generated from the excavation of the landfill and associated IDW is described in Appendix C.
- Twenty screening samples were collected from the bottom and sides of the excavation and field-screened for organic vapors; gross-alpha, -beta, and -gamma radioactivity; explosive compounds (TNT and RDX); and metals (barium, copper, lead, and uranium). Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.
- Eight confirmation samples were collected from four locations from approximately 0.0–1.0 ft and 4.0–5.0 ft below the bottom of the 4.0–5.0-ft-deep excavation.
- Twelve confirmation samples were collected from six locations around the excavation boundary from 2.0–3.0 ft and 5.0–6.0 ft bgs. Sampling locations were sited approximately 8.0 to 25 ft from the excavation boundary (see deviations in Appendix B).

- All confirmation samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, isotopic uranium, and isotopic thorium. Three of the 20 samples (2 from below the bottom of the excavation and 1 next to the eastern boundary of the excavation) were also analyzed for dioxins/furans and PCBs. The sampling locations for the dioxin/furan and PCB analyses were selected based on their proximity to the potential contaminant source.

Sampling locations with decision-level data for SWMU 15-007(a) are shown in Figure 6.3-1. Table 6.3-1 presents the samples collected and analyses requested for SWMU 15-007(a). The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.3.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at SWMU 15-007(a), a maximum concentration of 0.1 ppm was detected at location 15-613395 from 2.0–3.0 ft bgs. No radiological-screening results exceeded twice the maximum site background levels. No screening results for explosive compounds exceeded industrial SSLs. The field-screening results are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.

One metals-screening sample exceeded the screening threshold for lead (greater than 2 times the sample media BV) at the base of the excavation. In accordance with the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677), one confirmation sample was collected at location 15-613391 from 4.0–5.0 ft bgs and analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, isotopic uranium, and isotopic thorium.

6.3.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 15-007(a) consisted of results from 20 samples (10 soil and 10 tuff) collected from 10 locations.

Inorganic Chemicals

Twenty samples (10 soil and 10 tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.3-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Plate 2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Aluminum was detected above the Qbt 2,3,4 BV (7340 mg/kg) in four samples with a maximum concentration of 11,600 mg/kg. The Gehan and quantile tests indicated site concentrations of aluminum in tuff are statistically different from background (Figure H-11 and Table H-3). Aluminum is retained as a COPC.

Antimony was not detected above the Qbt 2,3,4 BV (0.5 mg/kg) but had DLs (0.52 mg/kg to 0.53 mg/kg) above the BV in 2 samples. The DLs were 0.02 mg/kg to 0.03 mg/kg above the BV and antimony was not detected in the other 18 samples (DLs below BVs). Antimony is not a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in one sample at a concentration of 3.4 mg/kg. The Gehan and quantile tests indicated site concentrations of arsenic in tuff are statistically different from background (Figure H-12 and Table H-3). Arsenic is retained as a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in six samples with a maximum concentration of 178 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in tuff are statistically different from background (Figure H-13 and Table H-3). Barium is retained as a COPC.

Beryllium was detected above the Qbt 2,3,4 BV (1.21 mg/kg) in two samples with a maximum concentration of 1.3 mg/kg. The Gehan and quantile tests indicated site concentrations of beryllium in tuff are not statistically different from background (Figure H-14 and Table H-3). Beryllium is not a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in two samples with a maximum concentration of 4180 mg/kg. The Gehan and quantile tests indicated site concentrations of calcium in tuff are statistically different from background (Figure H-15 and Table H-3). Calcium is retained as a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in two samples with a maximum concentration of 10 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in tuff are statistically different from background (Figure H-16 and Table H-3). Chromium is retained as a COPC.

Cobalt was detected above the Qbt 2,3,4 BV (3.14 mg/kg) in one sample at a concentration of 3.4 mg/kg. The quantile and slippage tests indicated site concentrations of cobalt in tuff are not statistically different from background (Figure H-17 and Table H-3). Cobalt is not a COPC.

Copper was detected above the Qbt 2,3,4 BV (4.66 mg/kg) in one sample at a concentration of 5.2 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in tuff are statistically different from background (Figure H-18 and Table H-3). Copper is retained as a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.52 mg/kg to 0.59 mg/kg) above the BVs in 15 samples. The DLs were only 0.02 mg/kg to 0.09 mg/kg above the BVs and cyanide was not detected in the other 5 samples (DLs below BVs). Cyanide is not a COPC.

Lead was detected above the soil and Qbt 2,3,4 BVs (22.3 mg/kg and 11.2 mg/kg) in three soil samples and six tuff samples with a maximum concentration of 168 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are statistically different from background (Figure H-19 and Table H-4). The Gehan and quantile tests indicated site concentrations of lead in tuff are statistically different from background (Figure H-20 and Table H-3). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in four samples with a maximum concentration of 2780 mg/kg. The Gehan and quantile tests indicated site concentrations of magnesium in tuff are statistically different from background (Figure H-21 and Table H-3). Magnesium is retained as a COPC.

Mercury was detected above the Qbt 2,3,4 BV (0.1 mg/kg) in one sample at a concentration of 0.104 mg/kg. The concentration was only 0.004 mg/kg above the BV. Mercury was not detected above BVs in the other 19 samples. Mercury is not a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in five samples with a maximum concentration of 10 mg/kg. The Gehan and quantile tests indicated site concentrations of nickel in tuff are statistically different from background (Figure H-22 and Table H-3). Nickel is retained as a COPC.

Nitrate was detected in 18 samples with a maximum concentration of 17.1 mg/kg. Nitrate is naturally occurring and the concentrations reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Perchlorate was detected in five samples with a maximum concentration of 0.0033 mg/kg. Perchlorate is retained as a COPC.

Selenium was detected above the Qbt 2,3,4 BV (0.3 mg/kg) in 10 samples with a maximum concentration of 2.4 mg/kg. The quantile and slippage tests indicated site concentrations in tuff are statistically different from background (Figure H-23 and Table H-3). Selenium is retained as a COPC.

Zinc was detected above the soil and Qbt 2,3,4 BVs (48.8 mg/kg and 63.5 mg/kg) in two soil and one tuff samples with a maximum concentration of 125 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in tuff are not statistically different from background (Figure H-24 and Table H-3). The Gehan and quantile tests indicated site concentrations of zinc in soil are not statistically different from background (Figure H-25 and Table H-4). Zinc is not retained as a COPC.

Organic Chemicals

Twenty samples (10 soil and 10 tuff) were analyzed for explosive compounds, SVOCs, and VOCs. Three samples (one soil and two tuff) were analyzed for dioxins/furans and PCBs. Table 6.3-3 presents the detected organic chemicals. Plate 3 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at SWMU 15-007(a) include acetone; bis(2-ethylhexyl)phthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; and 1,2,3,4,6,7,8,9-octachlorodibenzodioxin. All detected organic chemicals are retained as COPCs.

Radionuclides

Twenty samples (10 soil and 10 tuff) were analyzed for isotopic thorium and isotopic uranium. Radionuclides were not detected above BVs at SWMU 15-007(a).

6.3.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 15-007(a) are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMU 15-007(a) include aluminum, arsenic, barium, calcium, chromium, copper, lead, magnesium, nickel, perchlorate, and selenium.

Aluminum was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 11,600 mg/kg. Aluminum concentrations decreased with depth at all locations (the concentrations in the shallower samples at locations 15-613392, 15-613397, and 15-613398 [12,900 mg/kg, 15,500 mg/kg and 12,600 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations decreased downgradient. The lateral and vertical extent of aluminum are defined.

Arsenic was detected above the Qbt 2,3,4 BV in one sample at a concentration of 3.4 mg/kg. Arsenic concentrations did not change substantially with depth (0.2 mg/kg) at location 15-613397 (the concentration in the shallower sample (3.6 mg/kg) was below the soil BV [Appendix F, Inorganic Chemicals Table]) and was below the maximum Qbt 2,3,4 background concentration (5 mg/kg). Concentrations decreased downgradient. The lateral and vertical extent of arsenic are defined.

Barium was detected above the Qbt 2,3,4 BV in six samples with a maximum concentration of 178 mg/kg. Barium concentrations decreased with depth at all locations (the concentrations in the shallower samples at locations 15-613392, 15-613397, and 15-613398 [161 mg/kg, 217 mg/kg, and 170 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations decreased downgradient. The lateral and vertical extent of barium are defined.

Calcium was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 4180 mg/kg. Calcium concentrations decreased with depth at location 15-613399 and decreased downgradient. Calcium concentrations increased with depth at location 15-613397. The NMED residential

essential nutrient SSL was approximately 3110 times the maximum concentration. The lateral extent of calcium is defined, and further sampling for vertical extent is not warranted.

Chromium was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 10 mg/kg. Chromium concentrations decreased with depth at both locations (the concentrations in the shallower samples at locations 15-613397 and 15-613398 [12.7 mg/kg and 11 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]) and were below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium concentrations decreased downgradient. The lateral and vertical extent of chromium are defined.

Copper was detected above the Qbt 2,3,4 BV in one sample at a concentration of 5.2 mg/kg. Copper concentrations decreased slightly with depth (concentration in the shallower sample at location 15-613397 [7.4 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]) and decreased downgradient. The lateral and vertical extent of copper are defined.

Lead was detected above the soil and Qbt 2,3,4 BVs in three soil samples and six tuff samples with a maximum concentration of 168 mg/kg. Lead concentrations decreased with depth at location 15-613391 (the concentration in the shallower sample [14.4 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]). The lead concentration was below the maximum soil background concentration (28 mg/kg) at location 15-613400 and did not change substantially with depth (1.6 mg/kg) at location 15-613393. Concentrations increased with depth at locations 15-613392, 15-613394, 15-613396, and 15-613397. The residential SSL was approximately 2.4 times and the industrial SSL was approximately 5 times the maximum concentration (the SSLs were more than 200 mg/kg and 600 mg/kg above the maximum concentration). (Note: The human health risk-assessment screening results for lead resulted in hazard quotients [HQs] of 0.2 [resident] and 0.08 [construction worker] [Appendix I.]) Concentrations decreased downgradient. The lateral extent of lead is defined, and further sampling for vertical extent is not warranted

Magnesium was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 2780 mg/kg. Magnesium concentrations were below the maximum Qbt 2,3,4 background concentration (2820 mg/kg) at all locations. Concentrations decreased with depth at locations 15-613392, 15-613393, and 15-613398 (concentrations in the shallower samples at locations 15-613392 and 15-613398 [2230 mg/kg and 2060 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations increased with depth at location 15-613397 (230 mg/kg). The NMED residential essential nutrient SSL was approximately 122 times the maximum concentration. Concentrations decreased downgradient. The lateral extent of magnesium is defined, and further sampling for vertical extent is not warranted.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in five samples with a maximum concentration of 10 mg/kg. Nickel concentrations decreased or did not change substantially with depth (0.5 mg/kg to 2 mg/kg) at all locations (the concentrations in the shallower samples at locations 15-613392, 15-613397, and 15-613398 [8.8 mg/kg, 10.5 mg/kg and 9.7 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations decreased downgradient. The lateral and vertical extent of nickel are defined.

Perchlorate was detected in five samples with a maximum concentration of 0.0033 mg/kg. Concentrations decreased with depth at location 15-613398, did not change substantially (0.0009 mg/kg) with depth at location 15-613396, and increased with depth at locations 15-613397 and 15-613400. Concentrations were at or below EDLs. The residential SSL was approximately 18,200 times the maximum concentration. Perchlorate concentrations decreased downgradient. Further sampling for extent of perchlorate is not warranted.

Selenium was detected above the Qbt 2,3,4 BV in 10 samples with a maximum concentration of 2.4 mg/kg. Selenium concentrations did not change substantially with depth (0.64 mg/kg or less) at all locations, except at locations 15-613391 and 15-613392 where concentrations increased with depth. The residential SSL was approximately 163 times the maximum concentration. Concentrations decreased downgradient. The lateral extent of selenium is defined, and further sampling for vertical extent is not warranted.

Organic Chemicals

Organic COPCs at SWMU 15-007(a) include acetone, bis(2-ethylhexyl)phthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; and 1,2,3,4,6,7,8,9-octachlorodibenzodioxin.

Acetone was detected in five samples with a maximum concentration of 0.14 mg/kg. Acetone concentrations did not change substantially with depth (0.013 mg/kg to 0.12 mg/kg). The residential SSL was approximately 474,000 times the maximum concentration. Acetone concentrations decreased downgradient. The lateral extent of acetone is defined, and further sampling for vertical extent is not warranted.

Bis(2-ethylhexyl)phthalate was detected in two samples with a maximum concentration of 0.14 mg/kg. Concentrations were below the EQLs, decreased with depth at location 15-613393, and increased slightly with depth at location 15-613395 (0.14 mg/kg). The residential SSL was approximately 2714 times the maximum concentration. Concentrations decreased downgradient. The lateral extent of bis(2-ethylhexyl)phthalate is defined, and further sampling for vertical extent is not warranted.

Two dioxin/furan congeners were detected in one or three samples. Concentrations were below the EQLs. The residential SSL was approximately 4150 times the maximum 2,3,7,8-tetrachlorodibenzodioxin– (TCDD-) equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

Radionuclides were not detected above BVs at SWMU 15-007(a).

6.3.5 Summary of Human Health Risk Screening

Industrial Scenario

Because samples were not collected from 0.0–1.0-ft-bgs depth interval, the industrial scenario was not evaluated.

Construction Worker Scenario

No carcinogenic or radionuclide COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 8×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, or residential scenarios at SWMU 15-007(a).

6.3.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks exist at SMWU 15-007(a).

6.4 SWMUs 15-004(b) and 15-004(c), Firing Sites A and B

6.4.1 Site Description and Operational History

SWMU 15-004(b) is inactive Firing Site A, located approximately 450 ft southeast of building 15-0183, and SWMU 15-004(c) is inactive Firing Site B, located approximately 525 ft southeast of building 15-0183, at TA-15 (Figure 6.4-1). Both SWMUs comprise Consolidated Unit 15-004(b)-99. Firing Sites A and B are located approximately 75 ft apart. Firing Site A was among the first firing sites to be used at the Laboratory, and it operated from 1945 to 1953. Aerial photographs taken in 1958 show that the areas of land cleared of vegetation and affected by explosives at these two firing sites were relatively small and located approximately 400 ft south of the bunker (former structure 15-0014) and control building (former building 15-0074) associated with Firing Sites A and B (USAF 1958, 015826). Both firing sites and associated structures were removed and the ground surface was regraded in 1967. Before they were removed, the bunker and the control building were surveyed and were found to contain no detectable levels of HE or radionuclides (Buckland 1965, 005305; Courtright 1965, 005282).

Information is limited concerning the materials used in tests at Firing Site A, SWMU 15-004(b). Most of the experiments conducted at SWMU 15-004(b) involved small amounts of HE (i.e., up to 50 lb). Tests involving larger quantities of HE were conducted at Firing Site B, SWMU 15-004(c) (LANL 1995, 050294, p. 4-3). Other materials used at Firing Sites A and B included natural uranium, beryllium, lead, mercury, and HE. The amount of uranium used in any one test was a few kilograms (LANL 1993, 020946, p. 8-5).

6.4.2 Relationship to Other SWMUs and AOCs

SWMUs 15-004(b) and 15-004(c) are not associated with any other SWMUs or AOCs.

6.4.3 Summary of Previous Investigations

Past environmental surveys at this site include an aerial radiological survey conducted in 1982 that identified background levels of radiation (LANL 1993, 020946, p. 8-5).

Because of their close proximity, SWMUs 15-004(b) and 15-004(c) were investigated as a combined area during the 1995 Phase I RFI (LANL 1995, 050294, pp. 4-3–4-12). Four samples were collected from two depths (0.0–0.5 ft and 1.5–2.0 ft bgs) at two locations at SWMU 15-004(b) and four samples were collected from two depths (0.0–0.5 ft and 1.5–2.0 ft bgs) at two locations at SWMU 15-004(c); the samples were submitted for analysis of TAL metals. Based on the analytical results, the RFI report recommended that an expedited cleanup be implemented at SWMU 15-004(b) to remove lead contamination (LANL 1996, 054977, p. 4-12). Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2009, 105251). Screening-level data showed inorganic chemicals detected above BVs and cesium-137 and europium-152 detected or detected above the FVs.

A voluntary corrective action (VCA) was conducted at SWMU 15-004(b) in 1996 to determine the extent of lead contamination at the site and to remove soil with lead above the Laboratory-adopted lead preliminary remediation goal (PRG) of 1000 mg/kg (LANL 1996, 055046). A photograph discovered after the Operable Unit (OU) 1086 RFI work plan was prepared indicated the firing site was located farther west than the location described in the work plan; VCA sampling locations were adjusted to reflect the revised site location (LANL 1993, 020946, p. 8-6). The VCA consisted of XRF sampling to determine the extent of lead contamination and HE spot testing. Based upon these and the Phase I RFI results, soil was removed until the lead concentrations met the 1000 mg/kg PRG. Five confirmation soil samples were collected and submitted for analysis of TAL metals, HE, and isotopic uranium; one sample also was analyzed for TCLP metals for waste characterization purposes (LANL 1996, 055046, p. 8). However, review of historical aerial photographs during the preparation of the HIR and investigation work plan revealed that the locations of Firing Sites A and B [SWMUs 15-004(b) and 15-004(c)] are south of the areas investigated during the 1995 RFI and the 1996 VCA (LANL 2009, 105251). The RFI and VCA were conducted near the former control building (former building 15-0074) and former bunker (former structure 15-0014), approximately 400 ft north of the actual locations of the two former firing sites. The data from samples collected during the 1996 VCA are not representative of the former firing site locations but are located within the proposed sampling grid in the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677) and therefore are included in this report.

6.4.4 Site Contamination

6.4.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- A grid (100 ft × 100 ft) was established over the entire area around the former control building and bunker locations and south to include the two firing points and the area around the firing points to the mesa edge.
- A total of 162 field-screening samples were collected at 81 grid locations from 0.0–1.0 ft and 3.0–4.0 ft bgs and screened for organic vapors; gross-alpha, -beta, and -gamma radioactivity; explosive compounds (TNT and RDX); and metals (barium, copper, lead, and uranium). Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.
- A total of 14 samples were collected from 7 locations from 0.0–1.0 ft and 3.0–4.0 ft bgs based on elevated metals field-screening results (see section 6.6.4.2 below).
- A total of 24 samples were collected from 12 random locations across the site; 22 samples were collected from 11 locations from 0.0–1.0 ft and 3.0–4.0 ft bgs and 2 samples were collected from 1 location from 0.0–1.0 ft and 1.0–2.0 ft bgs (see deviations in Appendix B).
- Two samples were collected at one location from SWMU 15-004(b) from 0.0–1.0 ft and 3.0–4.0 ft bgs.
- Two samples were collected at one location from SWMU 15-004(c) from 0.0–1.0 ft and 3.0–4.0 ft bgs.
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, americium-241, isotopic uranium, and gamma-emitting radionuclides. Two of the 42 samples were also analyzed for dioxins/furans and PCBs. The sampling locations for the dioxin/furan and PCB analyses were selected based on their proximity to the potential contaminant source.

Sampling locations with decision-level data for SWMUs 15-004(b) and 15-004(c) are shown in Figure 6.4-1. Table 6.4-1 presents the samples collected and analyses requested for SWMUs 15-004(b) and 15-004(c). The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.4.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at SWMUs 15-004(b) and 15-004(c), a maximum concentration of 1.4 ppm was detected at location 15-613334 from 0.0–1.0 ft and 3.0–4.0 ft bgs. No radiological-screening results exceeded twice the maximum site background levels. No screening results for explosive compounds exceeded industrial SSLs. The field-screening results are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.

Metals field-screening results for barium, lead, and uranium exceeded the metals-screening threshold (greater than 2 times the media BV) in eight field-screening samples collected from seven locations. Specifically, barium, lead, and/or uranium exceeded the metals-screening threshold in one or two samples collected at locations 15-613330, 15-613346, 15-613347, 15-613348, 15-613349, 15-613350, and 15-613351. The field-screening results are presented in Table 3.2-2 and Appendix B, Table B-3.0-1. In accordance with the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677), samples were collected from 0.0–1.0 ft and 3.0–4.0 ft bgs at these seven locations and analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, americium-241, isotopic uranium, and gamma-emitting radionuclides.

6.4.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMUs 15-004(b) and 15-004(c) consisted of results from 47 samples (42 soil and 5 tuff) collected from 25 locations.

Inorganic Chemicals

Forty-seven samples (42 soil and 5 tuff) were analyzed for TAL metals. Forty-two samples (37 soil and 5 tuff) were also analyzed for nitrate, cyanide, and perchlorate. Table 6.4-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Plate 4 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Aluminum was detected above the Qbt 2,3,4 BV (7340 mg/kg) in two samples with a maximum concentration of 16,600 mg/kg. Concentrations were above the maximum Qbt 2,3,4 background concentration (8370 mg/kg). Aluminum is retained as a COPC.

Antimony was not detected above the soil and Qbt 2,3,4 BVs (0.83 mg/kg and 0.5 mg/kg) but had DLs (0.51 mg/kg to 12 mg/kg) above the BVs in nine samples. The elevated DLs (11 mg/kg to 12 mg/kg) in the soil samples were from historical (1996) data with substantially higher DLs than in the forty-two 2010 samples; thirty-seven 2010 DLs were below the BVs. The DLs in the other four 2010 tuff samples were only 0.01 mg/kg to 0.05 mg/kg above the Qbt 2,3,4 BV; one tuff sample had a DL below the BV. Antimony is not a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in two samples with a maximum concentration of 5.5 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (5 mg/kg). Arsenic is retained as a COPC.

Barium was detected above the soil and Qbt 2,3,4 BVs (295 mg/kg and 46 mg/kg) in 10 soil samples and 2 tuff samples with a maximum concentration of 1000 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in soil are statistically different from background (Figure H-26 and Table H-5). Barium is retained as a COPC.

Beryllium was detected above the soil BV (1.83 mg/kg) in one sample at a concentration of 1.9 mg/kg. The Gehan and quantile tests indicated site concentrations of beryllium in soil are statistically different from background (Figure H-27 and Table H-5). Beryllium is retained as a COPC.

Cadmium was detected above the soil BV (0.4 mg/kg) in nine samples with a maximum concentration of 87 mg/kg and had DLs (0.53 mg/kg) above the soil BV in two samples. Cadmium is retained as a COPC.

Calcium was detected above the soil and Qbt 2,3,4 BVs (6120 mg/kg and 2200 mg/kg) in one soil sample and one tuff sample with a maximum concentration of 8140 mg/kg. The quantile and slippage tests indicated site concentrations of calcium in soil are not statistically different from background (Figure H-28 and Table H-5). The maximum tuff concentration was above the maximum Qbt 2,3,4 background concentration (2230 mg/kg). Calcium is retained as a COPC.

Chromium was detected above the soil and Qbt 2,3,4 BVs (19.3 mg/kg and 7.14 mg/kg) in one soil sample and three tuff samples with a maximum concentration of 30.1 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in soil are not statistically different from background (Figure H-29 and Table H-5). The maximum tuff concentration was above the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium is retained as a COPC.

Cobalt was detected above the soil BV (8.64 mg/kg) in eight soil samples and one tuff sample with a maximum concentration of 14.8 mg/kg. The Gehan and quantile tests indicated site concentrations of cobalt in soil are statistically different from background (Figure H-30 and Table H-5). Cobalt is retained as a COPC.

Copper was detected above the soil and Qbt 2,3,4 BVs (14.7 mg/kg and 4.66 mg/kg) in 11 soil samples and 1 tuff sample with a maximum concentration of 700 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in soil are statistically different from background (Figure H-31 and Table H-5). Copper is retained as a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.53 mg/kg to 0.61 mg/kg) above the BVs in 41 samples. The DLs were only 0.01 mg/kg to 0.11 mg/kg above the BVs. Cyanide was detected below the BV in the other sample. Cyanide is not a COPC.

Iron was detected above the Qbt 2,3,4 BV (14,500 mg/kg) in 1 sample at a concentration of 16,500 mg/kg. The concentration was 2000 mg/kg above the BV and 3000 mg/kg below the maximum Qbt 2,3,4 background concentration. Iron was detected below BVs in the other 46 samples. Iron is not a COPC.

Lead was detected above the soil and Qbt 2,3,4 BVs (22.3 mg/kg and 11.5 mg/kg) in 17 soil samples and 2 tuff samples with a maximum concentration of 1520 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are statistically different from background (Figure H-32 and Table H-5). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in 2 samples with a maximum concentration of 3560 mg/kg. One tuff concentration was below the 2 highest Qbt 2,3,4 background concentrations (2720 mg/kg and 2820 mg/kg), and 1 tuff concentration was above the maximum Qbt 2,3,4 background concentration. Magnesium was detected below the BVs in the other 45 samples. Magnesium is not a COPC.

Manganese was detected above the soil BV (671 mg/kg) in one sample at a concentration of 699 mg/kg. The Gehan and quantile tests indicated site concentrations of manganese in soil are statistically different from background (Figure H-33 and Table H-5). Manganese is retained as a COPC.

Mercury was detected above the soil BV (0.1 mg/kg) in three samples with a maximum concentration of 0.575 mg/kg and had DLs (0.11 mg/kg to 0.12 mg/kg) above the soil BV in four samples. Mercury is retained as a COPC.

Nickel was detected above the soil and Qbt 2,3,4 BVs (15.4 mg/kg and 6.58 mg/kg) in two soil samples and two tuff samples with a maximum concentration of 18.9 mg/kg. The Gehan and quantile tests indicated site concentrations of nickel in soil are statistically different from background (Figure H-34 and Table H-5). Nickel is retained as a COPC.

Nitrate was detected in 42 samples with a maximum concentration of 2.4 mg/kg. Nitrate is naturally occurring and the concentrations reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Selenium was detected above the soil and Qbt 2,3,4 BVs (1.52 mg/kg and 0.3 mg/kg) in 11 soil samples and 5 tuff samples with a maximum concentration of 2.8 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure H-35 and Table H-5). Selenium is retained as a COPC.

Silver was not detected above the soil BV (1 mg/kg) but had DLs (2.1 mg/kg to 2.4 mg/kg) above the BV in 5 samples. The DLs were 1.1 mg/kg to 1.4 mg/kg above the BV and were detected only in the 1996 samples; the 2010 data reported no concentrations or DLs above the BV in 42 samples. Silver is not a COPC.

Sodium was detected above the soil BV (915 mg/kg) in two samples with a maximum concentration of 1010 mg/kg. The Gehan and quantile tests indicated site concentrations of sodium in soil are not statistically different from background (Figure H-36 and Table H-5). Sodium is not a COPC.

Thallium was detected above the soil and Qbt 2,3,4 BVs (0.73 mg/kg and 1.1 mg/kg) in two soil samples and two tuff samples with a maximum concentration of 5 mg/kg and had DLs (1.1 mg/kg to 1.3 mg/kg) above the soil BV in five samples. Thallium is retained as a COPC.

Vanadium was detected above the Qbt 2,3,4 BV (17 mg/kg) in one sample at a concentration of 21.4 mg/kg. The concentration was only 4.4 mg/kg above the BV and 0.4 mg/kg above the maximum Qbt 2,3,4 background concentration (21 mg/kg). Vanadium was not detected above BV in the other 46 samples. Vanadium is not a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in five samples with a maximum concentration of 78.5 mg/kg. The Gehan and slippage tests indicated site concentrations of zinc in soil are not statistically different from background (Figure H-37 and Table H-5). Zinc is not a COPC.

Organic Chemicals

Forty-seven samples (42 soil and 5 tuff) were analyzed for explosive compounds. Forty-two samples (37 soil and 5 tuff) were analyzed for VOCs and SVOCs. Two soil samples were also analyzed for dioxins/furans and PCBs. Table 6.4-3 presents the organic chemicals detected. Plate 5 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at SWMUs 15-004(b) and 15-004(c) include acetone; 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; benzyl alcohol; bis(2-ethylhexyl)phthalate;

di-n-butylphthalate; HMX; 4-isopropyltoluene; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; RDX; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; 2,4,6-trinitrotoluene; and xylene (total). All detected organic chemicals are retained as COPCs.

Radionuclides

Forty-seven samples (42 soil and 5 tuff) were analyzed for isotopic uranium. Forty-two samples (37 soil and 5 tuff) were analyzed for americium-241 and gamma-emitting radionuclides. Table 6.4-4 presents the radionuclides detected or detected above BVs/FVs. Plate 6 shows the spatial distribution of radionuclides detected or detected above BVs/FVs.

Uranium-234 was detected above the soil BV (2.59 pCi/g) in one sample at an activity of 2.98 pCi/g. Uranium-234 is retained as a COPC.

Uranium-238 was detected above the soil BV (2.29 pCi/g) in one sample at an activity of 3.76 pCi/g. Uranium-238 is retained as a COPC.

6.4.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMUs 15-004(b) and 15-004(c) are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMUs 15-004(b) and 15-004(c) include aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, and thallium.

Aluminum was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 16,600 mg/kg. Aluminum concentrations decreased with depth at location 15-613330 (the concentration in the shallower sample [12,100 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]); did not change substantially with depth at location 15-613351 (100 mg/kg); and decreased downgradient. The residential SSL was approximately 4.7 times (the concentration was 61,400 mg/kg below the residential SSL), and the industrial SSL was approximately 78 times the maximum concentration. The lateral extent of aluminum is defined, and further sampling for vertical extent is not warranted.

Arsenic was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 5.5 mg/kg. Arsenic concentrations did not change substantially with depth at locations 15-613330 and 15-613351 (0.5 mg/kg and 1.3 mg/kg) and decreased downgradient. The maximum concentration is 0.5 mg/kg above the maximum background concentration (5 mg/kg). The lateral extent of arsenic is defined, and further sampling for vertical extent is not warranted.

Barium was detected above the soil BV in 10 soil samples and 2 tuff samples with a maximum concentration of 1000 mg/kg. Barium concentrations decreased with depth at locations 15-613330, 15-613346, 15-613347, 15-613348, 15-313349, 15-613350, and 15-613351 (the concentration in the shallower sample at location 15-613351 [243 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]); were below the maximum soil background concentration (410 mg/kg) in a single-depth sample at location 15-02434; and increased with depth at locations 15-613341 and 15-02444. Concentrations decreased downgradient. The residential SSL was approximately 17 times and 32 times and the industrial SSL was approximately 277 times and 529 times the maximum concentrations at locations 15-02444 and 15-613341, respectively. The lateral extent of barium is defined, and further sampling for vertical extent is not warranted.

Beryllium was detected above the soil BV in one sample at a concentration of 1.9 mg/kg. The concentration was below the maximum soil background concentration (3.95 mg/kg) and decreased downgradient. The residential SSL was approximately 82 times the maximum concentration. The lateral extent of beryllium is defined, and further sampling for vertical extent is not warranted.

Cadmium was detected above the soil BV in nine samples with a maximum concentration of 87 mg/kg and had DLs (0.53 mg/kg) above the soil BV in two samples. Cadmium concentrations decreased with depth at locations 15-613346, 15-613347, 15-613348, and 15-313349; were below the maximum soil background concentration (2.6 mg/kg) in a single-depth sample at location 15-02434; and increased with depth at location 15-02444. The residential SSL was approximately 19 times the maximum concentration at location 15-02444 and approximately 133 times the elevated DLs. Concentrations decreased downgradient. The lateral extent of cadmium is defined, and further sampling for vertical extent is not warranted.

Calcium was detected above the soil and Qbt 2,3,4 BVs in one soil sample and one tuff sample with a maximum concentration of 8140 mg/kg. Calcium concentrations decreased downgradient. The NMED residential essential nutrient SSL was approximately 1590 times the maximum concentration. The lateral extent of calcium is defined, and further sampling for vertical extent is not warranted.

Chromium was detected above the soil and Qbt 2,3,4 BVs in one soil sample and three tuff samples with a maximum concentration of 30.1 mg/kg. Chromium concentrations did not change substantially (from no change in concentration to 0.1 mg/kg) with depth at locations 15-613330 and 15-613343 and were below the maximum Qbt 2,3,4 background concentration (13 mg/kg). The concentration was below the maximum soil background concentration (36.5 mg/kg) at location 15-613350, increased with depth at location 15-613351, and decreased downgradient. As discussed in section 4.2, there was no known use of hexavalent chromium at this site, and no site conditions would have produced hexavalent chromium. Therefore, the total chromium results represent trivalent chromium concentrations. The trivalent chromium residential SSL was approximately 3890 times the maximum concentration. The lateral extent of chromium is defined, and further sampling for vertical extent is not warranted.

Cobalt was detected above the soil and Qbt 2,3,4 BVs in eight soil samples and one tuff sample with a maximum concentration of 14.8 mg/kg. Cobalt concentrations decreased with depth at all but one location. The concentration at location 15-02444 was below the maximum soil background concentration (9.5 mg/kg). Concentrations decreased downgradient. The lateral and vertical extent of cobalt are defined.

Copper was detected above the soil and Qbt 2,3,4 BVs in 11 soil samples and 1 tuff sample with a maximum concentration of 700 mg/kg. Copper concentrations decreased with depth at locations 15-02444, 15-613346, 15-613347, 15-613348, 15-613349, and 15-613350 and did not change substantially with depth at location 15-613351 (0.2 mg/kg). Copper was also detected slightly above the maximum soil background concentration (16 mg/kg) in a single-depth sample at location 15-02434. The residential SSL was approximately 156 times the concentration at location 15-02434. Copper concentrations decreased downgradient. The lateral extent is defined, and further sampling for vertical extent is not warranted.

Lead was detected above the soil and Qbt 2,3,4 BVs in 17 soil samples and 2 tuff samples with a maximum concentration of 1520 mg/kg. Single-depth samples were collected at locations 15-02428 and 15-02434 and overlapping depth samples were collected at location 15-02444 (the concentrations at this location ranged from 100 mg/kg to 370 mg/kg). These sampling locations were related to a VCA designed to remove highly lead-contaminated soil (LANL 1996, 055046). Therefore, the lead concentrations reported were lower than the concentrations removed during the 1996 VCA. Lead concentrations

decreased with depth at locations 15-613332, 15-613346, 15-613347, 15-613348, 15-613349, and 15-613350. Lead concentrations were below the maximum soil background concentration (28 mg/kg) at location 15-613341. Concentrations increased with depth at locations 15-613330 and 15-613351. The residential SSL was approximately 8 times and 3 times and the industrial SSL was approximately 16 times and 6 times the maximum concentrations at these locations (maximum concentrations were 276 mg/kg to 749 mg/kg below the SSLs). Lead concentrations decreased downgradient at locations 15-613342, 15-613343, and 15-613345 (Plate 4). The lateral extent of lead is defined, and further sampling for vertical extent is not warranted.

Manganese was detected above the soil BV in one sample at a concentration of 699 mg/kg. Manganese concentration decreased with depth and decreased downgradient. The lateral and vertical extent of manganese are defined.

Mercury was detected above the soil BV in three samples with a maximum concentration of 0.575 mg/kg and had DLs (0.11 mg/kg to 0.12 mg/kg) above the soil BV in four samples. Concentrations decreased with depth and decreased downgradient. The residential SSL was approximately 196 times the maximum DL. The lateral and vertical extent of mercury are defined.

Nickel was detected above the soil and Qbt 2,3,4 BVs in two soil samples and two tuff samples with a maximum concentration of 18.9 mg/kg. Nickel concentrations decreased with depth at location 15-613330 (the concentration in the shallower sample (9.2 mg/kg) was below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations were below the maximum soil background concentration (29 mg/kg) at locations 15-613347 and 15-613350 and increased with depth at location 15-613351. The residential SSL was approximately 82 times of the maximum concentration. Nickel concentrations decreased downgradient. The lateral extent of nickel is defined, and further sampling for vertical extent is not warranted.

Selenium was detected above the soil and Qbt 2,3,4 BVs in 11 soil samples and 5 tuff samples with a maximum concentration of 2.8 mg/kg. Selenium concentrations did not substantially change with depth at all locations (1.1 mg/kg or less). The residential SSL was approximately 140 times the maximum concentration. Selenium concentrations decreased downgradient. The lateral extent of selenium is defined, and further sampling for vertical extent is not warranted.

Thallium was detected above the soil and Qbt 2,3,4 BVs in two soil samples and two tuff samples with a maximum concentration of 5 mg/kg. Thallium concentrations increased with depth at 15-613330, 15-613341, and 15-613351. The residential SSL was exceeded at all locations, and the industrial SSL was approximately 2.6 times the maximum concentration. Thallium concentrations decreased laterally. The lateral extent of thallium is defined, but further sampling for vertical extent is warranted.

Organic Chemicals

Organic COPCs at SWMUs 15-004(b) and 15-004(c) include acetone; 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; benzyl alcohol; bis(2-ethylhexyl)phthalate; di-n-butylphthalate; HMX; 4-isopropyltoluene; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; RDX; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; 2,4,6-trinitrotoluene; and xylene (total).

Acetone was detected in one sample at a concentration of 0.012 mg/kg. The concentration was below the EQL and was only detected in the deeper sample at location 15-613347. The residential SSL was approximately 5,525,000 times the concentration. Acetone concentrations decreased downgradient. The lateral extent of acetone is defined, and further sampling for vertical extent is not warranted.

Amino-2,6-dinitrotoluene[4-] was detected in one sample at a concentration of 0.0074 mg/kg. The concentration was below the EQL, decreased with depth, and decreased downgradient. The lateral and vertical extent of 4-amino-2,6-dinitrotoluene are defined.

Amino-4,6-dinitrotoluene[2-] was detected in one sample at a concentration of 0.0076 mg/kg. The concentration was below the EQL, decreased with depth, and decreased downgradient. The lateral and vertical extent of 2-amino-4,6-dinitrotoluene are defined.

Benzyl alcohol was detected in five samples with a maximum concentration of 0.097 mg/kg. Concentrations were below the EQLs, decreased with depth at locations 15-613343 and 15-613345, and decreased downgradient. The residential SSL was approximately 64,000 times the maximum concentration. The lateral extent of benzyl alcohol is defined, and further sampling for vertical extent is not warranted.

Bis(2-ethylhexyl)phthalate was detected nine samples with a maximum concentration of 0.47 mg/kg. All concentrations, except the maximum, were below EQLs. Concentrations decreased with depth at location 15-613341, 15-613346, and 15-613347 and did not change substantially with depth at the other locations (0.05 mg/kg to 0.1 mg/kg). The residential SSL was approximately 1810 times the maximum concentration. Bis(2-ethylhexyl)phthalate concentrations decreased downgradient. The lateral extent of bis(2-ethylhexyl)phthalate is defined, and further sampling for vertical extent is not warranted.

Di-n-butylphthalate was detected in four samples with a maximum concentration of 0.99 mg/kg. Di-n-butylphthalate concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of di-n-butylphthalate are defined.

HMX was detected in one sample at a concentration of 0.086 mg/kg. The concentration was below the EQL, and HMX was detected only in the deeper sample at location 15-613347. The residential SSL was approximately 44,770 times the concentration. Concentrations decreased downgradient. The lateral extent of HMX is defined, and further sampling for vertical extent is not warranted.

Isopropyltoluene[4-] was detected in one sample at a concentration of 0.00058 mg/kg. The concentration decreased with depth, was below the EQL, and decreased downgradient. The lateral and vertical extent of 4-isopropyltoluene are defined.

RDX was detected in one sample at a concentration of 0.31 mg/kg. The concentration was detected only in the deeper sample at location 15-613347 and decreased downgradient. The residential SSL was approximately 194 times the concentration. The lateral extent of RDX is defined, and further sampling for vertical extent is not warranted.

Trimethylbenzene[1,2,4-] was detected in five samples with a maximum concentration of 0.0011 mg/kg. Concentrations were below the EQLs, decreased with depth at locations 15-613335, 15-613336, and 15-613339, and were detected only in the deeper samples at the other two locations. The residential SSL was approximately 52,730 times the maximum concentration. Concentrations decreased downgradient. The lateral extent of 1,2,4-trimethylbenzene is defined, and further sampling for vertical extent is not warranted.

Trimethylbenzene[1,3,5-] was detected in two samples with a maximum concentration of 0.00061 mg/kg. The concentrations decreased with depth, were below the EQLs, and decreased downgradient. The lateral and vertical extent of 1,3,5-trimethylbenzene are defined.

Trinitrotoluene[2,4,6-] was detected in two samples with a maximum concentration of 0.0098 mg/kg. The concentrations were below the EQLs, decreased with depth at location 15-613346, and were detected only in the deeper sample at location 15-613347. The residential SSL was approximately 3670 times the maximum concentration. Concentrations decreased downgradient. The lateral extent of 2,4,6-trinitrotoluene is defined, and further sampling for vertical extent is not warranted.

Xylene (total) was detected in one sample at a concentration of 0.00095 mg/kg. The concentration was below the EQL and was only detected in the deeper sample at location 15-613345. The residential SSL was approximately 916,840 times the concentration. Concentrations decreased downgradient. The lateral extent of xylene is defined, and further sampling for vertical extent is not warranted.

One dioxin/furan congener was detected in two samples. Concentrations were below the EQLs. The residential SSL was approximately 60,000 times the maximum TCDD-equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

Radionuclide COPCs at SWMUs 15-004(b) and 15-004(c) include uranium-234 and uranium-238.

Uranium-234 was detected above the soil BV in one sample at an activity of 2.98 pCi/g. Uranium-234 activities decreased with depth and decreased downgradient. The lateral and vertical extent of uranium-234 are defined.

Uranium-238 was detected above the soil BV in one sample at an activity of 3.76 pCi/g. Uranium-238 activities decreased with depth and decreased downgradient. The lateral and vertical extent of uranium-238 are defined.

6.4.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.7, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.06 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Construction Worker Scenario

The construction worker HI is 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from aluminum, lead, and manganese. As discussed in the uncertainty analysis (section I-4.4.2), the potential risk from aluminum and manganese is overestimated and is comparable to naturally occurring levels of aluminum and manganese. The lead EPC is below the construction worker SSL (800 mg/kg). Therefore, the HI does not exceed the NMED target HI. No carcinogenic COPCs were identified for the construction worker scenario.

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-5} (7×10^{-6} using the EPA regional screening value for arsenic), which is equivalent to (or less than) the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is approximately 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from aluminum, lead, and thallium. As discussed in

the uncertainty analysis (section I-4.4.2), the potential risks from aluminum and thallium are overestimated and are comparable to naturally occurring levels of aluminum and thallium. The lead EPC is below the residential SSL (400 mg/kg). Therefore, the HI does not exceed the NMED target HI. The total dose is 0.4 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios at SWMUs 15-004(b) and 15-004(c).

6.4.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, potential ecological risks exist at SWMUs 15-004(b) and 15-004(c) for the American robin (insectivore and omnivore), deer mouse, and montane shrew from cadmium, copper, lead, di-n-butylphthalate; and the American robin (herbivore) from copper and lead.

6.5 SWMU 15-004(f), E-F Firing Site

6.5.1 Site Description and Operational History

SWMU 15-004(f) is an inactive firing site, E-F Firing Site, that consists of three inactive firing points (D, E, and F) covering a total area of approximately 60 acres at TA-15 (Figure 6.5-1). E-F Firing Site began operating in 1946 and was last used in 1981. It was operated extensively from 1947 to 1973 and was the largest firing site at the Laboratory (LANL 1993, 020946, p. 7-3).

Originally, E-F Firing Site consisted of a single firing point (D) that was built in 1946 and that ceased to operate in 1949 (LANL 1990, 007512, p. 69). In 1947, the firing area was expanded to include Firing Point E, which was used for large-scale shots containing up to 2500 lb of HE, and Firing Point F, which was used for smaller-scale shots. Firing Points E and F were approximately 650 ft apart and were wired to an underground control bunker (structure 15-0027). Tests at the two firing points were conducted on the ground and created depressions in the ground. After test shots, the firing points were either regraded or backfilled with gravel to fill in the depressions. Eventually, nearby soil was mounded on the north and south sides of Firing Point E to protect structures at TA-15 from shrapnel (LANL 1993, 020946, pp. 7-3–7-5). Tests at E-F Firing Site involved HE, uranium, beryllium, lead, and mercury (LANL 1993, 020946, p. 7-8).

6.5.2 Relationship to Other SWMUs and AOCs

The three inactive firing points (D, E, and F) of SWMU 15-004(f) are located north and west of SWMU 15-008(a). AOCs 15-008(f) and 36-004(e) are located southeast of SWMU 15-004(f). Together, SWMUs 15-008(a) and 15-004(f) comprise Consolidated Unit 15-004(f)-99.

6.5.3 Summary of Previous Investigations

The site was surveyed in 1982 by EG&G Energy Measurements with radiological detectors mounted in a helicopter as part of a survey of the entire Laboratory. Results of this effort identified elevated levels of radiation at the site (LANL 1993, 020946, p. 7-3).

During the 1994 Phase I RFI conducted at SWMU 15-004(f), a 200-ft grid was established over the site. Surface samples (0.0–0.5 ft bgs) were collected from 85 locations from selected grid points, and subsurface samples (1.5–2.0 ft bgs) were collected from a subset of 35 of the sampling locations (LANL 1995, 050294, pp. 4-23–4-57). Samples were field-screened for radioactivity, metals, and HE. Based on the field-screening results, 43 surface samples and 17 subsurface samples collected from 53 locations were submitted for analysis of radionuclides and TAL metals (LANL 1995, 050294, pp. 4-23–4-57). All decision-level analytical data collected during previous investigations are presented and evaluated in section 6.5.4.4. Table 6.5-1 presents the samples collected and analyses requested at SWMU 15-004(f).

In 1999, the Laboratory submitted a plan for a technology feasibility demonstration project at SWMU 15-004(f) to NMED (LANL 1999, 063100). An environmental pilot treatment study was conducted in 2001 at E-F Firing Site. The process was designed to selectively remove uranium by precipitation. The soil was sluiced to separate large uranium aggregates, heaped into containers, and leached with a sodium bicarbonate solution. The soil was then placed on a drying tray and the leachate was pumped into a settling tank, where its pH was adjusted to 6.5 using phosphoric acid, followed by passage through a container of apatite mineral (DOE 2001, 070068, p. 6). Although the pilot treatment study was implemented, a report was never produced.

6.5.4 Site Contamination

The objective of the SWMU 15-004(f) investigation was not to determine the nature and extent of contamination but rather to identify areas and depths of soil requiring corrective actions. Samples were collected at the previous 1994 RFI grid sampling locations and at the two earthen mounds to characterize the site to support corrective actions and determine if residual contamination poses an unacceptable risk based on an industrial scenario. In addition, the two earthen mounds were characterized to determine waste disposition requirements and if any portion of the soil could be spread over the site as part of site restoration following corrective actions (LANL 2009, 106657.8; NMED 2009, 106677).

Samples were also collected from sediment catchment areas in the drainages downgradient of the site to determine if contaminants are migrating from the site. These investigation activities are discussed in the following sections.

6.5.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- The 1994 RFI grid sampling locations were reestablished across the site at 42 locations where screening- and decision-level data from previous investigations showed inorganic chemicals detected above BVs and/or radionuclides detected or detected above BVs/FVs and at 51 locations where no inorganic chemicals or radionuclides were detected above BVs or BVs/FVs during previous investigations.
- A FIDLER survey was conducted over the E-F Firing Site during October 25, 2010, to October 28, 2010, and November 10, 2010, to November 12, 2010. Radiological survey results are presented in Figures 6.5-2 and 6.5-3 and in Appendix D.
- All samples collected during the 2010 investigation were field-screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.

- A total of 42 samples were collected at 42 grid sampling locations from 2 depth intervals (3.0–3.5 ft or 3.0–4.0 ft bgs) (see deviations in Appendix B). Specifically, 33 samples were collected from 3.0–4.0 ft bgs, and 9 samples were collected from 3.0–3.5 ft bgs. All 42 samples were analyzed for TAL metals, explosive compounds, and isotopic uranium. One of the 42 samples was also analyzed for dioxins/furans and PCBs. The sampling location for the dioxin/furan and PCB analyses was selected based on its proximity to the potential contaminant source.
- A total of 102 samples were collected from 51 grid sampling locations from depths of 0.0–1.0 ft bgs and 3.0–4.0 ft bgs and field-screened for explosive compounds (TNT and RDX) using ENSYS test kits and metals (barium, copper, lead, and uranium) using XRF. Based on these field-screening results, a total of 30 samples were collected from 15 locations for off-site laboratory analysis. Specifically, 20 samples were collected from 10 locations from 0.0–1.0 ft and 3.0–4.0 ft bgs; 8 samples were collected at 4 locations from 0.0–1.0 ft bgs and 1.0–2.0 ft bgs; and 2 samples were collected from 1 location from 0.0–0.5 ft bgs and 0.5–1.0 ft bgs. All 30 samples were analyzed for TAL metals, explosive compounds, and isotopic uranium. One of the 30 samples was also analyzed for dioxins/furans and PCBs. The sampling location for the dioxin/furan and PCB analyses was selected based on its proximity to the potential contaminant source.
- A total of 57 samples were collected from 18 locations within the earthen mounds at Firing Point E. All samples were field-screened for metals (barium, copper, lead, and uranium) using an XRF, and additional samples collected if field-screening results were elevated. Samples were collected from depths of 0.0–1.0 ft, 6.0–7.0 ft, and 9.0–10.0 ft bgs or deeper, based on field-screening results. Refusal was encountered at the base of several boreholes within the earthen mounds; therefore, it was not possible to collect samples from the bottommost sampling depth interval at some locations (see deviations in Appendix B). All mound samples were analyzed for TAL metals, explosive compounds, and isotopic uranium. One of the 57 mound samples was also analyzed for dioxins/furans and PCBs. The sampling location for the dioxin/furan and PCB analyses was selected based on its proximity to the potential contaminant source.
- Twelve sediment samples were collected from six drainage locations downgradient of the site from two depth intervals (0.0–0.5 ft or 0.0–1.0 ft bgs and 0.5–1.0 ft, 1.0–1.5 ft, 1.0–2.0 ft, or 2.0-3.0 ft bgs) at each location (see deviations in Appendix B). All sediment samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, explosive compounds, and isotopic uranium. One of the 12 samples was also analyzed for dioxins/furans and PCBs. The sampling location for the dioxin/furan and PCB analyses was selected based on its proximity to the potential contaminant source.

The 2010 sampling locations at SWMU 15-004(f) are shown in Figure 6.5-1. Table 6.5-1 presents the samples collected and analyses requested for SWMU 15-004(f). The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.5.4.2 Soil, Rock, and Sediment Field-Screening Results

The FIDLER is a specialized detector consisting of a thin layer of sodium or cesium iodide that is optimized to detect gamma radiation below 100 keV. It is most widely used to determine the presence of plutonium, americium-241, and DU and can be used to estimate radionuclide activities in the field. Natural uranium and DU are known to be present at SWMU 15-004(f) and are considered the primary contaminants. Before site investigation samples were collected, a radiological FIDLER survey was conducted at the E-F Firing Site over the approximately 60-acre area with a detector spacing of approximately 5 ft and a survey speed of 2.5 ft/sec. The highest count rates of more than 8 times the estimated site background value of 22,500 counts per minute (cpm) were detected in an area within the

earthen mounds at Firing Point E and at an area located about 200 ft directly east of the two earthen mounds. The count rates for the site generally decreased with distance away from the earthen-mound area. A number of isolated point sources were scattered throughout the 60-acre area. The density of these point sources also decreased with distance away from the earthen mounds (Figures 6.5-2 and 6.5-3 and Appendix D). Two tuff samples were collected at sampling location 15-02230 from 0.0–0.5 ft bgs and 0.5–1.0 ft bgs where radiological FIDLER survey results exceeded 2 times the background level. The two samples were submitted for analysis of TAL metals, explosive compounds, and isotopic uranium. FIDLER survey results are presented in Appendix D.

During headspace screening of collected samples for organic vapors at SWMU 15-004(f), a maximum concentration of 67.9 ppm was detected at location 15-02231 from 3.0–4.0 ft bgs. No radiological-screening results for collected samples exceeded twice the maximum site background levels. No screening results for explosive compounds exceeded industrial SSLs. The field-screening results are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.

Uranium exceeded the metals-screening threshold (greater than 2 times the media BV) at 14 of the 51 grid locations at SWMU 15-004(f) where XRF screening was conducted; therefore, 28 samples were collected at 14 locations from depths of 0.0–1.0 ft bgs and 3.0–4.0 ft bgs and submitted for analysis of TAL metals, explosive compounds, and isotopic uranium. The field-screening results are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.

Copper, lead, and/or uranium exceeded the metals-screening threshold (greater than 2 times the media BV) at six of the earthen mound sampling locations (locations 15-613365, 15-613369, 15-613372, 15-613375, 15-613376, and 15-613381) at SWMU 15-004(f) where XRF screening was conducted. A deeper tuff sample was collected at each of the six locations and submitted for analysis of TAL metals, explosive compounds, and isotopic uranium. The field-screening results are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.

6.5.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 15-004(f) consisted of results from 159 samples (97 soil, 50 tuff, and 12 sediment) collected from 83 locations.

Inorganic Chemicals

A total of 159 samples (97 soil, 50 tuff, and 12 sediment) were analyzed for TAL metals. Twelve sediment samples were analyzed for cyanide, nitrate, and perchlorate. Eighteen soil samples were analyzed for uranium. Table 6.5-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Plate 7 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Aluminum was detected above the soil and Qbt 2,3,4 BVs (29,200 mg/kg and 7340 mg/kg) in one soil sample and six tuff samples with a maximum concentration of 30,700 mg/kg. The Gehan and quantile tests indicated site concentrations of aluminum in soil are not statistically different from background (Figure H-38 and Table H-6). The Gehan and quantile tests indicated site concentrations of aluminum in tuff are statistically different from background (Figure H-39 and Table H-7). Aluminum is retained as a COPC.

Antimony was detected above the soil and Qbt 2,3,4 BVs (0.83 mg/kg and 0.5 mg/kg) in 9 soil samples and 3 tuff samples with a maximum concentration of 17.5 mg/kg and had DLs (0.51 mg/kg to 4.3 mg/kg) above the soil BV in 34 samples. Antimony is retained as a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in seven samples with a maximum concentration of 4.4 mg/kg. The Gehan and quantile tests indicated site concentrations of arsenic in tuff are statistically different from background (Figure H-40 and Table H-7). Arsenic is retained as a COPC.

Barium was detected above the soil, Qbt 2,3,4, and sediment BVs (295 mg/kg, 46 mg/kg, and 127 mg/kg) in 28 soil samples, 24 tuff samples, and 5 sediment samples with a maximum concentration of 857 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in soil, tuff, and sediment are statistically different from background (Figures H-41, H-42, and H-43 and Tables H-6, H-7, and H-8). Barium is retained as a COPC.

Beryllium was detected above the soil, Qbt 2,3,4, and sediment BVs (1.83 mg/kg, 1.21 mg/kg, and 1.31 mg/kg) in 10 soil samples, 2 tuff samples, and 1 sediment sample with a maximum concentration of 42.1 mg/kg. The Gehan and quantile tests indicated site concentrations of beryllium in soil and sediment are statistically different from background and concentrations in tuff are not statistically different from background (Figures H-44, H-45, and H-46 and Tables H-6, H-7, and H-8). Beryllium is retained as a COPC.

Cadmium was detected above the soil and sediment BVs (0.4 mg/kg) in 32 soil samples and 1 sediment sample with a maximum concentration of 44.9 mg/kg and had DLs (0.43 mg/kg to 1 mg/kg) above the soil BV in 14 samples. The Gehan and quantile tests indicated site concentrations of cadmium in sediment are not statistically different from background (Figure H-47 and Table H-8). However, cadmium concentrations in soil were substantially above the soil BV. Cadmium is retained as a COPC.

Calcium was detected above the soil and Qbt 2,3,4 BVs (6120 mg/kg and 2200 mg/kg) in 7 soil samples and 12 tuff samples with a maximum concentration of 13,300 mg/kg. The Gehan and quantile tests indicated site concentrations of calcium in soil and tuff are statistically different from background (Figures H-48 and H-49 and Tables H-6 and H-7). Calcium is retained as a COPC.

Chromium was detected above the soil and Qbt 2,3,4 BVs (19.3 mg/kg and 7.14 mg/kg) in 6 soil samples and 22 tuff samples with a maximum concentration of 35.5 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in soil and tuff are statistically different from background (Figures H-50 and H-51 and Tables H-6 and H-7). Chromium is retained as a COPC.

Cobalt was detected above the soil, Qbt 2,3,4, and sediment BVs (8.64 mg/kg, 3.14 mg/kg, and 4.73 mg/kg) in 14 soil samples, 4 tuff samples, and 3 sediment samples with a maximum concentration of 16.8 mg/kg. The Gehan and quantile tests indicated site concentrations of cobalt in soil, tuff, and sediment are statistically different from background (Figures H-52, H-53, and H-54 and Tables H-6, H-7, and H-8). Cobalt is retained as a COPC.

Copper was detected above the soil, Qbt 2,3,4, and sediment BVs (14.7 mg/kg, 4.66 mg/kg, and 11.2 mg/kg) in 54 soil samples, 15 tuff samples, and 7 sediment samples with a maximum concentration of 108,000 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in soil, tuff, and sediment are statistically different from background (Figures H-55, H-56, and H-57 and Tables H-6, H-7, and H-8). Copper is retained as a COPC.

Iron was detected above the soil and Qbt 2,3,4 BVs (21,500 mg/kg and 14,500 mg/kg) in one soil sample and two tuff samples with a maximum concentration of 22,200 mg/kg. The Gehan and quantile tests indicated site concentrations of iron in soil are statistically different from background (Figure H-58 and Table H-6). The Gehan and quantile tests indicated site concentrations of iron in tuff are not statistically different from background (Figure H-59 and Table H-7). Iron is retained as a COPC.

Lead was detected above the soil and Qbt 2,3,4 BVs (22.3 mg/kg and 11.2 mg/kg) in 32 soil samples and 4 tuff samples with a maximum concentration of 375 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are statistically different from background (Figure H-60 and Table H-6). The Gehan and quantile tests indicated site concentrations of lead in tuff are not statistically different from background (Figure H-61 and Table H-7). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in nine samples with a maximum concentration of 2450 mg/kg. The Gehan and quantile tests indicated site concentrations of magnesium in tuff are statistically different from background (Figure H-62 and Table H-7). Magnesium is retained as a COPC.

Manganese was detected above the soil BV (671 mg/kg) in three samples with a maximum concentration of 893 mg/kg. The Gehan and quantile tests indicated site concentrations of manganese in soil are statistically different from background (Figure H-63 and Table H-6). Manganese is retained as a COPC.

Mercury was detected above the soil and Qbt 2,3,4 BVs (0.1 mg/kg) in 13 soil samples and 2 tuff samples with a maximum concentration of 2.3 mg/kg. Mercury is retained as a COPC.

Nickel was detected above soil and Qbt 2,3,4 BVs (15.4 mg/kg and 6.58 mg/kg) in 8 soil samples and 20 tuff samples at with a maximum concentration of 27.5 mg/kg. The Gehan and quantile tests indicated site concentrations of nickel in soil and tuff are statistically different from background (Figures H-64 and H-65 and Tables H-6 and H-7). Nickel is retained as a COPC.

Nitrate was detected in nine sediment samples with a maximum concentration of 0.52 mg/kg. Nitrate is naturally occurring and the concentrations reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Potassium was detected above the soil BV (3460 mg/kg) in one sample at a concentration of 3940 mg/kg. The Gehan and quantile tests indicated site concentrations of potassium in soil are not statistically different from background (Figure H-66 and Table H-6). Potassium is not a COPC.

Selenium was detected above the soil, Qbt 2,3,4 and sediment BVs (1.52 mg/kg, 0.3 mg/kg, and 0.3 mg/kg) in 38 soil samples, 50 tuff samples, and 12 sediment samples with a maximum concentration of 4.2 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure H-67 and Table H-6). Selenium is retained as a COPC.

Silver was detected above the soil and Qbt 2,3,4 BVs (1 mg/kg) in seven soil samples and one tuff sample with a maximum concentration of 25.5 mg/kg. Silver is retained as a COPC.

Sodium was detected above the soil BV (915 mg/kg) in five samples with a maximum concentration of 1340 mg/kg. The Gehan and quantile tests indicated site concentrations of sodium in soil are not statistically different from background (Figure H-68 and Table H-6). Sodium is not a COPC.

Thallium was detected above the Qbt 2,3,4 BV (1.1 mg/kg) in two samples with a maximum concentration of 2.3 mg/kg. The Gehan and quantile tests indicated site concentrations of thallium in tuff are not statistically different from background (Figure H-69 and Table H-7). Thallium is not a COPC.

Uranium was detected above the soil BV (1.82 mg/kg) in 18 samples with a maximum concentration of 2763 mg/kg. The Gehan and quantile tests indicated site concentrations of uranium in soil are statistically different from background (Figure H-70 and Table H-6). Uranium is retained as a COPC.

Vanadium was detected above the Qbt 2,3,4 and sediment BVs (17 mg/kg and 19.7 mg/kg) in two tuff samples and one sediment sample with a maximum concentration of 22.8 mg/kg. The quantile and

slippage tests indicated site concentrations of vanadium in tuff are not statistically different from background (Figure H-71 and Table H-7). The Gehan and quantile tests indicated site concentrations of vanadium in sediment are not statistically different from background (Figure H-72 and Table H-8). Vanadium is not a COPC.

Zinc was detected above the soil and sediment BVs (48.8 mg/kg and 60.2 mg/kg) in 24 soil samples and one sediment sample with a maximum concentration of 716 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are statistically different from background (Figure H-73 and Table H-6). The Gehan and quantile tests indicated site concentrations of zinc in sediment are not statistically different from background (Figure H-74 and Table H-8). Zinc is retained as a COPC.

Organic Chemicals

A total of 141 samples (79 soil, 50 tuff, and 12 sediment) were analyzed for explosive compounds. Four samples (two soil, one tuff, and one sediment) were analyzed for dioxins/furans and PCBs. Table 6.5-3 presents the detected organic chemicals. Plate 8 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at SWMU 15-004(f) include 2-amino-4,6-dinitrotoluene; 3,5-dinitroaniline; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; and tris(o-cresyl)phosphate. All detected organic chemicals are retained as COPCs.

Radionuclides

Eighteen soil samples were analyzed for gamma-emitting radionuclides. A total of 141 samples (79 soil, 50 tuff, and 12 sediment) were analyzed for isotopic uranium. Table 6.5-4 presents the radionuclides detected or detected above BVs/FVs. Plate 9 shows the spatial distribution of radionuclides detected or detected above BVs/FVs.

Cesium-137 was detected in one sample at a depth below 0.0−1.0 ft at an activity of 0.13 pCi/g. Cesium-137 is retained as a COPC.

Uranium-234 was detected above the soil, Qbt 2,3,4, and sediment BVs (2.59 pCi/g, 1.98 pCi/g, and 2.59 pCi/g) in 60 soil samples, 8 tuff samples, and 8 sediment samples with a maximum activity of 523 pCi/g. Uranium-234 is retained as a COPC.

Uranium-235/236 was detected above the soil, Qbt 2,3,4, and sediment BVs (0.2 pCi/g, 0.09 pCi/g, and 0.2 pCi/g) in 55 soil samples, 11 tuff samples, and 6 sediment samples with a maximum activity of 73 pCi/g. Uranium-235/236 is retained as a COPC.

Uranium-238 was detected above the soil, Qbt 2,3,4, and sediment BVs (2.29 pCi/g, 1.93 pCi/g, and 2.29 pCi/g) in 63 soil samples, 13 tuff samples, and 9 sediment samples with a maximum activity of 3140 pCi/g. Uranium-238 is retained as a COPC.

6.5.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 15-004(f) are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMU 15-004(f) include aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, uranium, and zinc.

Aluminum was detected above the soil and Qbt 2,3,4 BVs in one soil sample and six tuff samples with a maximum concentration of 30,700 mg/kg. Only one depth was sampled at location 15-02123. The residential SSL was approximately 7 times (the detected concentration is 66,400 mg/kg below the residential SSL) and the industrial SSL was approximately 111 times the concentration. Aluminum concentrations decreased with depth at locations 15-02114, 15-02137, 15-02150, 15-02156, 15-613376, and 15-613379 (concentrations in the shallower samples at locations 15-02114, 15-02150, 15-02156, and 15-613379 [15,500 mg/kg, 13,000 mg/kg, 12,000 mg/kg, and 17,900 mg/kg respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Aluminum concentrations decreased downgradient. The lateral extent of aluminum is defined, and further sampling for vertical extent is not warranted.

Antimony was detected above the soil and Qbt 2,3,4 BVs in 9 soil samples and 3 tuff samples with a maximum concentration of 17.5 mg/kg and had DLs (0.51 mg/kg to 4.3 mg/kg) above the BVs in 45 samples. Concentrations decreased with depth at all locations and decreased downgradient. The residential SSL was approximately 7 times and the industrial SSL was approximately 121 times the maximum DL. Further sampling of extent of antimony is not warranted.

Arsenic was detected above the Qbt 2,3,4 BV in seven samples with a maximum concentration of 4.4 mg/kg. Single-depth samples were collected at locations 15-02123 and 15-02125. Concentrations were below the maximum Qbt 2,3,4 background concentration (5 mg/kg). Arsenic concentrations decreased with depth at locations 15-613365 and 15-613376 and did not change substantially with depth at locations 15-02114, 15-02150, and 15-613379 (0.1 mg/kg to 0.3 mg/kg) (concentrations in the shallower samples were 3.6 mg/kg, 3.8 mg/kg, and 3.6 mg/kg [Appendix F, Inorganic Chemicals Table]). Arsenic concentrations decreased downgradient. All concentrations were below the maximum Qbt 2,3,4 background concentration. The lateral extent of arsenic is defined, and further sampling for vertical extent is not warranted.

Barium was detected above the soil, Qbt 2,3,4, and sediment BVs in 28 soil samples, 24 tuff samples, and 5 sediment samples with a maximum concentration of 857 mg/kg. Single-depth samples were collected at locations 15-02119, 15-02123, 15-02125, 15-02152, 15-02167, 15-02173, 15-02179, 15-02180, and 15-02182. The residential SSL was approximately 40 times the maximum concentration at these locations. Locations 15-02182 and 15-02299 are collocated, with location 15-02299 having a deeper sample collected from 3.0−4.0 ft and barium was not detected above BV. Barium concentrations decreased with depth at locations 15-02113, 15-02137, 15-02148, 15-02150, 15-02156, 15-02162, 15-02171, 15-02172, 15-02295, 15-02299, 15-613365, 15-613366, 15-613368, 15-613369, 15-613371, 15-613372, 15-613375, 15-613376, 15-613377, 15-613379, 15-613381, 15-613382, 15-613386, and 15-613387 (concentrations in the shallower samples at locations 15-02113, 15-02148, 15-02150, 15-02156, 15-02162, 15-02172, 15-02295, and 15-613379 [170 mg/kg, 227 mg/kg, 204 mg/kg, 207 mg/kg, 196 mg/kg, 159 mg/kg, 168 mg/kg, and 202 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations increased with depth at locations 15-02114, 15-613367, 15-613370, 15-613373, 15-613374, 15-613380, and 15-613389. Concentrations were below the maximum soil background concentration (410 mg/kg) at locations 15-613367 and 15-613373; were equivalent to the maximum Qbt 2,3,4 background concentration (51.6 mg/kg) at location 15-02167; and did not change substantially with depth at location 15-613388 (1 mg/kg). The residential SSL was approximately 18 times and the industrial SSL was approximately 298 times the maximum concentration.

Concentrations decreased downgradient. The lateral extent of barium is defined, and further sampling for vertical extent is not warranted.

Beryllium was detected above the soil, Qbt 2,3,4, and sediment BVs in 10 soil samples, 2 tuff samples, and 1 sediment sample with a maximum concentration of 42.1 mg/kg. A single-depth sample was collected at location 15-02246 and the concentration was less than the maximum soil background concentration (3.95 mg/kg). Beryllium concentrations decreased with depth at locations 15-613365, 15-613367, 15-613368, 15-613371, 15-613376, 15-613379, 15-613380, and 15-613381 and decreased downgradient. The concentrations at location 15-613389 did not change substantially with depth (0.6 mg/kg). The residential SSL was approximately 82 times and the industrial SSL was approximately 1358 times the maximum concentration at this location. The lateral extent of beryllium is defined, and further sampling for vertical extent is not warranted.

Cadmium was detected above the soil and sediment BVs in 32 soil samples and 1 sediment sample with a maximum concentration of 44.9 mg/kg and had DLs (0.43 mg/kg to 1 mg/kg) above the soil BV in 14 samples. Cadmium concentrations decreased with depth at locations 15-02114, 15-02277, 15-02279, 15-613365, 15-613367, 15-613368, 15-613369, 15-613371, 15-613376, 15-613379, 15-613381, and 15-613382. Cadmium concentrations did not change substantially with depth (approximately 1 mg/kg or less) and were below the maximum soil background concentration (2.6 mg/kg) at locations 15-613366, 15-613372, 15-613373, 15-613375, 15-613377, and 15-613380. A deeper sample was collected from 3.0−4.0 ft at location 15-02299, which is collocated with location 15-02182, and cadmium was not detected above BV. Concentrations increased with depth at locations 15-613370 and 15-613374. The residential SSL was approximately 1.6 times and the industrial SSL was approximately 25 times the maximum concentration. Cadmium concentrations decreased downgradient. The lateral extent of cadmium is defined, and further sampling for vertical extent is not warranted.

Calcium was detected above the soil and Qbt 2,3,4 BVs in 7 soil samples and 12 tuff samples with a maximum concentration of 13,300 mg/kg. Single-depth samples were collected from tuff at locations 15-02123 (2720 mg/kg), 15-02152 (8860 mg/kg), 15-02179 (6640 mg/kg), and 15-02180 (13,300 mg/kg). The NMED residential essential nutrient SSL was approximately 1000 times the maximum concentration at these locations. Calcium concentrations decreased with depth at locations 15-02137, 15-02162, 15-613368, 15-613376, 15-613379, and 15-613382 (concentrations in the shallower samples at locations 15-02162 and 15-613379 [3910 mg/kg and 5130 mg/kg, respectively] were below the soil BV (Appendix F, Inorganic Chemicals Table]). Calcium concentrations were below the maximum soil background concentration (14,000 mg/kg) at locations 15-02101, 15-02157, 15-02240, and 15-613367. Concentrations increased with depth at locations 15-02113, 15-02148, 15-02150, 15-02156, and 15-02295. The NMED residential essential nutrient SSL was approximately 1780 times the maximum concentration at these locations. Concentrations decreased downgradient. The lateral extent of calcium is defined, and further sampling for vertical extent is not warranted.

Chromium was detected above the soil and Qbt 2,3,4 BVs in 6 soil samples and 22 tuff samples with a maximum concentration of 35.5 mg/kg. Single-depth samples were collected at locations 15-02152 (14.7 mg/kg) and 15-02177 (21.8 mg/kg). As discussed in section 4.2, there was no known use of hexavalent chromium at this site, and no site conditions would have produced hexavalent chromium. Therefore, the total chromium results represent trivalent chromium concentrations. The trivalent residential SSL was approximately 5367 times and 7959 times these concentrations. Chromium concentrations decreased with depth at locations 15-02137, 15-02198, 15-02295, 15-02203, 15-02295, 15-613365, 15-613376, and 15-613379 (concentrations in the shallower samples at locations 15-02137, 15-02203, 15-02295, and 15-613379 [13.7 mg/kg, 11.3 mg/kg, 9.3 mg/kg, and 11.4 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Chromium concentrations were detected below the maximum soil background concentration (36.5 mg/kg) at locations 15-02231,

15-613370, 15-613377, and 15-613380 and below the maximum Qbt 2,3,4 background concentration (13 mg/kg) at locations 15-02123, 15-02125, 15-02150, 15-02173, 15-02180, 15-02191, and 15-02226. Concentrations increased with depth at locations 15-02114, 15-02156, 15-02166, 15-02206, and 15-02279. The trivalent chromium residential SSL was 3295 times the maximum concentration at these locations. Chromium concentrations decreased downgradient. The lateral extent of chromium is defined, and further sampling for vertical extent is not warranted.

Cobalt was detected above the soil, Qbt 2,3,4, and sediment BVs in 14 soil samples, 4 tuff samples, and 3 sediment samples with a maximum concentration of 16.8 mg/kg and had a DL (11.1 mg/kg) above the soil BV in 1 sample. The DL decreased to below the BV in the deeper sample at this location (15-02137). A single-depth sample was collected at location 15-02123 with a concentration of 3.2 mg/kg, which was only 0.06 mg/kg above the Qbt 2,3,4 BV. Cobalt concentrations decreased with depth at locations 15-02114, 15-02162, 15-613372, 15-613376, 15-613380, 15-613382, and 15-613387 (the concentration in the shallower sample at location 15-02114 [8.6 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]). Cobalt concentrations were below the maximum soil background concentration (9.5 mg/kg) at locations 15-613366 and 15-613370 and did not change substantially with depth (1.6 mg/kg to 3.5 mg/kg) at locations 15-613365, 15-613366, 15-613370, 15-613377, and 15-613381. Concentrations increased with depth at location 15-613369. The residential SSL was approximately 1.3 times and the industrial SSL was approximately 21 times the maximum concentration. Cobalt concentrations decreased downgradient. The lateral extent of cobalt is defined, and further sampling for vertical extent is not warranted.

Copper was detected above the soil, Qbt 2,3,4, and sediment BVs in 54 soil samples, 15 tuff samples, and 7 sediment samples with a maximum concentration of 108,000 mg/kg. Copper concentrations were below the maximum Qbt 2,3,4 background concentration (6.2 mg/kg) in single-depth samples at locations 15-02123 and 15-02228. Copper concentrations decreased with depth at locations 15-02112, 15-02113, 15-02114, 15-02150, 15-02156, 15-02166, 15-02171, 15-02229, 15-02240, 15-02246 (collocated with 15-613377), 15-02277, 15-02779, 15-02295, 15-613365, 15-613367, 15-613368, 15-613369, 15-613370, 15-613371, 15-613375, 15-613376, 15-613377, 15-613378, 15-613379, 15-613381, 15-613382, 15-613386, 15-613387, 15-613388, and 15-613389. Concentrations increased with depth at locations 15-613366, 15-613372, 15-613373, 15-613374, 15-613380, and 15-613384. The residential SSL was approximately 12.3 times and the industrial SSL was approximately 204 times the maximum concentration at locations 15-613372, 15-613373, 15-613380, and 15-613384. The residential SSL was exceeded by the maximum concentrations at locations 15-613366 and 15-613374, and the industrial SSL was approximately 4 times the maximum concentrations at these locations. Copper concentrations decreased downgradient in Potrillo Canyon. Copper was detected above the sediment BV at 14.4 mg/kg at location 15-613384 at the head of Potrillo Canyon and was detected at 52 mg/kg in sediment in the nearest downgradient reach in Potrillo Canyon (Reach PO-1). However, copper concentrations decreased in Reach PO-3 from Potrillo Canyon Reach PO-2 (LANL 2011, 201580.14, Table 6.2-1). The lateral extent of copper is defined, but vertical extent is not defined at locations 15-613366 and 15-613374.

Iron was detected above the soil and Qbt 2,3,4 BVs in one soil sample and two tuff samples with a maximum concentration of 22,200 mg/kg. Iron concentrations decreased with depth at location 15-02150 (the concentration in the shallower sample at location 15-02150 [16,200 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]) and at location 15-02162. Concentrations were below the maximum Qbt 2,3,4 background concentration (19,500 mg/kg) at locations 15-02123 and 15-02150 and decreased downgradient. The lateral extent of iron is defined, and further sampling for vertical extent is not warranted.

Lead was detected above the soil and Qbt 2,3,4 BVs in 32 soil samples and 4 tuff samples with a maximum concentration of 375 mg/kg. Lead concentrations decreased with depth at locations 15-02112, 15-02114, 15-02162, 15-02198, 15-02277, 15-02279, 15-613366, 15-613367, 15-613368, 15-613371, 15-613372, 15-613375, 15-613376, 15-613379, 15-613381, and 15-613382 (the concentration in the shallower sample at location 15-02114 [15.2 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]) and did not substantially change with depth at location 15-613369 (0.8 mg/kg). Lead concentrations were below the maximum soil background concentration (28 mg/kg) at location 15-02246 and below the maximum Qbt 2,3,4 background concentration (15.5 mg/kg) at location 15-02123. Concentrations increased with depth at locations 15-613370, 15-613373, 15-613374, 15-613377, and 15-613380. The maximum concentration at these locations was 112 mg/kg. The residential SSL was approximately 4 times to 10 times and the industrial SSL was approximately 7 times to 20 times the maximum concentrations at these locations (the maximum concentration at these locations was approximately 300 mg/kg and 700 mg/kg below the SSLs). Lead concentrations decreased downgradient. The lateral extent of lead is defined, and further sampling for vertical extent is not warranted.

Magnesium was detected above the Qbt 2,3,4 BV in nine samples with a maximum concentration of 2450 mg/kg. Magnesium concentrations decreased with depth at locations 15-02156, 15-613365, 15-613376, and 15-613379 (the concentrations in the shallower samples at locations 15-02156 and 15-613379 [2250 mg/kg and 2640 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]) and did not substantially change with depth at location 15-02114 (10 mg/kg). Concentrations were below the maximum soil background concentration (2820 mg/kg) at locations 15-02119, 15-02123, 15-02150, and 15-02167. The NMED residential essential nutrient SSL was approximately 139 times the maximum concentration. Concentrations decreased downgradient. The lateral extent of magnesium is defined, and further sampling for vertical extent is not warranted.

Manganese was detected above the soil BV in three samples with a maximum concentration of 893 mg/kg. Manganese concentrations decreased with depth at location 15-02162 and were below the maximum soil background concentration (1100 mg/kg) at all locations. The residential SSL was approximately 12 times, and the industrial SSL was approximately 180 times the maximum concentration. Manganese concentrations decreased downgradient. The lateral extent of manganese is defined, and further sampling for vertical extent is not warranted.

Mercury was detected above soil and Qbt 2,3,4 BVs in 13 soil samples and 2 tuff samples with a maximum concentration of 2.3 mg/kg and had DLs (0.11 mg/kg) above the soil BV in 5 samples. The DLs were only 0.01 mg/kg above the BV, and the residential SSL was approximately 214 times the DLs. Single-depth samples were collected at locations 15-02170, 15-02180, 15-02182, and 15-02241. The residential SSL was approximately 32 times and the industrial SSL was approximately 540 times the maximum concentration at these single-depth locations. Locations 15-02182 and 15-02299 are collocated, with the deeper sample collected from 3.0−4.0 ft at location 15-02299 in which mercury was not detected above BV. Mercury concentrations decreased with depth at locations 15-02112, 15-02113, 15-02114, 15-02137, 15-02153, 15-02171, 15-02178, 15-02206, 15-02240, and 15-613375 and decreased downgradient. The lateral extent of mercury is defined, and further sampling for vertical extent is not warranted.

Nickel was detected above soil and Qbt 2,3,4 BVs in 8 soil samples and 20 tuff samples with a maximum concentration of 27.5 mg/kg. Single-depth samples were collected at locations 15-02123, 15-02125, 15-02152, 15-02167, 15-02173, 15-02177, and 15-02180. The residential SSL was approximately 143 times the maximum concentration at these locations. Nickel concentrations decreased with depth at locations 15-02137, 15-02148, 15-02295, 15-613365, 15-613367, 15-613371, and 15-613376 (concentration in the shallower samples at location 15-02148 [10.4 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]). Nickel concentrations did not change with depth at location

15-02114 and did not change substantially with depth at locations 15-02150 (0.4 mg/kg), 15-613379 (0.5 mg/kg), and 15-613380 (0.3 mg/kg). Concentrations were below the maximum soil background concentration (29 mg/kg) at locations 15-613370, 15-613377, and 15-613380. Concentrations increased with depth at locations 15-02156, 15-02166, and 15-02206. The residential SSL was approximately 83 times and the industrial SSL was approximately 1370 times the maximum concentration at these locations. Nickel concentrations decreased downgradient. The lateral extent of nickel is defined, and further sampling for vertical extent is not warranted.

Selenium was detected above the soil, Qbt 2,3,4, and sediment BVs in 38 soil samples, 50 tuff samples, and 12 sediment samples with a maximum concentration of 4.2 mg/kg. Concentrations detected above the BVs varied by less than 4 mg/kg across the site, and the largest change with depth was less than 4 mg/kg. The residential SSL was approximately 93 times and the industrial SSL was approximately 1545 times the maximum concentration. Selenium concentrations decreased downgradient. The lateral extent of selenium is defined, and further sampling for vertical extent is not warranted.

Silver was detected above the soil and Qbt 2,3,4 BVs in seven soil samples and one tuff sample with a maximum concentration of 25.5 mg/kg. Silver concentrations decreased with depth at all locations and decreased downgradient. The lateral and vertical extent of silver are defined.

Uranium was detected above the soil BV in 18 samples with a maximum concentration of 2763 mg/kg. Only the shallower samples at 18 locations were analyzed for total uranium, and deeper samples collected in 2011 were analyzed for isotopic uranium only. As summarized below for isotopic uranium, the lateral extent is defined and vertical extent is not defined for 5 locations. The residential SSL was exceeded by the maximum concentration and the industrial SSL was approximately 1.4 times the maximum concentration. Further sampling for vertical extent of isotopic uranium is warranted.

Zinc was detected above the soil and sediment BVs in 24 soil samples and 1 sediment sample with a maximum concentration of 716 mg/kg. Zinc concentrations decreased with depth at locations 15-02246 (collocated with 15-613377), 15-613365, 15-613367, 15-613368, 15-613369, 15-613371, 15-613372, 15-613376, 15-613379, 15-613381, and 15-613382. Zinc concentrations were below the maximum soil background concentration (75.5 mg/kg) at locations 15-613366 and 15-613373. Concentrations increased with depth at locations 15-613370, 15-613374, 15-613380, and 15-613389. The residential SSL was approximately 67 times and the industrial SSL was approximately 1115 times the maximum concentration at these locations. Zinc concentrations decreased downgradient. The lateral extent of zinc is defined, and further sampling for vertical extent is not warranted.

Organic Chemicals

Organic COPCs at SWMU 15-004(f) include 2-amino-4,6-dinitrotoluene; 3,5-dinitroaniline; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; and tris(o-cresyl)phosphate.

Amino-4,6-dinitrotoluene[2-]; 3,5-dinitroaniline; 2,4-dinitrotoluene; and 2,6-dinitrotoluene were detected in one or two samples with maximum concentrations of 0.0072 mg/kg, 0.0048 mg/kg, 0.004 mg/kg, and 0.0064 mg/kg, respectively. Concentrations decreased with depth, were below the EQLs, and decreased downgradient. The lateral and vertical extent of 2-amino-4,6-dinitrotoluene; 3,5-dinitroaniline; 2,4-dinitrotoluene; and 2,6-dinitrotoluene are defined.

Four dioxin/furan congeners were detected in one to four samples. Concentrations were below the EQLs, except at location 15-613381. The residential SSL was approximately 374 times the maximum TCDD-equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Tris(o-cresyl)phosphate was detected in two samples with a maximum concentration of 0.064 mg/kg. Concentrations did not change substantially with depth (0.039 mg/kg) and decreased downgradient. The EPA residential SSL for tricresylphosphate, of which tris(o-cresyl)phosphate is an isomer, was approximately 91,000 times the maximum concentration. The lateral extent of tris(o-cresyl)phosphate is defined, and further sampling for vertical extent is not warranted.

Radionuclides

Radionuclide COPCs at SWMU 15-004(f) include cesium-137, uranium-234, uranium-235/236, and uranium-238.

Cesium-137 was detected in two samples at depths below 1.0 ft bgs with a maximum activity of 0.13 pCi/g. Only one depth was sampled at location 15-02182. Locations 15-02182 and 15-02299 are collocated, and a deeper sample was collected from 3.0−4.0 ft at location 15-02299. Activities decreased with depth at location 15-02299. Cesium-137 activities decreased downgradient in Potrillo Canyon Reach PO-1 (LANL 2011, 201580.14, Table 6.2-3). The lateral extent of cesium-137 is defined, and further sampling for vertical extent is not warranted.

Uranium-234 was detected above the soil, Qbt 2,3,4, and sediment BVs in 60 soil samples, 8 tuff samples, and 8 sediment samples with a maximum activity of 523 pCi/g. Uranium-234 activities decreased with depth at locations 15-02113, 15-02124, 15-02132, 15-02136, 15-02142, 15-02145, 15-02148, 15-02150, 15-02156, 15-02162, 15-02171, 15-02203, 15-02229, 15-02279, 15-613365, 15-613367, 15-613368, 15-613369, 15-613371, 15-613373, 15-613375, 15-613376, 15-613377, 15-613378, 15-613379, 15-613381, 15-613382, 15-613387, and 15-613388 and did not change substantially with depth at locations 15-613366, 15-613372, 15-613384, and 15-613389 (1.7 pCi/g, 4.5 pCi/g, 1.77 pCi/g and 2 pCi/g, respectively). Uranium-234 activities increased with depth at locations 15-613370, 15-613374, 15-613380, and 15-613386. The residential SAL was exceeded at location 15-613370 and was approximately 1.2 times to 4 times and the industrial SAL was approximately 14 times to 44 times the maximum activities at the other 3 locations. Uranium-234 activities decreased downgradient. Uranium-234 was detected slightly above the sediment BV (0.43 pCi/g) at the head of Potrillo Canyon (location 15-613384) and was detected at 44.3 pCi/g in sediment in the nearest downgradient reach in Potrillo Canyon (Reach PO-1). However, uranium-234 activities decreased to below BV in Reach PO-3 (LANL 2011, 201580.14, Table 6.2-3). The lateral extent of uranium-234 is defined, and further sampling for vertical extent is warranted at location 15-613370.

Uranium-235/236 was detected above the soil, Qbt 2,3,4, and sediment BVs in 55 soil samples, 11 tuff samples, and 6 sediment samples with a maximum activity of 73 pCi/g. Uranium-235/236 activities decreased with depth at locations 15-02113, 15-02124, 15-02132, 15-02136, 15-02142, 15-02145, 15-02148, 15-02150, 15-02156, 15-02162, 15-02171, 15-02203, 15-02229, 15-02279, 15-613365, 15-613367, 15-613368, 15-613369, 15-613371, 15-613375, 15-613376, 15-613377, 15-613378, 15-613379, 15-613381, 15-613382, and 15-613388. Only one depth was sampled at locations 15-02149 and 15-02152, but the activities were only 0.019 pCi/g and 0.02 pCi/g, respectively, above the Qbt 2,3,4 BV. Uranium-235/236 activities did not substantially change with depth at locations 15-613366, 15-613372, 15-613373, and 15-613389 (0.34 pCi/g, 0.13 pCi/g, 0.69 pCi/g, and 0.14 pCi/g). Uranium-235/236 activities increased with depth at locations 15-613370, 15-613374, 15-613380, and 15-613386. The increases with depth were approximately 2 pCi/g to 6 pCi/g at locations 15-613374, 15-613380, and 15-613386. The only substantial increase was at location 15-613370 (17.6 pCi/g). The residential SAL

was approximately 1.8 times and the industrial SAL was approximately 7 times the maximum activity at this location. Uranium-235/236 activities decreased downgradient. The lateral extent is defined, and further sampling for vertical extent is warranted at location 15-613370.

Uranium-238 was detected above the soil, Qbt 2,3,4, and sediment BVs in 63 soil samples, 13 tuff samples, and 9 sediment samples with a maximum activity of 3140 pCi/g. Uranium-238 activities decreased with depth at locations 15-02113, 15-02124, 15-02132, 15-02136, 15-02142, 15-02145, 15-02148, 15-02150, 15-02156, 15-02162, 15-02171, 15-02203, 15-02229, 15-02279, 15-613365, 15-613366, 15-613367, 15-613368, 15-613369, 15-613371, 15-613373, 15-613375, 15-613376, 15-613377, 15-613378, 15-613379, 15-613381, 15-613382, 15-613387, and 15-613388. Only one depth was sampled and analyzed for isotopic uranium at locations 15-02149, 15-02152, 15-02228, and 15-02240, but the activities were only approximately 1 pCi/g above the Qbt 2,3,4 BV. Uranium-238 activities did not substantially change with depth at locations 15-613372 and 15-613384 (2.1 pCi/g and 0.19 pCi/g). Uranium-238 activities increased with depth at locations 15-613370, 15-613374, 15-613380, 15-613386, and 15-613389. The residential SAL was exceeded at 4 of the 5 locations, and the industrial SAL was approximately 1.9 to 4.4 times the activities at the 5 locations. Uranium-238 activities decreased downgradient. Uranium-238 was detected slightly above the sediment BV (approximately 1.1 pCi/g) at location 15-613384 at the head of Potrillo Canyon and was detected at 57.4 pCi/g in the nearest downgradient reach in Potrillo Canyon (Reach PO-1) (LANL 2011, 201580.14, Table 6.2-3). However, uranium-238 activities decreased to below BV in Reach PO-3 from upgradient Potrillo Canyon Reach PO-2 (LANL 2011, 201580.14, Table 6.2-3). The lateral extent of uranium-238 is defined, and further sampling for vertical extent is warranted at locations 15-613370, 15-613374, 15-613380, 15-613386, and 15-613389.

6.5.5 Summary of Human Health Risk Screening

Based on preliminary analyses, the data indicate that Firing Point E contains the majority of contamination at SWMU 15-004(f) and are the primary drivers for risk at the site. To confirm these findings, several analyses, discussed below, were performed: (1) the entire site for SWMU 15-004(f); (2) SWMU 15-004(f) without Firing Point E; and (3) SWMU 15-004(f) with only Firing Point E.

SWMU 15-004(f), Entire Site

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 19 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Construction Worker Scenario

The construction worker HI is 5, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from uranium and manganese. No carcinogenic COPCs were identified for the construction worker scenario. The total dose is 15 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Residential Scenario

The total excess cancer risk for the residential scenario is 9×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 6, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from copper and uranium. The total dose is 41 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from isotopic uranium (uranium-234, uranium-235/236, and uranium-238).

SWMU 15-004(f), Excluding Firing Point E

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.1, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 4 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese. The total dose is 2 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Residential Scenario

The total excess cancer risk for the residential scenario is 7×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.9, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 7 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

SWMU 15-004(f), Firing Point E Only

Industrial Scenario

The total excess cancer risk for the industrial scenario is the NMED target risk level of 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is approximately 1, which is equivalent to the NMED target HI of 1 (NMED 2015, 600575). The total dose is 41 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 13, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese and uranium. The total dose is 29 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238.

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-5} which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 17, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from copper and uranium. The total dose is 79 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238.

Summary of Additional Analyses

The results of the risk/dose assessments indicated that Firing Point E contains most of contamination at SWMU 15-004(f) and is the primary area for risk and/or dose at the site. The industrial risk/dose for the entire SWMU is below target levels, but the dose exceeds the 25 mrem/yr target at Firing Point E. The construction worker risk for the entire SWMU exceeds the HI and does not exceed the dose target level. The construction worker HI is primarily confined to Firing Point E, with minimal potential risk in the remaining SWMU. The residential risk/dose for the entire SWMU exceeds the HI and dose target levels, but the potential unacceptable risk and dose are confined to Firing Point E.

No potential unacceptable cancer risks exist for the industrial, construction worker, or residential scenarios at SWMU 15-004(f) for the site as a whole. However, potential unacceptable noncancer risk exists from uranium and manganese under the construction worker scenario, unacceptable noncancer risk from copper and uranium under the residential scenario, and potential unacceptable dose from isotopic uranium under the residential scenario. For the site without Firing Point E, minimal potential unacceptable noncancer risk exists from manganese under the construction worker scenario. For Firing Point E only, potential unacceptable noncancer risk under the construction worker scenario from manganese and uranium, unacceptable noncancer risk exists from copper and uranium under the residential scenario, and unacceptable dose from isotopic uranium under all three scenarios.

6.5.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, potential ecological risks exist at SWMU 15-004(f) for the robin (herbivore, insectivore, omnivore) from copper and lead; and for the deer mouse, montane shrew, and plant from copper and uranium.

The results of the risk-screening assessments indicate that Firing Point E contains the majority of contamination at SWMU 15-004(f). The inorganic chemicals of potential ecological concern (COPECs) for SWMU 15-004(f) and Firing Point E overlap completely, and uranium-234 is the only additional COPEC at Firing Pont E. The HIs for Firing Point E are the highest, with all receptors having HIs above 1, while the SWMU without Firing Point E has the lowest His, with the red fox, desert cottontail, and kestrel (top carnivore) having HIs equivalent to or less than 1. However, both parts of the SWMU (with and without Firing Point E) present potential ecological risks to several receptors.

6.6 SWMU 15-008(a), Two Surface Disposal Areas at E-F Firing Site

6.6.1 Site Description and Operational History

SWMU 15-008(a) consists of two small surface disposal areas located on the edge of Potrillo Canyon, one south and one east of E-F Firing Site [SWMU 15-004(f)], at TA-15 (Figure 6.6-1). The disposal areas are located within approximately 350 ft of each other, with each disposal area having dimensions of

approximately 8 ft in diameter × 2 ft high. Both areas were used to dispose of debris from tests conducted at the E-F Firing Site, including soil, rock, pebbles, metal fragments, plastic, electrical cable, and electrical accessories. The exact period of operation of the surface disposal areas is not known but probably falls within the period of operation for E-F Firing Site (1946 to 1981) (LANL 1993, 020946, p. 7-20). All debris was removed from both surface disposal areas during the 2010 investigation.

6.6.2 Relationship to Other SWMUs and AOCs

SWMU 15-008(a) is located south of the three inactive firing points (D, E, and F) of SWMU 15-004(f) and northwest of AOCs 15-008(f) and 36-004(e). Together SWMUs 15-004(f) and 15-008(a) comprise Consolidated Unit 15-004(f)-99.

6.6.3 Summary of Previous Investigations

An aerial radiological survey conducted in 1982 identified no areas of elevated levels of radioactivity at SWMU 15-008(a) (LANL 1993, 020946, p. 7-3).

During the 1994 Phase I RFI conducted at SWMU 15-008(a), three surface samples (0.0–0.5 ft bgs) were collected from each of the two debris piles and four surface samples (0.0–0.5 ft bgs) were collected from nearby drainages (LANL 1995, 050294, pp. 4-23–4-57). The samples were field-screened for radioactivity, metals, and HE and submitted for analysis of radionuclides and TAL metals (LANL 1995, 050294, pp. 4-23–4-57). All decision-level analytical data collected during previous investigations are presented and evaluated in section 6.6.4.4. Table 6.6-1 presents the samples collected and analyses requested at SWMU 15-008(a).

6.6.4 Site Contamination

6.6.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- All samples were field-screened for organic vapors; gross-alpha, -beta, and -gamma radioactivity; and explosive compounds (TNT and RDX). Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.
- Following the removal of the two surface debris piles, eight samples were collected from four locations (two locations at each debris pile) from 0.0–1.0 ft and 1.0–2.0 ft bgs (see deviations in Appendix B).
- A total of 16 samples were collected from 8 locations around the surface debris removal boundaries from 2 depths (0.0–1.0 ft bgs and 1.0–2.0 ft, 2.0–3.0 ft, or 3.0–4.0 ft bgs) (see deviations in Appendix B).
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, PCBs, and isotopic uranium. Two of the 24 samples (1 at each of the debris piles) were also analyzed for dioxins/furans. The sampling locations for the dioxin/furan and PCB analyses were selected based on their proximity to the potential contaminant source.

Sampling locations with decision-level data at SWMU 15-008(a) are shown in Figure 6.6-1. Table 6.6-1 presents the samples collected and analyses requested for SWMU 15-008(a). The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.6.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at SWMU 15-008(a), a maximum concentration of 3 ppm was detected at location 15-613413 from 0.0–1.0 ft bgs. Samples RE15-11-824 and RE15-11-825 collected at location 15-613407 from 0.0–1.0 ft and 1.0–2.0 ft bgs, respectively, exceeded the gross-alpha, -beta, and -gamma screening threshold. Detected gross-alpha and gross-beta/gamma levels for sample RE15-11-824 were 2460 dpm and 16,660 dpm, respectively. Detected gross-alpha and gross-beta/-gamma levels for RE15-11-825 were 174 dpm and 10,610 dpm, respectively. None of the remaining radiological-screening results exceeded twice the maximum site background levels. No screening results for explosive compounds exceeded industrial SSLs. The field-screening results are presented in Table 3.2-2 and Appendix B, Table B-3.0-1. No changes to sampling or other activities occurred because of the field-screening results.

6.6.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 15-008(a) consisted of results from 25 samples (13 soil and 12 tuff) collected from 13 locations.

Inorganic Chemicals

Twenty-five samples (13 soil and 12 tuff) were analyzed for TAL metals. Twenty-four samples (12 soil and 12 tuff) were analyzed for cyanide, nitrate, and perchlorate. One soil sample was analyzed for uranium. Table 6.6-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Plate 7 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Aluminum was detected above the Qbt 2,3,4 BV (7340 mg/kg) in four samples with a maximum concentration of 15,100 mg/kg. The Gehan and slippage tests indicated site concentrations of aluminum in tuff are statistically different from background (Figure H-75 and Table H-9). Aluminum is retained as a COPC.

Antimony was detected above soil and Qbt 2,3,4 BVs (0.83 mg/kg and 0.5 mg/kg) in four soil samples and one tuff sample with a maximum concentration of 2.5 mg/kg and had DLs (0.81 mg/kg to 3.8 mg/kg) above the BVs in three samples. Antimony is retained as a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in two samples with a maximum concentration of 3.6 mg/kg. The Gehan and quantile tests indicated site concentrations of arsenic in tuff are statistically different from background (Figure H-76 and Table H-9). Arsenic is retained as a COPC.

Barium was detected above the soil and Qbt 2,3,4 BVs (295 mg/kg and 46 mg/kg) in three soil samples and six tuff samples with a maximum concentration of 834 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in soil are not statistically different from background (Figure H-77 and Table H-10). The Gehan and quantile tests indicated site concentrations of barium in tuff are statistically different from background (Figure H-78 and Table H-9). Barium is retained as a COPC.

Beryllium was detected above the soil and Qbt 2,3,4 BVs (1.83 mg/kg and 1.21 mg/kg) in two soil samples and two tuff samples with a maximum concentration of 2.9 mg/kg. The Gehan and quantile tests indicated site concentrations of beryllium in soil are not statistically different from background (Figure H-79 and Table H-10). The Gehan and quantile tests indicated site concentrations of beryllium in tuff are not statistically different from background (Figure H-80 and Table H-9). Beryllium is not a COPC.

Cadmium was detected above the soil BV (0.4 mg/kg) in 6 samples with a maximum concentration of 1.1 mg/kg and had a DL (0.59 mg/kg) above the BV in 1 sample. The detected concentrations were 0.02 mg/kg to 0.7 mg/kg above the BV, below the highest background DL (2 mg/kg), and below or similar to the 2 or 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). The DL was only 0.19 mg/kg above the BV, below the highest background DL (2 mg/kg), and below or similar to the 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). Cadmium was detected below the BVs in the other 18 samples. Cadmium is not a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in four samples with a maximum concentration of 2980 mg/kg. The Gehan and slippage tests indicated site concentrations of calcium in tuff are statistically different from background (Figure H-81 and Table H-9). Calcium is retained as a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in six samples with a maximum concentration of 18 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in tuff are statistically different from background (Figure H-82 and Table H-9). Chromium is retained as a COPC.

Cobalt was detected above the Qbt 2,3,4 BV (3.14 mg/kg) in four samples with a maximum concentration of 4.5 mg/kg. The quantile and slippage tests indicated site concentrations of cobalt in tuff are not statistically different from background (Figure H-83 and Table H-9). Cobalt is not a COPC.

Copper was detected above the soil and Qbt 2,3,4 BVs (14.7 mg/kg and 4.66 mg/kg) in nine soil samples and seven tuff samples with a maximum concentration of 7720 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in soil and tuff are statistically different from background (Figures H-84 and H-85 and Tables H-9 and H-10). Copper is retained as a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.51 mg/kg to 0.57 mg/kg) above the BVs in 19 samples. The DLs were only 0.01 mg/kg to 0.07 mg/kg above the BVs and cyanide was not detected or detected below BVs in the other 6 samples (detected below BVs in 2 samples). Cyanide is not a COPC.

Iron was detected above the Qbt 2,3,4 BV (14,500 mg/kg) in one sample at a concentration of 15,800 mg/kg. The Gehan and quantile tests indicated site concentrations of iron in tuff are statistically different from background (Figure H-86 and Table H-9). Iron is retained as a COPC.

Lead was detected above the soil and Qbt 2,3,4 BVs (22.3 mg/kg and 11.2 mg/kg) in six soil samples and three tuff samples with a maximum concentration of 58.2 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are statistically different from background (Figure H-87 and Table H-10). The Gehan and slippage tests indicated site concentrations of lead in tuff are statistically different from background (Figure H-88 and Table H-9). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in two samples with a maximum concentration of 1980 mg/kg. The Gehan and quantile tests indicated site concentrations of magnesium in tuff are statistically different from background (Figure H-89 and Table H-9). Magnesium is retained as a COPC.

Mercury was detected above the soil and Qbt 2,3,4 BVs (0.1 mg/kg) in 10 soil samples and 11 tuff samples with a maximum concentration of 1.4 mg/kg. Mercury is retained as a COPC.

Nickel was detected above the soil and Qbt 2,3,4 BVs (15.4 mg/kg and 6.58 mg/kg) in one soil sample and five tuff samples with a maximum concentration of 57.3 mg/kg. The Gehan and quantile tests indicated site concentrations of nickel in soil are not statistically different from background (Figure H-90

and Table H-10). The quantile and slippage tests indicated site concentrations of nickel in tuff are statistically different from background (Figure H-91 and Table H-9). Nickel is retained as a COPC.

Nitrate was detected in 21 samples with a maximum concentration of 4.2 mg/kg. Nitrate is naturally occurring and the concentrations reflect naturally occuring levels of nitrate. Nitrate is not a COPC.

Perchlorate was detected in nine samples with a maximum concentration of 0.0049 mg/kg. Perchlorate is retained as a COPC.

Selenium was detected above the soil and Qbt 2,3,4 BVs (1.52 mg/kg and 0.3 mg/kg) in 2 soil samples and 12 tuff samples with a maximum concentration of 3 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure H-92 and Table H-10). Selenium is retained as a COPC.

Silver was detected above the Qbt 2,3,4 BV (1 mg/kg) in one sample at a concentration of 3.1 mg/kg. Silver is retained as a COPC.

Uranium was detected above the soil BV (1.82 mg/kg) in one sample with a maximum concentration of 2820 mg/kg. Uranium is retained as a COPC.

Vanadium was detected above the Qbt 2,3,4 BV (17 mg/kg) in two samples with a maximum concentration of 20.8 mg/kg. The Gehan and quantile tests indicated site concentrations of vanadium in tuff are statistically different from background (Figure H-93 and Table H-9). Vanadium is retained as a COPC.

Zinc was detected above the soil and Qbt 2,3,4 BVs (48.8 mg/kg and 63.5 mg/kg) in five soil samples and one tuff sample with a maximum concentration of 309 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are statistically different from background (Figure H-94 and Table H-10). The Gehan and quantile tests indicated site concentrations of zinc in tuff are not statistically different from background (Figure H-95 and Table H-9). Zinc is retained as a COPC.

Organic Chemicals

Twenty-four samples (12 soil and 12 tuff) were analyzed for explosive compounds, VOCs, SVOCs, and PCBs. Two of the 24 soil samples were also analyzed for dioxins/furans. Table 6.6-3 presents the detected organic chemicals. Plate 8 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at SWMU 15-008(a) include acenaphthene; acetone; benzoic acid; bis(2-ethylhexyl)phthalate; diethylphthalate; di-n-butylphthalate; di-n-octylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzodioxin; 1,2,3,6,7,8-hexachlorodibenzodioxin; 1,2,3,7,8,9-hexachlorodibenzodioxin; 4-isopropyltoluene; methylene chloride; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 1,2,3,7,8-pentachlorodibenzodioxin; and 2,3,7,8-tetrachlorodibenzodioxin. All detected organic chemicals are retained as COPCs.

Radionuclides

Twenty-four samples (12 soil and 12 tuff) were analyzed for isotopic uranium. One soil sample was analyzed for gamma-emitting radionuclides. Table 6.6-4 presents the radionuclides detected or detected above BVs/FVs. Plate 9 shows the spatial distribution of radionuclides detected or detected above BVs/FVs.

Uranium-234 was detected above the soil and Qbt 2,3,4 BVs (2.59 pCi/g and 1.95 pCi/g) in 10 soil samples and 7 tuff samples with a maximum activity of 492 pCi/g. Uranium-234 is retained as a COPC.

Uranium-235/236 was detected above the soil and Qbt 2,3,4 BVs (0.2 pCi/g and 0.09 pCi/g) in 10 soil samples and 7 tuff samples with a maximum activity of 26.5 pCi/g. Uranium-235/236 is retained as a COPC.

Uranium-238 was detected above the soil and Qbt 2,3,4 BVs (2.29 pCi/g and 1.93 pCi/g) in 10 soil samples and 7 tuff samples with a maximum activity of 681 pCi/g. Uranium-238 is retained as a COPC.

6.6.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 15-008(a) are discussed below.

Storm water runoff from SWMUs 15-008(a) and 15-004(f) flows into the same drainage; therefore, data from sediment samples collected from the drainage downgradient of SWMU 15-004(f) (section 6.5.4.4) determine if any contaminants may have migrated from SWMU 15-008(a).

Inorganic Chemicals

Inorganic COPCs at SWMU 15-008(a) include aluminum, antimony, arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, magnesium, mercury, nickel, perchlorate, selenium, silver, uranium, vanadium, and zinc.

Aluminum was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 15,100 mg/kg. Aluminum concentrations decreased with depth at locations 15-613405, 15-613407, and 15-613408 (the concentrations in the shallower samples [13,600 mg/kg, 10,400 mg/kg, and 10,500 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]); increased with depth at location 15-613406; and decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The residential SSL was approximately 5 times (the concentration was 62,900 mg/kg below the residential SSL) and the industrial SSL was approximately 85 times the maximum concentration. The lateral extent of aluminium is defined, and further sampling for vertical extent is not warranted.

Antimony was detected above soil and Qbt 2,3,4 BVs in four soil samples and one tuff sample with a maximum concentration of 2.5 mg/kg and had DLs (0.81 mg/kg to 3.8 mg/kg) above the BVs in three samples. Antimony concentrations decreased with depth and decreased downgradient. The residential SSL was approximately 8 times and the industrial SSL was approximately 137 times the maximum DL. The lateral extent of antimony is defined, and further sampling for vertical extent is not warranted.

Arsenic was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 3.6 mg/kg. Arsenic concentrations did not substantially change with depth (the concentrations in the shallower samples were 3.3 mg/kg and 3.7 mg/kg, respectively [Appendix F, Inorganic Chemicals Table]), and decreased downgradient. The concentrations were below the maximum Qbt 2,3,4 background concentration (5 mg/kg). Further sampling for extent of arsenic is not warranted.

Barium was detected above the soil and Qbt 2,3,4 BVs in three soil samples and six tuff samples with a maximum concentration of 834 mg/kg. Barium concentrations decreased with depth at locations 15-613404, 15-613405, 15-613407, 15-613408, and 15-613414. Concentrations also decreased with depth at locations (concentrations in the shallower samples at locations 15-613404, 15-613405, and 15-613408 ([69 mg/kg, 201 mg/kg, and 165 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). A single-depth sample was collected at location 15-02242, but the

concentration at 1.0−2.0 ft bgs at location 15-613406, approximately 10 ft southeast, was less than the concentration at location 15-02242. Barium concentrations increased with depth at location 15-613406. The residential SSL was approximately 59 times and the industrial SSL was approximately 1000 times the concentration at location 15-613406. Barium decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The lateral extent of barium is defined, and further sampling for vertical extent is not warranted.

Calcium was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 2980 mg/kg. Calcium concentrations decreased with depth at locations 15-613405 and 15-613408 (the concentrations in the shallower samples [2740 mg/kg and 2870 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations increased with depth at locations 15-613407 and 15-613410. The NMED residential essentiral nutrient SSL was approximately 4360 times the maximum concentration. Concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The lateral extent of calcium is defined, and further sampling for vertical exent is not warranted.

Chromium was detected above the Qbt 2,3,4 BV in six samples with a maximum concentration of 18 mg/kg. Concentrations were below the maximum Qbt 2,3,4 background concentration (13 mg/kg) at locations 15-613405, 15-613407, 15-613408, and 15-613412 and decreased with depth at locations 15-613405 and 15-613406 (the concentrations in the shallower samples [11.4 mg/kg and 10.6 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations increased with depth at location 15-613410. As discussed in section 4.2, there was no known use of hexavalent chromium at this site, and no site conditions would have produced hexavalent chromium. Therefore, the total chromium results represent trivalent chromium concentrations. The trivalent chromium residential SSL was approximately 6500 times the maximum concentration and decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The lateral extent of chromium is defined, and further sampling for vertical extent is not warranted.

Copper was detected above the soil and Qbt 2,3,4 BVs in nine soil samples and seven tuff samples with a maximum concentration of 7720 mg/kg. A single-depth sample was collected at location 15-02242 (the location of the maximum concentration), but the concentration at 1.0−2.0 ft bgs at location 15-613406, approximately 10 ft southeast, was less than the concentration at location 15-02242. Copper concentrations decreased with depth at all other locations and decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The lateral and verical extent of copper are defined.

Iron was detected above the Qbt 2,3,4 BV in one sample at a concentration of 15,800 mg/kg. The iron concentration was below the maximum Qbt 2,3,4 background concentration (19,500 mg/kg) and decreased downgradient. The lateral and verical extent of iron are defined.

Lead was detected above the soil and Qbt 2,3,4 BVs in six soil samples and three tuff samples with a maximum concentration of 58.2 mg/kg. A single-depth sample was collected at location 15-02242 (the location of the maximum concentration), but the concentration at 1.0−2.0 ft bgs at location 15-613406, approximately 10 ft southeast, was less than the concentration at location 15-02242. Lead concentrations decreased with depth at locations 15-613406, 15-613407, 15-613412, 15-613413, and 15-613414. Concentrations increased with depth at location 15-613405. The residential SSL was approximately 19 times and the industrial SSL was approximately 38 times the maximum concentration at this location. Lead concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The lateral extent of lead is defined, and further sampling for vertical extent is not warranted.

Magnesium was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 1980 mg/kg. Magnesium concentrations decreased with depth at locations 15-613405 and 15-613406 (concentrations in the shallower samples [2140 mg/kg and 2010 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]); and decreased downgradient. The lateral and vertical extent of magnesium are defined.

Mercury was detected above the soil and Qbt 2,3,4 BVs in 10 soil samples and 11 tuff samples with a maximum concentration of 1.4 mg/kg. A single-depth sample was collected at location 15-02242 (the location of the maximum concentration), but the concentration at 1.0−2.0 ft bgs at location 15-613406, approximately 10 ft southeast, was less than the concentration at location 15-02242. Mercury concentrations did not change substantially at any location (less than 0.2 mg/kg). The residential SSL was approximately 17 times and the industrial SSL was approximately 275 times the maximum concentration. Concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The lateral extent of mercury is defined, and further sampling for vertical extent is not warranted.

Nickel was detected above the soil and Qbt 2,3,4 BVs in one soil sample and five tuff samples with a maximum concentration of 57.3 mg/kg. A single-depth sample was collected at location 15-02242 (the location of the maximum concentration), but the concentration at 1.0−2.0 ft bgs at location 15-613406, approximately 10 ft southeast, was less than the concentration at location 15-02242. Nickel concentrations decreased at locations 15-613405, 15-613406, and 15-613407 (the concentrations in the shallower samples [9 mg/kg, 9.4 mg/kg, and 11.5 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations increased with depth at locations 15-613408 and 15-613410 (only approximately 1 mg/kg to 4.5 mg/kg above the BV). The residential SSL was 1560 times and approximately 142 times the concentrations at these locations. Concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The lateral extent of nickel is defined, and further sampling for vertical extent is not warranted.

Perchlorate was detected in nine samples with a maximum concentration of 0.0049 mg/kg. Perchlorate concentrations were below the EDLs at all locations and decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The residential SSL was approximately 11,180 times the maximum concentration. The lateral extent of perchlorate is defined, and further sampling for vertical extent is not warranted.

Selenium was detected above the soil and Qbt 2,3,4 BVs in 2 soil samples and 12 tuff samples with a maximum concentration of 3 mg/kg. Selenium concentrations did not change substantially with depth at any location (no change to 1 mg/kg), did not change substantially downgradient in samples collected for SWMU 15-004(f) (less than 2 mg/kg) (Plate 7), and decreased in Reach PO-1 in Potrillo Canyon (LANL 2011, 201580.14; Table 6.2-1). The residential SSL was approximately 130 times the maximum concentration. The lateral extent of selenium is defined, and further sampling for vertical extent is not warranted.

Silver was detected above the Qbt 2,3,4 BV in one sample at a concentration of 3.1 mg/kg. Silver concentrations increased with depth. Concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The residential SSL was approximately 126 times the concentration. The lateral extent of silver is defined, and further sampling for vertical extent is not warranted.

Uranium was detected above the soil BV in one sample at a maximum concentration of 2820 mg/kg. Only one sample (the only sample collected in 1994 at location 15-02242) was analyzed for total uranium, and extent was evaluated using isotopic uranium data for samples collected in 2010. Isotopic uranium concentrations decreased with depth in the 2010 samples collected at location 15-613406, 10 ft southeast

of location 15-02242, and decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). As indicated below, the lateral and vertical extent of isotopic uranium are defined.

Vanadium was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 20.8 mg/kg. Vanadium concentrations decreased with depth at locations 15-613405 and 15-613406 (concentrations in the shallower samples [24 mg/kg and 26.1 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]) and decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The lateral and vertical extent of vanadium are defined.

Zinc was detected above the soil and Qbt 2,3,4 BVs in five soil samples and one tuff samples with a maximum concentration of 309 mg/kg. A single-depth sample was collected at location 15-02242 (the location of the maximum concentration), but the concentration at 1.0−2.0 ft bgs at location 15-613406, approximately 10 ft southeast, was less than the concentration at location 15-02242. Zinc concentrations decreased with depth at all other locations and decreased downgradient in samples collected for SWMU 15-004(f) (Plate 7). The lateral and vertical extent of zinc are defined.

Organic Chemicals

Organic COPCs at SWMU 15-008(a) include acenaphthene; acetone; benzoic acid; bis(2-ethylhexyl)phthalate; diethylphthalate; di-n-butylphthalate; di-n-octylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzodioxin, 1,2,3,6,7,8-hexachlorodibenzodioxin, 1,2,3,7,8,9-hexachlorodibenzodioxin; 4-isopropyltoluene; methylene chloride; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 1,2,3,7,8-pentachlorodibenzodioxin; and 2,3,7,8-tetrachlorodibenzodioxin.

Acenaphthene was detected in six samples with a maximum concentration of 0.21 mg/kg. Concentrations were below the EQLs at all locations. Concentrations decreased with depth or did not change substantially with depth (0.086 mg/kg at location 15-613412) at four locations. Acenaphthene was detected only in the deeper sample at location 15-613407 (0.068 mg/kg) below the EQL. The residential SSL was approximately 16,600 times the maximum concentration. Concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 8). The lateral extent of acenaphthene is defined, and further sampling for vertical extent is not warranted.

Acetone was detected in eight samples with a maximum concentration of 0.2 mg/kg. Concentrations decreased or did not change substantially (approximately 0.16 mg/kg to 0.18 mg/kg) with depth at locations 15-613403, 15-613404, 15-613405, 15-613407, and 15-613408. Acetone, detected only in the deeper sample at location 15-613406 (0.012 mg/kg), was below the EQL. The residential SSL was approximately 332,000 times the maximum concentration. Concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 8). The lateral extent of acetone is defined, and further sampling for vertical extent is not warranted.

Benzoic acid was detected in one sample at a concentration of 0.8 mg/kg at a concentration below the EQL. The residential SSL was approximately 312,500 times the concentration, and concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 8). The lateral extent of benzoic acid is defined, and further sampling for vertical extent is not warranted.

Bis(2-ethylhexyl)phthalate was detected in 13 samples with a maximum concentration of 1.7 mg/kg. Concentrations decreased or did not change substantially (0.05 mg/kg to 0.07 mg/kg) with depth at locations 15-613404, 15-613406, 15-613407, 15-613408, 15-613409, 15-613413, and 15-613414. Bis(2-ethylhexyl)phthalate, detected only in the deeper sample at location 15-613403 (0.15 mg/kg), was

below the EQL. Concentrations increased slightly with depth at location 15-613405 (1.4 mg/kg). The residential SSL was approximately 225 times the maximum concentration, and concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 8). The lateral extent of bis(2-ethylhexyl)phthalate is defined, and further sampling for vertical extent is not warranted.

Diethylphthalate was detected in one sample at a concentration of 0.05 mg/kg. Diethylphthalate, detected only in the deeper sample at location 15-613414 (0.05 mg/kg), was below the EQL. The residential SSL was approximately 986,000 times the concentration, and concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 8). The lateral extent of diethylphthalate is defined, and further sampling for vertical extent is not warranted.

Di-n-butylphthalate was detected in three samples with a maximum concentration of 0.21 mg/kg. Concentrations decreased with depth and decreased downgradient in samples collected for SWMU 15-004(f) (Plate 8). The lateral and vertical extent of di-n-butylphthalate are defined.

Di-n-octylphthalate was detected in one sample at a concentration of 0.069 mg/kg. Concentrations decreased with depth and decreased downgradient in samples collected for SWMU 15-004(f) (Plate 8). The lateral and vertical extent of di-n-octylphthalate are defined.

Isopropyltoluene[4-] was detected in three samples with a maximum concentration of 0.013 mg/kg. Concentrations decreased or did not change substantially (0.0084 mg/kg) with depth and decreased downgradient in samples collected for SWMU 15-004(f) (Plate 8). The lateral and vertical extent of 4-isopropyltoluene are defined.

Methylene chloride was detected in seven samples with a maximum concentration of 0.0047 mg/kg. Methylene chloride, detected only in the deeper samples, was below the EQLs at all locations. The residential SSL was approximately 87,000 times the maximum concentration. Concentrations decreased downgradient in samples collected for SWMU 15-004(f) (Plate 8). The lateral extent of methylene chloride is defined, and further sampling for vertical extent is not warranted.

Nine dioxin/furan congeners were detected in one or two samples. The residential SSL was approximately 36 times the maximum TCDD-equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

Radionuclide COPCs at SWMU 15-008(a) include uranium-234, uranium-235/236, and uranium-238.

Uranium-234 was detected above the soil and Qbt 2,3,4 BVs in 10 soil samples and 7 tuff samples with a maximum activity of 492 pCi/g. Uranium-234 activities decreased with depth at locations 15-613404, 15-613406, 15-613407, 15-613408, 15-613409, 15-613410, 15-613412, 15-613413, and 15-613414 and decreased downgradient in samples collected for SWMU 15-004(f) (locations 15-613385, 15-613386, and 15-613387) (Plate 9). Uranium-234 increased with depth at location 15-613405 (2.15 pCi/g). The residential SAL was approximately 27 times and the industrial SSL was approximately 301 times the maximum activity at this location. The lateral extent of uranium-234 is defined, and further sampling for vertical extent is not warranted.

Uranium-235/236 was detected above the soil and Qbt 2,3,4 BVs in 10 soil and 7 tuff samples with a maximum activity of 26.5 pCi/g. Uranium-235/236 activities decreased or did not change substantially with depth at locations 15-613404, 15-613405 (0.3 pCi/g), 15-613406, 15-613407, 15-613408, 15-613409, 15-613410, 15-613412, 15-613413, and 15-613414 and decreased downgradient in samples

collected for SWMU 15-004(f) (locations 15-613385, 15-613386, and 15-613387) (Plate 9). The lateral extent of uranium-235/236 is defined, and further sampling for vertical extent is not warranted.

Uranium-238 was detected above the soil and Qbt 2,3,4 BVs in 10 soil and 7 tuff samples with a maximum activity of 681 pCi/g. Uranium-238 activities decreased with depth at locations 15-613404, 15-613406, 15-613407, 15-613408, 15-613409, 15-613410, 15-613412, 15-613413, and 15-613414 and decreased downgradient in samples collected for SWMU 15-004(f) (locations 15-613385, 15-613386, and 15-613387) (Plate 9). Uranium-238 increased with depth at location 15-613405 (2.6 pCi/g). The residential SAL was approximately 7.6 times and the industrial SAL was approximately 38 times the maximum activity at this location. The lateral extent of uranium-238 is defined, and further sampling for vertical extent is not warranted.

6.6.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.9, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 15 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 11, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from uranium. The total dose is 15 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Residential Scenario

The total excess cancer risk for the residential scenario is 7×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 13, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from uranium. The total dose is 42 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is from isotopic uranium.

Based on the risk-screening assessment results, no potential unacceptable cancer risks exist for any of the scenarios at SWMU 15-008(a). No potential unacceptable noncancer risk exists for the industrial scenario, and no potential unacceptable doses for the industrial and construction worker scenarios. However, potential unacceptable noncancer risks exist from uranium under the construction worker and residential scenarios, and a potential unacceptable dose exists from isotopic uranium under the residential scenario.

6.6.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks exist for any receptors at SWMU 15-008(a).

6.7 AOC 15-005(b), Storage Area

6.7.1 Site Description and Operational History

AOC 15-005(b) is a former storage area located inside a HE make-up building (15-0242) at TA-15 (Figure 6.7-1). This area was used to store containers of waste HE. Experiments were assembled, approved adhesives were used during the assembly process, and solvents may have been used to clean some of the parts. The period of operation of this site and the quantities of wastes stored are not known (LANL 1993, 020946, p. 9-12).

6.7.2 Relationship to Other SWMUs and AOCs

AOC 15-005(b) is located northeast of SWMUs 15-004(b) and 15-004(c) and is not associated with any other SWMUs or AOCs.

6.7.3 Summary of Previous Investigations

During the 1995 Phase I RFI conducted at AOC 15-005(b), three surface samples (0.0–0.5 ft bgs) and two subsurface (1.5–2.0 ft bgs) samples were collected from two locations immediately outside building 15-0242 (LANL 1996, 054977, pp. 5-72–5-75). Samples were field-screened for radioactivity, metals, and HE and submitted for analysis of TAL metals (LANL 1996, 054977, pp. 5-72–5-75). Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2009, 105251). Screening-level data showed inorganic chemicals detected above BVs.

6.7.4 Site Contamination

6.7.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- All samples were field-screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2.
- A total of eight samples were collected from four locations around building 15-0242 from 0.0–1.0 ft and 4.0–5.0 ft bgs.
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, and explosive compounds. One of the eight samples was also analyzed for dioxins/furans and PCBs. The sampling location for the dioxin/furan and PCB analyses was selected based on its proximity to the potential contaminant source.

The 2010 sampling locations at AOC 15-005(b) are shown in Figure 6.7-1. Table 6.7-1 presents the samples collected and analyses requested for AOC 15-005(b). The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.7.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at AOC 15-005(b), a maximum concentration of 1 ppm was detected at location 15-613254 from 4.0–5.0 ft bgs. No radiological-screening results exceeded twice the maximum site background levels. The field-screening results are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the field-screening results.

6.7.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC 15-005(b) consisted of results from eight samples (six soil and two tuff) collected from four locations.

Inorganic Chemicals

Eight samples (six soil and two tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.7-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.7-2 shows the spatial distribution of inorganic chemicals detected or detected above BVs. Because less than eight samples were collected for each medium, statistical tests could not be performed.

Aluminum was detected above the Qbt 2,3,4 BV (7340 mg/kg) in one sample at a concentration of 10,400 mg/kg. Aluminum is retained as a COPC.

Antimony was not detected above the Qbt 2,3,4 BV (0.5 mg/kg) but had DLs (0.52 mg/kg to 0.58 mg/kg) above the BV in two samples. The DLs are only 0.02 mg/kg to 0.08 mg/kg above the BV and antimony was not detected in the other six samples (DLs below soil BV). Antimony is not a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in one sample at a concentration of 4.3 mg/kg. The concentration was approximately 1.5 mg/kg above the BV and below or similar to the 2 highest Qbt 2,3,4 background concentrations (4 mg/kg and 5 mg/kg). Arsenic was not detected above BVs in the other seven samples. Arsenic is not a COPC.

Barium was detected above the soil and Qbt 2,3,4 BVs (295 mg/kg and 46 mg/kg) in one fill and two tuff samples with a maximum concentration of 310 mg/kg. Barium is retained as a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in two samples with a maximum concentration of 4490 mg/kg. Calcium is retained as a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in two samples with a maximum concentration of 12.9 mg/kg. The concentrations were approximately 0.36 mg/kg and 5.8 mg/kg above the BV and 5.5 mg/kg and 0.1 mg/kg below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium was detected below the soil BV in the other six samples. Chromium is not a COPC.

Cobalt was detected above the soil BV (8.64 mg/kg) in one sample at a concentration of 11.9 mg/kg. Cobalt is retained as a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.52 mg/kg to 0.62 mg/kg) above the BVs in eight samples. The DLs were only 0.02 mg/kg to 0.12 mg/kg above the BVs. Cyanide is not a COPC.

Lead was detected above the soil BV (22.3 mg/kg) in one sample at a concentration of 27.6 mg/kg. The concentration was 5.3 mg/kg above the BV and 0.4 mg/kg below the maximum soil background concentration (28 mg/kg). Lead was detected below the BVs in the other seven samples. Lead is not a COPC.

Manganese was detected above the soil BV (671 mg/kg) in one sample at a concentration of 776 mg/kg. The concentration was 105 mg/kg above the BV and below the 5 highest soil background concentrations (810 mg/kg, 860 mg/kg, 950 mg/kg, 1000 mg/kg, and 1100 mg/kg). Manganese was detected below the BVs in the other seven samples. Manganese is not a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in one sample at a concentration of 7.6 mg/kg. Nickel is retained as a COPC.

Nitrate was detected in eight samples with a maximum concentration of 2.5 mg/kg. Nitrate is naturally occurring, and the concentrations detected likely reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Perchlorate was detected in one sample at a concentration of 0.0033 mg/kg. Perchlorate is retained as a COPC.

Selenium was detected above the Qbt 2,3,4 BV (0.3 mg/kg) in two samples with a maximum concentration of 0.96 mg/kg. Selenium is retained as a COPC.

Organic Chemicals

Eight samples (six soil and two tuff) were analyzed for explosive compounds, VOCs, and SVOCs. One soil sample was also analyzed for dioxins/furans and PCBs. Table 6.7-3 presents the detected organic chemicals. Figure 6.7-3 shows the spatial distribution of detected organic chemicals.

PAHs

PAHs are a class of SVOCs frequently detected as a result of environmental sampling but generally were not released from the SWMUs or AOCs investigated. PAHs unrelated to site activities are thus often detected in samples analyzed for the presence of site related SVOCs.

PAHs are known to be widely distributed in the environment from a number of sources, both natural, such as forest fires, and anthropogenic, such as combustion of fossil fuels, oil drips off motor vehicles, vehicle tires, coal tar pitch, and weathering or eroding of asphalt pavement (Kose et al. 2008, 219977; Teaf 2008, 219976). PAHs from these sources generally occur as complex mixtures, not as single compounds. Individual PAH compounds can be manufactured for research purposes and some PAHs (e.g., anthracene, fluorene, naphthalene, and pyrene) are used in dye production, in the manufacture of synthetic fibers, and in plastics and pesticides.

The principal sources of PAHs in soil along parking lots, roads, and highways are vehicular exhaust and emissions, the wearing of tires, and asphalt. PAH-containing materials, such as asphalt and rubber particles, do not easily dissolve in water, thus preventing migration, except as suspended particles in storm water. PAH concentrations in excess of soil cleanup levels may result from common anthropogenic sources such as runoff from asphalt paved areas (e.g., roads and parking areas).

Site Activities

AOC 15-005(b) was identified as an AOC because it is a former storage area used to store containers of waste HE located inside a HE make-up building. The area surrounding the building is paved with asphalt (Appendix J, Figure J-1). Samples were collected outside the building. PAHs are not associated with the building or the materials stored there but are associated with the paved parking area around the building through and under which sampling was conducted. Therefore, the PAHs detected in samples used to

characterize this site [acenaphthene; anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; chrysene; dibenz(a,h)anthracene; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; 2-methylnaphthalene; naphthalene; phenanthrene; and pyrene] are not related to historical Laboratory operations at this site and are not COPCs.

Organic COPCs

The other organic chemicals detected at AOC 15-005(b) include bis(2-ethylhexyl)phthalate; dibenzofuran; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; methylene chloride; and 1,2,3,4,6,7,8,9-octachlorodibenzodioxin. All detected organic chemicals listed are retained as COPCs.

Radionuclides

No radiological analyses were conducted for AOC 15-005(b) per the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677).

6.7.4.4 Nature and Extent of Contamination

The nature and extent of inorganic and organic COPCs at AOC 15-005(b) are discussed below.

Inorganic Chemicals

Inorganic COPCs at AOC 15-005(b) include aluminum, barium, calcium, cobalt, nickel, perchlorate, and selenium.

Aluminum was detected above the Qbt 2,3,4 BV in one sample at a concentration of 10,400 mg/kg. Aluminum concentrations decreased with depth at location 15-613253 (the concentrations in the shallower sample [11,200 mg/kg] were below the soil BV [Appendix F, Inorganic Chemicals Table]). The residential SSL was approximately 7.5 times (the concentration was 67,600 mg/kg below the residential SSL) and the industrial SSL was approximately 124 times the concentration. Further sampling for extent of aluminum is not warranted.

Barium was detected above the soil and Qbt 2,3,4 BVs in one fill and two tuff samples with a maximum concentration of 310 mg/kg. Barium concentrations decreased with depth at location 15-613252 (the concentration in the shallower sample [156 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]). The concentration was below the maximum soil background concentration (410 mg/kg) at location 15-613254 and increased with depth at location 15-613253. The residential SSL was approximately 81 times and 50 times the concentrations at locations 15-613253 and 15-613254, respectively. Further sampling for extent of barium is not warranted.

Calcium was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 4490 mg/kg. Calcium concentrations increased with depth at both locations. The NMED residential SSL was approximately 510 and 290 times the concentrations. Further sampling for extent of calcium is not warranted.

Cobalt was detected above the soil BV in one sample at a concentration of 11.9 mg/kg. Cobalt concentrations increased with depth. The residential SSL was approximately 2 times and the industrial SSL was approximately 29 times the concentration. Further sampling for extent of cobalt is not warranted.

Nickel was detected above the Qbt 2,3,4 BV in one sample at a concentration of 7.6 mg/kg. Nickel concentrations did not change substantially with depth (0.1 mg/kg) at location 15-613253 and were approximately 1 mg/kg above the BV (0.6 mg/kg above the maximum Qbt 2,3,4 background

concentration). The residential SSL was approximately 200 times the maximum concentration. Further sampling for extent of nickel is not warranted.

Perchlorate was detected in one sample at a concentration of 0.0033 mg/kg. The concentration was below the EDL. The residential SSL was approximately 16,600 times the concentration. Further sampling for extent of perchlorate is not warranted.

Selenium was detected above Qbt 2,3,4 BV in two samples with a maximum concentration of 0.96 mg/kg. Selenium concentrations did not change substantially with depth (0.45 mg/kg or less) at either location. The residential SSL was approximately 407 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Organic Chemicals

Organic COPCs at AOC 15-005(b) include bis(2-ethylhexyl)phthalate; dibenzofuran; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; methylene chloride; and 1,2,3,4,6,7,8,9-octachlorodibenzodioxin.

Bis(2-ethylhexyl)phthalate was detected in two samples with a maximum concentration of 0.21 mg/kg. Concentrations were below the EQLs and decreased with depth at location 15-613254. The residential SSL was approximately 1810 times the maximum concentration. Further sampling for extent of bis(2-ethylhexyl)phthalate is not warranted.

Dibenzofuran was detected in one sample at a concentration of 0.17 mg/kg. The concentration was below the EQL and decreased with depth. The residential SSL was approximately 420 times the maximum concentration. Further sampling for extent of dibenzofuran is not warranted.

Methylene chloride was detected in eight samples with a maximum concentration of 0.0065 mg/kg. Concentrations were below EQLs in seven samples and did not change substantially with depth (0.0001 mg/kg to 0.0009 mg/kg) at any location**.** The residential SSL was approximately 62,900 times the maximum concentration. Further sampling for extent of methylene chloride is not warranted.

Three dioxin/furan congeners were detected in one sample. The residential SSL was approximately 1600 times the TCDD-equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

No radiological analyses were conducted for AOC 15-005(b) per the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677).

6.7.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.03, which is below the NMED target HI of 1 (NMED 2015, 600575).

Construction Worker Scenario

No carcinogenic or radionuclide COPCs were identified for the construction worker scenario. The construction worker HI is 0.6, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-8} (2×10^{-6} based on the vapor-intrusion screening), which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

Based on the risk-screening assessment results, no potential unacceptable risks exist for the industrial, construction worker, or residential scenarios at AOC 15-005(b).

6.7.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks exist for any receptors at AOC 15-005(b).

6.8 SWMU 15-009(e), Septic Tank

6.8.1 Site Description and Operational History

SWMU 15-009(e) is a decommissioned 1500-gal. septic tank (structure 15-0072) at E-F Firing Site [SWMU 15-004(f)] at TA-15 (Figure 6.8-1). The septic tank was constructed in 1947 and received sanitary waste from the E-F Firing Site control building (15-0027), located approximately 175 ft northeast of the tank. The drainline goes around structure 15-0463, which is a transportable used for storage. The septic tank is constructed of 4- to 6-in. reinforced concrete and is 5 ft long × 9 ft deep × 7 ft wide (LANL 1993, 020946, pp. 7-21, 10-20). The septic tank was used until 1981 when E-F Firing Site last operated. Discharges from the septic tank flowed through a vitrified clay pipe to an outfall located approximately 30 ft from the tank at the edge of Potrillo Canyon (LANL 1997, 074091, p. 1).

6.8.2 Relationship to Other SWMUs and AOCs

SWMU 15-009(e) is located southeast of AOC C-15-004. SWMU 15-009(e) is not associated with any other SWMUs or AOCs.

6.8.3 Summary of Previous Investigations

During the 1994 Phase I RFI conducted at SWMU 15-009(e), two samples of the septic tank contents were collected and submitted for analysis of radionuclides, TAL metals, VOCs, and SVOCs (LANL 1995, 050294, pp. 4-23–4-57). Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2009, 105251). Screening-level data showed inorganic chemicals detected above BVs.

Based on the results of the Phase I RFI, a VCA was conducted at SWMU 15-009(e) in 1997 to remove the contents of the septic tank, pressure-wash the interior of the septic tank, collect concrete-chip samples from the interior of the tank to demonstrate the adequacy of the corrective action, and collect a rinsate sample for waste characterization purposes (LANL 1997, 074091, p. 15). Twelve soil samples

were collected beneath the septic tank inlet and outlet, next to and below the septic tank, and from the outfall area and drainage channel downgradient of the outfall (LANL 1997, 074091, pp. 1–3). The samples were submitted for analysis of HE and TAL metals; a subset of the samples was also analyzed for VOCs and SVOCs. The tank and drain lines were filled and plugged with expandable concrete and left in place.

All decision-level analytical data collected during previous investigations are presented and evaluated in section 6.8.4.4. Table 6.8-1 presents the samples collected and analyses requested at SWMU 15-009(e).

6.8.4 Site Contamination

6.8.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- All samples were field-screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2.
- The investigation work plan required six samples to be collected from two depths (0.0–1.0 ft and 3.0–4.0 ft below structures) at three locations: next to the tank inlet, next to the tank outlet, and on the east side of the tank at SWMU 15-009(e). All six samples were inadvertently collected from 0.0–1.0 ft and 3.0–4.0 ft bgs, not below the structures; therefore, the sample results are not presented in this report (see deviations in Appendix B).
- The investigation work plan required four samples to be collected from two depths at two locations along the tank inlet drainline at SWMU 15-009(e). All four samples were inadvertently collected from 0.0–1.0 ft and 3.0–4.0 ft bgs, not below the drainline; therefore, the sample results are not presented in this report (see deviations in Appendix B).
- Six samples were collected from three locations at the outfall and within the drainage: 0.0–1.0 ft and 2.5-3.0 ft, 0.0–0.5 ft and 0.5–1.0 ft, and 0.0–1.0 ft and 2.0–2.5 ft bgs, respectively (see deviations in Appendix B).
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, and isotopic uranium. One of the six samples was also analyzed for dioxins/furans and PCBs. The sampling location for the dioxin/furan and PCB analyses was selected based on its proximity to the potential contaminant source.

Sampling locations with decision-level data for SWMU 15-009(e) are shown in Figure 6.8-1. Table 6.8-1 presents the samples collected and analyses requested for SWMU 15-009(e). The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.8.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at SWMU 15-009(e), no organic vapors were detected. No radiological-screening results exceeded twice the maximum site background levels. The field-screening results are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the field-screening results.

6.8.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 15-009(e) consisted of results from 18 samples (15 soil and 3 tuff) from 10 locations.

Inorganic Chemicals

Eighteen samples (15 soil and 3 tuff) were analyzed for TAL metals. Six samples (3 soil and 3 tuff) were also analyzed for cyanide, nitrate, and perchlorate. Table 6.8-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.8-2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Antimony was detected above the soil BV (0.83 mg/kg) in two samples with a maximum concentration of 8.6 mg/kg, had DLs (7.1 mg/kg to 7.6 mg/kg) above the BV in four samples, and had DLs (0.51 mg/kg to 0.53 mg/kg) above the Qbt 2,3,4 BV (0.5 mg/kg) in three samples. Antimony is retained as a COPC.

Cadmium was detected above the soil BV (0.4 mg/kg) in 2 samples with a maximum concentration of 0.83 mg/kg and had DLs (0.62 mg/kg to 0.66 mg/kg) above the BV in 5 samples. The detected concentrations were only 0.2 mg/kg and 0.43 mg/kg above the BV, below the highest background DL (2 mg/kg), and below or similar to the 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). The DLs were only 0.22 mg/kg to 0.26 mg/kg above the BV, below the highest background DL (2 mg/kg), and below or similar to the 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). Cadmium was not detected or detected below BVs in the other 11 samples (detected below BVs in 5 samples). Cadmium is not a COPC.

Calcium was detected above the soil BV (6120 mg/kg) in one sample at a concentration of 6200 mg/kg. The Gehan and quantile tests indicated site concentrations of calcium in soil are not statistically different from background (Figure H-96 and Table H-11). Calcium is not a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in three samples with a maximum concentration of 13 mg/kg. Chromium is retained as a COPC.

Copper was detected above the soil BV (14.7 mg/kg) in one sample at a concentration of 15.6 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in soil are not statistically different from background (Figure H-97 and Table H-11). Copper is not a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.51 mg/kg to 0.53 mg/kg) above the BVs in six samples. The DLs were only 0.01 mg/kg to 0.03 mg/kg above the BVs. Cyanide is not a COPC.

Lead was detected above the soil BV (22.3 mg/kg) in two samples with a maximum concentration of 135 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are not statistically different from background (Figure H-98 and Table H-11). Lead is not a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in 3 samples with a maximum concentration of 7.3 mg/kg. The concentrations were 0.12 mg/kg to 0.72 mg/kg above the BV and 0.1 mg/kg to 0.3 mg/kg below the maximum Qbt 2,3,4 background concentration (7 mg/kg) in 2 samples and 0.3 mg/kg above the maximum Qbt 2,3,4 background concentration in the other sample. Nickel was not detected or detected below the BVs in the other 15 samples (detected below the soil BV in the 11 samples). Nickel is not a COPC.

Nitrate was detected in six samples with a maximum concentration of 0.85 mg/kg. Nitrate is naturally occurring and the concentrations reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Selenium was detected above the soil and Qbt 2,3,4 BVs (1.52 mg/kg and 0.3 mg/kg) in two soil samples and three tuff samples with a maximum concentration of 1.9 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are not statistically different from background

(Figure H-99 and Table H-11). The tuff concentrations were substantially above the Qbt 2,3,4 BV. Selenium is retained as a COPC.

Silver was detected above the soil BV (1 mg/kg) in two samples with a maximum concentration of 4.1 mg/kg and had DLs (1.7 mg/kg to 1.9 mg/kg) above the BV in four samples. Silver is retained as a COPC.

Uranium was detected above the soil BV (1.82 mg/kg) in three samples with a maximum concentration of 18.9 mg/kg and had DLs (26.8 mg/kg to 67.8 mg/kg) above the BV in six samples. The Gehan and quantile tests indicated site concentrations of uranium in soil are not statistically different from background (Figure H-100 and Table H-11). However, the maximum concentration and maximum DL were substantially higher than the BV. Uranium is retained as a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in one sample at a concentration of 71 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are not statistically different from background (Figure H-101 and Table H-11). Zinc is not a COPC.

Organic Chemicals

Eighteen samples (15 soil and 3 tuff) were analyzed for explosive compounds. Twelve samples (9 soil and 3 tuff) were analyzed for VOCs and SVOCs, and 1 soil sample was analyzed for PCBs and dioxins/furans. Table 6.8-3 presents the detected organic chemicals. Figure 6.8-3 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at SWMU 15-009(e) include acetone; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; fluoranthene; pyrene; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 4-isopropyltoluene; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; and toluene. All detected organic chemicals listed are retained as COPCs.

Radionuclides

Six samples (three soil and three tuff) were analyzed for isotopic uranium. Table 6.8-4 presents the radionuclides detected or detected above BVs/FVs. Figure 6.8-4 shows the spatial distribution of radionuclides detected or detected above BVs/FVs.

Uranium-234 was detected above the soil BV (2.59 pCi/g) in two samples with a maximum activity of 8.85 pCi/g. Uranium-234 is retained as a COPC.

Uranium-235/236 was detected above the soil BV (0.2 pCi/g) in three samples with a maximum activity of 0.488 pCi/g. Uranium-235/236 is retained as a COPC.

Uranium-238 was detected above the soil BV (2.29 pCi/g) in three samples with a maximum activity of 16.1 pCi/g. Uranium-238 is retained as a COPC.

6.8.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 15-009(e) are discussed below. Samples were inadvertently not collected from under the septic tank and drainlines in 2010 as specified in the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677). The data presented below describe the nature and lateral extent of contamination at and below the outfall and

around the septic tank based on samples collected to date. The vertical extent beneath the septic tank and drainlines is not defined.

Inorganic Chemicals

Inorganic COPCs at SWMU 15-009(e) include antimony, chromium, selenium, silver, and uranium.

Antimony was detected above the soil BV in two samples with a maximum concentration of 8.6 mg/kg and had DLs (0.51 mg/kg to 7.6 mg/kg) above the soil and Qbt 2,3,4 BVs in seven samples. Antimony concentrations decreased with depth at and below the outfall and decreased downgradient. The residential SSL was approximately 4 times and the industrial SSL was approximately 68 times the maximum DL. The lateral and vertical extent of antimony are defined at and below the outfall and around the septic tank, and further sampling for vertical extent is warranted under the septic tank and lines.

Chromium was detected above the Qbt 2,3,4 BV in three samples with a maximum concentration of 13 mg/kg. Chromium was not detected above BV around the septic tank. Chromium concentrations did not change substantially (1.3 mg/kg) down the drainage and increased slightly with depth in the drainage (approximately 6 mg/kg to 7 mg/kg). Concentrations were equal to or below the maximum Qbt 2,3,4 background concentration (13 mg/kg). As discussed in section 4.2, there was no known use of hexavalent chromium at this site, and no site conditions would have produced hexavalent chromium. Therefore, the total chromium results represent trivalent chromium concentrations. The trivalent chromium residential SSL was approximately 9000 times the maximum concentration. Further sampling for extent of chromium is not warranted at and below the outfall and around the septic tank, and further sampling for extent is warranted under the septic tank and lines.

Selenium was detected above the soil and Qbt 2,3,4 BVs in two soil samples and three tuff samples with a maximum concentration of 1.9 mg/kg. Selenium was not detected above BV around the septic tank. Concentrations did not change substantially with depth (0.1 mg/kg to 0.4 mg/kg) or downgradient (0.2 mg/kg) in the drainage. The residential SSL was approximately 206 times the maximum concentration. Further sampling for extent of selenium is not warranted at and below the outfall and around the septic tank, and further sampling for extent is warranted under the septic tank and lines.

Silver was detected above the soil BV in two samples with a maximum concentration of 4.1 mg/kg and had DLs (1.7 mg/kg to 1.9 mg/kg) above the BV in four samples. Silver was not detected above BV around the septic tank. Concentrations decreased with depth and decreased downgradient in the drainage. The residential SSL was approximately 205 times the maximum DL. The lateral and vertical extent of silver are defined at and below the outfall and around the septic tank, and further sampling for extent is warranted under the septic tank and lines.

Uranium was detected above the soil BV in three samples with a maximum concentration of 18.9 mg/kg and had DLs (26.8 mg/kg to 67.8 mg/kg) above the BV in six samples. Concentrations decreased with depth at location 15-02513 next to the septic tank. Single-depth samples were collected at locations 15-02515 and 15-02516 at the inlet and outlet, respectively. The uranium concentration (2.67 mg/kg) was below the maximum soil background concentration (3.6 mg/kg) at location 15-02515. The residential SSL was approximately 12.4 times and the industrial SSL was approximately 205 times the maximum concentration. Uranium concentrations decreased downgradient. The lateral extent of uranium is defined at and below outfall and around the septic tank, and further sampling for extent is warranted under the septic tank and lines.

Organic Chemicals

Organic COPCs at SWMU 15-009(e) include acetone; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; fluoranthene; pyrene; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 4-isopropyltoluene; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; and toluene.

Acetone was detected in two samples with a maximum concentration of 0.0093 mg/kg. Concentrations did not change substantially (0.0014 mg/kg) with depth and were below the EQLs at location 15-02513 next to the septic tank. The residential SSL was approximately 7,130,000 times the maximum concentration. Acetone was not detected in the drainage. The lateral extent of acetone is defined at and below the outfall and around the septic tank, and further sampling for vertical extent is warranted under the septic tank and lines.

Benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, fluoranthene, and pyrene were detected in one sample and benzo(b)fluoranthene was detected in three samples. Concentrations decreased downgradient and were below the EQLs. Single-depth samples were collected at locations 15-02515 and 15-02516 where benzo(b)fluoranthene was detected below EQLs. The residential SSL was approximately 27 times to 33 times and the industrial SSL was approximately 560 times to 670 times the concentrations at these locations. The lateral and vertical extent of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, and pyrene are defined at and below the outfall and around the septic tank, and further sampling for extent is warranted under the septic tank and lines.

Isopropyltoluene[4-] was detected in one sample at a concentration of 0.003 mg/kg. The concentration decreased with depth, was below the EQL, and decreased downgradient in the drainage. Isopropyltoluene[4-] was not detected around the septic tank. The lateral and vertical extent of 4-isopropyltoluene are defined at and below the outfall and around the septic tank, and further sampling for extent is warranted under the septic tank and lines.

Toluene was detected in one sample at a concentration of 0.0021 mg/kg. Concentrations decreased with depth and decreased downgradient in the drainage. Toluene was not detected around the septic tank. The lateral and vertical extent of toluene are defined at and below the outfall and around the septic tank, and further sampling for extent is warranted under the septic tank and lines.

Four dioxin/furan congeners were detected in one sample. The residential SSL was approximately 600 times the TCDD-equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

Radionuclide COPCs at SWMU 15-009(e) include uranium-234, uranium-235/236, and uranium-238.

Uranium-234 was detected above the soil BV in two samples with a maximum activity of 8.85 pCi/g. Uranium-234 activities decreased with depth at both locations and decreased downgradient in samples collected for SWMU 15-004(f) at location 15-613384 (Plate 9). The lateral and vertical extent of uranium-234 are defined at and below the outfall, and further sampling for extent is warranted under the septic tank and lines.

Uranium-235/236 was detected above the soil BV in three samples with a maximum activity of 0.488 pCi/g. Uranium-235/236 activities decreased with depth at all locations and decreased downgradient in samples collected for SWMU 15-004(f) at location 15-613384 (Plate 9). The lateral and

vertical extent of uranium-235/236 are defined at and below the outfall, and further sampling for extent is warranted under the septic tank and lines.

Uranium-238 was detected above the soil BV in three samples with a maximum activity of 16.1 pCi/g. Uranium-238 activities decreased with depth at all locations and decreased downgradient in samples collected for SWMU 15-004(f) at location 15-613384 (Plate 9). The lateral and vertical extent of uranium-238 are defined at and below the outfall area, and further sampling for extent is warranted under the septic tank and lines.

6.8.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 3×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.02, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.7 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 0.2, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Residential Scenario

The total excess cancer risk for the residential scenario is 5×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 4 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Based on the risk-screening assessment results and the available data, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios at SWMU 15-009(e).

6.8.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations using the available data, no potential ecological risks to any receptors exist at SWMU 15-009(e).

6.9 SWMU 15-010(a), Septic Tank

6.9.1 Site Description and Operational History

SWMU 15-010(a) is the location of a former decommissioned septic tank (structure 15-0080) located east of former buildings 15-0001 and 15-0023 at R-Site at TA-15 (Figure 6.9-1). The septic tank was constructed of reinforced concrete and measured approximately 5 ft long × 3 ft wide × 4 ft deep with a 900-gal. capacity (LANL 1996, 054977, p. 5-79). The septic tank was constructed in 1944 and was

connected to a laboratory and shop (former building 15-0001) that were removed in 1962. The septic tank was later connected to relocated laboratory storage building 15-0023 (LANL 1996, 054977, p. 5-79). A 1965 memorandum (Michel 1965, 005292) states the septic tank was reactivated after 1961 to provide sanitary facilities for former building 15-0007, which housed a photography laboratory (AOC C-15-006). Engineering records show that building 15-0007 was destroyed in 1962, and no engineering drawings document the connection of the septic tank to building 15-0007 (LANL 1983, 094948). The septic tank was surveyed in 1965 and found to be free of HE and radioactivity (LANL 1996, 054977, p. 5-84). The septic tank was filled with sand and left in place (LANL 1996, 054977, p. 5-84). During the 2010 investigation, the SWMU 15-010(a) septic tank was not located. Areas of disturbed soil-tuff were evident in the area before the test trenches were excavated to locate the tank. The test trenches confirmed that the septic tank had been removed between 1995 and 2010. Subsequent discussions with knowledgeable site personnel also confirmed the septic tank had been removed.

6.9.2 Relationship to Other SWMUs and AOCs

SWMU 15-010(a) is located east of AOC C-15-005, northwest of SWMU 15-007(a), and south of the former north burn pit at SWMU 15-002.

6.9.3 Summary of Previous Investigations

A Phase I RFI was conducted at SWMU 15-010(a) from June 1995 to March 1996 (LANL 1996, 054977, pp. 5-82–5-84). Originally, the RFI was to have included soil sampling at the location of the SWMU 15-010(a) septic tank. However, because the septic tank was found to be in place, the RFI was modified to characterize the contents of the septic tank. During the RFI, the top of the septic tank was found to be damaged and the tank had been backfilled with sand. Two sand samples were collected from two depths at one location within the septic tank. The samples were field-screened for radioactivity, inorganic chemicals, and HE and submitted for analysis of radionuclides, TAL metals, VOCs, SVOCs, and HE (LANL 1996, 054977, pp. 5-79–5-80). Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2009, 105251). Screening-level data showed inorganic chemicals detected above BVs.

Because mercury concentrations were detected in the sand samples, the Phase I RFI report recommended a Phase II RFI to better characterize SWMU 15-010(a). During the 1997 Phase II RFI, four subsurface samples were collected from four locations at depth intervals ranging from 8.0–9.5 ft bgs (LANL 1997, 058499, pp. 17–20) and submitted for analysis of HE, TAL metals, and SVOCs.

All decision-level analytical data collected during previous investigations are presented and evaluated in section 6.9.4.4. Table 6.9-1 presents the samples collected and analyses requested at SWMU 15-010(a).

6.9.4 Site Contamination

6.9.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- All samples were field-screened for organic vapors; gross-alpha, -beta, and -gamma radioactivity; explosive compounds (TNT and RDX); and metals (barium, copper, lead, and uranium). Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2.

- The septic tank was removed previously as noted above (see deviations in Appendix B). Additionally, the inlet and outlet lines to the former septic tank were not located and are assumed to have been removed previously (see deviations in Appendix B).
- Six samples were collected from three locations associated with the former septic tank from 4.0–5.0 ft and 7.0–8.0 ft bgs (see deviations in Appendix B).
- Three samples were collected from one location south of the former septic tank location from 4.0–5.0 ft, 7.0–8.0 ft, and 9.0–9.5 ft bgs (see deviations in Appendix B).
- Two samples were collected from one location associated with the former septic tank outlet from 4.0–5.0 ft and 6.0–7.0 ft bgs (see deviations in Appendix B).
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, and isotopic uranium. One of the 11 samples was also analyzed for dioxins/furans and PCBs. The sampling location for the dioxin/furan and PCB analyses was selected based on its proximity to the potential contaminant source.

Sampling locations with decision-level data for SWMU 15-010(a) are shown in Figure 6.9-1. Table 6.9-1 presents the samples collected and analyses requested for SWMU 15-010(a). The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.9.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at SWMU 15-010(a), no organic vapors were detected. No radiological-screening results exceeded twice the maximum site background levels. No screening results for explosive compounds exceeded industrial SSLs. The field-screening results are presented in Table 3.2-2.

One soil sample collected at location 15-613429 from 7.0–8.0 ft bgs at SWMU 15-010(a) exceeded the screening threshold for lead. Therefore, an additional sample was collected from 9.0–9.5 ft bgs and submitted for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, and isotopic uranium analyses. The metals-screening results that guided additional sampling are presented in Table 3.2-2.

6.9.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 15-010(a) consisted of results from 15 samples (10 soil and 5 tuff) from 9 locations.

Inorganic Chemicals

Fifteen samples (10 soil and 5 tuff) were analyzed for TAL metals. Eleven samples (10 soil and 1 tuff) were analyzed for cyanide, nitrate, and perchlorate. Table 6.9-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Plate 2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Antimony was detected above the soil BV (0.83 mg/kg) in one sample at a concentration of 0.97 mg/kg and had DLs (0.52 mg/kg to 6.7 mg/kg) above the Qbt 2,3,4 BV (0.5 mg/kg) in five samples. Antimony is retained as a COPC.

Barium was detected above the soil and Qbt 2,3,4 BVs (295 mg/kg and 46 mg/kg) in one soil sample and five tuff samples with a maximum concentration of 824 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in soil are not statistically different from background (Figure H-102 and Table H-12). The tuff concentrations were above the maximum Qbt 2,3,4 background concentration (51.6 mg/kg). Barium is retained as a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in three samples with a maximum concentration of 4070 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (2230 mg/kg). Calcium is retained as a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in four samples with a maximum concentration of 18 mg/kg. The maximum concentration was above the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium is retained as a COPC.

Cobalt was detected above the Qbt 2,3,4 BV (3.14 mg/kg) in four samples with a maximum concentration of 5.5 mg/kg. Cobalt is retained as a COPC.

Copper was detected above the soil and Qbt 2,3,4 BVs (14.7 mg/kg and 4.66 mg/kg) in one soil sample and four tuff samples with a maximum concentration of 15.4 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in soil are not statistically different from background (Figure H-103 and Table H-12). The tuff concentrations were above the maximum Qbt 2,3,4 background concentration (6.2 mg/kg). Copper is retained as a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.52 mg/kg to 0.54 mg/kg) above the BVs in 10 samples. The DLs were only 0.02 mg/kg to 0.04 mg/kg above the BVs and cyanide was not detected in the other sample. Cyanide is not a COPC.

Lead was detected above the soil and Qbt 2,3,4 BVs (22.3 mg/kg and 11.2 mg/kg) in three soil samples and four tuff samples with a maximum concentration of 173 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are statistically different from background (Figure H-104 and Table H-12). Lead is retained as a COPC.

Mercury was detected above the soil and Qbt 2,3,4 BVs (0.1 mg/kg) in 10 soil samples and 4 tuff samples with a maximum concentration of 11.5 mg/kg. Mercury is retained as a COPC.

Nitrate was detected in 11 samples with a maximum concentration of 65 mg/kg. Nitrate is retained as a COPC.

Perchlorate was detected in six samples with a maximum concentration of 0.0034 mg/kg. Perchlorate is retained as a COPC.

Selenium was detected above the soil and Qbt 2,3,4 BVs (1.52 mg/kg and 0.3 mg/kg) in 10 soil samples and one tuff sample with a maximum concentration of 4.9 mg/kg and had DLs (0.35 mg/kg to 0.55 mg/kg) above the Qbt 2,3,4 BV in 4 samples. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure H-105 and Table H-12). Selenium is retained as a COPC.

Silver was detected above the soil and Qbt 2,3,4 BVs (1 mg/kg) in one soil sample and in two tuff samples with a maximum concentration of 4.9 mg/kg and had DLs (1.9 mg/kg to 2 mg/kg) above the Qbt 2,3,4 BV in two samples. Silver is retained as a COPC.

Thallium was detected above the soil BV (0.73 mg/kg) in 1 sample at a concentration of 0.83 mg/kg. The concentration was 0.1 mg/kg above the BV and below the 2 highest soil background concentrations (0.9 mg/kg and 1 mg/kg). Thallium was not detected or detected below the BVs in the other 14 samples (detected below BVs in 5 samples). Thallium is not a COPC.

Uranium was detected above the Qbt 2,3,4 BV (2.4 mg/kg) in four samples with a maximum concentration of 2.79 mg/kg. Concentrations were only 0.14 mg/kg to 0.39 mg/kg above the BV and below or similar to the 7 highest Qbt 2,3,4 background concentrations (2.5 mg/kg, 2.6 mg/kg, 2.7 mg/kg, 2.8 mg/kg, 2.9 mg/kg, 3.1 mg/kg, and 5 mg/kg). Uranium is not a COPC.

Vanadium was detected above the Qbt 2,3,4 BV (17 mg/kg) in 1 sample at a concentration of 17.4 mg/kg. The concentration was only 0.4 mg/kg above the BV and 3.6 mg/kg below the maximum Qbt 2,3,4 background concentration (21 mg/kg). Vanadium was detected below the BVs in the other 14 samples. Vanadium is not a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in one sample at a concentration of 64.3 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are statistically different from background (Figure H-106 and Table H-12). Zinc is retained as a COPC.

Organic Chemicals

Fifteen samples (10 soil and 5 tuff) were analyzed for explosive compounds and SVOCs. Eleven samples (10 soil and 1 tuff) were analyzed for VOCs. One soil sample was also analyzed for dioxins/furans and PCBs. Table 6.9-3 presents the detected organic chemicals. Plate 3 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at SWMU 15-010(a) include acenaphthene; bis(2-ethylhexyl)phthalate; diethylphthalate; di-n-butylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzofuran; 4-isopropyltoluene; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; and 1,2,3,4,6,7,8,9-octachlorodibenzofuran. All detected organic chemicals are retained as COPCs.

Radionuclides

Eleven samples (10 soil and 1 tuff) were analyzed for isotopic uranium. Radionuclides were not detected above BVs at SWMU 15-010(a).

6.9.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at the SWMU 15-010(a) are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMU 15-010(a) include antimony, barium, calcium, chromium, cobalt, copper, lead, mercury, nitrate, perchlorate, selenium, silver, and zinc.

Antimony was detected above the soil BV (0.83 mg/kg) in one sample at a concentration of 0.97 mg/kg and had DLs (0.52 mg/kg to 6.7 mg/kg) above the Qbt 2,3,4 BV (0.5 mg/kg) in five samples. The concentration decreased with depth and decreased laterally. The residential SSL was approximately 5 times and the industrial SSL was approximately 77 times the maximum DL. In addition, antimony was

either not detected or detected at much lower concentrations (approximately an order of magnitude) in the 2011 samples compared to the 1997 samples. Further sampling for extent of antimony is not warranted.

Barium was detected above the soil and Qbt 2,3,4 BVs in one soil sample and five tuff samples with a maximum concentration of 824 mg/kg. Single-depth samples were collected at locations 15-02520, 15-02521, 15-02522, and 15-02523 in 1997. Barium concentrations increased with depth at location 15-613431, but the concentration decreased from 8.5−9.0 ft (120 mg/kg) at location 15-02522, approximately 5 ft south. The residential SSL was approximately 102 times and the industrial SSL was approximately 1670 times the maximum 1997 concentration. Concentrations decreased laterally at locations 15-613318, 15-613319, 15-613320, and 15-613321 associated with the former north burn pit at SWMU 15-002 (Plate 2). The lateral extent of barium is defined, and further sampling for vertical extent is not warranted.

Calcium was detected above the Qbt 2,3,4 BV in three samples with a maximum concentration of 4070 mg/kg. Calcium was only detected above BV in the 1997 single-depth samples collected at locations 15-02521, 15-02522, and 15-02523. The NMED residential essential nutrient SSL was approximately 3200 times the maximum concentration. Concentrations decreased laterally. The lateral extent of calcium is defined, and further sampling for vertical extent is not warranted.

Chromium was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 18 mg/kg. Chromium was only detected above BV in the 1997 single-depth samples collected at locations 15-02520, 15-02521, 15-02522, and 15-02523. Concentrations were below the maximum Qbt 2,3,4 background concentration (13 mg/kg) at locations 15-02520, 15-02521, and 15-02522. As discussed in section 4.2, there was no known use of hexavalent chromium at this site, and no site conditions would have produced hexavalent chromium. Therefore, the total chromium results represent trivalent chromium concentrations. The trivalent chromium residential SSL was 6500 times the maximum concentration. Chromium concentrations decreased laterally at locations 15-613318, 15-613319, 15-613320, and 15-613321 associated with the former north burn pit at SWMU 15-002 (Plate 2). The lateral extent of chromium is defined, and further sampling for vertical extent is not warranted.

Cobalt was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 5.5 mg/kg. Cobalt was only detected above BV in the 1997 single-depth samples collected at locations 15-02520, 15-02521, 15-02522, and 15-02523. Concentrations were only 1.3 mg/kg to 2.4 mg/kg above the BV. The residential SSL was approximately 4 times and the industrial SSL was approximately 64 times the maximum concentration. Cobalt concentrations decreased laterally. The lateral extent of cobalt is defined, and further sampling for vertical extent is not warranted.

Copper was detected above the soil and Qbt 2,3,4 BVs in one soil sample and four tuff samples with a maximum concentration of 15.4 mg/kg. Copper concentrations decreased with depth at location 15-613430. Only single-depth samples were collected in 1997 at locations 15-02520, 15-02521, 15-02522, and 15-02523. The residential SSL was approximately 239 times the maximum 1997 concentration. Concentrations decreased laterally at locations 15-613318, 15-613319, 15-613320, and 15-613321 associated with the former north burn pit at SWMU 15-002 (Plate 2). The lateral extent of copper is defined, and further sampling for vertical extent is not warranted.

Lead was detected above the soil and Qbt 2,3,4 BVs in three soil samples and four tuff samples with a maximum concentration of 173 mg/kg. Lead concentrations decreased with depth at locations 15-613429 and 15-613430. Only single-depth samples were collected at locations 15-02520, 15-02521, 15-02522, and 15-02523 in 1997. The residential SSL was approximately 15 times and the industrial SSL was approximately 30 times the maximum concentration at these locations. Concentrations decreased laterally at locations 15-613318, 15-613319, 15-613320, and 15-613321 associated with the former north

burn pit at SWMU 15-002 (Plate 2). The lateral extent of lead is defined, and further sampling for vertical extent is not warranted.

Mercury was detected above the soil and Qbt 2,3,4 BVs in 10 soil samples and 4 tuff samples with a maximum concentration of 11.5 mg/kg. Mercury concentrations decreased with depth at all 2011 locations and only single-depth samples were collected in 1997 at locations 15-02520, 15-02521, 15-02522, and 15-02523. The residential SSL was approximately 2.2 times and the industrial SSL was approximately 37 times the maximum 1997 concentration (10.5 mg/kg). Although the combination of mercury data at locations 15-613427 and 15-02523 beneath the location of the former septic tank indicated concentrations were increasing with depth to 8.5–9.0 ft bgs, the industrial SSL is more than an order of magnitude above the mercury concentration at this depth (10.5 mg/kg). Concentrations decreased laterally at locations 15-613318, 15-613319, 15-613320, and 15-613321 associated with the former north burn pit at SWMU 15-002 (Plate 2). The lateral extent of mercury is defined, and further sampling for vertical extent is not warranted.

Nitrate was detected in 11 samples with a maximum concentration of 65 mg/kg. The elevated nitrate concentrations (greater than 20 mg/kg) were only at locations 15-613329 and 15-613330. All other concentrations (0.28 mg/kg to 2.1 mg/kg) reflect naturally occurring concentrations of nitrate. Nitrate concentrations decreased with depth at locations 15-613329 and 15-613330. The residential SSL was approximately 1920 times the maximum concentration. Concentrations decreased laterally at locations 15-613318, 15-613319, 15-613320, and 15-613321 associated with the former north burn pit at SWMU 15-002 (Plate 2). The lateral and vertical extent of nitrate are defined.

Perchlorate was detected in six samples with a maximum concentration of 0.0034 mg/kg. Perchlorate concentrations were below the EDLs at all locations. The residential SSL was 16,100 times the maximum concentration. Further sampling for extent of perchlorate is not warranted.

Selenium was detected above the soil and Qbt 2,3,4 BVs in 10 soil samples and 1 tuff sample with a maximum concentration of 4.9 mg/kg and had DLs (0.35 mg/kg to 0.55 mg/kg) above the Qbt 2,3,4 BV in 4 samples. Selenium concentrations decreased with depth at location 15-613329 and did not change substantially with depth at the other locations (0.5 mg/kg to 1.4 mg/kg). Concentrations did not change substantially laterally (less than 3 mg/kg) at locations 15-613318, 15-613319, 15-613320, and 15-613321 associated with the former north burn pit at SWMU 15-002 (Plate 2). The residential SSL was approximately 80 times the maximum concentration and approximately 710 times the maximum DL. Further sampling for extent of selenium is not warranted.

Silver was detected above the soil and Qbt 2,3,4 BVs in one soil sample and two tuff samples with a maximum concentration of 4.9 mg/kg and had DLs (1.9 mg/kg to 2 mg/kg) above the Qbt 2,3,4 BV in two samples. Only single-depth samples were collected in 1997 at locations 15-02520, 15-02521, 15-02522, and 15-02523. Silver concentrations increased with depth at location 15-613430, but the concentration was only 0.3 mg/kg above the BV. The residential SSL was approximately 80 times the maximum concentration and approximately 195 times the maximum DL. Concentrations decreased laterally at locations 15-613318, 15-613319, 15-613320, and 15-613321 associated with the former north burn pit at SWMU 15-002 (Plate 2). The lateral extent of silver is defined, and further sampling for vertical extent is not warranted.

Zinc was detected above the soil BV in one sample at a concentration of 64.3 mg/kg. Zinc concentrations decreased with depth and decreased laterally at locations 15-613320 and 15-613321 associated with the former north burn pit at SWMU 15-002 (Plate 2). The lateral and vertical extent of zinc are defined.

Organic Chemicals

Organic COPCs at SWMU 15-010(a) include acenaphthene; bis(2-ethylhexyl)phthalate; diethylphthalate; di-n-butylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzofuran; 4-isopropyltoluene; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; and 1,2,3,4,6,7,8,9-octachlorodibenzofuran.

Acenaphthene was detected in one sample at a concentration of 0.096 mg/kg. The concentration decreased with depth, was below the EQL, and decreased laterally. The lateral and vertical extent of acenaphthene are defined.

Bis(2-ethylhexyl)phthalate was detected in five samples with a maximum concentration of 0.099 mg/kg. The concentrations were below the EQLs at all locations and did not change substantially laterally (less than 0.06 mg/kg). The residential SSL was approximately 3840 times the maximum concentration. Further sampling for extent of bis(2-ethylhexyl)phthalate is not warranted.

Diethylphthalate was detected in one sample at a concentration of 1.5 mg/kg. The concentration was detected in the deeper sample at location 15-613431. The residential SSL was approximately 32,870 times the concentration. Concentrations decreased laterally at locations 15-613318 and 15-613321 associated with the former north burn pit at SWMU 15-002 (Plate 3). Further sampling for extent of diethylphthalate is not warranted.

Di-n-butylphthalate was detected in seven samples with a maximum concentration of 0.19 mg/kg. Concentrations were below the EQLs at all locations and concentrations did not change substantially laterally (0.01 mg/kg to 0.08 mg/kg). The residential SSL was approximately 32,400 times the maximum concentration. Further sampling for extent of di-n-butylphthalate is not warranted.

Isopropyltoluene[4-] was detected in one sample at a concentration of 0.0017 mg/kg. The concentration decreased with depth, was below the EQL, and decreased laterally. The lateral and vertical extent of 4-isopropyltoluene are defined.

Five dioxin/furan congeners were detected in one sample. The residential SSL was approximately 250 times the TCDD-equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

Radionuclides were not detected above BVs at SWMU 15-010(a).

6.9.5 Summary of Human Health Risk Screening

Industrial Scenario

Because samples were not collected from 0.0–1.0-ft-bgs depth interval, the industrial scenario was not evaluated.

Construction Worker Scenario

No carcinogenic or radionuclide COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.7, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios at SWMU 15-010(a).

6.9.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks for any receptor exist at SWMU 15-010(a).

6.10 AOC C-15-004, Former Transformer Station

6.10.1 Site Description and Operational History

AOC C-15-004 is a former transformer station (former structure 15-0056) located approximately 30 ft southwest of the former E-F Firing Site control room (building 15-0027) at TA-15 (Figure 6.8-1). Two transformers (18-gal. and 30-gal. capacity) were located on a 5-ft-long wooden platform 10 ft above the ground (LANL 1993, 020946, p. 7-21). Each transformer contained mineral oil with PCBs of unknown concentration. The date of installation is not known, but the transformers were removed from the site in 1989 (Francis 1992, 057736, p. 2). No evidence was found of a release on the wooden platform or on the soil beneath the platform (LANL 1993, 020946, p. 7-21).

6.10.2 Relationship to Other SWMUs and AOCs

AOC C-15-004 is located northwest of SWMU 15-009(e). No SWMUs or AOCs are associated with AOC C-15-004.

6.10.3 Summary of Previous Investigations

During the 1994 Phase I RFI conducted at AOC C-15-004, one surface sample (0.0–0.5 ft bgs) was collected from each of two locations beneath the former transformer platform (LANL 1995, 050294, p. 4-25). The samples were field-screened for radioactivity and submitted for analysis of PCBs. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2009, 105251). Screening-level data showed no PCBs detected in any of the RFI samples.

6.10.4 Site Contamination

6.10.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- All samples were field-screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2.
- Four samples were collected from two locations beneath the former transformer platform from 0.0–1.0 ft and 2.0–3.0 ft bgs.

- All samples were analyzed for TAL metals, PCBs, and isotopic uranium. One of the four samples was also analyzed for dioxins/furans. The sampling location for the dioxin/furan analyses was selected based on its proximity to the potential contaminant source.

Sampling locations with decision-level data for AOC C-15-004 are shown in Figure 6.8-1. Table 6.10-1 presents the samples collected and analyses requested for AOC C-15-004. The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.10.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at AOC C-15-004, a concentration of 0.1 ppm was detected in all four samples. No radiological-screening results exceeded twice the maximum site background levels. The field-screening results are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the field-screening results.

6.10.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision level data at AOC C-15-004 consisted of results from four soil samples collected from two locations.

Inorganic Chemicals

Four soil samples were analyzed for TAL metals. Table 6.10-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.8-2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Antimony was detected above the soil BV (0.83 mg/kg) in one sample at a concentration of 1 mg/kg. The concentration is the same as the maximum soil background concentration. Antimony was detected below the BV in the other three samples. Antimony is not a COPC.

Cadmium was detected above the soil BV (0.4 mg/kg) in two samples with a maximum concentration of 2 mg/kg. Concentrations were 0.25 mg/kg to 1.6 mg/kg above the BV and below or similar to the 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). Cadmium was detected below the BV in the other two samples. Cadmium is not a COPC.

Copper was detected above the soil BV (14.7 mg/kg) in three samples with a maximum concentration of 52.6 mg/kg. Copper is retained as a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in three samples with a maximum concentration of 184 mg/kg. Zinc is retained as a COPC.

Organic Chemicals

Four soil samples were analyzed for PCBs. One of the four samples was also analyzed for dioxins/furans. Table 6.10-3 presents the detected organic chemicals. Figure 6.8-3 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at AOC C-15-004 include 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8,9-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzodioxin; 1,2,3,6,7,8-hexachlorodibenzodioxin; 1,2,3,7,8,9-hexachlorodibenzodioxin; 1,2,3,4,7,8-hexachlorodibenzofuran;

1,2,3,6,7,8-hexachlorodibenzofuran; 2,3,4,6,7,8-hexachlorodibenzofuran; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 1,2,3,7,8-pentachlorodibenzodioxin; 2,3,4,7,8-pentachlorodibenzofuran; and 2,3,7,8-tetrachlorodibenzodioxin. All detected organic chemicals are retained as COPCs.

Radionuclides

Four soil samples were analyzed for isotopic uranium. Table 6.10-4 presents the radionuclides detected above BVs. Figure 6.8-4 shows the spatial distribution of radionuclides detected above BVs.

Uranium-234 was detected above the soil BV (2.59 pCi/g) in one sample at an activity of 6.08 pCi/g. Uranium-234 is retained as a COPC.

Uranium-235/236 was detected above the soil BV (0.2 pCi/g) in one sample at an activity of 0.311 pCi/g. Uranium-235/236 is retained as a COPC.

Uranium-238 was detected above the soil BV (2.29 pCi/g) in three samples with a maximum activity of 13.9 pCi/g. Uranium-238 is retained as a COPC.

6.10.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at AOC C-15-004 are discussed below.

Inorganic Chemicals

Inorganic COPCs at AOC C-15-004 include copper and zinc.

Copper was detected above the soil BV in three samples with a maximum concentration of 52.6 mg/kg. Copper concentrations decreased with depth at location 15-613295, increased with depth at location 15-613296, and decreased downgradient at location 15-613423 associated with SWMU 15-009(e) (Figure 6.8-2). The residential SSL was approximately 60 times and the industrial SSL was approximately 987 times the maximum concentration. The lateral extent of copper is defined, and further sampling for vertical extent is not warranted.

Zinc was detected above the soil BV in three samples with a maximum concentration of 184 mg/kg. Zinc concentrations decreased with depth at both locations and decreased downgradient at location 15-613423 associated with SWMU 15-009(e) (Figure 6.8-2). The lateral and vertical extent of zinc are defined.

Organic Chemicals

Organic COPCs at AOC C-15-004 include 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8,9-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzodioxin; 1,2,3,6,7,8-hexachlorodibenzodioxin; 1,2,3,7,8,9-hexachlorodibenzodioxin; 1,2,3,4,7,8-hexachlorodibenzofuran; 1,2,3,6,7,8-hexachlorodibenzofuran; 2,3,4,6,7,8-hexachlorodibenzofuran; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 1,2,3,7,8-pentachlorodibenzodioxin; 2,3,4,7,8-pentachlorodibenzofuran; and 2,3,7,8-tetrachlorodibenzodioxin.

Fourteen dioxin/furan congeners were detected in one sample. Concentrations decreased downgradient at location 15-613423 associated with SWMU 15-009(e) (Figure 6.8-3). The residential SSL was approximately 8.6 times and the industrial SSL was approximately 44 times the TCDD-equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

Radionuclide COPCs at AOC C-15-004 include uranium-234, uranium-235/236, and uranium-238.

Uranium-234 was detected above the soil BV in one sample at an activity of 6.08 pCi/g. Uranium-234 activities decreased with depth and decreased downgradient in samples collected for SWMU 15-004(f) at location 15-613384 (Plate 9). The lateral and vertical extent of uranium-234 are defined.

Uranium-235/236 was detected above the soil BV in one sample at an activity of 0.311 pCi/g. Uranium-235/236 activities decreased with depth and decreased downgradient in samples collected for SWMU 15-004(f) at location 15-613384 (Plate 9). The lateral and vertical extent of uranium-235/236 are defined.

Uranium-238 was detected above the soil BV in three samples with a maximum activity of 13.9 pCi/g. Uranium-238 activities decreased with depth and decreased downgradient in samples collected for SWMU 15-004(f) at location 15-613384 (Plate 9). The lateral and vertical extent of uranium-235/236 are defined.

6.10.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.0009, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.6 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.03, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.02, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 3 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, or residential scenarios at AOC C-15-004.

6.10.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks for any receptor exist at AOC C-15-004.

6.11 AOC C-15-005, Potential Soil Contamination from Former Building

6.11.1 Site Description and Operational History

AOC C-15-005 is an area of potential soil contamination associated with the footprint of a former laboratory and shop (former building 15-0001) at TA-15 (Figure 6.11-1). Former building 15-0001 was constructed in 1944 to support experiments performed at Firing Sites C and D (LANL 1993, 020946, p. 9-2). Engineering records document that building 15-0001 was destroyed by burning in 1962 (LANL 2009, 105251). The remaining debris from the demolition of building 15-0001 was disposed of at MDA N [SWMU 15-007(a)] in 1962 (LANL 1993, 020946, p. 9-2). Information about the use of materials in this building is limited, but thorium contamination was discovered in the building and cleaned up (LANL 1993, 020946, p. 9-2).

6.11.2 Relationship to Other SWMUs and AOCs

AOC C-15-005 is located northwest of SWMU 15-007(a) and west of SWMU 15-010(a) and the northernmost SWMU 15-002 burn pit.

6.11.3 Summary of Previous Investigations

During the Phase I RFI conducted at AOC C-15-005 from June 1995 to March 1996, four soil samples were collected from two depths (0.0–0.5 ft and 1.5–2.0 ft bgs) at two locations within the building footprint. The samples were field-screened for radioactivity, VOCs, and HE. One surface sample and both subsurface samples were submitted for analysis of inorganic chemicals, VOCs, SVOCs, isotopic thorium, and uranium (LANL 1996, 054977, pp. 5-16–5-18). Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2009, 105251). Screening-level data showed inorganic chemicals detected above BVs, detected VOCs, and isotopic thorium detected above BVs.

6.11.4 Site Contamination

6.11.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- All samples were field-screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2.
- A total of 12 samples were collected from 6 locations within and next to the footprint of the former building 15-0001 from 0.0–1.0 ft and 2.0–3.0 ft bgs. Two of the 12 samples were collected from 1 location beneath the asphalt driveway located next to former building 15-0001 from 0.5–1.5 ft and 2.5–3.5 ft bgs.
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, isotopic uranium, and isotopic thorium. One of the 12 samples was also analyzed for dioxins/furans and PCBs. The sampling location for the dioxin/furan and PCB analyses was selected based on its proximity to the potential contaminant source.

Sampling locations with decision-level data for AOC C-15-005 are shown in Figure 6.11-1. Table 6.11-1 presents the samples collected and analyses requested for AOC C-15-005. The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.11.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at AOC C-15-005, no organic vapors were detected. No radiological-screening results exceeded twice the maximum site background levels. The field-screening results are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the field-screening results.

6.11.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Inorganic Chemicals

Twelve samples (six soil and six tuff) were analyzed for TAL metals, nitrate, cyanide, and perchlorate. Table 6.11-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Plate 2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Aluminum was detected above the Qbt 2,3,4 BV (7340 mg/kg) in three samples with a maximum concentration of 15,300 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (8370 mg/kg). Aluminum is retained as a COPC.

Antimony was detected above the soil BV (0.83 mg/kg) in one sample at a concentration of 2.6 mg/kg. Antimony is retained as a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in 2 samples with a maximum concentration of 3.3 mg/kg. The concentrations were only 0.21 mg/kg and 0.51 mg/kg above the BV and below the 2 highest Qbt 2,3,4 background concentrations (4 mg/kg and 5 mg/kg). Arsenic was detected below the BVs in the other 10 samples. Arsenic is not a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in five samples with a maximum concentration of 129 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (51.6 mg/kg). Barium is retained as a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in five samples with a maximum concentration of 4790 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (2230 mg/kg). Calcium is retained as a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in three samples with a maximum concentration of 10.6 mg/kg. The concentrations were only 1.8 mg/kg to 3.5 mg/kg above the BV and 2.4 mg/kg to 4 mg/kg below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium was detected below the BVs in the other nine samples. Chromium is not a COPC.

Copper was detected above the Qbt 2,3,4 BV (4.66 mg/kg) in 1 sample at a concentration of 5.1 mg/kg. The concentration was only 0.44 mg/kg above the BV and below the 2 highest Qbt 2,3,4 background concentrations (5.7 mg/kg and 6.2 mg/kg). Copper was detected below the BVs in the other 11 samples. Copper is not a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.54 mg/kg to 0.58 mg/kg) above the BVs in nine samples. The DLs were only 0.04 mg/kg to 0.08 mg/kg above the BVs and cyanide was not detected in the other three samples. Cyanide is not a COPC.

Lead was detected above the soil and Qbt 2,3,4 BVs (22.3 mg/kg and 11.2 mg/kg) in three soil samples and five tuff samples with a maximum concentration of 45.4 mg/kg. Concentrations were above the maximum soil and Qbt 2,3,4 background concentrations (28 mg/kg and 15.5 mg/kg). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in three samples with a maximum concentration of 2650 mg/kg. The concentrations were 670 mg/kg to 960 mg/kg above the BV and below the 2 highest Qbt 2,3,4 background concentrations (2720 mg/kg and 2820 mg/kg). Magnesium was detected below BVs in the other nine samples. Magnesium is not a COPC.

Mercury was detected above the soil BV (0.1 mg/kg) in four samples with a maximum concentration of 2.97 mg/kg and had a DL (0.121 mg/kg) above the BV in one sample. Mercury is retained as a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in three samples with a maximum concentration of 9 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (7 mg/kg). Nickel is retained as a COPC.

Nitrate was detected in 10 samples with a maximum concentration of 1.4 mg/kg. Nitrate is naturally occurring and the concentrations reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Perchlorate was detected in three samples with a maximum concentration of 0.023 mg/kg. Perchlorate is retained as a COPC.

Selenium was detected above the soil and Qbt 2,3,4 BVs (1.52 mg/kg and 0.3 mg/kg) in two soil samples and six tuff samples with a maximum concentration of 1.9 mg/kg. Selenium is retained as a COPC.

Zinc was detected above the soil and Qbt 2,3,4 BVs (48.8 mg/kg and 63.5 mg/kg) in two fill samples and one tuff sample with a maximum concentration of 138 mg/kg. Concentrations were above the maximum soil and Qbt 2,3,4 background concentrations (75.5 mg/kg and 65.6 mg/kg). Zinc is retained as a COPC.

Organic Chemicals

Twelve samples (six soil and six tuff) were analyzed for VOCs, SVOCs, and explosive compounds and one tuff sample was analyzed for PCBs and dioxins/furans. Table 6.11-3 presents the detected organic chemicals. Plate 3 shows the spatial distribution of detected organic chemicals.

PAHs

PAHs are a class of SVOCs frequently detected as a result of environmental sampling but generally were not released from the SWMUs or AOCs investigated. PAHs unrelated to site activities are thus often detected in samples analyzed for the presence of site related SVOCs.

PAHs are known to be widely distributed in the environment from a number of sources, both natural, such as forest fires, and anthropogenic, such as combustion of fossil fuels, oil drips off motor vehicles, vehicle tires, coal tar pitch, and weathering or eroding of asphalt pavement (Kose et al. 2008, 219977; Teaf 2008, 219976). PAHs from these sources generally occur as complex mixtures, not as single compounds. Individual PAH compounds can be manufactured for research purposes and some PAHs (e.g., anthracene, fluorene, naphthalene, and pyrene) are used in dye production, in the manufacture of synthetic fibers, and in plastics and pesticides.

The principal sources of PAHs in soil along parking lots, roads, and highways are vehicular exhaust and emissions, the wearing of tires, and asphalt. PAH-containing materials, such as asphalt and rubber

particles, do not easily dissolve in water, thus preventing migration, except as suspended particles in storm water. PAH concentrations in excess of soil cleanup levels may result from common anthropogenic sources such as runoff from asphalt paved areas (e.g., roads and parking areas).

Site Activities

AOC C-15-005 was identified as an AOC because of potential soil contamination associated with the footprint of a former laboratory and shop (former building 15-0001) that supported experiments performed at Firing Sites C and D. PAHs are not associated with the laboratory work. However, as noted above in section 6.11.4.1, an asphalt driveway is located next to former building 15-0001, and samples were collected below the asphalt at location 15-613301 (Appendix J, Figures J-2 and J-3). Therefore, the PAHs detected in samples used to characterize this site [acenaphthene, anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene] are not related to historical Laboratory operations at this site and are not COPCs.

Organic COPCs

Other organic chemicals detected at AOC C-15-005 include acetone; benzyl alcohol; butylbenzylphthalate; diethylphthalate; di-n-butylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; and 1,2,3,4,6,7,8,9-octachlorodibenzodioxin. All detected organic chemicals listed are retained as COPCs.

Radionuclides

Twelve samples (six soil and six tuff) were analyzed for isotopic thorium and isotopic uranium. Radionuclides were not detected above BVs at AOC C-15-005.

6.11.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at AOC C-15-005 are discussed below.

Inorganic Chemicals

Inorganic COPCs at AOC C-15-005 include aluminum, antimony, barium, calcium, lead, mercury, nickel, perchlorate, selenium, and zinc.

Aluminum was detected above the Qbt 2,3,4 BV in three samples with a maximum concentration of 15,300 mg/kg. Aluminum concentrations did not change substantially with depth at location 15-613300 (100 mg/kg) and increased with depth at locations 15-613302 and 15-613303. The residential SSL was approximately 5.1 times (the concentrations were approximately 62,700 mg/kg to 64,800 mg/kg below the residential SSL) and the industrial SSL was approximately 85 times the maximum concentration. Aluminum concentrations decreased laterally. The lateral extent of aluminum is defined, and further sampling for vertical extent is not warranted.

Antimony was detected above the soil BV in one sample at a concentration of 2.6 mg/kg. Antimony concentrations decreased with depth and increased laterally to the west. However, the extent is limited by R-Site Road located approximately 20 ft west of location 15-613301. The residential SSL was approximately 12 times and the industrial SSL was approximately 200 times the concentration. The vertical extent of antimony is defined, and further sampling for lateral extent is not warranted.

Barium was detected above the Qbt 2,3,4 BV in five samples with a maximum concentration of 129 mg/kg. Barium concentrations decreased with depth at locations 15-613298, 15-613300, 15-613301, and 15-613302 (concentrations in the shallower samples [111 mg/kg, 146 mg/kg, 120 mg/kg, and 151 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]) and did not change with depth at location 15-613303. The residential SSL was approximately 138 times the concentration at location 15-613303. Concentrations decreased laterally. The lateral and vertical extent of barium are defined.

Calcium was detected above the Qbt 2,3,4 BV in five samples with a maximum concentration of 4790 mg/kg. Calcium concentrations decreased with depth at location 15-613302 (the concentration in the shallower sample [3500 mg/kg] was below the soil BV sample [Appendix F, Inorganic Chemicals Table]). Concentrations increased with depth at locations 15-613298, 15-613299, 15-613300, and 15-613303. The NMED residential essential nutrient SSL was approximately 2710 times the maximum concentration. Calcium concentrations decreased laterally. The lateral extent of calcium is defined, and further sampling for vertical extent is not warranted.

Lead was detected above the soil and Qbt 2,3,4 BVs in three fill and five tuff samples with a maximum concentration of 45.4 mg/kg. Lead concentrations decreased with depth at location 15-613299, did not change substantially with depth at location 15-613301 (2 mg/kg), and increased with depth at locations 15-613300, 15-613302, and 15-613303. Concentrations increased laterally to the west and south. The western extent is limited by R-Site Road, located approximately 20 ft west of location 15-613301. The residential SSL was approximately 9 times and the industrial SSL was approximately 18 times the maximum concentration (355 mg/kg and 755 mg/kg below the SSLs). Further sampling for extent of lead is not warranted.

Mercury was detected above the soil BV in four samples with a maximum concentration of 2.97 mg/kg and had a DL (0.121 mg/kg) above the BV in one sample. Mercury concentrations decreased with depth at all locations and increased laterally to the west, north, and east. The western and northern extent is limited by R-Site Road, located approximately 20 ft west of location 15-613301 and approximately 55 ft north of location 15-613298. Concentrations decreased to the east at location 15-613322 associated with the former north burn pit at SWMU 15-002 (Plate 2). The residential SSL was approximately 8 times and the industrial SSL was approximately 131 times the maximum concentration. The vertical extent of mercury is defined, and further sampling for lateral extent is not warranted.

Nickel was detected above the Qbt 2,3,4 BV in three samples with a maximum concentration of 9 mg/kg. Nickel concentrations decreased with depth at location 15-613300 (the concentration in the shallower sample [9.5 mg/kg] was below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations increased with depth at locations 15-613302 and 15-613303. The residential SSL was approximately 173 times the maximum concentration. Nickel concentrations decreased laterally. The lateral extent of nickel is defined, and further sampling for vertical extent is not warranted.

Perchlorate was detected in three samples with a maximum concentration of 0.023 mg/kg. Perchlorate concentrations did not change substantially with depth at location 15-613303 (approximately 0.02 mg/kg) and decreased laterally. The residential SSL was approximately 2380 times the maximum concentration. Further sampling for extent of perchlorate is not warranted.

Selenium was detected above the soil and Qbt 2,3,4 BVs in two soil samples and six tuff samples with a maximum concentration of 1.9 mg/kg. Selenium concentrations did not change substantially with depth and laterally (0.4 mg/kg or less). The residential SSL was approximately 206 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Zinc was detected above the soil and Qbt 2,3,4 BVs in two fill samples and one tuff sample with a maximum concentration of 138 mg/kg. Zinc concentrations decreased with depth at location 15-613301 and increased with depth at location 15-613302. The residential SSL was approximately 170 times the maximum concentration. Concentrations decreased laterally. The lateral extent of zinc is defined, and further sampling for vertical extent is not warranted.

Organic Chemicals

Organic COPCs at AOC C-15-005 include acetone; benzyl alcohol; butylbenzylphthalate; diethylphthalate; d-n-butylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; and 1,2,3,4,6,7,8,9-octachlorodibenzodioxin.

Acetone was detected in four samples with a maximum concentration of 0.012 mg/kg. Concentrations did not change substantially with depth (0.0 mg/kg and 0.002 mg/kg), were below the EQLs, and did not change substantially laterally (0.0093 mg/kg and 0.01 mg/kg). The residential SSL was approximately 5,525,000 times the maximum concentration. Further sampling for extent of acetone is not warranted.

Benzyl alcohol was detected in one sample at a concentration of 0.044 mg/kg. The concentration was below the EQL. The residential SSL was approximately 141,000 times the concentration. Concentrations decreased laterally. Further sampling for extent of benzyl alcohol is not warranted.

Butylbenzylphthalate was detected in one sample at a concentration of 0.038 mg/kg. The concentration decreased with depth, was below the EQL, and increased to the west. The western extent is limited by R-Site Road, located approximately 20 ft west of location 15-613301. The residential SSL was approximately 73,700 times the concentration. The vertical extent of butylbenzylphthalate is defined, and further sampling for lateral extent is not warranted.

Diethylphthalate was detected in one sample at a concentration of 13 mg/kg. The concentration decreased with depth and increased to the west. The western extent is limited by R-Site Road, located approximately 20 ft west of location 15-613301. The residential SSL was approximately 3800 times the concentration. The vertical extent of diethylphthalate is defined, and further sampling for lateral extent is not warranted.

Di-n-butylphthalate was detected in one sample at a concentration of 0.093 mg/kg. The concentration decreased with depth, was below the EQL, and increased to the west. The western extent is limited by R-Site Road, located approximately 20 ft west of location 15-613301. The residential SSL was approximately 66,200 times the concentration. The vertical extent of di-n-butylphthalate is defined, and further sampling for lateral extent is not warranted.

Three dioxin/furan congeners were detected in one sample. The residential SSL was approximately 1010 times the TCDD-equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

Radionuclides were not detected above BVs at AOC C-15-005.

6.11.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.07, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

Construction Worker Scenario

No carcinogenic or radionuclide COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios at AOC C-15-005.

6.11.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks for any receptors exist at AOC C-15-005.

6.12 AOC C-15-006, Potential Soil Contamination from Former Building

6.12.1 Site Description and Operational History

AOC C-15-006 is an area of potential soil contamination associated with the footprint of a former control building and darkroom (former building 15-0007) at TA-15 (Figure 6.12-1). Former building 15-0007 was constructed in 1944 to support activities performed at Firing Sites C and D (LANL 1993, 020946, p. 9-2). Engineering records document that building 15-0007 was destroyed by burning in 1962 (LANL 1993, 020946, p. 9-2). Debris from the demolition of building 15-0007 was disposed of at MDA N in 1962 [SWMU 15-007(a)] (LANL 1993, 020946, p. 9-2).

6.12.2 Relationship to Other SWMUs and AOCs

AOC C-15-006 is located north of AOC C-15-005, SWMU 15-010(a), the former north burn pit at SWMU 15-002, and SWMU 15-007(a).

6.12.3 Summary of Previous Investigations

During the 1995 Phase I RFI conducted at AOC C-15-006, two soil samples were collected from two depths (0.0–0.5 ft and 1.5–2.0 ft bgs) at one location within the footprint of building 15-0007 (LANL 1996, 054977, pp. 5-20–5-22). The samples were field-screened for radioactivity, inorganic chemicals, and HE. Only the surface sample was submitted for analysis for TAL metals, SVOCs, isotopic thorium, and uranium (LANL 1996, 054977, pp. 5-20–5-22). Data from the Phase I RFI are screening-level data

and are presented in Appendix B of the HIR (LANL 2009, 105251). Screening-level data showed no inorganic chemicals detected above BVs, no detected VOCs, and no radionuclides detected above BVs.

6.12.4 Site Contamination

6.12.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- All samples were field-screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2.
- A total of 12 samples were collected from 6 locations within and next to the footprint of the former building 15-0007 from 0.0–1.0 ft and 2.0–3.0 ft bgs.
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, isotopic uranium, and isotopic thorium. One of the 12 samples was also analyzed for dioxins/furans and PCBs. The sampling location for the dioxin/furan and PCB analyses was selected based on its proximity to the potential contaminant source.

Sampling locations with decision-level data for AOC C-15-006 are shown in Figure 6.12-1. Table 6.12-1 presents the samples collected and analyses requested for AOC C-15-006. The geodetic coordinates of sampling locations are presented in Table 3.2-1.

6.12.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at AOC C-15-006, no organic vapors were detected. No radiological-screening results exceeded twice the maximum site background levels. The field-screening results are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the field-screening results.

6.12.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC C-15-006 consisted of results from 12 soil samples from 6 locations.

Inorganic Chemicals

Twelve soil samples were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.12-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Plate 2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Antimony was detected above the soil BV (0.83 mg/kg) in seven samples with a maximum concentration of 10 mg/kg. The quantile and slippage tests indicated site concentrations of antimony in soil are statistically different from background (Figure H-107 and Table H-13). Antimony is retained as a COPC.

Cadmium was detected above the soil BV (0.4 mg/kg) in 2 samples with a maximum concentration of 1.2 mg/kg. The concentrations were 0.05 mg/kg and 0.8 mg/kg above the BV and below the 2 or 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). Cadmium was not detected above BV in the other 10 samples. Cadmium is not a COPC.

Cobalt was detected above the soil BV (8.64 mg/kg) in two samples with a maximum concentration of 15.3 mg/kg. The Gehan and quantile tests indicated site concentrations of cobalt in soil are statistically different from background (Figure H-108 and Table H-13). Cobalt is retained as a COPC.

Copper was detected above the soil BV (14.7 mg/kg) in one sample at a concentration of 16.2 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in soil are statistically different from background (Figure H-109 and Table H-13). Copper is retained as a COPC.

Cyanide was not detected above the soil BV (0.5 mg/kg) but had DLs (0.53 mg/kg to 0.59 mg/kg) above the BV in seven samples. The DLs were only 0.03 mg/kg to 0.09 mg/kg above the BV, and cyanide was not detected in the other five samples. Cyanide is not a COPC.

Iron was detected above the soil BV (21,500 mg/kg) in one sample at a concentration of 35,800 mg/kg. The Gehan and quantile tests indicated site concentrations of iron in soil are statistically different from background (Figure H-110 and Table H-13). Iron is retained as a COPC.

Lead was detected above the soil BV (22.3 mg/kg) in six samples with a maximum concentration of 43.6 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are statistically different from background (Figure H-111 and Table H-13). Lead is retained as a COPC.

Manganese was detected above the soil BV (671 mg/kg) in two samples with a maximum concentration of 1120 mg/kg. The Gehan and quantile tests indicated site concentrations of manganese in soil are statistically different from background (Figure H-112 and Table H-13). Manganese is retained as a COPC.

Mercury was detected above the soil BV (0.1 mg/kg) in 10 soil samples with a maximum concentration of 14.4 mg/kg. Mercury is retained as a COPC.

Nitrate was detected in 10 samples with a maximum concentration of 4.1 mg/kg. Nitrate is naturally occurring and the concentrations likely reflect naturally occurring levels. Nitrate is not a COPC.

Perchlorate was detected in seven samples with a maximum concentration of 0.0044 mg/kg. Perchlorate is retained as a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in five samples with a maximum concentration of 85.5 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are statistically different from background (Figure H-113 and Table H-13). Zinc is retained as a COPC.

Organic Chemicals

Twelve soil samples were analyzed for VOCs, SVOCs, and explosive compounds. One soil sample was also analyzed for PCBs and dioxins/furans. Table 6.12-3 presents the detected organic chemicals. Plate 3 shows the spatial distribution of detected organic chemicals.

PAHs

PAHs are a class of SVOCs frequently detected as a result of environmental sampling but generally were not released from the SWMUs or AOCs investigated. PAHs unrelated to site activities are thus often detected in samples analyzed for the presence of site related SVOCs.

PAHs are known to be widely distributed in the environment from a number of sources, both natural, such as forest fires, and anthropogenic, such as combustion of fossil fuels, oil drips off motor vehicles, vehicle tires, coal tar pitch, and weathering or eroding of asphalt pavement (Kose et al. 2008, 219977; Teaf 2008,

219976). PAHs from these sources generally occur as complex mixtures, not as single compounds. Individual PAH compounds can be manufactured for research purposes and some PAHs (e.g., anthracene, fluorene, naphthalene, and pyrene) are used in dye production, in the manufacture of synthetic fibers, and in plastics and pesticides.

The principal sources of PAHs in soil along parking lots, roads, and highways are vehicular exhaust and emissions, the wearing of tires, and asphalt. PAH-containing materials, such as asphalt and rubber particles, do not easily dissolve in water, thus preventing migration, except as suspended particles in storm water. PAH concentrations in excess of soil cleanup levels may result from common anthropogenic sources such as runoff from asphalt paved areas (e.g., roads and parking areas).

Site Activities

AOC C-15-006 was identified as an AOC because of potential soil contamination associated with the footprint of a former control building and darkroom (former building 15-0007) that supported Firing Sites C and D. PAHs are not associated with the work performed in this building. However, the AOC is 45 ft south of R-Site Road, which is paved with asphalt (Appendix J, Figures J-2 and J-3), with runoff from the road directed towards the site. Therefore, the PAHs detected in samples used to characterize this site (acenaphthene and chrysene) are not related to historical Laboratory operations at this site and are not COPCs.

Organic COPCs

Other organic chemicals detected at AOC C-15-006 include Aroclor-1254; Aroclor-1260; benzoic acid; bis(2-ethylhexyl)phthalate; butylbenzylphthalate; di-n-butylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,6,7,8-hexachlorodibenzodioxin; 1,2,3,7,8,9-hexachlorodibenzodioxin; 1,2,3,4,7,8-hexachlorodibenzofuran; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 2,3,4,7,8-pentachlorodibenzofuran; and 2,3,7,8-tetrachlorodibenzofuran. All detected organic chemicals listed are retained as COPCs.

Radionuclides

Twelve soil samples were analyzed for isotopic thorium and isotopic uranium. Radionuclides were not detected above BVs at AOC C-15-006.

6.12.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at AOC C-15-006 are discussed below.

Inorganic Chemicals

Inorganic COPCs at AOC C-15-006 include antimony, cobalt, copper, iron, lead, manganese, mercury, perchlorate, and zinc.

Antimony was detected above the soil BV (0.83 mg/kg) in seven samples with a maximum concentration of 10 mg/kg. Antimony concentrations decreased or did not change substantially (0.5 mg/kg to 1.3 mg/kg) with depth at locations 15-613306, 15-613309, and 15-613310 and increased with depth at locations 15-613307 and 15-613308. Concentrations decreased laterally (not detected above BVs at location 15-613322 to the south, which is associated with the former north burn pit at SWMU 15-002) (Plate 2).

The western and northern extent is limited by R-Site Road, located approximately 85 ft west of former building 15-0007 and approximately 45 ft north of former building 15-0007. The residential SSL was approximately 3 times and the industrial SSL was approximately 52 times the maximum concentration. Further sampling for extent of antimony is not warranted.

Cobalt was detected above the soil BV in two samples with a maximum concentration of 15.3 mg/kg. Cobalt concentrations decreased with depth at location 15-613310, increased with depth at location 15-613305, and increased laterally at location 15-613305. The northern extent is limited by R-Site Road, located approximately 45 ft north of former building 15-0007. The residential SSL was approximately 1.5 times and the industrial SSL was approximately 23 times the maximum concentration. Further sampling for extent of cobalt is not warranted.

Copper was detected above the soil BV in one sample at a concentration of 16.2 mg/kg. The copper concentration increased with depth at location 15-613310 (4.2 mg/kg) but was only 0.2 mg/kg above the maximum soil background concentration (16 mg/kg). Concentrations decreased laterally. The residential SSL was approximately 193 times the maximum concentration. The lateral extent of copper is defined, and further sampling for vertical extent is not warranted.

Iron was detected above the soil BV in one sample at a concentration of 35,800 mg/kg. Iron concentrations decreased with depth and decreased laterally. The lateral and vertical extent of iron are defined.

Lead was detected above the soil BV in six samples with a maximum concentration of 43.6 mg/kg. Lead concentrations did not change substantially with depth at locations 15-613309 and 15-613310 (1.4 mg/kg and 2.3 mg/kg) and increased with depth at locations 15-613307 and 15-613308. Concentrations increased laterally. The northern extent is limited by R-Site Road, located approximately 45 ft north of former building 15-0007, and lead decreased to the south at location 15-613318 associated with the former north burn pit at SWMU 15-002 (Plate 2). The residential SSL was approximately 9 times and the industrial SSL was approximately 18 times the maximum concentration (356 mg/kg and 756 mg/kg below the SSLs). Further sampling for extent of lead is not warranted.

Manganese was detected above the soil BV in two samples with a maximum concentration of 1120 mg/kg. Manganese concentrations increased with depth at locations 15-613305 and 15-613308 but were below (427 mg/kg) or slightly above (20 mg/kg) the maximum soil background concentration (1100 mg/kg). Manganese concentrations increased laterally. The northern extent is limited by R-Site Road located approximately 45 ft north of former building 15-0007. The residential SSL was approximately 9 times and the industrial SSL was approximately 143 times the maximum concentration. Further sampling for extent of manganese is not warranted.

Mercury was detected above the soil BV in 10 samples with a maximum concentration of 14.4 mg/kg. Mercury concentrations decreased with depth at locations 15-613305 and 15-613309 and did not change substantially with depth at locations 15-613306 and 15-613310 (0.12 mg/kg and 0.24 mg/kg). Concentrations increased with depth at locations 15-613307 and 15-613308. The residential SSL was approximately 5.3 times and the industrial SSL was approximately 87 times the maximum concentration at these locations. Concentrations decreased laterally. The lateral extent of mercury is defined, and further sampling for vertical extent is not warranted.

Perchlorate was detected in seven samples with a maximum concentration of 0.0044 mg/kg. Perchlorate concentrations were below EDLs at all locations, decreased with depth at locations 15-613306, 15-613109, and 15-613310, and did not change substantially with depth at locations 15-613305 (0.0005 mg/kg) and 15-613307 (0.004 mg/kg). Concentrations did not change substantially laterally

(0.0006 mg/kg or less). The residential SSL was approximately 12,400 times the maximum concentration. Further sampling for extent of perchlorate is not warranted.

Zinc was detected above the soil BV in five samples with a maximum concentration of 85.5 mg/kg. Zinc concentrations decreased with depth at locations 15-613309 and 15-613310. Concentrations increased with depth at locations 15-613307 and 15-613308 but were below (18.5 mg/kg) or slightly above (3.1 mg/kg) the maximum soil background concentration (75.5 mg/kg). Concentrations decreased or did not change substantially laterally (4.7 mg/kg at location 15-613308 and below BV at location 15-613322 associated with the former north burn pit at SWMU 15-002) (Plate 2). The residential SSL was approximately 275 times the maximum concentration. Further sampling for extent of zinc is not warranted.

Organic Chemicals

Organic COPCs at AOC C-15-006 include Aroclor-1254; Aroclor-1260; benzoic acid; bis(2-ethylhexyl)phthalate; butylbenzylphthalate; di-n-butylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,6,7,8-hexachlorodibenzodioxin; 1,2,3,7,8,9-hexachlorodibenzodioxin; 1,2,3,4,7,8-hexachlorodibenzofuran; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 2,3,4,7,8-pentachlorodibenzofuran; and 2,3,7,8-tetrachlorodibenzofuran.

Aroclor-1254 and Aroclor-1260 were detected in one sample at concentrations of 0.032 mg/kg and 0.018 mg/kg. The concentrations were below the EQLs. The residential SSLs were approximately 36 times and 135 times and the industrial SSLs were approximately 359 times and 640 times the concentrations. Further sampling for extent of Aroclor-1254 and Aroclor-1260 is not warranted.

Benzoic acid was detected in one sample at a concentration of 0.55 mg/kg. The concentration was below the EQL. The northern extent is limited by R-Site Road, which is located approximately 45 ft north of former building 15-0007. The residential SSL was approximately 454,000 times the concentration. Further sampling for extent of benzoic acid is not warranted.

Bis(2-ethylhexyl)phthalate was detected in one sample at a concentration of 0.14 mg/kg. The concentration was below the EQL. Concentrations decreased to the south at location 15-613322 associated with the former north burn pit at SWMU 15-002) (Plate 3). The residential SSL was approximately 2710 times the concentration. Further sampling for extent of bis(2-ethylhexyl)phthalate is not warranted.

Butylbenzylphthalate was detected in one sample at a concentration of 0.042 mg/kg. The concentration was below the EQL. Concentrations decreased laterally. The residential SSL was approximately 66,670 times the concentration. Further sampling for extent of butylbenzylphthalate is not warranted.

Di-n-butylphthalate was detected in one sample at a concentration of 0.052 mg/kg. The concentration decreased with depth, was below the EQL, and decreased laterally. The lateral and vertical extent of di-n-butylphthalate are defined.

Nine dioxin/furan congeners were detected in one sample. The residential SSL was approximately 68 times the TCDD-equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

Radionuclides were not detected above BVs at AOC C-15-006.

6.12.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 7×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.2, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 2×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese. As discussed in the uncertainty analysis (section I-4.4.2), the potential risk from manganese is similar to naturally occurring levels of manganese. Therefore, the HI does not exceed the NMED target HI. No radionuclide COPCs were identified for the construction worker scenario.

Residential Scenario

The total excess cancer risk for the residential scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is approximately 1, which is equivalent to the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, or residential scenarios at AOC C-15-006.

6.12.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks to any receptors exist at AOC C-15-006.

7.0 TA-36 BACKGROUND AND FIELD-INVESTIGATION RESULTS

7.1 Background of TA-36

TA-36, also known as Kappa Site, is located in the Potrillo and Fence Canyons in a remote area near the eastern boundary of the Laboratory (Plate 1). TA-36 occupies approximately 3.7 mi^2 in the central-south-central portion of the Laboratory and is bounded to the west and northwest by TA-15, to the east by TA-71 and the town of White Rock, and to the south by TA-39 and TA-68. TA-68 and TA-71 are buffer areas and have not been used for Laboratory operations. Potrillo Canyon intersects TA-36 and Fence Canyon parallels the southern boundary of TA-36 (Figure 1.1-1 and Plate 1).

7.1.1 Operational History

TA-36 consists of a series of firing sites that have been used to support explosives experiments from the 1950s to the present. The firing sites and facilities at TA-36 accommodate the shipping, receiving, transporting, and testing of HE. Over 30,000 test shots using an estimated 2200 to 4400 lb of DU have been fired at Kappa Site. Initially, the Kappa Site consisted of group offices; four firing sites named Eenie,

Meenie, Minie, and Lower Slobbovia; and a storage magazine. In 1983, the boundary of TA-36 was expanded to incorporate the I-J Firing Site, previously located in TA-15 (LANL 1993, 015313, p. 2-2). Sites investigated at TA-36 include a landfill, a septic system, a surface disposal area, a storage area, the location of a former shot-containment-vessel, a project test area, former burn pits, and an inactive firing site.

7.1.2 Summary of Releases

Potential contaminants at TA-36 may have been released into the environment through drainages downgradient of active firing sites, inactive landfills, inactive surface disposal sites, former firing sites, former septic systems, former storage areas, or former burn pits.

7.1.3 Current Site Usage and Status

Much of TA-36 is undeveloped and has been used since the 1950s to the present for explosives experiments. The TA is remote, with small office and Laboratory buildings, utilities, paved and unpaved roads, and firing site structures scattered throughout the area. TA-36 is located within the HE area, and access is controlled and restricted to Laboratory badge holders.

7.2 SWMU 36-001, MDA AA

7.2.1 Site Description and Operational History

SWMU 36-001 consists of MDA AA, an inactive landfill located at TA-36 approximately 240 ft southwest of a control bunker (building 36-0120) and 100 ft southwest of the x-ray device building (building 36-0086) (Figure 7.2-1). MDA AA consists of two disposal trenches containing burned debris from test shots conducted at the Lower Slobbovia Firing Site (LANL 1993, 015313, p. 5-1). The debris included wood and sand contaminated with barium, uranium, other inorganic chemicals, plastics, and HE (LANL 1989, 105232). The reported dimensions of the north trench are 80 ft × 40 ft × 8 ft to 13 ft deep, and the reported dimensions of the south trench are 120 ft × 20 ft to 30 ft × 3 ft to 12 ft deep (LANL 1996, 054733, p. 5-3). The debris was transported by truck from the Lower Slobbovia Firing Site, placed in the trenches, and burned. Once a trench was filled, it was covered with approximately 4 ft of soil. The disposal trenches were originally constructed in the mid-1960s, and the site was closed in 1989 (LANL 1993, 015313, pp. 5-1–5-9).

7.2.2 Relationship to Other SWMUs and AOCs

SWMU 36-001 is located southwest of SWMU 36-004(d) (Lower Slobbovia Firing Site) and southeast of the SWMU 36-004(d) (Skunk Works Firing Site and burn pits).

7.2.3 Summary of Previous Investigations

Phase I RFI activities were conducted at SWMU 36-001 from 1993 to 1996 (LANL 1996, 054733, pp. 5-1–5-9). Initial RFI activities consisted of geophysical surveys using EM, magnetometer/gradiometer, and GPR techniques to define the trenches. Geophysical survey results showed the presence of buried debris but did not delineate the boundaries of discrete disposal trenches. As a result, an exploratory drilling program was conducted to define the extent of buried materials. Approximately 88 boreholes were drilled, and ash and/or debris were found at 21 borehole locations, which helped delineate the 2 disposal trenches. Once the trenches had been delineated, samples were collected from borehole locations with elevated field-screening results. Five boreholes were advanced into the north trench and 4 boreholes

were advanced into the south trench. Samples were collected at 3 depth intervals in each borehole. Two of the depth intervals were in the ash/debris zone, and 1 was approximately 2.0 ft below the bottom of each trench. In addition, samples of fill/cover material were collected at 3 of the borehole locations, field-screened for organic vapors, radioactivity, and HE, and submitted for analysis of TAL metals, isotopic uranium, VOCs, SVOCs, and HE (LANL 1996, 054733, pp. 5-1–5-9). The data collected from 7 of the 9 sampling locations during the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2009, 105251). Screening-level data showed inorganic chemicals detected above BVs, detected organic chemicals, and uranium isotopes detected above BVs.

Decision-level analytical data collected from two of the nine RFI sampling locations (36-03127 and 36-03131) during previous investigations are presented and evaluated in section 7.2.4.3. Table 7.2-1 presents the samples collected and analyses requested at SWMU 36-001.

In addition to the Phase I RFI, interim action activities were conducted in 1996 to implement erosion-control measures around SWMU 36-001 (LANL 1996, 054449, pp. 1–7). During the interim action, erosion gullies were stabilized near SWMU 36-001 to prevent encroachment onto the site and erosion of the soil cover over the trenches.

7.2.4 Site Contamination

The approved investigation work plan for Potrillo and Fence Canyons Aggregate Area called for the excavation of the disposal trenches and removal and disposal of waste (LANL 2009, 106657.8; NMED 2009, 106677). These activities were initiated during the 2010 investigation but were suspended shortly thereafter because of potential health and safety concerns. Specifically, the higher-than-expected radiation levels and the potential presence of beryllium at SWMU 36-001 resulted in the suspension of work activities (see deviations in Appendix B). The Laboratory notified NMED of these conditions and proposed halting waste removal activities and conducting additional investigations to collect data needed to address potential health and safety concerns (LANL 2010, 111304). NMED agreed with this approach and indicated the Laboratory should conduct this additional characterization and use the data to develop a plan for future actions at SWMU 36-001 (NMED 2010, 111464). To implement this approach, 22 characterization samples were collected from 7 locations where 2010 geophysical data indicated the presence of buried metal debris (Figure 7.2-2 and Appendix E). The samples were collected to determine the levels of beryllium and radioactivity present in the buried waste.

7.2.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- A total of 15 characterization samples were collected from 5 locations within the anticipated landfill boundaries from 0.0–1.5 ft, 5.0–6.5 ft, and 10.0–11.5 ft bgs (see deviations in Appendix B).
- Three characterization samples were collected from one location within a test pit from 2.0–4.0 ft, 5.0–6.5 ft, and 10.0–11.5 ft bgs (see deviations in Appendix B).
- Four characterization samples were collected from one location from 0.0–1.5 ft, 5.0–6.5 ft, 10.0-11.5 ft, and 13.5–15.0 ft bgs based on elevated field-screening results (see section 7.2.4.2). All seven alternate locations were identified based on geophysical survey results (Figure 7.2-2, deviations in Appendix B, and geophysical survey results in Appendix E).
- All samples were field-screened for organic vapors; gross-alpha, -beta, and -gamma radioactivity; explosive compounds (TNT and RDX); and metals (barium, copper, lead and uranium).

Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2.

- All samples were analyzed for cyanide, nitrate, perchlorate, TCLP metals, TAL metals, VOCs, SVOCs, explosive compounds, dioxins/furans, PCBs, americium-241, isotopic plutonium, isotopic thorium, isotopic uranium, strontium-90, total uranium, tritium, and gamma-emitting radionuclides.

Sampling locations with decision-level data for SWMU 36-001 are shown in Figure 7.2-1. Table 7.2-1 presents the samples collected and analyses requested for SWMU 36-001. The geodetic coordinates of sampling locations are presented in Table 3.2-1.

7.2.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at SWMU 36-001, no organic vapors were detected. No radiological-screening results exceeded twice the maximum site background levels. No screening results for explosive compounds exceeded industrial SSLs. The field-screening results are presented in Table 3.2-2.

One soil sample collected at location 36-613727 from 10.0–11.5 ft bgs exceeded the metals-screening thresholds for copper and uranium. A deeper sample from 13.5–15.0 ft bgs was collected at this location and analyzed for cyanide, nitrate, perchlorate, TCLP metals, TAL metals, VOCs, SVOCs, explosive compounds, dioxins/furans, PCBs, americium-241, isotopic plutonium, isotopic thorium, isotopic uranium, strontium-90, total uranium, tritium, and gamma-emitting radionuclides. The metals-screening results that guided the additional sampling are presented in Table 3.2-2.

7.2.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data for SWMU 36-001 consisted of results from 26 soil samples collected from 9 locations.

Inorganic Chemicals

Twenty-six soil samples were analyzed for TAL metals. Twenty-two soil samples were also analyzed for cyanide, nitrate, and perchlorate. Table 7.2-2 presents the inorganic chemicals detected or detected above BVs. Plate 10 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Antimony was detected above the soil BV (0.83 mg/kg) in four samples with a maximum concentration of 22.6 mg/kg and had DLs (0.85 mg/kg to 5.7 mg/kg) above the BV in six samples. Antimony is retained as a COPC.

Barium was detected above the soil BV (295 mg/kg) in one sample at a concentration of 622 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in soil are not statistically different from background (Figure H-114 and Table H-14). Barium is not a COPC.

Cadmium was detected above the soil BV (0.4 mg/kg) in 1 sample at a concentration of 0.42 mg/kg and had DLs (0.56 mg/kg to 0.57 mg/kg) above the BV in 2 samples. The concentration was only 0.02 mg/kg above the BV and below the 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). The DLs were 0.16 mg/kg and 0.17 mg/kg above the BV, below the highest background DL (2 mg/kg), and below the 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). Cadmium was detected below the BV in the other 23 samples. Cadmium is not a COPC.

Chromium was detected above the soil BV (19.3 mg/kg) in one sample at a concentration of 31 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in soil are not statistically different from background (Figure H-115 and Table H-14). Chromium is not a COPC.

Copper was detected above the soil BV (14.7 mg/kg) in nine samples with a maximum concentration of 2340 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in soil are statistically different from background (Figure H-116 and Table H-14). Copper is retained as a COPC.

Cyanide was not detected above the soil BV (0.5 mg/kg) but had DLs (0.52 mg/kg to 0.59 mg/kg) above the BV in 17 samples. The DLs were only 0.02 mg/kg to 0.09 mg/kg above the BV and cyanide was not detected above the BV in the other 5 samples. Cyanide is not a COPC.

Iron was detected above the soil BV (21,500 mg/kg) in one sample at a concentration of 27,100 mg/kg. The Gehan and quantile tests indicated site concentrations of iron in soil are not statistically different from background (Figure H-117 and Table H-14). Iron is not a COPC.

Lead was detected above the soil BV (22.3 mg/kg) in four samples with a maximum concentration of 668 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are not statistically different from background (Figure H-118 and Table H-14). However, the maximum concentration was substantially above the BV. Lead is retained as a COPC.

Mercury was not detected above the soil BV (0.1 mg/kg) but had DLs (0.266 mg/kg to 0.433 mg/kg) above the BV in 18 samples. The DLs were only 0.166 mg/kg to 0.333 mg/kg above the BV. Mercury was not detected or detected below the BV in the other 8 samples (detected below BV in three samples). Mercury is not a COPC.

Nickel was detected above the soil BV (15.4 mg/kg) in two samples with a maximum concentration of 132 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in nickel are not statistically different from background (Figure H-119 and Table H-14). However, the maximum concentration was substantially above the BV. Nickel is retained as a COPC.

Nitrate was detected in 22 samples with a maximum concentration of 20 mg/kg. Nitrate is retained as a COPC.

Perchlorate was detected in one sample at a concentration of 0.0035 mg/kg. Perchlorate is retained as a COPC.

Silver was detected above the soil BV (1 mg/kg) in one sample at a concentration of 4.4 mg/kg. Silver is retained as a COPC.

Sodium was detected above the soil BV (915 mg/kg) in one sample at a concentration of 1450 mg/kg. The Gehan and quantile tests indicated site concentrations of sodium in soil are not statistically different from background (Figure H-120 and Table H-14). Sodium is not a COPC.

Thallium was detected above BV (0.73 mg/kg) in 1 sample at a concentration of 0.89 mg/kg. The concentration was 0.16 mg/kg above the BV and below or similar to the 2 highest soil background concentrations (0.9 mg/kg and 1 mg/kg). Thallium was not detected or detected below the BV in the other 25 samples (detected below the BV in one sample). Thallium is not a COPC.

Uranium was detected above the soil BV (1.82 mg/kg) in 13 samples with a maximum concentration of 274 mg/kg. The quantile and slippage tests indicated site concentrations of uranium in soil are statistically different from background (Figure H-121 and Table H-14). Uranium is retained as a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in eight samples with a maximum concentration of 397 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are statistically different from background (Figure H-122 and Table H-14). Zinc is retained as a COPC.

Organic Chemicals

Twenty-six soil samples were analyzed for VOCs, SVOCs, and explosive compounds. Twenty-two soil samples were also analyzed for dioxins/furans and PCBs. Table 7.2-3 presents the detected organic chemicals. Plate 11 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at SWMU 36-001 include acetone; benzyl alcohol; bis(2-ethylhexyl)phthalate; di-n-butylphthalate; 3,5-dinitroaniline; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8,9-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzodioxin; 1,2,3,6,7,8-hexachlorodibenzodioxin; 1,2,3,7,8,9-hexachlorodibenzodioxin; 1,2,3,4,7,8-hexachlorodibenzofuran; 1,2,3,6,7,8-hexachlorodibenzofuran; 1,2,3,7,8,9-hexachlorodibenzofuran; 2,3,4,6,7,8-hexachlorodibenzofuran; methylene chloride; 2-methylphenol; 4-methylphenol; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 1,2,3,7,8-pentachlorodibenzodioxin; 1,2,3,7,8-pentachlorodibenzofuran; 2,3,4,7,8-pentachlorodibenzofuran; phenol; 2,3,7,8-tetrachlorodibenzodioxin; 2,3,7,8-tetrachlorodibenzofuran; and trichlorofluoromethane. All detected organic chemicals are retained as COPCs.

Radionuclides

Twenty-six soil samples were analyzed for isotopic uranium. Twenty-two soil samples were also analyzed for americium-241, gamma-emitting radionuclides, isotopic plutonium, isotopic thorium, isotopic uranium, strontium-90, and tritium. Table 7.2-4 presents the radionuclides detected or detected above BVs/FVs. Plate 12 shows the spatial distribution of radionuclides detected or detected above BVs/FVs.

Uranium-234 was detected above the soil BV (2.59 pCi/g) in three samples with a maximum activity of 61.3 pCi/g. Uranium-234 is retained as a COPC.

Uranium-235/236 was detected above the soil BV (0.2 pCi/g) in three samples with a maximum activity of 6.7 pCi/g. Uranium-235/236 is retained as a COPC.

Uranium-238 was detected above the soil BV (2.29 pCi/g) in eight samples with a maximum activity of 464 pCi/g. Uranium-238 is retained as a COPC.

7.2.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 36-001 are discussed below. Because no samples have been collected from peripheral locations, the lateral extent of contamination is not defined.

Inorganic Chemicals

Inorganic COPCs at SWMU 36-001 include antimony, copper, lead, nickel, nitrate, perchlorate, silver, uranium, and zinc.

Antimony was detected above the soil BV in four samples with a maximum concentration of 22.6 mg/kg and had DLs (0.85 mg/kg to 5.7 mg/kg) above the BV in six samples. Antimony concentrations decreased with depth. The residential SSL was approximately 5.5 times and the industrial SSL was approximately 91 times the maximum DL. Further sampling for vertical extent of antimony is not warranted.

Copper was detected above the soil BV in nine samples with a maximum concentration of 2340 mg/kg. Copper concentrations decreased with depth at all locations. The vertical extent of copper is defined.

Lead was detected above the soil BV in four samples with a maximum concentration of 668 mg/kg. Lead concentrations decreased with depth at all locations. The vertical extent of lead is defined.

Nickel was detected above the soil BV in two samples with a maximum concentration of 132 mg/kg. Nickel concentrations decreased with depth at both locations. The vertical extent of nickel is defined.

Nitrate was detected in 22 samples with a maximum concentration of 20 mg/kg. Concentrations decreased with depth at location 36-613724 where the elevated nitrate concentration was detected. The remaining nitrate concentrations reflect naturally occurring levels. The vertical extent of nitrate is defined.

Perchlorate was detected in one sample at a concentration of 0.0035 mg/kg. The concentration decreased with depth and was below the EDL. The vertical extent of perchlorate are defined.

Silver was detected above the soil BV in one sample at a concentration of 4.4 mg/kg. The concentration decreased with depth and decreased laterally. The lateral and vertical extent of silver are defined.

Uranium was detected above the soil BV in 13 samples with a maximum concentration of 107 Ci/g. Uranium concentrations decreased with depth at all locations. The vertical extent of uranium is defined.

Zinc was detected above the soil BV in eight samples with a maximum concentration of 397 mg/kg. Zinc concentrations decreased with depth. The vertical extent of zinc is defined.

Organic Chemicals

Organic COPCs at SWMU 36-001 include acetone; benzyl alcohol; bis(2-ethylhexyl)phthalate; di-n-butylphthalate, 3,5-dinitroaniline; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8,9-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzodioxin; 1,2,3,6,7,8-hexachlorodibenzodioxin; 1,2,3,7,8,9-hexachlorodibenzodioxin; 1,2,3,4,7,8-hexachlorodibenzofuran; 1,2,3,6,7,8-hexachlorodibenzofuran; 1,2,3,7,8,9-hexachlorodibenzofuran; 2,3,4,6,7,8-hexachlorodibenzofuran; methylene chloride; 2-methylphenol; 4-methylphenol; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 1,2,3,7,8-pentachlorodibenzodioxin; 1,2,3,7,8-pentachlorodibenzofuran; 2,3,4,7,8-pentachlorodibenzofuran; phenol, 2,3,7,8-tetrachlorodibenzodioxin; 2,3,7,8-tetrachlorodibenzofuran; and trichlorofluoromethane.

Acetone was detected in one sample at a concentration of 0.041 mg/kg. The residential SSL was approximately 1,617,000 times the concentration. Further sampling for vertical extent of acetone is not warranted.

Benzyl alcohol was detected in one sample at a concentration of 0.073 mg/kg. The concentration was below the EQL and decreased with depth. The vertical extent of benzyl alcohol is defined.

Bis(2-ethylhexyl)phthalate was detected in four samples with a maximum concentration of 0.31 mg/kg. Concentrations decreased with depth at all locations. The vertical extent of bis(2-ethylhexyl)phthalate is defined.

Di-n-butylphthalate was detected in one sample at a concentration of 0.076 mg/kg. The concentration was below the EQL and decreased with depth. The vertical extent of di-n-butylphthalate is defined.

Dinitroaniline[3,5-] was detected in one sample at a concentration 0.004 mg/kg. The concentration decreased with depth, was below the EQL, and decreased laterally. The lateral and vertical extent of 3,5-dinitroaniline are defined.

Methylene chloride was detected in two samples with a maximum concentration of 0.006 mg/kg. Concentrations did not change substantially with depth (0.002 mg/kg) and were below the EQLs. The residential SSL was 68,170 times the maximum concentration. Further sampling for vertical extent of methylene chloride is not warranted.

Methylphenol[2-] and 4-methylphenol were detected in one sample each at concentrations of 0.047 mg/kg and 0.12 mg/kg, respectively. Concentrations decreased with depth. The vertical extent of 2-methylphenol and 4-methylphenol is defined.

Phenol was detected in one sample at a concentration of 0.64 mg/kg. Concentrations decreased with depth. The vertical extent of phenol is defined.

Trichlorofluoromethane was detected in one sample at a concentration 0.00071 mg/kg. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of trichlorofluoromethane are defined.

Seventeen dioxin/furan congeners were detected in 4 to 21 samples. Concentrations decreased with depth or did not change substantially with depth at location 15-613727 (1.31E-06 mg/kg). Further sampling for vertical extent of dioxins/furans is not warranted.

Radionuclides

Radionuclide COPCs at SWMU 36-001 include uranium-234, uranium-235/236, and uranium-238.

Uranium-234 was detected above the soil BV in three samples with a maximum activity of 61.3 pCi/g. Uranium-234 activities decreased with depth at all locations. The vertical extent of uranium-234 is defined.

Uranium-235/236 was detected above the soil BV in three samples with a maximum activity of 6.7 pCi/g. Uranium-235/236 activities decreased with depth at all locations. The vertical extent of uranium-235/236 is defined.

Uranium-238 was detected above the soil BV in eight samples with a maximum activity of 464 pCi/g. Uranium-238 activities decreased with depth at all locations. The vertical extent of uranium-238 is defined.

7.2.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.02, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 1, which is equivalent to the NMED target HI of 1 (NMED 2015, 600575). The HI is in part because of lead. The HI is 0.9 without lead, which is below the NMED target HI of 1. The lead EPC is below the construction worker SSL (800 mg/kg). The total dose is 11 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Residential Scenario

The total excess cancer risk for the residential scenario is 7×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is approximately 2. The HI is in part from antimony and lead. The HI is approximately 1 without lead and using a 95% upper confidence limit (UCL) for antimony, which is equivalent to the NMED target HI of 1. The lead EPC is below the residential SSL (400 mg/kg). The total dose is 31 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial and construction worker scenarios at SWMU 36-001. There is no potential unacceptable risk for the residential scenario at SWMU 36-001. There is a potential unacceptable dose under the residential scenario from uranium-238.

7.2.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks for any receptor exist at SWMU 36-001.

7.3 SWMU 36-003(b), Septic System, I-J Firing Site

7.3.1 Site Description and Operational History

SWMU 36-003(b) is a decommissioned septic system located at the west end of TA-36 (Figure 7.3-1). The septic system served building 36-0055, the control bunker for the I-J Firing Site, and consists of a septic tank (structure 36-0061) and its associated drain lines and outfall. The septic tank sits near the edge of Mesita del Potrillo, approximately 100 ft southwest of building 36-0055 (LANL 1993, 015313, p. 5-24). The control bunker housed the electronics and instrumentation used in the operation of the I-J Firing Site [AOC 36-004(e)] and also contained a toilet, sink, and water fountain, all of which were connected to the septic tank via a 4-in.-diameter clay-tile pipe (LASL 1949, 105276). The septic tank is constructed of reinforced concrete and measures 7 ft long × 3.5 ft wide × 5.73 ft deep with a capacity of 420 gal. The tank has a buried overflow pipe that previously discharged near the north rim of Potrillo Canyon. The overflow pipe was capped in 1989. After the overflow pipe was capped, the septic

tank continued to be used and its contents were periodically removed and taken to a sanitary wastewater treatment plant for treatment and disposal (LANL 1993, 015313, p. 5-24). The septic system was taken out of service in the early 1990s.

7.3.2 Relationship to Other SWMUs and AOCs

SWMU 36-003(b) served control building 36-0055 for the I-J Firing Site and is located northwest of AOC C-36-006(e) and east-southeast of AOC 15-008(f).

7.3.3 Summary of Previous Investigations

The contents of the SWMU 36-003(b) septic tank were sampled in 1981; analytical data confirmed HE was not present (LANL 1993, 015313, p. 5-27). During the 1994 Phase I RFI conducted at SWMU 36-003(b), two samples of the liquid were collected from one location within the tank and four sludge samples were collected from three locations within the tank (LANL 1995, 053985, pp. 5-4–5-12). In addition, five surface samples (0.0–0.5 ft bgs) were collected from four locations in the drainage channel downgradient of the outfall. The samples were field-screened for organic vapors, radioactivity, and HE and submitted for analysis of TAL metals, HE, VOCs, and SVOCs (LANL 1995, 053985, p. 1-15). Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2009, 105251). Screening-level data showed inorganic chemicals detected above BVs and detected HE.

The 1996 VCA implemented at SWMU 36-003(b) included removing the septic tank contents, pressure-washing the tank, and filling the tank with expanding cement. The contents of the tank were disposed of as low-level radioactive waste at Area G at TA-54 and at the TA-50 Radioactive Liquid Waste Treatment Facility. No confirmation samples were collected (LANL 1996, 055072, pp. 1–4).

7.3.4 Site Contamination

7.3.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- All samples were field-screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2.
- The approved investigation work plan required six samples to be collected from two depth intervals (0.0–1.0 ft and 3.0–4.0 ft below structures) at three locations: next to the tank inlet, next to the tank outlet, and on the south side of the tank at SWMU 36-003(b). All six samples were inadvertently collected from 0.0–1.0 ft and 3.0–4.0 ft bgs and not below the structures; therefore, the sample results are not included in this report (see deviations in Appendix B).
- The approved investigation work plan required four samples to be collected from two depth intervals at two locations along the tank inlet drainline at SWMU 36-003(b). All four samples were inadvertently collected from 0.0–1.0 ft and 3.0–4.0 ft bgs and not below the drainline; therefore, the sample results are not included in this report (see deviations in Appendix B).
- Six samples were collected from three locations at and below the outfall from 0.0–1.0 ft and 3.0–4.0 ft bgs.
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, and isotopic uranium. One of the six samples was also analyzed for

dioxins/furans and PCBs. The sampling location for the dioxin/furan and PCB analyses was selected based on its proximity to the potential contaminant source.

Sampling locations with decision-level data for SWMU 36-003(b) are shown in Figure 7.3-1. Table 7.3-1 presents the samples collected and analyses requested for SWMU 36-003(b). The geodetic coordinates of sampling locations are presented in Table 3.2-1.

7.3.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at SWMU 36-003(b), no organic vapors were detected. No radiological-screening results exceeded twice the maximum site background levels. The field-screening results are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the field-screening results.

7.3.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 36-003(b) consisted of results from six samples (four soil and two tuff) collected from three locations below the outfall.

Inorganic Chemicals

Six samples (four soil and two tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 7.3-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 7.3-2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Copper was detected above the soil BV (14.7 mg/kg) in one sample at a concentration of 15.2 mg/kg. The concentration was 0.5 mg/kg above the BV and 0.8 mg/kg below the maximum soil background concentration (16 mg/kg). Copper was detected below the BVs in the other five samples. Copper is not a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.51 mg/kg to 0.54 mg/kg) above the BVs in five samples. The DLs were only 0.01 mg/kg to 0.04 mg/kg above the BVs and cyanide was not detected in the other sample. Cyanide is not a COPC.

Nitrate was detected in five samples with a maximum concentration of 6.8 mg/kg. Nitrate is naturally occurring and the concentrations reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Selenium was detected above the Qbt 2,3,4 BV (0.3 mg/kg) in two samples with a maximum concentration of 1.3 mg/kg. Selenium is retained as a COPC.

Organic Chemicals

Six samples (four soil and two tuff) were analyzed for VOCs, SVOCs, and explosive compounds. One soil sample was analyzed for PCBs and dioxins/furans. Table 7.3-3 presents the detected organic chemicals. Figure 7.3-3 shows the spatial distribution of detected organic chemicals.

PAHs

PAHs are a class of SVOCs frequently detected as a result of environmental sampling but generally were not released from the SWMUs or AOCs investigated. PAHs unrelated to site activities are thus often detected in samples analyzed for the presence of site related SVOCs.

PAHs are known to be widely distributed in the environment from a number of sources, both natural, such as forest fires, and anthropogenic, such as combustion of fossil fuels, oil drips off motor vehicles, vehicle tires, coal tar pitch, and weathering or eroding of asphalt pavement (Kose et al. 2008, 219977; Teaf 2008, 219976). PAHs from these sources generally occur as complex mixtures, not as single compounds. Individual PAH compounds can be manufactured for research purposes and some PAHs (e.g., anthracene, fluorene, naphthalene, and pyrene) are used in dye production, in the manufacture of synthetic fibers, and in plastics and pesticides.

The principal sources of PAHs in soil along parking lots, roads, and highways are vehicular exhaust and emissions, the wearing of tires, and asphalt. PAH-containing materials, such as asphalt and rubber particles, do not easily dissolve in water, thus preventing migration, except as suspended particles in storm water. PAH concentrations in excess of soil cleanup levels may result from common anthropogenic sources such as runoff from asphalt paved areas (e.g., roads and parking areas).

Site Activities

SWMU 36-003(b) was identified as a SWMU because the septic system received sanitary waste from building 36-0055, the control bunker for the I-J Firing Site. The control bunker housed the electronics and instrumentation used in the operation of the I-J Firing Site and also contained a toilet, sink, and water fountain, all of which were connected to the septic tank. PAHs are not associated with the sanitary waste or the operations of I-J Firing Site. There is asphalt upgradient of the septic tank (Appendix J, Figures J-4 and J-5). Therefore, the PAHs detected in samples used to characterize this site (fluoranthene, phenanthrene, and pyrene) are not related to historical Laboratory operations at this site and are not COPCs.

The other organic chemicals detected at SWMU 36-003(b) include 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; and 1,2,3,4,6,7,8,9-octachlorodibenzofuran. All detected organic chemicals listed are retained as COPCs.

Radionuclides

Six samples (four soil and two tuff) were analyzed for isotopic uranium. Radionuclides were not detected above BVs at SWMU 36-003(b).

7.3.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 36-003(b) are discussed below.

Samples were inadvertently not collected from the soil underlying the structures. The information presented below describes the nature and extent of contamination based on samples collected to date, which were collected at and downgradient of the outfall. The nature and extent for the site is not defined.

Inorganic Chemicals

The inorganic COPC at SWMU 36-003(b) includes selenium.

Selenium was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 1.3 mg/kg. Selenium concentrations did not change substantially with depth and downgradient (concentrations in the shallower samples at locations 15-613464 and 15-613466 were 1.1 mg/kg and

1.4 mg/kg and below the soil BV [Appendix F, Inorganic Chemicals Table]). The residential SSL was approximately 300 times the maximum concentration above the BV. Further sampling for extent of selenium at the outfall is not warranted.

Organic Chemicals

Organic COPCs at SWMU 36-003(b) include 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; and 1,2,3,4,6,7,8,9-octachlorodibenzofuran.

Four dioxin/furan congeners were detected in one sample. The residential SSL was approximately 287 times the TCDD-equivalent concentration. Further sampling for the extent of dioxin/furans at the outfall is not warranted.

Radionuclides

Radionuclides were not detected above BVs at and below the outfall at SWMU 36-003(b).

7.3.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 7×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.0002, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

Construction Worker Scenario

No carcinogenic or radionuclide COPCs were identified for the construction worker scenario. The construction worker HI is 0.002, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

Residential Scenario

The total excess cancer risk for the residential scenario is 4×10^{-8} which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.004, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios at SWMU 36-003(b).

7.3.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks for any receptors exist at SWMU 36-003(b).

7.4 SWMU 36-005, Storage Area

7.4.1 Site Description and Operational History

SWMU 36-005 is an inactive storage area (known as the "Boneyard") located at TA-36 near the head of Fence Canyon between the Meenie and Minie Firing Sites [AOCs 36-004(b) and 36-004(c), respectively] (Figure 7.4-1 and Plate 1). This approximately 260-ft × 300-ft storage area is undeveloped and largely covered with grass and ponderosa pine. From the 1950s to the late 1970s, the Boneyard was used as a parking lot for trailers and a storage area for large nonwaste items. From the late 1970s to the late 1980s, the site was used to store large waste items exposed to explosives tests (Kelkar 1992, 012470), including metal drums, cans, cylinders, and scrap metals such as lead sheets, copper, uranium-contaminated steel, and iron (LANL 1993, 020946, p. 5-53).

In the late 1980s, a major cleanup was conducted at the site. Cans labeled isopentane, uranium-contaminated iron and steel, drums, and cylinders were removed during this cleanup effort (LANL 1993, 020946, p. 5-53).

7.4.2 Relationship to Other SWMUs and AOCs

SWMU 36-005 is located near the head of Fence Canyon between the Meenie and Minie Firing Sites [AOCs 36-004(b) and 36-004(c), respectively].

7.4.3 Summary of Previous Investigations

Previous environmental investigations at SWMU 36-005 include a radiological survey and sampling performed by the DOE environmental survey in 1988. This effort involved collecting six grab samples from four locations showing elevated radiation levels and six grab samples from locations showing visible staining or debris (LANL 1993, 015313, pp. 5-55–5-56).

The Phase I RFI conducted at SWMU 36-005 in 1994 included land, geomorphic, and radiological surveys (LANL 1995, 053985, pp. 4-12–4-13). The radiological survey identified no areas of elevated radiation. Thirty-one surface soil samples (0.0–0.5 ft bgs) were collected from 27 locations. Nine of these locations were within the current active storage area; 9 were in the drainage channel downgradient of the site; and 9 were from random locations, including 3 locations outside the Boneyard. The samples were field-screened for VOCs, radioactivity, and HE and submitted for analysis of TAL metals, isotopic uranium, and VOCs. Data collected during the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2009, 105251). Screening-level data showed inorganic chemicals detected above BVs, detected organic chemicals, and uranium-235 detected above the BV.

Based on Phase I RFI results, a Phase II RFI was conducted in 1997 involving the collection of subsurface samples at locations where the maximum concentrations of organic chemicals were detected in Phase I RFI samples. Four subsurface soil samples were collected from three locations from depths ranging from 1.0–3.3 ft bgs. The samples were submitted for analysis of VOCs. All decision-level analytical data collected during previous investigations are presented and evaluated in section 7.4.4.4. Table 7.4-1 presents the samples collected and analyses requested at SWMU 36-005.

7.4.4 Site Contamination

During the 2010 implementation of the approved work plan, cultural resource issues were raised by Laboratory archaeologists, causing work activities to be suspended. The Laboratory was aware of cultural resources located at SWMU 36-005; however, additional archaeological sites were discovered during a

site visit by Laboratory archaeologists (English 2010, 111797). It was determined that full clearance by the State Historical Preservation Office to collect samples (and remove debris) may not be possible and the review process to reach this determination would extend beyond the due date of the investigation report. An alternate sampling approach was proposed that included three transects across the slope downgradient of the site. This alternative sampling approach was successfully implemented (see section 7.4.4.1 and deviations in Appendix B).

7.4.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- All samples were field-screened for organic vapors; gross-alpha, -beta, and -gamma radioactivity; and explosive compounds (TNT and RDX). Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2.
- Four samples were collected from two locations in the drainage downgradient of the site from two depth intervals (0.0–0.5 ft and 0.5–1.0 ft bgs at location 36-03022 and 0.0–1.0 ft and 1.0–2.0 ft bgs at location 36-03020) at each location (see deviations in Appendix B).
- Three samples were collected from location 36-03051 from 0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft bgs (see deviations in Appendix B).
- A total of 21 samples were collected from seven alternate locations from 0.0–1.0 ft, 2.0–3.0 ft, and 4.0−5.0 ft bgs (see deviations in Appendix B).
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, and isotopic uranium. One of the 28 samples was also analyzed for dioxins/furans and 3 of the 28 samples were also analyzed for PCBs. The sampling locations for the dioxin/furan and PCB analyses were selected based on their proximity to the potential contaminant source.

Sampling locations with decision-level data for SWMU 36-005 are shown in Figure 7.4-1. Table 7.4-1 presents the samples collected and analyses requested for SWMU 36-005. The geodetic coordinates of sampling locations are presented in Table 3.2-1.

7.4.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at SWMU 36-005, no organic vapors were detected. No radiological-screening results exceeded twice the maximum site background levels. Field-screening results are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the field-screening results.

7.4.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 36-005 consisted of results from 28 samples (19 soil and 9 tuff) collected from 10 locations.

Inorganic Chemicals

Twenty-eight samples (19 soil and 9 tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 7.4-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 7.4-2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Antimony was not detected above the Qbt 2,3,4 BV (0.5 mg/kg) but had a DL (0.54 mg/kg) above the BV in one sample. The DL was only 0.04 mg/kg above the BV and antimony was not detected in the other 27 samples. Antimony is not a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in one sample at a concentration of 257 mg/kg. The quantile and slippage tests indicate site concentrations of barium in tuff are not statistically different from background (Figure H-123 and Table H-15). Barium is not a COPC.

Beryllium was detected above the Qbt 2,3,4 BV (1.21 mg/kg) in one sample at a concentration of 1.4 mg/kg. The Gehan and quantile tests indicate site concentrations of beryllium in tuff are not statistically different from background (Figure H-124 and Table H-15). Beryllium is not a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in two samples with a maximum concentration of 5840 mg/kg. The Gehan and quantile tests indicate site concentrations of calcium in tuff are not statistically different from background (Figure H-125 and Table H-15). Calcium is not a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in four samples with a maximum concentration of 27.2 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in tuff are statistically different from background (Figure H-126 and Table H-15). Chromium is retained as a COPC.

Copper was detected above the soil BV (14.7 mg/kg) in one sample at a concentration of 17.7 mg/kg. The Gehan and quantile tests indicate site concentrations of copper in soil are not statistically different from background (Figure H-127 and Table H-16). Copper is not a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.51 mg/kg to 0.59 mg/kg) above the BVs in 26 samples. The DLs were only 0.02 mg/kg to 0.09 mg/kg above the BVs. Cyanide was not detected in the other samples with the DL below the BV and was detected below the BV in the other sample. Cyanide is not a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in two samples with a maximum concentration of 12.4 mg/kg. The quantile and slippage tests indicated site concentrations of nickel in tuff are statistically different from background (Figure H-128 and Table H-15). Nickel is retained as a COPC.

Nitrate was detected in 25 samples with a maximum concentration of 16.4 mg/kg. Nitrate is naturally occurring and the concentrations detected likely reflect naturally occurring levels. Nitrate is not a COPC.

Perchlorate was detected in five samples with a maximum concentration of 0.0048 mg/kg. Perchlorate is retained as a COPC.

Selenium was detected above the soil and Qbt 2,3,4 BVs (1.52 mg/kg and 0.3 mg/kg) in five soil samples and nine tuff samples with a maximum concentration of 3.2 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure H-129 and Table H-16). Selenium is retained as a COPC.

Organic Chemicals

Twenty-eight samples (19 soil and 9 tuff) were analyzed for explosive compounds, VOCs, and SVOCs. Three samples (1 soil and 2 tuff) were also analyzed for PCBs, and the same soil sample was also analyzed for dioxins/furans. Table 7.4-3 presents the detected organic chemicals. Figure 7.4-3 shows the spatial distribution of detected organic chemicals.

The organic chemicals detected at SWMU 36-005 include acetone; benzoic acid; bis(2-ethylhexyl)phthalate; butylbenzylphthalate; di-n-butylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; methylene chloride; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; and pentachlorophenol. All detected organic chemicals are retained as COPCs.

Radionuclides

Twenty-eight samples (19 soil and 9 tuff) were analyzed for isotopic uranium. Radionuclides were not detected above BVs at SWMU 36-005.

7.4.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 36-005 are discussed below. Samples have not been collected from within the boundary of SWMU 36-005. Therefore, the nature and extent discussion below addresses only the area downgradient of the site.

Inorganic Chemicals

Inorganic COPCs at SWMU 36-005 include chromium, nickel, perchlorate, and selenium.

Chromium was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 27.2 mg/kg. Chromium concentrations decreased with depth or did not change substantially at locations 15-613507 and 15-613510 (concentrations in the shallower samples [14.9 mg/kg and 9.8 mg/kg, respectively] were below the soil BV [Appendix F, Inorganic Chemicals Table]). Concentrations increased with depth at locations 15-613508 and 15-613509. Chromium concentrations increased slightly downgradient of location 15-613510 to 15-613509 (6.6 mg/kg) with the concentration at location 15-613509 (15 mg/kg) being only 2 mg/kg above the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium was not detected above BV at downgradient location 15-613507. As discussed in section 4.2, there was no known use of hexavalent chromium at this site, and no site conditions would have produced hexavalent chromium. Therefore, the total chromium results represent trivalent chromium concentrations. The trivalent chromium the residential SSL was approximately 4300 times the maximum concentration. Further sampling for downgradient extent of chromium is not warranted.

Nickel was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 12.4 mg/kg. Nickel concentrations increased with depth at location 15-613508 and did not change substantially with depth (0.3 mg/kg) at location15-613509. Concentrations did not change substantially downgradient (0.08 mg/kg) at location 15-613509 (the concentration at location 15-613509 was only 0.7 mg/kg above the maximum Qbt 2,3,4 background concentration [7 mg/kg]) and decreased downgradient at location 15-613507. The residential SSL was approximately 126 times the maximum concentration. Further sampling for downgradient extent of nickel is not warranted.

Perchlorate was detected in five samples with a maximum concentration of 0.0048 mg/kg. Perchlorate concentrations were below the EDLs. Concentrations did not change substantially downgradient (0.001 mg/kg and 0.0038 mg/kg). The residential SSL was approximately 11,400 times the maximum concentration. Further sampling for downgradient extent of perchlorate is not warranted.

Selenium was detected above the soil and Qbt 2,3,4 BVs in five soil samples and nine tuff samples with a maximum concentration of 3.2 mg/kg. Selenium concentrations did not change substantially with depth at any location (less than 2 mg/kg) and downgradient (0.3 mg/kg or less). The residential SSL was approximately 122 times the maximum concentration. Further sampling for downgradient extent of selenium is not warranted.

Organic Chemicals

Organic COPCs at SWMU 36-005 include acetone, benzoic acid; bis(2-ethylhexyl)phthalate; butylbenzylphthalate; di-n-butylphthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; methylene chloride; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; and pentachlorophenol.

Acetone was detected in four samples with a maximum concentration of 0.31 mg/kg. Acetone concentrations did not change substantially with depth (0.029 mg/kg and 0.17 mg/kg). Concentrations did not change substantially downgradient (0.34 mg/kg). The residential SSL was approximately 214,000 times the maximum concentration. Further sampling for downgradient extent of acetone is not warranted.

Benzoic acid was detected in one sample at a concentration of 0.61 mg/kg. The concentration decreased with depth, was below the EQL, and increased downgradient at location 15-613507. The residential SSL was approximately 410,000 times the concentration. Further sampling for downgradient extent of benzoic acid is not warranted.

Bis(2-ethylhexyl)phthalate was detected in four samples with a maximum concentration of 0.079 mg/kg. The concentrations were below the EQLs at all locations. Concentrations decreased with depth at locations 15-613510 and 15-613513 and did not change substantially with depth at locations 15-613508 and 15-613511 (0.001 mg/kg or less). Concentrations decreased downgradient. The residential SSL was approximately 4810 times the maximum concentration. Further sampling for downgradient extent of bis(2-ethylhexyl)phthalate is not warranted.

Butylbenzylphthalate was detected in one sample at a concentration of 0.043 mg/kg. The concentration decreased with depth, was below the EQL, and increased downgradient at location 15-03022. The residential SSL was approximately 65,100 times the concentration. Further sampling for downgradient extent of butylbenzylphthalate is not warranted.

Di-n-butylphthalate was detected in one sample at a concentration of 0.2 mg/kg. The concentration decreased with depth, was below the EQL, and increased downgradient at location 15-613512. The residential SSL was approximately 30,800 times the concentration. Further sampling for downgradient extent of di-n-butylphthalate is not warranted.

Methylene chloride was detected in 16 samples with a maximum concentration of 0.0063 mg/kg. Concentrations were below the EQLs in all but 2 samples and did not change substantially with depth and downgradient (0.0034 mg/kg or less). The residential SSL was approximately 65,000 times the maximum concentration. Further sampling for downgradient extent of methylene chloride is not warranted.

Pentachlorophenol was detected in one sample at a concentration of 0.37 mg/kg. The concentration decreased with depth and decreased downgradient. Further sampling for downgradient extent of pentachlorophenol is not warranted.

One sample was analyzed for dioxins/furans. Two dioxin/furan congeners were detected in one sample at concentrations below the EQLs. The residential SSL was approximately 3403 times the TCDD-equivalent concentration. Further sampling for downgradient extent of dioxins/furans is not warranted.

Radionuclides

Radionuclides were not detected above BVs at SWMU 36-005.

7.4.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.0005, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 1×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 0.08, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.009, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios at SWMU 36-005.

7.4.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks for any receptor exist at SWMU 36-005.

7.5 SWMU 36-006, Surface Disposal Area

7.5.1 Site Description and Operational History

SWMU 36-006 consists of an inactive surface disposal area located at TA-36 on the southern slope of Potrillo Canyon, approximately 600 ft north of the Eenie Firing Site [AOC 36-004(a)] at TA-36 (Figure 7.5-1). SWMU 36-006 was used to dispose of cables, metal, concrete, and other similar debris from the TA-36 firing sites (LANL 1993, 015313, p. 5-63). The majority of the debris covers an area approximately 75 ft wide that extends approximately 100 ft down the south canyon slope. The remainder of the debris was scattered laterally 300 ft along the south canyon slope. SWMU 36-006 was used from 1955 to 1970. All remaining debris was removed from the SWMU 36-006 surface disposal area during the 2010 investigation.

7.5.2 Relationship to Other SWMUs and AOCs

SWMU 36-006 is located directly north of AOC 36-004(a); debris from AOC 36-004(a) was disposed of at SWMU 36-006. Together AOC 36-004(a) and SWMU 36-006 comprise Consolidated Unit 36-006-99 (Table 1.1-1).

7.5.3 Summary of Previous Investigations

During the 1995 Phase I RFI conducted at SWMU 36-006, surface (0.0–0.5 ft bgs) and subsurface samples (1.5 ft–2.0 ft bgs) were collected from 19 locations around the disposal area and field-screened for inorganic chemicals, radioactivity, organic vapors, and HE to bias sampling locations (LANL 1996, 054733, pp. 5-39–5-43). Field-screening results showed primarily background levels, although some elevated lead and uranium concentrations were noted. Based on these results, four locations were selected for sampling. Surface samples (0.0–0.33 ft bgs) were collected from a location upgradient of the debris area and in the first sediment catchments downgradient of the debris area. In addition, one surface sample (0.0–0.33 ft bgs) and one subsurface sample (1.33–1.5 ft bgs) were collected from each of two locations at the base of the debris area. All six samples were submitted for analysis of TAL metals, HE, VOCs, and SVOCs (LANL 1996, 054733, pp. 5-39–5-43).

All decision-level analytical data collected during previous investigations are presented and evaluated in section 7.5.4.4. Table 7.5-1 presents the samples collected and analyses requested at SWMU 36-006.

7.5.4 Site Contamination

7.5.4.1 Soil, Rock, and Sediment Sampling

The following activities were completed during the 2010 investigation.

- Following removal of surface debris, samples were collected at locations beneath where debris was removed and screened for organic vapors; gross-alpha, -beta, and -gamma radioactivity; explosive compounds (TNT and RDX); and metals (barium, copper, lead, and uranium). Field-screening results are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.
- All samples were field-screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded in the SCLs (Appendix G) and are presented in Table 3.2-2 and Appendix B, Table B-3.0-1.
- A total of 12 samples were collected from 6 locations in the debris removal area from 0.0–1.0 ft and 2.0–3.0 ft bgs.
- A total of 10 samples were collected from 5 locations next to the debris removal area boundaries from 0.0–1.0 ft and 2.0–3.0 ft bgs.
- All samples were analyzed for cyanide, nitrate, perchlorate, TAL metals, VOCs, SVOCs, explosive compounds, and isotopic uranium. Two of the 22 samples (1 from the debris removal and 1 next to the debris removal boundary) were also analyzed for dioxins/furans and PCBs. The sampling locations for the dioxin/furan and PCB analyses were selected based on their proximity to the potential contaminant source.

Sampling locations with decision-level data for SWMU 36-006 are shown in Figure 7.5-1. Table 7.5-1 presents the samples collected and analyses requested for SWMU 36-006. The geodetic coordinates of sampling locations are presented in Table 3.2-1.

7.5.4.2 Soil, Rock, and Sediment Field-Screening Results

During headspace screening for organic vapors at SWMU 36-006, a maximum concentration of 65 ppm was detected at location 15-613518 from 2.0–3.0 ft bgs. No radiological-screening results exceeded twice the maximum site background levels. The field-screening results are presented in Table 3.2-2 and

Appendix B, Table B-3.0-1. No changes to sampling or other activities occurred because of the field-screening results.

7.5.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 36-006 consisted of results from 28 samples (27 soil and 1 tuff) collected from 15 locations.

Inorganic Chemicals

Twenty-eight samples (27 soil and 1 tuff) were analyzed for TAL metals. Twenty-two samples (21 soil and 1 tuff) were analyzed for cyanide, nitrate, and perchlorate. Table 7.5-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 7.5-2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Antimony was detected above the soil BV (0.83 mg/kg) in one sample at a concentration of 1.6 mg/kg and had DLs (10 mg/kg to 11 mg/kg) above the BV in six samples. Antimony is retained as a COPC.

Barium was detected above the soil BV (295 mg/kg) in one 1995 sample at a concentration of 380 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in soil are not statistically different from background (Figure H-130 and Table H-17). Barium is not a COPC.

Cadmium was detected above the soil BV (0.4 mg/kg) in 1 sample at a concentration of 1.5 mg/kg and had DLs (0.52 mg/kg to 0.56 mg/kg) above the BV in 5 samples. The concentration was 1.1 mg/kg above the soil BV and below or similar to the 2 highest soil background concentrations (1.4 mg/kg and 2.6 mg/kg). The DLs were 0.12 mg/kg to 0.16 mg/kg above the BV, below the highest background DL (2 mg/kg), and below the 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). Cadmium was not detected above the BVs in the other 22 samples. Cadmium is not a COPC.

Calcium was detected above the soil BV (6120 mg/kg) in five samples with a maximum concentration of 15,000 mg/kg. The Gehan and quantile tests indicate site concentrations of calcium in soil are not statistically different from background (Figure H-131 and Table H-17). Calcium is not a COPC.

Chromium was detected above the soil BV (19.3 mg/kg) in one 1995 sample at a concentration of 410 mg/kg. The Gehan and quantile tests indicate site concentrations of chromium in soil are not statistically different from background (Figure H-132 and Table H-17). Chromium is not a COPC.

Copper was detected above the soil BV (14.7 mg/kg) in eight samples with a maximum concentration of 3140 mg/kg. The Gehan and quantile tests indicate site concentrations of copper in soil are statistically different from background (Figure H-133 and Table H-17). Copper is retained as a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg) but had DLs (0.52 mg/kg to 0.55 mg/kg) above the BVs in 21 samples. The DLs were only 0.02 mg/kg to 0.05 mg/kg above the BVs and cyanide was not detected above BVs in the other sample (DL below BV). Cyanide is not a COPC.

Lead was detected above the soil and Qbt 2,3,4 BVs (22.3 mg/kg and 11.2 mg/kg) in five soil samples and one tuff sample with a maximum concentration of 200 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are not statistically different from background (Figure H-134 and Table H-17). The tuff concentration was only 3.3 mg/kg above the BV and below or similar to the 2 highest Qbt 2,3,4 background concentrations (14.5 mg/kg and 15.5 mg/kg). Lead is not a COPC.

Mercury was detected above the soil BV (0.1 mg/kg) in four samples with a maximum concentration of 1.48 mg/kg and had DLs (0.11 mg/kg) above the BV in four samples. Mercury is retained as a COPC.

Nickel was detected above the soil BV (15.4 mg/kg) in one 1995 sample at a concentration of 200 mg/kg. The Gehan and quantile tests indicated site concentrations of nickel in soil are not statistically different from background (Figure H-135 and Table H-17). Nickel is not a COPC.

Nitrate was detected in 22 samples with a maximum concentration of 3.9 mg/kg. Nitrate is naturally occurring, and the concentrations reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Selenium was detected above the soil and Qbt 2,3,4 BVs (1.52 mg/kg and 0.3 mg/kg) in 11 soil samples and 1 tuff sample with a maximum concentration of 2.5 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure H-136 and Table H-17). Selenium is retained as a COPC.

Silver was not detected above the soil BV (1 mg/kg) but had DLs (2.1 mg/kg to 2.3 mg/kg) above the BV in six 1995 samples. The DLs were 1.1 mg/kg to 1.3 mg/kg above the BV. Silver was detected below the BVs in twenty-two 2011 samples. Silver is not a COPC.

Thallium was not detected above the soil BV (0.73 mg/kg) but had DLs (1.3 mg/kg to 1.4 mg/kg) above the BV in six 1995 samples. The DLs were approximately 0.6 mg/kg to 0.7 mg/kg above the BV and 0.3 mg/kg to 0.4 mg/kg above the maximum soil background concentration (1 mg/kg). Thallium was not detected (DLs below BVs) or detected below the BVs in all twenty-two 2011 samples (detected below BV in four samples). Thallium is not a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in six samples with a maximum concentration of 168 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are statistically different from background (Figure H-137 and Table H-17). Zinc is retained as a COPC.

Organic Chemicals

Twenty-eight samples (27 soil and 1 tuff) were analyzed for VOCs, SVOCs, and explosive compounds. Two soils samples were also analyzed for PCBs and dioxins/furans. Table 7.5-3 presents the detected organic chemicals. Figure 7.5-3 shows the spatial distribution of detected organic chemicals.

The detected organic chemicals at SWMU 36-006 include acenaphthene; acetone; 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; benzoic acid; chrysene; dibenz(a,h)anthracene; dibenzofuran; 3,5-dinitroaniline; fluoranthene; fluorene; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; indeno(1,2,3-cd)pyrene; 4-isopropyltoluene; methylene chloride; 2-methylnaphthalene; naphthalene; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; phenanthrene; pyrene; RDX; TATB (1,3,5-triamino-2,4,6-trinitrobenzene); trichlorofluoromethane; 1,3,5-trinitrobenzene; and 2,4,6-trinitrotoluene. All detected organic chemicals are retained as COPCs.

Radionuclides

Twenty-two samples (21 soil and 1 tuff) were analyzed for isotopic uranium. Table 7.5-4 presents the radionuclides detected above BVs. Figure 7.5-4 shows the spatial distribution of radionuclides detected above BVs.

Uranium-238 was detected above the soil BV (2.29 pCi/g) in three samples with a maximum activity of 5.26 pCi/g. Uranium-238 is retained as a COPC.

7.5.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 36-006 are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMU 36-006 include antimony, copper, mercury, selenium, and zinc.

Antimony was detected above the soil BV in one sample at a concentration of 1.6 mg/kg and had DLs (10 mg/kg to 11 mg/kg) above the BV in six samples. The elevated DLs were only associated with the 1995 samples and not with the 2011 samples, which constitute almost 80% of the data. The detected concentration decreased with depth and decreased downgradient. The residential SSL was approximately 2.8 times and the industrial SSL was approximately 47 times the maximum DL. Further sampling for extent of antimony is not warranted.

Copper was detected above the soil BV in eight samples with a maximum concentration of 3140 mg/kg. Copper concentrations decreased with depth at locations 15-613517, 15-613521, 15-613522, 15-613523, and 15-613524 and did not change substantially with depth (3 mg/kg) at location 36-03145. Concentrations decreased downgradient, except at location 36-613522. The residential SSL was approximately 73 times the maximum concentration at location 36-613522. The vertical extent of copper is defined, and further sampling for lateral extent is not warranted.

Mercury was detected above the soil BV in four samples with a maximum concentration of 1.48 mg/kg and had DLs (0.11 mg/kg) above the BV in four samples. Mercury concentrations decreased with depth and decreased downgradient, except at location 36-613522. The residential SSL was approximately 16 times and the industrial SSL was approximately 263 times the concentration at location 36-613522. The DLs were only 0.01 mg/kg above the BV and the residential SSL was approximately 210 times the DL. The vertical extent of mercury is defined, and further sampling for lateral extent is not warranted.

Selenium was detected above the soil BV in 11 soil samples and 1 tuff sample with a maximum concentration of 2.5 mg/kg. Selenium concentrations decreased with depth at location 15-613517 and 15-613521, did not change with depth at locations 15-613514 and 15-613524, and did not change substantially with depth (less than 2 mg/kg) at the other locations. Concentrations did not change substantially downgradient (0.8 mg/kg or less). The residential SSL was approximately 156 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Zinc was detected above the soil BV in six samples with a maximum concentration of 168 mg/kg. Zinc concentrations decreased with depth at locations 15-613517, 15-613522, 15-613523, and 15-613524 and increased with depth at location 36-03145. Concentrations decreased downgradient or were below the maximum soil background concentration (75.5 mg/kg). The residential SSL was approximately 157 times maximum concentration at location 36-03145 and approximately 140 times the maximum site concentration. The lateral extent of zinc is defined, and further sampling for vertical extent is not warranted.

Organic Chemicals

Organic COPCs at SWMU 36-006 include acenaphthene; acetone; 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene;

benzo(g,h,i)perylene; benzo(k)fluoranthene; benzoic acid; chrysene; dibenz(a,h)anthracene; dibenzofuran; 3,5-dinitroaniline; fluoranthene; fluorene; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran, indeno(1,2,3-cd)pyrene, 4-isopropyltoluene, methylene chloride, 2-methylnaphthalene; naphthalene; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; phenanthrene; pyrene; RDX; TATB; trichlorofluoromethane; 1,3,5-trinitrobenzene; and 2,4,6-trinitrotoluene.

Acenaphthene; anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; chrysene; dibenz(a,h)anthracene; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; 2-methylnaphthalene; naphthalene; phenanthrene; and pyrene were detected in one to four samples. The concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of these organic COPCs are defined.

Acetone was detected in six samples with a maximum concentration of 0.022 mg/kg. Concentrations were below EQLs at locations 15-613516, 15-613518, 15-613519, and 15-613521 and did not change substantially with depth at any location (approximately 0.016 mg/kg or less). Concentrations decreased downgradient. The residential SSL was approximately 3,014,000 times the maximum concentration. The lateral extent of acetone is defined, and further sampling for vertical extent is not warranted.

Amino-2,6-dinitrotoluene[4-]; 2-amino-4,6-dinitrotoluene; dibenzofuran; 3,5-dinitroaniline; RDX; trichlorofluoromethane; 1,3,5-trinitrobenzene; and 2,4,6-trinitrotoluene were detected in one sample at concentrations ranging from 0.00045 mg/kg to 0.58 mg/kg. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of these organic COPCs are defined.

Benzoic acid was detected in one sample at a concentration of 0.64 mg/kg. The concentration was below the EQL and decreased downgradient. The residential SSL was approximately 390,625 times the concentration. The lateral extent of benzoic acid is defined, and further sampling for vertical extent is not warranted.

Isopropyltoluene[4-] was detected in one sample at a concentration of 0.0037 mg/kg. The concentration was below the EQL and decreased downgradient. The residential SSL (isopropylbenzene used as a surrogate) was approximately 637,000 times the concentration. The lateral extent of 4-isopropyltoluene is defined, and further sampling for vertical extent is not warranted.

Methylene chloride was detected in one sample at a concentration of 0.0086 mg/kg. Concentrations decreased downgradient. The residential SSL was approximately 47,560 times the concentration. The lateral extent of methylene chloride is defined, and further sampling for vertical extent is not warranted.

TATB was detected in one sample at a concentration of 2.7 mg/kg. Concentrations decreased with depth and increased downgradient. The residential SSL (1,3,5-trinitrobenzene used as a surrogate) was approximately 289 times the concentration. The vertical extent of TATB is defined, and further sampling for lateral extent is not warranted.

Four dioxin/furan congeners were detected in one or two samples. The residential SSL was approximately 269 times the maximum TCDD-equivalent concentration. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

The radionuclide COPC at SWMU 36-006 is uranium-238.

Uranium-238 was detected above the soil BV in three samples with a maximum activity of 5.26 pCi/g. Uranium-238 activities decreased with depth at all locations. Concentrations decreased downgradient at two locations and did not change substantially downgradient at location 36-613522 (0.76 pCi/g). The residential SAL was approximately 48 times the activity at location 36-613522. The vertical extent of uranium-238 is defined, and further sampling for lateral extent is not warranted.

7.5.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 1×10^{-5}, which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2015, 600575) from PAHs. As discussed in the uncertainty analysis (section I-4.4.2), the potential exposure to PAHs under the industrial scenario is impractical for a worker given the limited extent and detection of elevated concentrations. The industrial HI is 0.03, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.08 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 0.07, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Residential Scenario

The total excess cancer risk for the residential scenario is 3×10^{-4}, which is above the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The elevated cancer risk is from PAHs. The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.3 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial or construction worker scenarios at SWMU 36-006. There is a potential unacceptable cancer risk under the residential scenario but no potential unacceptable noncancer risk or dose.

7.5.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and DLs to background concentrations, no potential ecological risks to any receptors exist at SWMU 36-006.

8.0 CONCLUSIONS

8.1 Nature and Extent of Contamination

Based on the revised evaluation of the data, the nature and extent of contamination have been defined, and/or no further sampling for extent is warranted for nine sites. The nature and extent of contamination have not been defined, and further sampling is warranted for seven sites. Summaries of the nature and extent of contamination and remaining characterization and/or remediation requirements for the sites at TA-15 and TA-36 are presented below.

8.1.1 TA-15

Twelve sites at TA-15 were investigated to determine the nature and extent of contamination. The nature and extent of contamination is defined and/or further sampling for extent is not warranted for seven sites. Additional sampling is needed to define the extent of contamination for one or more inorganic, organic, or radionuclide COPCs at the following sites:

- SWMU 15-002, Former north burn pit—lateral extent of manganese
- SWMUs 15-004(b) and 15-004(c)—Vertical extent of thallium
- SWMU 15-004(f)—Vertical extent of copper, uranium, and isotopic uranium
- SWMU 15-009(e)—Vertical extent below the structures

8.1.2 TA-36

Four sites at TA-36 were investigated to determine the nature and extent of contamination. The nature and extent of contamination is defined and/or further sampling for extent is not warranted for one site (SWMU 36-006). Additional sampling is needed to define the extent of contamination at the following sites:

- SWMU 36-001—Lateral extent around periphery
- SWMU 36-003(b)—Vertical extent below the structures
- SWMU 36-005—Lateral and vertical extent within the SWMU boundary

8.2 Summary of Risk-Screening Assessments

Sites were evaluated for potential risk by human health and ecological risk-screening assessments.

- Human health risk-screening assessments were performed for 16 SWMUs/AOCs.
- Ecological risk-screening assessments were performed for 16 SWMUs/AOCs.

As noted in the report, PAHs were not evaluated for potential risk at some sites because they are not site-related. PAHs were evaluated for SWMU 15-008(a) and SWMU 36-006, which were surface disposal areas, and SWMUs 15-009(e) and 15-010(a), which were septic tanks connected to the E-F Firing Site control building, and a shop building, storage building, and a photography laboratory.

8.2.1 Human Health Risk-Screening Assessment

The human health risk-screening assessments are presented in Appendix I, section I-4.0.

The human health risk-screening assessments indicated no potential unacceptable risks or doses for the industrial, construction worker, and residential scenarios for 11 SWMUs/AOCs [SWMUs 15-004(b) and 15-004(c), 15-007(a), 15-009(e), 15-010(a), 36-003(b), and 36-005, and AOCs 15-005(b), C-15-004, C-15-005, and C-15-006]. The total excess cancer risks were below or equivalent to the NMED target risk level of 1×10^{-5}, the HIs were below or equivalent to the NMED target HI of 1, and total doses were below the DOE target dose of 25 mrem/yr.

The sites having potential unacceptable risks or doses included

- SWMU 15-002 former south burn pit (noncancer risk from mercury for all three scenarios and barium for construction worker and residential);
- SWMU 15-004(f) (construction worker noncancer risk from uranium and manganese; residential noncancer risk from copper and uranium; residential dose from isotopic uranium, primarily uranium-238). It should be noted that the results of the risk/dose assessments indicate Firing Point E contains most of contamination at SWMU 15-004(f) and is the primary area for potential unacceptable risk and/or dose at the site. However, both parts of the SWMU (with and without Firing Point E) present potential risks to receptors.
- SWMU 15-008(a) (construction worker and residential noncancer risk from uranium; residential dose from isotopic uranium, primarily uranium-238);
- SWMU 36-001 (residential dose from uranium-238); and
- SWMU 36-006 (residential cancer risk from PAHs).

The industrial cancer risk at SWMU 36-006 was approximately 1×10^{-5} from PAHs. The potential risk is based on the maximum detected concentrations of benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. The PAHs were only detected in 1 to 4 samples of a total of 28 samples (1 to 3 samples of a total of 15 surface samples), and the use of the maximum concentrations overestimated the potential risk. PAHs were detected at elevated concentrations in only 1 surface sample. In addition, the next highest concentration was an order of magnitude lower and concentrations decreased substantially with depth (1 to 2 orders of magnitude or to nondetect). For the industrial scenario, exposure to PAHs resulting in potential unacceptable cancer risk is impractical for a worker given the limited extent and detection of elevated concentrations. Therefore, the total excess cancer risk under the industrial scenario does not exceed the NMED target risk level.

Sites at TA-15 and TA-36 are inaccessible to the public and are not planned for release by DOE in the foreseeable future. Therefore, an as low as reasonably achievable (ALARA) evaluation for radiological exposure to the public is not currently required. Should DOE's plans for releasing these areas change, an ALARA evaluation will be conducted at that time. It should be noted that the Laboratory addresses considerations for radiation exposures to workers under the Laboratory's occupational radiological protection program in compliance with 10 Code of Federal Regulations 835. The Laboratory's radiation protection program implements ALARA and consists of the following elements: management commitment, training, design review, radiological work review, performance assessments, and documentation.

8.2.2 Ecological Risk-Screening Assessment

The ecological risk-screening assessments are presented in Appendix I, section I-5.0.

No potential ecological risks to populations or T&E individuals were found for 14 SWMUs/AOCs following evaluations based on minimum ESL, HI analyses, LOAEL analyses, and potential effects to populations (individuals for T&E species). These lines of evidence and the analysis of COPECs with no ESLs support the conclusions that no potential ecological risks exist at SWMUs 15-004(b) and 15-004(c), 15-007(a), 15-008(a), 15-009(e), 15-010(a), 36-001, 36-003(b), 36-005, and 36-006 and AOCs 15-005(b), C-15-004, C-15-005, and C-15-006.

Potential ecological risks were found at the following sites:

- SWMU 15-002, the former south burn pit, was found to have potential ecological risk to the robin (all feeding guilds) from mercury and to the earthworm and plant from barium and mercury.
- SWMU 15-004(f) was found to have potential ecological risks to the robin (herbivore, insectivore, omnivore) from copper and lead; and to the deer mouse, montane shrew, and plant from copper and uranium.

9.0 RECOMMENDATIONS

The determination of site status is based on the results of the risk-screening assessments and the nature and extent evaluation. Depending upon the decision scenario used, the sites are recommended as corrective actions complete either with or without controls or for additional action. The residential scenario is the only scenario under which corrective action complete without controls is applicable; that is, no additional corrective actions or conditions are necessary. The other decision scenarios (industrial and construction worker) result in corrective action complete with controls; that is, some type of institutional controls must be in place to ensure land use remains consistent with site cleanup levels. The current and reasonably foreseeable future land use for the Potrillo and Fence Canyons Aggregate Area is industrial.

9.1 Additional Field Characterization and Remediation Activities

9.1.1 Additional Field Characterization Activities

The extent of contamination has not been defined for eight sites investigated in the Potrillo and Fence Canyons Aggregate Area (Table 9.1-1). Additional sampling is needed to define the extent of contamination for one or more inorganic chemicals, organic chemicals, or radionuclides at the following sites:

- SWMUs 15-002 (former north burn pit), 15-004(b) and 15-004(c), 15-004(f), 15-009(e), 36-001, 36-003(b), and 36-005

A Phase II investigation work plan will be developed specifying sampling locations, numbers of samples, and analytical suites required to define the extent of contamination for these sites. Upon completion of the proposed Phase II sampling, the data collected will be used to confirm the extent of contamination has been defined and to complete human health and ecological risk-screening assessments for these sites. The results will be presented in a Phase II investigation report for the Potrillo and Fence Canyons Aggregate Area.

9.1.2 Remediation and Confirmation Sampling Activities

Sites requiring remediation and confirmation sampling (Table 9.1-1) in the Potrillo and Fence Canyons Aggregate Area include the following

- SWMU 15-002, Former south burn pit
- SWMU 15-004(f), E-F Firing Site
- SWMU 15-008(a), Surface disposal areas at E-F Firing Site

9.2 Recommendations for Corrective Actions Complete

Six SWMUs/AOCs do not pose a potential unacceptable risk or dose under the industrial, construction worker, and residential scenarios, have no potential ecological risks, and the nature and extent of contamination is defined and/or no further sampling for extent is warranted (Table 9.1-1). These sites are appropriate for corrective actions complete without controls:

- SWMU 15-007(a), MDA N
- AOC 15-005(b), Storage area
- SWMU 15-010(a), Septic tank
- AOC C-15-004, Former transformer station
- AOC C-15-005, Potential soil contamination from former building
- AOC C-15-006, Potential soil contamination from former building

One site has been found to pose no potential unacceptable risks to human health under the construction worker and industrial scenarios or to ecological receptors and the nature and extent of contamination is defined and/or no further sampling for extent is warranted (Table 9.1-1). This site is appropriate for corrective actions complete with controls:

- SWMU 36-006, Surface disposal area

9.3 Schedule for Recommended Activities

A Phase II investigation work plan will be developed and submitted to NMED after this supplemental investigation report is approved. The Phase II work plan will provide details of and a schedule for implementing sampling and remediation activities and submitting a Phase II investigation report.

10.0 REFERENCES AND MAP DATA SOURCES

10.1 References

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Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH 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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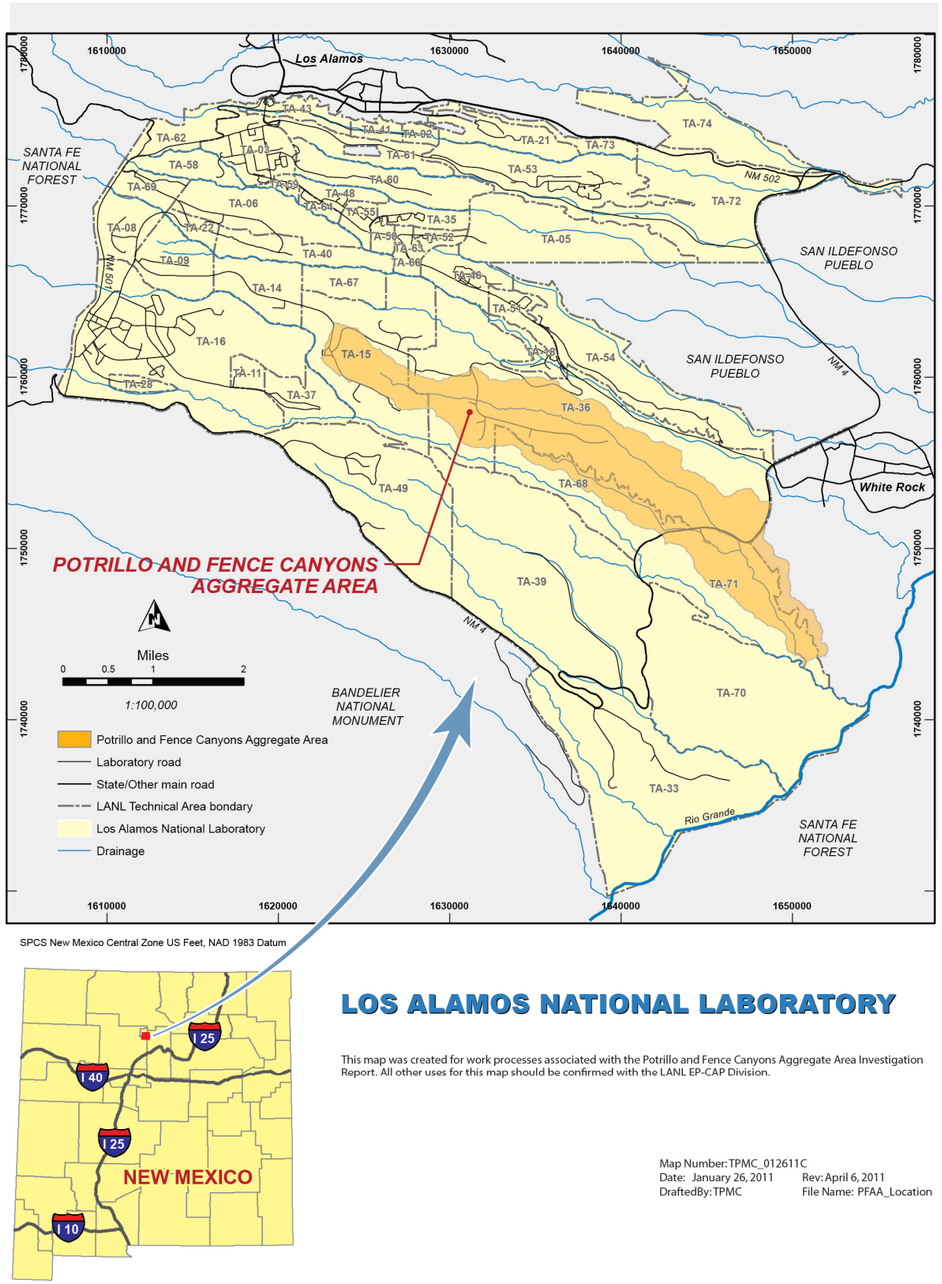
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10.2 Map Data Sources

Data sources used in original figures and/or plates created for this report are described below and identified by legend title.

Legend Item/Type	Data Source
LANL Technical Areas	Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published 04 December 2008.
Paved roads	Paved Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published 29 November 2010.
Paved parking	Paved Parking; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published 29 November 2010.
Dirt roads	Dirt Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published 29 November 2010.
Drainages	WQH Drainage Arcs; Los Alamos National Laboratory, ENV Water Quality and Hydrology Group; 1:24,000 Scale Data; 03 June 2003.
Canyon reaches for Potrillo and Fence Canyons	Investigation Report for Potrillo and Fence Canyons, Plates 1 and 2; Los Alamos National Laboratory, Environment and Remediation Support Services, LA-UR-10-8316, 15 December 2010.
LANL structures	Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published 29 November 2010.
LANL fence lines	Security and Industrial Fences and Gates; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published 29 November 2010.
LANL communications lines	Communication Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published 29 November 2010.
LANL electric lines	Primary Electric Grid; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published 29 November 2010.
LANL gas lines	Primary Gas Distribution Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published 29 November 2010.
LANL sewer lines	Sewer Line System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section as published 29 November 2010.
LANL water lines	Water Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; as published 29 November 2010.

Legend Item/Type	Data Source
Other LANL / drain lines in PFAA area	Two drain lines digitized from Figures 4.1-22 and -26 from the Integrated Work Plan for Potrillo and Fence Canyons Aggregate Area; LANL ERID 2009-0318; July 2009.
Former LANL PFAA area structures	Former PFAA structures, WES GIS Team project folder 09-0039; Los Alamos National Laboratory, Waste and Environmental Services Division, Environmental Data and Analysis Group Geographic Information Systems, unpublished
PFAA area LANL PRS boundaries	Potential Release Sites; Los Alamos National Laboratory, Waste and Environmental Services Division, Environmental Data and Analysis Group, 2010-1E, published 9 December 2010.
PFAA area sample locations	TPMC field survey data, now found in: Point Feature Locations of the Environmental Restoration Project Database; Los Alamos National Laboratory, Waste and Environmental Services Division, to be included in a post October 2010 publication of the data.
PFAA area field-screening locations for SWMUs 15-004(b,c,f)	TPMC field survey data, plan locations contained in the Integrated Work Plan for Potrillo and Fence Canyons Aggregate Area, Rev. 1; LANL ERID 2009-0318; July 2009; final screening locations unpublished.
MDA N [SWMU 15-007(a)] excavation perimeter	TPMC field survey data, GPS survey conducted post-excavation December 2010, unpublished.
LANL historical sample locations	Point Feature Locations of the Environmental Restoration Project Database; Los Alamos National Laboratory, Waste and Environmental Services Division, 4 October 2010
LANL surface water monitoring site locations	Surface Water Monitoring Environmental Surveillance at Los Alamos During 2008 On-site and Perimeter Monitoring Locations; Los Alamos National Laboratory, Waste and Environmental Services Division, Environmental Data and Analysis Group, September 2009, as published 2 April, 2010.
MDA N [SWMU 15-007(a)] and MDA AA (SWMU 36-001) geophysical survey results	Geophysical Investigations at SWMU 36-001 (MDA AA) and SWMU 15-007(a) (MDA N) Los Alamos National Laboratory Los Alamos, New Mexico; Figures 1, 5, and 8, Sunbelt Geophysics, Socorro, New Mexico, November 2010.
SWMU 15-004(f) radiological survey and contours	GPS-Based Radiological Survey of SWMUs 15-004(f), 15-007(a), and 36-001 at the Los Alamos National Laboratory; Figure A1, Environmental Restoration Group, Inc., Albuquerque, New Mexico, December 2010. TPMC digital contouring of survey radiological count data, March 2011, unpublished
Contours	Hypsography, 2, 10, 20, and 100 Foot Contour Interval; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; 1991.



LOS ALAMOS NATIONAL LABORATORY

This map was created for work processes associated with the Potrillo and Fence Canyons Aggregate Area Investigation Report. All other uses for this map should be confirmed with the LANL EP-CAP Division.

Map Number: TPMC_012611C
Date: January 26, 2011 Rev: April 6, 2011
DraftedBy: TPMC File Name: PFAA_Location

Figure 1.1-1 Location of Potrillo and Fence Canyons Aggregate Area with respect to Laboratory technical areas

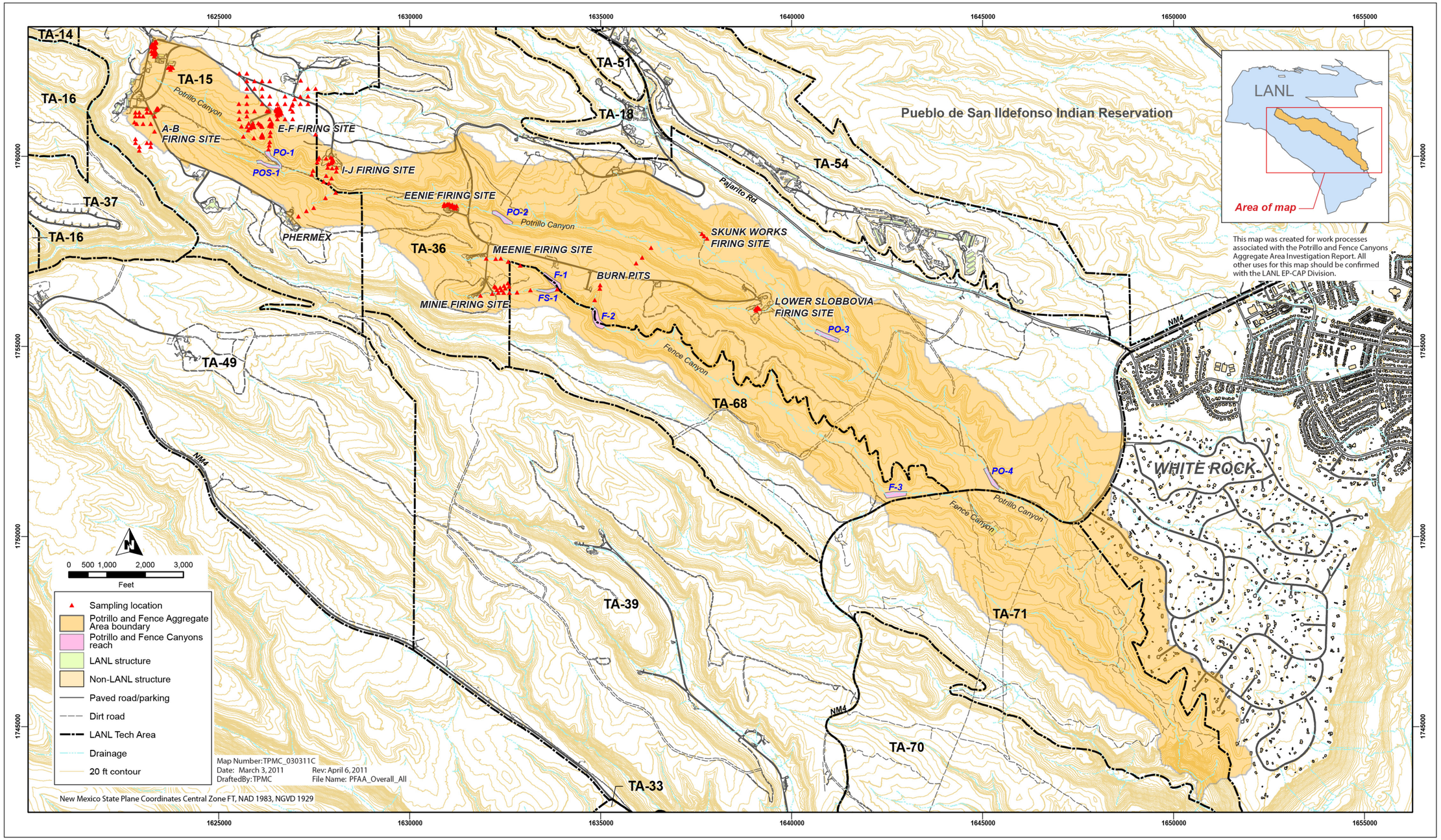


Figure 1.1-2 Location of Potrillo and Fence Canyons Aggregate Area and its surrounding landholdings

Bandelier Tuff	Tshirege Member (Qbt)	Qbt 4	Ash-Flow Units
		Qbt 3	
		Qbt 2	
		Qbt 1v	
		Qbt 1g	
		Tsankawi Pumice Bed	
Cerro Toledo Interval (Qct)		Volcaniclastic Sediments and Ash-Falls	
Bandelier Tuff	Otowi Member (Qbo)	Ash-Flow Units	
		Guaje Pumice Bed (Qbog)	
Puye Formation (Tp)	Fanglomerate	Fanglomerate Facies includes sand, gravel, conglomerate, and tuffaceous sediments	
	Basalt and Andesite	Cerros del Rio Basalts intercalated within the Puye Formation, includes up to four interlayered basaltic flows. Andesites of the Tschicoma Formation present in western part of plateau	
	Fanglomerate	Fanglomerate Facies includes sand, gravel, conglomerate, and tuffaceous sediments; includes “Old Alluvium”	
	Axial facies deposits of the ancestral Rio Grande	Totavi Lentil	
Santa Fe Group	Coarse Sediments	Coarse-Grained Upper Facies (formerly called the “Chaquehui Formation” by Purtymun 1995, 045344)	
	Basalt		
	Coarse Sediments		
	Basalt		
	Coarse Sediments		
	Basalt		
	Coarse Sediments		
	Arkosic clastic sedimentary deposits	Undivided Santa Fe Group (includes Chamita[?] and Tesuque Formations)	

Source: Adapted from (LANL 1999, 064617).

Figure 2.2-1 Generalized stratigraphy of bedrock geologic units of the Pajarito Plateau

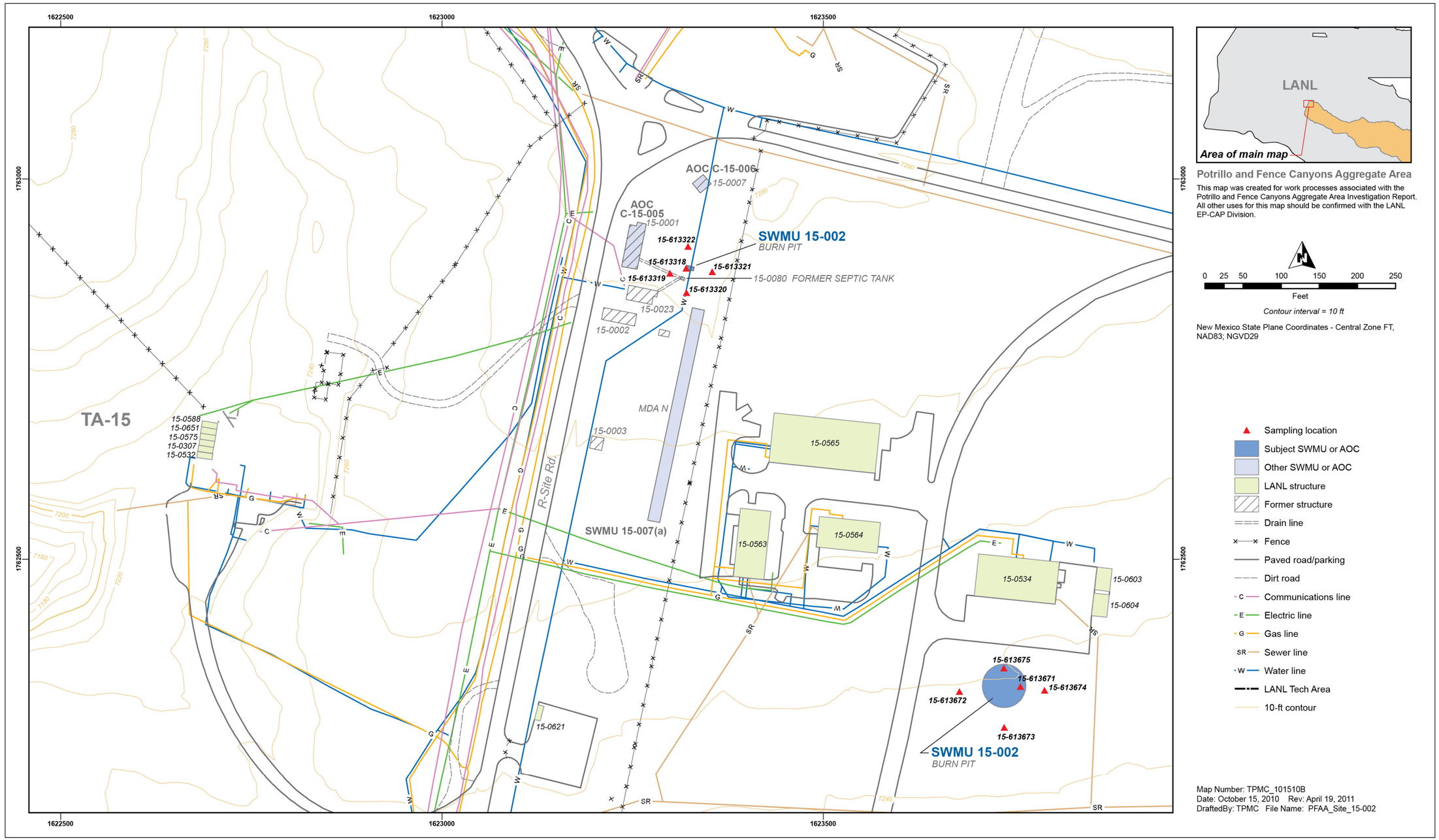


Figure 6.2-1 Site map of SWMU 15-002

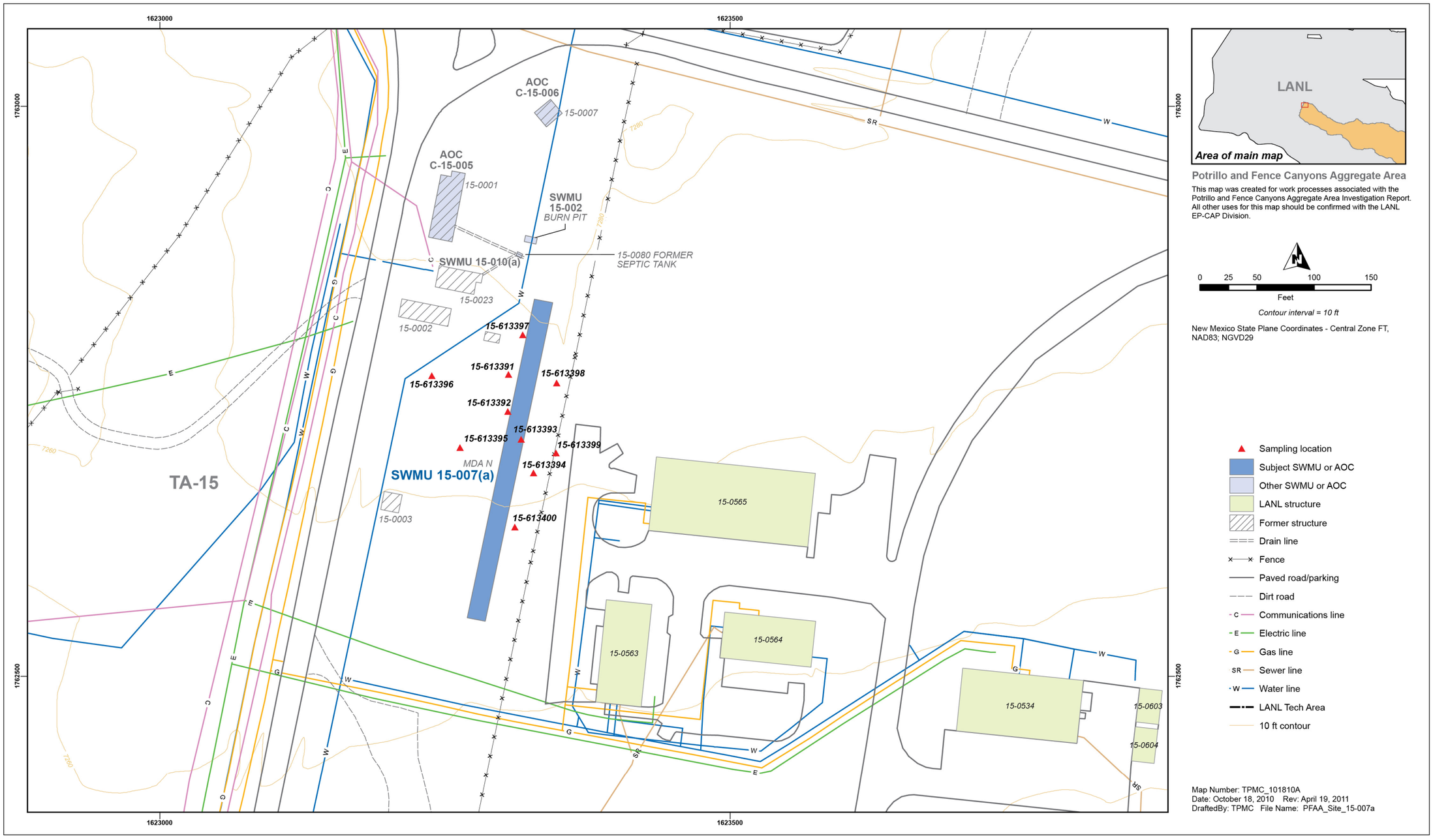


Figure 6.3-1 Site map of SWMU 15-007(a)

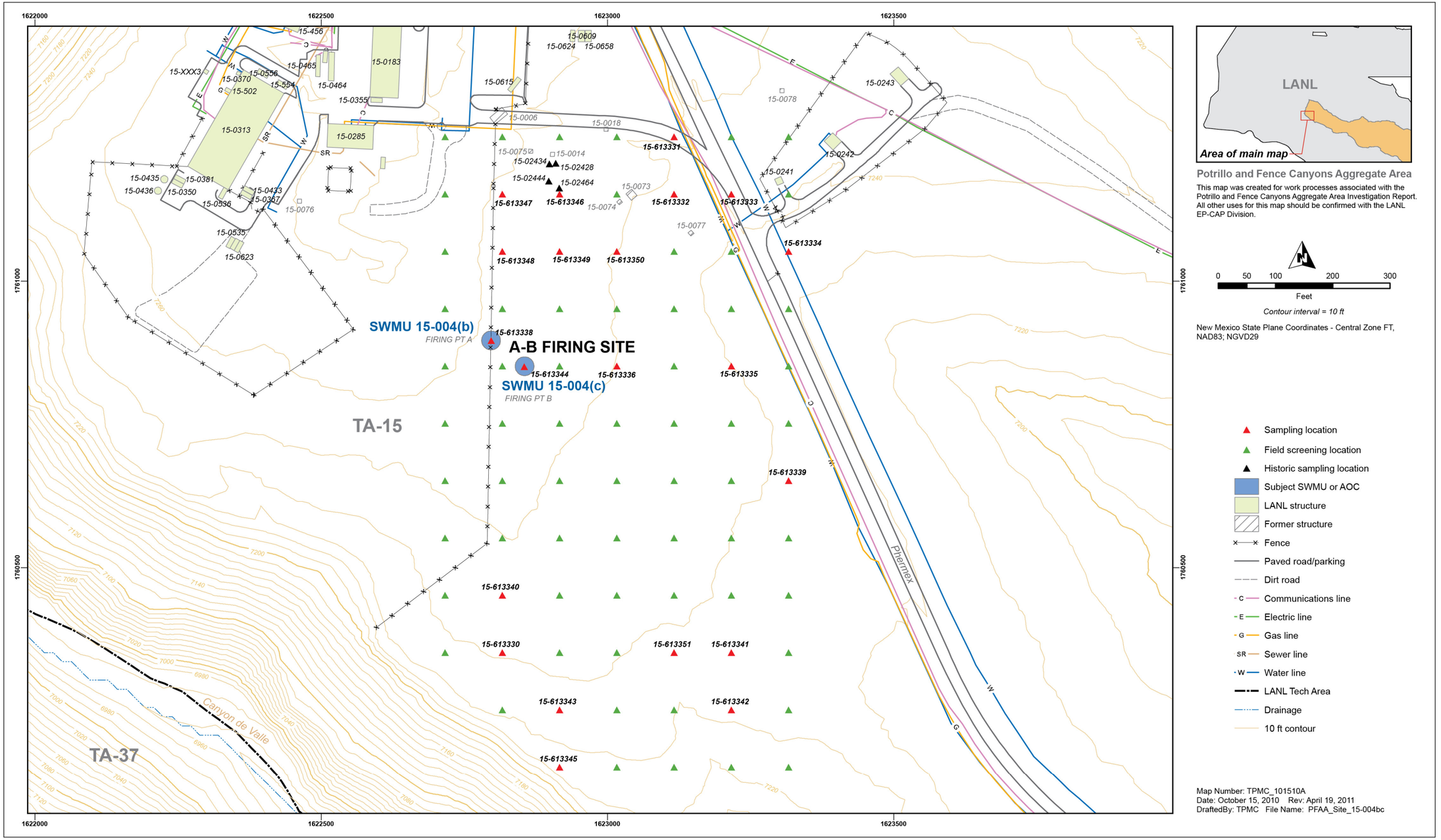


Figure 6.4-1 Site map of SWMUs 15-004(b) and 15-004(c)

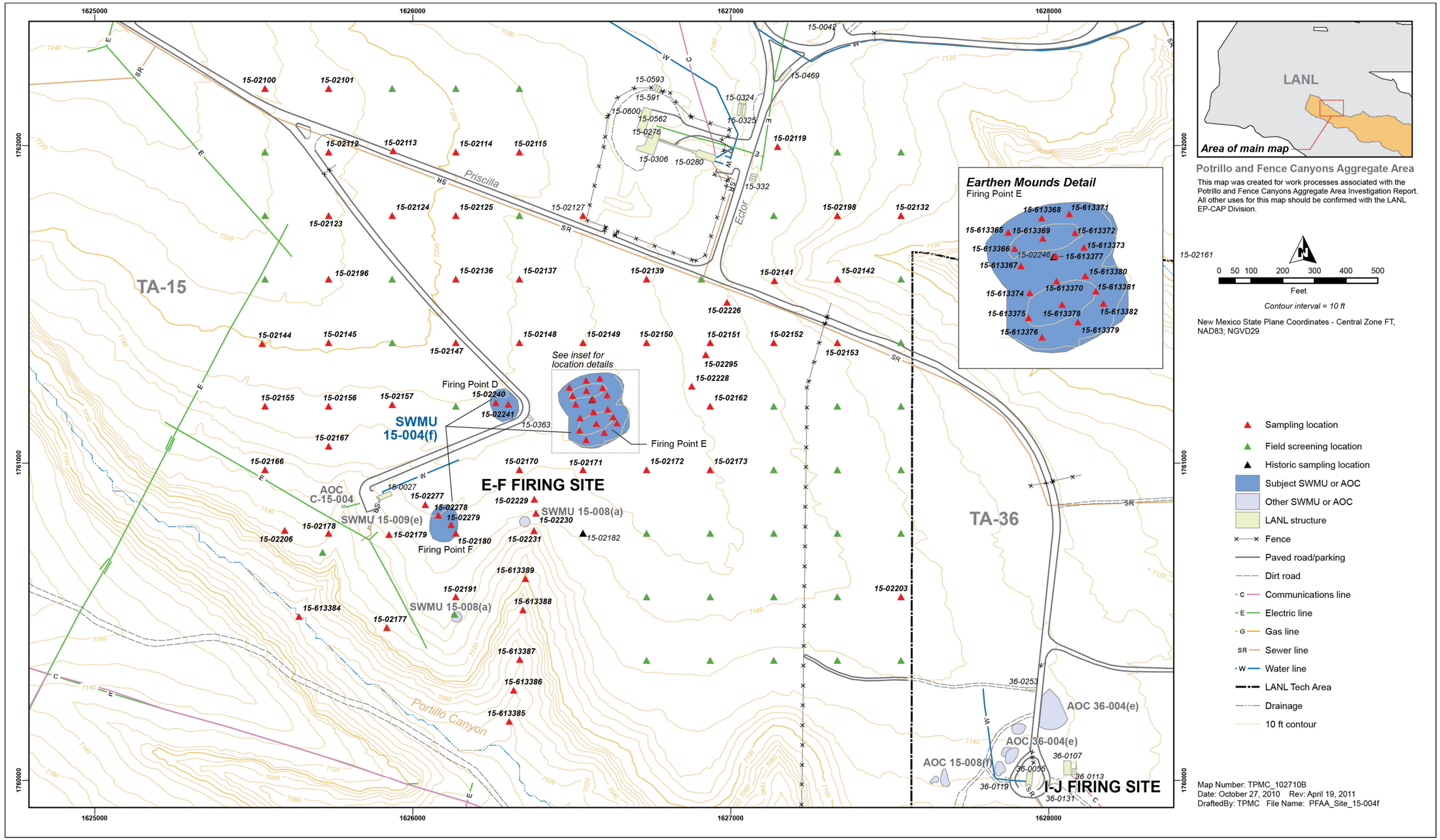


Figure 6.5-1 Site map of SWMU 15-004(f)

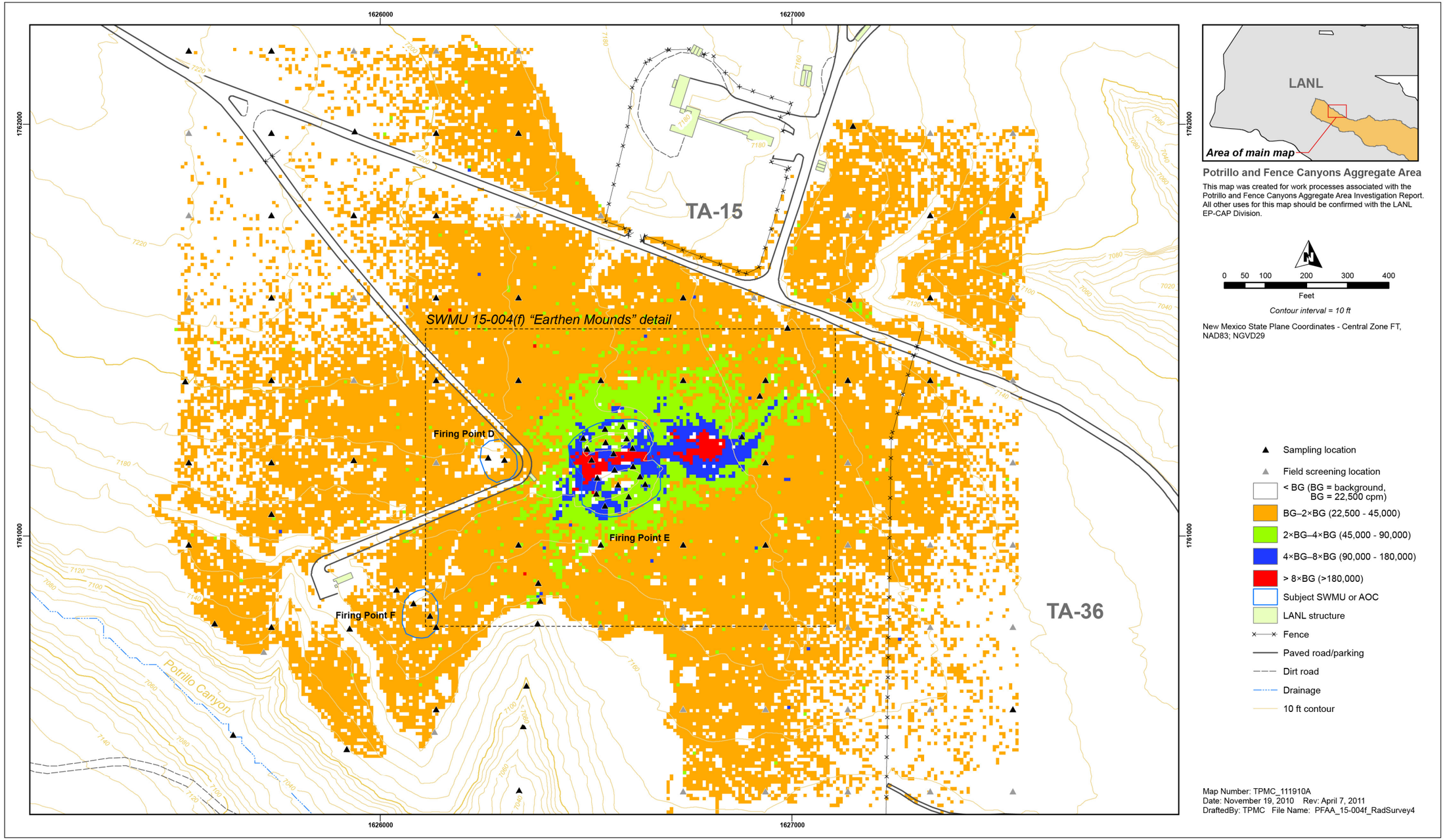


Figure 6.5-2 Radiological survey data for SWMU 15-004(f)

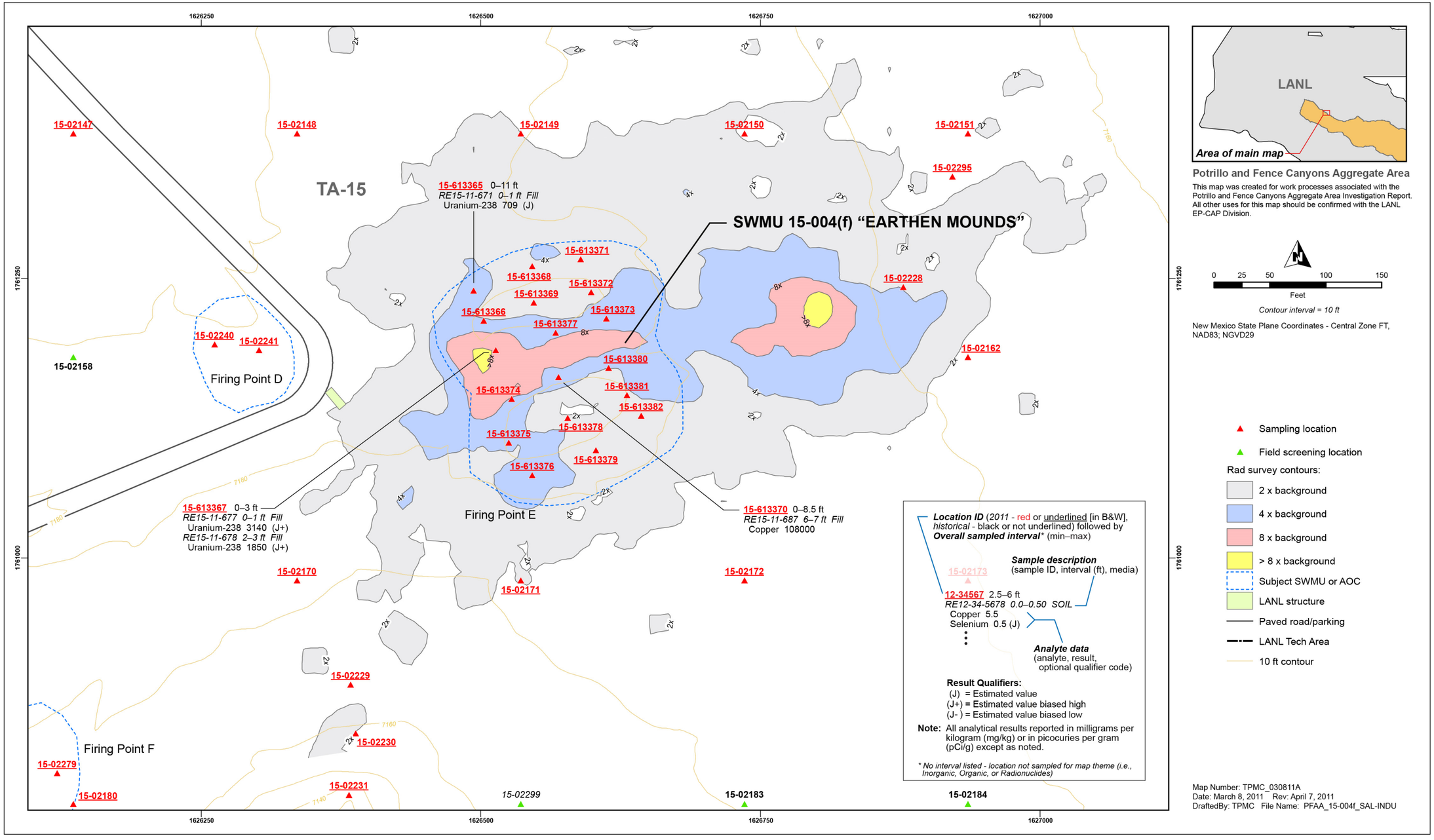


Figure 6.5-3 Comparison of radiological survey data for SWMU 15-004(f) with inorganic chemical and radionuclide results greater than industrial SSLs or SALs

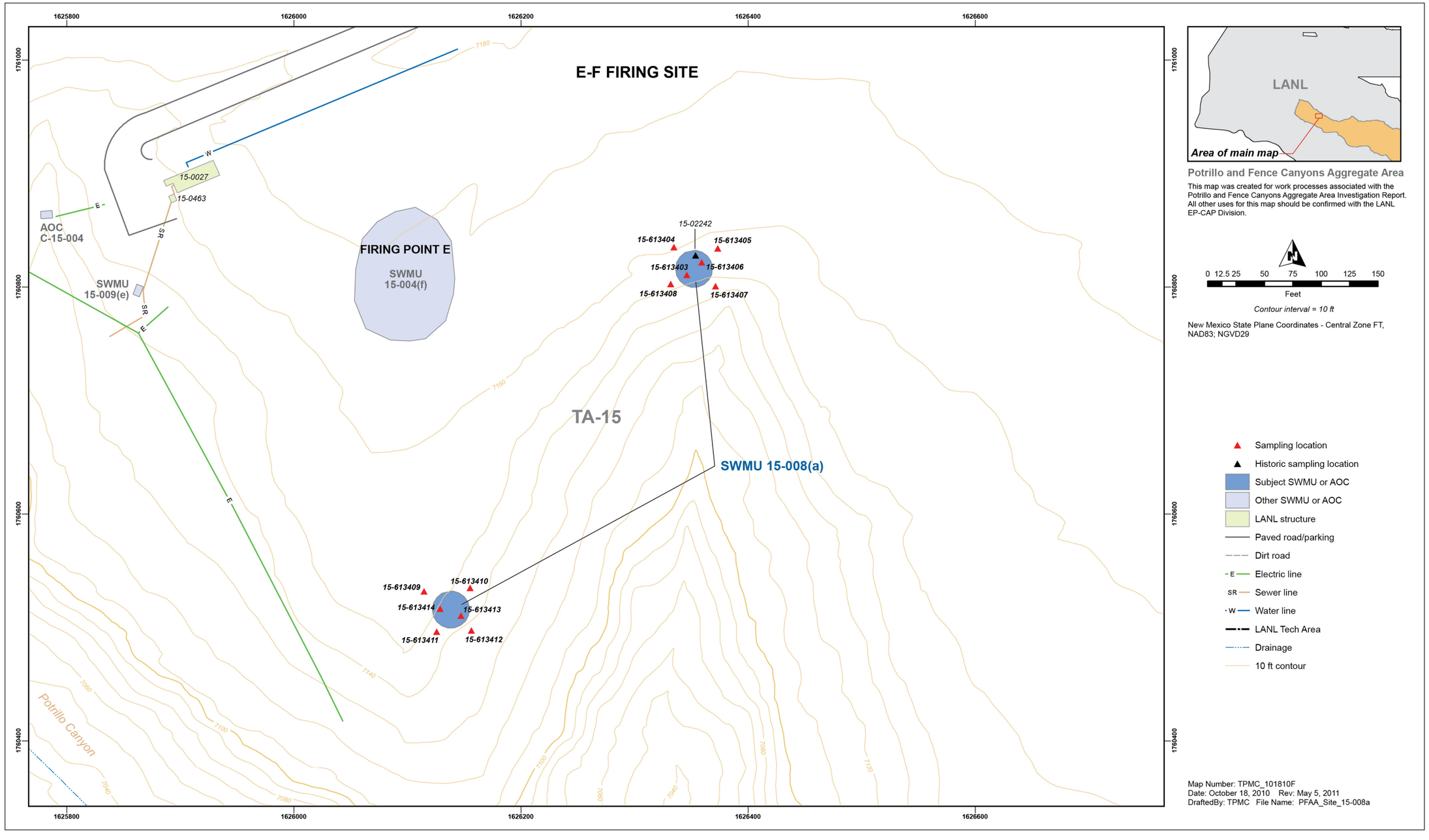


Figure 6.6-1 Site map of SWMU 15-008(a)

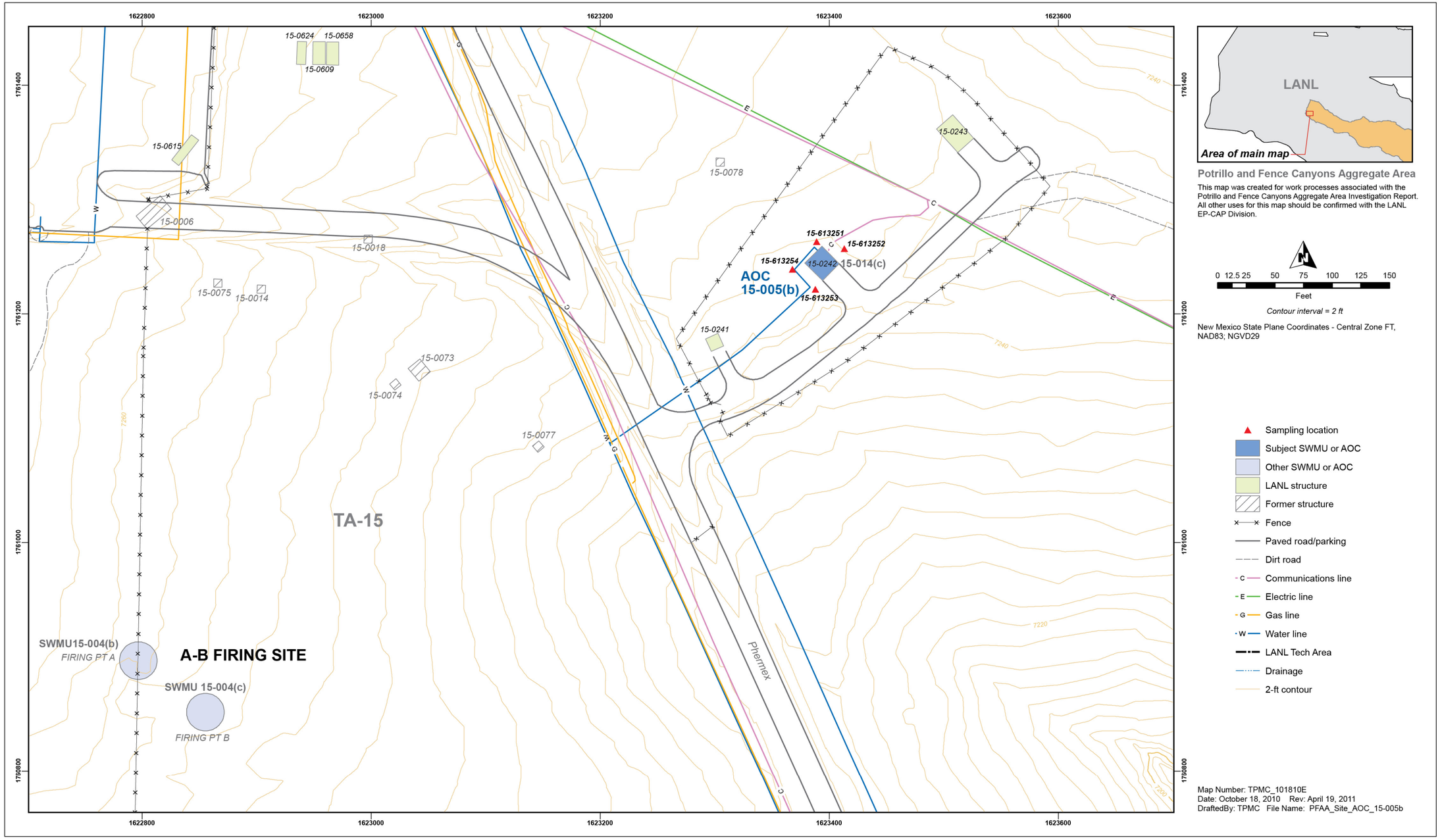


Figure 6.7-1 Site map of AOC 15-005(b)

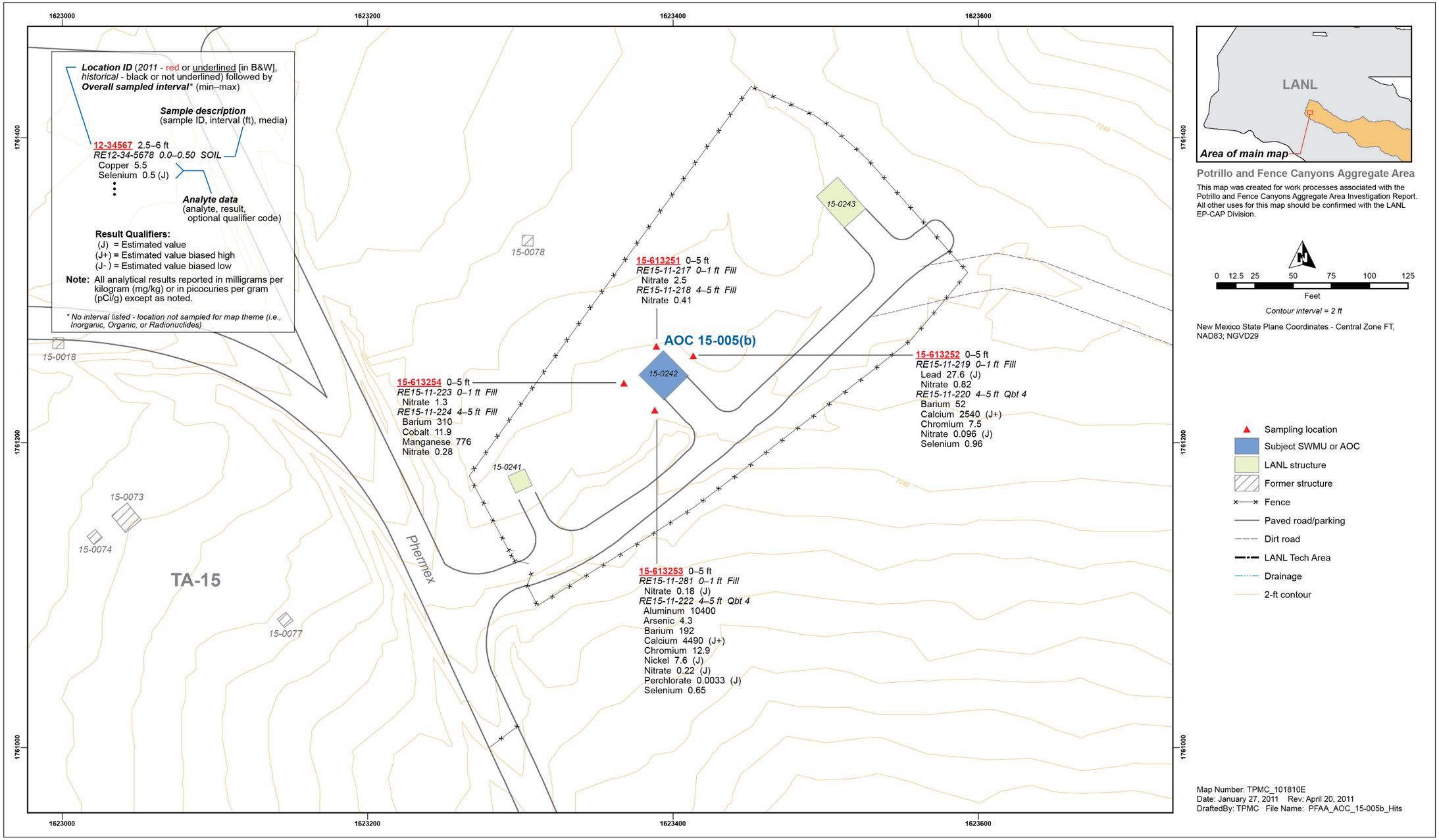


Figure 6.7-2 Inorganic chemicals above BVs at AOC 15-005(b)

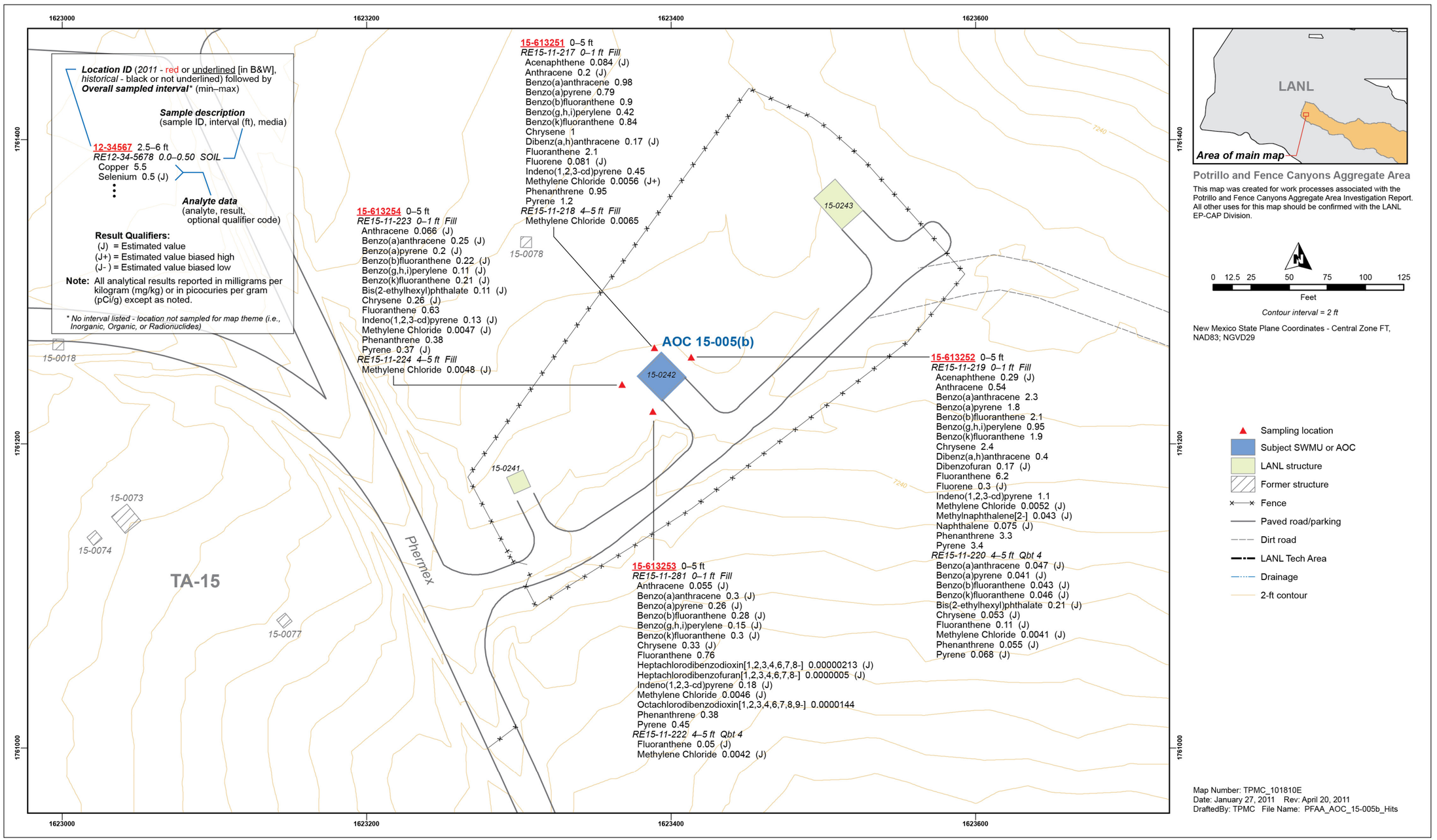


Figure 6.7-3 Organic chemicals detected at AOC 15-005(b)

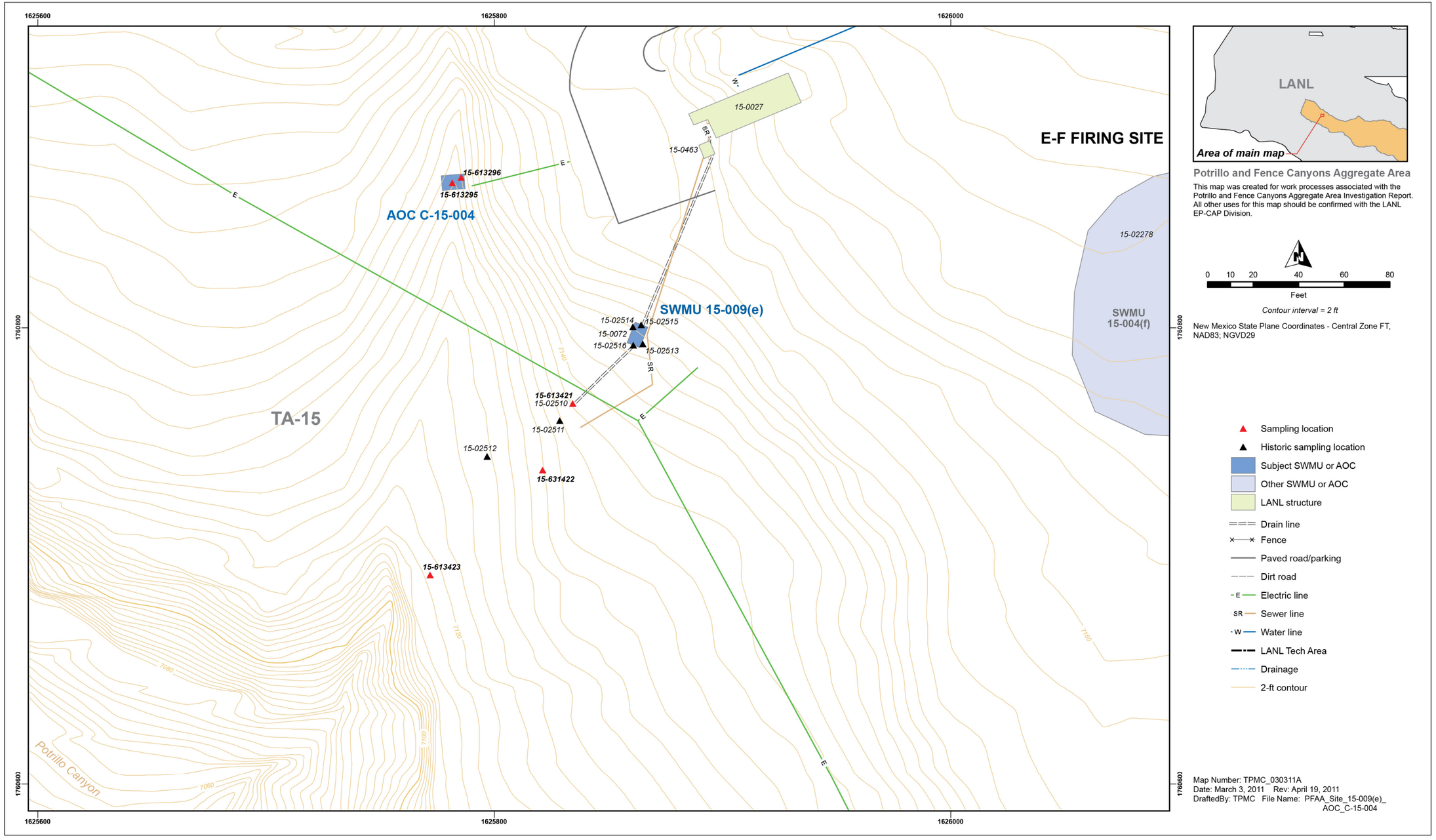


Figure 6.8-1 Site map of SWMU 15-009(e) and AOC C-15-004

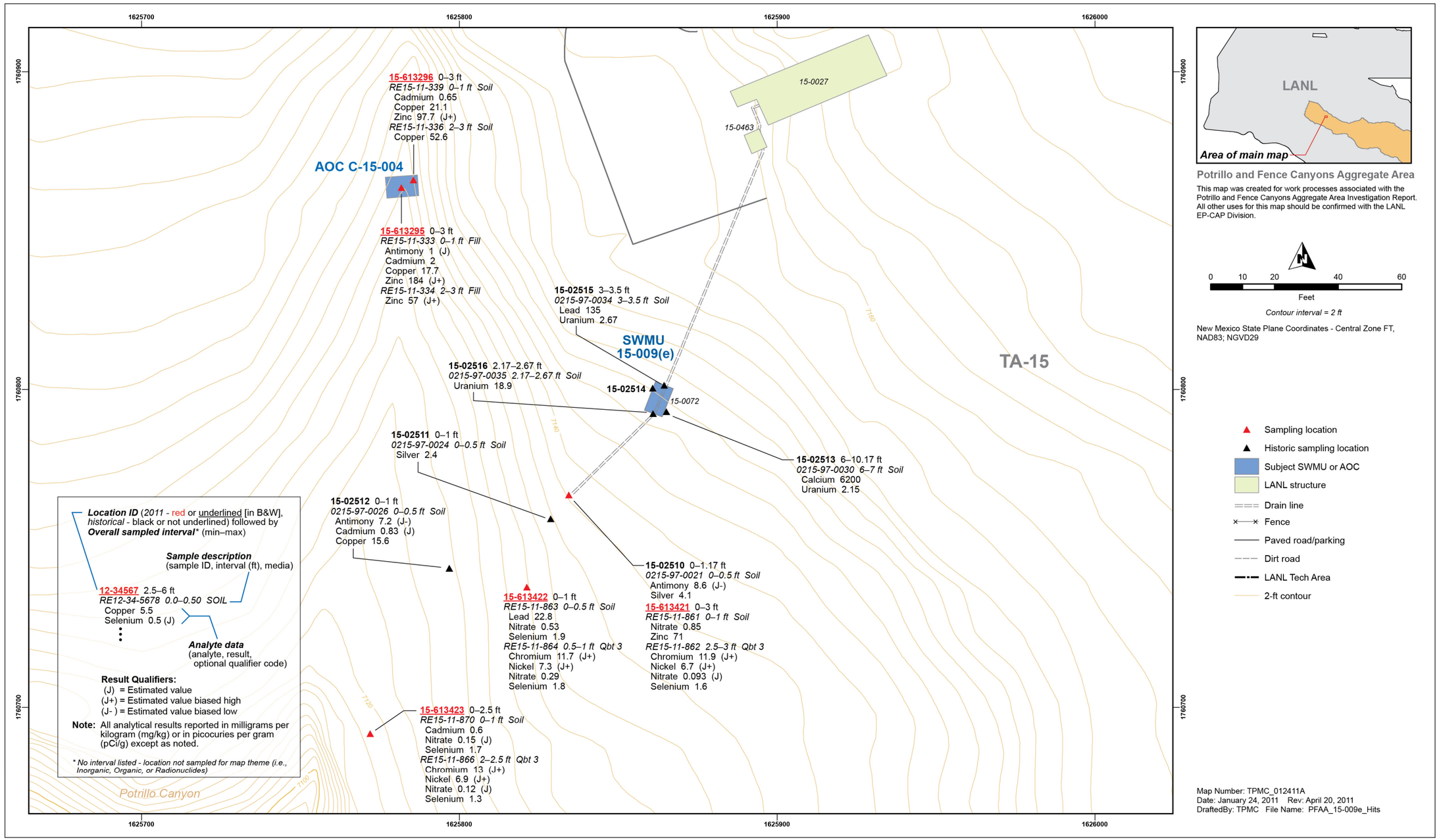


Figure 6.8-2 Inorganic chemicals above BVs at SWMU 15-009(e) and AOC C-15-004

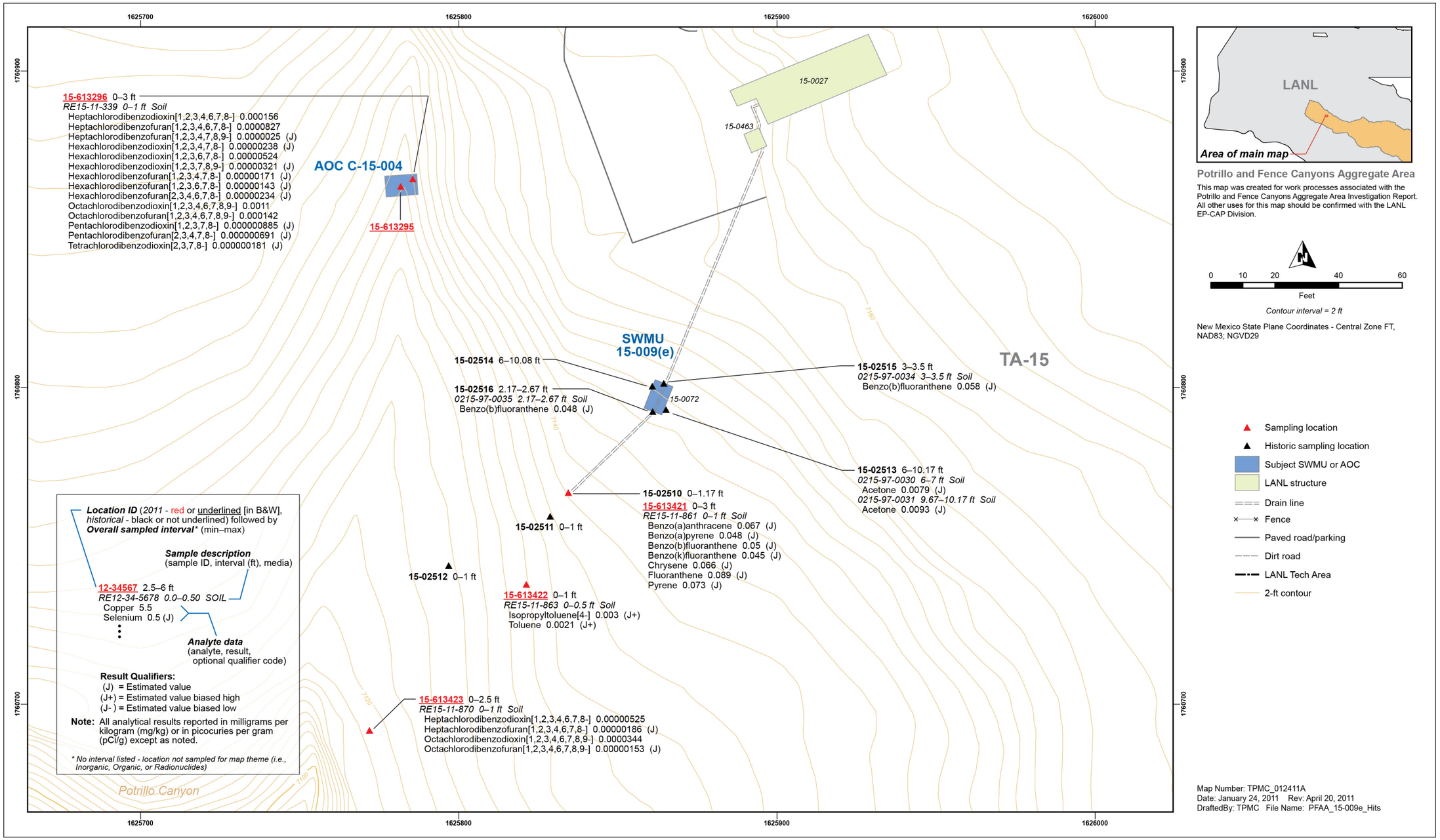


Figure 6.8-3 Organic chemicals detected at SWMU 15-009(e) and AOC C-15-004

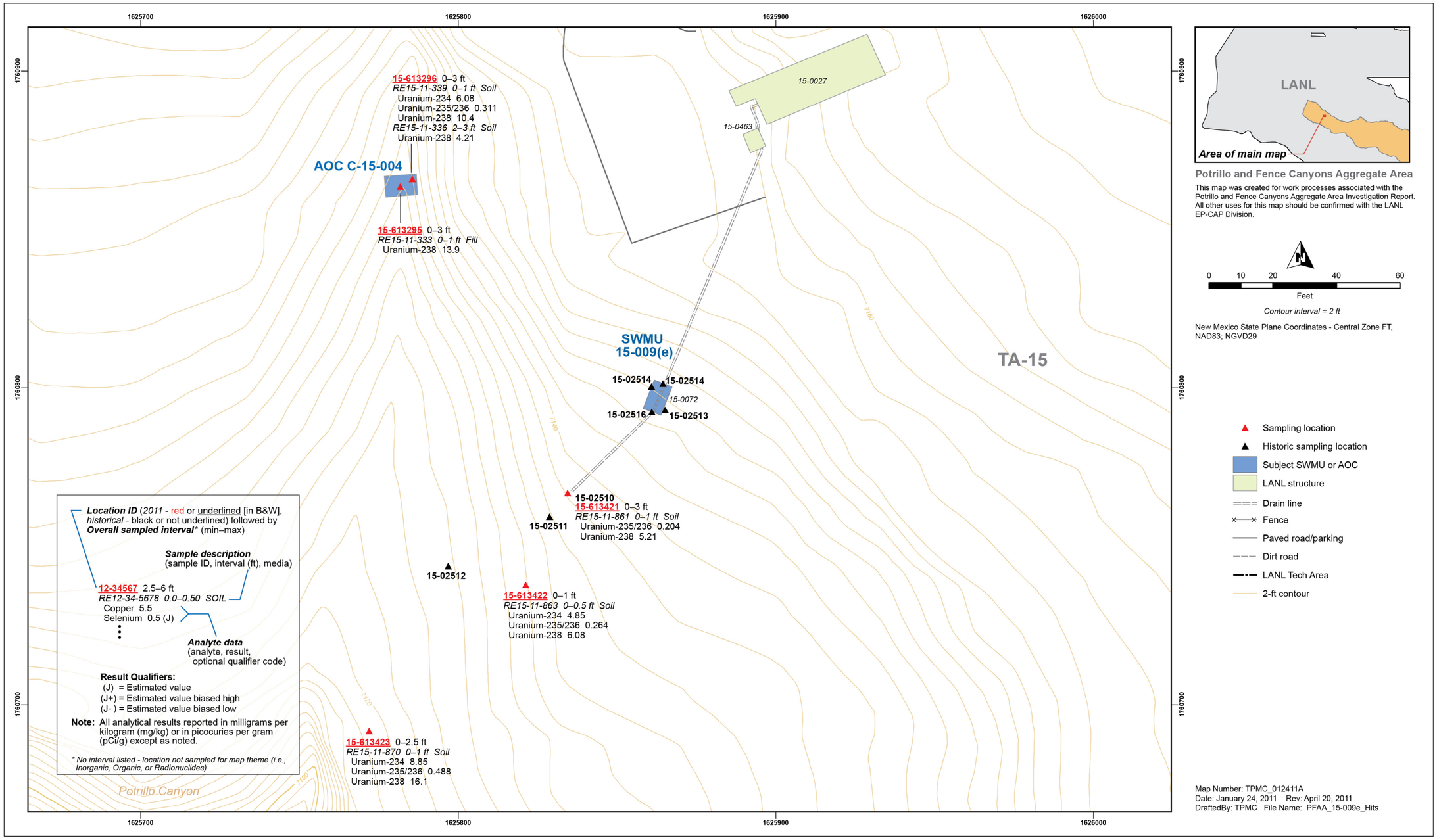


Figure 6.8-4 Radionuclides detected above BVs at SWMU 15-009(e) and AOC C-15-004

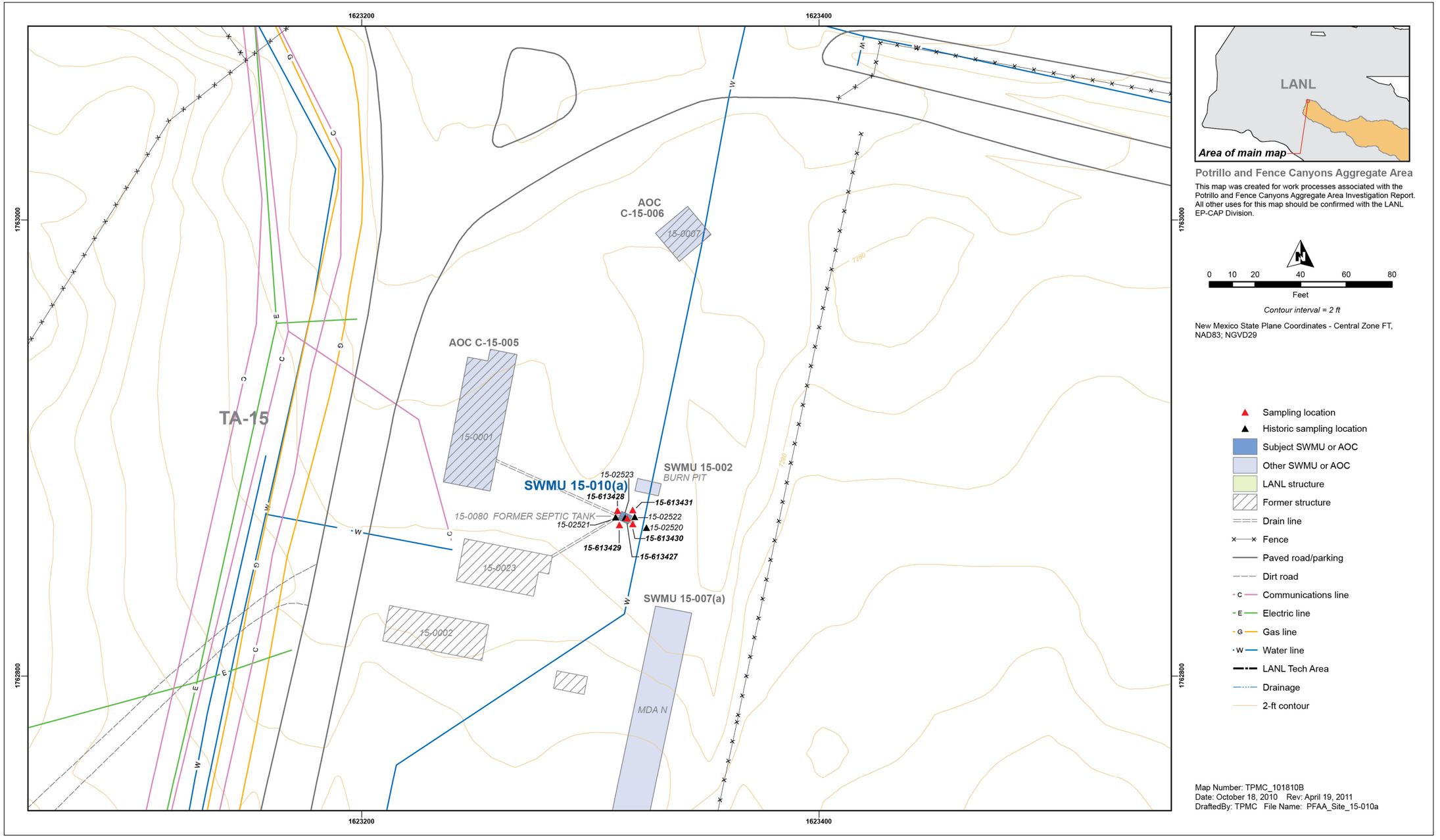


Figure 6.9-1 Site map of SWMU 15-010(a)

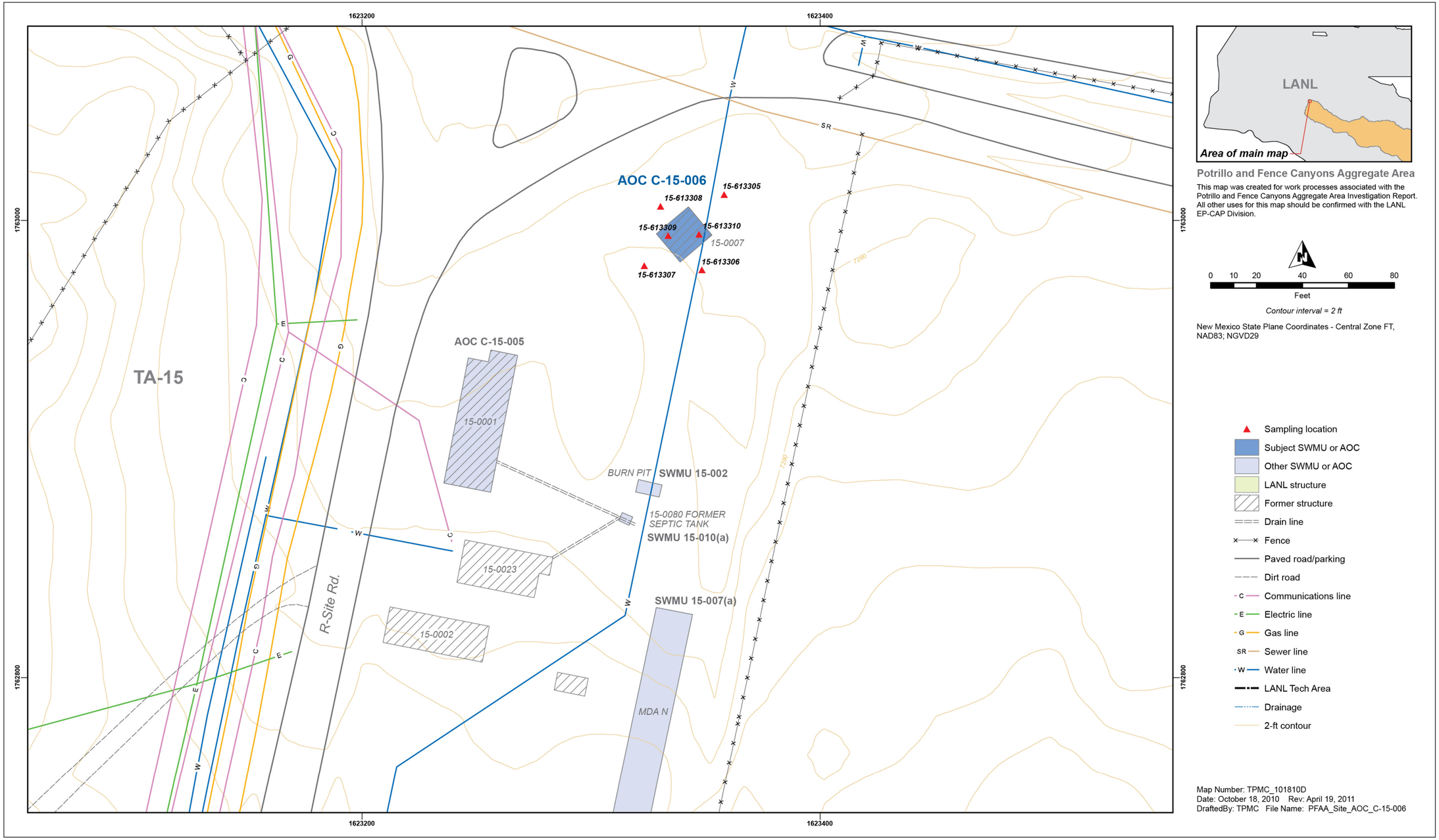


Figure 6.11-1 Site map of AOC C-15-005

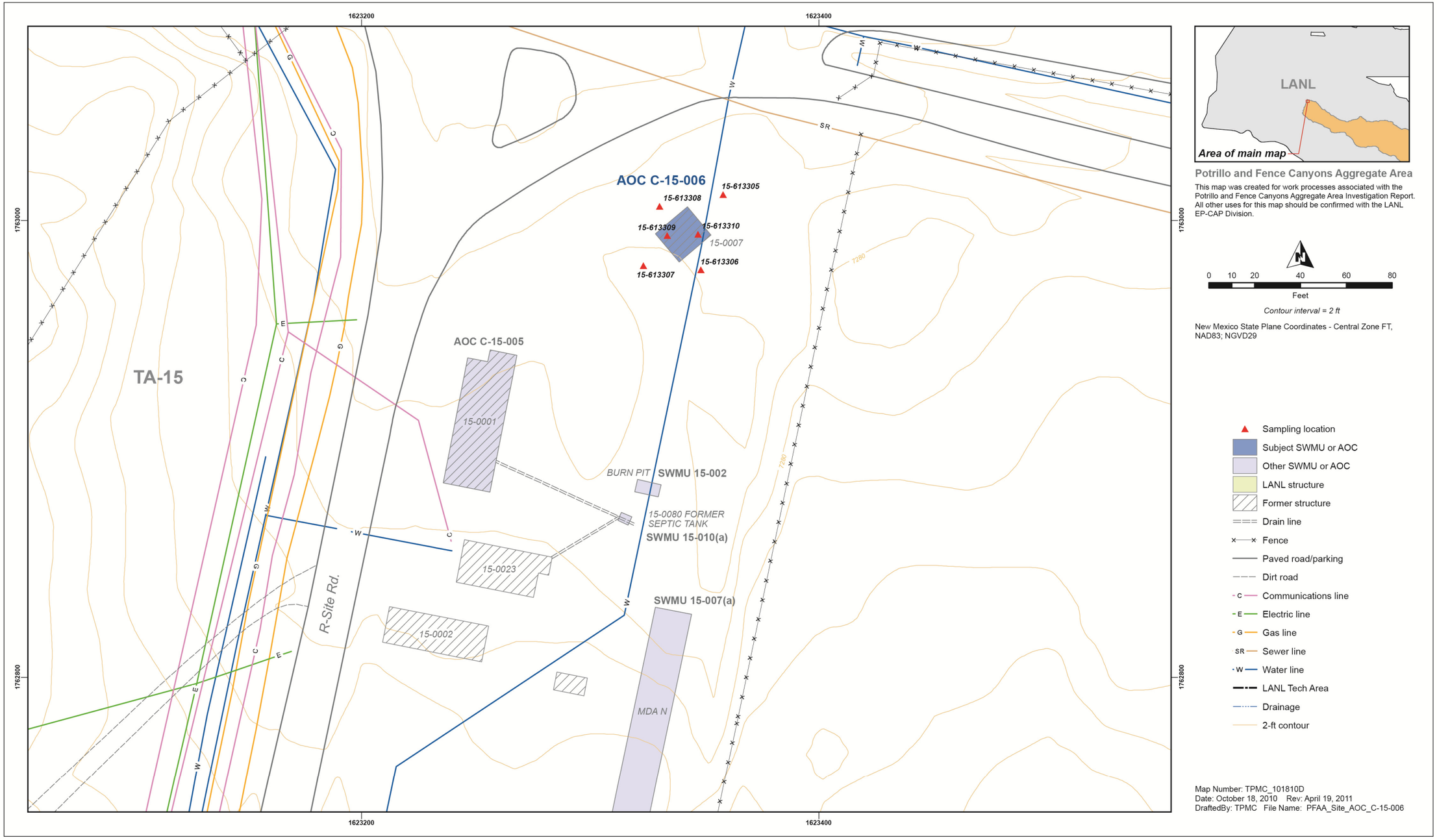


Figure 6.12-1 Site map of AOC C-15-006

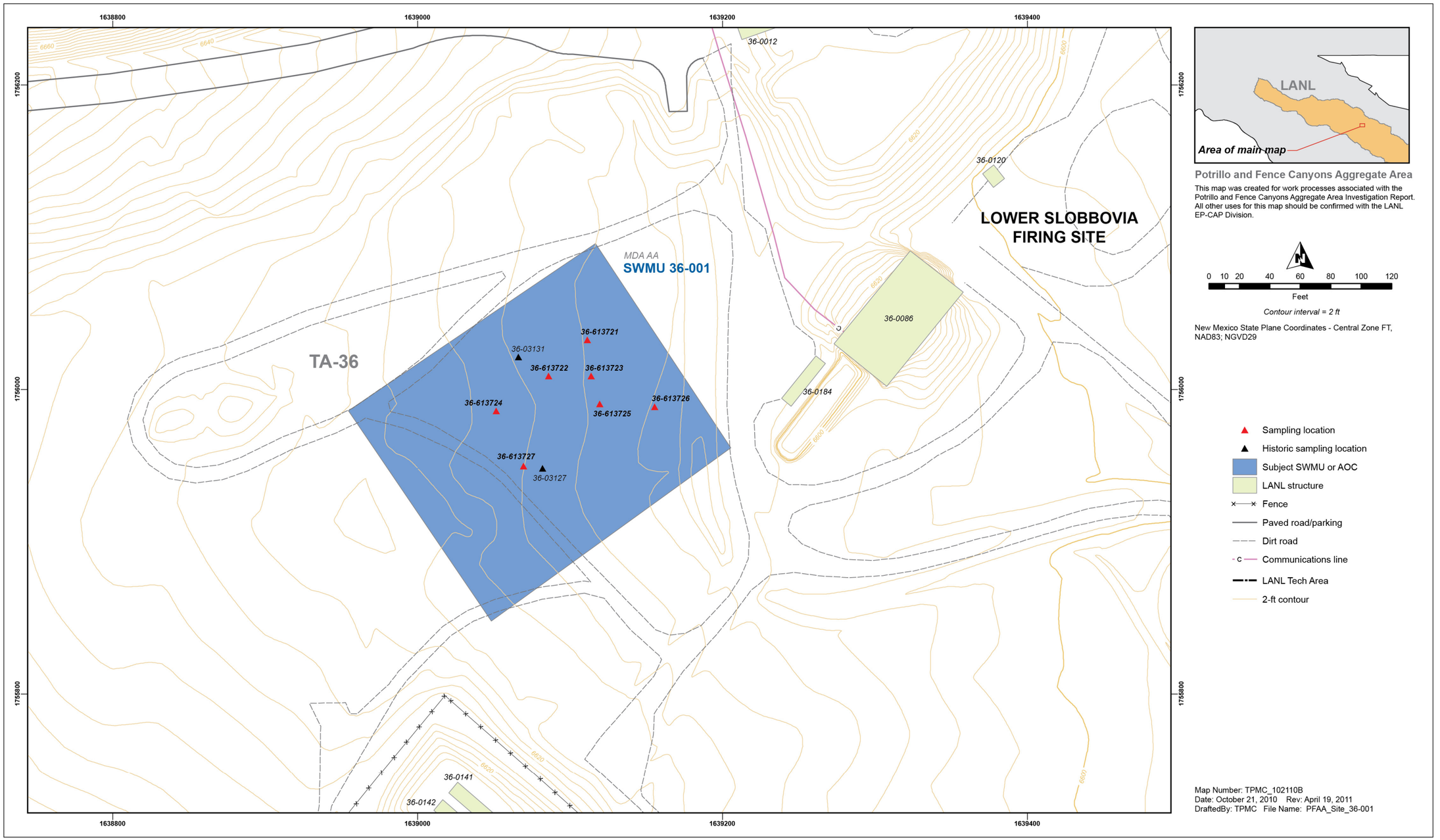


Figure 7.2-1 Site map of SWMU 36-001

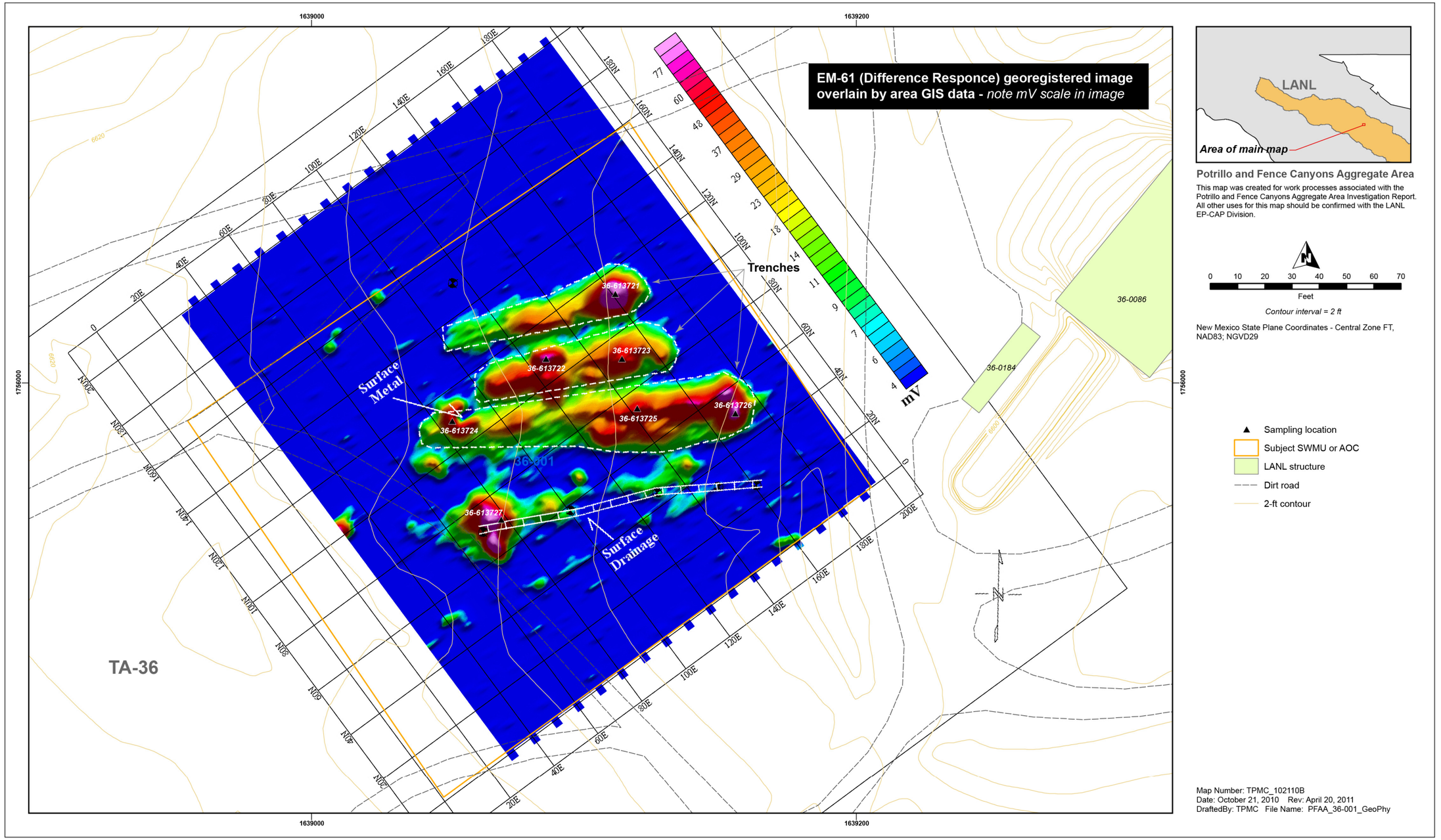


Figure 7.2-2 Geophysical survey of SWMU 36-001

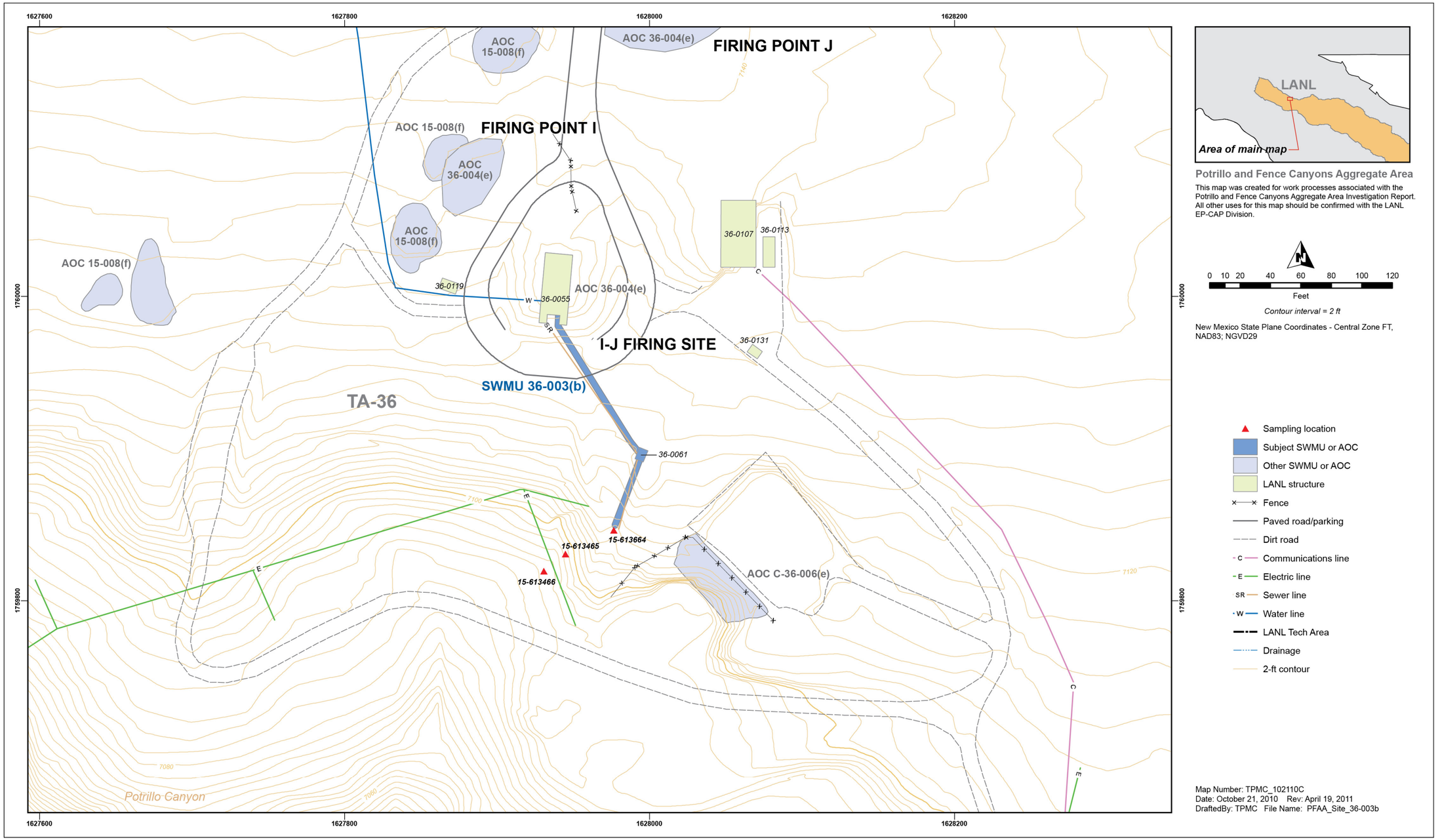


Figure 7.3-1 Site map of SWMU 36-003(b)

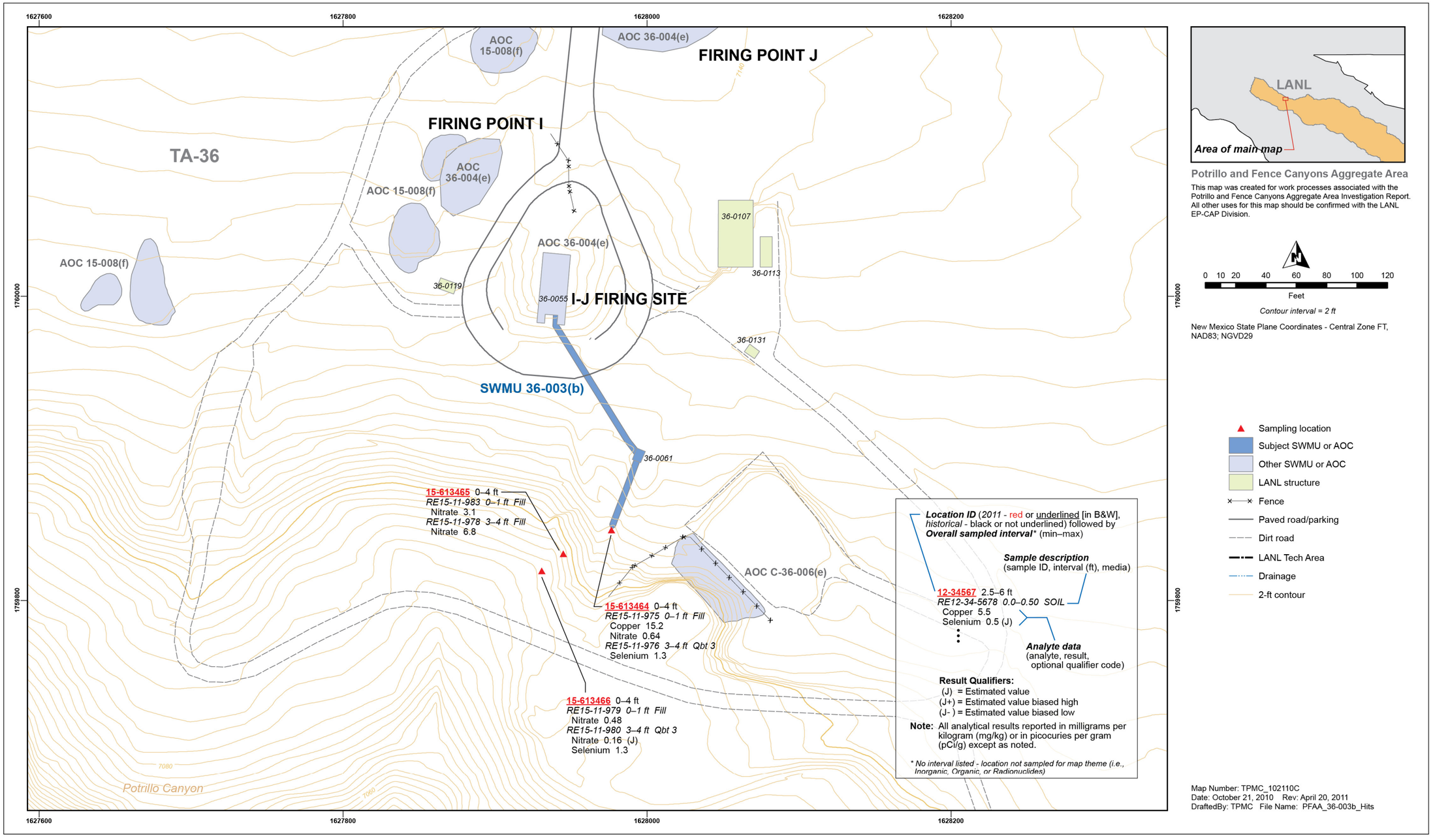


Figure 7.3-2 Inorganic chemicals above BVs at SWMU 36-003(b)

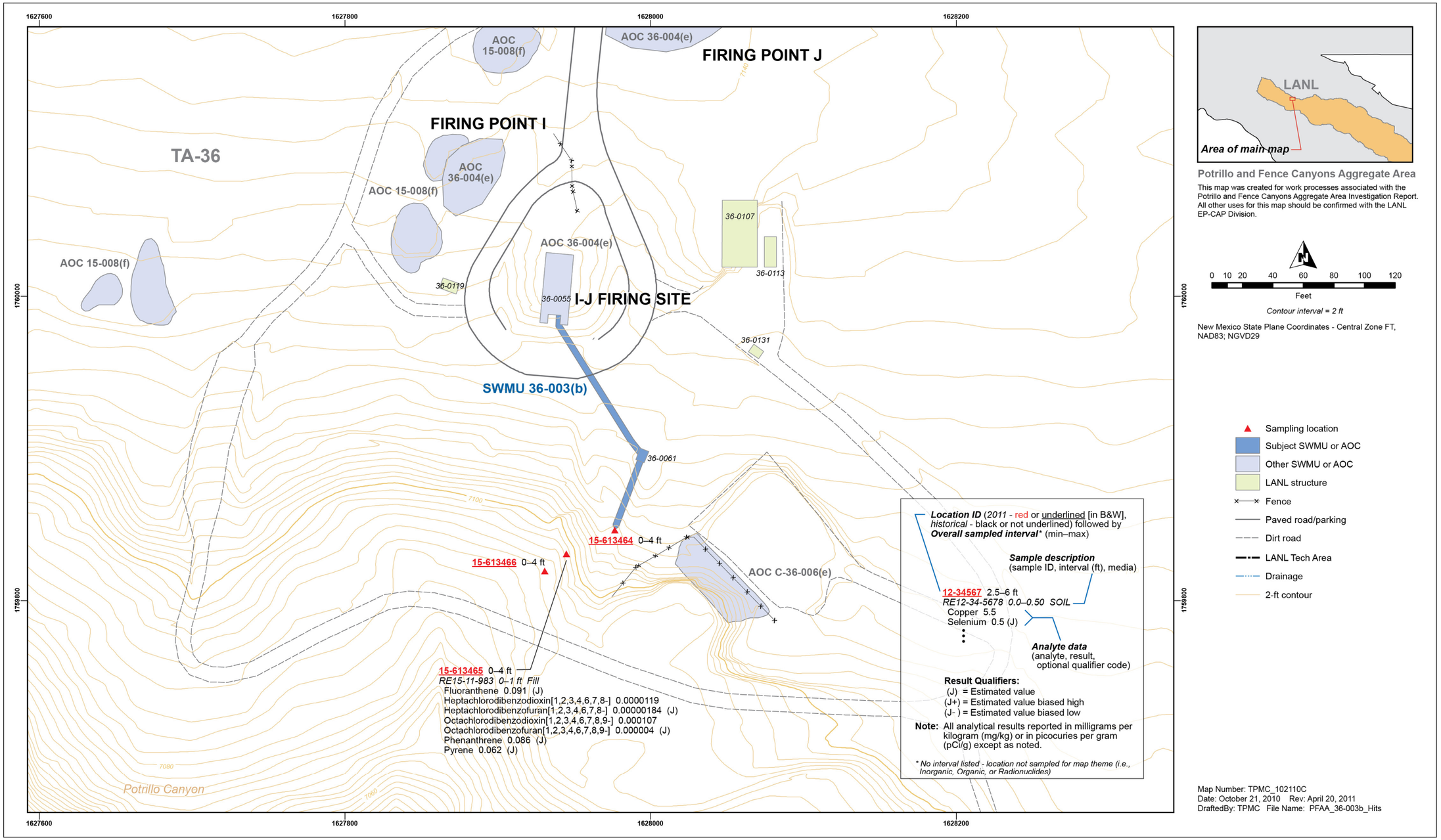


Figure 7.3-3 Organic chemicals detected at SWMU 36-003(b)

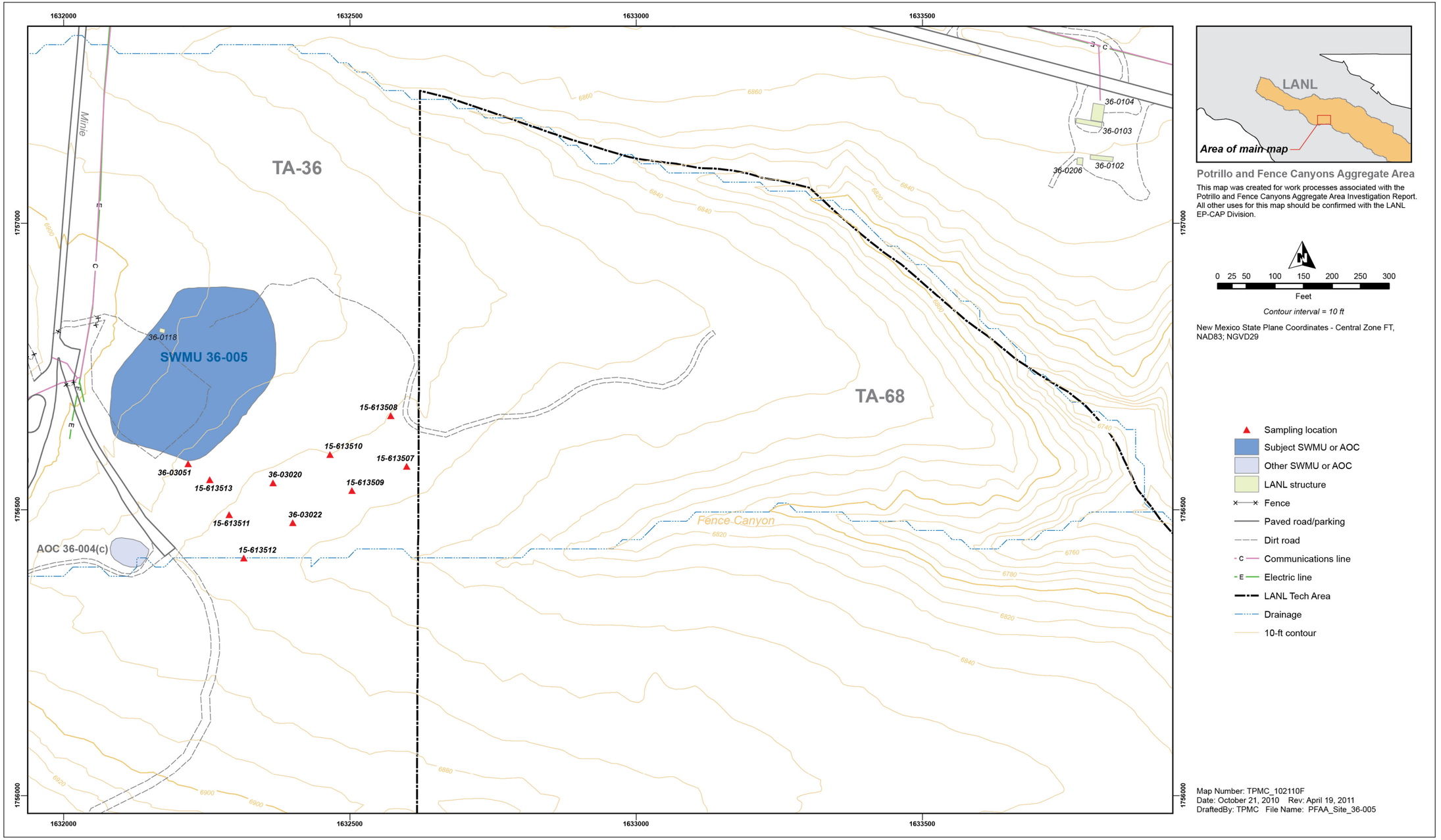


Figure 7.4-1 Site map of SWMU 36-005

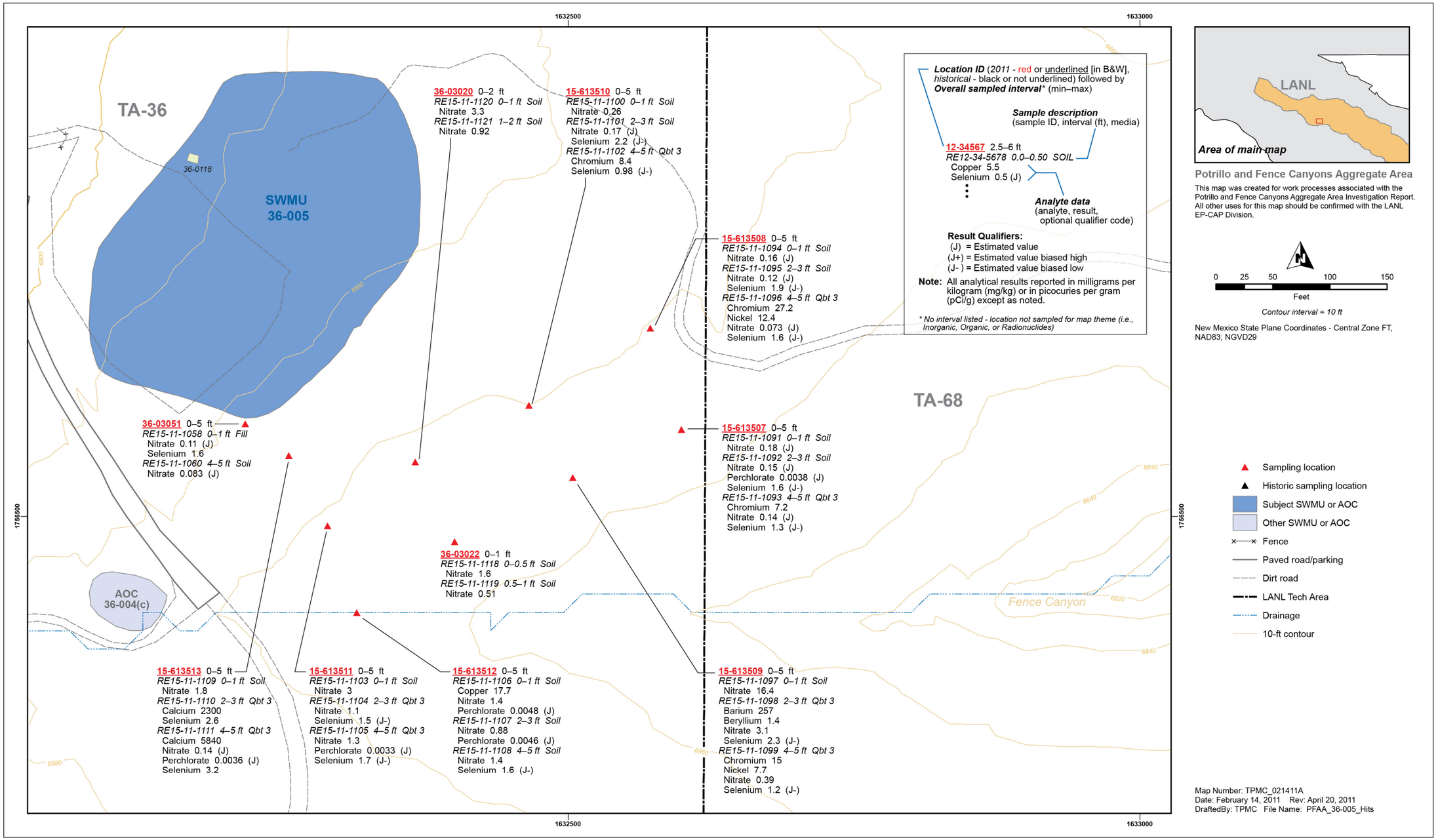


Figure 7.4-2 Inorganic chemicals above BVs at SWMU 36-005

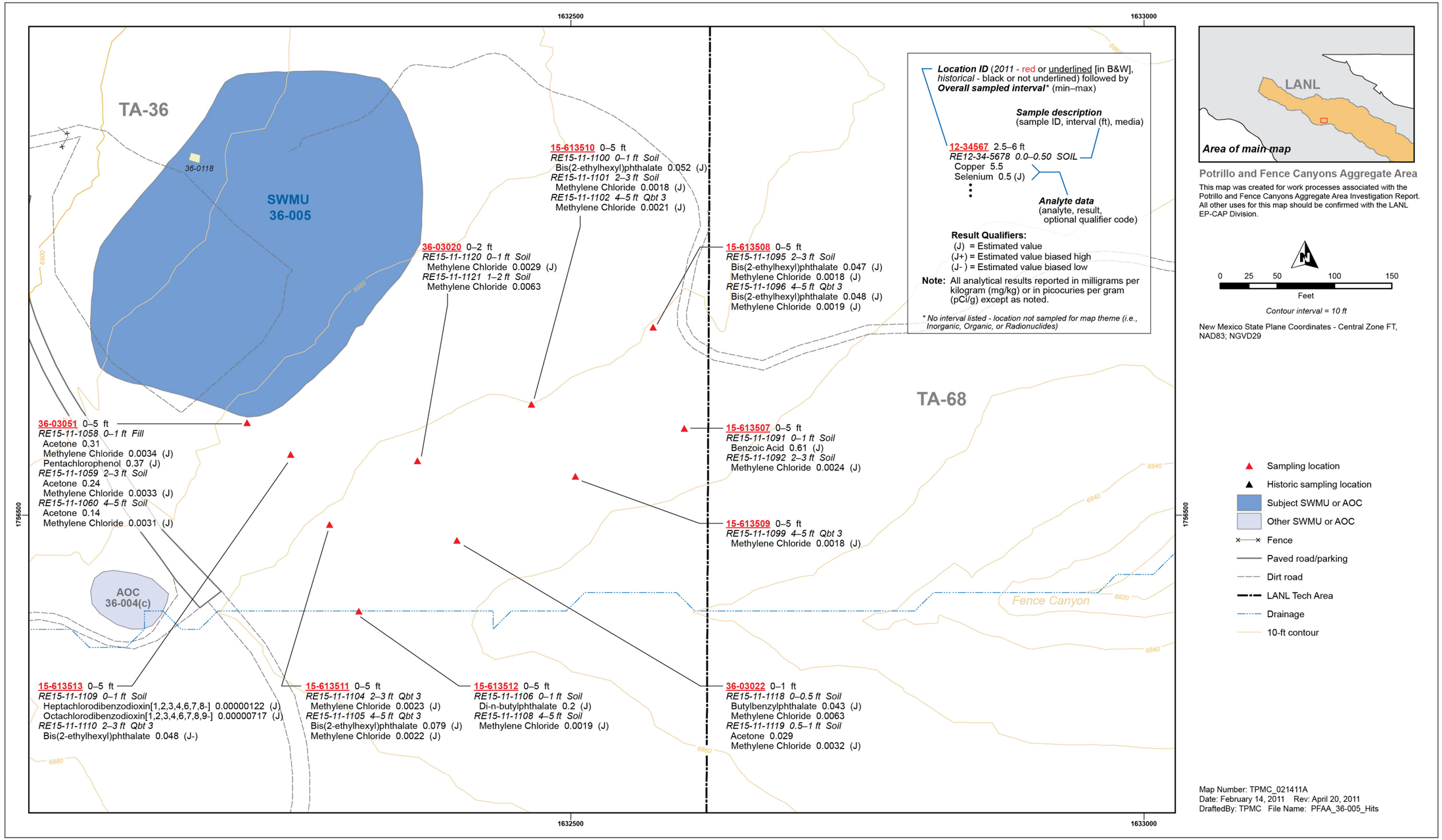


Figure 7.4-3 Organic chemicals detected at SWMU 36-005

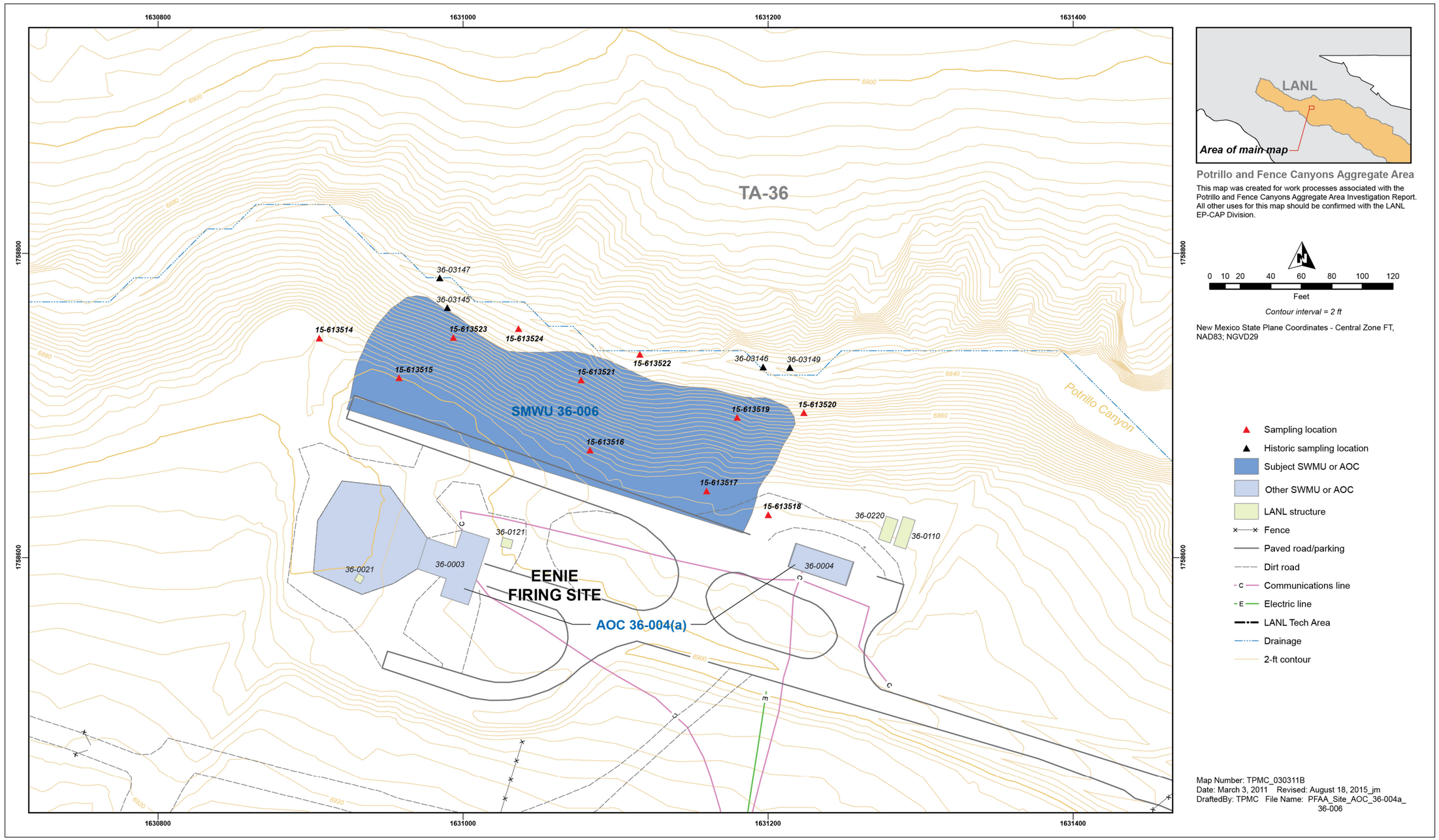


Figure 7.5-1 Site map of SWMU 36-006

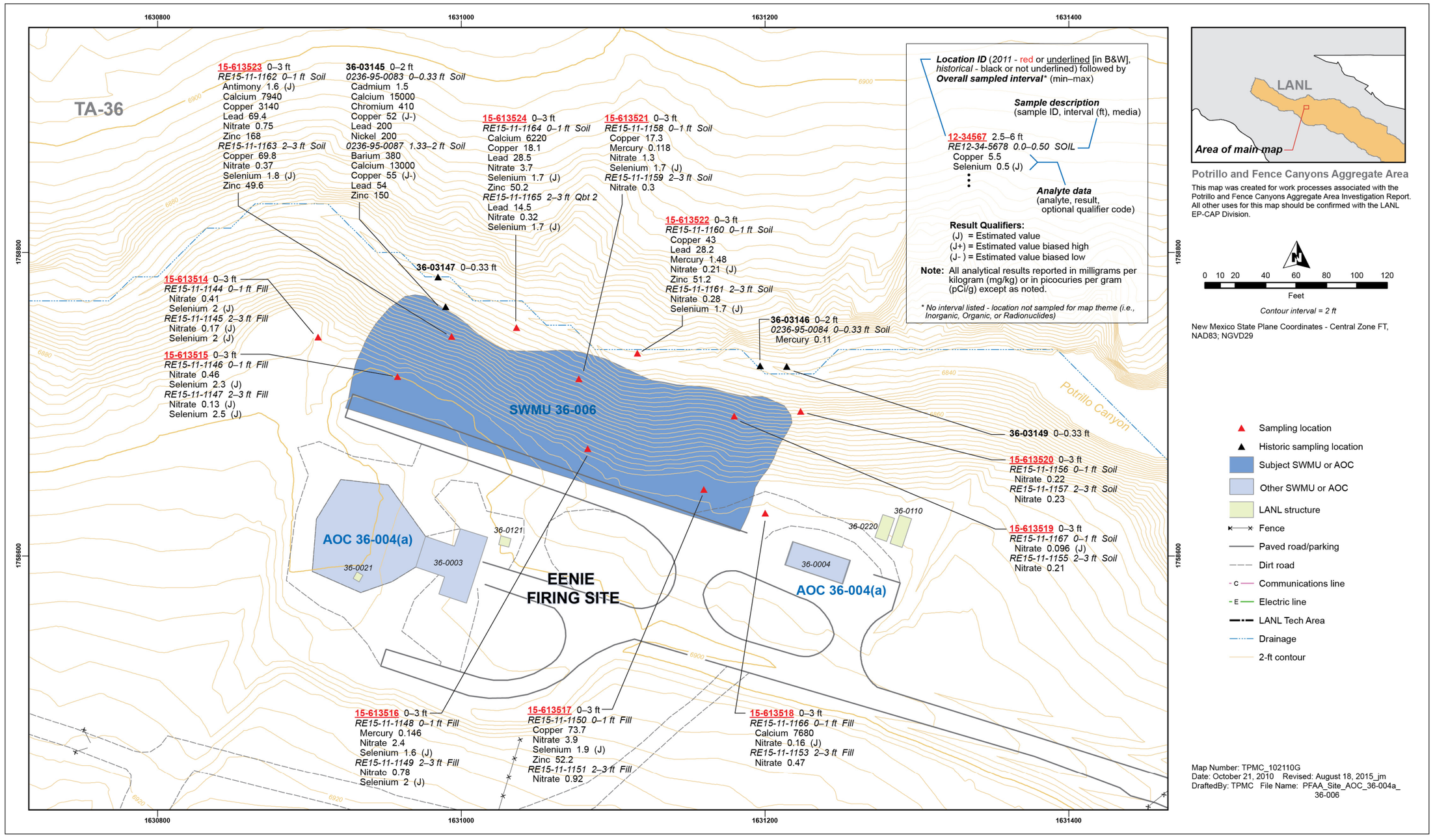


Figure 7.5-2 Inorganic chemicals above BVs at SWMU 36-006

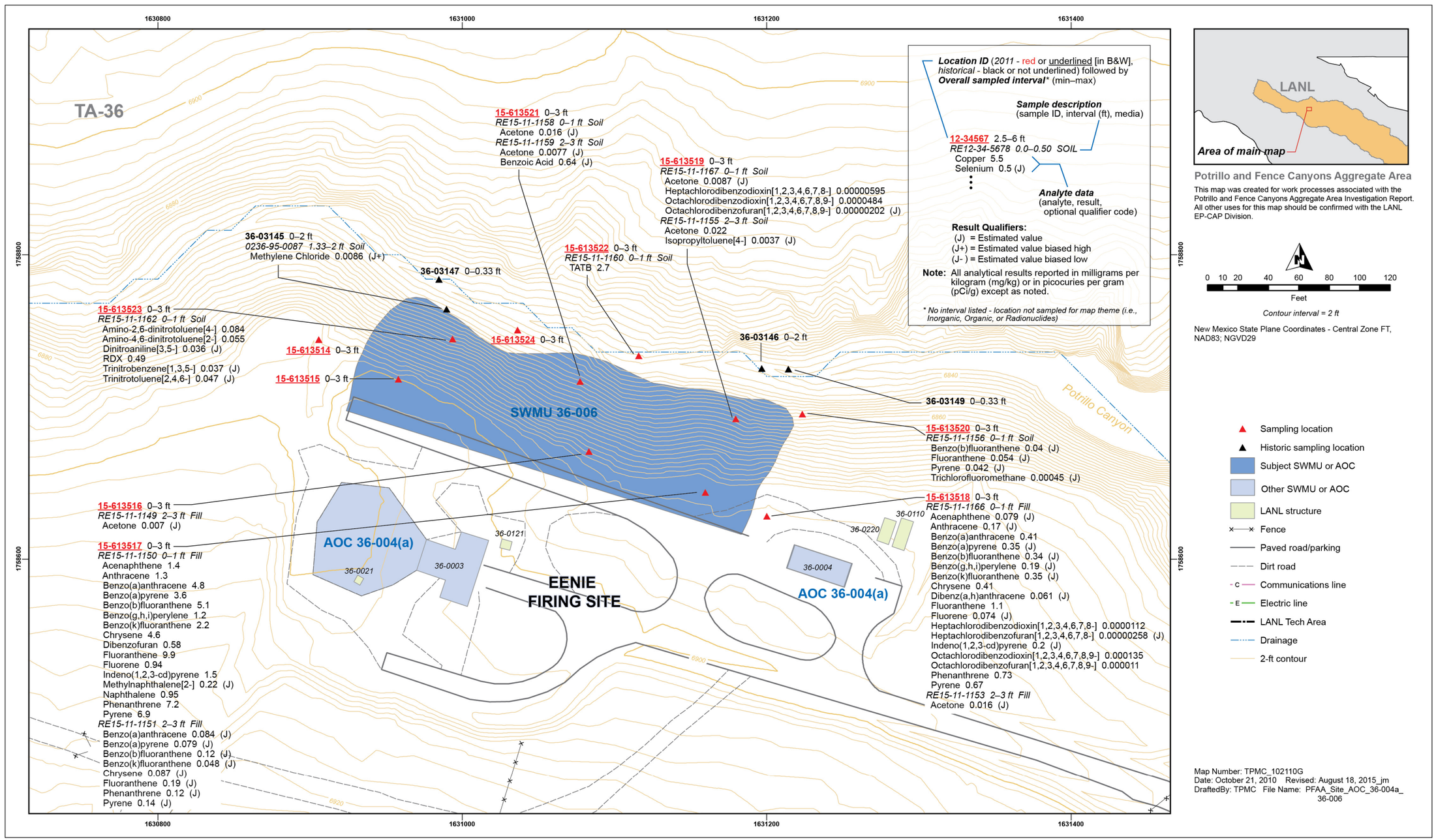


Figure 7.5-3 Organic chemicals detected at SWMU 36-006

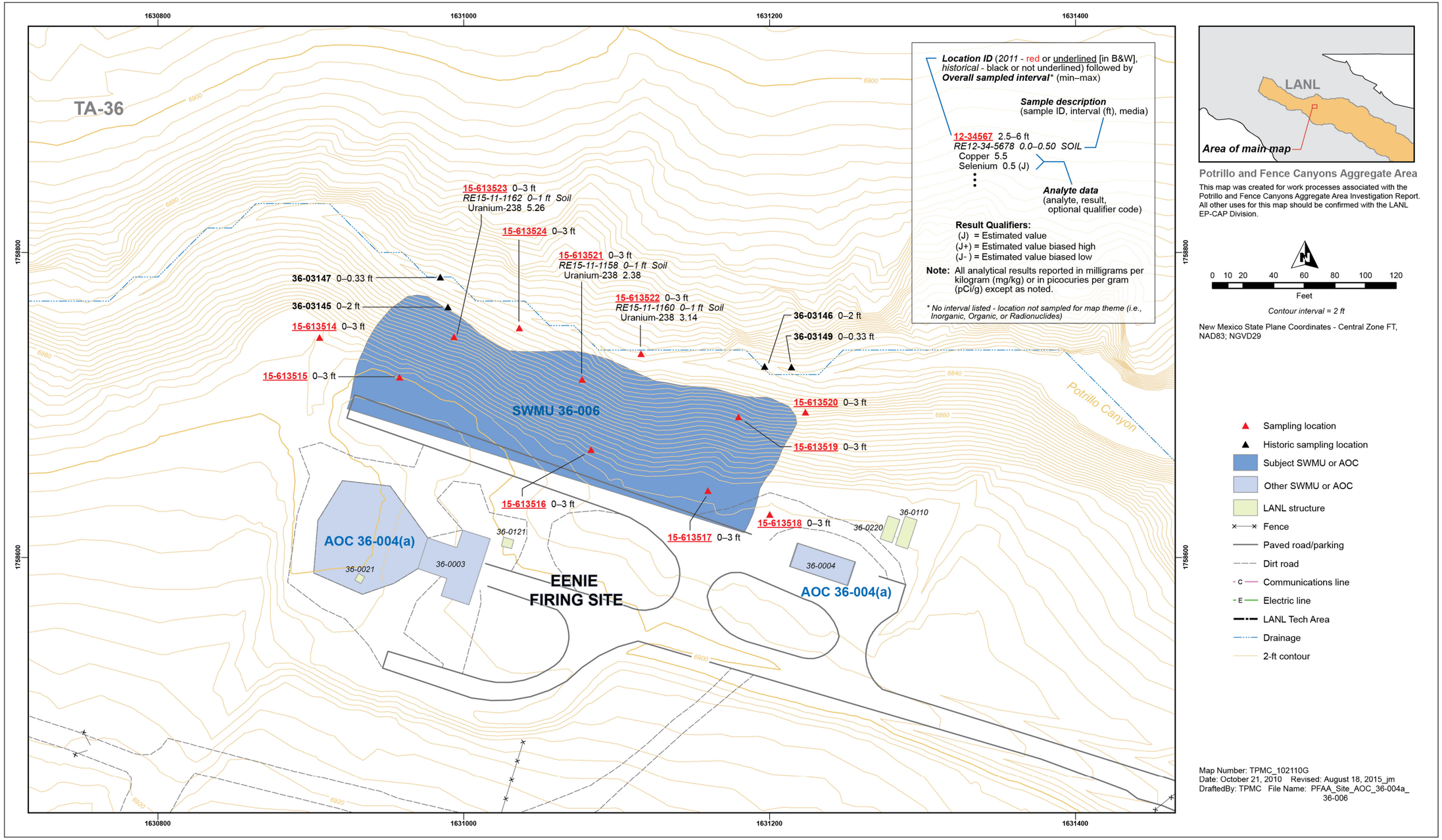


Figure 7.5-4 Radionuclides detected above BVs at SWMU 36-006

Table 1.1-1
Sites Under Investigation in Potrillo and Fence Canyons Aggregate Area

Consolidated Unit	SWMU/AOC	Brief Description	2010 Investigation	Current Status
TA-15				
15-002-00	SWMU 15-002	Former Burn Pits	Sampled	Supplemental investigation report (section 6.2)
	SWMU 15-007(a)	MDA N	Remediated and sampled	Supplemental investigation report (section 6.3)
15-003-00	SWMU 15-003	PHERMEX Steel Firing Pad	Samples collected from drainages downgradient of the site to determine if contaminants are migrating from the site	Deferred per Table IV-2 of the Consent Order
	SWMU 15-006(a)	PHERMEX Firing Site	Samples collected from drainages downgradient of the site to determine if contaminants are migrating from the site	Deferred per Table IV-2 of the Consent Order
15-004(b)-99	SWMU 15-004(b)	Firing Site A	Sampled	Supplemental investigation report (section 6.4)
	SWMU 15-004(c)	Firing Site B	Sampled	Supplemental investigation report (section 6.4)
15-004(f)-99	SWMU 15-004(f)	E-F Firing Site	Sampled to plan remediation activities	Supplemental investigation report (section 6.5)
	SWMU 15-008(a)	Two Surface Disposal Areas at E-F Firing Site	Remediated and sampled	Supplemental investigation report (section 6.6)
	AOC 15-005(b)	Storage Area	Sampled	Supplemental investigation report (section 6.7)
	AOC 15-006(e)	Projectile Test Area, Duplicate of AOC C-36-006(e)	See AOC C-36-006(e)	Duplicate of AOC C-36-006(e)
	AOC 15-008(f)	Sand Mounds at I-J Firing Site (TA-36)	Samples collected from drainages downgradient of the site to determine if contaminants are migrating from the site	Deferred per Table IV-2 of the Consent Order
	SWMU 15-009(e)	Septic Tank	Sampled	Supplemental investigation report (section 6.8)
	SWMU 15-010(a)	Septic Tank	Sampled	Supplemental investigation report (section 6.9)

Table 1.1-1 (continued)

Consolidated Unit	SWMU/AOC	Brief Description	2010 Investigation	Current Status
	AOC C-15-004	Former Transformer Station	Sampled	Supplemental investigation report (section 6.10)
	AOC C-15-005	Potential Soil Contamination from Former Building	Sampled	Supplemental investigation report (section 6.11)
	AOC C-15-006	Potential Soil Contamination from Former Building	Sampled	Supplemental investigation report (section 6.12)
TA-36				
	SWMU 36-001	MDA AA	Sampled for health and safety and waste characterization purposes	Supplemental investigation report (section 7.2)
	SWMU 36-003(b)	Septic System, I-J Firing Site	Sampled	Supplemental investigation report (section 7.3)
36-006-99	AOC 36-004(a)	Eenie Firing Site	Samples collected from drainage downgradient of the site to determine if contaminants are migrating from the site	Deferred per Table IV-2 of the Consent Order
	SWMU 36-006	Surface Disposal Area	Remediated and sampled	Supplemental investigation report (section 7.5)
	AOC 36-004(b)	Meenie Firing Site	Samples collected from drainage downgradient of the site to determine if contaminants are migrating from the site	Deferred per Table IV-2 of the Consent Order
	AOC 36-004(c)	Minie Firing Site	Samples collected from drainage downgradient of the site to determine if contaminants are migrating from the site	Active RCRA-regulated open detonation site
	SWMU 36-004(d)	Skunk Works Firing Site, Lower Slobbovia Firing Site, and Burn Pits	Samples collected from drainages downgradient of the sites to determine if contaminants are migrating from the sites	Deferred per Table IV-2 of the Consent Order
	AOC 36-004(e)	I-J Firing Site	Samples collected from drainages downgradient of the site to determine if contaminants are migrating from the site	Deferred per Table IV-2 of the Consent Order

Table 1.1-1 (continued)

Consolidated Unit	SWMU/AOC	Brief Description	2010 Investigation	Current Status
	SWMU 36-005	Storage Area	Archaeological site; samples collected around site boundary and from drainage downgradient of the site to determine if contaminants are migrating from the site	Supplemental investigation report (section 7.4)
	AOC C-36-001	Former Containment Vessel	Samples collected from drainages downgradient of the site to determine if contaminants are migrating from the site	Deferred per Table IV-2 of the Consent Order
	AOC C-36-006(e)	Projectile Test Area	Samples collected from drainages downgradient of the site to determine if contaminants are migrating from the site	Delayed; encompassed by the I-J Firing Site, which is deferred per Table IV-2 of the Consent Order

Note: Shading denotes consolidated unit.

Table 3.2-1
Surveyed Coordinates for Locations Sampled

SWMU/AOC	Location ID	Easting (ft)	Northing (ft)
TA-15			
SWMU 15-002	15-613318	1623320.602	1762882.752
SWMU 15-002	15-613319	1623299.493	1762876.315
SWMU 15-002	15-613320	1623321.107	1762850.772
SWMU 15-002	15-613321	1623354.510	1762878.280
SWMU 15-002	15-613322	1623323.072	1762911.684
SWMU 15-002	15-613671	1623758.697	1762332.822
SWMU 15-002	15-613672	1623678.721	1762326.140
SWMU 15-002	15-613673	1623737.668	1762278.982
SWMU 15-002	15-613674	1623790.721	1762328.105
SWMU 15-002	15-613675	1623737.130	1762357.171
SWMUs 15-004(b) and 15-004(c)	15-613330	1622816.889	1760352.355
SWMUs 15-004(b) and 15-004(c)	15-613331	1623116.889	1761252.355
SWMUs 15-004(b) and 15-004(c)	15-613332	1623116.889	1761152.355
SWMUs 15-004(b) and 15-004(c)	15-613333	1623216.889	1761152.355
SWMUs 15-004(b) and 15-004(c)	15-613334	1623316.889	1761052.355
SWMUs 15-004(b) and 15-004(c)	15-613335	1623216.889	1760852.355
SWMUs 15-004(b) and 15-004(c)	15-613336	1623016.889	1760852.355
SWMUs 15-004(b) and 15-004(c)	15-613338	1622796.969	1760896.507
SWMUs 15-004(b) and 15-004(c)	15-613339	1623316.889	1760652.355
SWMUs 15-004(b) and 15-004(c)	15-613340	1622816.889	1760452.355
SWMUs 15-004(b) and 15-004(c)	15-613341	1623216.889	1760352.355
SWMUs 15-004(b) and 15-004(c)	15-613342	1623216.889	1760252.355
SWMUs 15-004(b) and 15-004(c)	15-613343	1622916.889	1760252.355
SWMUs 15-004(b) and 15-004(c)	15-613344	1622855.059	1760851.382
SWMUs 15-004(b) and 15-004(c)	15-613345	1622916.889	1760152.355
SWMUs 15-004(b) and 15-004(c)	15-613346	1622916.889	1761152.355
SWMUs 15-004(b) and 15-004(c)	15-613347	1622816.889	1761152.355
SWMUs 15-004(b) and 15-004(c)	15-613348	1622816.889	1761052.355
SWMUs 15-004(b) and 15-004(c)	15-613349	1622916.889	1761052.355
SWMUs 15-004(b) and 15-004(c)	15-613350	1623016.889	1761052.355
SWMUs 15-004(b) and 15-004(c)	15-613351	1623116.889	1760352.355
SWMU 15-004(f)	15-02100	1625535.567	1762180.046
SWMU 15-004(f)	15-02101	1625735.566	1762180.052
SWMU 15-004(f)	15-02112	1625735.561	1761980.051
SWMU 15-004(f)	15-02113	1625938.513	1761983.942

Table 3.2-1 (continued)

SWMU/AOC	Location ID	Easting (ft)	Northing (ft)
SWMU 15-004(f)	15-02114	1626135.557	1761980.051
SWMU 15-004(f)	15-02115	1626335.565	1761980.049
SWMU 15-004(f)	15-02119	1627147.610	1761997.251
SWMU 15-004(f)	15-02123	1625735.561	1761780.051
SWMU 15-004(f)	15-02124	1625935.559	1761780.053
SWMU 15-004(f)	15-02125	1626135.559	1761780.053
SWMU 15-004(f)	15-02132	1627535.565	1761780.049
SWMU 15-004(f)	15-02136	1626135.565	1761580.049
SWMU 15-004(f)	15-02137	1626335.565	1761580.049
SWMU 15-004(f)	15-02139	1626735.565	1761580.049
SWMU 15-004(f)	15-02141	1627138.315	1761575.286
SWMU 15-004(f)	15-02142	1627335.565	1761580.049
SWMU 15-004(f)	15-02144	1625527.108	1761376.971
SWMU 15-004(f)	15-02145	1625735.561	1761380.055
SWMU 15-004(f)	15-02147	1626135.557	1761380.055
SWMU 15-004(f)	15-02148	1626335.565	1761380.049
SWMU 15-004(f)	15-02149	1626535.565	1761380.049
SWMU 15-004(f)	15-02150	1626735.565	1761380.049
SWMU 15-004(f)	15-02151	1626935.565	1761380.049
SWMU 15-004(f)	15-02152	1627135.565	1761380.049
SWMU 15-004(f)	15-02153	1627335.565	1761380.049
SWMU 15-004(f)	15-02155	1625535.565	1761180.049
SWMU 15-004(f)	15-02156	1625735.565	1761180.049
SWMU 15-004(f)	15-02157	1625935.565	1761185.049
SWMU 15-004(f)	15-02162	1626935.565	1761180.049
SWMU 15-004(f)	15-02166	1625535.565	1760980.049
SWMU 15-004(f)	15-02167	1625735.565	1761054.049
SWMU 15-004(f)	15-02170	1626335.565	1760980.049
SWMU 15-004(f)	15-02171	1626535.565	1760980.049
SWMU 15-004(f)	15-02172	1626735.565	1760980.049
SWMU 15-004(f)	15-02173	1626935.565	1760980.049
SWMU 15-004(f)	15-02177	1625918.903	1760483.036
SWMU 15-004(f)	15-02178	1625735.565	1760780.049
SWMU 15-004(f)	15-02179	1625925.973	1760775.778
SWMU 15-004(f)	15-02180	1626135.565	1760780.049
SWMU 15-004(f)	15-02191	1626135.565	1760580.049
SWMU 15-004(f)	15-02196	1625735.560	1761580.060
SWMU 15-004(f)	15-02198	1627335.570	1761780.050
SWMU 15-004(f)	15-02203	1627535.565	1760580.049

Table 3.2-1 (continued)

SWMU/AOC	Location ID	Easting (ft)	Northing (ft)
SWMU 15-004(f)	15-02206	1625597.670	1760788.497
SWMU 15-004(f)	15-02226	1626988.684	1761506.462
SWMU 15-004(f)	15-02228	1626877.735	1761242.642
SWMU 15-004(f)	15-02229	1626383.459	1760886.811
SWMU 15-004(f)	15-02230	1626388.066	1760843.172
SWMU 15-004(f)	15-02231	1626382.048	1760788.107
SWMU 15-004(f)	15-02240	1626261.924	1761191.231
SWMU 15-004(f)	15-02241	1626301.421	1761186.267
SWMU 15-004(f)	15-02277	1626039.800	1760870.300
SWMU 15-004(f)	15-02278	1626080.800	1760837.400
SWMU 15-004(f)	15-02279	1626121.000	1760807.300
SWMU 15-004(f)	15-02295	1626921.550	1761341.450
SWMU 15-004(f)	15-613365	1626493.236	1761239.358
SWMU 15-004(f)	15-613366	1626502.487	1761212.578
SWMU 15-004(f)	15-613367	1626513.200	1761186.284
SWMU 15-004(f)	15-613368	1626545.823	1761261.270
SWMU 15-004(f)	15-613369	1626547.284	1761228.646
SWMU 15-004(f)	15-613370	1626569.195	1761161.938
SWMU 15-004(f)	15-613371	1626589.159	1761267.600
SWMU 15-004(f)	15-613372	1626598.410	1761237.898
SWMU 15-004(f)	15-613373	1626612.044	1761214.525
SWMU 15-004(f)	15-613374	1626527.320	1761142.461
SWMU 15-004(f)	15-613375	1626524.886	1761103.508
SWMU 15-004(f)	15-613376	1626545.823	1761074.293
SWMU 15-004(f)	15-613377	1626566.761	1761201.866
SWMU 15-004(f)	15-613378	1626577.473	1761125.419
SWMU 15-004(f)	15-613379	1626602.793	1761096.691
SWMU 15-004(f)	15-613380	1626613.992	1761170.216
SWMU 15-004(f)	15-613381	1626630.547	1761145.870
SWMU 15-004(f)	15-613382	1626643.207	1761127.367
SWMU 15-004(f)	15-613384	1625642.929	1760518.103
SWMU 15-004(f)	15-613385	1626304.126	1760187.503
SWMU 15-004(f)	15-613386	1626318.103	1760286.076
SWMU 15-004(f)	15-613387	1626337.177	1760382.717
SWMU 15-004(f)	15-613388	1626347.350	1760539.122
SWMU 15-004(f)	15-613389	1626355.007	1760637.388
AOC 15-005(b)	15-613251	1623389.118	1761263.375
AOC 15-005(b)	15-613252	1623413.250	1761257.269
AOC 15-005(b)	15-613253	1623387.955	1761221.508

Table 3.2-1 (continued)

SWMU/AOC	Location ID	Easting (ft)	Northing (ft)
AOC 15-005(b)	15-613254	1623367.894	1761239.243
SWMU 15-007(a)	15-613391	1623306.007	1762764.838
SWMU 15-007(a)	15-613392	1623305.442	1762732.397
SWMU 15-007(a)	15-613393	1623316.951	1762707.942
SWMU 15-007(a)	15-613394	1623327.785	1762678.486
SWMU 15-007(a)	15-613395	1623263.361	1762700.712
SWMU 15-007(a)	15-613396	1623238.747	1762763.804
SWMU 15-007(a)	15-613397	1623318.255	1762799.610
SWMU 15-007(a)	15-613398	1623348.173	1762757.246
SWMU 15-007(a)	15-613399	1623347.519	1762696.106
SWMU 15-007(a)	15-613400	1623311.576	1762631.065
SWMU 15-008(a)	15-613403	1626334.864	1760822.062
SWMU 15-008(a)	15-613404	1626334.468	1760834.939
SWMU 15-008(a)	15-613405	1626368.198	1760867.165
SWMU 15-008(a)	15-613406	1626368.251	1760852.271
SWMU 15-008(a)	15-613407	1626370.990	1760800.446
SWMU 15-008(a)	15-613408	1626331.424	1760802.475
SWMU 15-008(a)	15-613409	1626114.323	1760531.606
SWMU 15-008(a)	15-613410	1626154.903	1760534.649
SWMU 15-008(a)	15-613411	1626125.482	1760496.099
SWMU 15-008(a)	15-613412	1626155.917	1760497.113
SWMU 15-008(a)	15-613413	1626146.787	1760510.302
SWMU 15-008(a)	15-613414	1626131.808	1760530.641
SWMU 15-009(e)	15-613421	1625834.533	1760766.940
SWMU 15-009(e)	15-613423	1625772.017	1760691.804
SWMU 15-009(e)	15-631422	1625821.319	1760737.868
SWMU 15-010(a)	15-613427	1623316.225	1762869.235
SWMU 15-010(a)	15-613428	1623312.033	1762872.679
SWMU 15-010(a)	15-613429	1623312.794	1762866.397
SWMU 15-010(a)	15-613430	1623318.621	1762866.809
SWMU 15-010(a)	15-613431	1623318.611	1762872.912
AOC C-15-004	15-613295	1625785.587	1760865.945
AOC C-15-004	15-613296	1625781.775	1760863.579
AOC C-15-005	15-613298	1623259.644	1762956.011
AOC C-15-005	15-613299	1623269.641	1762907.178
AOC C-15-005	15-613300	1623243.109	1762869.880
AOC C-15-005	15-613301	1623234.650	1762917.944
AOC C-15-005	15-613302	1623254.645	1762926.788
AOC C-15-005	15-613303	1623248.108	1762896.412

Table 3.2-1 (continued)

SWMU/AOC	Location ID	Easting (ft)	Northing (ft)
AOC C-15-006	15-613305	1623358.264	1763011.444
AOC C-15-006	15-613306	1623348.487	1762978.448
AOC C-15-006	15-613307	1623323.434	1762980.281
AOC C-15-006	15-613308	1623330.461	1763006.250
AOC C-15-006	15-613309	1623333.822	1762993.418
AOC C-15-006	15-613310	1623347.265	1762994.029
TA-36			
SWMU 36-001	36-613721	1639111.525	1756032.694
SWMU 36-001	36-613722	1639086.103	1756008.873
SWMU 36-001	36-613723	1639113.927	1756008.873
SWMU 36-001	36-613724	1639051.673	1755986.054
SWMU 36-001	36-613725	1639119.531	1755990.658
SWMU 36-001	36-613726	1639155.562	1755988.856
SWMU 36-001	36-613727	1639069.660	1755949.896
SWMU 36-003(b)	15-613465	1627944.971	1759830.739
SWMU 36-003(b)	15-613466	1627930.834	1759819.517
SWMU 36-003(b)	15-613664	1627976.672	1759846.470
SWMU 36-005	15-613507	1632599.153	1756575.965
SWMU 36-005	15-613508	1632571.748	1756664.576
SWMU 36-005	15-613509	1632504.147	1756533.943
SWMU 36-005	15-613510	1632465.780	1756596.976
SWMU 36-005	15-613511	1632289.471	1756491.921
SWMU 36-005	15-613512	1632315.049	1756416.099
SWMU 36-005	15-613513	1632255.670	1756553.127
SWMU 36-005	36-03020	1632366.173	1756547.542
SWMU 36-005	36-03022	1632400.784	1756477.844
SWMU 36-005	36-03051	1632217.527	1756580.877
SWMU 36-006	15-613514	1630905.695	1758744.404
SWMU 36-006	15-613515	1630957.981	1758718.227
SWMU 36-006	15-613516	1631083.286	1758670.780
SWMU 36-006	15-613517	1631159.588	1758644.007
SWMU 36-006	15-613518	1631200.193	1758628.390
SWMU 36-006	15-613519	1631179.667	1758692.198
SWMU 36-006	15-613520	1631223.396	1758695.321
SWMU 36-006	15-613521	1631077.485	1758716.739
SWMU 36-006	15-613522	1631115.859	1758733.695
SWMU 36-006	15-613523	1630993.598	1758744.850
SWMU 36-006	15-613524	1631036.434	1758750.651

Table 3.2-2
Field-Screening Results for Samples Collected and Submitted for Off-Site Analysis

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
TA-15												
SWMU 15-002	15-613318	0–1	RE15-11-394	0.0	48	2120	ND[a]	1.2	NA[b]	NA	NA	NA
SWMU 15-002	15-613318	3–4	RE15-11-415	0.0	24	2360	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613318	6–7	RE15-11-396	0.0	42	2380	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613319	0–1	RE15-11-397	0.0	66	2090	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613319	3–4	RE15-11-398	0.0	40	2180	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613319	6–7	RE15-11-399	0.0	78	2270	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613320	0–1	RE15-11-400	0.0	60	2080	ND	1.2	NA	NA	NA	NA
SWMU 15-002	15-613320	3–4	RE15-11-401	0.0	48	2450	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613320	6–7	RE15-11-402	0.0	60	2400	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613321	0–1	RE15-11-403	0.0	66	2100	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613321	3–4	RE15-11-404	0.0	44	2660	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613321	6–7	RE15-11-405	0.0	96	2420	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613322	0–1	RE15-11-406	0.0	30	2140	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613322	3–4	RE15-11-407	0.0	54	2390	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613322	6–7	RE15-11-408	0.0	48	2410	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613671	0–1	RE15-11-2706	0.0	28	1930	2.2	1.2	NA	NA	NA	NA
SWMU 15-002	15-613671	3–4	RE15-11-2728	0.0	60	2200	ND	3.2	NA	NA	NA	NA
SWMU 15-002	15-613671	6–7	RE15-11-2708	0.0	96	2090	ND	3.0	NA	NA	NA	NA
SWMU 15-002	15-613672	0–1	RE15-11-2709	0.0	66	2240	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613672	3–4	RE15-11-2710	0.0	36	2380	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613672	6–7	RE15-11-2711	0.0	66	2540	ND	1.5	NA	NA	NA	NA
SWMU 15-002	15-613673	0–1	RE15-11-2712	0.0	54	1979	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613673	3–4	RE15-11-2713	0.0	54	2570	ND	0.8	NA	NA	NA	NA

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 15-002	15-613673	5–6	RE15-11-2714	0.0	78	2380	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613674	0–1	RE15-11-2715	0.0	66	2170	0.8	ND	NA	NA	NA	NA
SWMU 15-002	15-613674	3–4	RE15-11-2716	0.0	54	2330	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613674	6–7	RE15-11-2717	0.0	78	2410	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613675	0–1	RE15-11-2718	0.0	60	2080	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613675	3–4	RE15-11-2719	0.0	102	2210	ND	ND	NA	NA	NA	NA
SWMU 15-002	15-613675	6–7	RE15-11-2720	0.0	108	2190	ND	5.6	NA	NA	NA	NA
SWMU 15-007(a)	15-613391	4–5	RE15-11-784	0.0	58	2101	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613391	8–9	RE15-11-805	0.0	36	883	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613392	5–6	RE15-11-804	0.0	46	2000	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613392	9–10	RE15-11-786	0.0	58	3620	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613393	5.5–6.5	RE15-11-787	0.0	29	2150	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613393	9.5–10.5	RE15-11-788	0.0	72	3218	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613394	5–6	RE15-11-789	0.0	23	2030	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613394	9–10	RE15-11-790	0.0	87	3264	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613395	2–3	RE15-11-792	0.1	42	2120	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613395	5–6	RE15-11-793	0.0	36	2770	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613396	2–3	RE15-11-794	0.0	24	2490	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613396	5–6	RE15-11-795	0.0	38	2050	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613397	2–3	RE15-11-796	0.0	42	1848	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613397	5–6	RE15-11-797	0.0	48	2440	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613398	2–3	RE15-11-798	0.0	54	2310	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613398	5–6	RE15-11-799	0.0	48	2410	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613399	2–3	RE15-11-806	0.0	60	2230	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613399	5–6	RE15-11-801	0.0	48	2330	NA	NA	NA	NA	NA	NA
SWMU 15-007(a)	15-613400	2–3	RE15-11-802	0.0	66	2270	NA	NA	NA	NA	NA	NA

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 15-007(a)	15-613400	5–6	RE15-11-803	0.0	30	2200	NA	NA	NA	NA	NA	NA
SWMUs 15-004(b) and 15-004(c)	15-613330	0–1	RE15-11-440	0.2	82	2810	ND	ND	174.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613330	3–4	RE15-11-441	0.2	134	2950	ND	ND	76.0	ND	69.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613331	0–1	RE15-11-442	0.0	76	2710	ND	ND	290.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613331	3–4	RE15-11-443	0.0	87	2470	ND	1.4	ND	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613332	0–1	RE15-11-444	1.3	52	2500	ND	ND	121.0	43.0	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613332	3–4	RE15-11-445	1.2	52	2430	ND	ND	232.0	47.0	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613333	0–1	RE15-11-446	1.3	52	2490	ND	ND	183.0	ND	14.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613333	3–4	RE15-11-447	0.8	17	2690	ND	ND	237.0	41.0	18.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613334	0–1	RE15-11-448	1.4	117	2380	ND	ND	228.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613334	3–4	RE15-11-449	1.4	52	2730	ND	ND	ND	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613335	0–1	RE15-11-450	1.0	70	2590	ND	ND	ND	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613335	3–4	RE15-11-451	0.0	93	2920	ND	ND	244.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613336	0–1	RE15-11-452	0.0	82	2970	ND	ND	256.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613336	3–4	RE15-11-453	0.0	70	2660	ND	ND	210.0	40.0	ND	ND

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMUs 15-004(b) and 15-004(c)	15-613338	0–1	RE15-11-456	0.0	93	2530	ND	ND	184.0	ND	14.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613338	3–4	RE15-11-457	0.0	52	2690	ND	ND	ND	43.0	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613339	0–1	RE15-11-458	0.0	76	2450	ND	ND	229.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613339	3–4	RE15-11-459	0.0	93	2280	ND	ND	234.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613340	0–1	RE15-11-460	0.0	58	2470	ND	1.0	81.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613340	3–4	RE15-11-461	0.0	23	2600	ND	1.2	90.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613341	0–1	RE15-11-462	0.0	61	2440	ND	ND	142.0	ND	16.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613341	3–4	RE15-11-463	0.0	27	2370	ND	ND	208.0	39.0	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613342	0–1	RE15-11-469	0.0	22	2320	ND	2.9	188.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613342	3–4	RE15-11-464	0.0	33	2880	ND	ND	ND	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613343	0–1	RE15-11-466	0.0	55	2200	ND	ND	226.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613343	3–4	RE15-11-467	0.0	33	2740	ND	ND	114.0	ND	14.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613344	0–1	RE15-11-468	0.6	64	2540	ND	1.0	218.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613344	3–4	RE15-11-454	0.0	87	2690	ND	2.9	273.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613345	0–1	RE15-11-470	0.0	55	2490	ND	ND	86.0	ND	ND	ND

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMUs 15-004(b) and 15-004(c)	15-613345	1–2	RE15-11-471	0.0	38	2810	ND	ND	102.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613346	0–1	RE15-11-472	0.0	16	2600	ND	ND	637.0	ND	351.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613346	3–4	RE15-11-473	0.0	10	2300	ND	ND	262.0	ND	78.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613347	0–1	RE15-11-474	0.0	26	2490	ND	1.5	737.0	ND	483.0	22.0
SWMUs 15-004(b) and 15-004(c)	15-613347	3–4	RE15-11-475	0.0	26	2250	ND	ND	268.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613348	0–1	RE15-11-476	0.0	21	2430	ND	ND	247.0	ND	31.0	18.0
SWMUs 15-004(b) and 15-004(c)	15-613348	3–4	RE15-11-477	0.0	21	2640	ND	ND	189.0	ND	18.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613349	0–1	RE15-11-478	0.0	26	2270	ND	ND	458.0	ND	819.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613349	3–4	RE15-11-479	0.0	21	2560	ND	ND	206.0	ND	16.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613350	0–1	RE15-11-480	0.0	32	2280	ND	ND	181.0	ND	274.0	18.0
SWMUs 15-004(b) and 15-004(c)	15-613350	3–4	RE15-11-481	0.0	41	2210	ND	ND	325.0	ND	ND	ND
SWMUs 15-004(b) and 15-004(c)	15-613351	0–1	RE15-11-482	0.0	26	2340	ND	ND	196.0	ND	27.0	ND
SWMUs 15-004(b) and 15-004(c)	15-613351	3–4	RE15-11-483	0.0	32	2690	ND	ND	ND	ND	96.0	ND
SWMU 15-004(f)	15-02100	3–4	RE15-11-543	0.0	58	3010	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02101	3–4	RE15-11-542	0.0	87	4030	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02112	3–4	RE15-11-540	0.0	123	3130	NA	NA	NA	NA	NA	NA

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 15-004(f)	15-02113	0–1	RE15-11-576	0.0	43	2690	ND	1.2	154.0	ND	17.0	24.0
SWMU 15-004(f)	15-02113	3–4	RE15-11-577	0.0	21	2610	ND	1.0	ND	ND	15.0	ND
SWMU 15-004(f)	15-02114	3–4	RE15-11-541	0.0	64	4220	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02115	3–4	RE15-11-544	0.0	105	3110	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02119	3–4	RE15-11-555	0.0	16	2680	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02123	3–4	RE15-11-546	0.0	64	3440	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02124	0–1	RE15-11-572	0.0	53	2210	NA	NA	288.0	2.0	ND	20.0
SWMU 15-004(f)	15-02124	3–4	RE15-11-573	0.0	32	2380	NA	NA	323.0	ND	ND	ND
SWMU 15-004(f)	15-02125	3–4	RE15-11-539	0.0	95	3760	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02127	3–4	RE15-11-545	0.0	82	2990	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02132	0–1	RE15-11-592	0.0	56	2860	ND	ND	ND	ND	ND	53.0
SWMU 15-004(f)	15-02132	1–2	RE15-11-593	0.0	76	3060	ND	ND	ND	ND	ND	31.0
SWMU 15-004(f)	15-02136	0–1	RE15-11-568	0.0	32	2670	NA	NA	86.0	ND	ND	22.0
SWMU 15-004(f)	15-02136	3–4	RE15-11-569	0.0	26	2460	NA	NA	ND	ND	ND	ND
SWMU 15-004(f)	15-02137	3–4	RE15-11-538	0.0	121	4560	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02139	3–4	RE15-11-557	0.0	5	2880	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02141	3–3.5	RE15-11-554	0.0	5	2780	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02142	0–1	RE15-11-595	0.0	71	2340	ND	ND	ND	ND	ND	59.0
SWMU 15-004(f)	15-02142	1–2	RE15-11-596	0.0	40	2290	ND	ND	ND	ND	ND	ND
SWMU 15-004(f)	15-02144	3–4	RE15-11-550	0.0	82	3560	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02145	0–1	RE15-11-590	0.0	82	2570	ND	ND	97.0	ND	ND	45.0
SWMU 15-004(f)	15-02145	3–4	RE15-11-591	0.0	58	2130	ND	ND	ND	ND	ND	ND
SWMU 15-004(f)	15-02147	3–4	RE15-11-548	0.0	41	3930	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02148	0–1	RE15-11-574	0.0	32	2810	ND	ND	184.0	ND	19.0	23.0
SWMU 15-004(f)	15-02148	3–4	RE15-11-575	0.0	46	2260	ND	ND	ND	ND	21.0	ND
SWMU 15-004(f)	15-02149	3–4	RE15-11-529	0.0	134	3310	NA	NA	NA	NA	NA	NA

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 15-004(f)	15-02150	0–1	RE15-11-582	0.0	71	1942	ND	ND	354.0	ND	18.0	25.0
SWMU 15-004(f)	15-02150	3–4	RE15-11-583	0.0	51	2030	ND	ND	ND	ND	ND	ND
SWMU 15-004(f)	15-02151	3–4	RE15-11-535	0.0	83	4250	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02152	3–4	RE15-11-536	0.0	100	4257	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02153	3–4	RE15-11-558	0.0	21	3670	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02155	3–4	RE15-11-551	0.0	29	3440	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02156	0–1	RE15-11-586	0.0	68	2261	1.1	ND	159.0	ND	17.0	58.0
SWMU 15-004(f)	15-02156	3–4	RE15-11-587	0.0	53	2370	ND	ND	ND	ND	16.0	ND
SWMU 15-004(f)	15-02157	3–4	RE15-11-549	0.0	45	3141	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02162	0–1	RE15-11-580	0.0	81	2290	ND	ND	72.0	ND	ND	31.0
SWMU 15-004(f)	15-02162	3–4	RE15-11-581	0.0	40	2130	ND	ND	ND	ND	ND	ND
SWMU 15-004(f)	15-02166	3–3.5	RE15-11-552	0.0	64	3350	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02167	3–3.5	RE15-11-553	0.0	99	3500	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02170	3–4	RE15-11-526	0.0	61	2770	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02171	0–1	RE15-11-578	0.0	102	5190	ND	ND	119.0	ND	ND	29.0
SWMU 15-004(f)	15-02171	1–2	RE15-11-579	0.0	68	2190	ND	ND	ND	ND	ND	ND
SWMU 15-004(f)	15-02172	3–4	RE15-11-528	2.5	64	3330	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02173	3–4	RE15-11-532	0.0	49	4410	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02177	3–3.5	RE15-11-560	0.0	32	3720	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02178	3–3.5	RE15-11-559	0.0	37	3560	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02179	3–3.5	RE15-11-561	0.0	37	2900	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02180	3–4	RE15-11-524	0.0	27	2650	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02191	3–4	RE15-11-523	0.0	55	2890	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02196	3–4	RE15-11-547	0.0	35	4050	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02198	3–4	RE15-11-556	0.0	37	3260	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02203	0–1	RE15-11-670	0.0	86	2340	ND	ND	243.0	ND	15.0	23.0

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 15-004(f)	15-02203	3–4	RE15-11-594	0.0	40	1971	ND	ND	ND	ND	ND	ND
SWMU 15-004(f)	15-02206	3–3.5	RE15-11-562	0.0	37	3120	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02226	3–4	RE15-11-537	0.0	97	4820	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02228	3–4	RE15-11-533	0.0	55	3840	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02229	0–1	RE15-11-588	0.0	121	4678	ND	ND	77.0	17.0	20.0	80.0
SWMU 15-004(f)	15-02229	1–2	RE15-11-589	0.0	48	2410	ND	ND	ND	ND	21.0	ND
SWMU 15-004(f)	15-02230	0–0.5	RE15-11-597	0.0	92	2870	ND	ND	ND	ND	ND	ND
SWMU 15-004(f)	15-02230	0.5–1	RE15-11-598	0.0	111	2700	ND	ND	ND	ND	ND	ND
SWMU 15-004(f)	15-02231	3–4	RE15-11-527	67.9	82	3640	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02240	3–4	RE15-11-531	0.0	70	2940	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02241	3–4	RE15-11-530	0.0	52	2740	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02277	3–3.5	RE15-11-565	0.0	32	2760	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02278	3–4	RE15-11-525	0.0	27	2380	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02279	0–1	RE15-11-584	0.0	107	3620	ND	ND	96.0	4.0	ND	30.0
SWMU 15-004(f)	15-02279	3–4	RE15-11-585	0.0	68	2530	ND	ND	ND	ND	ND	ND
SWMU 15-004(f)	15-02295	3–4	RE15-11-534	0.0	77	4110	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-02299	3–4	RE15-11-563	0.0	43	2590	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613365	10.5–11	RE15-11-604	0.0	55	4120	NA	NA	ND	ND	ND	ND
SWMU 15-004(f)	15-613365	0–1	RE15-11-671	0.0	98	4760	NA	NA	189.0	200.0	28.0	278.0
SWMU 15-004(f)	15-613365	6–7	RE15-11-672	0.0	106	4680	NA	NA	ND	ND	ND	28.0
SWMU 15-004(f)	15-613365	9–10	RE15-11-673	0.0	106	4860	NA	NA	ND	ND	15.0	17.0
SWMU 15-004(f)	15-613366	0–1	RE15-11-674	0.0	159	4060	NA	NA	229.0	ND	ND	129.0
SWMU 15-004(f)	15-613366	6–7	RE15-11-675	0.0	123	3990	NA	NA	190.0	53.0	ND	33.0
SWMU 15-004(f)	15-613366	9–10	RE15-11-676	0.0	105	4490	NA	NA	323.0	124.0	15.0	69.0
SWMU 15-004(f)	15-613367	0–1	RE15-11-677	0.0	1140	140000	NA	NA	ND	3822.0	206.0	4972.0
SWMU 15-004(f)	15-613367	2–3	RE15-11-678	0.0	648	101900	NA	NA	ND	798.0	120.0	3383.0

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 15-004(f)	15-613368	0–1	RE15-11-680	0.0	149	15570	NA	NA	109.0	331.0	26.0	555.0
SWMU 15-004(f)	15-613368	6–7	RE15-11-681	0.0	0	1924	NA	NA	168.0	50.0	ND	33.0
SWMU 15-004(f)	15-613368	9–10	RE15-11-682	0.0	98	4340	NA	NA	ND	36.0	20.0	ND
SWMU 15-004(f)	15-613369	0–1	RE15-11-683	0.0	105	4130	NA	NA	229.0	ND	ND	47.0
SWMU 15-004(f)	15-613369	6–7	RE15-11-684	0.0	58	3340	NA	NA	228.0	15.0	ND	30.0
SWMU 15-004(f)	15-613369	9–10	RE15-11-685	0.0	152	4460	NA	NA	185.0	18.0	23.0	62.0
SWMU 15-004(f)	15-613369	11–12	RE15-11-600	0.0	38	3010	NA	NA	293.0	36.0	17.0	ND
SWMU 15-004(f)	15-613370	0–1	RE15-11-686	0.0	66	3710	NA	NA	208.0	16.0	17.0	103.0
SWMU 15-004(f)	15-613370	6–7	RE15-11-687	0.0	49	3300	NA	NA	198.0	95.0	ND	78.0
SWMU 15-004(f)	15-613370	8–8.5	RE15-11-688	0.0	266	22000	NA	NA	88.0	493.0	45.0	1085.0
SWMU 15-004(f)	15-613371	0–1	RE15-11-689	0.0	55	4560	NA	NA	121.0	1764.0	125.0	1421.0
SWMU 15-004(f)	15-613371	6–7	RE15-11-690	0.0	16	2280	NA	NA	ND	39.0	ND	78.0
SWMU 15-004(f)	15-613371	9–10	RE15-11-691	0.0	16	2000	NA	NA	ND	ND	ND	ND
SWMU 15-004(f)	15-613372	0–1	RE15-11-692	0.0	123	5790	NA	NA	234.0	21.0	ND	116.0
SWMU 15-004(f)	15-613372	6–7	RE15-11-693	0.0	134	4420	NA	NA	302.0	13.0	ND	45.0
SWMU 15-004(f)	15-613372	9–10	RE15-11-694	0.0	159	4170	NA	NA	356.0	33.0	ND	36.0
SWMU 15-004(f)	15-613372	10.9–11.1	RE15-11-603	0.0	44	5470	NA	NA	261.0	68.0	16.0	107.0
SWMU 15-004(f)	15-613373	0–1	RE15-11-695	0.0	26	5770	NA	NA	128.0	44.0	19.0	260.0
SWMU 15-004(f)	15-613373	6–6.25	RE15-11-696	0.0	43	5100	NA	NA	719.0	117.0	55.0	162.0
SWMU 15-004(f)	15-613374	0–1	RE15-11-698	0.0	110	8810	NA	NA	124.0	34.0	ND	335.0
SWMU 15-004(f)	15-613374	6–7	RE15-11-699	0.0	77	4320	NA	NA	183.0	49.0	ND	58.0
SWMU 15-004(f)	15-613374	8–8.5	RE15-11-700	0.0	210	15570	NA	NA	317.0	1849.0	84.0	864.0
SWMU 15-004(f)	15-613375	0–1	RE15-11-701	0.0	240	8760	NA	NA	155.0	69.0	17.0	406.0
SWMU 15-004(f)	15-613375	6–7	RE15-11-702	0.0	111	3900	NA	NA	197.0	ND	ND	ND
SWMU 15-004(f)	15-613375	9–10	RE15-11-703	0.0	117	4850	NA	NA	228.0	8.0	15.0	47.0
SWMU 15-004(f)	15-613375	11–12	RE15-11-599	0.0	38	3310	NA	NA	352.0	1.0	ND	30.0

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 15-004(f)	15-613376	0–1	RE15-11-704	0.0	257	12900	NA	NA	118.0	237.0	18.0	381.0
SWMU 15-004(f)	15-613376	6–7	RE15-11-705	0.0	181	7770	NA	NA	ND	ND	10.0	128.0
SWMU 15-004(f)	15-613376	8.25–9.25	RE15-11-706	0.0	26	6420	NA	NA	88.0	48.0	ND	307.0
SWMU 15-004(f)	15-613376	10–11	RE15-11-601	0.0	105	4830	NA	NA	99.0	ND	6.0	69.0
SWMU 15-004(f)	15-613377	0–1	RE15-11-707	0.0	72	5380	NA	NA	281.0	76.0	17.0	246.0
SWMU 15-004(f)	15-613377	3–3.5	RE15-11-708	0.0	44	4320	NA	NA	190.0	63.0	ND	104.0
SWMU 15-004(f)	15-613378	0–1	RE15-11-710	0.0	140	4160	NA	NA	262.0	ND	ND	52.0
SWMU 15-004(f)	15-613378	6–7	RE15-11-711	0.0	128	2830	NA	NA	181.0	ND	ND	ND
SWMU 15-004(f)	15-613378	9–10	RE15-11-712	0.0	87	3060	NA	NA	160.0	ND	ND	ND
SWMU 15-004(f)	15-613379	0–1	RE15-11-713	0.0	86	8270	NA	NA	215.0	84.0	36.0	396.0
SWMU 15-004(f)	15-613379	6–7	RE15-11-714	0.0	32	3220	NA	NA	441.0	ND	ND	ND
SWMU 15-004(f)	15-613379	9–10	RE15-11-715	0.0	43	3500	NA	NA	89.0	ND	18.0	ND
SWMU 15-004(f)	15-613380	0–1	RE15-11-716	0.0	75	5080	NA	NA	228.0	50.0	21.0	213.0
SWMU 15-004(f)	15-613380	6–7	RE15-11-717	0.0	16	3500	NA	NA	254.0	60.0	19.0	41.0
SWMU 15-004(f)	15-613380	9–9.5	RE15-11-718	0.0	80	10280	NA	NA	355.0	72.0	50.0	463.0
SWMU 15-004(f)	15-613381	0–1	RE15-11-725	0.0	369	19980	NA	NA	222.0	55.0	21.0	456.0
SWMU 15-004(f)	15-613381	6–7	RE15-11-720	0.0	111	3140	NA	NA	285.0	3.0	14.0	ND
SWMU 15-004(f)	15-613381	9–10	RE15-11-721	0.0	175	7210	NA	NA	312.0	163.0	45.0	154.0
SWMU 15-004(f)	15-613381	11–12	RE15-11-602	0.0	88	3160	NA	NA	257.0	ND	ND	ND
SWMU 15-004(f)	15-613382	0–1	RE15-11-722	0.0	140	15870	NA	NA	324.0	76.0	ND	809.0
SWMU 15-004(f)	15-613382	6–7	RE15-11-723	0.0	91	3030	NA	NA	219.0	ND	ND	ND
SWMU 15-004(f)	15-613382	9–10	RE15-11-724	0.0	70	4040	NA	NA	ND	ND	ND	ND
SWMU 15-004(f)	15-613384	0–0.5	RE15-11-728	0.3	27	2080	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613384	0.5–1	RE15-11-729	0.8	33	2450	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613385	0–1	RE15-11-730	0.9	55	2270	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613385	1–1.5	RE15-11-731	0.6	55	2140	NA	NA	NA	NA	NA	NA

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 15-004(f)	15-613386	0–1	RE15-11-732	0.4	38	4300	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613386	1–2	RE15-11-733	2.4	61	5400	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613387	0–1	RE15-11-734	0.7	72	2330	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613387	2–3	RE15-11-735	1.1	88	2110	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613388	0–1	RE15-11-736	0.2	72	2710	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613388	1–1.5	RE15-11-737	3.2	49	2140	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613389	0–0.5	RE15-11-740	0.3	110	7060	NA	NA	NA	NA	NA	NA
SWMU 15-004(f)	15-613389	0.5–1	RE15-11-739	1.6	105	10150	NA	NA	NA	NA	NA	NA
SWMU 15-008(a)	15-613403	0–1	RE15-11-816	0.0	96	2970	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613403	1–2	RE15-11-817	0.0	78	3190	ND	1.3	NA	NA	NA	NA
SWMU 15-008(a)	15-613404	0–1	RE15-11-818	0.5	78	3160	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613404	1–2	RE15-11-819	0.0	114	3000	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613405	0–1	RE15-11-820	0.1	126	3830	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613405	1–2	RE15-11-821	0.0	108	5510	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613406	0–1	RE15-11-840	0.0	66	5120	ND	1.7	NA	NA	NA	NA
SWMU 15-008(a)	15-613406	1–2	RE15-11-823	0.0	126	4350	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613407	0–1	RE15-11-824	0.0	2460	16660	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613407	2–3	RE15-11-825	0.0	174	10610	ND	0.8	NA	NA	NA	NA
SWMU 15-008(a)	15-613408	0–1	RE15-11-826	0.0	78	6860	0.7	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613408	1–2	RE15-11-827	0.0	126	4600	ND	1.0	NA	NA	NA	NA
SWMU 15-008(a)	15-613409	0–1	RE15-11-828	0.0	60	3620	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613409	1–2	RE15-11-829	0.0	42	3180	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613410	0–1	RE15-11-830	0.0	60	3010	ND	0.9	NA	NA	NA	NA
SWMU 15-008(a)	15-613410	3–4	RE15-11-831	0.0	48	4180	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613411	0–1	RE15-11-832	0.0	60	2550	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613411	3–4	RE15-11-833	0.0	72	3920	ND	ND	NA	NA	NA	NA

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 15-008(a)	15-613412	0–1	RE15-11-834	0.0	78	5600	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613412	3–4	RE15-11-835	0.0	46	4860	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613413	0–1	RE15-11-836	3.0	132	6400	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613413	1–2	RE15-11-837	0.0	42	4580	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613414	0–1	RE15-11-841	0.0	144	5950	ND	ND	NA	NA	NA	NA
SWMU 15-008(a)	15-613414	1–2	RE15-11-839	0.0	77	4520	ND	ND	NA	NA	NA	NA
SWMU 15-009(e)	15-613421	0–1	RE15-11-861	0.0	61	2110	NA	NA	NA	NA	NA	NA
SWMU 15-009(e)	15-613421	2.5–3	RE15-11-862	0.0	83	2200	NA	NA	NA	NA	NA	NA
SWMU 15-009(e)	15-613422	0–0.5	RE15-11-863	0.0	49	2450	NA	NA	NA	NA	NA	NA
SWMU 15-009(e)	15-613422	0.5–1	RE15-11-864	0.0	49	2340	NA	NA	NA	NA	NA	NA
SWMU 15-009(e)	15-613423	0–1	RE15-11-870	0.0	16	2770	NA	NA	NA	NA	NA	NA
SWMU 15-009(e)	15-613423	2–2.5	RE15-11-866	0.0	33	2420	NA	NA	NA	NA	NA	NA
SWMU 15-010(a)	15-613427	4–5	RE15-11-902	0.0	30	1548	ND	ND	ND	ND	27.0	ND
SWMU 15-010(a)	15-613427	7–8	RE15-11-883	0.0	54	2480	ND	ND	104.0	ND	14.0	ND
SWMU 15-010(a)	15-613428	4–5	RE15-11-884	0.0	72	2390	ND	ND	25.0	ND	32.0	ND
SWMU 15-010(a)	15-613428	7–8	RE15-11-885	0.0	96	2480	ND	ND	ND	ND	23.0	ND
SWMU 15-010(a)	15-613429	4–5	RE15-11-886	0.0	36	2430	ND	ND	184.0	27.0	ND	ND
SWMU 15-010(a)	15-613429	7–8	RE15-11-887	0.0	36	2010	ND	ND	ND	ND	111.0	ND
SWMU 15-010(a)	15-613429	9–9.5	RE15-11-2947	0.0	33	3960	ND	ND	89.0	ND	71.0	ND
SWMU 15-010(a)	15-613430	4–5	RE15-11-888	0.0	84	2250	ND	ND	168.0	ND	16.0	ND
SWMU 15-010(a)	15-613430	6–7	RE15-11-889	0.0	72	2330	ND	ND	ND	ND	ND	ND
SWMU 15-010(a)	15-613431	4–5	RE15-11-890	0.0	72	2320	ND	ND	261.0	11.0	18.0	ND
SWMU 15-010(a)	15-613431	7–8	RE15-11-891	0.0	90	2560	ND	ND	198.0	ND	ND	ND
AOC 15-005(b)	15-613251	0–1	RE15-11-217	0.0	33	2370	NA	NA	NA	NA	NA	NA
AOC 15-005(b)	15-613251	4–5	RE15-11-218	0.0	38	3240	NA	NA	NA	NA	NA	NA
AOC 15-005(b)	15-613252	0–1	RE15-11-219	0.0	77	2380	NA	NA	NA	NA	NA	NA

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
AOC 15-005(b)	15-613252	4–5	RE15-11-220	0.0	38	3630	NA	NA	NA	NA	NA	NA
AOC 15-005(b)	15-613253	0–1	RE15-11-281	0.0	44	2660	NA	NA	NA	NA	NA	NA
AOC 15-005(b)	15-613253	4–5	RE15-11-222	0.0	44	3070	NA	NA	NA	NA	NA	NA
AOC 15-005(b)	15-613254	0–1	RE15-11-223	0.0	49	2810	NA	NA	NA	NA	NA	NA
AOC 15-005(b)	15-613254	4–5	RE15-11-224	1.0	33	2840	NA	NA	NA	NA	NA	NA
AOC C-15-004	15-613295	0–1	RE15-11-333	0.1	61	2220	NA	NA	NA	NA	NA	NA
AOC C-15-004	15-613295	2–3	RE15-11-334	0.1	38	1905	NA	NA	NA	NA	NA	NA
AOC C-15-004	15-613296	2–3	RE15-11-336	0.1	88	2370	NA	NA	NA	NA	NA	NA
AOC C-15-004	15-613296	0–1	RE15-11-339	0.1	49	2420	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613298	0–1	RE15-11-341	0.0	48	2010	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613298	2–3	RE15-11-342	0.0	54	2210	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613299	0.5–1.5	RE15-11-343	0.0	84	2350	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613299	2.5–3.5	RE15-11-344	0.0	48	2440	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613300	0–1	RE15-11-345	0.0	66	2210	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613300	2–3	RE15-11-346	0.0	54	2390	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613301	0–1	RE15-11-347	0.0	42	2450	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613301	2–3	RE15-11-348	0.0	78	2390	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613302	0–1	RE15-11-349	0.0	78	2160	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613302	2–3	RE15-11-350	0.0	102	2440	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613303	0–1	RE15-11-357	0.0	66	2230	NA	NA	NA	NA	NA	NA
AOC C-15-005	15-613303	2–3	RE15-11-352	0.0	102	2520	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613305	0–1	RE15-11-360	0.0	36	1968	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613305	2–3	RE15-11-361	0.0	12	1991	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613306	0–1	RE15-11-362	0.0	48	2200	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613306	2–3	RE15-11-363	0.0	60	2160	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613307	0–1	RE15-11-364	0.0	36	2150	NA	NA	NA	NA	NA	NA

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
AOC C-15-006	15-613307	2–3	RE15-11-365	0.0	60	2015	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613308	0–1	RE15-11-366	0.0	22	2270	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613308	2–3	RE15-11-367	0.0	66	2280	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613309	0–1	RE15-11-368	0.0	30	1962	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613309	2–3	RE15-11-369	0.0	48	1911	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613310	0–1	RE15-11-376	0.0	72	2110	NA	NA	NA	NA	NA	NA
AOC C-15-006	15-613310	2–3	RE15-11-371	0.0	60	2010	NA	NA	NA	NA	NA	NA
TA-36												
SWMU 36-001	36-613721	2–4	RE36-11-2862	0.0	126	7450	ND	ND	ND	4498.0	132.0	682.0
SWMU 36-001	36-613721	5–6.5	RE36-11-2863	0.0	48	3010	ND	ND	ND	47.0	14.0	38.0
SWMU 36-001	36-613721	10–11.5	RE36-11-2864	0.0	60	2630	ND	ND	63.0	ND	19.0	ND
SWMU 36-001	36-613722	0–1.5	RE36-11-2865	0.0	48	2110	ND	ND	ND	ND	ND	ND
SWMU 36-001	36-613722	5–6.5	RE36-11-2866	0.0	66	2400	ND	ND	93.0	ND	ND	ND
SWMU 36-001	36-613722	10–11.5	RE36-11-2867	0.0	108	2540	ND	ND	ND	ND	ND	ND
SWMU 36-001	36-613723	0–1.5	RE36-11-2868	0.0	102	2280	ND	ND	ND	ND	ND	ND
SWMU 36-001	36-613723	5–6	RE36-11-2869	0.0	108	2170	ND	ND	63.0	397.0	43.0	ND
SWMU 36-001	36-613723	10–11.5	RE36-11-2870	0.0	114	2470	ND	ND	ND	10.0	ND	ND
SWMU 36-001	36-613724	0–1.5	RE36-11-2871	0.0	60	2380	ND	ND	ND	ND	ND	ND
SWMU 36-001	36-613724	5–6.5	RE36-11-2872	0.0	72	1397	4.1	2.0	ND	116.0	28.0	ND
SWMU 36-001	36-613724	10–11.5	RE36-11-2873	0.0	33	5700	ND	1.0	173.0	ND	ND	ND
SWMU 36-001	36-613725	0–1	RE36-11-2874	0.0	40	2380	ND	1.3	61.0	ND	ND	ND
SWMU 36-001	36-613725	5–6.5	RE36-11-2875	0.0	46	5450	ND	1.1	ND	ND	ND	ND
SWMU 36-001	36-613725	10–11.5	RE36-11-2876	0.0	46	2850	ND	2.0	ND	ND	ND	ND
SWMU 36-001	36-613726	0–1.5	RE36-11-2877	0.0	46	2550	ND	ND	ND	ND	ND	ND
SWMU 36-001	36-613726	5–6.5	RE36-11-2878	0.0	30	2710	ND	ND	ND	ND	ND	ND
SWMU 36-001	36-613726	10–11.5	RE36-11-2879	0.0	25	2210	ND	ND	ND	ND	ND	ND

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 36-001	36-613727	0–1.5	RE36-11-2880	0.0	56	2680	ND	ND	ND	ND	ND	ND
SWMU 36-001	36-613727	5–6.5	RE36-11-2881	0.0	46	2550	ND	2.0	ND	52.0	ND	63.0
SWMU 36-001	36-613727	10–11.5	RE36-11-2882	0.0	40	2530	ND	ND	ND	55.0	ND	25.0
SWMU 36-001	36-613727	13.5–15	RE36-11-2949	0.0	33	5740	ND	ND	104.0	28.0	13.0	ND
SWMU 36-003(b)	15-613464	0–1	RE15-11-975	0.0	41	1707	NA	NA	NA	NA	NA	NA
SWMU 36-003(b)	15-613464	3–4	RE15-11-976	0.0	47	1964	NA	NA	NA	NA	NA	NA
SWMU 36-003(b)	15-613465	0–1	RE15-11-983	0.0	41	1905	NA	NA	NA	NA	NA	NA
SWMU 36-003(b)	15-613465	3–4	RE15-11-978	0.0	43	2000	NA	NA	NA	NA	NA	NA
SWMU 36-003(b)	15-613466	0–1	RE15-11-979	0.0	65	2190	NA	NA	NA	NA	NA	NA
SWMU 36-003(b)	15-613466	3–4	RE15-11-980	0.0	59	1776	NA	NA	NA	NA	NA	NA
SWMU 36-005	15-613507	0–1	RE15-11-1091	0.0	102	2470	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613507	2–3	RE15-11-1092	0.0	60	2400	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613507	4–5	RE15-11-1093	0.0	24	2450	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613508	0–1	RE15-11-1094	0.0	90	2050	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613508	2–3	RE15-11-1095	0.0	42	2640	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613508	4–5	RE15-11-1096	0.0	90	2390	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613509	0–1	RE15-11-1097	0.0	90	2360	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613509	2–3	RE15-11-1098	0.0	54	2960	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613509	4–5	RE15-11-1099	0.0	72	2630	ND	0.9	NA	NA	NA	NA
SWMU 36-005	15-613510	0–1	RE15-11-1100	0.0	114	2310	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613510	2–3	RE15-11-1101	0.0	54	2560	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613510	4–5	RE15-11-1102	0.0	66	2860	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613511	0–1	RE15-11-1103	0.0	66	2550	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613511	2–3	RE15-11-1104	0.0	72	2450	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613511	4–5	RE15-11-1105	0.0	126	2570	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613512	0–1	RE15-11-1106	0.0	42	2550	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613512	2–3	RE15-11-1107	0.0	90	2770	ND	ND	NA	NA	NA	NA

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 36-005	15-613512	4–5	RE15-11-1108	0.0	66	2550	ND	0.8	NA	NA	NA	NA
SWMU 36-005	15-613513	0–1	RE15-11-1109	0.0	66	2290	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613513	2–3	RE15-11-1110	0.0	72	2900	ND	ND	NA	NA	NA	NA
SWMU 36-005	15-613513	4–5	RE15-11-1111	0.0	60	2470	ND	1.1	NA	NA	NA	NA
SWMU 36-005	36-03020	0–1	RE15-11-1120	0.0	53	1948	ND	ND	NA	NA	NA	NA
SWMU 36-005	36-03020	1–2	RE15-11-1121	0.0	83	1750	ND	ND	NA	NA	NA	NA
SWMU 36-005	36-03022	0–0.5	RE15-11-1118	0.0	53	1819	ND	ND	NA	NA	NA	NA
SWMU 36-005	36-03022	0.5–1	RE15-11-1119	0.0	53	1572	ND	ND	NA	NA	NA	NA
SWMU 36-005	36-03051	0–1	RE15-11-1058	0.0	23	1390	ND	1.5	NA	NA	NA	NA
SWMU 36-005	36-03051	2–3	RE15-11-1059	0.0	41	1787	ND	2.0	NA	NA	NA	NA
SWMU 36-005	36-03051	4–5	RE15-11-1060	0.0	89	1803	ND	2.0	NA	NA	NA	NA
SWMU 36-006	15-613514	0–1	RE15-11-1144	0.0	49	2840	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613514	2–3	RE15-11-1145	0.0	72	2970	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613515	0–1	RE15-11-1146	0.0	88	3260	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613515	2–3	RE15-11-1147	0.0	61	3040	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613516	0–1	RE15-11-1148	0.0	127	2670	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613516	2–3	RE15-11-1149	0.0	55	3230	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613517	0–1	RE15-11-1150	0.0	55	3040	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613517	2–3	RE15-11-1151	0.0	122	3060	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613518	0–1	RE15-11-1166	0.0	72	2660	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613518	2–3	RE15-11-1153	65.0	27	3150	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613519	0–1	RE15-11-1167	0.0	66	2790	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613519	2–3	RE15-11-1155	0.0	27	2570	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613520	0–1	RE15-11-1156	0.1	61	2610	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613520	2–3	RE15-11-1157	0.0	72	2940	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613521	0–1	RE15-11-1158	0.0	72	2590	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613521	2–3	RE15-11-1159	0.4	33	2900	NA	NA	NA	NA	NA	NA

Table 3.2-2 (continued)

SWMU/AOC	Location ID	Depth (ft)	Sample ID	PID (ppm)	Alpha (dpm)	Beta/ Gamma (dpm)	HE (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
SWMU 36-006	15-613522	0–1	RE15-11-1160	0.0	44	2680	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613522	2–3	RE15-11-1161	0.9	44	2780	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613523	0–1	RE15-11-1162	0.0	116	2570	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613523	2–3	RE15-11-1163	0.0	88	3190	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613524	0–1	RE15-11-1164	0.0	66	2810	NA	NA	NA	NA	NA	NA
SWMU 36-006	15-613524	2–3	RE15-11-1165	0.0	77	2960	NA	NA	NA	NA	NA	NA

[a] ND = Not detected.

[b] NA = Not analyzed.

Table 6.2-1
Samples Collected and Analyses Requested at SWMU 15-002

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	TPH-DRO	TPH-GRO	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Isotopic Thorium
Former North Burn Pit																
RE15-11-394	15-613318	0–1	Fill	11-897	11-895	11-895	11-895	11-895	—*	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-415	15-613318	3–4	Qbt 4	11-897	11-895	11-895	11-895	11-895	11-895	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-396	15-613318	6–7	Qbt 4	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-397	15-613319	0–1	Fill	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-398	15-613319	3–4	Fill	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-399	15-613319	6–7	Qbt 4	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-400	15-613320	0–1	Fill	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-401	15-613320	3–4	Fill	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898

Table 6.2-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	TPH-DRO	TPH-GRO	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Isotopic Thorium
RE15-11-402	15-613320	6–7	Qbt 4	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-403	15-613321	0–1	Fill	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-404	15-613321	3–4	Fill	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-405	15-613321	6–7	Qbt 4	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-406	15-613322	0–1	Fill	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-407	15-613322	3–4	Qbt 4	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
RE15-11-408	15-613322	6–7	Qbt 4	11-897	11-895	11-895	11-895	11-895	—	11-895	11-896	11-897	11-897	11-897	11-898	11-898
Former South Burn Pit																
RE15-11-2706	15-613671	0–1	Fill	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2728	15-613671	3–4	Fill	11-901	11-899	11-899	11-899	11-899	11-899	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2708	15-613671	6–7	Qbt 4	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2709	15-613672	0–1	Fill	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2710	15-613672	3–4	Fill	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2711	15-613672	6–7	Qbt 4	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2712	15-613673	0–1	Fill	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2713	15-613673	3–4	Qbt 4	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2714	15-613673	5–6	Qbt 4	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2715	15-613674	0–1	Fill	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2716	15-613674	3–4	Qbt 4	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2717	15-613674	6–7	Qbt 4	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2718	15-613675	0–1	Fill	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2719	15-613675	3–4	Fill	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902
RE15-11-2720	15-613675	6–7	Qbt 4	11-901	11-899	11-899	11-899	11-899	—	11-899	11-900	11-901	11-901	11-901	11-902	11-902

* — = Analysis not requested.

Table 6.2-2
Inorganic Chemicals above BVs at SWMU 15-002

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Potassium	Selenium	Thallium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**[b]	**na**	**3500**	**0.3**	**1.1**	**17**	**63.5**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na**	**na**	**3460**	**1.52**	**0.73**	**39.6**	**48.8**
Construction Worker SSL[c]				**41400**	**142**	**57.4**	**4390**	**148**	**8850000**	**134**[d]	**36.6**[e]	**14200**	**12.1**	**248000**	**800**	**1550000**	**464**	**77.1**	**753**	**566000**	**248**	**19900000**	**1750**	**3.54**	**614**	**106000**
Industrial SSL[c]				**1290000**	**519**	**21.5**	**255000**	**2580**	**32400000**	**505**[d]	**350**[f]	**51900**	**63.3**	**908000**	**800**	**5680000**	**160000**	**389**	**25700**	**2080000**	**908**	**73000000**	**6490**	**13**	**6530**	**389000**
Residential SSL[c]				**78000**	**31.3**	**4.25**	**15600**	**156**	**13000000**	**96.6**[d]	**23**[f]	**3130**	**11.2**	**54800**	**400**	**339000**	**10500**	**23.5**	**1560**	**125000**	**54.8**	**15600000**	**391**	**0.782**	**394**	**23500**
Former North Burn Pit																										
RE15-11-394	15-613318	0–1	Fill	—[g]	—	—	—	—	—	—	—	—	0.52 (U)	—	—	—	—	1.29 (J)	—	0.71	—	—	—	—	—	—
RE15-11-415	15-613318	3–4	Qbt 4	12200	0.73 (U)	3.2	122	—	2470 (J+)	10.2	3.8	7.4	0.55 (U)	—	19.6	2050	—	0.47 (J)	7.8	0.17 (J)	—	—	1.4	—	18.7	—
RE15-11-396	15-613318	6–7	Qbt 4	—	—	—	—	—	2600 (J+)	9.1	—	—	0.52 (U)	—	12.1	—	—	0.302 (J)	—	0.1 (J)	—	—	1.7	—	—	—
RE15-11-397	15-613319	0–1	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.906 (J)	—	0.97	—	—	—	—	—	—
RE15-11-398	15-613319	3–4	Fill	—	—	—	—	—	—	—	—	—	0.53 (U)	—	32.1	—	—	0.243 (J)	—	0.22	—	—	—	—	—	—
RE15-11-399	15-613319	6–7	Qbt 4	—	—	—	—	—	—	7.6	—	—	0.53 (U)	—	13.6	—	—	0.351 (J)	—	0.09 (J)	—	—	1.8	—	—	—
RE15-11-400	15-613320	0–1	Fill	—	—	—	—	—	—	—	10.2	—	0.54 (U)	—	—	—	745	0.345 (J)	—	0.84	—	—	—	—	—	—
RE15-11-401	15-613320	3–4	Fill	—	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	0.314 (J)	—	0.26	0.0032 (J)	—	—	—	—	—
RE15-11-402	15-613320	6–7	Qbt 4	—	—	—	66.1	—	2800 (J+)	8.1	—	—	0.53 (U)	—	—	—	—	0.254 (J)	7	0.24	—	—	1.7	—	—	—
RE15-11-403	15-613321	0–1	Fill	—	—	—	—	—	—	—	23.6	—	—	—	—	—	2400	—	—	1.3	—	—	—	—	—	—
RE15-11-404	15-613321	3–4	Fill	—	—	—	—	—	—	—	—	—	0.53 (U)	—	23.5	—	—	0.329 (J)	—	5.2	—	—	—	—	—	—
RE15-11-405	15-613321	6–7	Qbt 4	—	—	—	—	—	—	—	—	—	0.51 (U)	—	12	—	—	0.273 (J)	—	0.31	—	—	2	—	—	—
RE15-11-406	15-613322	0–1	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.17 (J)	—	—	—	—	—	—
RE15-11-407	15-613322	3–4	Qbt 4	9560	—	—	139	—	9850 (J+)	8.5	—	—	0.53 (U)	—	50.1	2370	—	0.284 (J)	6.9	0.1 (J)	—	—	1.9	1.3	—	—
RE15-11-408	15-613322	6–7	Qbt 4	—	—	—	—	—	—	8.1	—	—	0.52 (U)	—	21.6	—	—	—	—	—	—	—	2.2	—	—	—
Former South Burn Pit																										
RE15-11-2706	15-613671	0–1	Fill	—	12.5	—	18200	—	—	—	—	146	1.9	—	170	—	—	1120	—	1.4	0.0022 (J)	—	—	—	—	112
RE15-11-2728	15-613671	3–4	Fill	—	—	—	4490	—	—	—	—	—	—	—	31.9	—	—	8.52	—	4.6	—	4440 (J+)	1.6	—	—	—
RE15-11-2708	15-613671	6–7	Qbt 4	11800 (J+)	0.68 (U)	2.9	952	2.2	2820	32.6 (J)	3.4	795	—	—	23.2	2220	—	8.52	21 (J)	1.3	—	3520 (J+)	2.9	—	—	—
RE15-11-2709	15-613672	0–1	Fill	—	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	0.11 (J)	—	—	1.6	—	—	—
RE15-11-2710	15-613672	3–4	Fill	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.077 (J)	—	—	1.8	—	—	—
RE15-11-2711	15-613672	6–7	Qbt 4	—	—	—	—	—	—	8.6 (J)	—	—	0.53 (U)	—	22.3	—	—	—	—	0.085 (J)	—	—	2.2	—	—	—
RE15-11-2712	15-613673	0–1	Fill	—	—	—	—	—	—	—	9.2	—	0.53 (U)	—	—	—	—	—	—	0.21	—	—	—	—	—	—
RE15-11-2713	15-613673	3–4	Qbt 4	—	—	—	—	—	—	12.6 (J)	—	—	0.51 (U)	—	—	—	—	—	9.1 (J)	0.21	—	—	2	—	—	—
RE15-11-2714	15-613673	5–6	Qbt 4	—	—	—	—	—	—	9.5 (J)	—	—	0.51 (U)	—	—	—	—	—	6.9 (J)	0.099 (J)	—	—	2.3	—	—	—
RE15-11-2715	15-613674	0–1	Fill	—	—	—	357	—	—	—	—	—	0.53 (U)	—	—	—	—	—	—	0.3	—	—	—	—	—	—
RE15-11-2716	15-613674	3–4	Qbt 4	—	—	6	76.6	—	3180	7.3 (J)	—	—	0.62 (U)	—	13.3	—	—	—	6.9 (J)	—	0.0029 (J)	—	1.7	—	—	—

Table 6.2-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Potassium	Selenium	Thallium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na[b]**	**na**	**3500**	**0.3**	**1.1**	**17**	**63.5**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na**	**na**	**3460**	**1.52**	**0.73**	**39.6**	**48.8**
Construction Worker SSL[c]				**41400**	**142**	**57.4**	**4390**	**148**	**8850000**	**134[d]**	**36.6**	**14200**	**12.1**	**248000**	**800**	**1550000**	**464**	**77.1**	**753**	**566000**	**248**	**19900000**	**1750**	**3.54**	**614**	**106000**
Industrial SSL[c]				**1290000**	**519**	**21.5**	**255000**	**2580**	**32400000**	**505[d]**	**350**	**51900**	**63.3**	**908000**	**800**	**5680000**	**160000**	**389**	**25700**	**2080000**	**908**	**73000000**	**6490**	**13**	**6530**	**389000**
Residential SSL[c]				**78000**	**31.3**	**4.25**	**15600**	**156**	**13000000**	**96.6[d]**	**23**	**3130**	**11.2**	**54800**	**400**	**339000**	**10500**	**23.5**	**1560**	**125000**	**54.8**	**15600000**	**391**	**0.782**	**394**	**23500**
RE15-11-2717	15-613674	6–7	Qbt 4	—	—	3.4	—	—	—	—	—	—	0.6 (U)	—	—	—	—	—	—	0.11 (J)	—	—	2	—	—	—
RE15-11-2718	15-613675	0–1	Fill	—	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	0.08 (J)	—	—	—	—	—	—
RE15-11-2719	15-613675	3–4	Fill	—	—	—	—	—	—	—	—	—	0.62 (U)	—	—	—	—	—	—	0.19 (J)	NA[h]	—	1.6	—	—	—
RE15-11-2720	15-613675	6–7	Qbt 4	12500 (J+)	—	—	114	—	—	12.8 (J)	3.3	4.8	0.68 (U)	15300	—	3200	—	—	10.4 (J)	0.8	—	—	2.3	—	—	—

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575) unless otherwise noted.

[d] SSL for total chromium.

[e] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[f] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[g] — = Not detected or not detected above BV.

[h] NA = Not analyzed.

Table 6.2-3
Organic Chemicals Detected at SWMU 15-002

Sample ID	Location ID	Depth (ft)	Media	Acetone	Amino-2,6-dinitrotoluene[4-]	Amino-4,6-dinitrotoluene[2-]	Bis(2-ethylhexyl)phthalate	Diethylphthalate	Di-n-butylphthalate	Dinitroaniline[3,5-]	Dinitrotoluene[2,4-]	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxin [1,2,3,4,7,8-]	Hexachlorodibenzodioxin [1,2,3,6,7,8-]	Hexachlorodibenzodioxin [1,2,3,7,8,9-]	Hexachlorodibenzodioxins (Total)
Construction Worker SSL[a]				**242000**	**688**[b]	**695**[b]	**5380**	**215000**	**26900**	**10000**[c]	**536**	**na**[d]	**na**	**na**	**na**	**na**	**na**	**na**	**na**
Industrial SSL[a]				**960000**	**2300**[e]	**2300**[e]	**1830**	**733000**	**91600**	**32000**[c]	**82.3**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
Residential SSL[a]				**66300**	**150**[e]	**150**[e]	**380**	**49300**	**6160**	**2200**[c]	**17.1**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
Former North Burn Pit																			
RE15-11-394	15-613318	0–1	Fill	—[f]	—	—	—	—	0.69 (J-)	—	—	0.0000047	0.0000138	0.00000139 (J)	0.00000367 (J)	—	—	—	0.00000126 (J)
RE15-11-415	15-613318	3–4	Qbt 4	—	—	—	0.077 (J-)	0.18 (J-)	—	—	—	0.0000045 (J)	0.00000853	0.000000642 (J)	0.00000111 (J)	—	—	—	0.00000187 (J)
RE15-11-396	15-613318	6–7	Qbt 4	—	—	—	0.093 (J-)	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-397	15-613319	0–1	Fill	—	—	—	—	—	—	—	—	0.00000489	0.0000153	0.00000203 (J)	0.00000546	—	—	—	0.000000881 (J)
RE15-11-398	15-613319	3–4	Fill	—	—	—	—	—	—	—	—	0.00000835	0.00003	0.00000333 (J)	0.0000112	—	—	—	0.00000076 (J)
RE15-11-399	15-613319	6–7	Qbt 4	—	—	—	0.16 (J-)	—	—	—	—	0.00000066 (J)	0.00000175 (J)	—	—	—	—	—	—
RE15-11-400	15-613320	0–1	Fill	—	—	—	0.14 (J-)	—	0.037 (J-)	—	—	0.00000136 (J)	0.00000315 (J)	—	0.000000659 (J)	—	—	—	—
RE15-11-401	15-613320	3–4	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-402	15-613320	6–7	Qbt 4	—	—	—	0.094 (J-)	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-403	15-613321	0–1	Fill	—	—	—	—	—	—	—	—	0.00000286 (J)	0.00000661	0.000000962 (J)	0.000000962 (J)	—	—	—	—
RE15-11-404	15-613321	3–4	Fill	0.083	—	—	—	—	—	—	—	—	—	—	0.000000877 (J)	—	—	—	—
RE15-11-405	15-613321	6–7	Qbt 4	—	—	—	0.18 (J-)	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-406	15-613322	0–1	Fill	—	—	—	—	—	—	—	—	0.00000769	0.0000175	0.00000237 (J)	0.00000945	—	—	—	0.000000513 (J)
RE15-11-407	15-613322	3–4	Qbt 4	—	—	—	0.084 (J-)	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-408	15-613322	6–7	Qbt 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Former South Burn Pit																			
RE15-11-2706	15-613671	0–1	Fill	—	0.15	0.12	—	—	—	0.037 (J)	0.012 (J)	0.0000386	0.000133	0.0000073	0.0000288	0.000000927 (J)	0.00000245 (J)	0.0000023 (J)	0.0000321
RE15-11-2728	15-613671	3–4	Fill	—	0.0068 (J)	—	—	—	—	0.0043 (J)	—	0.000000732 (J)	0.00000227 (J)	—	—	—	—	—	—
RE15-11-2708	15-613671	6–7	Qbt 4	—	0.02 (J)	0.013 (J)	—	—	—	0.0074 (J)	—	0.00000237 (J)	0.00000643	—	0.000000842 (J)	—	—	—	0.000000782 (J)
RE15-11-2709	15-613672	0–1	Fill	—	—	—	0.13 (J-)	—	—	—	—	0.00000065 (J)	0.0000016 (J)	—	—	—	—	—	—
RE15-11-2711	15-613672	6–7	Qbt 4	—	—	—	0.068 (J-)	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-2712	15-613673	0–1	Fill	—	—	—	—	—	—	—	—	0.00000113 (J)	0.00000273 (J)	—	—	—	—	—	—
RE15-11-2715	15-613674	0–1	Fill	—	—	—	—	—	—	—	—	0.00000518	0.0000146	0.00000114 (J)	0.00000337 (J)	—	—	—	0.00000162 (J)
RE15-11-2718	15-613675	0–1	Fill	—	—	—	—	—	—	—	—	0.00000386 (J)	0.00000754	—	0.00000111 (J)	—	—	—	—

Table 6.2-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Hexachlorodibenzofuran [2,3,4,6,7,8-]	Hexachlorodibenzofurans (Total)	HMX	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]	Pentachlorodibenzodioxin [1,2,3,7,8-]	Pentachlorodibenzodioxins (Total)	Pentachlorodibenzofurans (Totals)	RDX	Tetrachlorodibenzodioxin [2,3,7,8-]	Tetrachlorodibenzodioxins (Total)	Tetrachlorodibenzofurans (Totals)	TPH-DRO	Trinitrobenzene[1,3,5-]	Trinitrotoluene[2,4,6-]
Construction Worker SSL[a]				**na**	**na**	**17400**	**na**	**na**	**na**	**na**	**na**	**1010**	**0.000226**	**na**	**na**	**3000[g]**	**10000[b]**	**161**
Industrial SSL[a]				**na**	**na**	**63300**	**na**	**na**	**na**	**na**	**na**	**311**	**0.000248**	**na**	**na**	**3000**	**32000[e]**	**573**
Residential SSL[a]				**na**	**na**	**3850**	**na**	**na**	**na**	**na**	**na**	**60.4**	**0.000049**	**na**	**na**	**1000**	**2200[e]**	**36**
Former North Burn Pit																		
RE15-11-394	15-613318	0–1	Fill	—	0.00000102 (J)	—	0.0000488	0.00000312 (J)	—	—	—	—	—	—	—	—	—	—
RE15-11-415	15-613318	3–4	Qbt 4	—	—	—	0.0000161	—	—	—	—	—	—	0.000000167 (J)	—	—	—	—
RE15-11-396	15-613318	6–7	Qbt 4	—	—	—	0.00000253 (J)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-397	15-613319	0–1	Fill	—	0.000000733 (J)	—	0.0000517	0.00000485 (J)	—	—	—	—	—	—	—	—	—	—
RE15-11-398	15-613319	3–4	Fill	—	—	—	0.000116	0.0000129	—	—	—	—	—	—	—	—	—	—
RE15-11-399	15-613319	6–7	Qbt 4	—	—	—	0.00000573 (J)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-400	15-613320	0–1	Fill	—	—	—	0.000014	—	—	—	—	—	—	—	—	—	—	—
RE15-11-401	15-613320	3–4	Fill	—	—	—	0.0000051 (J)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-402	15-613320	6–7	Qbt 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-403	15-613321	0–1	Fill	—	0.000000456 (J)	—	0.0000265	0.00000203 (J)	—	—	—	—	—	—	—	—	—	—
RE15-11-404	15-613321	3–4	Fill	—	—	—	0.0000116	0.00000151 (J)	—	—	—	—	—	—	—	—	—	—
RE15-11-405	15-613321	6–7	Qbt 4	—	—	—	0.00000148 (J)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-406	15-613322	0–1	Fill	—	0.00000121 (J)	—	0.0000735	0.0000113	—	—	—	—	—	—	—	8.1 (J)	—	—
RE15-11-407	15-613322	3–4	Qbt 4	—	—	—	0.00000184 (J)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-408	15-613322	6–7	Qbt 4	—	—	—	0.00000381 (J)	—	—	—	—	—	—	—	—	—	—	—
Former South Burn Pit																		
RE15-11-2706	15-613671	0–1	Fill	0.000000486 (J)	0.00000777	0.44	0.000251	0.0000226 (J)	0.000000754 (J)	0.0000076	0.00000272 (J)	2.6 (J)	0.000000237 (J)	0.00000328	0.00000437 (J)	18 (J)	0.0097 (J)	0.11
RE15-11-2728	15-613671	3–4	Fill	—	—	0.6	—	—	—	—	—	2.5 (J)	—	—	—	—	—	—
RE15-11-2708	15-613671	6–7	Qbt 4	—	—	0.1 (J)	0.000013 (J)	—	—	—	—	1.3 (J)	—	—	—	4.3 (J)	—	—
RE15-11-2709	15-613672	0–1	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-2711	15-613672	6–7	Qbt 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-2712	15-613673	0–1	Fill	—	—	—	0.0000121 (J)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-2715	15-613674	0–1	Fill	—	—	—	0.0000386 (J)	—	—	—	—	—	—	—	—	11 (J)	—	—
RE15-11-2718	15-613675	0–1	Fill	—	—	—	0.0000404 (J)	—	—	—	—	—	—	—	—	—	—	—

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

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[d] na = Not available.

[e] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[f] — = Not detected.

[g] Industrial screening guideline from NMED (2015, 600575) used.

Table 6.3-1
Samples Collected and Analyses Requested at SWMU 15-007(a)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Isotopic Thorium
RE15-11-784	15-613391	4–5	Soil	11-770	11-769	11-769	—*	11-769	—	11-770	11-770	11-770	11-771	11-771
RE15-11-805	15-613391	8–9	Qbt 4	11-770	11-769	11-769	11-769	11-769	11-835	11-770	11-770	11-770	11-771	11-771
RE15-11-804	15-613392	5–6	Soil	11-770	11-769	11-769	11-769	11-769	11-835	11-770	11-770	11-770	11-771	11-771
RE15-11-786	15-613392	9–10	Qbt 4	11-770	11-769	11-769	—	11-769	—	11-770	11-770	11-770	11-771	11-771
RE15-11-787	15-613393	5.5–6.5	Qbt 4	11-770	11-769	11-769	—	11-769	—	11-770	11-770	11-770	11-771	11-771
RE15-11-788	15-613393	9.5–10.5	Qbt 4	11-770	11-769	11-769	—	11-769	—	11-770	11-770	11-770	11-771	11-771
RE15-11-789	15-613394	5–6	Soil	11-770	11-769	11-769	—	11-769	—	11-770	11-770	11-770	11-771	11-771
RE15-11-790	15-613394	9–10	Soil	11-770	11-769	11-769	—	11-769	—	11-770	11-770	11-770	11-771	11-771
RE15-11-792	15-613395	2–3	Fill	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859
RE15-11-793	15-613395	5–6	Qbt 4	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859
RE15-11-794	15-613396	2–3	Fill	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859
RE15-11-795	15-613396	5–6	Qbt 4	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859
RE15-11-796	15-613397	2–3	Fill	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859
RE15-11-797	15-613397	5–6	Qbt 4	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859
RE15-11-798	15-613398	2–3	Fill	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859
RE15-11-799	15-613398	5–6	Qbt 4	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859
RE15-11-806	15-613399	2–3	Qbt 4	11-859	11-857	11-857	11-857	11-857	11-858	11-859	11-859	11-859	11-859	11-859
RE15-11-801	15-613399	5–6	Qbt 4	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859
RE15-11-802	15-613400	2–3	Fill	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859
RE15-11-803	15-613400	5–6	Fill	11-859	11-857	11-857	—	11-857	—	11-859	11-859	11-859	11-859	11-859

* — = Analysis not requested.

Table 6.3-2
Inorganic Chemicals above BVs at SWMU 15-007(a)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Lead	Magnesium	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Zinc
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**11.2**	**1690**	**0.1**	**6.58**	**na**[b]	**na**	**0.3**	**63.5**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**22.3**	**4610**	**0.1**	**15.4**	**na**	**na**	**1.52**	**48.8**
Construction Worker SSL[c]				**41400**	**142**	**57.4**	**4390**	**148**	**8850000**	**134**[d]	**36.6**[e]	**14200**	**12.1**	**800**	**1550000**	**77.1**	**753**	**566000**	**248**	**1750**	**106000**
Industrial SSL[c]				**1290000**	**519**	**21.5**	**255000**	**2580**	**32400000**	**505**[d]	**350**[f]	**51900**	**63.3**	**800**	**5680000**	**389**	**25700**	**2080000**	**908**	**6490**	**389000**
Residential SSL[c]				**78000**	**31.3**	**4.25**	**15600**	**156**	**13000000**	**96.6**[d]	**23**[f]	**3130**	**11.2**	**400**	**339000**	**23.5**	**1560**	**125000**	**54.8**	**391**	**23500**
RE15-11-784	15-613391	4–5	Soil	—[g]	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	0.3	—	—	52.1 (J+)
RE15-11-805	15-613391	8–9	Qbt 4	—	—	—	—	—	—	—	—	—	0.52 (U)	11.7	—	0.104	—	—	—	2.4 (J-)	—
RE15-11-804	15-613392	5–6	Soil	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	0.58	—	—	—
RE15-11-786	15-613392	9–10	Qbt 4	7750	—	—	63.7	1.3	—	—	—	—	0.54 (U)	20.6	1880	—	6.8	—	—	2.3 (J-)	—
RE15-11-787	15-613393	5.5–6.5	Qbt 4	8310	—	—	105	—	—	—	—	—	0.52 (U)	21.1	1710	—	7.1	1.1	—	1.3 (J-)	—
RE15-11-788	15-613393	9.5–10.5	Qbt 4	—	—	—	58.3	—	—	—	—	—	0.52 (U)	22.7	—	—	—	0.8	—	1.6 (J-)	—
RE15-11-789	15-613394	5–6	Soil	—	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	2	—	—	—
RE15-11-790	15-613394	9–10	Soil	—	—	—	—	—	—	—	—	—	0.54 (U)	30.6	—	—	—	1.5	—	—	—
RE15-11-792	15-613395	2–3	Fill	—	—	—	—	—	—	—	—	—	0.55 (UJ)	—	—	—	—	0.41	—	—	—
RE15-11-793	15-613395	5–6	Qbt 4	—	0.52 (U)	—	—	—	—	—	—	—	0.52 (UJ)	—	—	—	—	0.16 (J)	—	1.1	—
RE15-11-794	15-613396	2–3	Fill	—	—	—	—	—	—	—	—	—	0.54 (UJ)	23.9 (J)	—	—	—	0.99	0.0033 (J)	—	—
RE15-11-795	15-613396	5–6	Qbt 4	—	—	—	—	—	—	—	—	—	0.52 (UJ)	168 (J)	—	—	—	0.29	0.0024 (J)	1.5	125
RE15-11-796	15-613397	2–3	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.64	—	—	—
RE15-11-797	15-613397	5–6	Qbt 4	11600	0.53 (U)	3.4	178	1.3	4180 (J-)	10	3.4 (J)	5.2	0.55 (UJ)	33.3 (J)	2780	—	10 (J)	0.28	0.0025 (J)	1.7	—
RE15-11-798	15-613398	2–3	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.7	0.0024 (J)	—	—
RE15-11-799	15-613398	5–6	Qbt 4	10000	—	—	92.5	—	—	9.3	—	—	—	—	1880	—	7.9 (J)	13.5	—	1.3	—
RE15-11-806	15-613399	2–3	Qbt 4	—	—	—	58.7	—	3240 (J-)	—	—	—	—	—	—	—	6.9 (J)	0.54	—	1.5	—
RE15-11-801	15-613399	5–6	Qbt 4	—	—	—	—	—	—	—	—	—	0.59 (UJ)	—	—	—	—	0.18 (J)	—	1.7	—
RE15-11-802	15-613400	2–3	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
RE15-11-803	15-613400	5–6	Fill	—	—	—	—	—	—	—	—	—	0.56 (UJ)	24 (J)	—	—	—	17.1	0.003 (J)	—	52.3

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575) unless otherwise noted.

[d] SSL for total chromium.

[e] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[f] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[g] — = Not detected or not detected above BV.

Table 6.3-3
Organic Chemicals Detected at SWMU 15-007(a)

Sample ID	Location ID	Depth (ft)	Media	Acetone	Bis(2-ethylhexyl)phthalate	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]
Construction Worker SSL[a]				**242000**	**5380**	**na**[b]	**na**	**na**
Industrial SSL[a]				**960000**	**1830**	**na**	**na**	**na**
Residential SSL[a]				**66300**	**380**	**na**	**na**	**na**
RE15-11-784	15-613391	4–5	Soil	0.0073 (J)	—[c]	NA[d]	NA	NA
RE15-11-805	15-613391	8–9	Qbt 4	0.02 (J)	—	—	—	0.00000128 (J)
RE15-11-804	15-613392	5–6	Soil	—	—	0.000000927 (J)	0.00000202 (J)	0.00000837 (J)
RE15-11-786	15-613392	9–10	Qbt 4	0.031	—	NA	NA	NA
RE15-11-787	15-613393	5.5–6.5	Qbt 4	0.14	0.048 (J)	NA	NA	NA
RE15-11-788	15-613393	9.5–10.5	Qbt 4	0.024	—	NA	NA	NA
RE15-11-793	15-613395	5–6	Qbt 4	—	0.14 (J)	NA	NA	NA
RE15-11-806	15-613399	2–3	Qbt 4	—	—	—	—	0.00000175 (J)

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.
[a] SSLs from NMED (2015, 600575).
[b] na = Not available.
[c] — = Not detected.
[d] NA = Not analyzed.

Table 6.4-1
Samples Collected and Analyses Requested at SWMUs 15-004(b) and 15-004(c)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Americium-241	Gamma Spectroscopy
0215-96-0106	15-02428	0.67–1.17	Soil	2529	—*	—	—	2535	—	—	—	—	2530	—	—
0215-96-0105	15-02434	0.67–1.17	Soil	2529	—	—	—	2535	—	—	—	—	2530	—	—
0215-96-0104	15-02444	0.83–1.17	Soil	2529	—	—	—	2535	—	—	—	—	2530	—	—
0215-96-0116	15-02444	1–1.08	Soil	2560	—	—	—	2558	—	—	—	—	2562	—	—
0215-96-0117	15-02464	2.75–2.92	Soil	2560	—	—	—	2558-1	—	—	—	—	2562-1	—	—
RE15-11-440	15-613330	0–1	Soil	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-441	15-613330	3–4	Qbt 4	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-442	15-613331	0–1	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-443	15-613331	3–4	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-444	15-613332	0–1	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-445	15-613332	3–4	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-446	15-613333	0–1	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-447	15-613333	3–4	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-448	15-613334	0–1	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-449	15-613334	3–4	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-450	15-613335	0–1	Soil	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-452	15-613336	0–1	Soil	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-453	15-613336	3–4	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-456	15-613338	0–1	Soil	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-457	15-613338	3–4	Soil	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-458	15-613339	0–1	Soil	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-459	15-613339	3–4	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-460	15-613340	0–1	Soil	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-461	15-613340	3–4	Soil	11-384	11-382	11-382	—	11-382	—	11-384	11-384	11-384	11-385	11-385	11-385
RE15-11-462	15-613341	0–1	Soil	11-419	11-418	11-418	—	11-418	—	11-419	11-419	11-419	11-420	11-420	11-420
RE15-11-463	15-613341	3–4	Fill	11-419	11-418	11-418	—	11-418	—	11-419	11-419	11-419	11-420	11-420	11-420
RE15-11-469	15-613342	0–1	Soil	11-419	11-418	11-418	11-418	11-418	11-421	11-419	11-419	11-419	11-420	11-420	11-420
RE15-11-464	15-613342	3–4	Qbt 4	11-419	11-418	11-418	—	11-418	—	11-419	11-419	11-419	11-420	11-420	11-420
RE15-11-466	15-613343	0–1	Soil	11-419	11-418	11-418	—	11-418	—	11-419	11-419	11-419	11-420	11-420	11-420
RE15-11-467	15-613343	3–4	Qbt 4	11-419	11-418	11-418	—	11-418	—	11-419	11-419	11-419	11-420	11-420	11-420
RE15-11-468	15-613344	0–1	Soil	11-384	11-382	11-382	11-382	11-382	11-383	11-384	11-384	11-384	11-385	11-385	11-385
RE15-11-454	15-613344	3–4	Fill	11-380	11-379	11-379	—	11-379	—	11-380	11-380	11-380	11-381	11-381	11-381
RE15-11-470	15-613345	0–1	Soil	11-419	11-418	11-418	—	11-418	—	11-419	11-419	11-419	11-420	11-420	11-420
RE15-11-471	15-613345	1–2	Qbt 4	11-419	11-418	11-418	—	11-418	—	11-419	11-419	11-419	11-420	11-420	11-420

Table 6.4-1 (continued

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Americium-241	Gamma Spectroscopy
RE15-11-472	15-613346	0–1	Fill	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-473	15-613346	3–4	Fill	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-474	15-613347	0–1	Fill	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-475	15-613347	3–4	Soil	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-476	15-613348	0–1	Soil	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-477	15-613348	3–4	Soil	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-478	15-613349	0–1	Soil	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-479	15-613349	3–4	Fill	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-480	15-613350	0–1	Soil	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-481	15-613350	3–4	Fill	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-482	15-613351	0–1	Soil	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481
RE15-11-483	15-613351	3–4	Qbt 4	11-482	11-481	11-481	—	11-481	—	11-482	11-482	11-482	11-481	11-481	11-481

* — = Analysis not requested.

Table 6.4-2
Inorganic Chemicals above BVs at SWMUs 15-004(b) and 15-004(c)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Selenium
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**[b]	**0.3**
Soil BV[a]				**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**	**1.52**
Construction Worker SSL[c]				**41400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8850000**	**134**[d]	**36.6**[e]	**14200**	**12.1**	**248000**	**800**	**1550000**	**464**	**77.1**	**753**	**566000**	**1750**
Industrial SSL[c]				**1290000**	**519**	**21.5**	**255000**	**2580**	**1110**	**32400000**	**505**[d]	**350**[f]	**51900**	**63.3**	**908000**	**800**	**5680000**	**160000**	**389**	**25700**	**2080000**	**6490**
Residential SSL[c]				**78000**	**31.3**	**4.25**	**15600**	**156**	**70.5**	**13000000**	**96.6**[d]	**23**[f]	**3130**	**11.2**	**54800**	**400**	**339000**	**10500**	**23.5**	**1560**	**125000**	**391**
0215-96-0106	15-02428	0.67–1.17	Soil	—[g]	11 (UJ)	—	—	—	0.53 (U)	—	—	—	—	NA[h]	—	50	—	—	NA	—	NA	—
0215-96-0105	15-02434	0.67–1.17	Soil	—	11 (U)	—	310	—	1.3	—	—	—	20	NA	—	88	—	—	0.11 (U)	—	NA	—
0215-96-0104	15-02444	0.83–1.17	Soil	—	11 (UJ)	—	510	—	0.66	—	—	—	700	NA	—	100	—	—	0.11 (U)	—	NA	—
0215-96-0116	15-02444	1–1.08	Soil	—	12 (U)	—	920	—	3.7	—	—	8.7	180	NA	—	370	—	—	0.12 (U)	—	NA	—
0215-96-0117	15-02464	2.75–2.92	Soil	—	11 (U)	—	—	—	0.53 (U)	—	—	—	—	NA	—	—	—	—	0.11 (U)	—	NA	—
RE15-11-440	15-613330	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	1.8	—
RE15-11-441	15-613330	3–4	Qbt 4	10400	—	5.3	131	—	—	—	10.3	—	—	0.55 (U)	—	51.3	2280 (J+)	—	—	7.8	0.23	2.2
RE15-11-442	15-613331	0–1	Fill	—	—	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	1.3	—
RE15-11-443	15-613331	3–4	Fill	—	—	—	—	—	—	—	—	—	—	0.6 (U)	—	—	—	—	—	—	0.092 (J)	—
RE15-11-444	15-613332	0–1	Fill	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	22.9	—	—	0.575	—	2.4	—
RE15-11-445	15-613332	3–4	Fill	—	—	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	0.98	—
RE15-11-446	15-613333	0–1	Fill	—	—	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	0.08 (J)	—
RE15-11-447	15-613333	3–4	Fill	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.27	—
RE15-11-448	15-613334	0–1	Fill	—	—	—	—	—	—	—	—	—	—	0.58 (U)	—	—	—	—	—	—	1.2	—
RE15-11-449	15-613334	3–4	Fill	—	—	—	—	—	—	—	—	—	—	0.58 (U)	—	—	—	—	—	—	0.088 (J)	2.1
RE15-11-450	15-613335	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.61 (U)	—	—	—	—	—	—	0.28	—
RE15-11-451	15-613335	3–4	Fill	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.087 (J)	—
RE15-11-452	15-613336	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	0.54	—
RE15-11-453	15-613336	3–4	Fill	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.26	—
RE15-11-454	15-613344	3–4	Fill	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.5	—
RE15-11-456	15-613338	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	0.37	—
RE15-11-457	15-613338	3–4	Soil	—	—	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	0.1 (J)	1.7
RE15-11-458	15-613339	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.39	—
RE15-11-459	15-613339	3–4	Fill	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.21 (J)	—
RE15-11-460	15-613340	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.57 (U)	—	—	—	—	—	—	0.34	—
RE15-11-461	15-613340	3–4	Soil	—	—	—	—	—	—	8140	—	—	—	0.56 (U)	—	—	—	—	—	—	0.11 (J)	—
RE15-11-462	15-613341	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	0.83	—
RE15-11-463	15-613341	3–4	Fill	—	—	—	482 (J+)	1.9	—	—	—	—	—	0.58 (U)	—	26.2	—	—	—	—	1.8	2.3
RE15-11-464	15-613342	3–4	Qbt 4	—	0.51 (U)	—	—	—	—	—	—	—	—	0.51 (U)	—	—	—	—	—	—	0.14 (J)	1.5

Table 6.4-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Selenium
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na[b]**	**0.3**
Soil BV[a]				**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**	**1.52**
Construction Worker SSL[c]				**41400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8850000**	**134[d]**	**36.6[e]**	**14200**	**12.1**	**248000**	**800**	**1550000**	**464**	**77.1**	**753**	**566000**	**1750**
Industrial SSL[c]				**1290000**	**519**	**21.5**	**255000**	**2580**	**1110**	**32400000**	**505[d]**	**350[f]**	**51900**	**63.3**	**908000**	**800**	**5680000**	**160000**	**389**	**25700**	**2080000**	**6490**
Residential SSL[c]				**78000**	**31.3**	**4.25**	**15600**	**156**	**70.5**	**13000000**	**96.6[d]**	**23[f]**	**3130**	**11.2**	**54800**	**400**	**339000**	**10500**	**23.5**	**1560**	**125000**	**391**
RE15-11-466	15-613343	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.2 (J)	—
RE15-11-467	15-613343	3–4	Qbt 4	—	0.51 (U)	—	—	—	—	—	8.4	—	—	0.51 (U)	—	—	—	—	—	—	0.1 (J)	1.4
RE15-11-468	15-613344	0–1	Soil	—	—	—	—	—	—	—	—	8.9	—	0.56 (U)	—	—	—	699 (J-)	—	—	1.3	—
RE15-11-469	15-613342	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.85	1.9
RE15-11-470	15-613345	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.4	—
RE15-11-471	15-613345	1–2	Qbt 4	—	0.51 (U)	—	—	—	—	—	—	—	—	0.51 (U)	—	—	—	—	—	—	0.12 (J)	1.3
RE15-11-472	15-613346	0–1	Fill	—	—	—	1000	—	8.5	—	—	—	46.6 (J-)	—	—	645	—	—	0.175	—	0.57	—
RE15-11-473	15-613346	3–4	Fill	—	—	—	379	—	1.5	—	—	—	22.6 (J-)	0.55 (U)	—	117	—	—	—	—	0.12 (J)	—
RE15-11-474	15-613347	0–1	Fill	—	—	—	708	—	4.4	—	—	14.8	89 (J-)	0.53 (U)	—	383	—	—	0.342	—	0.2 (J)	—
RE15-11-475	15-613347	3–4	Soil	—	—	—	—	—	—	—	—	12.3	19.6 (J-)	0.56 (U)	—	57.5	—	—	—	16.7	0.15 (J)	—
RE15-11-476	15-613348	0–1	Soil	—	—	—	322	—	0.42	—	—	9.8	18.3 (J-)	0.53 (U)	—	70.8	—	—	—	—	1.2	1.6
RE15-11-477	15-613348	3–4	Soil	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	24.6	—	—	—	—	0.68	1.9
RE15-11-478	15-613349	0–1	Soil	—	—	—	890	—	87	—	—	—	59 (J-)	0.55 (U)	—	1520	—	—	—	—	0.98	1.9
RE15-11-479	15-613349	3–4	Fill	—	—	—	—	—	1.1	—	—	—	—	0.6 (U)	—	52.7	—	—	—	—	0.4	1.8
RE15-11-480	15-613350	0–1	Soil	—	—	—	324	—	—	—	—	10.4	27.2 (J-)	0.54 (U)	—	330	—	—	—	—	1.6	1.7
RE15-11-481	15-613350	3–4	Fill	—	—	—	—	—	—	—	23	9	16.2 (J-)	0.55 (U)	—	48.6	—	—	—	15.5	0.8	1.6
RE15-11-482	15-613351	0–1	Soil	—	—	—	—	—	—	—	—	9.5	—	0.55 (U)	—	33.8	—	—	—	—	0.82	1.7
RE15-11-483	15-613351	3–4	Qbt4	16600	0.55 (U)	5.5	169	—	—	5580 (J+)	30.1	3.7	10.7 (J-)	0.55 (U)	16500	124	3560 (J+)	—	—	18.9	0.25	2.8

Table 6.4-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Silver	Sodium	Thallium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**1**	**2770**	**1.1**	**17**	**63.5**
Soil BV[a]				**1**	**915**	**0.73**	**39.6**	**48.8**
Construction Worker SSL[c]				**1770**	**9730000**	**3.54**	**614**	**106000**
Industrial SSL[c]				**6490**	**35700000**	**13**	**6530**	**389000**
Residential SSL[c]				**391**	**7820000**	**0.782**	**394**	**23500**
0215-96-0106	15-02428	0.67–1.17	Soil	2.1 (U)	—	1.3 (U)	—	—
0215-96-0105	15-02434	0.67–1.17	Soil	2.1 (U)	—	1.3 (U)	—	—
0215-96-0104	15-02444	0.83–1.17	Soil	2.2 (U)	—	1.3 (U)	—	49 (J-)
0215-96-0116	15-02444	1–1.08	Soil	2.4 (U)	—	1.2 (U)	—	—
0215-96-0117	15-02464	2.75–2.92	Soil	2.1 (U)	—	1.1 (U)	—	49
RE15-11-440	15-613330	0–1	Soil	—	—	1.7	—	—
RE15-11-441	15-613330	3–4	Qbt 4	—	—	5	—	—
RE15-11-442	15-613331	0–1	Fill	—	—	—	—	—
RE15-11-443	15-613331	3–4	Fill	—	—	—	—	—
RE15-11-444	15-613332	0–1	Fill	—	—	—	—	—
RE15-11-445	15-613332	3–4	Fill	—	—	—	—	—
RE15-11-446	15-613333	0–1	Fill	—	—	—	—	—
RE15-11-447	15-613333	3–4	Fill	—	—	—	—	—
RE15-11-448	15-613334	0–1	Fill	—	—	—	—	—
RE15-11-449	15-613334	3–4	Fill	—	—	—	—	—
RE15-11-450	15-613335	0–1	Soil	—	—	—	—	—
RE15-11-451	15-613335	3–4	Fill	—	—	—	—	—
RE15-11-452	15-613336	0–1	Soil	—	—	—	—	—
RE15-11-453	15-613336	3–4	Fill	—	—	—	—	—
RE15-11-454	15-613344	3–4	Fill	—	—	—	—	—
RE15-11-456	15-613338	0–1	Soil	—	—	—	—	—
RE15-11-457	15-613338	3–4	Soil	—	—	—	—	—
RE15-11-458	15-613339	0–1	Soil	—	—	—	—	—
RE15-11-459	15-613339	3–4	Fill	—	—	—	—	—
RE15-11-460	15-613340	0–1	Soil	—	—	—	—	—
RE15-11-461	15-613340	3–4	Soil	—	1010	—	—	—
RE15-11-462	15-613341	0–1	Soil	—	—	—	—	—
RE15-11-463	15-613341	3–4	Fill	—	922	0.94 (J)	—	—
RE15-11-464	15-613342	3–4	Qbt 4	—	—	—	—	—

Table 6.4-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Silver	Sodium	Thallium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**1**	**2770**	**1.1**	**17**	**63.5**
Soil BV[a]				**1**	**915**	**0.73**	**39.6**	**48.8**
Construction Worker SSL[c]				**1770**	**9730000**	**3.54**	**614**	**106000**
Industrial SSL[c]				**6490**	**35700000**	**13**	**6530**	**389000**
Residential SSL[c]				**391**	**7820000**	**0.782**	**394**	**23500**
RE15-11-466	15-613343	0–1	Soil	—	—	—	—	—
RE15-11-467	15-613343	3–4	Qbt 4	—	—	—	—	—
RE15-11-468	15-613344	0–1	Soil	—	—	—	—	—
RE15-11-469	15-613342	0–1	Soil	—	—	—	—	—
RE15-11-470	15-613345	0–1	Soil	—	—	—	—	—
RE15-11-471	15-613345	1–2	Qbt 4	—	—	—	—	—
RE15-11-472	15-613346	0–1	Fill	—	—	—	—	54.2
RE15-11-473	15-613346	3–4	Fill	—	—	—	—	51.2
RE15-11-474	15-613347	0–1	Fill	—	—	—	—	—
RE15-11-475	15-613347	3–4	Soil	—	—	—	—	—
RE15-11-476	15-613348	0–1	Soil	—	—	—	—	—
RE15-11-477	15-613348	3–4	Soil	—	—	—	—	—
RE15-11-478	15-613349	0–1	Soil	—	—	—	—	78.5
RE15-11-479	15-613349	3–4	Fill	—	—	—	—	—
RE15-11-480	15-613350	0–1	Soil	—	—	—	—	—
RE15-11-481	15-613350	3–4	Fill	—	—	—	—	—
RE15-11-482	15-613351	0–1	Soil	—	—	—	—	—
RE15-11-483	15-613351	3–4	Qbt 4	—	—	2	21.4	—

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575) unless otherwise noted.

[d] SSL for total chromium.

[e] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[f] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[g] — = Not detected or not detected above BV.

[h] NA = Not analyzed.

Table 6.4-3
Organic Chemicals Detected at SWMUs 15-004(b) and 15-004(c)

Sample ID	Location ID	Depth (ft)	Media	Acetone	Amino-2,6-dinitrotoluene[4-]	Amino-4,6-dinitrotoluene[2-]	Benzyl Alcohol	Bis(2-ethylhexyl)phthalate	Di-n-butylphthalate	HMX	Isopropyltoluene[4-]	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	RDX	Trimethylbenzene[1,2,4-]	Trimethylbenzene[1,3,5-]	Trinitrotoluene[2,4,6-]	Xylene (Total)
Construction Worker SSL[a]				**242000**	**688**[b]	**695**[b]	**26900**[b]	**5380**	**26900**	**17400**	**2740**[c]	**na**[d]	**1010**	**245**[b]	**3540**[b]	**161**	**798**
Industrial SSL[a]				**960000**	**2300**[e]	**2300**[e]	**82000**[e]	**1830**	**91600**	**63300**	**14200**[c]	**na**	**311**	**240**[e]	**12000**[e]	**573**	**4280**
Residential SSL[a]				**66300**	**150**[e]	**150**[e]	**6300**[e]	**380**	**6160**	**3850**	**2360**[c]	**na**	**60.4**	**58**[e]	**780**[e]	**36**	**871**
RE15-11-443	15-613331	3–4	Fill	—[f]	—	—	0.054 (J)	—	—	—	—	NA[g]	—	—	—	—	—
RE15-11-444	15-613332	0–1	Fill	—	—	—	—	—	—	—	—	NA	—	—	0.00045 (J)	—	—
RE15-11-445	15-613332	3–4	Fill	—	—	—	—	—	—	—	—	NA	—	0.00097 (J)	—	NA	—
RE15-11-450	15-613335	0–1	Soil	—	—	—	—	—	—	—	—	NA	—	0.00081 (J)	—	—	—
RE15-11-452	15-613336	0–1	Soil	—	—	—	—	—	—	—	—	NA	—	0.001 (J)	—	—	—
RE15-11-453	15-613336	3–4	Fill	—	—	—	0.045 (J)	—	—	—	—	NA	—	—	—	—	—
RE15-11-457	15-613338	3–4	Soil	—	—	—	0.097 (J)	0.065 (J)	—	—	—	NA	—	—	—	—	—
RE15-11-458	15-613339	0–1	Soil	—	—	—	—	—	—	—	—	NA	—	0.00099 (J)	—	—	—
RE15-11-460	15-613340	0–1	Soil	—	—	—	—	—	—	—	—	NA	—	—	0.00061 (J)	—	—
RE15-11-462	15-613341	0–1	Soil	—	—	—	—	0.47	—	—	—	NA	—	—	—	—	—
RE15-11-469	15-613342	0–1	Soil	—	—	—	—	—	—	—	—	0.00000101 (J)	—	—	—	—	—
RE15-11-466	15-613343	0–1	Soil	—	—	—	0.061 (J)	—	—	—	—	NA	—	—	—	—	—
RE15-11-468	15-613344	0–1	Soil	—	—	—	—	0.11 (J)	—	—	—	0.00000272 (J)	—	—	—	—	—
RE15-11-454	15-613344	3–4	Fill	—	—	—	—	0.21 (J)	—	—	—	NA	—	—	—	—	—
RE15-11-470	15-613345	0–1	Soil	—	—	—	0.063 (J)	—	—	—	—	NA	—	—	—	—	—
RE15-11-471	15-613345	1–2	Qbt 4	—	—	—	—	0.05 (J)	—	—	—	NA	—	0.0011 (J)	—	—	0.00095 (J)
RE15-11-472	15-613346	0–1	Fill	—	—	—	—	0.12 (J)	0.99	—	—	NA	—	—	—	0.0072 (J)	—
RE15-11-473	15-613346	3–4	Fill	—	—	—	—	—	0.15 (J)	—	—	NA	—	—	—	—	—
RE15-11-474	15-613347	0–1	Fill	—	0.0074 (J)	0.0076 (J)	—	0.064 (J)	0.18 (J)	—	0.00058 (J)	NA	—	—	—	—	—
RE15-11-475	15-613347	3–4	Soil	0.012 (J)	—	—	—	—	—	0.086 (J)	—	NA	0.31	—	—	0.0098 (J)	—
RE15-11-478	15-613349	0–1	Soil	—	—	—	—	—	0.97	—	—	NA	—	—	—	—	—
RE15-11-481	15-613350	3–4	Fill	—	—	—	—	0.078 (J)	—	—	—	NA	—	—	—	—	—
RE15-11-483	15-613351	3–4	Qbt 4	—	—	—	—	0.064 (J)	—	—	—	NA	—	—	—	—	—

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

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Isopropylbenzene used as a surrogate based on structural similarity.

[d] na = Not available.

[e] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[f] — = Not detected.

[g] NA = Not analyzed.

Table 6.4-4
Radionuclides Detected above BVs at SWMUs 15-004(b) and 15-004(c)

Sample ID	Location ID	Depth (ft)	Media	Uranium-234	Uranium-238
Soil BV[a]				**2.59**	**2.29**
Construction Worker SAL[b]				**770**	**410**
Industrial SAL[b]				**3000**	**750**
Residential SAL[b]				**270**	**150**
RE15-11-474	15-613347	0–1	Fill	2.98	3.76

Note: All activities are in pCi/g.

[a] BVs from LANL (1998, 059730).

[b] SALs from LANL (2014, 600064).

Table 6.5-1
Samples Collected and Analyses Requested at SWMU 15-004(f)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	Uranium	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Gamma Spectroscopy
AAB3451	15-02100	1.5–2	Soil	18681	19509	—*	—	—	—	—	—	—	19509
RE15-11-543	15-02100	3–4	Soil	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-542	15-02101	3–4	Soil	11-513	—	—	11-512	—	—	—	—	11-514	—
AAB3461	15-02112	0–0.5	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-540	15-02112	3–4	Soil	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-576	15-02113	0–1	Soil	11-599	—	—	11-599	—	—	—	—	11-599	—
RE15-11-577	15-02113	3–4	Qbt 4	11-599	—	—	11-599	—	—	—	—	11-599	—
AAB3476	15-02114	0–0.5	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-541	15-02114	3–4	Qbt 4	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-544	15-02115	3–4	Soil	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-555	15-02119	3–4	Qbt 4	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-546	15-02123	3–4	Qbt 4	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-572	15-02124	0–1	Soil	11-599	—	—	11-599	—	—	—	—	11-599	—
RE15-11-573	15-02124	3–4	Soil	11-599	—	—	11-599	—	—	—	—	11-599	—
RE15-11-539	15-02125	3–4	Qbt 4	11-513	—	—	11-512	—	—	—	—	11-514	—
AAB3340	15-02127	1.5–2	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-545	15-02127	3–4	Soil	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-592	15-02132	0–1	Soil	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-593	15-02132	1–2	Qbt 3	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-568	15-02136	0–1	Soil	11-599	—	—	11-599	—	—	—	—	11-599	—
RE15-11-569	15-02136	3–4	Soil	11-599	—	—	11-599	—	—	—	—	11-599	—
AAB3332	15-02137	1.5–2	Soil	18681	19509	—	—	—	—	—	—	—	19509

Table 6.5-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	Uranium	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Gamma Spectroscopy
RE15-11-538	15-02137	3–4	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-557	15-02139	3–4	Qbt 4	11-542	—	—	11-542	—	—	—	—	11-542	—
RE15-11-554	15-02141	3–3.5	Qbt 4	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-595	15-02142	0–1	Soil	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-596	15-02142	1–2	Qbt 3	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-550	15-02144	3–4	Soil	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-590	15-02145	0–1	Soil	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-591	15-02145	3–4	Soil	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-548	15-02147	3–4	Soil	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-574	15-02148	0–1	Soil	11-599	—	—	11-599	—	—	—	—	11-599	—
RE15-11-575	15-02148	3–4	Qbt 4	11-599	—	—	11-599	—	—	—	—	11-599	—
RE15-11-529	15-02149	3–4	Qbt 4	11-310	—	—	11-310	—	—	—	—	11-310	—
RE15-11-582	15-02150	0–1	Soil	11-599	—	—	11-599	—	—	—	—	11-599	—
RE15-11-583	15-02150	3–4	Qbt 4	11-599	—	—	11-599	—	—	—	—	11-599	—
RE15-11-535	15-02151	3–4	Soil	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-536	15-02152	3–4	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
AAB3304	15-02153	1–1	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-558	15-02153	3–4	Qbt 4	11-542	—	—	11-542	—	—	—	—	11-542	—
RE15-11-551	15-02155	3–3.5	Qbt 4	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-586	15-02156	0–1	Soil	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-587	15-02156	3–4	Qbt 4	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-549	15-02157	3–4	Soil	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-580	15-02162	0–1	Soil	11-599	—	—	11-599	—	—	—	—	11-599	—

Table 6.5-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	Uranium	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Gamma Spectroscopy
RE15-11-581	15-02162	3–4	Qbt 4	11-599	—	—	11-599	—	—	—	—	11-599	—
AAB3342	15-02166	0–0.33	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-552	15-02166	3–3.5	Qbt 4	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-553	15-02167	3–3.5	Qbt 4	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-526	15-02170	3–4	Qbt 4	11-310	—	—	11-310	—	—	—	—	11-310	—
RE15-11-578	15-02171	0–1	Soil	11-599	—	—	11-599	—	—	—	—	11-599	—
RE15-11-579	15-02171	1–2	Qbt 4	11-599	—	—	11-599	—	—	—	—	11-599	—
AAB3477	15-02172	1.5–2	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-528	15-02172	3–4	Qbt 4	11-310	—	—	11-310	—	—	—	—	11-310	—
RE15-11-532	15-02173	3–4	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-560	15-02177	3–3.5	Qbt 3	11-535	—	—	11-536	—	—	—	—	11-535	—
AAB3336	15-02178	0–0.5	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-559	15-02178	3–3.5	Qbt 3	11-535	—	—	11-536	—	—	—	—	11-535	—
RE15-11-561	15-02179	3–3.5	Qbt 4	11-535	—	—	11-536	—	—	—	—	11-535	—
RE15-11-524	15-02180	3–4	Qbt 4	11-310	—	—	11-310	—	—	—	—	11-310	—
AAB3470	15-02182	1.5–2	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-523	15-02191	3–4	Qbt 4	11-310	—	—	11-310	—	—	—	—	11-310	—
RE15-11-547	15-02196	3–4	Soil	11-513	—	—	11-512	—	—	—	—	11-514	—
AAB3485	15-02198	0–0.5	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-556	15-02198	3–4	Soil	11-513	—	—	11-512	—	—	—	—	11-514	—
RE15-11-670	15-02203	0–1	Soil	11-598	—	11-598	11-598	11-617	—	—	—	11-598	—
RE15-11-594	15-02203	3–4	Qbt 4	11-598	—	—	11-598	—	—	—	—	11-598	—
AAB3295	15-02206	0–0.33	Soil	18681	19509	—	—	—	—	—	—	—	19509

Table 6.5-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	Uranium	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Gamma Spectroscopy
RE15-11-562	15-02206	3–3.5	Qbt 3	11-535	—	—	11-536	—	—	—	—	11-535	—
RE15-11-537	15-02226	3–4	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-533	15-02228	3–4	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-588	15-02229	0–1	Soil	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-589	15-02229	1–2	Qbt 4	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-597	15-02230	0–0.5	Qbt 4	11-639	—	—	11-639	—	—	—	—	11-639	—
RE15-11-598	15-02230	0.5–1	Qbt 4	11-639	—	—	11-639	—	—	—	—	11-639	—
RE15-11-527	15-02231	3–4	Soil	11-310	—	—	11-310	—	—	—	—	11-310	—
AAB3298	15-02240	0–0.5	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-531	15-02240	3–4	Fill	11-310	—	—	11-310	—	—	—	—	11-310	—
RE15-11-530	15-02241	3–4	Fill	11-310	—	—	11-310	—	—	—	—	11-310	—
AAB3445	15-02246	0–0.5	Soil	18681	19509	—	—	—	—	—	—	—	19509
AAB3321	15-02277	0–0.42	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-565	15-02277	3–3.5	Qbt 4	11-535	—	11-536	11-536	11-537	—	—	—	11-535	—
RE15-11-525	15-02278	3–4	Qbt 4	11-310	—	—	11-310	—	—	—	—	11-310	—
AAB3525	15-02279	0–0.42	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-584	15-02279	0–1	Soil	11-598	—	—	11-598	—	—	—	—	11-598	—
RE15-11-585	15-02279	3–4	Qbt 4	11-598	—	—	11-598	—	—	—	—	11-598	—
AAB3325	15-02295	0–0.5	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-534	15-02295	3–4	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
AAB3480	15-02299	1.5–2	Soil	18681	19509	—	—	—	—	—	—	—	19509
RE15-11-563	15-02299	3–4	Qbt 4	11-535	—	—	11-536	—	—	—	—	11-535	—
RE15-11-671	15-613365	0–1	Fill	11-478	—	—	11-478	—	—	—	—	11-478	—

Table 6.5-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	Uranium	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Gamma Spectroscopy
RE15-11-672	15-613365	6–7	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-673	15-613365	9–10	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-604	15-613365	10.5–11	Qbt 4	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-674	15-613366	0–1	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-675	15-613366	6–7	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-676	15-613366	9–10	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-677	15-613367	0–1	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-678	15-613367	2–3	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-680	15-613368	0–1	Fill	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-681	15-613368	6–7	Fill	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-682	15-613368	9–10	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-683	15-613369	0–1	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-684	15-613369	6–7	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-685	15-613369	9–10	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-600	15-613369	11–12	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-686	15-613370	0–1	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-687	15-613370	6–7	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-688	15-613370	8–8.5	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-689	15-613371	0–1	Fill	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-690	15-613371	6–7	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-691	15-613371	9–10	Qbt 4	11-478	—	—	11-478	—	—	—	—	11-478	—
RE15-11-692	15-613372	0–1	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-693	15-613372	6–7	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—

Table 6.5-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	Uranium	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Gamma Spectroscopy
RE15-11-694	15-613372	9–10	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-603	15-613372	10.9–11.1	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-695	15-613373	0–1	Fill	11-483	—	—	11-483	—	—	—	—	11-483	—
RE15-11-696	15-613373	6–6.25	Fill	11-483	—	—	11-483	—	—	—	—	11-483	—
RE15-11-698	15-613374	0–1	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-699	15-613374	6–7	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-700	15-613374	8–8.5	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-701	15-613375	0–1	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-702	15-613375	6–7	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-703	15-613375	9–10	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-599	15-613375	11–12	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-704	15-613376	0–1	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-705	15-613376	6–7	Fill	11-479	—	—	11-479	—	—	—	—	11-479	—
RE15-11-706	15-613376	8.25–9.25	Qbt 4	11-479	—	—	11-479	—	—	—	—	11-479	—
RE15-11-601	15-613376	10–11	Qbt 4	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-707	15-613377	0–1	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-708	15-613377	3–3.5	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-710	15-613378	0–1	Fill	11-479	—	—	11-479	—	—	—	—	11-479	—
RE15-11-711	15-613378	6–7	Fill	11-479	—	—	11-479	—	—	—	—	11-479	—
RE15-11-712	15-613378	9–10	Fill	11-479	—	—	11-479	—	—	—	—	11-479	—
RE15-11-713	15-613379	0–1	Fill	11-479	—	—	11-479	—	—	—	—	11-479	—
RE15-11-714	15-613379	6–7	Fill	11-479	—	—	11-479	—	—	—	—	11-479	—
RE15-11-715	15-613379	9–10	Qbt 4	11-479	—	—	11-479	—	—	—	—	11-479	—

Table 6.5-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	Uranium	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Gamma Spectroscopy
RE15-11-716	15-613380	0–1	Fill	11-483	—	—	11-483	—	—	—	—	11-483	—
RE15-11-717	15-613380	6–7	Fill	11-483	—	—	11-483	—	—	—	—	11-483	—
RE15-11-718	15-613380	9–9.5	Fill	11-483	—	—	11-483	—	—	—	—	11-483	—
RE15-11-725	15-613381	0–1	Fill	11-480	—	11-480	11-480	11-573	—	—	—	11-480	—
RE15-11-720	15-613381	6–7	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-721	15-613381	9–10	Fill	11-480	—	—	11-480	—	—	—	—	11-480	—
RE15-11-602	15-613381	11–12	Fill	11-640	—	—	11-641	—	—	—	—	11-640	—
RE15-11-722	15-613382	0–1	Fill	11-479	—	—	11-479	—	—	—	—	11-479	—
RE15-11-723	15-613382	6–7	Fill	11-479	—	—	11-479	—	—	—	—	11-479	—
RE15-11-724	15-613382	9–10	Fill	11-479	—	—	11-479	—	—	—	—	11-479	—
RE15-11-728	15-613384	0–0.5	Sed	11-645	—	—	11-646	—	11-645	11-645	11-645	11-645	—
RE15-11-729	15-613384	0.5–1	Sed	11-645	—	—	11-646	—	11-645	11-645	11-645	11-645	—
RE15-11-730	15-613385	0–1	Sed	11-645	—	—	11-646	—	11-645	11-645	11-645	11-645	—
RE15-11-731	15-613385	1–1.5	Sed	11-645	—	—	11-646	—	11-645	11-645	11-645	11-645	—
RE15-11-732	15-613386	0–1	Sed	11-645	—	—	11-646	—	11-645	11-645	11-645	11-645	—
RE15-11-733	15-613386	1–2	Sed	11-645	—	—	11-646	—	11-645	11-645	11-645	11-645	—
RE15-11-734	15-613387	0–1	Sed	11-645	—	—	11-646	—	11-645	11-645	11-645	11-645	—
RE15-11-735	15-613387	2–3	Sed	11-645	—	—	11-646	—	11-645	11-645	11-645	11-645	—
RE15-11-736	15-613388	0–1	Sed	11-645	—	—	11-646	—	11-645	11-645	11-645	11-645	—
RE15-11-737	15-613388	1–1.5	Sed	11-645	—	—	11-646	—	11-645	11-645	11-645	11-645	—
RE15-11-740	15-613389	0–0.5	Sed	11-675	—	11-675	11-675	11-676	11-675	11-675	11-675	11-675	—
RE15-11-739	15-613389	0.5–1	Sed	11-708	—	—	11-708	—	11-708	11-708	11-708	11-708	—

* — = Analysis not requested.

Table 6.5-2
Inorganic Chemicals above BVs at SWMU 15-004(f)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**14500**	**11.2**	**1690**
Sediment BV[a]				**15400**	**0.83**	**3.98**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**13800**	**19.7**	**2370**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21500**	**22.3**	**4610**
Construction Worker SSL[b]				**41400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8850000**	**134[c]**	**36.6[d]**	**14200**	**248000**	**800**	**1550000**
Industrial SSL[b]				**1290000**	**519**	**21.5**	**255000**	**2580**	**1110**	**32400000**	**505[c]**	**350[e]**	**51900**	**908000**	**800**	**5680000**
Residential SSL[b]				**78000**	**31.3**	**4.25**	**15600**	**156**	**70.5**	**13000000**	**96.6[c]**	**23[e]**	**3130**	**54800**	**400**	**339000**
AAB3451	15-02100	1.5–2	Soil	—[f]	3.9 (U)	—	—	—	1 (U)	—	—	—	—	—	—	—
RE15-11-543	15-02100	3–4	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-542	15-02101	3–4	Soil	—	—	—	—	—	—	6750	—	—	—	—	—	—
AAB3461	15-02112	0–0.5	Soil	—	3.8 (U)	—	—	—	0.96 (U)	—	—	—	49.4	—	48.5	—
RE15-11-576	15-02113	0–1	Soil	—	—	—	—	—	—	—	—	—	16.2	—	—	—
RE15-11-577	15-02113	3–4	Qbt 4	—	—	—	83.8	—	—	2500	—	—	—	—	—	—
AAB3476	15-02114	0–0.5	Soil	—	3.7 (U)	—	—	—	1.1	—	—	—	17.3	—	—	—
RE15-11-541	15-02114	3–4	Qbt 4	11200	—	3.5	209 (J+)	—	—	—	15.6	7.2	6.2	—	13.2	2290 (J+)
RE15-11-555	15-02119	3–4	Qbt 4	—	—	—	89.8 (J+)	—	—	—	—	—	—	—	—	1720 (J+)
RE15-11-546	15-02123	3–4	Qbt 4	11600	—	3	102 (J+)	—	—	2720	8.2	3.2	5.2	15100	11.3	2450 (J+)
RE15-11-539	15-02125	3–4	Qbt 4	—	0.51 (U)	2.9	52.5 (J+)	—	—	—	10.2	—	—	—	—	—
AAB3340	15-02127	1.5–2	Soil	—	4 (U)	—	—	—	1 (U)	—	—	—	—	—	—	—
RE15-11-593	15-02132	1–2	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—
AAB3332	15-02137	1.5–2	Soil	30700	4 (U)	—	650	—	1 (U)	10000	—	11.1 (U)	—	—	—	—
RE15-11-538	15-02137	3–4	Qbt 4	—	0.52 (U)	—	115	—	—	—	11.9	—	—	—	—	—
RE15-11-557	15-02139	3–4	Qbt 4	—	0.51 (U)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-554	15-02141	3–3.5	Qbt 4	—	0.52 (U)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-596	15-02142	1–2	Qbt 3	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-550	15-02144	3–4	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-575	15-02148	3–4	Qbt 4	—	—	—	67.4	—	—	3450	—	—	—	—	—	—
RE15-11-529	15-02149	3–4	Qbt 4	—	0.55 (U)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-582	15-02150	0–1	Soil	—	—	—	—	—	—	—	—	—	17.5	—	—	—
RE15-11-583	15-02150	3–4	Qbt 4	11600 (J+)	—	3.5	113	—	—	7320	12.5	—	5.6	14900	—	2420
RE15-11-536	15-02152	3–4	Qbt 4	—	0.51 (U)	—	53.6	—	—	8860 (J)	14.7	—	—	—	—	—
AAB3304	15-02153	1–1	Soil	—	3.9 (U)	—	—	—	0.79 (U)	—	—	—	—	—	—	—
RE15-11-558	15-02153	3–4	Qbt 4	—	0.51 (U)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-551	15-02155	3–3.5	Qbt 4	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-587	15-02156	3–4	Qbt 4	7950	—	—	104 (J+)	—	—	5340	20.7	—	5.5	—	—	2030 (J+)
RE15-11-549	15-02157	3–4	Soil	—	—	—	—	—	—	7160	—	—	—	—	—	—
RE15-11-581	15-02162	3–4	Qbt 4	—	—	—	63.1	—	—	2770	—	—	—	—	—	—
AAB3342	15-02166	0–0.33	Soil	—	3.7 (U)	—	—	—	0.68 (U)	—	—	—	15.4	—	—	—

Table 6.5-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**14500**	**11.2**	**1690**
Sediment BV[a]				**15400**	**0.83**	**3.98**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**13800**	**19.7**	**2370**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21500**	**22.3**	**4610**
Construction Worker SSL[b]				**41400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8850000**	**134[c]**	**36.6[d]**	**14200**	**248000**	**800**	**1550000**
Industrial SSL[b]				**1290000**	**519**	**21.5**	**255000**	**2580**	**1110**	**32400000**	**505[c]**	**350[e]**	**51900**	**908000**	**800**	**5680000**
Residential SSL[b]				**78000**	**31.3**	**4.25**	**15600**	**156**	**70.5**	**13000000**	**96.6[c]**	**23[e]**	**3130**	**54800**	**400**	**339000**
RE15-11-552	15-02166	3–3.5	Qbt 4	—	0.51 (U)	—	—	—	—	—	35.5	—	—	—	—	—
RE15-11-553	15-02167	3–3.5	Qbt 4	—	—	—	51.4 (J+)	—	—	—	—	—	—	—	—	1710 (J+)
RE15-11-526	15-02170	3–4	Qbt 4	—	0.53 (U)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-578	15-02171	0–1	Soil	—	—	—	307	—	—	—	—	—	18.8	—	—	—
RE15-11-579	15-02171	1–2	Qbt 4	—	—	—	47	—	—	—	—	—	—	—	—	—
AAB3477	15-02172	1.5–2	Soil	—	4.3 (U)	—	—	—	1 (U)	—	—	—	—	—	—	—
RE15-11-528	15-02172	3–4	Qbt 4	—	0.54 (U)	—	75.5	—	—	—	—	—	—	—	—	—
RE15-11-532	15-02173	3–4	Qbt 4	—	0.54 (U)	—	70.5	—	—	—	9	—	—	—	—	—
RE15-11-560	15-02177	3–3.5	Qbt 3	—	0.51 (U)	—	—	—	—	—	21.8	—	—	—	—	—
AAB3336	15-02178	0–0.5	Soil	—	3.7 (U)	—	—	—	0.6 (U)	—	—	—	—	—	—	—
RE15-11-559	15-02178	3–3.5	Qbt 3	—	0.51 (U)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-561	15-02179	3–3.5	Qbt 4	—	0.53 (U)	—	154	—	—	6640	—	—	—	—	—	—
RE15-11-524	15-02180	3–4	Qbt 4	—	—	—	67.8	—	—	13300 (J)	10.1	—	—	—	—	—
AAB3470	15-02182	1.5–2	Soil	—	4 (U)	—	387	—	1.2	—	—	—	—	—	—	—
RE15-11-523	15-02191	3–4	Qbt 4	—	—	—	—	—	—	—	9.7	—	—	—	—	—
AAB3485	15-02198	0–0.5	Soil	—	3.7 (U)	—	—	—	0.87 (U)	—	—	—	—	—	23.3	—
RE15-11-594	15-02203	3–4	Qbt 4	—	—	—	—	—	—	—	9.8	—	—	—	—	—
AAB3295	15-02206	0–0.33	Soil	—	3.7 (U)	—	—	—	0.78 (U)	—	—	—	—	—	—	—
RE15-11-562	15-02206	3–3.5	Qbt 3	—	0.51 (U)	—	—	—	—	—	27.8	—	—	—	—	—
RE15-11-537	15-02226	3–4	Qbt 4	—	0.52 (U)	—	—	—	—	—	9.9	—	—	—	—	—
RE15-11-533	15-02228	3–4	Qbt 4	—	—	—	—	—	—	—	—	—	4.7	—	—	—
RE15-11-588	15-02229	0–1	Soil	—	—	—	—	—	—	—	—	—	62.1	—	—	—
RE15-11-589	15-02229	1–2	Qbt 4	—	—	—	—	—	—	—	—	—	4.8	—	—	—
RE15-11-597	15-02230	0–0.5	Qbt 4	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-598	15-02230	0.5–1	Qbt 4	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-527	15-02231	3–4	Soil	—	—	—	—	—	—	—	22.2	—	—	—	—	—
AAB3298	15-02240	0–0.5	Soil	—	3.9 (U)	—	—	—	0.76 (U)	—	—	—	53.1	—	—	—
RE15-11-531	15-02240	3–4	Fill	—	—	—	—	—	—	7090 (J)	—	—	—	—	—	—
RE15-11-530	15-02241	3–4	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 6.5-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**14500**	**11.2**	**1690**
Sediment BV[a]				**15400**	**0.83**	**3.98**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**13800**	**19.7**	**2370**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21500**	**22.3**	**4610**
Construction Worker SSL[b]				**41400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8850000**	**134[c]**	**36.6[d]**	**14200**	**248000**	**800**	**1550000**
Industrial SSL[b]				**1290000**	**519**	**21.5**	**255000**	**2580**	**1110**	**32400000**	**505[c]**	**350[e]**	**51900**	**908000**	**800**	**5680000**
Residential SSL[b]				**78000**	**31.3**	**4.25**	**15600**	**156**	**70.5**	**13000000**	**96.6[c]**	**23[e]**	**3130**	**54800**	**400**	**339000**
AAB3445	15-02246	0–0.5	Soil	—	3.9 (U)	—	—	2.5	0.43 (U)	—	—	—	147	—	23.6	—
AAB3321	15-02277	0–0.42	Soil	—	3.8 (U)	—	—	—	3.2	—	—	—	43.9	—	91.2	—
RE15-11-565	15-02277	3–3.5	Qbt 4	—	0.51 (U)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-525	15-02278	3–4	Qbt 4	—	0.52 (U)	—	—	—	—	—	—	—	—	—	—	—
AAB3525	15-02279	0–0.42	Soil	—	3.7 (U)	—	—	—	1.4	—	—	—	22.2	—	30.1	—
RE15-11-585	15-02279	3–4	Qbt 4	—	—	—	—	—	—	—	15.7	—	—	—	—	—
AAB3325	15-02295	0–0.5	Soil	—	3.7 (U)	—	—	—	1 (U)	—	—	—	40.9	—	—	—
RE15-11-534	15-02295	3–4	Qbt 4	—	0.53 (U)	—	92.1	—	—	5840 (J)	7.9	—	—	—	—	—
AAB3480	15-02299	1.5–2	Soil	—	4 (U)	—	315	—	0.98 (U)	—	—	—	—	—	—	—
RE15-11-563	15-02299	3–4	Qbt 4	—	0.52 (U)	—	—	—	—	—	—	—	—	—	—	—
RE15-11-671	15-613365	0–1	Fill	—	5.4	—	755	7.9	3.8	—	31.2	—	8250	—	177	—
RE15-11-672	15-613365	6–7	Qbt 4	—	0.54 (U)	—	—	1.7	—	—	—	—	95.8	—	—	—
RE15-11-673	15-613365	9–10	Qbt 4	—	0.54 (U)	4.4	51.9	—	—	—	8.2	—	27.7	—	—	2170 (J+)
RE15-11-604	15-613365	10.5–11	Qbt 4	—	1.2 (J)	—	82.5 (J+)	1.8	—	—	8.5	8.6	485	—	13.2	—
RE15-11-674	15-613366	0–1	Fill	—	—	—	—	—	—	—	—	9.6	40.9	—	—	—
RE15-11-675	15-613366	6–7	Fill	—	—	—	307 (J+)	—	0.43	—	—	9.4	88.4	—	23.3	—
RE15-11-676	15-613366	9–10	Fill	—	—	—	—	—	0.82	—	—	9.4	3540	—	22.5	—
RE15-11-677	15-613367	0–1	Fill	—	10.4	—	296 (J+)	42.1	12.9	—	—	—	8140	—	375	—
RE15-11-678	15-613367	2–3	Fill	—	6.6	—	344 (J+)	18.9	9.9	6140	—	—	1250	—	140	—
RE15-11-680	15-613368	0–1	Fill	—	17.5	—	365	18.7	1.2	—	—	—	423	—	43.2	—
RE15-11-681	15-613368	6–7	Fill	—	—	—	—	—	—	7030 (J)	—	—	20.6	—	—	—
RE15-11-682	15-613368	9–10	Qbt 4	—	0.6	—	—	—	—	—	—	—	16.2	—	—	—
RE15-11-683	15-613369	0–1	Fill	—	—	—	296 (J+)	—	—	—	—	—	24	—	—	—
RE15-11-684	15-613369	6–7	Fill	—	—	—	—	—	0.51	—	—	8.9	49.1	—	23.3	—
RE15-11-685	15-613369	9–10	Fill	—	—	—	—	—	0.84	—	—	—	92.9	—	23.3	—
RE15-11-600	15-613369	11–12	Fill	—	—	—	—	—	—	—	—	16.8	26.7	—	22.5	—
RE15-11-686	15-613370	0–1	Fill	—	—	—	—	—	—	—	—	—	37.6	—	—	—
RE15-11-687	15-613370	6–7	Fill	—	—	—	471 (J+)	—	1.7	—	—	—	108000	—	25.7	—
RE15-11-688	15-613370	8–8.5	Fill	—	—	—	675 (J+)	—	3.5	—	21.2	9	637	—	51.6	—

Table 6.5-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**14500**	**11.2**	**1690**
Sediment BV[a]				**15400**	**0.83**	**3.98**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**13800**	**19.7**	**2370**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21500**	**22.3**	**4610**
Construction Worker SSL[b]				**41400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8850000**	**134[c]**	**36.6[d]**	**14200**	**248000**	**800**	**1550000**
Industrial SSL[b]				**1290000**	**519**	**21.5**	**255000**	**2580**	**1110**	**32400000**	**505[c]**	**350[e]**	**51900**	**908000**	**800**	**5680000**
Residential SSL[b]				**78000**	**31.3**	**4.25**	**15600**	**156**	**70.5**	**13000000**	**96.6[c]**	**23[e]**	**3130**	**54800**	**400**	**339000**
RE15-11-689	15-613371	0–1	Fill	—	2.2	—	379	20.4	1.2	—	—	—	281	—	48.5	—
RE15-11-690	15-613371	6–7	Qbt 4	—	0.52 (U)	—	57	—	—	—	—	—	284	—	—	—
RE15-11-691	15-613371	9–10	Qbt 4	—	0.51 (U)	—	—	—	—	—	—	—	6.6	—	—	—
RE15-11-692	15-613372	0–1	Fill	—	—	—	—	—	—	—	—	—	42.6	—	—	—
RE15-11-693	15-613372	6–7	Fill	—	—	—	297 (J+)	—	0.42	—	—	9	61.3	—	—	—
RE15-11-694	15-613372	9–10	Fill	—	—	—	311 (J+)	—	0.45	—	—	8.8	49.7	—	25.7	—
RE15-11-603	15-613372	10.9–11.1	Fill	—	—	—	—	—	0.87	—	—	—	79.8	—	—	—
RE15-11-695	15-613373	0–1	Fill	—	—	—	—	—	—	—	—	—	47.3 (J-)	—	—	—
RE15-11-696	15-613373	6–6.25	Fill	—	—	—	375	—	0.55	—	—	—	119 (J-)	—	88.9	—
RE15-11-698	15-613374	0–1	Fill	—	—	—	339 (J+)	—	—	—	—	—	313	—	—	—
RE15-11-699	15-613374	6–7	Fill	—	—	—	—	—	—	—	—	—	112	—	—	—
RE15-11-700	15-613374	8–8.5	Fill	—	—	—	857 (J+)	—	44.9	—	—	—	3970	—	87.8	—
RE15-11-701	15-613375	0–1	Fill	—	—	—	—	—	—	—	—	—	106	—	—	—
RE15-11-702	15-613375	6–7	Fill	—	—	—	409 (J+)	—	—	—	—	—	—	—	—	—
RE15-11-703	15-613375	9–10	Fill	—	—	—	390 (J+)	—	0.43	—	—	—	69.2	—	23.7	—
RE15-11-599	15-613375	11–12	Fill	—	—	—	—	—	0.57	—	—	—	39.2	—	—	—
RE15-11-704	15-613376	0–1	Fill	—	1 (J)	—	439 (J+)	2	1.1	—	—	—	626	—	30.9	—
RE15-11-705	15-613376	6–7	Fill	—	—	—	—	—	—	—	—	—	35.2 (J)	—	—	—
RE15-11-706	15-613376	8.25–9.25	Qbt 4	11600	0.54	2.8	195	—	—	2260	13.6	5	526 (J)	—	15.7	1870
RE15-11-601	15-613376	10–11	Qbt 4	—	—	—	79.1 (J+)	—	—	—	9	—	189	—	—	—
RE15-11-707	15-613377	0–1	Fill	—	—	—	337 (J+)	—	0.45	—	—	—	119	—	25.5	—
RE15-11-708	15-613377	3–3.5	Fill	—	—	—	—	—	0.51	—	26.6	9.7	113	—	41.9	—
RE15-11-710	15-613378	0–1	Fill	—	—	—	—	—	—	—	—	—	41.8 (J)	—	—	—
RE15-11-711	15-613378	6–7	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-713	15-613379	0–1	Fill	—	1.3	—	—	2	0.58	—	—	—	94.9 (J)	—	28.9	—
RE15-11-714	15-613379	6–7	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-715	15-613379	9–10	Qbt 4	9040	0.52 (U)	3.8	78.7	—	—	2370	7.5	—	4.7 (J)	—	—	2350
RE15-11-716	15-613380	0–1	Fill	—	0.89	—	—	3.7	0.97	—	—	—	141 (J-)	—	33.5	—
RE15-11-717	15-613380	6–7	Fill	—	—	—	308	—	0.59	—	20.6	9.6	160 (J-)	—	25.1	—

Table 6.5-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**14500**	**11.2**	**1690**
Sediment BV[a]				**15400**	**0.83**	**3.98**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**13800**	**19.7**	**2370**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21500**	**22.3**	**4610**
Construction Worker SSL[b]				**41400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8850000**	**134[c]**	**36.6[d]**	**14200**	**248000**	**800**	**1550000**
Industrial SSL[b]				**1290000**	**519**	**21.5**	**255000**	**2580**	**1110**	**32400000**	**505[c]**	**350[e]**	**51900**	**908000**	**800**	**5680000**
Residential SSL[b]				**78000**	**31.3**	**4.25**	**15600**	**156**	**70.5**	**13000000**	**96.6[c]**	**23[e]**	**3130**	**54800**	**400**	**339000**
RE15-11-718	15-613380	9–9.5	Fill	—	—	—	658	—	2.1	—	23.9	—	255 (J-)	—	112	—
RE15-11-725	15-613381	0–1	Fill	—	2.1 (J)	—	537 (J+)	2.4	0.68	—	—	—	356	—	50.1	—
RE15-11-720	15-613381	6–7	Fill	—	—	—	—	—	—	—	—	—	137	—	—	—
RE15-11-721	15-613381	9–10	Fill	—	—	—	359 (J+)	—	0.79	—	—	9	168	—	89.8	—
RE15-11-602	15-613381	11–12	Fill	—	—	—	—	—	—	—	—	9.8	—	—	—	—
RE15-11-722	15-613382	0–1	Fill	—	—	—	550	—	0.87	—	—	—	135 (J)	—	26.8	—
RE15-11-723	15-613382	6–7	Fill	—	—	—	327	—	—	6180	—	9.1	15.6 (J)	—	—	—
RE15-11-724	15-613382	9–10	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-728	15-613384	0–0.5	Sed	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-729	15-613384	0.5–1	Sed	—	—	—	—	—	—	—	—	—	14.4	—	—	—
RE15-11-730	15-613385	0–1	Sed	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-731	15-613385	1–1.5	Sed	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-732	15-613386	0–1	Sed	—	—	—	160	—	—	—	—	—	51.5	—	—	—
RE15-11-733	15-613386	1–2	Sed	—	—	—	—	—	—	—	—	—	39.2	—	—	—
RE15-11-734	15-613387	0–1	Sed	—	—	—	158	—	—	—	—	6.2	12.1	—	—	—
RE15-11-735	15-613387	2–3	Sed	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-736	15-613388	0–1	Sed	—	—	—	150	—	—	—	—	6.2	19.6	—	—	—
RE15-11-737	15-613388	1–1.5	Sed	—	—	—	149	—	—	—	—	5.7	—	—	—	—
RE15-11-740	15-613389	0–0.5	Sed	—	—	—	—	—	—	—	—	—	587	—	—	—
RE15-11-739	15-613389	0.5–1	Sed	—	—	—	154	1.9	0.48	—	—	—	177	—	—	—

Table 6.5-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Manganese	Mercury	Nickel	Nitrate	Potassium	Selenium	Silver	Sodium	Thallium	Uranium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**482**	**0.1**	**6.58**	**na[g]**	**3500**	**0.3**	**1**	**2770**	**1.1**	**2.4**	**17**	**63.5**
Sediment BV[a]				**543**	**0.1**	**9.38**	**na**	**2690**	**0.3**	**1**	**1470**	**0.73**	**na**	**19.7**	**60.2**
Soil BV[a]				**671**	**0.1**	**15.4**	**na**	**3460**	**1.52**	**1**	**915**	**0.73**	**1.82**	**39.6**	**48.8**
Construction Worker SSL[b]				**464**	**77.1**	**753**	**566000**	**19900000**	**1750**	**1770**	**9730000**	**3.54**	**277**	**614**	**106000**
Industrial SSL[b]				**160000**	**389**	**25700**	**2080000**	**73000000**	**6490**	**6490**	**35700000**	**13**	**3880**	**6530**	**389000**
Residential SSL[b]				**10500**	**23.5**	**1560**	**125000**	**15600000**	**391**	**391**	**7820000**	**0.782**	**234**	**394**	**23500**
AAB3451	15-02100	1.5–2	Soil	—	0.11 (U)	—	NA[h]	—	—	—	—	—	3.17	—	—
RE15-11-543	15-02100	3–4	Soil	—	—	—	NA	—	2	—	—	—	NA	—	—
RE15-11-542	15-02101	3–4	Soil	—	—	—	NA	—	—	—	—	—	NA	—	—
AAB3461	15-02112	0–0.5	Soil	—	0.27 (J)	—	NA	—	—	—	—	—	66.3	—	—
RE15-11-576	15-02113	0–1	Soil	—	2.3	—	NA	—	—	—	—	—	NA	—	—
RE15-11-577	15-02113	3–4	Qbt 4	—	—	—	NA	—	1.6	—	—	—	NA	—	—
AAB3476	15-02114	0–0.5	Soil	—	0.65 (J)	—	NA	—	—	—	—	—	21.1	—	—
RE15-11-541	15-02114	3–4	Qbt 4	—	—	9.9	NA	—	1.2	—	—	—	NA	22.8	—
RE15-11-555	15-02119	3–4	Qbt 4	—	—	—	NA	—	2	—	—	—	NA	—	—
RE15-11-546	15-02123	3–4	Qbt 4	—	—	9.5	NA	—	2.3	—	—	—	NA	—	—
RE15-11-539	15-02125	3–4	Qbt 4	—	—	7.4	NA	—	2.6	—	—	—	NA	—	—
AAB3340	15-02127	1.5–2	Soil	—	—	—	NA	—	—	—	—	—	3.93	—	—
RE15-11-593	15-02132	1–2	Qbt 3	—	—	—	NA	—	1.7	—	—	—	NA	—	—
AAB3332	15-02137	1.5–2	Soil	—	0.14 (J)	—	NA	—	—	—	1340 (J)	—	6.47	—	—
RE15-11-538	15-02137	3–4	Qbt 4	—	—	8.5	NA	—	2.1	—	—	—	NA	—	—
RE15-11-557	15-02139	3–4	Qbt 4	—	—	—	NA	—	1.5	—	—	—	NA	—	—
RE15-11-554	15-02141	3–3.5	Qbt 4	—	—	—	NA	—	2.7	—	—	—	NA	—	—
RE15-11-596	15-02142	1–2	Qbt 3	—	—	—	NA	—	1.4	—	—	—	NA	—	—
RE15-11-550	15-02144	3–4	Soil	—	—	—	NA	—	2.2	—	—	—	NA	—	—
RE15-11-575	15-02148	3–4	Qbt 4	—	—	7 (J)	NA	—	1.3	—	—	—	NA	—	—
RE15-11-529	15-02149	3–4	Qbt 4	—	—	—	NA	—	3.6	—	—	—	NA	—	—
RE15-11-582	15-02150	0–1	Soil	—	—	—	NA	—	—	—	—	—	NA	—	—
RE15-11-583	15-02150	3–4	Qbt 4	—	—	10.7	NA	—	1.1	—	—	—	NA	—	—
RE15-11-536	15-02152	3–4	Qbt 4	—	—	9.6	NA	—	2	—	—	—	NA	—	—
AAB3304	15-02153	1–1	Soil	—	0.28 (J)	—	NA	—	—	—	—	—	21.7	—	—
RE15-11-558	15-02153	3–4	Qbt 4	—	—	—	NA	—	1.2	—	—	—	NA	—	—
RE15-11-551	15-02155	3–3.5	Qbt 4	—	—	—	NA	—	2.2	—	—	—	NA	—	—
RE15-11-587	15-02156	3–4	Qbt 4	—	—	13.1	NA	—	1.6	—	—	—	NA	—	—
RE15-11-549	15-02157	3–4	Soil	—	—	—	NA	—	2.4	—	—	—	NA	—	—
RE15-11-580	15-02162	0–1	Soil	824	—	—	NA	—	1.8	—	—	—	NA	—	—
RE15-11-581	15-02162	3–4	Qbt 4	—	—	—	NA	—	1.3	—	—	—	NA	—	—
AAB3342	15-02166	0–0.33	Soil	—	—	—	NA	—	—	—	—	—	49.2	—	—

Table 6.5-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Manganese	Mercury	Nickel	Nitrate	Potassium	Selenium	Silver	Sodium	Thallium	Uranium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**482**	**0.1**	**6.58**	**na[g]**	**3500**	**0.3**	**1**	**2770**	**1.1**	**2.4**	**17**	**63.5**
Sediment BV[a]				**543**	**0.1**	**9.38**	**na**	**2690**	**0.3**	**1**	**1470**	**0.73**	**na**	**19.7**	**60.2**
Soil BV[a]				**671**	**0.1**	**15.4**	**na**	**3460**	**1.52**	**1**	**915**	**0.73**	**1.82**	**39.6**	**48.8**
Construction Worker SSL[b]				**464**	**77.1**	**753**	**566000**	**19900000**	**1750**	**1770**	**9730000**	**3.54**	**277**	**614**	**106000**
Industrial SSL[b]				**160000**	**389**	**25700**	**2080000**	**73000000**	**6490**	**6490**	**35700000**	**13**	**3880**	**6530**	**389000**
Residential SSL[b]				**10500**	**23.5**	**1560**	**125000**	**15600000**	**391**	**391**	**7820000**	**0.782**	**234**	**394**	**23500**
RE15-11-552	15-02166	3–3.5	Qbt 4	—	—	18.8	NA	—	3.1	—	—	—	NA	—	—
RE15-11-553	15-02167	3–3.5	Qbt 4	—	—	6.9	NA	—	1.7	—	—	—	NA	—	—
RE15-11-526	15-02170	3–4	Qbt 4	—	0.561	—	NA	—	1.5	—	—	—	NA	—	—
RE15-11-578	15-02171	0–1	Soil	—	0.182	—	NA	—	—	—	1030	—	NA	—	—
RE15-11-579	15-02171	1–2	Qbt 4	—	—	—	NA	—	1.3	—	—	—	NA	—	—
AAB3477	15-02172	1.5–2	Soil	—	0.11 (U)	—	NA	—	—	—	1240 (J)	0.75 (U)	10.3	—	—
RE15-11-528	15-02172	3–4	Qbt 4	—	—	—	NA	—	2.5	—	—	—	NA	—	—
RE15-11-532	15-02173	3–4	Qbt 4	—	—	8.3	NA	—	1.8	—	—	—	NA	—	—
RE15-11-560	15-02177	3–3.5	Qbt 3	—	—	10.9	NA	—	1.8	—	—	—	NA	—	—
AAB3336	15-02178	0–0.5	Soil	—	0.53 (J)	—	NA	—	—	—	—	—	46.1	—	—
RE15-11-559	15-02178	3–3.5	Qbt 3	—	—	—	NA	—	1.6	—	—	—	NA	—	—
RE15-11-561	15-02179	3–3.5	Qbt 4	—	—	—	NA	—	1.1	—	—	—	NA	—	—
RE15-11-524	15-02180	3–4	Qbt 4	—	0.664	7.7	NA	—	1.1	—	—	—	NA	—	—
AAB3470	15-02182	1.5–2	Soil	—	1.8 (J)	—	NA	3940	—	—	1290 (J)	—	15.2	—	—
RE15-11-523	15-02191	3–4	Qbt 4	—	—	—	NA	—	1.6	—	—	—	NA	—	—
AAB3485	15-02198	0–0.5	Soil	—	—	—	NA	—	—	—	—	—	21.6	—	—
RE15-11-594	15-02203	3–4	Qbt 4	—	—	—	NA	—	1.1	—	—	—	NA	—	—
AAB3295	15-02206	0–0.33	Soil	—	0.11 (J)	—	NA	—	—	—	—	—	12.1	—	—
RE15-11-562	15-02206	3–3.5	Qbt 3	—	—	13.4	NA	—	1.7	—	—	—	NA	—	—
RE15-11-537	15-02226	3–4	Qbt 4	—	—	—	NA	—	1.8	—	—	—	NA	—	—
RE15-11-533	15-02228	3–4	Qbt 4	—	—	—	NA	—	1.8	—	—	1.3	NA	—	—
RE15-11-588	15-02229	0–1	Soil	—	—	—	NA	—	—	—	—	—	NA	—	—
RE15-11-589	15-02229	1–2	Qbt 4	—	—	—	NA	—	1.1	—	—	—	NA	—	—
RE15-11-597	15-02230	0–0.5	Qbt 4	—	—	—	NA	—	1.4	—	—	—	NA	—	—
RE15-11-598	15-02230	0.5–1	Qbt 4	—	—	—	NA	—	1.8	—	—	—	NA	—	—
RE15-11-527	15-02231	3–4	Soil	—	—	—	NA	—	1.6	—	—	—	NA	—	—
AAB3298	15-02240	0–0.5	Soil	—	0.21 (J)	—	NA	—	—	—	—	—	47.5	—	—
RE15-11-531	15-02240	3–4	Fill	—	0.101	—	NA	—	—	—	—	—	NA	—	—
RE15-11-530	15-02241	3–4	Fill	—	0.722	—	NA	—	—	—	—	—	NA	—	—

Table 6.5-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Manganese	Mercury	Nickel	Nitrate	Potassium	Selenium	Silver	Sodium	Thallium	Uranium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**482**	**0.1**	**6.58**	**na[g]**	**3500**	**0.3**	**1**	**2770**	**1.1**	**2.4**	**17**	**63.5**
Sediment BV[a]				**543**	**0.1**	**9.38**	**na**	**2690**	**0.3**	**1**	**1470**	**0.73**	**na**	**19.7**	**60.2**
Soil BV[a]				**671**	**0.1**	**15.4**	**na**	**3460**	**1.52**	**1**	**915**	**0.73**	**1.82**	**39.6**	**48.8**
Construction Worker SSL[b]				**464**	**77.1**	**753**	**566000**	**19900000**	**1750**	**1770**	**9730000**	**3.54**	**277**	**614**	**106000**
Industrial SSL[b]				**160000**	**389**	**25700**	**2080000**	**73000000**	**6490**	**6490**	**35700000**	**13**	**3880**	**6530**	**389000**
Residential SSL[b]				**10500**	**23.5**	**1560**	**125000**	**15600000**	**391**	**391**	**7820000**	**0.782**	**234**	**394**	**23500**
AAB3445	15-02246	0–0.5	Soil	—	0.11 (U)	—	NA	—	—	—	—	—	2763	—	52.1
AAB3321	15-02277	0–0.42	Soil	—	0.11 (U)	—	NA	—	—	—	—	—	41.1	—	—
RE15-11-565	15-02277	3–3.5	Qbt 4	—	—	—	NA	—	1.2	—	—	—	NA	—	—
RE15-11-525	15-02278	3–4	Qbt 4	—	—	—	NA	—	1.3	—	—	—	NA	—	—
AAB3525	15-02279	0–0.42	Soil	—	—	—	NA	—	—	—	—	—	39.1	—	—
RE15-11-585	15-02279	3–4	Qbt 4	—	—	8.4	NA	—	1	—	—	—	NA	—	—
AAB3325	15-02295	0–0.5	Soil	—	—	—	NA	—	—	4.1 (J)	—	—	190	—	—
RE15-11-534	15-02295	3–4	Qbt 4	—	—	7.4	NA	—	1.8	—	—	—	NA	—	—
AAB3480	15-02299	1.5–2	Soil	—	0.11 (U)	—	NA	—	—	—	1160 (J)	—	12.7	—	—
RE15-11-563	15-02299	3–4	Qbt 4	—	—	—	NA	—	1.4	—	—	—	NA	—	—
RE15-11-671	15-613365	0–1	Fill	—	—	27.5	NA	—	—	8.4	—	—	NA	—	520
RE15-11-672	15-613365	6–7	Qbt 4	—	—	—	NA	—	1.7	—	—	—	NA	—	—
RE15-11-673	15-613365	9–10	Qbt 4	—	—	9.6	NA	—	2.6	—	—	—	NA	—	—
RE15-11-604	15-613365	10.5–11	Qbt 4	—	—	8.6	NA	—	1.5	2.9	—	—	NA	—	—
RE15-11-674	15-613366	0–1	Fill	—	—	—	NA	—	1.8	—	—	—	NA	—	49.9
RE15-11-675	15-613366	6–7	Fill	—	—	—	NA	—	2	—	—	—	NA	—	—
RE15-11-676	15-613366	9–10	Fill	—	—	—	NA	—	1.6	—	—	—	NA	—	51.6
RE15-11-677	15-613367	0–1	Fill	—	—	18.1	NA	—	—	25.5	—	—	NA	—	716
RE15-11-678	15-613367	2–3	Fill	—	—	15.5	NA	—	—	13.8	—	—	NA	—	173
RE15-11-680	15-613368	0–1	Fill	—	—	—	NA	—	1.8	1.3	—	—	NA	—	75.9
RE15-11-681	15-613368	6–7	Fill	—	—	—	NA	—	1.9	—	—	—	NA	—	—
RE15-11-682	15-613368	9–10	Qbt 4	—	—	—	NA	—	1.5	—	—	—	NA	—	—
RE15-11-683	15-613369	0–1	Fill	—	—	—	NA	—	1.6	—	—	—	NA	—	—
RE15-11-684	15-613369	6–7	Fill	—	—	—	NA	—	1.8	—	—	—	NA	—	52.7
RE15-11-685	15-613369	9–10	Fill	—	—	—	NA	—	1.9	—	—	—	NA	—	53.1
RE15-11-600	15-613369	11–12	Fill	893	—	—	NA	—	—	—	—	—	NA	—	—
RE15-11-686	15-613370	0–1	Fill	—	—	—	NA	—	—	—	—	—	NA	—	—
RE15-11-687	15-613370	6–7	Fill	—	—	—	NA	—	—	8.4	—	—	NA	—	55.8
RE15-11-688	15-613370	8–8.5	Fill	726	—	15.6	NA	—	1.7	—	—	—	NA	—	114

Table 6.5-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Manganese	Mercury	Nickel	Nitrate	Potassium	Selenium	Silver	Sodium	Thallium	Uranium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**482**	**0.1**	**6.58**	**na[g]**	**3500**	**0.3**	**1**	**2770**	**1.1**	**2.4**	**17**	**63.5**
Sediment BV[a]				**543**	**0.1**	**9.38**	**na**	**2690**	**0.3**	**1**	**1470**	**0.73**	**na**	**19.7**	**60.2**
Soil BV[a]				**671**	**0.1**	**15.4**	**na**	**3460**	**1.52**	**1**	**915**	**0.73**	**1.82**	**39.6**	**48.8**
Construction Worker SSL[b]				**464**	**77.1**	**753**	**566000**	**19900000**	**1750**	**1770**	**9730000**	**3.54**	**277**	**614**	**106000**
Industrial SSL[b]				**160000**	**389**	**25700**	**2080000**	**73000000**	**6490**	**6490**	**35700000**	**13**	**3880**	**6530**	**389000**
Residential SSL[b]				**10500**	**23.5**	**1560**	**125000**	**15600000**	**391**	**391**	**7820000**	**0.782**	**234**	**394**	**23500**
RE15-11-689	15-613371	0–1	Fill	—	—	17.7	NA	—	—	—	—	—	NA	—	80.1
RE15-11-690	15-613371	6–7	Qbt 4	—	—	—	NA	—	1.9	—	—	—	NA	—	—
RE15-11-691	15-613371	9–10	Qbt 4	—	—	—	NA	—	2	—	—	—	NA	—	—
RE15-11-692	15-613372	0–1	Fill	—	—	—	NA	—	1.8	—	—	—	NA	—	—
RE15-11-693	15-613372	6–7	Fill	—	—	—	NA	—	2	—	—	—	NA	—	49.1
RE15-11-694	15-613372	9–10	Fill	—	—	—	NA	—	2	—	—	—	NA	—	—
RE15-11-603	15-613372	10.9–11.1	Fill	—	—	—	NA	—	1.8	—	—	—	NA	—	—
RE15-11-695	15-613373	0–1	Fill	—	—	—	NA	—	1.9	—	—	—	NA	—	—
RE15-11-696	15-613373	6–6.25	Fill	—	—	—	NA	—	2.2	—	—	—	NA	—	56.1
RE15-11-698	15-613374	0–1	Fill	—	—	—	NA	—	—	—	—	—	NA	—	51.2
RE15-11-699	15-613374	6–7	Fill	—	—	—	NA	—	1.6	—	—	—	NA	—	—
RE15-11-700	15-613374	8–8.5	Fill	—	—	—	NA	—	—	—	—	—	NA	—	349
RE15-11-701	15-613375	0–1	Fill	—	—	—	NA	—	—	—	—	—	NA	—	—
RE15-11-702	15-613375	6–7	Fill	—	—	—	NA	—	1.6	—	—	—	NA	—	—
RE15-11-703	15-613375	9–10	Fill	—	0.342	—	NA	—	1.6	—	—	—	NA	—	—
RE15-11-599	15-613375	11–12	Fill	—	—	—	NA	—	—	—	—	—	NA	—	—
RE15-11-704	15-613376	0–1	Fill	—	—	—	NA	—	1.7	—	—	—	NA	—	71.9
RE15-11-705	15-613376	6–7	Fill	—	—	—	NA	—	1.9 (J)	—	—	—	NA	—	—
RE15-11-706	15-613376	8.25–9.25	Qbt 4	—	—	10.1	NA	—	1.8 (J)	—	—	—	NA	20.8	—
RE15-11-601	15-613376	10–11	Qbt 4	—	—	—	NA	—	1.5	—	—	—	NA	—	—
RE15-11-707	15-613377	0–1	Fill	—	—	—	NA	—	1.6	—	—	—	NA	—	—
RE15-11-708	15-613377	3–3.5	Fill	—	—	18.2	NA	—	—	—	—	—	NA	—	—
RE15-11-710	15-613378	0–1	Fill	—	—	—	NA	—	1.9 (J)	—	—	—	NA	—	—
RE15-11-711	15-613378	6–7	Fill	—	—	—	NA	—	1.8 (J)	—	—	—	NA	—	—
RE15-11-713	15-613379	0–1	Fill	—	—	—	NA	—	1.8 (J)	—	—	—	NA	—	59.6
RE15-11-714	15-613379	6–7	Fill	—	—	—	NA	—	1.9 (J)	—	—	—	NA	—	—
RE15-11-715	15-613379	9–10	Qbt 4	—	—	9.2	NA	—	4.2 (J)	—	—	2.3	NA	—	—
RE15-11-716	15-613380	0–1	Fill	—	—	—	NA	—	1.8	—	—	—	NA	—	69.3
RE15-11-717	15-613380	6–7	Fill	—	—	15.7	NA	—	2.7	—	—	—	NA	—	50.2

Table 6.5-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Manganese	Mercury	Nickel	Nitrate	Potassium	Selenium	Silver	Sodium	Thallium	Uranium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**482**	**0.1**	**6.58**	**na[g]**	**3500**	**0.3**	**1**	**2770**	**1.1**	**2.4**	**17**	**63.5**
Sediment BV[a]				**543**	**0.1**	**9.38**	**na**	**2690**	**0.3**	**1**	**1470**	**0.73**	**na**	**19.7**	**60.2**
Soil BV[a]				**671**	**0.1**	**15.4**	**na**	**3460**	**1.52**	**1**	**915**	**0.73**	**1.82**	**39.6**	**48.8**
Construction Worker SSL[b]				**464**	**77.1**	**753**	**566000**	**19900000**	**1750**	**1770**	**9730000**	**3.54**	**277**	**614**	**106000**
Industrial SSL[b]				**160000**	**389**	**25700**	**2080000**	**73000000**	**6490**	**6490**	**35700000**	**13**	**3880**	**6530**	**389000**
Residential SSL[b]				**10500**	**23.5**	**1560**	**125000**	**15600000**	**391**	**391**	**7820000**	**0.782**	**234**	**394**	**23500**
RE15-11-718	15-613380	9–9.5	Fill	—	—	16	NA	—	1.8	—	—	—	NA	—	87.9
RE15-11-725	15-613381	0–1	Fill	—	—	—	NA	—	1.7	1.5	—	—	NA	—	75.7
RE15-11-720	15-613381	6–7	Fill	—	—	—	NA	—	—	—	—	—	NA	—	—
RE15-11-721	15-613381	9–10	Fill	—	—	—	NA	—	1.9	—	—	—	NA	—	93.9
RE15-11-602	15-613381	11–12	Fill	—	—	—	NA	—	—	—	—	—	NA	—	—
RE15-11-722	15-613382	0–1	Fill	—	—	—	NA	—	1.9 (J)	—	—	—	NA	—	66
RE15-11-723	15-613382	6–7	Fill	—	—	—	NA	—	1.8 (J)	—	—	—	NA	—	—
RE15-11-724	15-613382	9–10	Fill	—	—	—	NA	—	2.1 (J)	—	—	—	NA	—	—
RE15-11-728	15-613384	0–0.5	Sed	—	—	—	—	—	0.74	—	—	—	NA	—	—
RE15-11-729	15-613384	0.5–1	Sed	—	—	—	0.074 (J)	—	0.95	—	—	—	NA	—	—
RE15-11-730	15-613385	0–1	Sed	—	—	—	—	—	1.1	—	—	—	NA	—	—
RE15-11-731	15-613385	1–1.5	Sed	—	—	—	0.074 (J)	—	1.1	—	—	—	NA	—	—
RE15-11-732	15-613386	0–1	Sed	—	—	—	0.073 (J)	—	0.87	—	—	—	NA	—	—
RE15-11-733	15-613386	1–2	Sed	—	—	—	0.073 (J)	—	1.7	—	—	—	NA	—	—
RE15-11-734	15-613387	0–1	Sed	—	—	—	0.4	—	1.6	—	—	—	NA	—	—
RE15-11-735	15-613387	2–3	Sed	—	—	—	0.12 (J)	—	1.7	—	—	—	NA	—	—
RE15-11-736	15-613388	0–1	Sed	—	—	—	0.5	—	1.1	—	—	—	NA	19.9	—
RE15-11-737	15-613388	1–1.5	Sed	—	—	—	0.52	—	1.5	—	—	—	NA	—	—
RE15-11-740	15-613389	0–0.5	Sed	—	—	—	0.07 (J)	—	0.93	—	—	—	NA	—	—
RE15-11-739	15-613389	0.5–1	Sed	—	—	—	—	—	1.2	—	—	—	NA	—	70.4 (J+)

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.
[a] BVs from LANL (1998, 059730).
[b] SSLs from NMED (2015, 600575) unless otherwise noted.
[c] SSL for total chromium.
[d] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).
[e] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).
[f] — = Not detected or not detected above BV.
[g] na = Not available.
[h] NA = Not analyzed.

Table 6.5-3
Organic Chemicals Detected at SWMU 15-004(f)

Sample ID	Location ID	Depth (ft)	Media	Amino-4,6-dinitrotoluene[2-]	Dinitroaniline[3,5-]	Dinitrotoluene[2,4-]	Dinitrotoluene[2,6-]	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxins (Total)	Hexachlorodibenzofurans (Total)	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]	Tris(o-cresyl)phosphate
Construction Worker SSL[a]				**695[b]**	**10000[c]**	**536**	**80.9**	**na[d]**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**5380[e]**
Industrial SSL[a]				**2300[f]**	**32000[c]**	**82.3**	**17.2**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**16000[e]**
Residential SSL[a]				**150[f]**	**2200[c]**	**17.1**	**3.56**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1300[e]**
RE15-11-670	15-02203	0–1	Soil	0.0072 (J)	0.0048 (J)	0.004 (J)	0.0064 (J)	0.00000108 (J)	0.00000217 (J)	—[g]	—	—	—	0.00000926 (J)	0.00000126 (J)	—
RE15-11-565	15-02277	3–3.5	Qbt 4	—	—	—	—	—	—	—	—	—	—	0.00000476 (J)	—	—
RE15-11-674	15-613366	0–1	Fill	—	—	0.0038 (J)	—	NA[h]	NA	NA	NA	NA	NA	NA	NA	—
RE15-11-677	15-613367	0–1	Fill	—	—	—	—	NA	NA	NA	NA	NA	NA	NA	NA	0.064
RE15-11-678	15-613367	2–3	Fill	—	—	—	—	NA	NA	NA	NA	NA	NA	NA	NA	0.025 (J)
RE15-11-725	15-613381	0–1	Fill	—	—	—	—	0.00000923	0.0000211	0.00000163 (J)	0.000004 (J)	0.00000266 (J)	0.00000133 (J)	0.0000719	0.00000275 (J)	—
RE15-11-740	15-613389	0–0.5	Sed	—	—	—	—	0.00000133 (J)	0.00000288 (J)	—	—	—	—	0.0000076 (J)	0.00000189 (J)	—

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

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[d] na = Not available.

[e] Tricresyl phosphate used as a surrogate based on structural similarity.

[f] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[g] — = Not detected.

[h] NA = Not analyzed.

Table 6.5-4
Radionuclides Detected or Detected above BVs/FVs at SWMU 15-004(f)

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Uranium-234	Uranium-235/236	Uranium-238
Qbt 2, 3, 4 BV[a]				**na[b]**	**1.98**	**0.09**	**1.93**
Sediment BV[a]				**0.9**	**2.59**	**0.2**	**2.29**
Soil BV[a]				**1.65**	**2.59**	**0.2**	**2.29**
Construction Worker SAL[c]				**31**	**770**	**100**	**410**
Industrial SAL[c]				**39**	**3000**	**150**	**750**
Residential SAL[c]				**11**	**270**	**39**	**150**
RE15-11-576	15-02113	0–1	Soil	NA[d]	4.7	0.253	6.71
RE15-11-572	15-02124	0–1	Soil	NA	6.02	0.349	7.88
RE15-11-592	15-02132	0–1	Soil	NA	39 (J)	2.35 (J)	40.4 (J)
RE15-11-593	15-02132	1–2	Qbt 3	NA	13.5	0.55	13.3
RE15-11-568	15-02136	0–1	Soil	NA	15.4	0.844	16.5
RE15-11-595	15-02142	0–1	Soil	NA	3.77	0.249	5.5
RE15-11-590	15-02145	0–1	Soil	NA	6.08	0.397	17.4
RE15-11-574	15-02148	0–1	Soil	NA	7.59	0.472	13.7
RE15-11-529	15-02149	3–4	Qbt 4	NA	—[e]	0.109	2.96
RE15-11-582	15-02150	0–1	Soil	NA	7.53	0.399	15
RE15-11-583	15-02150	3–4	Qbt 4	NA	—	0.12	2.81
RE15-11-536	15-02152	3–4	Qbt 4	NA	—	0.11	3.26
RE15-11-586	15-02156	0–1	Soil	NA	3.92	0.222	6.62
RE15-11-580	15-02162	0–1	Soil	NA	5.98	0.374	11.1
RE15-11-578	15-02171	0–1	Soil	NA	12.8 (J)	1.76 (J)	90.6 (J)
AAB3470	15-02182	1.5–2	Soil	0.13	NA	NA	NA
RE15-11-670	15-02203	0–1	Soil	NA	5.93	0.323	6.61
RE15-11-533	15-02228	3–4	Qbt 4	NA	—	—	2.97
RE15-11-588	15-02229	0–1	Soil	NA	32.9 (J)	1.86 (J)	57.5 (J)
RE15-11-589	15-02229	1–2	Qbt 4	NA	2.03	0.166	2.79
RE15-11-531	15-02240	3–4	Fill	NA	—	—	3.17
RE15-11-584	15-02279	0–1	Soil	NA	5.17	0.281	9.57
AAB3480	15-02299	1.5–2	Soil	0.06	NA	NA	NA
RE15-11-671	15-613365	0–1	Fill	NA	327 (J)	22.4 (J)	709 (J)
RE15-11-672	15-613365	6–7	Qbt 4	NA	3.29	0.205	8.84
RE15-11-673	15-613365	9–10	Qbt 4	NA	4.69	0.376	14.9
RE15-11-604	15-613365	10.5–11	Qbt 4	NA	37.9	3.52	129 (J)
RE15-11-674	15-613366	0–1	Fill	NA	15.7	1.17	45.3 (J)
RE15-11-675	15-613366	6–7	Fill	NA	14.8	0.678	14.9 (J)
RE15-11-676	15-613366	9–10	Fill	NA	14	0.83	15.4 (J)
RE15-11-677	15-613367	0–1	Fill	NA	523 (J+)	73 (J+)	3140 (J+)
RE15-11-678	15-613367	2–3	Fill	NA	335 (J+)	33.1 (J+)	1850 (J+)
RE15-11-680	15-613368	0–1	Fill	NA	65.1 (J)	3.77 (J)	130 (J)

Table 6.5-4 (continued)

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Uranium-234	Uranium-235/236	Uranium-238
Qbt 2, 3, 4 BV[a]				**na**	**1.98**	**0.09**	**1.93**
Sediment BV[a]				**0.9**	**2.59**	**0.2**	**2.29**
Soil BV[a]				**1.65**	**2.59**	**0.2**	**2.29**
Construction Worker SAL[c]				**31**	**770**	**100**	**410**
Industrial SAL[c]				**39**	**3000**	**150**	**750**
Residential SAL[c]				**11**	**270**	**39**	**150**
RE15-11-681	15-613368	6–7	Fill	NA	2.94	—	4.5
RE15-11-683	15-613369	0–1	Fill	NA	7.9	0.656	16.3 (J)
RE15-11-684	15-613369	6–7	Fill	NA	8.9	0.41	9.35 (J)
RE15-11-685	15-613369	9–10	Fill	NA	15.5	0.79	15.8 (J)
RE15-11-600	15-613369	11–12	Fill	NA	5.88	0.298	6.52 (J)
RE15-11-686	15-613370	0–1	Fill	NA	38.1	3.67	123 (J)
RE15-11-687	15-613370	6–7	Fill	NA	27.3	1.17	31.8 (J)
RE15-11-688	15-613370	8–8.5	Fill	NA	404	21.3	404 (J)
RE15-11-689	15-613371	0–1	Fill	NA	70.6 (J)	4.2 (J)	113 (J)
RE15-11-690	15-613371	6–7	Qbt 4	NA	3.29	0.187	4.58
RE15-11-691	15-613371	9–10	Qbt 4	NA	—	—	1.96
RE15-11-692	15-613372	0–1	Fill	NA	22.5	1.56	43.6 (J)
RE15-11-693	15-613372	6–7	Fill	NA	17.7	0.83	18.9 (J)
RE15-11-694	15-613372	9–10	Fill	NA	13	0.685	13.2 (J)
RE15-11-603	15-613372	10.9–11.1	Fill	NA	28	1.43	41.5 (J)
RE15-11-695	15-613373	0–1	Fill	NA	58.6 (J)	3.12 (J)	70.6 (J)
RE15-11-696	15-613373	6–6.25	Fill	NA	53.7 (J)	2.43 (J)	61.1 (J)
RE15-11-698	15-613374	0–1	Fill	NA	120	5.92	120 (J)
RE15-11-699	15-613374	6–7	Fill	NA	25.1	1.32	25.4 (J)
RE15-11-700	15-613374	8–8.5	Fill	NA	221	12.1	222 (J)
RE15-11-701	15-613375	0–1	Fill	NA	65.6	3.71	86.7 (J)
RE15-11-702	15-613375	6–7	Fill	NA	3.18	—	3.61 (J)
RE15-11-703	15-613375	9–10	Fill	NA	14	0.389	13.6 (J)
RE15-11-599	15-613375	11–12	Fill	NA	10.5	0.48	11.5 (J)
RE15-11-704	15-613376	0–1	Fill	NA	102	5.61	138 (J)
RE15-11-705	15-613376	6–7	Fill	NA	25.2 (J)	1.1 (J)	28.4 (J)
RE15-11-706	15-613376	8.25–9.25	Qbt 4	NA	54 (J)	2.59 (J)	63.8 (J)
RE15-11-601	15-613376	10–11	Qbt 4	NA	36	1.87	42.3 (J)
RE15-11-707	15-613377	0–1	Fill	NA	56.2	3.37	93.5 (J)

Table 6.5-4 (continued)

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Uranium-234	Uranium-235/236	Uranium-238
Qbt 2, 3, 4 BV[a]				**na**	**1.98**	**0.09**	**1.93**
Sediment BV[a]				**0.9**	**2.59**	**0.2**	**2.29**
Soil BV[a]				**1.65**	**2.59**	**0.2**	**2.29**
Construction Worker SAL[c]				**31**	**770**	**100**	**410**
Industrial SAL[c]				**39**	**3000**	**150**	**750**
Residential SAL[c]				**11**	**270**	**39**	**150**
RE15-11-708	15-613377	3–3.5	Fill	NA	22.1	1.66	50.7 (J)
RE15-11-710	15-613378	0–1	Fill	NA	13.2	0.879	27.4
RE15-11-711	15-613378	6–7	Fill	NA	—	—	2.52
RE15-11-712	15-613378	9–10	Fill	NA	3.09	—	3.09
RE15-11-713	15-613379	0–1	Fill	NA	57.6 (J)	3.78 (J)	115 (J)
RE15-11-714	15-613379	6–7	Fill	NA	—	—	3.29
RE15-11-716	15-613380	0–1	Fill	NA	38.5 (J)	2.66 (J)	108 (J)
RE15-11-717	15-613380	6–7	Fill	NA	18.4	1.03	22
RE15-11-718	15-613380	9–9.5	Fill	NA	145 (J)	6.99 (J)	169 (J)
RE15-11-725	15-613381	0–1	Fill	NA	169	8.98	222 (J)
RE15-11-720	15-613381	6–7	Fill	NA	3.9	0.27	5.03 (J)
RE15-11-721	15-613381	9–10	Fill	NA	40.9	1.94	42.6 (J)
RE15-11-602	15-613381	11–12	Fill	NA	3.44	—	4.2 (J)
RE15-11-722	15-613382	0–1	Fill	NA	212 (J)	10.8 (J)	228 (J)
RE15-11-723	15-613382	6–7	Fill	NA	6.91	0.391	7.5
RE15-11-724	15-613382	9–10	Fill	NA	3.79	—	3.97
RE15-11-728	15-613384	0–0.5	Sed	NA	—	—	3.18
RE15-11-729	15-613384	0.5–1	Sed	NA	3.02	—	3.37
RE15-11-732	15-613386	0–1	Sed	NA	35.8	1.98	54.6 (J)
RE15-11-733	15-613386	1–2	Sed	NA	68.1	4	93.8 (J)
RE15-11-734	15-613387	0–1	Sed	NA	3.24	—	4.76
RE15-11-736	15-613388	0–1	Sed	NA	9.28	0.551	17.4
RE15-11-737	15-613388	1–1.5	Sed	NA	2.86	—	5.18
RE15-11-740	15-613389	0–0.5	Sed	NA	108 (J)	6.5 (J)	177 (J)
RE15-11-739	15-613389	0.5–1	Sed	NA	110 (J)	6.64 (J)	184 (J)

Note: All activities are in pCi/g.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SALs from LANL (2014, 600064).

[d] NA = Not analyzed.

[e] — = Not detected or not detected above BV/FV.

Table 6.6-1
Samples Collected and Analyses Requested at SWMU 15-008(a)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	Uranium	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Gamma Spectroscopy
AAB3473	15-02242	0–1	Soil	18681	19509	—*	—	—	—	—	—	—	—	—	19509
RE15-11-816	15-613403	0–1	Soil	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-817	15-613403	1–2	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-818	15-613404	0–1	Soil	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-819	15-613404	1–2	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-820	15-613405	0–1	Soil	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-821	15-613405	1–2	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-840	15-613406	0–1	Soil	11-911	—	11-909	11-909	11-909	11-909	11-910	11-911	11-911	11-911	11-911	—
RE15-11-823	15-613406	1–2	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-824	15-613407	0–1	Soil	11-941	—	11-941	11-941	11-941	11-941	—	11-941	11-941	11-941	11-941	—
RE15-11-825	15-613407	2–3	Qbt 4	11-940	—	11-940	11-940	11-940	11-940	—	11-940	11-940	11-940	11-940	—
RE15-11-826	15-613408	0–1	Soil	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-827	15-613408	1–2	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-828	15-613409	0–1	Soil	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-829	15-613409	1–2	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-830	15-613410	0–1	Soil	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-831	15-613410	3–4	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-832	15-613411	0–1	Soil	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-833	15-613411	3–4	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-834	15-613412	0–1	Soil	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-835	15-613412	3–4	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-836	15-613413	0–1	Soil	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-837	15-613413	1–2	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—
RE15-11-841	15-613414	0–1	Soil	11-911	—	11-909	11-909	11-909	11-909	11-910	11-911	11-911	11-911	11-911	—
RE15-11-839	15-613414	1–2	Qbt 4	11-907	—	11-906	11-906	11-906	11-906	—	11-907	11-907	11-907	11-908	—

* — = Analysis not requested.

Table 6.6-2
Inorganic Chemicals above BVs at SWMU 15-008(a)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Uranium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14500**	**11.2**	**1690**	**0.1**	**6.58**	**na[b]**	**na**	**0.3**	**1**	**2.4**	**17**	**63.5**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**4610**	**0.1**	**15.4**	**na**	**na**	**1.52**	**1**	**1.82**	**39.6**	**48.8**
Construction Worker SSL[c]				**41400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8850000**	**134[d]**	**36.6[e]**	**14200**	**12.1**	**248000**	**800**	**1550000**	**77.1**	**753**	**566000**	**248**	**1750**	**1770**	**277**	**614**	**106000**
Industrial SSL[c]				**1290000**	**519**	**21.5**	**255000**	**2580**	**1110**	**32400000**	**505[d]**	**350[f]**	**51900**	**63.3**	**908000**	**800**	**5680000**	**389**	**25700**	**2080000**	**908**	**6490**	**6490**	**3880**	**6530**	**389000**
Residential SSL[c]				**78000**	**31.3**	**4.25**	**15600**	**156**	**70.5**	**13000000**	**96.6[d]**	**23[f]**	**3130**	**11.2**	**54800**	**400**	**339000**	**23.5**	**1560**	**125000**	**54.8**	**391**	**391**	**234**	**394**	**23500**
AAB3473	15-02242	0–1	Soil	—[g]	3.8 (U)	—	834	—	0.59 (U)	—	—	—	7720	NA[h]	—	58.2	—	1.4 (J)	57.3	NA	NA	—	—	2820	—	309
RE15-11-816	15-613403	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.53 (U)	—	—	—	0.154	—	0.19 (J)	—	—	—	NA	—	—
RE15-11-817	15-613403	1–2	Qbt 4	—	—	—	—	—	—	—	—	—	—	0.51 (U)	—	—	—	0.129	—	—	—	1.3	—	NA	—	—
RE15-11-818	15-613404	0–1	Soil	—	—	—	—	—	0.42	—	—	—	35.7	0.55 (U)	—	—	—	0.173	—	0.21 (J)	—	—	—	NA	—	—
RE15-11-819	15-613404	1–2	Qbt 4	—	—	—	47.8	—	—	—	—	—	7.4	0.53 (U)	—	—	—	0.138	—	0.2 (J)	—	1.2	—	NA	—	—
RE15-11-820	15-613405	0–1	Soil	—	1.3	—	—	—	1.1	—	—	—	441	0.53 (U)	—	—	—	0.2	—	0.41	0.0044 (J)	—	—	NA	—	—
RE15-11-821	15-613405	1–2	Qbt 4	10500	0.81 (U)	2.8	140	—	—	2400	11.3	4.5	88.3	0.53 (U)	—	21.1	1760	0.22	8.8	0.31	0.0026 (J-)	1.4	3.1	NA	18.6	—
RE15-11-840	15-613406	0–1	Soil	—	2.5 (J)	—	—	—	0.74 (J)	—	—	—	242 (J-)	—	—	24.2	—	—	—	0.59	0.0024 (J)	—	—	NA	—	58.1
RE15-11-823	15-613406	1–2	Qbt 4	15100	1.2	3.6	263	—	—	—	9.5	3.4	139	0.57 (U)	15800	17.4	1980	0.195	6.7	0.13 (J)	0.0026 (J)	1.4	—	NA	20.8	—
RE15-11-824	15-613407	0–1	Soil	—	—	—	509 (J-)	2.8	1.1	—	—	—	437	—	—	30.4	—	—	—	0.86	—	2.7	—	NA	—	163
RE15-11-825	15-613407	2–3	Qbt 4	8570	—	—	228 (J-)	1.5	—	2320	8.5	4	136	0.53 (U)	—	15	—	—	8.9	4.2	—	3	—	NA	—	74.1
RE15-11-826	15-613408	0–1	Soil	—	—	—	—	—	—	—	—	—	49.9	—	—	—	—	0.186	—	1.7	0.0024 (J)	—	—	NA	—	—
RE15-11-827	15-613408	1–2	Qbt 4	8630	—	—	101	—	—	2570	11	3.3	9.6	0.53 (U)	—	—	—	0.24	7.5	0.88	—	1.9	—	NA	—	—
RE15-11-828	15-613409	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.51 (U)	—	—	—	0.194	—	0.43	—	—	—	NA	—	—
RE15-11-829	15-613409	1–2	Qbt 4	—	—	—	—	—	—	—	—	—	—	0.53 (U)	—	—	—	0.143	—	0.19 (J)	0.0049 (J)	1.6	—	NA	—	—
RE15-11-830	15-613410	0–1	Soil	—	—	—	—	2.9	—	—	—	—	—	—	—	—	—	0.199	—	0.18 (J)	—	1.6	—	NA	—	—
RE15-11-831	15-613410	3–4	Qbt 4	—	—	—	—	1.8	—	2980	18	—	—	0.52 (U)	—	—	—	0.132	11	0.073 (J)	—	2	—	NA	—	—
RE15-11-832	15-613411	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.51 (U)	—	—	—	0.146	—	0.2	0.0036 (J)	—	—	NA	—	—
RE15-11-833	15-613411	3–4	Qbt 4	—	—	—	—	—	—	—	—	—	—	0.51 (U)	—	—	—	0.119	—	0.08 (J)	—	1.2	—	NA	—	—
RE15-11-834	15-613412	0–1	Soil	—	2.2	—	—	—	0.44	—	—	—	219	0.52 (U)	—	55.1	—	0.237	—	0.12 (J)	—	—	—	NA	—	60.6
RE15-11-835	15-613412	3–4	Qbt 4	—	—	—	—	—	—	—	8.3	—	15.7	0.51 (U)	—	—	—	0.128	—	0.09 (J)	0.0027 (J)	0.48 (J)	—	NA	—	—
RE15-11-836	15-613413	0–1	Soil	—	1.7	—	—	—	—	—	—	—	86.9	0.51 (U)	—	31.2	—	0.168	—	0.1 (J)	—	—	—	NA	—	—
RE15-11-837	15-613413	1–2	Qbt 4	—	—	—	—	—	—	—	—	—	—	0.51 (U)	—	—	—	0.117	—	—	—	1.9	—	NA	—	—
RE15-11-841	15-613414	0–1	Soil	—	1.1 (U)	—	327 (J-)	—	0.61 (J)	—	—	—	260 (J-)	—	—	29.2	—	—	—	—	—	—	—	NA	—	104
RE15-11-839	15-613414	1–2	Qbt 4	—	—	—	78.3	—	—	—	—	—	58	0.52 (U)	—	—	—	0.138	—	0.088 (J)	0.0022 (J)	1.3	—	NA	—	—

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575) unless otherwise noted.

[d] SSL for total chromium.

[e] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[f] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[g] — = Not detected or not detected above BV.

[h] NA = Not analyzed.

Table 6.6-3
Organic Chemicals Detected at SWMU 15-008(a)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Diethylphthalate	Di-n-butylphthalate	Di-n-octylphthalate	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxin [1,2,3,4,7,8-]	Hexachlorodibenzodioxin [1,2,3,6,7,8-]	Hexachlorodibenzodioxin [1,2,3,7,8,9-]
Construction Worker SSL[a]				**15100**	**242000**	**1080000[b]**	**5380**	**215000**	**26900**	**3540[b]**	**na[c]**	**na**	**na**	**na**	**na**	**na**	**na**
Industrial SSL[a]				**50500**	**960000**	**3300000[d]**	**1830**	**733000**	**91600**	**8200[d]**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
Residential SSL[a]				**3480**	**66300**	**250000[d]**	**380**	**49300**	**6160**	**630[d]**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
RE15-11-816	15-613403	0–1	Soil	—[e]	0.014 (J)	—	—	—	—	—	NA[f]	NA	NA	NA	NA	NA	NA
RE15-11-817	15-613403	1–2	Qbt 4	—	0.19	—	0.15 (J)	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-818	15-613404	0–1	Soil	—	0.012 (J)	—	0.079 (J)	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-819	15-613404	1–2	Qbt 4	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-820	15-613405	0–1	Soil	—	0.2	—	0.31 (J)	—	0.21 (J)	0.069 (J)	NA	NA	NA	NA	NA	NA	NA
RE15-11-821	15-613405	1–2	Qbt 4	—	0.044	—	1.7	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-840	15-613406	0–1	Soil	—	—	—	0.067 (J)	—	—	—	0.00000338 (J)	0.00000749	0.00000106 (J)	0.00000197 (J)	—	—	—
RE15-11-823	15-613406	1–2	Qbt 4	—	0.012 (J)	—	0.12 (J)	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-824	15-613407	0–1	Soil	—	0.022	—	0.073 (J)	—	0.044 (J)	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-825	15-613407	2–3	Qbt 4	0.068 (J)	—	—	0.12 (J)	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-826	15-613408	0–1	Soil	0.1 (J)	0.028 (J+)	—	0.1 (J)	—	0.099 (J)	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-827	15-613408	1–2	Qbt 4	—	—	0.8 (J)	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-828	15-613409	0–1	Soil	—	—	—	0.1 (J)	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-829	15-613409	1–2	Qbt 4	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-830	15-613410	0–1	Soil	0.21 (J)	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-831	15-613410	3–4	Qbt 4	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-832	15-613411	0–1	Soil	0.12 (J)	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-833	15-613411	3–4	Qbt 4	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-834	15-613412	0–1	Soil	0.044 (J)	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-835	15-613412	3–4	Qbt 4	0.13 (J)	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-836	15-613413	0–1	Soil	—	—	—	0.06 (J)	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-837	15-613413	1–2	Qbt 4	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-841	15-613414	0–1	Soil	—	—	—	0.17 (J)	—	—	—	0.000031	0.0000526	0.00000192 (J)	0.00000583	0.000000656 (J)	0.00000149 (J)	0.00000174 (J)
RE15-11-839	15-613414	1–2	Qbt 4	—	—	—	0.099 (J)	0.05 (J)	—	—	NA	NA	NA	NA	NA	NA	NA

Table 6.6-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Hexachlorodibenzodioxins (Total)	Hexachlorodibenzofurans (Total)	Isopropyltoluene[4-]	Methylene Chloride	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran 1,2,3,4,6,7,8,9-]	Pentachlorodibenzodioxin [1,2,3,7,8-]	Pentachlorodibenzodioxins (Total)	Tetrachlorodibenzodioxin [2,3,7,8-]	Tetrachlorodibenzodioxins (Total)
Construction Worker SSL[a]				**na**	**na**	**2740[g]**	**1210**	**na**	**na**	**na**	**na**	**0.000226**	**na**
Industrial SSL[a]				**na**	**na**	**14200[g]**	**5130**	**na**	**na**	**na**	**na**	**0.000248**	**na**
Residential SSL[a]				**na**	**na**	**2360[g]**	**409**	**na**	**na**	**na**	**na**	**0.000049**	**na**
RE15-11-816	15-613403	0–1	Soil	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-817	15-613403	1–2	Qbt 4	NA	NA	—	0.0033 (J)	NA	NA	NA	NA	NA	NA
RE15-11-818	15-613404	0–1	Soil	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-819	15-613404	1–2	Qbt 4	NA	NA	—	0.0039 (J)	NA	NA	NA	NA	NA	NA
RE15-11-820	15-613405	0–1	Soil	NA	NA	0.013	—	NA	NA	NA	NA	NA	NA
RE15-11-821	15-613405	1–2	Qbt 4	NA	NA	0.0046 (J)	—	NA	NA	NA	NA	NA	NA
RE15-11-840	15-613406	0–1	Soil	0.000000668 (J)	0.000000508 (J)	—	—	0.0000215 (J)	—	—	—	—	0.00000012 (J)
RE15-11-823	15-613406	1–2	Qbt 4	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-824	15-613407	0–1	Soil	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-825	15-613407	2–3	Qbt 4	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-826	15-613408	0–1	Soil	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-827	15-613408	1–2	Qbt 4	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-828	15-613409	0–1	Soil	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-829	15-613409	1–2	Qbt 4	NA	NA	—	0.0029 (J)	NA	NA	NA	NA	NA	NA
RE15-11-830	15-613410	0–1	Soil	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-831	15-613410	3–4	Qbt 4	NA	NA	—	0.0026 (J)	NA	NA	NA	NA	NA	NA
RE15-11-832	15-613411	0–1	Soil	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-833	15-613411	3–4	Qbt 4	NA	NA	—	0.0042 (J)	NA	NA	NA	NA	NA	NA
RE15-11-834	15-613412	0–1	Soil	NA	NA	—	—	NA	NA	NA	NA	NA	NA
RE15-11-835	15-613412	3–4	Qbt 4	NA	NA	—	0.0047 (J)	NA	NA	NA	NA	NA	NA
RE15-11-836	15-613413	0–1	Soil	NA	NA	0.00043 (J)	—	NA	NA	NA	NA	NA	NA
RE15-11-837	15-613413	1–2	Qbt 4	NA	NA	—	0.0039 (J)	NA	NA	NA	NA	NA	NA
RE15-11-841	15-613414	0–1	Soil	0.0000131	0.00000184 (J)	—	—	0.000105	0.00000548 (J)	0.000000497 (J)	0.000000497 (J)	0.0000000943 (J)	0.0000000943 (J)
RE15-11-839	15-613414	1–2	Qbt 4	NA	NA	—	—	NA	NA	NA	NA	NA	NA

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

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] na = Not available.

[d] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[e] — = Not detected.

[f] NA = Not analyzed.

[g] Isopropylbenzene used as surrogate based on structural similarity.

Table 6.6-4
Radionuclides Detected above BVs at SWMU 15-008(a)

Sample ID	Location ID	Depth (ft)	Media	Uranium-234	Uranium-235/236	Uranium-238
Qbt 2, 3, 4 BV[a]				**1.98**	**0.09**	**1.93**
Soil BV[a]				**2.59**	**0.2**	**2.29**
Construction Worker SAL[b]				**770**	**100**	**410**
Industrial SAL[b]				**3000**	**150**	**750**
Residential SAL[b]				**270**	**39**	**150**
RE15-11-818	15-613404	0–1	Soil	8.96	0.482	10.8
RE15-11-819	15-613404	1–2	Qbt 4	3.09	0.159	3.98
RE15-11-820	15-613405	0–1	Soil	7.83	0.392	17.2
RE15-11-821	15-613405	1–2	Qbt 4	9.98	0.689	19.8
RE15-11-840	15-613406	0–1	Soil	67.3	4.48	124
RE15-11-823	15-613406	1–2	Qbt 4	11.3	0.759	19.5
RE15-11-824	15-613407	0–1	Soil	492	26.5	681
RE15-11-825	15-613407	2–3	Qbt 4	212	12.2	268
RE15-11-826	15-613408	0–1	Soil	12.1	1.03	27.5
RE15-11-827	15-613408	1–2	Qbt 4	2.88	0.212	9.99
RE15-11-828	15-613409	0–1	Soil	4.07	0.248	6.92
RE15-11-830	15-613410	0–1	Soil	3.15	0.267	14.2
RE15-11-834	15-613412	0–1	Soil	44.3	2.84 (J)	100
RE15-11-835	15-613412	3–4	Qbt 4	3.47	0.2	6.59
RE15-11-836	15-613413	0–1	Soil	47	3.09 (J)	105
RE15-11-841	15-613414	0–1	Soil	155	8.31	192
RE15-11-839	15-613414	1–2	Qbt 4	80.8	5.31 (J)	103

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

[a] BVs from LANL (1998, 059730).

[b] SALs from LANL (2014, 600064).

Table 6.7-1
Samples Collected and Analyses Requested at AOC 15-005(b)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/ Furans	Nitrate	Cyanide	Perchlorate
RE15-11-217	15-613251	0–1	Fill	11-681	11-680	11-680	—*	11-680	—	11-681	11-681	11-681
RE15-11-218	15-613251	4–5	Fill	11-681	11-680	11-680	—	11-680	—	11-681	11-681	11-681
RE15-11-219	15-613252	0–1	Fill	11-681	11-680	11-680	—	11-680	—	11-681	11-681	11-681
RE15-11-220	15-613252	4–5	Qbt 4	11-681	11-680	11-680	—	11-680	—	11-681	11-681	11-681
RE15-11-281	15-613253	0–1	Fill	11-681	11-680	11-680	11-680	11-680	11-682	11-681	11-681	11-681
RE15-11-222	15-613253	4–5	Qbt 4	11-681	11-680	11-680	—	11-680	—	11-681	11-681	11-681
RE15-11-223	15-613254	0–1	Fill	11-681	11-680	11-680	—	11-680	—	11-681	11-681	11-681
RE15-11-224	15-613254	4–5	Fill	11-681	11-680	11-680	—	11-680	—	11-681	11-681	11-681

* — = Analysis not requested.

Table 6.7-2
Inorganic Chemicals above BVs at AOC 15-005(b)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Calcium	Chromium	Cobalt	Cyanide (Total)	Lead	Manganese	Nickel	Nitrate	Perchlorate	Selenium
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**2200**	**7.14**	**3.14**	**0.5**	**11.2**	**482**	**6.58**	**na**[b]	**na**	**0.3**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**6120**	**19.3**	**8.64**	**0.5**	**22.3**	**671**	**15.4**	**na**	**na**	**1.52**
Construction Worker SSL[c]				**41400**	**142**	**57.4**	**4390**	**8850000**	**134**[d]	**36.6**[e]	**12.1**	**800**	**464**	**753**	**566000**	**248**	**1750**
Industrial SSL[c]				**1290000**	**519**	**21.5**	**255000**	**32400000**	**505**[d]	**350**[f]	**63.3**	**800**	**160000**	**25700**	**2080000**	**908**	**6490**
Residential SSL[c]				**78000**	**31.3**	**4.25**	**15600**	**13000000**	**96.6**[d]	**23**[f]	**11.2**	**400**	**10500**	**1560**	**125000**	**54.8**	**391**
RE15-11-217	15-613251	0–1	Fill	—[g]	—	—	—	—	—	—	0.56 (U)	—	—	—	2.5	—	—
RE15-11-218	15-613251	4–5	Fill	—	—	—	—	—	—	—	0.62 (U)	—	—	—	0.41	—	—
RE15-11-219	15-613252	0–1	Fill	—	—	—	—	—	—	—	0.53 (U)	27.6 (J)	—	—	0.82	—	—
RE15-11-220	15-613252	4–5	Qbt 4	—	0.52 (U)	—	52	2540 (J+)	7.5	—	0.52 (U)	—	—	—	0.096 (J)	—	0.96
RE15-11-281	15-613253	0–1	Fill	—	—	—	—	—	—	—	0.54 (U)	—	—	—	0.18 (J)	—	—
RE15-11-222	15-613253	4–5	Qbt 4	10400	0.58 (U)	4.3	192	4490 (J+)	12.9	—	0.58 (U)	—	—	7.6 (J)	0.22 (J)	0.0033 (J)	0.65
RE15-11-223	15-613254	0–1	Fill	—	—	—	—	—	—	—	0.57 (U)	—	—	—	1.3	—	—
RE15-11-224	15-613254	4–5	Fill	—	—	—	310	—	—	11.9	0.56 (U)	—	776	—	0.28	—	—

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575) unless otherwise noted.

[d] SSL for total chromium.

[e] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[f] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[g] — = Not detected or not detected above BV.

Table 6.7-3
Organic Chemicals Detected at AOC 15-005(b)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene
Construction Worker SSL[a]				**15100**	**75300**	**240**	**24**	**240**	**7530[b]**	**2310**	**5380**	**23100**	**24**	**354[c]**	**10000**	**10000**
Industrial SSL[a]				**50500**	**253000**	**32.3**	**3.23**	**32.3**	**25300[b]**	**323**	**1830**	**3230**	**3.23**	**1000[d]**	**33700**	**33700**
Residential SSL[a]				**3480**	**17400**	**1.53**	**0.153**	**1.53**	**1740[b]**	**15.3**	**380**	**153**	**0.153**	**73[d]**	**2320**	**2320**
RE15-11-217	15-613251	0–1	Fill	0.084 (J)	0.2 (J)	0.98	0.79	0.9	0.42	0.84	—[e]	1	0.17 (J)	—	2.1	0.081 (J)
RE15-11-218	15-613251	4–5	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-219	15-613252	0–1	Fill	0.29 (J)	0.54	2.3	1.8	2.1	0.95	1.9	—	2.4	0.4	0.17 (J)	6.2	0.3 (J)
RE15-11-220	15-613252	4–5	Qbt 4	—	—	0.047 (J)	0.041 (J)	0.043 (J)	—	0.046 (J)	0.21 (J)	0.053 (J)	—	—	0.11 (J)	—
RE15-11-281	15-613253	0–1	Fill	—	0.055 (J)	0.3 (J)	0.26 (J)	0.28 (J)	0.15 (J)	0.3 (J)	—	0.33 (J)	—	—	0.76	—
RE15-11-222	15-613253	4–5	Qbt 4	—	—	—	—	—	—	—	—	—	—	—	0.05 (J)	—
RE15-11-223	15-613254	0–1	Fill	—	0.066 (J)	0.25 (J)	0.2 (J)	0.22 (J)	0.11 (J)	0.21 (J)	0.11 (J)	0.26 (J)	—	—	0.63	—
RE15-11-224	15-613254	4–5	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 6.7-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofurans (Total)	Indeno(1,2,3-cd)pyrene	Methylene Chloride	Methylnaphthalene[2-]	Naphthalene	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Phenanthrene	Pyrene	Tetrachlorodibenzodioxins (Total)
Construction Worker SSL[a]				**na[f]**	**na**	**na**	**na**	**240**	**1210**	**1420[c]**	**159**	**na**	**7530**	**7530**	**na**
Industrial SSL[a]				**na**	**na**	**na**	**na**	**32.3**	**5130**	**3000[d]**	**241**	**na**	**25300**	**25300**	**na**
Residential SSL[a]				**na**	**na**	**na**	**na**	**1.53**	**409**	**240[d]**	**49.7**	**na**	**1740**	**1740**	**na**
RE15-11-217	15-613251	0–1	Fill	NA[g]	NA	NA	NA	0.45	0.0056 (J+)	—	—	NA	0.95	1.2	NA
RE15-11-218	15-613251	4–5	Fill	NA	NA	NA	NA	—	0.0065	—	—	NA	—	—	NA
RE15-11-219	15-613252	0–1	Fill	NA	NA	NA	NA	1.1	0.0052 (J)	0.043 (J)	0.075 (J)	NA	3.3	3.4	NA
RE15-11-220	15-613252	4–5	Qbt 4	NA	NA	NA	NA	—	0.0041 (J)	—	—	NA	0.055 (J)	0.068 (J)	NA
RE15-11-281	15-613253	0–1	Fill	0.00000213 (J)	0.00000373 (J)	0.0000005 (J)	0.0000005 (J)	0.18 (J)	0.0046 (J)	—	—	0.0000144	0.38	0.45	0.000000105 (J)
RE15-11-222	15-613253	4–5	Qbt 4	NA	NA	NA	NA	—	0.0042 (J)	—	—	NA	—	—	NA
RE15-11-223	15-613254	0–1	Fill	NA	NA	NA	NA	0.13 (J)	0.0047 (J)	—	—	NA	0.38	0.37 (J)	NA
RE15-11-224	15-613254	4–5	Fill	NA	NA	NA	NA	—	0.0048 (J)	—	—	NA	—	—	NA

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

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Pyrene SSL used as a surrogate based on structural similarity.

[c] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2009, 108070).

[d] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[e] — = Not detected.

[f] na = Not available.

[g] NA = Not analyzed.

Table 6.8-1
Samples Collected and Analyses Requested at SWMU 15-009(e)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium
0215-97-0021	15-02510	0–0.5	Soil	3359R	—*	—	—	3358R	—	—	—	—	—
0215-97-0023	15-02510	0.83–1.17	Soil	3359R	—	—	—	3358R	—	—	—	—	—
0215-97-0024	15-02511	0–0.5	Soil	3359R	—	—	—	3358R	—	—	—	—	—
0215-97-0025	15-02511	0.83–1	Soil	3359R	—	—	—	3358R	—	—	—	—	—
0215-97-0026	15-02512	0–0.5	Soil	3359R	—	—	—	3358R	—	—	—	—	—
0215-97-0027	15-02512	0.83–1	Soil	3359R	—	—	—	3358R	—	—	—	—	—
0215-97-0030	15-02513	6–7	Soil	3607R	3605R	3605R	—	3606R	—	—	—	—	—
0215-97-0031	15-02513	9.67–10.17	Soil	3607R	3605R	3605R	—	3606R	—	—	—	—	—
0215-97-0032	15-02514	6–6.67	Soil	3607R	3605R	3605R	—	3606R	—	—	—	—	—
0215-97-0033	15-02514	9.67–10.08	Soil	3607R	3605R	3605R	—	3606R	—	—	—	—	—
0215-97-0034	15-02515	3–3.5	Soil	3607R	3605R	3605R	—	3606R	—	—	—	—	—
0215-97-0035	15-02516	2.17–2.67	Soil	3607R	3605R	3605R	—	3606R	—	—	—	—	—
RE15-11-861	15-613421	0–1	Soil	11-631	11-630	11-630	—	11-630	—	11-631	11-631	11-631	11-632
RE15-11-862	15-613421	2.5–3	Qbt 3	11-631	11-630	11-630	—	11-630	—	11-631	11-631	11-631	11-632
RE15-11-863	15-613422	0–0.5	Soil	11-631	11-630	11-630	—	11-630	—	11-631	11-631	11-631	11-632
RE15-11-864	15-613422	0.5–1	Qbt 3	11-631	11-630	11-630	—	11-630	—	11-631	11-631	11-631	11-632
RE15-11-870	15-613423	0–1	Soil	11-631	11-630	11-630	11-630	11-630	11-633	11-631	11-631	11-631	11-632
RE15-11-866	15-613423	2–2.5	Qbt 3	11-631	11-630	11-630	—	11-630	—	11-631	11-631	11-631	11-632

* — = Analysis not requested.

Table 6.8-2
Inorganic Chemicals above BVs at SWMU 15-009(e)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Lead	Nickel	Nitrate	Selenium	Silver	Uranium	Zinc
Qbt 2, 3, 4 BV[a]				**0.5**	**1.63**	**2200**	**7.14**	**4.66**	**0.5**	**11.2**	**6.58**	**na[b]**	**0.3**	**1**	**2.4**	**63.5**
Soil BV[a]				**0.83**	**0.4**	**6120**	**19.3**	**14.7**	**0.5**	**22.3**	**15.4**	**na**	**1.52**	**1**	**1.82**	**48.8**
Construction Worker SSL[c]				**142**	**72.1**	**8850000**	**134[d]**	**14200**	**12.1**	**800**	**753**	**566000**	**1750**	**1770**	**277**	**106000**
Industrial SSL[c]				**519**	**1110**	**32400000**	**505[d]**	**51900**	**63.3**	**800**	**25700**	**2080000**	**6490**	**6490**	**3880**	**389000**
Residential SSL[c]				**31.3**	**70.5**	**13000000**	**96.6[d]**	**3130**	**11.2**	**400**	**1560**	**125000**	**391**	**391**	**234**	**23500**
0215-97-0021	15-02510	0–0.5	Soil	8.6 (J-)	0.63 (U)	—[e]	—	—	NA[f]	—	—	NA	—	4.1	33.5 (U)	—
0215-97-0023	15-02510	0.83–1.17	Soil	7.1 (UJ)	0.62 (U)	—	—	—	NA	—	—	NA	—	1.8 (U)	26.8 (U)	—
0215-97-0024	15-02511	0–0.5	Soil	7.2 (UJ)	0.62 (U)	—	—	—	NA	—	—	NA	—	2.4	67.8 (U)	—
0215-97-0025	15-02511	0.83–1	Soil	7.4 (UJ)	0.64 (U)	—	—	—	NA	—	—	NA	—	1.8 (U)	34.9 (U)	—
0215-97-0026	15-02512	0–0.5	Soil	7.2 (J-)	0.83 (J)	—	—	15.6	NA	—	—	NA	—	1.7 (U)	61.3 (U)	—
0215-97-0027	15-02512	0.83–1	Soil	7.6 (UJ)	0.66 (U)	—	—	—	NA	—	—	NA	—	1.9 (U)	29.4 (U)	—
0215-97-0030	15-02513	6–7	Soil	—	—	6200	—	—	NA	—	—	NA	—	—	2.15	—
0215-97-0034	15-02515	3–3.5	Soil	—	—	—	—	—	NA	135	—	NA	—	—	2.67	—
0215-97-0035	15-02516	2.17–2.67	Soil	—	—	—	—	—	NA	—	—	NA	—	—	18.9	—
RE15-11-861	15-613421	0–1	Soil	—	—	—	—	—	0.52 (U)	—	—	0.85	—	—	NA	71
RE15-11-862	15-613421	2.5–3	Qbt 3	0.52 (U)	—	—	11.9 (J+)	—	0.52 (U)	—	6.7 (J+)	0.093 (J)	1.6	—	NA	—
RE15-11-863	15-613422	0–0.5	Soil	—	—	—	—	—	0.52 (U)	22.8	—	0.53	1.9	—	NA	—
RE15-11-864	15-613422	0.5–1	Qbt 3	0.53 (U)	—	—	11.7 (J+)	—	0.53 (U)	—	7.3 (J+)	0.29	1.8	—	NA	—
RE15-11-870	15-613423	0–1	Soil	—	0.6	—	—	—	0.53 (U)	—	—	0.15 (J)	1.7	—	NA	—
RE15-11-866	15-613423	2–2.5	Qbt 3	0.51 (U)	—	—	13 (J+)	—	0.51 (U)	—	6.9 (J+)	0.12 (J)	1.3	—	NA	—

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575).

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

[f] NA = Not analyzed.

Table 6.8-3
Organic Chemicals Detected at SWMU 15-009(e)

Sample ID	Location ID	Depth (ft)	Media	Acetone	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Fluoranthene	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofurans (Total)
Construction Worker SSL[a]				**242000**	**240**	**24**	**240**	**2310**	**23100**	**10000**	**na**[b]	**na**	**na**	**na**
Industrial SSL[a]				**960000**	**32.3**	**3.23**	**32.3**	**323**	**3230**	**33700**	**na**	**na**	**na**	**na**
Residential SSL[a]				**66300**	**1.53**	**0.153**	**1.53**	**15.3**	**153**	**2320**	**na**	**na**	**na**	**na**
0215-97-0030	15-02513	6–7	Soil	0.0079 (J)	—[c]	—	—	NA[d]	—	—	NA	NA	NA	NA
0215-97-0031	15-02513	9.67–10.17	Soil	0.0093 (J)	—	—	—	NA	—	—	NA	NA	NA	NA
0215-97-0034	15-02515	3–3.5	Soil	—	—	—	0.058 (J)	NA	—	—	NA	NA	NA	NA
0215-97-0035	15-02516	2.17–2.67	Soil	—	—	—	0.048 (J)	NA	—	—	NA	NA	NA	NA
RE15-11-861	15-613421	0–1	Soil	—	0.067 (J)	0.048 (J)	0.05 (J)	0.045 (J)	0.066 (J)	0.089 (J)	NA	NA	NA	NA
RE15-11-863	15-613422	0–0.5	Soil	—	—	—	—	—	—	—	NA	NA	NA	NA
RE15-11-870	15-613423	0–1	Soil	—	—	—	—	—	—	—	0.00000525	0.0000117	0.00000186 (J)	0.00000307 (J)

Table 6.8-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Hexachlorodibenzodioxins (Total)	Hexachlorodibenzofurans (Total)	Isopropyltoluene[4-]	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]	Pyrene	Tetrachlorodibenzodioxins (Total)	Toluene
Construction Worker SSL[a]				**na**	**na**	**2740[e]**	**na**	**na**	**7530**	**na**	**14000**
Industrial SSL[a]				**na**	**na**	**14200[e]**	**na**	**na**	**25300**	**na**	**61300**
Residential SSL[a]				**na**	**na**	**2360[e]**	**na**	**na**	**1740**	**na**	**5230**
0215-97-0030	15-02513	6–7	Soil	NA	NA	—	NA	NA	—	NA	—
0215-97-0031	15-02513	9.67–10.17	Soil	NA	NA	—	NA	NA	—	NA	—
0215-97-0034	15-02515	3–3.5	Soil	NA	NA	—	NA	NA	—	NA	—
RE15-11-861	15-613421	0–1	Soil	NA	NA	—	NA	NA	0.073 (J)	NA	—
RE15-11-863	15-613422	0–0.5	Soil	NA	NA	0.003 (J+)	NA	NA	—	NA	0.0021 (J+)
RE15-11-870	15-613423	0–1	Soil	0.00000213 (J)	0.00000131 (J)	—	0.0000344	0.00000153 (J)	—	0.000000146 (J)	—

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

[a] SSLs from NMED (2015, 600575).

[b] na = Not available.

[c] — = Not detected.

[d] NA = Not analyzed.

[e] Isopropylbenzene used as surrogate based on structural similarity.

Table 6.8-4
Radionuclides Detected above BVs at SWMU 15-009(e)

Sample ID	Location ID	Depth (ft)	Media	Uranium-234	Uranium-235/236	Uranium-238
Soil BV[a]				**2.59**	**0.2**	**2.29**
Construction Worker SAL[b]				**770**	**100**	**410**
Industrial SAL[b]				**3000**	**150**	**750**
Residential SAL[b]				**270**	**39**	**150**
RE15-11-861	15-613421	0–1	Soil	—[c]	0.204	5.21
RE15-11-863	15-613422	0–0.5	Soil	4.85	0.264	6.08
RE15-11-870	15-613423	0–1	Soil	8.85	0.488	16.1

Note: All activities are in pCi/g.

[a] BVs from LANL (1998, 059730).

[b] SALs from LANL (2014, 600064).

[c] — = Not detected or not detected above BV.

Table 6.9-1
Samples Collected and Analyses Requested at SWMU 15-010(a)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium
0215-97-0063	15-02520	9–9.5	Qbt 2	3493R, 3494R	—*	3491R	—	3492R	—	—	—	—	—
0215-97-0064	15-02521	8–8.5	Qbt 2	3493R, 3494R	—	3491R	—	3492R	—	—	—	—	—
0215-97-0065	15-02522	8.5–9	Qbt 2	3493R, 3494R	—	3491R	—	3492R	—	—	—	—	—
0215-97-0066	15-02523	8.5–9	Qbt 2	3493R, 3494R	—	3491R	—	3492R	—	—	—	—	—
RE15-11-902	15-613427	4–5	Fill	11-925	11-924	11-924	11-924	11-924	11-927	11-925	11-925	11-925	11-926
RE15-11-883	15-613427	7–8	Fill	11-925	11-924	11-924	—	11-924	—	11-925	11-925	11-925	11-926
RE15-11-884	15-613428	4–5	Fill	11-925	11-924	11-924	—	11-924	—	11-925	11-925	11-925	11-926
RE15-11-885	15-613428	7–8	Fill	11-925	11-924	11-924	—	11-924	—	11-925	11-925	11-925	11-926
RE15-11-886	15-613429	4–5	Fill	11-925	11-924	11-924	—	11-924	—	11-925	11-925	11-925	11-926
RE15-11-887	15-613429	7–8	Fill	11-925	11-924	11-924	—	11-924	—	11-925	11-925	11-925	11-926
RE15-11-2947	15-613429	9–9.5	Fill	11-981	11-981	11-981	—	11-981	—	11-981	11-981	11-981	11-981
RE15-11-888	15-613430	4–5	Fill	11-925	11-924	11-924	—	11-924	—	11-925	11-925	11-925	11-926
RE15-11-889	15-613430	6–7	Fill	11-925	11-924	11-924	—	11-924	—	11-925	11-925	11-925	11-926
RE15-11-890	15-613431	4–5	Fill	11-925	11-924	11-924	—	11-924	—	11-925	11-925	11-925	11-926
RE15-11-891	15-613431	7–8	Qbt 4	11-925	11-924	11-924	—	11-924	—	11-925	11-925	11-925	11-926

* — = Analysis not requested.

Table 6.9-2
Inorganic Chemicals above BVs at SWMU 15-010(a)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Qbt 2, 3, 4 BV[a]				**0.5**	**46**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**11.2**	**0.1**	**na[b]**	**na**	**0.3**	**1**	**1.1**	**2.4**	**17**	**63.5**
Soil BV[a]				**0.83**	**295**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**22.3**	**0.1**	**na**	**na**	**1.52**	**1**	**0.73**	**na**	**39.6**	**48.8**
Construction Worker SSL[c]				**142**	**4390**	**8850000**	**134[d]**	**36.6[e]**	**14200**	**12.1**	**800**	**77.1**	**566000**	**248**	**1750**	**1770**	**3.54**	**277**	**614**	**106000**
Industrial SSL[c]				**519**	**255000**	**32400000**	**505[d]**	**350[f]**	**51900**	**63.3**	**800**	**389**	**2080000**	**908**	**6490**	**6490**	**13**	**3880**	**6530**	**389000**
Residential SSL[c]				**31.3**	**15600**	**13000000**	**96.6[d]**	**23[f]**	**3130**	**11.2**	**400**	**23.5**	**125000**	**54.8**	**391**	**391**	**0.782**	**234**	**394**	**23500**
0215-97-0063	15-02520	9–9.5	Qbt 2	6.6 (UJ)	147	—[g]	10	5.3 (J)	11.2	NA[h]	18.6	3.7	NA	NA	0.55 (U)	1.9 (U)	—	2.62	—	—
0215-97-0064	15-02521	8–8.5	Qbt 2	6.7 (UJ)	139	2460	9.3	5.5 (J)	9.5	NA	26	5.5	NA	NA	0.55 (U)	3.3	—	2.55	17.4	—
0215-97-0065	15-02522	8.5–9	Qbt 2	6.7 (UJ)	120	2850	8	5.4 (J)	8.2	NA	26.5	3.5	NA	NA	0.49 (U)	2 (U)	—	2.79	—	—
0215-97-0066	15-02523	8.5–9	Qbt 2	6.5 (UJ)	153	4070	18	4.4 (J)	13.1	NA	22.8	10.5	NA	NA	0.35 (U)	4.9	—	2.54	—	—
RE15-11-902	15-613427	4–5	Fill	—	—	—	—	—	—	0.53 (UJ)	—	2.35	0.94	NA	2.5	—	—	NA	—	—
RE15-11-883	15-613427	7–8	Fill	—	—	—	—	—	—	0.52 (UJ)	—	0.327	1.8	0.0021 (J)	3.3	—	—	NA	—	—
RE15-11-884	15-613428	4–5	Fill	—	—	—	—	—	—	0.53 (UJ)	—	5.82	0.57	0.0025 (J)	2.3	—	—	NA	—	—
RE15-11-885	15-613428	7–8	Fill	—	—	—	—	—	—	0.52 (UJ)	—	0.338	0.28	—	3.6	—	—	NA	—	—
RE15-11-886	15-613429	4–5	Fill	—	—	—	—	—	—	0.54 (UJ)	—	4.81	22.3	0.0034 (J)	2.1	—	—	NA	—	—
RE15-11-887	15-613429	7–8	Fill	—	—	—	—	—	—	0.53 (UJ)	173	0.809	65	0.0025 (J)	4.9	—	0.83 (J)	NA	—	—
RE15-11-2947	15-613429	9–9.5	Fill	—	—	—	—	—	—	0.52 (U)	100	0.456	40.4	—	1.6	—	—	NA	—	—
RE15-11-888	15-613430	4–5	Fill	0.97	—	—	—	—	15.4	—	25.1	11.5	29.5	0.0023 (J)	2.4	—	—	NA	—	64.3
RE15-11-889	15-613430	6–7	Fill	—	—	—	—	—	—	0.52 (UJ)	—	4.57	9.1	0.0024 (J)	2.9	1.3	—	NA	—	—
RE15-11-890	15-613431	4–5	Fill	—	551 (J-)	—	—	—	—	0.54 (UJ)	—	3.6	2.1	NA	2.2	—	—	NA	—	—
RE15-11-891	15-613431	7–8	Qbt 4	0.52 (U)	824 (J-)	—	—	—	—	0.52 (UJ)	—	—	0.85	—	3.6	—	—	NA	—	—

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575) unless otherwise noted.

[d] SSL for total chromium.

[e] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[f] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[g] — = Not detected or not detected above BV.

[h] NA = Not analyzed.

Table 6.9-3
Organic Chemicals Detected at SWMU 15-010(a)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Bis(2-ethylhexyl)phthalate	Diethylphthalate	Di-n-butylphthalate	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxins (Total)	Hexachlorodibenzofuran [1,2,3,4,7,8-]	Hexachlorodibenzofurans (Total)	Isopropyltoluene[4-]	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]
Construction Worker SSL[a]				**15100**	**5380**	**215000**	**26900**	**na[b]**	**na**	**na**	**na**	**na**	**na**	**na**	**2740[c]**	**na**	**na**
Industrial SSL[a]				**50500**	**1830**	**733000**	**91600**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**14200[c]**	**na**	**na**
Residential SSL[a]				**3480**	**380**	**49300**	**6160**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**2360[c]**	**na**	**na**
0215-97-0063	15-02520	9–9.5	Qbt 2	—[d]	0.099 (J)	—	0.19 (J)	NA[e]	NA	NA	NA	NA	NA	NA	NA	NA	NA
0215-97-0064	15-02521	8–8.5	Qbt 2	—	0.044 (J)	—	0.047 (J)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0215-97-0065	15-02522	8.5–9	Qbt 2	—	0.044 (J)	—	0.1 (J)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0215-97-0066	15-02523	8.5–9	Qbt 2	—	0.049 (J)	—	0.11 (J)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RE15-11-902	15-613427	4–5	Fill	—	—	—	—	0.00000706	0.0000188	0.00000508	0.00000936	0.0000013 (J)	0.000000488 (J)	0.00000272 (J)	—	0.000075	0.00000775 (J)
RE15-11-885	15-613428	7–8	Fill	—	—	—	0.12 (J)	NA	NA	NA	NA	NA	NA	NA	—	NA	NA
RE15-11-2947	15-613429	9–9.5	Fill	—	0.054 (J-)	—	—	NA	NA	NA	NA	NA	NA	NA	—	NA	NA
RE15-11-888	15-613430	4–5	Fill	0.096 (J)	—	—	0.048 (J)	NA	NA	NA	NA	NA	NA	NA	0.0017 (J)	NA	NA
RE15-11-890	15-613431	4–5	Fill	—	—	—	0.077 (J)	NA	NA	NA	NA	NA	NA	NA	—	NA	NA
RE15-11-891	15-613431	7–8	Qbt 4	—	—	1.5	—	NA	NA	NA	NA	NA	NA	NA	—	NA	NA

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.
[a] SSLs from NMED (2015, 600575).
[b] na = Not available.
[c] Isopropylbenzene used as surrogate based on structural similarity.
[d] — = Not detected.
[e] NA = Not analyzed.

Table 6.10-1
Samples Collected and Analyses Requested at AOC C-15-004

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	PCBs	Dioxins/Furans	Isotopic Uranium
RE15-11-333	15-613295	0–1	Fill	11-644	11-643	—*	11-644
RE15-11-334	15-613295	2–3	Fill	11-644	11-643	—	11-644
RE15-11-339	15-613296	0–1	Soil	11-644	11-643	11-674	11-644
RE15-11-336	15-613296	2–3	Soil	11-644	11-643	—	11-644

* — = Analysis not requested.

Table 6.10-2
Inorganic Chemicals above BVs at AOC C-15-004

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Copper	Zinc
Soil BV[a]				**0.83**	**0.4**	**14.7**	**48.8**
Construction Worker SSL[b]				**142**	**72.1**	**14200**	**106000**
Industrial SSL[b]				**519**	**1110**	**51900**	**389000**
Residential SSL[b]				**31.3**	**70.5**	**3130**	**23500**
RE15-11-333	15-613295	0–1	Fill	1 (J)	2	17.7	184 (J+)
RE15-11-334	15-613295	2–3	Fill	—[c]	—	—	57 (J+)
RE15-11-339	15-613296	0–1	Soil	—	0.65	21.1	97.7 (J+)
RE15-11-336	15-613296	2–3	Soil	—	—	52.6	—

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

[a] BVs from LANL (1998, 059730).

[b] SSLs from NMED (2015, 600575).

[c] — = Not detected or not detected above BV.

Table 6.10-3
Organic Chemicals Detected at AOC C-15-004

Sample ID	Location ID	Depth (ft)	Media	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofuran [1,2,3,4,7,8,9-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxin [1,2,3,4,7,8-]	Hexachlorodibenzodioxin [1,2,3,6,7,8-]	Hexachlorodibenzodioxin [1,2,3,7,8,9-]	Hexachlorodibenzodioxins (Total)	Hexachlorodibenzofuran [1,2,3,4,7,8-]	Hexachlorodibenzofuran [1,2,3,6,7,8-]	Hexachlorodibenzofuran [2,3,4,6,7,8-]
Construction Worker SSL[a]				**na[b]**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
Industrial SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
Residential SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
RE15-11-339	15-613296	0–1	Soil	0.000156	0.000413	0.0000827	0.0000025 (J)	0.000187	0.00000238 (J)	0.00000524	0.00000321 (J)	0.0000462	0.00000171 (J)	0.00000143 (J)	0.00000234 (J)

Table 6.10-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Hexachlorodibenzofurans (Total)	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]	Pentachlorodibenzodioxin [1,2,3,7,8-]	Pentachlorodibenzodioxins (Total)	Pentachlorodibenzofuran [2,3,4,7,8-]	Pentachlorodibenzofurans (Totals)	Tetrachlorodibenzodioxin [2,3,7,8-]	Tetrachlorodibenzodioxins (Total)	Tetrachlorodibenzofurans (Totals)
Construction Worker SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**0.000226**	**na**	**na**
Industrial SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**0.000248**	**na**	**na**
Residential SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**0.000049**	**na**	**na**
RE15-11-339	15-613296	0–1	Soil	0.0000551	0.0011	0.000142	0.000000885 (J)	0.00000354 (J)	0.000000691 (J)	0.0000147	0.000000181 (J)	0.000000784 (J)	0.00000782 (J)

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

[a] SSLs from NMED (2015, 600575).

[b] na = Not available.

Table 6.10-4
Radionuclides Detected above BVs at AOC C-15-004

Sample ID	Location ID	Depth (ft)	Media	Uranium-234	Uranium-235/236	Uranium-238
Soil BV[a]				**2.59**	**0.2**	**2.29**
Construction Worker SAL[b]				**770**	**100**	**410**
Industrial SAL[b]				**3000**	**150**	**750**
Residential SAL[b]				**270**	**39**	**150**
RE15-11-333	15-613295	0–1	Fill	—[c]	—	13.9
RE15-11-339	15-613296	0–1	Soil	6.08	0.311	10.4
RE15-11-336	15-613296	2–3	Soil	—	—	4.21

Note: All activities are in pCi/g.

[a] BVs from LANL (1998, 059730).

[b] SALs from LANL (2014, 600064).

[c] — = Not detected or not detected above BV.

Table 6.11-1
Samples Collected and Analyses Requested at AOC C-15-005

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Isotopic Thorium
RE15-11-341	15-613298	0–1	Fill	11-873	11-868	11-868	—*	11-868	—	11-873	11-873	11-873	11-879	11-879
RE15-11-342	15-613298	2–3	Qbt 4	11-873	11-868	11-868	—	11-868	—	11-873	11-873	11-873	11-879	11-879
RE15-11-343	15-613299	0.5–1.5	Fill	11-873	11-868	11-868	—	11-868	—	11-873	11-873	11-873	11-879	11-879
RE15-11-344	15-613299	2.5–3.5	Qbt 4	11-873	11-868	11-868	—	11-868	—	11-873	11-873	11-873	11-879	11-879
RE15-11-345	15-613300	0–1	Fill	11-873	11-868	11-868	—	11-868	—	11-873	11-873	11-873	11-879	11-879
RE15-11-346	15-613300	2–3	Qbt 4	11-873	11-868	11-868	—	11-868	—	11-873	11-873	11-873	11-879	11-879
RE15-11-347	15-613301	0–1	Fill	11-873	11-868	11-868	—	11-868	—	11-873	11-873	11-873	11-879	11-879
RE15-11-348	15-613301	2–3	Qbt 4	11-873	11-868	11-868	—	11-868	—	11-873	11-873	11-873	11-879	11-879
RE15-11-349	15-613302	0–1	Fill	11-873	11-868	11-868	—	11-868	—	11-873	11-873	11-873	11-879	11-879
RE15-11-350	15-613302	2–3	Qbt 4	11-873	11-868	11-868	—	11-868	—	11-873	11-873	11-873	11-879	11-879
RE15-11-357	15-613303	0–1	Fill	11-873	11-868	11-868	11-868	11-868	11-913	11-873	11-873	11-873	11-879	11-879
RE15-11-352	15-613303	2–3	Qbt 4	11-873	11-868	11-868	—	11-868	—	11-873	11-873	11-873	11-879	11-879

* — = Analysis not requested.

Table 6.11-2
Inorganic Chemicals above BVs at AOC C-15-005

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Calcium	Chromium	Copper	Cyanide (Total)	Lead	Magnesium	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Zinc
Qbt 2, 3, 4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**2200**	**7.14**	**4.66**	**0.5**	**11.2**	**1690**	**0.1**	**6.58**	**na[b]**	**na**	**0.3**	**63.5**
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**6120**	**19.3**	**14.7**	**0.5**	**22.3**	**4610**	**0.1**	**15.4**	**na**	**na**	**1.52**	**48.8**
Construction Worker SSL[c]				**41400**	**142**	**57.4**	**4390**	**8850000**	**134[d]**	**14200**	**12.1**	**800**	**1550000**	**77.1**	**753**	**566000**	**248**	**1750**	**106000**
Industrial SSL[c]				**1290000**	**519**	**21.5**	**255000**	**32400000**	**505[d]**	**51900**	**63.3**	**800**	**5680000**	**389**	**25700**	**2080000**	**908**	**6490**	**389000**
Residential SSL[c]				**78000**	**31.3**	**4.25**	**15600**	**13000000**	**96.6[d]**	**3130**	**11.2**	**400**	**339000**	**23.5**	**1560**	**125000**	**54.8**	**391**	**23500**
RE15-11-341	15-613298	0–1	Fill	—[e]	—	—	—	—	—	—	—	—	—	1.11	—	0.94	NA[f]	1.9	—
RE15-11-342	15-613298	2–3	Qbt 4	—	—	—	61.7	2890	—	—	0.58 (U)	—	—	—	—	0.14 (J)	0.0027 (J)	1.5	—
RE15-11-343	15-613299	0.5–1.5	Fill	—	—	—	—	—	—	—	—	22.6	—	2.68	—	0.083 (J)	—	—	—
RE15-11-344	15-613299	2.5–3.5	Qbt 4	—	—	—	—	3280	—	—	0.54 (U)	14.1	—	—	—	0.089 (J)	—	1.4	—
RE15-11-345	15-613300	0–1	Fill	—	—	—	—	—	—	—	0.57 (U)	—	—	—	—	0.21 (J)	—	1.8	—
RE15-11-346	15-613300	2–3	Qbt 4	13200	—	—	89.5	2720	8.9	—	0.56 (U)	45.4	2360 (J+)	—	7.1	—	—	1.9	—
RE15-11-347	15-613301	0–1	Fill	—	2.6 (J)	—	—	—	—	—	—	33.8	—	2.97	—	0.4	—	—	90.8
RE15-11-348	15-613301	2–3	Qbt 4	—	—	—	54.2	—	—	—	0.54 (U)	35.8	—	—	—	—	—	1.3	—
RE15-11-349	15-613302	0–1	Fill	—	—	—	—	—	—	—	0.54 (U)	24	—	0.9	—	0.11 (J)	—	—	57.6
RE15-11-350	15-613302	2–3	Qbt 4	14100	—	3.3	129	3310	10.6	5.1	0.55 (U)	33	2650 (J+)	—	8.9	0.18 (J)	—	1.4	138
RE15-11-357	15-613303	0–1	Fill	—	—	—	—	—	—	—	0.58 (U)	—	—	0.121 (U)	—	0.18 (J)	0.0051 (J)	—	—
RE15-11-352	15-613303	2–3	Qbt 4	15300	—	3	113	4790	10.5	—	0.54 (U)	21.6	2540 (J+)	—	9	1.4	0.023	1.3	—

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.
[a] BVs from LANL (1998, 059730).
[b] na = Not available.
[c] SSLs from NMED (2015, 600575).
[d] SSL for total chromium.
[e] — = Not detected or not detected above BV.
[f] NA = Not analyzed.

Table 6.11-3
Organic Chemicals Detected at AOC C-15-005

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzyl Alcohol	Butylbenzylphthalate	Chrysene	Diethylphthalate	Di-n-butylphthalate	Fluoranthene	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxins (Total)	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Phenanthrene	Pyrene
Construction Worker SSL[a]				**15100**	**242000**	**75300**	**240**	**2310**	**26900[b]**	**53800[b]**	**23100**	**215000**	**26900**	**10000**	**na[c]**	**na**	**na**	**na**	**na**	**na**	**7530**	**7530**
Industrial SSL[a]				**50500**	**960000**	**253000**	**32.3**	**323**	**82000[d]**	**12000[d]**	**3230**	**733000**	**91600**	**33700**	**na**	**na**	**na**	**na**	**na**	**na**	**25300**	**25300**
Residential SSL[a]				**3480**	**66300**	**17400**	**1.53**	**15.3**	**6300[d]**	**2900[d]**	**153**	**49300**	**6160**	**2320**	**na**	**na**	**na**	**na**	**na**	**na**	**1740**	**1740**
RE15-11-341	15-613298	0–1	Fill	—[e]	—	—	—	—	—	—	—	—	—	0.039 (J)	NA[f]	NA	NA	NA	NA	NA	—	—
RE15-11-343	15-613299	0.5–1.5	Fill	—	0.01 (J)	—	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	—	—
RE15-11-344	15-613299	2.5–3.5	Qbt 4	—	0.012 (J)	—	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	—	—
RE15-11-345	15-613300	0–1	Fill	0.41	—	—	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	—	—
RE15-11-347	15-613301	0–1	Fill	—	0.0093 (J)	0.52	0.11 (J)	0.046 (J)	—	0.038 (J)	0.17 (J)	13	0.093 (J)	0.69	NA	NA	NA	NA	NA	NA	0.52	0.44
RE15-11-348	15-613301	2–3	Qbt 4	—	0.0093 (J)	—	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	—	—
RE15-11-350	15-613302	2–3	Qbt 4	—	—	—	—	—	0.044 (J)	—	—	—	—	—	NA	NA	NA	NA	NA	NA	—	—
RE15-11-357	15-613303	0–1	Fill	—	—	—	—	—	—	—	—	—	—	0.065 (J)	0.00000346 (J)	0.0000193	0.00000053 (J)	0.00000172 (J)	0.00000148 (J)	0.0000286 (J)	—	—

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

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] na = Not available.

[d] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[e] — = Not detected.

[f] NA = Not analyzed.

Table 6.12-1
Samples Collected and Analyses Requested at AOC C-15-006

Sample ID	Location ID	Depth (ft)	Field QC Type	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Isotopic Thorium
RE15-11-360	15-613305	0–1	Fill	11-856	11-855	11-855	—*	11-855	—	11-856	11-856	11-856	11-856	11-856
RE15-11-361	15-613305	2–3	Fill	11-856	11-855	11-855	—	11-855	—	11-856	11-856	11-856	11-856	11-856
RE15-11-362	15-613306	0–1	Fill	11-856	11-855	11-855	—	11-855	—	11-856	11-856	11-856	11-856	11-856
RE15-11-363	15-613306	2–3	Fill	11-856	11-855	11-855	—	11-855	—	11-856	11-856	11-856	11-856	11-856
RE15-11-364	15-613307	0–1	Fill	11-856	11-855	11-855	—	11-855	—	11-856	11-856	11-856	11-856	11-856
RE15-11-365	15-613307	2–3	Fill	11-856	11-855	11-855	—	11-855	—	11-856	11-856	11-856	11-856	11-856
RE15-11-366	15-613308	0–1	Fill	11-856	11-855	11-855	—	11-855	—	11-856	11-856	11-856	11-856	11-856
RE15-11-367	15-613308	2–3	Fill	11-856	11-855	11-855	—	11-855	—	11-856	11-856	11-856	11-856	11-856
RE15-11-368	15-613309	0–1	Fill	11-856	11-855	11-855	—	11-855	—	11-856	11-856	11-856	11-856	11-856
RE15-11-369	15-613309	2–3	Fill	11-856	11-855	11-855	—	11-855	—	11-856	11-856	11-856	11-856	11-856
RE15-11-376	15-613310	0–1	Fill	11-856	11-855	11-855	11-855	11-855	11-854	11-856	11-856	11-856	11-856	11-856
RE15-11-371	15-613310	2–3	Fill	11-856	11-855	11-855	—	11-855	—	11-856	11-856	11-856	11-856	11-856

* — = Analysis not requested.

Table 6.12-2
Inorganic Chemicals above BVs at AOC C-15-006

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Manganese	Mercury	Nitrate	Perchlorate	Zinc
Soil BV[a]				**0.83**	**0.4**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**671**	**0.1**	**na[b]**	**na**	**48.8**
Construction Worker SSL[c]				**142**	**72.1**	**36.6[d]**	**14200**	**12.1**	**248000**	**800**	**464**	**77**	**566000**	**248**	**106000**
Industrial SSL[c]				**519**	**1110**	**350[e]**	**51900**	**63.3**	**908000**	**800**	**160000**	**389**	**2080000**	**908**	**389000**
Residential SSL[c]				**31.3**	**70.5**	**23[e]**	**3130**	**11.2**	**54800**	**400**	**10500**	**23.5**	**125000**	**54.8**	**23500**
RE15-11-360	15-613305	0–1	Fill	—[f]	—	—	—	0.54 (UJ)	—	—	—	0.184	—	0.0044 (J)	—
RE15-11-361	15-613305	2–3	Fill	—	—	15.3	—	0.53 (UJ)	—	—	1120	—	0.21	0.0039 (J)	—
RE15-11-362	15-613306	0–1	Fill	3.8 (J)	—	—	—	—	—	—	—	0.187	0.3	0.0038 (J)	—
RE15-11-363	15-613306	2–3	Fill	—	—	—	—	—	—	—	—	0.426	0.25	—	—
RE15-11-364	15-613307	0–1	Fill	—	—	—	—	0.55 (UJ)	—	—	—	—	0.45	—	—
RE15-11-365	15-613307	2–3	Fill	10	1.2	—	—	—	—	43.6	—	4.47	0.18 (J)	0.0038 (J)	78.6
RE15-11-366	15-613308	0–1	Fill	—	—	—	—	—	—	—	—	0.244	2.9	NA[g]	—
RE15-11-367	15-613308	2–3	Fill	3.5 (J)	0.45	—	—	—	—	33	673	1.49	4.1	0.0041 (J)	57
RE15-11-368	15-613309	0–1	Fill	4.9 (J)	—	—	—	0.56 (UJ)	35800	25.9	—	14.4	—	0.004 (J)	52.3
RE15-11-369	15-613309	2–3	Fill	5.4 (J)	—	—	—	0.58 (UJ)	—	23.6	—	0.179	0.2 (J)	—	—
RE15-11-376	15-613310	0–1	Fill	3.6 (J)	—	9.7	—	0.59 (UJ)	—	27.8	—	0.476	0.084 (J)	0.0044 (J)	85.5
RE15-11-371	15-613310	2–3	Fill	2.3 (J)	—	—	16.2	0.55 (UJ)	—	29.2	—	0.594	0.36	—	58.3

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.
[a] BVs from LANL (1998, 059730).
[b] na = Not available.
[c] SSLs from NMED (2015, 600575) unless otherwise noted.
[d] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).
[e] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).
[f] — = Not detected or not detected above BV.
[g] NA = Not analyzed.

Table 6.12-3
Organic Chemicals Detected at AOC C-15-006

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Aroclor-1254	Aroclor-1260	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Butylbenzylphthalate	Chrysene	Di-n-butylphthalate	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxin [1,2,3,6,7,8-]	Hexachlorodibenzodioxin [1,2,3,7,8,9-]	Hexachlorodibenzodioxins (Total)
Construction Worker SSL[a]				**15100**	**4.91**	**85.3**	**1080000**[b]	**5380**	**53800**[b]	**23100**	**26900**	**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**
Industrial SSL[a]				**50500**	**11.5**	**11.5**	**3300000**[d]	**1830**	**12000**[d]	**3230**	**91600**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
Residential SSL[a]				**3480**	**1.14**	**2.43**	**250000**[d]	**380**	**2900**[d]	**153**	**6160**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
RE15-11-365	15-613307	2–3	Fill	—[e]	NA[f]	NA	—	0.14 (J)	—	0.14 (J)	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-367	15-613308	2–3	Fill	—	NA	NA	0.55 (J)	—	—	—	—	NA	NA	NA	NA	NA	NA	NA
RE15-11-368	15-613309	0–1	Fill	0.064 (J)	NA	NA	—	—	—	—	0.052 (J)	NA	NA	NA	NA	NA	NA	NA
RE15-11-376	15-613310	0–1	Fill	—	0.032 (J)	0.018 (J)	—	—	—	—	—	0.0000144	0.0000327	0.0000033 (J)	0.0000083	0.000000768 (J)	0.000000736 (J)	0.00000568
RE15-11-371	15-613310	2–3	Fill	—	NA	NA	—	—	0.042 (J)	—	—	NA	NA	NA	NA	NA	NA	NA

Table 6.12-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Hexachlorodibenzofuran [1,2,3,4,7,8-]	Hexachlorodibenzofurans (Total)	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]	Pentachlorodibenzofuran [2,3,4,7,8-]	Pentachlorodibenzofurans (Totals)	Tetrachlorodibenzodioxins (Total)	Tetrachlorodibenzofuran [2,3,7,8-]	Tetrachlorodibenzofurans (Totals)
Construction Worker SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**0.0172**	**na**
Industrial SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**0.00248**	**na**
Residential SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**0.00049**	**na**
RE15-11-365	15-613307	2–3	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA
RE15-11-367	15-613308	2–3	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA
RE15-11-368	15-613309	0–1	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA
RE15-11-376	15-613310	0–1	Fill	0.000000534 (J)	0.00000357 (J)	0.000115	0.00000538 (J)	0.000000644 (J)	0.00000651	0.000000145 (J)	0.00000109	0.0000119
RE15-11-371	15-613310	2–3	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] na = Not available.

[d] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[e] — = Not detected.

[f] NA = Not analyzed.

Table 7.2-1
Samples Collected and Analyses Requested at SWMU 36-001

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/ Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium	Isotopic Plutonium	Isotopic Thorium	Americium-241	Strontium-90	Tritium	Gamma Spectroscopy
0236-96-0009	36-03127	10.83–13.33	Soil	1809	1808	1808	—	1808	—	—	—	—	1810	—	—	—	—	—	—
0236-96-0010	36-03127	14.25–16.67	Soil	1809	1808	1808	—	1808	—	—	—	—	1810	—	—	—	—	—	—
0236-96-0022	36-03131	5.5–7.58	Soil	1792	1791	1791	—	1791	—	—	—	—	1793	—	—	—	—	—	—
0236-96-0023	36-03131	9.17–11.67	Soil	1792	1791	1791	—	1791	—	—	—	—	1793	—	—	—	—	—	—
RE36-11-2862	36-613721	2–4	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2863	36-613721	5–6.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2864	36-613721	10–11.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2865	36-613722	0–1.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2866	36-613722	5–6.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2867	36-613722	10–11.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2868	36-613723	0–1.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2869	36-613723	5–6	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2870	36-613723	10–11.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2871	36-613724	0–1.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2872	36-613724	5–6.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2873	36-613724	10–11.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2874	36-613725	0–1	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2875	36-613725	5–6.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2876	36-613725	10–11.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2877	36-613726	0–1.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2878	36-613726	5–6.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2879	36-613726	10–11.5	Fill	11-972	11-971	11-971	11-971	11-971	11-973	11-972	11-972	11-972	11-974	11-974	11-974	11-974	11-974	11-974	11-974
RE36-11-2880	36-613727	0–1.5	Fill	11-977	11-975	11-975	11-975	11-975	11-976	11-977	11-977	11-977	11-978	11-978	11-978	11-978	11-978	11-978	11-978
RE36-11-2881	36-613727	5–6.5	Fill	11-977	11-975	11-975	11-975	11-975	11-976	11-977	11-977	11-977	11-978	11-978	11-978	11-978	11-978	11-978	11-978
RE36-11-2882	36-613727	10–11.5	Fill	11-977	11-975	11-975	11-975	11-975	11-976	11-977	11-977	11-977	11-978	11-978	11-978	11-978	11-978	11-978	11-978
RE36-11-2949	36-613727	13.5–15	Fill	11-979	11-979	11-979	11-979	11-979	11-980	11-979	11-979	11-979	11-979	11-979	11-979	11-979	11-979	11-979	11-979

* — = Analysis not requested.

Table 7.2-2
Inorganic Chemicals above BVs at SWMU 36-001

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Cadmium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Nickel	Nitrate	Perchlorate	Silver	Sodium	Thallium	Uranium	Zinc
Soil BV[a]				**0.83**	**295**	**0.4**	**19.3**	**14.7**	**0.5**	**21500**	**22.3**	**0.1**	**15.4**	**na[b]**	**na**	**1**	**915**	**0.73**	**1.82**	**48.8**
Construction Worker SSL[c]				**142**	**4390**	**72.1**	**134[d]**	**14200**	**12.1**	**248000**	**800**	**77.1**	**753**	**566000**	**248**	**1770**	**9730000**	**3.54**	**277**	**106000**
Industrial SSL[c]				**519**	**255000**	**1110**	**505[d]**	**51900**	**63.3**	**908000**	**800**	**389**	**25700**	**2080000**	**908**	**6490**	**35700000**	**13**	**3880**	**389000**
Residential SSL[c]				**31.3**	**15600**	**70.5**	**96.6[d]**	**3130**	**11.2**	**54800**	**400**	**23.5**	**1560**	**125000**	**54.8**	**391**	**7820000**	**0.782**	**234**	**23500**
0236-96-0009	36-03127	10.83–13.33	Soil	5.6 (U)	—[e]	0.56 (U)	—	—	NA[f]	—	—	—	—	NA	NA	—	—	—	NA	—
0236-96-0010	36-03127	14.25–16.67	Soil	5.7 (U)	—	0.57 (UJ)	—	—	NA	—	—	—	—	NA	NA	—	—	—	NA	—
0236-96-0022	36-03131	5.5–7.58	Soil	0.87 (UJ)	—	—	—	43.1	NA	—	—	—	—	NA	NA	—	—	0.89 (J)	NA	77.6
0236-96-0023	36-03131	9.17–11.67	Soil	0.85 (UJ)	—	—	—	—	NA	—	—	—	—	NA	NA	—	—	—	NA	—
RE36-11-2862	36-613721	2–4	Fill	5 (J)	—	—	—	1160	0.52 (U)	—	79.7	0.393 (U)	—	7.5	NA	—	—	—	107	260
RE36-11-2863	36-613721	5–6.5	Fill	12.6 (J)	—	—	—	54.3	0.55 (U)	—	—	0.433 (U)	—	4.2	—	—	—	—	30.9	61.8
RE36-11-2864	36-613721	10–11.5	Fill	—	—	—	—	—	0.52 (U)	—	—	0.266 (U)	—	2.3	—	—	—	—	3.8	—
RE36-11-2865	36-613722	0–1.5	Fill	—	—	—	—	—	0.53 (U)	—	—	0.315 (U)	—	1.9	—	—	—	—	—	—
RE36-11-2866	36-613722	5–6.5	Fill	—	—	—	—	—	—	—	—	0.399 (U)	—	4.9	0.0035 (J)	—	—	—	—	—
RE36-11-2867	36-613722	10–11.5	Fill	—	—	—	—	—	0.56 (U)	—	—	0.391 (U)	—	7.7	—	—	—	—	—	—
RE36-11-2868	36-613723	0–1.5	Fill	—	—	—	—	—	—	—	—	0.279 (U)	—	0.24	—	—	—	—	—	—
RE36-11-2869	36-613723	5–6	Fill	1.8 (J)	—	—	—	598	0.52 (U)	—	25.8	0.306 (U)	—	0.82	NA	—	—	—	7.4	95.8
RE36-11-2870	36-613723	10–11.5	Fill	—	—	—	—	—	—	—	—	0.411 (U)	—	1.7	—	—	—	—	2.1	—
RE36-11-2871	36-613724	0–1.5	Fill	—	—	—	—	—	0.54 (U)	—	—	0.301 (U)	—	0.41	—	—	—	—	—	—
RE36-11-2872	36-613724	5–6.5	Fill	1.4 (U)	—	0.42	—	81.1	—	—	—	0.284 (U)	—	20	—	—	—	—	1.9	—
RE36-11-2873	36-613724	10–11.5	Fill	—	—	—	—	—	0.54 (U)	—	—	0.352 (U)	—	5.6	—	—	—	—	—	—
RE36-11-2874	36-613725	0–1	Fill	—	—	—	—	—	0.53 (U)	—	—	0.3 (U)	—	0.42	NA	—	—	—	2.2	—
RE36-11-2875	36-613725	5–6.5	Fill	22.6	622	—	31	1890	0.53 (U)	27100	668	0.307 (U)	22.7	0.72	—	4.4	1450	—	274	397
RE36-11-2876	36-613725	10–11.5	Fill	0.91 (U)	—	—	—	—	0.56 (U)	—	23.8	0.348 (U)	—	4.8	—	—	—	—	4	52
RE36-11-2877	36-613726	0–1.5	Fill	—	—	—	—	—	0.53 (U)	—	—	0.329 (U)	—	0.66	—	—	—	—	—	—
RE36-11-2878	36-613726	5–6.5	Fill	—	—	—	—	—	0.57 (U)	—	—	0.405 (U)	—	1.2	—	—	—	—	—	—
RE36-11-2879	36-613726	10–11.5	Fill	—	—	—	—	—	0.56 (U)	—	—	0.421 (U)	—	3.9	—	—	—	—	—	—
RE36-11-2880	36-613727	0–1.5	Fill	—	—	—	—	—	0.56 (U)	—	—	—	—	5.2	—	—	—	—	2.7 (J)	—
RE36-11-2881	36-613727	5–6.5	Fill	—	—	—	—	88.6 (J)	—	—	—	—	132	6.6	—	—	—	—	95.1 (J)	105
RE36-11-2882	36-613727	10–11.5	Fill	—	—	—	—	2340 (J)	0.56 (U)	—	—	—	—	1	—	—	—	—	27.3 (J)	59.6
RE36-11-2949	36-613727	13.5–15	Fill	—	—	—	—	60 (J)	0.59 (U)	—	—	—	—	1.5	—	—	—	—	10.2 (J)	—

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575).

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

[f] NA = Not analyzed.

Table 7.2-3
Organic Chemicals Detected at SWMU 36-001

Sample ID	Location ID	Depth (ft)	Media	Acetone	Benzyl Alcohol	Bis(2-ethylhexyl)phthalate	Di-n-butylphthalate	Dinitroaniline[3,5-]	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofuran [1,2,3,4,7,8,9-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxin [1,2,3,4,7,8-]	Hexachlorodibenzodioxin [1,2,3,6,7,8-]
Construction Worker SSL[a]				**242000**	**26900[b]**	**5380**	**26900**	**10000[c]**	**na[d]**	**na**	**na**	**na**	**na**	**na**	**na**
Industrial SSL[a]				**960000**	**82000[e]**	**1830**	**91600**	**32000[c]**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
Residential SSL[a]				**66300**	**6300[e]**	**380**	**6160**	**2200[c]**	**na**	**na**	**na**	**na**	**na**	**na**	**na**
0236-96-0009	36-03127	10.83–13.33	Soil	—[f]	—	—	—	NA[g]	NA	NA	NA	NA	NA	NA	NA
0236-96-0010	36-03127	14.25–16.67	Soil	—	—	—	—	NA	NA	NA	NA	NA	NA	NA	NA
0236-96-0023	36-03131	9.17–11.67	Soil	0.041	—	—	—	NA	NA	NA	NA	NA	NA	NA	NA
RE36-11-2862	36-613721	2–4	Fill	—	—	0.15 (J)	0.076 (J)	—	0.000197	0.000367	0.00000937	0.000000602 (J)	0.0000211	0.00000257 (J)	0.00000646
RE36-11-2863	36-613721	5–6.5	Fill	—	—	—	—	—	0.00000364 (J)	0.00000695	—	—	—	—	—
RE36-11-2864	36-613721	10–11.5	Fill	—	—	—	—	—	0.00000099 (J)	0.00000191 (J)	—	—	—	—	—
RE36-11-2865	36-613722	0–1.5	Fill	—	—	—	—	—	0.00000152 (J)	0.00000333 (J)	—	—	—	—	—
RE36-11-2866	36-613722	5–6.5	Fill	—	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2867	36-613722	10–11.5	Fill	—	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2868	36-613723	0–1.5	Fill	—	—	—	—	—	0.00000144 (J)	0.00000298 (J)	—	—	—	—	—
RE36-11-2869	36-613723	5–6	Fill	—	—	—	—	—	0.00000461 (J)	0.00000834	0.00000417 (J)	0.000000512 (J)	0.00000566	—	—
RE36-11-2870	36-613723	10–11.5	Fill	—	—	—	—	—	0.000000787 (J)	0.00000171 (J)	—	—	—	—	—
RE36-11-2871	36-613724	0–1.5	Fill	—	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2872	36-613724	5–6.5	Fill	—	—	—	—	—	0.00000729	0.0000148	0.0000241	0.00000167 (J)	0.000032	0.000000939 (J)	0.00000145 (J)
RE36-11-2873	36-613724	10–11.5	Fill	—	—	—	—	—	0.000000481 (J)	0.000000481 (J)	0.000000603 (J)	—	0.000000603 (J)	—	—
RE36-11-2874	36-613725	0–1	Fill	—	—	—	—	—	—	0.000000728 (J)	—	—	—	—	—
RE36-11-2875	36-613725	5–6.5	Fill	—	—	0.062 (J)	—	0.004 (J)	0.0000675	0.00018	0.000136	0.0000101	0.000183	0.00000428 (J)	0.00000996
RE36-11-2876	36-613725	10–11.5	Fill	—	—	—	—	—	—	0.00000054 (J)	—	—	—	—	—
RE36-11-2877	36-613726	0–1.5	Fill	—	—	—	—	—	0.000000586 (J)	0.00000115 (J)	—	—	—	—	—
RE36-11-2878	36-613726	5–6.5	Fill	—	0.073 (J)	—	—	—	0.00000138 (J)	0.00000248 (J)	—	—	—	—	—
RE36-11-2879	36-613726	10–11.5	Fill	—	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2880	36-613727	0–1.5	Fill	—	—	0.31 (J-)	—	—	0.0000199	0.0000514	0.00000627	—	0.00000901	0.00000126 (J)	0.00000201 (J)
RE36-11-2881	36-613727	5–6.5	Fill	—	—	0.069 (J-)	—	—	0.000822	0.00112	0.00015	0.0000187 (J)	0.000552	—	0.0000134 (J)
RE36-11-2882	36-613727	10–11.5	Fill	—	—	—	—	—	0.0000159	0.000026	0.0000103	0.000000737 (J)	0.0000155	0.000000476 (J)	—
RE36-11-2949	36-613727	13.5–15	Fill	—	—	—	—	—	0.0000525 (J)	0.0000798	0.000023	0.00000222 (J)	0.0000507	—	0.00000172 (J)

Table 7.2-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Hexachlorodibenzodioxin [1,2,3,7,8,9-]	Hexachlorodibenzodioxins (Total)	Hexachlorodibenzofuran [1,2,3,4,7,8-]	Hexachlorodibenzofuran [1,2,3,6,7,8-]	Hexachlorodibenzofuran [1,2,3,7,8,9-]	Hexachlorodibenzofuran [2,3,4,6,7,8-]	Hexachlorodibenzofurans (Total)	Methylene Chloride	Methylphenol[2-]	Methylphenol[4-]	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]
Construction Worker SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1210**	**13400[b]**	**26800[b]**	**na**	**na**
Industrial SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**5130**	**41000[e]**	**82000[e]**	**na**	**na**
Residential SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**na**	**409**	**3200[e]**	**6300[e]**	**na**	**na**
0236-96-0009	36-03127	10.83–13.33	Soil	NA	NA	NA	NA	NA	NA	NA	0.006 (J)	—	—	NA	NA
0236-96-0010	36-03127	14.25–16.67	Soil	NA	NA	NA	NA	NA	NA	NA	0.004 (J)	—	—	NA	NA
0236-96-0023	36-03131	9.17–11.67	Soil	NA	NA	NA	NA	NA	NA	NA	—	—	—	NA	NA
RE36-11-2862	36-613721	2–4	Fill	0.00000728	0.0000675	0.00000215 (J)	—	0.00000054 (J)	0.0000022 (J)	0.0000204	—	—	—	0.00151	0.0000154
RE36-11-2863	36-613721	5–6.5	Fill	—	0.000000482 (J)	—	—	—	—	—	—	—	—	0.0000292	—
RE36-11-2864	36-613721	10–11.5	Fill	—	—	—	—	—	—	—	—	—	—	0.00000726 (J)	—
RE36-11-2865	36-613722	0–1.5	Fill	—	—	—	—	—	—	—	—	—	—	0.0000196	—
RE36-11-2866	36-613722	5–6.5	Fill	—	—	—	—	—	—	—	—	—	—	0.00000242 (J)	—
RE36-11-2867	36-613722	10–11.5	Fill	—	—	—	—	—	—	—	—	—	—	0.00000195 (J)	—
RE36-11-2868	36-613723	0–1.5	Fill	—	—	—	—	—	—	—	—	—	—	0.00000955	—
RE36-11-2869	36-613723	5–6	Fill	—	0.00000351 (J)	0.00000283 (J)	0.00000277 (J)	0.00000093 (J)	—	0.0000185	—	—	—	0.0000247	0.00000122 (J)
RE36-11-2870	36-613723	10–11.5	Fill	—	—	—	—	—	—	0.000000494 (J)	—	—	—	0.00000773 (J)	—
RE36-11-2871	36-613724	0–1.5	Fill	—	—	—	—	—	—	—	—	—	—	0.00000184 (J)	—
RE36-11-2872	36-613724	5–6.5	Fill	0.00000138 (J)	0.0000132	0.00000943	0.00000674	0.00000187 (J)	0.00000842	0.0000658	—	—	—	0.0000163	0.00000606 (J)
RE36-11-2873	36-613724	10–11.5	Fill	—	—	—	—	—	—	0.000000609 (J)	—	—	—	0.0000023 (J)	—
RE36-11-2874	36-613725	0–1	Fill	—	—	—	—	—	—	—	—	—	—	0.00000414 (J)	—
RE36-11-2875	36-613725	5–6.5	Fill	0.00000983	0.000205	0.0000458	0.0000486	0.0000203	0.0000757	0.000474	—	—	—	0.000154	0.000032
RE36-11-2876	36-613725	10–11.5	Fill	—	—	—	—	—	—	—	—	—	—	0.00000295 (J)	—
RE36-11-2877	36-613726	0–1.5	Fill	—	—	—	—	—	—	—	—	—	—	0.00000463 (J)	—
RE36-11-2878	36-613726	5–6.5	Fill	—	—	—	—	—	—	—	—	—	—	0.00000494 (J)	—
RE36-11-2879	36-613726	10–11.5	Fill	—	—	—	—	—	—	—	—	—	—	0.00000212 (J)	—
RE36-11-2880	36-613727	0–1.5	Fill	0.00000207 (J)	0.0000272	0.00000217 (J)	0.00000187 (J)	—	0.00000247 (J)	0.0000188	—	0.047 (J-)	0.12 (J-)	0.0000706 (J+)	0.00000282 (J)
RE36-11-2881	36-613727	5–6.5	Fill	0.00000465 (J)	0.0000393	0.00000487 (J)	0.00000674 (J)	—	0.00000853 (J)	0.000153	—	—	—	0.00815 (J+)	0.000926
RE36-11-2882	36-613727	10–11.5	Fill	—	0.0000081	0.00000289 (J)	0.00000243 (J)	—	0.00000307 (J)	0.0000243	—	—	—	0.000148 (J+)	0.0000114
RE36-11-2949	36-613727	13.5–15	Fill	0.00000121 (J)	0.0000153	0.00000315 (J)	0.00000343 (J)	—	0.00000302 (J)	0.0000372	—	—	—	NA	0.0000466

Table 7.2-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Pentachlorodibenzodioxin [1,2,3,7,8-]	Pentachlorodibenzodioxins (Total)	Pentachlorodibenzofuran [1,2,3,7,8-]	Pentachlorodibenzofuran [2,3,4,7,8-]	Pentachlorodibenzofurans (Totals)	Phenol	Tetrachlorodibenzodioxin [2,3,7,8-]	Tetrachlorodibenzodioxins (Total)	Tetrachlorodibenzofuran [2,3,7,8-]	Tetrachlorodibenzofurans (Totals)	Trichlorofluoromethane
Construction Worker SSL[a]				**na**	**na**	**na**	**na**	**na**	**77400**	**0.000226**	**na**	**0.0172**	**na**	**1130**
Industrial SSL[a]				**na**	**na**	**na**	**na**	**na**	**275000**	**0.000248**	**na**	**0.00248**	**na**	**6030**
Residential SSL[a]				**na**	**na**	**na**	**na**	**na**	**18500**	**0.000049**	**na**	**0.00049**	**na**	**1230**
0236-96-0009	36-03127	10.83–13.33	Soil	NA	NA	NA	NA	NA	—	NA	NA	NA	NA	—
0236-96-0010	36-03127	14.25–16.67	Soil	NA	NA	NA	NA	NA	—	NA	NA	NA	NA	—
0236-96-0023	36-03131	9.17–11.67	Soil	NA	NA	NA	NA	NA	—	NA	NA	NA	NA	—
RE36-11-2862	36-613721	2–4	Fill	0.00000316 (J)	0.0000236	0.0000013 (J)	0.00000259 (J)	0.0000253	—	0.00000172	0.0000171	0.00000282 (J)	0.0000422	—
RE36-11-2863	36-613721	5–6.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2864	36-613721	10–11.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2865	36-613722	0–1.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2866	36-613722	5–6.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2867	36-613722	10–11.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2868	36-613723	0–1.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2869	36-613723	5–6	Fill	0.000000616 (J)	0.00000335 (J)	0.00000316 (J)	0.00000512	0.0000517	—	0.000000436 (J)	0.00000367	0.0000054 (J)	0.000086	—
RE36-11-2870	36-613723	10–11.5	Fill	—	—	—	—	0.00000108 (J)	—	—	—	—	0.00000613 (J)	—
RE36-11-2871	36-613724	0–1.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2872	36-613724	5–6.5	Fill	—	0.0000103	0.00000323 (J)	0.00000774	0.0000623	—	0.000000243 (J)	0.00000913	0.00000369 (J)	0.0000558	—
RE36-11-2873	36-613724	10–11.5	Fill	—	—	—	—	—	—	—	0.000000359 (J)	—	—	—
RE36-11-2874	36-613725	0–1	Fill	—	—	—	—	—	—	—	0.000000239 (J)	—	—	—
RE36-11-2875	36-613725	5–6.5	Fill	0.00000714	0.000139	0.0000311	0.0000589	0.000684	—	0.00000318	0.000136	0.0000384	0.00112	0.00071 (J+)
RE36-11-2876	36-613725	10–11.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2877	36-613726	0–1.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2878	36-613726	5–6.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2879	36-613726	10–11.5	Fill	—	—	—	—	—	—	—	—	—	—	—
RE36-11-2880	36-613727	0–1.5	Fill	0.00000132 (J)	0.0000129	0.00000093 (J)	0.00000175 (J)	0.0000199	0.64 (J-)	0.000000409 (J)	0.00000593	—	0.0000182 (J)	—
RE36-11-2881	36-613727	5–6.5	Fill	—	0.000000904 (J)	—	—	0.0000189 (J)	—	—	—	—	—	—
RE36-11-2882	36-613727	10–11.5	Fill	—	0.00000721	0.00000161 (J)	0.00000263 (J)	0.0000292	—	—	0.00000666	0.00000213 (J)	0.0000353	—
RE36-11-2949	36-613727	13.5–15	Fill	—	0.0000087	0.00000177 (J)	0.00000222 (J)	0.0000295	—	0.000000368 (J)	0.00000974	0.00000189 (J)	0.0000342	—

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

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[d] na = Not available.

[e] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[f] — = Not detected.

[g] NA = Not analyzed.

Table 7.2-4
Radionuclides Detected above BVs at SWMU 36-001

Sample ID	Location ID	Depth (ft)	Media	Uranium-234	Uranium-235/236	Uranium-238
Soil BV[a]				**2.59**	**0.2**	**2.29**
Construction Worker SAL[b]				**770**	**100**	**410**
Industrial SAL[b]				**3000**	**150**	**750**
Residential SAL[b]				**270**	**39**	**150**
0236-96-0022	36-03131	5.5–7.58	Soil	—[c]	—	3.862
RE36-11-2862	36-613721	2–4	Fill	4.42 (J+)	0.606 (J+)	26.7 (J+)
RE36-11-2863	36-613721	5–6.5	Fill	—	—	6.36
RE36-11-2864	36-613721	10–11.5	Fill	—	—	—
RE36-11-2865	36-613722	0–1.5	Fill	—	—	—
RE36-11-2866	36-613722	5–6.5	Fill	—	—	—
RE36-11-2867	36-613722	10–11.5	Fill	—	—	—
RE36-11-2868	36-613723	0–1.5	Fill	—	—	—
RE36-11-2869	36-613723	5–6	Fill	—	—	2.62
RE36-11-2870	36-613723	10–11.5	Fill	—	—	—
RE36-11-2871	36-613724	0–1.5	Fill	—	—	—
RE36-11-2872	36-613724	5–6.5	Fill	—	—	—
RE36-11-2873	36-613724	10–11.5	Fill	—	—	—
RE36-11-2874	36-613725	0–1	Fill	—	—	—
RE36-11-2875	36-613725	5–6.5	Fill	11.9	1.8	88.6
RE36-11-2876	36-613725	10–11.5	Fill	—	—	—
RE36-11-2877	36-613726	0–1.5	Fill	—	—	—
RE36-11-2878	36-613726	5–6.5	Fill	—	—	—
RE36-11-2879	36-613726	10–11.5	Fill	—	—	—
RE36-11-2880	36-613727	0–1.5	Fill	—	—	—
RE36-11-2881	36-613727	5–6.5	Fill	61.3	6.7	464
RE36-11-2882	36-613727	10–11.5	Fill	—	—	5.17
RE36-11-2949	36-613727	13.5–15	Fill	—	—	3.42

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

[a] BVs from LANL (1998, 059730).

[b] SALs from LANL (2014, 600064).

[c] — = Not detected or not analyzed.

Table 7.3-1
Samples Collected and Analyses Requested at SWMU 36-003(b)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium
RE15-11-975	15-613464	0–1	Fill	11-733	11-732	11-732	—*	11-732	—	11-733	11-733	11-733	11-734
RE15-11-976	15-613464	3–4	Qbt 3	11-733	11-732	11-732	—	11-732	—	11-733	11-733	11-733	11-734
RE15-11-983	15-613465	0–1	Fill	11-733	11-732	11-732	11-732	11-732	11-735	11-733	11-733	11-733	11-734
RE15-11-978	15-613465	3–4	Fill	11-733	11-732	11-732	—	11-732	—	11-733	11-733	11-733	11-734
RE15-11-979	15-613466	0–1	Fill	11-733	11-732	11-732	—	11-732	—	11-733	11-733	11-733	11-734
RE15-11-980	15-613466	3–4	Qbt 3	11-733	11-732	11-732	—	11-732	—	11-733	11-733	11-733	11-734

* — = Analysis not requested.

Table 7.3-2
Inorganic Chemicals above BVs at SWMU 36-003(b)

Sample ID	Location ID	Depth (ft)	Media	Copper	Cyanide (Total)	Nitrate	Selenium
Qbt 2, 3, 4 BV[a]				**4.66**	**0.5**	**na**[b]	**0.3**
Soil BV[a]				**14.7**	**0.5**	**na**	**1.52**
Construction Worker SSL[c]				**14200**	**12.1**	**566000**	**1750**
Industrial SSL[c]				**51900**	**63.3**	**2080000**	**6490**
Residential SSL[c]				**3130**	**11.2**	**125000**	**391**
RE15-11-975	15-613464	0–1	Fill	15.2	0.54 (UJ)	0.64	—[d]
RE15-11-976	15-613464	3–4	Qbt 3	—	0.51 (UJ)	—	1.3
RE15-11-983	15-613465	0–1	Fill	—	0.54 (UJ)	3.1	—
RE15-11-978	15-613465	3–4	Fill	—	0.51 (UJ)	6.8	—
RE15-11-979	15-613466	0–1	Fill	—	0.51 (UJ)	0.48	—
RE15-11-980	15-613466	3–4	Qbt 3	—	—	0.16 (J)	1.3

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575).

[d] — = Not detected or not detected above BV.

Table 7.3-3
Organic Chemicals Detected at SWMU 36-003(b)

Sample ID	Location ID	Depth (ft)	Media	Fluoranthene	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxins (Total)	Hexachlorodibenzofurans (Total)	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]	Pentachlorodibenzofurans (Totals)	Phenanthrene	Pyrene
Construction Worker SSL[a]				**10000**	**na**[b]	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**7530**	**7530**
Industrial SSL[a]				**33700**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**25300**	**25300**
Residential SSL[a]				**2320**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**1740**	**1740**
RE15-11-983	15-613465	0–1	Fill	0.091 (J)	0.0000119	0.0000393	0.00000184 (J)	0.00000424 (J)	0.0000029 (J)	0.00000218 (J)	0.000107	0.000004 (J)	0.00000101 (J)	0.086 (J)	0.062 (J)

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

[a] SSLs from NMED (2015, 600575).

[b] na = Not available.

Table 7.4-1
Samples Collected and Analyses Requested at SWMU 36-005

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium
RE15-11-1091	15-613507	0–1	Soil	11-929	11-928	11-928	—*	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1092	15-613507	2–3	Soil	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1093	15-613507	4–5	Qbt 3	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1094	15-613508	0–1	Soil	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1095	15-613508	2–3	Soil	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1096	15-613508	4–5	Qbt 3	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1097	15-613509	0–1	Soil	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1098	15-613509	2–3	Qbt 3	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1099	15-613509	4–5	Qbt 3	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1100	15-613510	0–1	Soil	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1101	15-613510	2–3	Soil	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1102	15-613510	4–5	Qbt 3	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1103	15-613511	0–1	Soil	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1104	15-613511	2–3	Qbt 3	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1105	15-613511	4–5	Qbt 3	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930

Table 7.4-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium
RE15-11-1106	15-613512	0–1	Soil	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1107	15-613512	2–3	Soil	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1108	15-613512	4–5	Soil	11-929	11-928	11-928	—	11-928	—	11-929	11-929	11-929	11-930
RE15-11-1109	15-613513	0–1	Soil	11-929	11-928	11-928	11-928	11-928	11-931	11-929	11-929	11-929	11-930
RE15-11-1110	15-613513	2–3	Qbt 3	11-933	11-932	11-932	11-932	11-932	—	11-933	11-933	11-933	11-933
RE15-11-1111	15-613513	4–5	Qbt 3	11-933	11-932	11-932	11-932	11-932	—	11-933	11-933	11-933	11-933
RE15-11-1120	36-03020	0–1	Soil	11-737	11-736	11-736	—	11-736	—	11-737	11-737	11-737	11-738
RE15-11-1121	36-03020	1–2	Soil	11-737	11-736	11-736	—	11-736	—	11-737	11-737	11-737	11-738
RE15-11-1118	36-03022	0–0.5	Soil	11-737	11-736	11-736	—	11-736	—	11-737	11-737	11-737	11-738
RE15-11-1119	36-03022	0.5–1	Soil	11-737	11-736	11-736	—	11-736	—	11-737	11-737	11-737	11-738
RE15-11-1058	36-03051	0–1	Fill	11-737	11-736	11-736	—	11-736	—	11-737	11-737	11-737	11-738
RE15-11-1059	36-03051	2–3	Soil	11-737	11-736	11-736	—	11-736	—	11-737	11-737	11-737	11-738
RE15-11-1060	36-03051	4–5	Soil	11-737	11-736	11-736	—	11-736	—	11-737	11-737	11-737	11-738

* — = Analysis not requested.

Table 7.4-2
Inorganic Chemicals above BVs at SWMU 36-005

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Beryllium	Calcium	Chromium	Copper	Cyanide (Total)	Nickel	Nitrate	Perchlorate	Selenium
Qbt 2, 3, 4 BV[a]				**0.5**	**46**	**1.21**	**2200**	**7.14**	**4.66**	**0.5**	**6.58**	**na[b]**	**na**	**0.3**
Soil BV[a]				**0.83**	**295**	**1.83**	**6120**	**19.3**	**14.7**	**0.5**	**15.4**	**na**	**na**	**1.52**
Construction Worker SSL[c]				**142**	**4390**	**148**	**8850000**	**134[d]**	**14200**	**12.1**	**753**	**566000**	**248**	**1750**
Industrial SSL[c]				**519**	**255000**	**2580**	**32400000**	**505[d]**	**51900**	**63.3**	**25700**	**2080000**	**908**	**6490**
Residential SSL[c]				**31.3**	**15600**	**156**	**13000000**	**96.6[d]**	**3130**	**11.2**	**1560**	**125000**	**54.8**	**391**
RE15-11-1091	15-613507	0–1	Soil	—[e]	—	—	—	—	—	0.52 (UJ)	—	0.18 (J)	—	—
RE15-11-1092	15-613507	2–3	Soil	—	—	—	—	—	—	0.53 (UJ)	—	0.15 (J)	0.0038 (J)	1.6 (J-)
RE15-11-1093	15-613507	4–5	Qbt 3	—	—	—	—	7.2	—	0.51 (UJ)	—	0.14 (J)	—	1.3 (J-)
RE15-11-1094	15-613508	0–1	Soil	—	—	—	—	—	—	0.53 (UJ)	—	0.16 (J)	—	—
RE15-11-1095	15-613508	2–3	Soil	—	—	—	—	—	—	0.52 (UJ)	—	0.12 (J)	—	1.9 (J-)
RE15-11-1096	15-613508	4–5	Qbt 3	—	—	—	—	27.2	—	—	12.4	0.073 (J)	—	1.6 (J-)
RE15-11-1097	15-613509	0–1	Soil	—	—	—	—	—	—	—	—	16.4	—	—
RE15-11-1098	15-613509	2–3	Qbt 3	—	257	1.4	—	—	—	0.53 (UJ)	—	3.1	—	2.3 (J-)
RE15-11-1099	15-613509	4–5	Qbt 3	—	—	—	—	15	—	0.52 (UJ)	7.7	0.39	—	1.2 (J-)

Table 7.4-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Beryllium	Calcium	Chromium	Copper	Cyanide (Total)	Nickel	Nitrate	Perchlorate	Selenium
Qbt 2, 3, 4 BV[a]				**0.5**	**46**	**1.21**	**2200**	**7.14**	**4.66**	**0.5**	**6.58**	**na[b]**	**na**	**0.3**
Soil BV[a]				**0.83**	**295**	**1.83**	**6120**	**19.3**	**14.7**	**0.5**	**15.4**	**na**	**na**	**1.52**
Construction Worker SSL[c]				**142**	**4390**	**148**	**8850000**	**134[d]**	**14200**	**12.1**	**753**	**566000**	**248**	**1750**
Industrial SSL[c]				**519**	**255000**	**2580**	**32400000**	**505[d]**	**51900**	**63.3**	**25700**	**2080000**	**908**	**6490**
Residential SSL[c]				**31.3**	**15600**	**156**	**13000000**	**96.6[d]**	**3130**	**11.2**	**1560**	**125000**	**54.8**	**391**
RE15-11-1100	15-613510	0–1	Soil	—	—	—	—	—	—	0.54 (UJ)	—	0.26	—	—
RE15-11-1101	15-613510	2–3	Soil	—	—	—	—	—	—	0.53 (UJ)	—	0.17 (J)	—	2.2 (J-)
RE15-11-1102	15-613510	4–5	Qbt 3	—	—	—	—	8.4	—	0.52 (UJ)	—	—	—	0.98 (J-)
RE15-11-1103	15-613511	0–1	Soil	—	—	—	—	—	—	0.56 (UJ)	—	3	—	—
RE15-11-1104	15-613511	2–3	Qbt 3	—	—	—	—	—	—	0.53 (UJ)	—	1.1	—	1.5 (J-)
RE15-11-1105	15-613511	4–5	Qbt 3	—	—	—	—	—	—	0.53 (UJ)	—	1.3	0.0033 (J)	1.7 (J-)
RE15-11-1106	15-613512	0–1	Soil	—	—	—	—	—	17.7	0.53 (UJ)	—	1.4	0.0048 (J)	—
RE15-11-1107	15-613512	2–3	Soil	—	—	—	—	—	—	0.53 (UJ)	—	0.88	0.0046 (J)	—
RE15-11-1108	15-613512	4–5	Soil	—	—	—	—	—	—	0.59 (UJ)	—	1.4	—	1.6 (J-)
RE15-11-1109	15-613513	0–1	Soil	—	—	—	—	—	—	0.53 (UJ)	—	1.8	—	—
RE15-11-1110	15-613513	2–3	Qbt 3	—	—	—	2300	—	—	0.54 (U)	—	—	—	2.6
RE15-11-1111	15-613513	4–5	Qbt 3	0.54 (U)	—	—	5840	—	—	0.54 (U)	—	0.14 (J)	0.0036 (J)	3.2
RE15-11-1120	36-03020	0–1	Soil	—	—	—	—	—	—	0.53 (UJ)	—	3.3	—	—
RE15-11-1121	36-03020	1–2	Soil	—	—	—	—	—	—	0.53 (UJ)	—	0.92	—	—
RE15-11-1118	36-03022	0–0.5	Soil	—	—	—	—	—	—	0.52 (UJ)	—	1.6	—	—
RE15-11-1119	36-03022	0.5–1	Soil	—	—	—	—	—	—	0.54 (UJ)	—	0.51	—	—
RE15-11-1058	36-03051	0–1	Fill	—	—	—	—	—	—	0.54 (UJ)	—	0.11 (J)	—	1.6
RE15-11-1059	36-03051	2–3	Soil	—	—	—	—	—	—	0.54 (UJ)	—	—	—	—
RE15-11-1060	36-03051	4–5	Soil	—	—	—	—	—	—	0.53 (UJ)	—	0.083 (J)	—	—

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575).

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

Table 7.4-3
Organic Chemicals Detected at SWMU 36-005

Sample ID	Location ID	Depth (ft)	Media	Acetone	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Butylbenzylphthalate	Di-n-butylphthalate	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Methylene Chloride	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Pentachlorophenol
Construction Worker SSL[a]				**242000**	**1080000[b]**	**5380**	**53800[b]**	**26900**	**na**	**na**	**1210**	**na**	**346**
Industrial SSL[a]				**960000**	**3300000[d]**	**1830**	**12000[d]**	**91600**	**na**	**na**	**5130**	**na**	**44.5**
Residential SSL[a]				**66300**	**250000[d]**	**380**	**2900[d]**	**6160**	**na**	**na**	**409**	**na**	**9.85**
RE15-11-1091	15-613507	0–1	Soil	—[e]	0.61 (J)	—	—	—	NA[f]	NA	—	NA	—
RE15-11-1092	15-613507	2–3	Soil	—	—	—	—	—	NA	NA	0.0024 (J)	NA	—
RE15-11-1095	15-613508	2–3	Soil	—	—	0.047 (J)	—	—	NA	NA	0.0018 (J)	NA	—
RE15-11-1096	15-613508	4–5	Qbt 3	—	—	0.048 (J)	—	—	NA	NA	0.0019 (J)	NA	—
RE15-11-1099	15-613509	4–5	Qbt 3	—	—	—	—	—	NA	NA	0.0018 (J)	NA	—
RE15-11-1100	15-613510	0–1	Soil	—	—	0.052 (J)	—	—	NA	NA	—	NA	—
RE15-11-1101	15-613510	2–3	Soil	—	—	—	—	—	NA	NA	0.0018 (J)	NA	—
RE15-11-1102	15-613510	4–5	Qbt 3	—	—	—	—	—	NA	NA	0.0021 (J)	NA	—
RE15-11-1104	15-613511	2–3	Qbt 3	—	—	—	—	—	NA	NA	0.0023 (J)	NA	—
RE15-11-1105	15-613511	4–5	Qbt 3	—	—	0.079 (J)	—	—	NA	NA	0.0022 (J)	NA	—
RE15-11-1106	15-613512	0–1	Soil	—	—	—	—	0.2 (J)	NA	NA	—	NA	—
RE15-11-1108	15-613512	4–5	Soil	—	—	—	—	—	NA	NA	0.0019 (J)	NA	—
RE15-11-1109	15-613513	0–1	Soil	—	—	—	—	—	0.00000122 (J)	0.00000456 (J)	—	0.00000717 (J)	—
RE15-11-1110	15-613513	2–3	Qbt 3	—	—	0.048 (J-)	—	—	NA	NA	—	NA	—
RE15-11-1120	36-03020	0–1	Soil	—	—	—	—	—	NA	NA	0.0029 (J)	NA	—
RE15-11-1121	36-03020	1–2	Soil	—	—	—	—	—	NA	NA	0.0063	NA	—
RE15-11-1118	36-03022	0–0.5	Soil	—	—	—	0.043 (J)	—	NA	NA	0.0063	NA	—
RE15-11-1119	36-03022	0.5–1	Soil	0.029	—	—	—	—	NA	NA	0.0032 (J)	NA	—
RE15-11-1058	36-03051	0–1	Fill	0.31	—	—	—	—	NA	NA	0.0034 (J)	NA	0.37 (J)
RE15-11-1059	36-03051	2–3	Soil	0.24	—	—	—	—	NA	NA	0.0033 (J)	NA	—
RE15-11-1060	36-03051	4–5	Soil	0.14	—	—	—	—	NA	NA	0.0031 (J)	NA	—

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

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] na = Not available.

[d] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[e] — = Not detected.

[f] NA = Not analyzed.

Table 7.5-1
Samples Collected and Analyses Requested at SWMU 36-006

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	VOCs	SVOCs	PCBs	Explosive Compounds	Dioxins/Furans	Nitrate	Cyanide	Perchlorate	Isotopic Uranium
0236-95-0083	36-03145	0–0.33	Soil	1713	1712	1712	—*	1711	—	—	—	—	1714
0236-95-0087	36-03145	1.33–2	Soil	1713	1712	1712	—	1711	—	—	—	—	1714
0236-95-0084	36-03146	0–0.33	Soil	1713	1712	1712	—	1711	—	—	—	—	1714
0236-95-0123	36-03146	1.33–2	Soil	1713	1712	1712	—	1711	—	—	—	—	1714
0236-95-0086	36-03147	0–0.33	Soil	1713	1712	1712	—	1711	—	—	—	—	1714
0236-95-0088	36-03149	0–0.33	Soil	1713	1712	1712	—	1711	—	—	—	—	1714
RE15-11-1144	15-613514	0–1	Fill	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1145	15-613514	2–3	Fill	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1146	15-613515	0–1	Fill	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1147	15-613515	2–3	Fill	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1148	15-613516	0–1	Fill	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1149	15-613516	2–3	Fill	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1150	15-613517	0–1	Fill	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1151	15-613517	2–3	Fill	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1166	15-613518	0–1	Fill	11-628	11-627	11-627	11-627	11-627	11-629	11-628	11-628	11-628	11-628
RE15-11-1153	15-613518	2–3	Fill	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1167	15-613519	0–1	Soil	11-628	11-627	11-627	11-627	11-627	11-629	11-628	11-628	11-628	11-628
RE15-11-1155	15-613519	2–3	Soil	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1156	15-613520	0–1	Soil	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1157	15-613520	2–3	Soil	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1158	15-613521	0–1	Soil	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1159	15-613521	2–3	Soil	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1160	15-613522	0–1	Soil	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1161	15-613522	2–3	Soil	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1162	15-613523	0–1	Soil	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1163	15-613523	2–3	Soil	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1164	15-613524	0–1	Soil	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626
RE15-11-1165	15-613524	2–3	Qbt 2	11-625	11-624	11-624	—	11-624	—	11-625	11-625	11-625	11-626

* — = Analysis not requested.

Table 7.5-2
Inorganic Chemicals above BVs at SWMU 36-006

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Nitrate	Selenium	Silver	Thallium	Zinc
Qbt 2, 3, 4 BV[a]				**0.5**	**46**	**1.63**	**2200**	**7.14**	**4.66**	**0.5**	**11.2**	**0.1**	**6.58**	**na**[b]	**0.3**	**1**	**1.1**	**63.5**
Soil BV[a]				**0.83**	**295**	**0.4**	**6120**	**19.3**	**14.7**	**0.5**	**22.3**	**0.1**	**15.4**	**na**	**1.52**	**1**	**0.73**	**48.8**
Construction Worker SSL[c]				**142**	**4390**	**72.1**	**8850000**	**134**[d]	**14200**	**12.1**	**800**	**77.1**	**753**	**566000**	**1750**	**1770**	**3.54**	**106000**
Industrial SSL[c]				**519**	**255000**	**1110**	**32400000**	**505**[d]	**51900**	**63.3**	**800**	**389**	**25700**	**2080000**	**6490**	**6490**	**13**	**389000**
Residential SSL[c]				**31.3**	**15600**	**70.5**	**13000000**	**96.6**[d]	**3130**	**11.2**	**400**	**23.5**	**1560**	**125000**	**391**	**391**	**0.782**	**23500**
0236-95-0083	36-03145	0–0.33	Soil	11 (UJ)	—[e]	1.5	15000	410	52 (J-)	NA[f]	200	0.11 (U)	200	NA	—	2.1 (U)	1.3 (U)	—
0236-95-0087	36-03145	1.33–2	Soil	11 (UJ)	380	0.54 (U)	13000	—	55 (J-)	NA	54	0.11 (U)	—	NA	—	2.2 (U)	1.3 (U)	150
0236-95-0084	36-03146	0–0.33	Soil	11 (UJ)	—	0.56 (U)	—	—	—	NA	—	0.11	—	NA	—	2.2 (U)	1.4 (U)	—
0236-95-0123	36-03146	1.33–2	Soil	11 (UJ)	—	0.54 (U)	—	—	—	NA	—	0.11 (U)	—	NA	—	2.2 (U)	1.4 (U)	—
0236-95-0086	36-03147	0–0.33	Soil	11 (UJ)	—	0.57 (U)	—	—	—	NA	—	0.11 (U)	—	NA	—	2.3 (U)	1.4 (U)	—
0236-95-0088	36-03149	0–0.33	Soil	10 (UJ)	—	0.52 (U)	—	—	—	NA	—	—	—	NA	—	2.1 (U)	1.3 (U)	—
RE15-11-1144	15-613514	0–1	Fill	—	—	—	—	—	—	0.53 (U)	—	—	—	0.41	2 (J)	—	—	—
RE15-11-1145	15-613514	2–3	Fill	—	—	—	—	—	—	0.53 (U)	—	—	—	0.17 (J)	2 (J)	—	—	—
RE15-11-1146	15-613515	0–1	Fill	—	—	—	—	—	—	0.54 (U)	—	—	—	0.46	2.3 (J)	—	—	—
RE15-11-1147	15-613515	2–3	Fill	—	—	—	—	—	—	0.53 (U)	—	—	—	0.13 (J)	2.5 (J)	—	—	—
RE15-11-1148	15-613516	0–1	Fill	—	—	—	—	—	—	0.54 (U)	—	0.146	—	2.4	1.6 (J)	—	—	—
RE15-11-1149	15-613516	2–3	Fill	—	—	—	—	—	—	0.53 (U)	—	—	—	0.78	2 (J)	—	—	—
RE15-11-1150	15-613517	0–1	Fill	—	—	—	—	—	73.7	0.53 (U)	—	—	—	3.9	1.9 (J)	—	—	52.2
RE15-11-1151	15-613517	2–3	Fill	—	—	—	—	—	—	0.53 (U)	—	—	—	0.92	—	—	—	—
RE15-11-1166	15-613518	0–1	Fill	—	—	—	7680	—	—	0.54 (U)	—	—	—	0.16 (J)	—	—	—	—
RE15-11-1153	15-613518	2–3	Fill	—	—	—	—	—	—	0.55 (U)	—	—	—	0.47	—	—	—	—
RE15-11-1167	15-613519	0–1	Soil	—	—	—	—	—	—	0.55 (U)	—	—	—	0.096 (J)	—	—	—	—
RE15-11-1155	15-613519	2–3	Soil	—	—	—	—	—	—	0.53 (U)	—	—	—	0.21	—	—	—	—
RE15-11-1156	15-613520	0–1	Soil	—	—	—	—	—	—	—	—	—	—	0.22	—	—	—	—
RE15-11-1157	15-613520	2–3	Soil	—	—	—	—	—	—	0.52 (U)	—	—	—	0.23	—	—	—	—
RE15-11-1158	15-613521	0–1	Soil	—	—	—	—	—	17.3	0.55 (U)	—	0.118	—	1.3	1.7 (J)	—	—	—
RE15-11-1159	15-613521	2–3	Soil	—	—	—	—	—	—	0.52 (U)	—	—	—	0.3	—	—	—	—
RE15-11-1160	15-613522	0–1	Soil	—	—	—	—	—	43	0.55 (U)	28.2	1.48	—	0.21 (J)	—	—	—	51.2
RE15-11-1161	15-613522	2–3	Soil	—	—	—	—	—	—	0.53 (U)	—	—	—	0.28	1.7 (J)	—	—	—
RE15-11-1162	15-613523	0–1	Soil	1.6 (J)	—	—	7940	—	3140	0.52 (U)	69.4	—	—	0.75	—	—	—	168
RE15-11-1163	15-613523	2–3	Soil	—	—	—	—	—	69.8	0.53 (U)	—	—	—	0.37	1.8 (J)	—	—	49.6
RE15-11-1164	15-613524	0–1	Soil	—	—	—	6220	—	18.1	0.54 (U)	28.5	—	—	3.7	1.7 (J)	—	—	50.2
RE15-11-1165	15-613524	2–3	Qbt 2	—	—	—	—	—	—	0.52 (U)	14.5	—	—	0.32	1.7 (J)	—	—	—

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

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600575).

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

[f] NA = Not analyzed.

Table 7.5-3
Organic Chemicals Detected at SWMU 36-006

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Amino-2,6-dinitrotoluene[4-]	Amino-4,6-dinitrotoluene[2-]	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic Acid	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Dinitroaniline[3,5-]	Fluoranthene	Fluorene
Construction Worker SSL[a]				**15100**	**242000**	**688[b]**	**695[b]**	**75300**	**240**	**24**	**240**	**7530[c]**	**2310**	**1080000[b]**	**23100**	**24**	**354[b]**	**10000[d]**	**10000**	**10000**
Industrial SSL[a]				**50500**	**960000**	**2300[e]**	**2300[e]**	**253000**	**32.3**	**3.23**	**32.3**	**25300[c]**	**323**	**3300000[e]**	**3230**	**3.23**	**1000[e]**	**32000[d]**	**33700**	**33700**
Residential SSL[a]				**3480**	**66300**	**150[e]**	**150[e]**	**17400**	**1.53**	**0.153**	**1.53**	**1740[c]**	**15.3**	**250000[e]**	**153**	**0.153**	**73[e]**	**2200[d]**	**2320**	**2320**
0236-95-0087	36-03145	1.33–2	Soil	—[f]	—	—	—	—	—	—	—	—	—	—	—	—	—	NA[g]	—	—
RE15-11-1149	15-613516	2–3	Fill	—	0.007 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-1150	15-613517	0–1	Fill	1.4	—	—	—	1.3	4.8	3.6	5.1	1.2	2.2	—	4.6	—	0.58	—	9.9	0.94
RE15-11-1151	15-613517	2–3	Fill	—	—	—	—	—	0.084 (J)	0.079 (J)	0.12 (J)	—	0.048 (J)	—	0.087 (J)	—	—	—	0.19 (J)	—
RE15-11-1166	15-613518	0–1	Fill	0.079 (J)	—	—	—	0.17 (J)	0.41	0.35 (J)	0.34 (J)	0.19 (J)	0.35 (J)	—	0.41	0.061 (J)	—	—	1.1	0.074 (J)
RE15-11-1153	15-613518	2–3	Fill	—	0.016 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-1167	15-613519	0–1	Soil	—	0.0087 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-1155	15-613519	2–3	Soil	—	0.022	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-1156	15-613520	0–1	Soil	—	—	—	—	—	—	—	0.04 (J)	—	—	—	—	—	—	—	0.054 (J)	—
RE15-11-1158	15-613521	0–1	Soil	—	0.016 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-1159	15-613521	2–3	Soil	—	0.0077 (J)	—	—	—	—	—	—	—	—	0.64 (J)	—	—	—	—	—	—
RE15-11-1160	15-613522	0–1	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE15-11-1162	15-613523	0–1	Soil	—	—	0.084	0.055	—	—	—	—	—	—	—	—	—	—	0.036 (J)	—	—

Table 7.5-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Heptachlorodibenzodioxin [1,2,3,4,6,7,8-]	Heptachlorodibenzodioxins (Total)	Heptachlorodibenzofuran [1,2,3,4,6,7,8-]	Heptachlorodibenzofurans (Total)	Hexachlorodibenzodioxins (Total)	Hexachlorodibenzofurans (Total)	Indeno(1,2,3-cd)pyrene	Isopropyltoluene[4-]	Methylene Chloride	Methylnaphthalene[2-]	Naphthalene	Octachlorodibenzodioxin [1,2,3,4,6,7,8,9-]	Octachlorodibenzofuran [1,2,3,4,6,7,8,9-]
Construction Worker SSL[a]				**na[h]**	**na**	**na**	**na**	**na**	**na**	**240**	**2740[i]**	**1210**	**1420[b]**	**159**	**na**	**na**
Industrial SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**32.3**	**14200[i]**	**5130**	**3000[e]**	**241**	**na**	**na**
Residential SSL[a]				**na**	**na**	**na**	**na**	**na**	**na**	**1.53**	**2360[i]**	**409**	**240[e]**	**49.7**	**na**	**na**
0236-95-0087	36-03145	1.33–2	Soil	NA	NA	NA	NA	NA	NA	—	—	0.0086 (J+)	—	—	NA	NA
RE15-11-1149	15-613516	2–3	Fill	NA	NA	NA	NA	NA	NA	—	—	—	—	—	NA	NA
RE15-11-1150	15-613517	0–1	Fill	NA	NA	NA	NA	NA	NA	1.5	—	—	0.22 (J)	0.95	NA	NA
RE15-11-1151	15-613517	2–3	Fill	NA	NA	NA	NA	NA	NA	—	—	—	—	—	NA	NA
RE15-11-1166	15-613518	0–1	Fill	0.0000112	0.0000392	0.00000258 (J)	0.0000101	0.00000476	0.00000268 (J)	0.2 (J)	—	—	—	—	0.000135	0.000011
RE15-11-1153	15-613518	2–3	Fill	NA	NA	NA	NA	NA	NA	—	—	—	—	—	NA	NA
RE15-11-1167	15-613519	0–1	Soil	0.00000595	0.0000122	—	0.00000138 (J)	0.000000518 (J)	—	—	—	—	—	—	0.0000484	0.00000202 (J)
RE15-11-1155	15-613519	2–3	Soil	NA	NA	NA	NA	NA	NA	—	0.0037 (J)	—	—	—	NA	NA
RE15-11-1156	15-613520	0–1	Soil	NA	NA	NA	NA	NA	NA	—	—	—	—	—	NA	NA
RE15-11-1158	15-613521	0–1	Soil	NA	NA	NA	NA	NA	NA	—	—	—	—	—	NA	NA
RE15-11-1159	15-613521	2–3	Soil	NA	NA	NA	NA	NA	NA	—	—	—	—	—	NA	NA
RE15-11-1160	15-613522	0–1	Soil	NA	NA	NA	NA	NA	NA	—	—	—	—	—	NA	NA
RE15-11-1162	15-613523	0–1	Soil	NA	NA	NA	NA	NA	NA	—	—	—	—	—	NA	NA

Table 7.5-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Pentachlorodibenzofurans (Totals)	Phenanthrene	Pyrene	RDX	TATB	Tetrachlorodibenzodioxins (Total)	Trichlorofluoromethane	Trinitrobenzene[1,3,5-]	Trinitrotoluene[2,4,6-]
Construction Worker SSL[a]				**na**	**7530**	**7530**	**1010**	**10000[d]**	**na**	**1130**	**10000[b]**	**161**
Industrial SSL[a]				**na**	**25300**	**25300**	**311**	**32000[d]**	**na**	**6030**	**32000[e]**	**573**
Residential SSL[a]				**na**	**1740**	**1740**	**60.4**	**2200[d]**	**na**	**1230**	**2200[e]**	**36**
0236-95-0087	36-03145	1.33–2	Soil	NA	—	—	—	NA	NA	—	—	—
RE15-11-1149	15-613516	2–3	Fill	NA	—	—	—	—	NA	—	—	—
RE15-11-1150	15-613517	0–1	Fill	NA	7.2	6.9	—	—	NA	—	—	—
RE15-11-1151	15-613517	2–3	Fill	NA	0.12 (J)	0.14 (J)	—	—	NA	—	—	—
RE15-11-1166	15-613518	0–1	Fill	0.000000639 (J)	0.73	0.67	—	—	0.000000214 (J)	—	—	—
RE15-11-1153	15-613518	2–3	Fill	NA	—	—	—	—	NA	—	—	—
RE15-11-1167	15-613519	0–1	Soil	0.000000526 (J)	—	—	—	—	0.000000128 (J)	—	—	—
RE15-11-1155	15-613519	2–3	Soil	NA	—	—	—	—	NA	—	—	—
RE15-11-1156	15-613520	0–1	Soil	NA	—	0.042 (J)	—	—	NA	0.00045 (J)	—	—
RE15-11-1158	15-613521	0–1	Soil	NA	—	—	—	—	NA	—	—	—
RE15-11-1159	15-613521	2–3	Soil	NA	—	—	—	—	NA	—	—	—
RE15-11-1160	15-613522	0–1	Soil	NA	—	—	—	2.7	NA	—	—	—
RE15-11-1162	15-613523	0–1	Soil	NA	—	—	0.49	—	NA	—	0.037 (J)	0.047 (J)

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

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Pyrene used as a surrogate based on structural similarity.

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[e] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[f] — = Not detected.

[g] NA = Not analyzed.

[h] na = Not available.

[i] Isopropylbenzene used as a surrogate based on structural similarity.

Table 7.5-4
Radionuclides Detected above BVs at SWMU 36-006

Sample ID	Location ID	Depth (ft)	Media	Uranium-238
Soil BV[a]				**2.29**
Construction Worker SAL[b]				**410**
Industrial SAL[b]				**750**
Residential SAL[b]				**150**
RE15-11-1158	15-613521	0–1	Soil	2.38
RE15-11-1160	15-613522	0–1	Soil	3.14
RE15-11-1162	15-613523	0–1	Soil	5.26

Note: All activities are in pCi/g.

[a] BVs from LANL (1998, 059730).

[b] SALs from LANL (2014, 600064).

Table 9.1-1
Summary of Investigation Results and Recommendations

Consolidated Unit	SWMU/AOC	Brief Description	Extent Defined or No Further Sampling Warranted?	Potential Unacceptable Risk?	Recommendation
TA-15					
15-002-00	SWMU 15-002	Former North Burn Pit	No	No	Sample
		Former South Burn Pit	Yes	Yes (all scenarios and ecological)	Remediate
	SWMU 15-007(a)	MDA N	Yes	No	Complete without controls
15-004(b)-99	SWMU 15-004(b)	Firing Site A	No	No	Sample
	SWMU 15-004(c)	Firing Site B	No	No	Sample
15-004(f)-99	SWMU 15-004(f)	E-F Firing Site	No	Yes (construction worker, residential, ecological)	Sample and remediate
	SWMU 15-008(a)	Surface Disposal Areas at E-F Firing Site	Yes	Yes (construction worker and residential)	Remediate
	AOC 15-005(b)	Storage Area	Yes	No	Complete without controls
	SWMU 15-009(e)	Septic Tank	No	No	Sample under structures
	SWMU 15-010(a)	Septic Tank	Yes	No	Complete without controls
	AOC C-15-004	Former Transformer Station	Yes	No	Complete without controls
	AOC C-15-005	Potential Soil Contamination from Former Building	Yes	No	Complete without controls
	AOC C-15-006	Potential Soil Contamination from Former Building	Yes	No	Complete without controls
TA-36					
	SWMU 36-001	MDA AA	No	Yes (residential)	Sample
	SWMU 36-003(b)	Septic System, I-J Firing Site	No	No	Sample under structures
	SWMU 36-005	Storage Area	No	No	Sample within SWMU boundary
	SWMU 36-006	Surface Disposal Area	Yes	Yes (residential)	Complete with controls

Note: Shading denotes consolidated unit.

Appendix A

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

A-1.0 ACRONYMS AND ABBREVIATIONS

%R	percent recovery
%RSD	percent relative standard deviation
AEI	areas of environmental interest
AK	acceptable knowledge
ALARA	as low as reasonably achievable
AOC	area of concern
ARS	American Radiation Services
ATSDR	Agency for Toxic Substances and Disease Registry
AUF	area use factor
bgs	below ground surface
BCG	Biota Concentration Guide (DOE)
BV	background value
CCV	continuing calibration verification
COC	chain of custody
Consent Order	Compliance Order on Consent
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
cpm	counts per minute
CSM	conceptual site model
CVAA	cold vapor atomic absorption
DAF	dilution attenuation factor
DARHT	Dual-Axis Radiographic Hydrodynamic Test
DGPS	differential global-positioning system
DL	detection limit
DOE	Department of Energy (U.S.)
dpm	disintegrations per minute
DRO	diesel range organics
DU	depleted uranium
EDL	estimated detection limit
Eh	oxidation-reduction potential
EM	electromagnetic
EPA	Environmental Protection Agency (U.S.)
EPC	exposure point concentration

EQL	estimated quantitation limit
ES&H	environment, safety, and health
ES&H	Environment, Safety, and Health (Laboratory Directorate)
ESL	ecological screening level
FIDLER	Field Instrument for Detection of Low-Energy Radiation
FTL	field team leader
FV	fallout value
GC	gas chromatography
GC/MS	GC/mass spectrometry
GPR	ground-penetrating radar
GPS	global positioning system
GRO	gasoline range organics
HE	high explosives
HI	hazard index
HIR	historical investigation report
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7 tetrazocine
HQ	hazard quotient
HR	home range
ICS	interference check sample
ICV	initial calibration verification
ID	identification
IDW	investigation-derived waste
IP	Individual Permit
IS	internal standard
K_d	soil-water partition coefficient
K_{OC}	organic carbon–water partition coefficient
K_{OW}	octanol-water partition coefficient
LAL	lower acceptance limit
LANL	Los Alamos National Laboratory
LCS	laboratory control sample
LLW	low-level waste
LOAEL	lowest observed adverse effect level
MDA	material disposal area
MDC	minimum detectable concentration

MDL	method detection limit
MLLW	mixed low-level waste
MS	matrix spike
MSD	matrix spike duplicate
MSW	municipal solid waste
NFA	no further action
NMED	New Mexico Environment Department
NOAEL	no observed adverse effect level
OD	open detonation
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PAUF	population area use factor
PCB	polychlorinated biphenyl
PCS	petroleum-contaminated soil
PHERMEX	Pulsed High-Energy Radiographic Machine Emitting X-rays (facility)
PID	photoionization detector
PQL	practical quantitation limit
PRG	preliminary remediation goal
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RESRAD	residual radioactive (model)
RfD	reference dose
RFI	RCRA facility investigation
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
SAL	screening action level
SCL	sample collection log
SF	slope factor
SMO	Sample Management Office
SOP	standard operating procedure

SOW	statement of work
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	solid waste management unit
T&E	threatened and endangered
TA	technical area
TAL	target analyte list
TATB	1,3,5-triamino-2,4,6-trinitrobenzene
TCDD	tetrachlorodibenzodioxin
TCLP	toxicity characteristic leaching procedure
TEF	toxic equivalency factor
TNT	2,4,6-trinitrotoluene
TPH	total petroleum hydrocarbons
TPU	total propagated uncertainty
TRV	toxicity reference value
UAL	upper acceptance limit
UCL	upper confidence limit
UTL	upper tolerance limit
VCA	voluntary corrective action
VOC	volatile organic compound
WCSF	waste characterization strategy form
XRF	x-ray fluorescence

A-2.0 METRIC CONVERSION TABLE

Multiply SI (Metric) Unit	by	To Obtain U.S. 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-3.0 DATA QUALIFIER DEFINITIONS

Data Qualifier	Definition
U	The analyte was analyzed for but not detected.
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.
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.
R	The data are rejected as a result of major problems with quality assurance/quality control parameters.

Appendix B

Field Methods

B-1.0 INTRODUCTION

This appendix summarizes field methods implemented during the 2010 investigation at Potrillo and Fence Canyons Aggregate Area at Los Alamos National Laboratory (LANL or the Laboratory). Table B-1.0-1 summarizes the field-investigation methods, and the following sections provide more detailed descriptions of these methods. All activities were conducted in accordance with approved subcontractor procedures technically equivalent to Laboratory standard operating procedures (SOPs) listed in Table B-1.0-2. These procedures are available at eprr.lanl.gov.

B-2.0 EXPLORATORY DRILLING CHARACTERIZATION

No exploratory drilling characterization was conducted during the 2010 Potrillo and Fence Canyons Aggregate Area investigation.

B-3.0 FIELD-SCREENING METHODS

This section summarizes the field-screening methods used during the investigation activities. Field screening for organic vapors was performed for health and safety purposes. Field screening for radioactivity was performed on all samples before submittal to the Sample Management Office (SMO) and, if elevated readings were encountered, to guide confirmation sampling. Field screening for metals and explosive compounds was performed in accordance with the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677) to guide sample collection for chemical and radiological analyses. Field-screening results for all investigation activities are described in section 3.2.4 of the investigation report. Table 3.2-2 of the investigation report presents field-screening results for samples collected and submitted for off-site analysis, and Table B-3.0-1 of this appendix presents field-screening results for samples collected and not submitted for off-site analysis.

B-3.1 Field Screening for Organic Vapors

Field screening for organic vapors was conducted for all samples using a MiniRAE 2000 photoionization detector (PID) equipped with an 11.7-electronvolt lamp. Screening was performed in accordance with the manufacturer's specifications and SOP-06.33, Headspace Vapor Screening with a Photoionization Detector. Screening was performed on each characterization sample collected, and screening measurements were recorded on the sample collection logs (SCLs) and chain-of-custody (COC) forms provided on DVD in Appendix G. The field-screening results are presented in Table 3.2-2 of the investigation report.

B-3.2 Field Screening for Radioactivity

All samples collected were field screened for gross-alpha, -beta, and -gamma radioactivity before they were submitted to the SMO. A Laboratory radiological control technician (RCT) conducted radiological screening using an Eberline E-600 radiation meter with an SHP-380AB alpha/beta scintillation detector held within 1 in. of the sample. 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 used to detect beta and gamma emissions and is thinly coated with zinc sulfide to detect alpha emissions. The operational range varies from trace emissions to 1 million disintegrations per minute (dpm). If elevated radioactivity was encountered (5000 dpm over the daily background), a sample was collected and submitted to American Radiation Services (ARS) for analysis

before shipment from the SMO. Screening measurements were recorded on the SCLs and COC forms and are provided on DVD in Appendix G. The screening results are presented in Table 3.2-2 of the investigation report or Table B-3.0-1 of this appendix.

B-3.3 Field Screening for Metals

All samples collected from Solid Waste Management Units (SWMUs) 15-004(b), 15-004(c), 15-004(f), 15-007(a), 15-008(a), 36-001, and 36-006 were field screened for barium, copper, lead, and uranium using a handheld Thermo Scientific Niton XL3t 600 x-ray fluorescence (XRF) analyzer. Additional samples were collected if XRF results for barium, copper, lead, or uranium exceeded 2 times the background value (BV) of the sample matrix. Screening measurements were recorded in the field. The screening results are presented in Table 3.2-2 of the investigation report or Table B-3.0-1 of this appendix.

B-3.4 Field Screening for Explosive Compounds

All samples collected from SWMUs 15-002, 15-004(b), 15-004(c), 15-004(f), 15-007(a), 15-008(a), 15-010(a), 36-001, 36-005, and 36-006 were field screened for RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) and TNT (2,4,6-trinitrotoluene) using Strategic Diagnostics, Inc., Ensys immunoassay test kits. The operational range for the RDX/TNT soil tests is between 1 and 30 ppm. The lowest detectable concentrations of RDX and TNT were 0.8 ppm and 0.7 ppm, respectively. Additional samples were collected if TNT or RDX results exceeded the industrial soil screening levels (SSLs). The screening results are presented in Table 3.2-2 of the investigation report or Table B-3.0-1 of this appendix.

B-4.0 FIELD INSTRUMENT CALIBRATION

Instrument calibration and/or function check was completed daily. Several environmental factors affected the instruments' integrity, including air temperature, atmospheric pressure, wind speed, and humidity. Calibration of the PID was conducted by the environment, safety, and health (ES&H) representative. The RCT calibrated the Eberline E-600 instrument according to the manufacturer's specifications and requirements. The field team leader (FTL) performed a daily calibration check on the XRF analyzer.

B-4.1 MiniRAE 2000 Instrument Calibration

The ES&H representative performed a daily calibration check of the MiniRAE 2000 PID 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 on operational calibration logs:

- instrument identification number
- final span settings
- date and time
- concentration and type of calibration gas used (isobutylene at 100 ppm)
- name of the person performing the calibration

All daily calibration procedures for the MiniRAE 2000 PID met the manufacturer's specifications for standard reference gas calibration.

B-4.2 Eberline E-600 Instrument Calibration

The RCT calibrated the Eberline E-600 daily before local background levels for radioactivity were measured. The instrument was calibrated using plutonium-239 and chloride-36 sources for alpha and beta emissions, respectively. The following five checks were performed as part of the calibration procedures:

- calibration date
- physical damage
- battery
- response to a source of radioactivity
- background

All calibrations performed for the Eberline E-600 met the manufacturer's specifications and the applicable radiation detection instrument manual.

B-4.3 XRF Instrument Calibration

The FTL performed a daily calibration check of the XRF analyzer. The check consisted of a negative test using a known nondetect blank and a positive test using a standard with a known concentration of metals.

The following calibration information was recorded daily on operational calibration logs:

- instrument identification number
- date and time
- concentration in mg/kg and error (+/−) of lead, barium, copper, mercury, arsenic, selenium, chromium, cadmium, and uranium
- name of the person performing the calibration

B-5.0 SURFACE AND SUBSURFACE SAMPLING

This section summarizes the methods used for collecting surface and subsurface samples, including soil, fill, tuff, and sediment samples, according to the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677).

B-5.1 Surface and Subsurface Sampling Methods

Surface and subsurface samples were collected in Technical Area 15 (TA-15) and TA-36 using either hand-auger or spade-and-scoop methods. Surface and subsurface samples were collected in accordance with approved subcontractor procedures technically equivalent to SOP-06.10, Hand Auger and Thin-Wall Tube Sampler, or SOP-06.09, Spade and Scoop Method for the Collection of Soil Samples. A hand auger or spade and scoop was used to collect material in approximately 6-in. increments. Samples for volatile organic compound (VOC) analysis were immediately transferred from the sampling device to the sample container. Containers for VOC samples were filled as completely as possible, leaving no or minimal headspace, and sealed with a Teflon-lined cap. The remaining sample material was placed in a stainless-

steel bowl with a stainless-steel scoop, after which it was transferred to sterile sample collection jars or bags. Samples were preserved using coolers to maintain the required temperature in accordance with an approved subcontractor procedure technically equivalent to SOP-5056, Sample Containers and Preservation.

Samples were appropriately labeled, sealed with custody seals, and documented before transporting to the SMO. Samples were managed according to approved subcontractor procedures technically equivalent to SOP-5057, Handling, Packaging, and Transporting Field Samples, and WES-EDA-QP-219, Sample Control and Field Documentation.

Sample collection tools were decontaminated immediately before each sample was collected in accordance with a subcontractor procedure technically equivalent to SOP-5061, Field Decontamination of Equipment (see section B-5.6).

B-5.2 Borehole Logging

No drilling characterization was conducted during the 2010 investigation.

B-5.3 Quality Control Samples

Quality control (QC) samples were collected in accordance with an approved subcontractor procedure technically equivalent to SOP-5059, Field Quality Control Samples. The QC samples included field duplicates, field rinsate blanks, and field trip blanks. Field duplicate samples were collected from the same material as a regular investigation sample and submitted for the same analyses. Field duplicate samples were collected at a frequency of at least 1 duplicate sample for every 10 samples.

Field rinsate blanks were collected to evaluate field decontamination procedures. Rinsate blanks were collected by rinsing sampling equipment (i.e., sampling bowls and spoons), after decontamination, with deionized water. The rinsate water was collected in a sample container and submitted to the SMO. Field rinsate blank samples were analyzed for inorganic chemicals (target analyte list metals) and were collected from sampling equipment at a frequency of at least 1 rinsate sample for every 10 solid samples.

Field trip blanks also were collected at a frequency of 1 per d at the time samples were collected for VOCs. Trip blanks consisted of containers of certified clean sand and were kept with the other sample containers during the sampling process.

B-5.4 Sample Documentation and Handling

Field personnel completed a SCL/COC form for each sample. Sample containers were sealed with custody seals and placed in coolers at approximately 4°C. Samples were handled in accordance with approved subcontractor procedures technically equivalent to SOP-5057, Handling, Packaging, and Transporting Field Samples, and SOP-5056, Sample Containers and Preservation. Swipe samples were collected from the exterior of sample containers and analyzed by the RCT before the sample containers were removed from the site. Samples were transported to the SMO for processing and shipment to off-site contract analytical laboratories. The SMO personnel reviewed and approved the SCL/COC forms and accepted custody of the samples.

B-5.5 Borehole Abandonment

No borehole abandonment activities were conducted during the 2010 investigation.

B-5.6 Decontamination of Sampling Equipment

All sampling equipment that came (or could have come) in contact with sample material was decontaminated after each sample was retrieved. Decontamination included wiping the equipment with Fantastik and paper towels. Decontamination of the remediation equipment was conducted before mobilization of the heavy equipment to another location to avoid cross-contamination between samples and locations. Residual material adhering to equipment was removed using dry decontamination methods such as the use of wire brushes and scrapers. Decontamination activities were performed in accordance with an approved subcontractor procedure technically equivalent to SOP-5061, Field Decontamination of Equipment. Decontaminated equipment was surveyed by an RCT before it was released from the site.

B-5.7 Site Demobilization and Restoration

All remediation equipment was demobilized from the site on December 21, 2010, and January 18, 2011. Before equipment was removed from the site, a Laboratory RCT screened the equipment for radioactivity to ensure all materials were clean of site contamination. Before equipment was removed from a beryllium site, beryllium swipe samples were collected and submitted to Test America for analysis. Equipment was released from the site after passing the beryllium release criteria (0.2 µg/100 cm^2). All temporary fencing and staging areas (except the waste management area) were dismantled and returned to preinvestigation conditions. All excavated and disturbed areas were regraded and reseeded with native grass mix in spring 2011.

B-6.0 REMEDIATION ACTIVITIES

Remediation activities included the excavation of the inactive landfill at SWMU 36-001, removal of debris from the inactive landfill at SWMU 15-007(a), removal of surface debris at SWMUs 36-006 and 15-008(a), and an attempt to locate and remove a septic tank at SWMU 15-010(a). The specific sequence of activities associated with the waste removal activities was as follows: (1) mobilizing, including preparing excavation documents, identifying underground utilities, and conducting excavation readiness assessment; (2) preparing the site, including the installing fencing and storm water controls and conducting a pre-excavation survey; (3) removing waste, including stockpiling, characterizing, and disposing of waste at the appropriate facility; (4) performing confirmation sampling; and (5) backfilling, including compacting, and revegetating the surface after demobilization.

Two test pits were excavated in the northeast and northwest sections of SWMU 36-001. An ash layer was encountered in the northeast trench at a depth of approximately 4 to 5 ft below ground surface (bgs). Underlying the ash layer was wood and metal debris. The metal debris consisted of a large piece (3 ft long × 3 ft wide) of crumpled metal. The on-site RCT screened the metal, and elevated readings of 200,000 dpm beta and 904 dpm alpha were recorded. Levels of radiation on the metal exceeded the thresholds allowable in the radiological work permit (RWP); therefore, the metal debris was placed back in the test pit and work was stopped pending a review of the RWP. After reviewing the RWP, the Laboratory determined that the RWP needed to be revised. The Laboratory also decided that beryllium contamination may be a potential concern at SWMU 36-001. Therefore, excavation of the landfill at SWMU 36-001 was not completed because of the conditions encountered during excavation of test pits and the associated potential health and safety issues. In lieu of excavating and removing the debris at SWMU 36-001, characterization samples were collected (LANL 2010, 111304; NMED 2010, 111464).

Two excavators were used to remove overburden and concrete from the inactive landfill at SWMU 15-007(a). The excavators removed concrete, rebar, wire, and conduit pipe to approximately 6 ft bgs. Approximately 125 yd^3 of concrete and 1550 yd^3 of overburden and soil were excavated from the

inactive landfill. The overburden material was stockpiled to facilitate waste characterization sampling. Following removal of the concrete and debris, a backhoe bucket was used to collect confirmation samples. Details describing the samples collected and analyses requested for confirmation sampling are presented in Table 6.3-1 of the supplemental investigation report.

A long reach track excavator was used to remove surface debris at SWMU 36-006. All surface debris was placed in 1-yd^3 Wrangler bags and stored within the area of contamination. Approximately 12.5 yd^3 of debris and/or soil, 4 fence posts with concrete, and 2 guardrails (approximately 20 ft in length) were removed from the inactive surface disposal area and placed in the area of contamination until waste data was acquired for characterization. Debris consisted of concrete, cord, tin cans, wood, cloth, metal, plastic, and Styrofoam. Confirmation samples were collected with a hand auger immediately following debris removal activities. Specific sample depths and analyses requested are presented in Table 7.5-1 of the supplemental investigation report.

Excavation activities were implemented at SWMU 15-010(a) to remove a decommissioned septic tank. An excavator was used to remove soil/tuff, which was stockpiled near excavation. Before test trenches were excavated to locate the tank, areas of disturbed soil/tuff were evident in the area, indicating the septic tank may have been removed. Test trenches confirmed that the tank was not present. Subsequent discussions with knowledgeable site personnel additionally confirmed the tank's removal. All soil/tuff was placed back in the excavated area at SWMU 15-010(a). Confirmation samples were collected using a hand auger. Specific sample depths and analyses requested are presented in Table 6.9-1 of the supplemental investigation report.

All debris at two small surface disposal areas at SWMU 15-008(a) was removed. Field crew members used jackhammers to break up concrete and collected the debris using hand tools. Surface debris consisted of concrete, soil, wire, metal, and connectors. Approximately 18.5 yd^3 of debris and/or soil was removed from the two small surface disposal areas and stored in 1-yd^3 Wrangler bags within the area of contamination until waste data was acquired for characterization. Confirmation samples were collected with a hand auger or spade and scoop. Specific sample depths and analyses requested are presented in Table 6.6-1 of the supplemental investigation report.

B-7.0 GEODETIC SURVEYING

Geodetic surveys were performed to demarcate the SWMU boundaries at the remediation sites [SWMUs 15-007(a), 15-008(a), 15-010(a), 36-001, and 36-006] before mobilizing heavy equipment to the sites (see Table 3.2-1 of the supplemental investigation report). Geodetic surveys were also performed to locate both historical and proposed sampling locations at the areas of concern (AOCs) and SWMUs at TA-15 and TA-36. Geodetic surveys were conducted using a Trimble RTK 5700 differential global-positioning system (DGPS) referenced from published and monumented external Laboratory survey control points in the vicinity. All sampling locations were surveyed in accordance with an approved subcontractor procedure technically equivalent to SOP-5028, Coordinating and Evaluating Geodetic Surveys. Horizontal accuracy of the monumented control points is within 0.1 ft. The DGPS instrument referenced from Laboratory control points is accurate to within 0.2 ft. The surveyed coordinates are presented in Table 3.2-1 of the supplemental investigation report.

B-8.0 RADIOLOGICAL SURVEYS

Environmental Restoration Group, Inc., performed radiological surveys at SWMUs 15-007(a) and 36-001 (inactive landfills) and at SWMU 15-004(f) (the inactive E-F Firing Site) using a Trimble Pro XRS mapping-grade global positioning system (GPS), an Alpha Spectra FIDLER (Field Instrument for

Detection of Low-Energy Radiation), a Ludlum Model 44-10 2-in. × 2-in. sodium iodide detector, and a Ludlum Model 2221 ratemeter/scaler.

Formal surveying was conducted over spatial control and data acquisition grids, which were established using a GPS. The results of the radiological surveys are included in Appendix D.

B-9.0 GEOPHYSICAL SURVEYS

Sunbelt Geophysics performed a nonintrusive geophysical investigation at SWMUs 15-007(a) and 36-001, inactive landfills, using ground-penetrating radar (GPR) and data from a Geonics Ltd. EM-31 ground conductivity meter (Serial No. 08003), Geonics, Ltd. EM-61 high-resolution metal detector (Serial No. 930204), and a Geometrics, Inc., G-858 magnetometer (Serial No. 29004).

Formal surveying was conducted over spatial control and data acquisition grids that were established using a transit and tape. The EM-31, EM-61, and G-858, along with a Sensors & Software Inc. 250-MHz GPR (Serial No. 0057-006) and an Advanced Geosciences, Inc. MiniSting Memory Earth resistivity/induced polarization meter (Serial No. S0604039), were used during the surveys.

Data from the EM-61 and GPR were recorded with data loggers intrinsic to each system and transferred daily to a computer for quality assurance (QA), analysis, mapping, and archiving. The DAT61 and DAT31 (Geonics, Ltd.), MagMapper (Geometrics, Inc.), Ekko View (Sensors & Software, Inc.) and the Oasis montaj (Geosoft, Inc.) programs were used for processing and preparing images. The results of the geophysical surveys are included in Appendix E.

B-10.0 INVESTIGATION-DERIVED WASTE STORAGE AND DISPOSAL

All investigation-derived waste (IDW) generated during the field investigation was managed in accordance with SOP-5238, Characterization and Management of Environmental Program Waste. This procedure incorporates the requirements of all applicable U.S. Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED) regulations, U.S. Department of Energy orders, and Laboratory implementation requirements. All IDW was also managed in accordance with the approved waste characterization strategy form and the IDW management appendix of the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677). Details of IDW management for the Potrillo and Fence Canyons Aggregate Area investigation are presented in Appendix C.

B-11.0 DEVIATIONS FROM THE WORK PLAN

Several proposed sampling locations identified in the approved investigation work plan were moved as a result of site conditions encountered during the field activities because they were sited on top of or next to underground utilities, could not be sampled because of refusal, or were inaccessible. When locations were moved, the new locations were sited as close as possible to the proposed locations. Deviations to specific sampling locations are summarized in Table B-11.0-1. Additional deviations to the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677) are discussed below and are also summarized in Table B-11.0-1.

- The approved investigation work plan required samples to be collected from a step-out location north of the former south burn pit at SWMU 15-002. Location 15-613675 was moved 25 ft south because the proposed location was surveyed above the concrete apron of building 15-0534.

- The approved investigation work plan required 24 samples to be collected from 12 random locations at SWMUs 15-004(b) and 15-004(c) from 0.0–1.0 ft bgs and 3.0–4.0 ft bgs. Two samples were collected from one location from 0.0–1.0 ft bgs and 1.0–2.0 ft bgs because the soil-tuff contact was encountered close to the surface (0.25 ft bgs). Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan required 42 samples to be collected from 42 Resource Conservation and Recovery Act facility investigation grid locations from 3.0–4.0 ft bgs at SWMU 15-004(f). Since the soil-tuff interface was encountered at a very shallow depth (0.5–1.0 ft bgs) or tuff was exposed at the surface at 8 locations in the southernmost part of E-F Firing Site and one location (15-02141) in the northeasternmost part (steep cliff-walls of Potrillo Canyon and Threemile Canyon, respectively), 9 samples were collected from 3.0–3.5 ft bgs. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan required 52 samples to be collected from 18 earthen mound locations from 0.0–1.0 ft bgs, 6.0–7.0 ft bgs, and 9.0–10.0 ft bgs at SWMU 15-004(f). Refusal was encountered at the base of 6 of these 18 boreholes. Nine samples were collected from 3 earthen mound locations (15-613370, 15-613374, and 15-613380) from 0.0–1.0 ft bgs and 6.0–7.0 ft bgs (at all 3 locations), and from 8.0–8.5 ft bgs; 8.0–8.5 ft bgs; and 9.0–9.5 ft bgs, respectively. Six samples were collected from 3 earthen mound locations (15-613367, 15-613373, and 15-613377) from 0.0–1.0 ft bgs and 2.0–3.0 ft bgs; 0.0–1.0 ft bgs and 6.0–6.25 ft bgs; and 0.0–1.o ft bgs and 3.0–3.5 ft bgs, respectively. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan required specific depth intervals (e.g., 0.0–1.0 ft bgs and 2.0–3.0 ft bgs) for downgradient sediment samples from six locations at SWMU 15-004(f). Since the sediment-tuff interface was encountered at variable depths below the ground surface, two samples were collected above the sediment-tuff or soil-tuff interface at all six locations. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan proposed that step-out sampling locations be collected 6 ft from the edge of the landfill excavation at SWMU 15-007(a). The map in the approved investigation work plan showed sampling locations approximately 30 ft from the edge of the SWMU boundary. Survey results at SWMU 15-007(a) showed buried wastes and disturbed soil wider (east-west) and shorter (north-south) than the anticipated landfill boundaries. Safety fencing was placed in a square around the open excavation immediately after soil and debris were removed for health and safety purposes. Step-out locations were sited approximately 8 to 25 ft from the excavation boundary to avoid entering the fenced area and to avoid stockpiled soil and debris and areas where heavy equipment was operating. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan required four samples to be collected from two locations beneath each of the surface debris removal locations at SWMU 15-008(a) from 0.0–1.0 ft bgs and 3.0–4.0 ft bgs. A total of eight samples were collected from 0.0–1.0 ft bgs and 1.0–2.0 ft bgs because the soil-tuff contact was encountered close to the surface (0.25 ft to 0.75 ft bgs). Information on specific locations and depth intervals is summarized in Table B-11.0-1.

- The approved investigation work plan required eight samples to be collected from four locations around each of the surface debris removal locations at SWMU 15-008(a) from 0.0–1.0 ft bgs and 3.0–4.0 ft bgs. Six samples from the northern debris pile were collected from 0.0–1.0 ft bgs and 1.0–2.0 ft bgs because the soil-tuff contact was encountered close to the surface (0.25–0.5 ft bgs). Two samples from the northern debris pile were collected from 0.0–1.0 ft bgs and 2.0–3.0 ft bgs because the soil-tuff interface was encountered close to the surface at 1 ft bgs. Two samples from the southern debris pile were collected from 0.0–1.0 ft bgs and 1.0–2.0 ft bgs because the soil-tuff interface was encountered close to the surface at 0.5 ft bgs. The remaining six samples were collected as required in the investigation work plan. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan required six samples to be collected from two depths (0.0–1.0 ft and 3.0–4.0 ft below structures) at three locations: next to the tank inlet, next to the tank outlet, and on the east side of the tank at SWMU 15-009(e). All six samples were inadvertently collected from 0.0–1.0 ft bgs and 3.0–4.0 ft bgs, not below the structures. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan required four samples to be collected from two depths at two locations along the tank inlet drainline at SWMU 15-009(e). All four samples were inadvertently collected from 0.0–1.0 ft bgs and 3.0–4.0 ft bgs, not below the drainline. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan required six samples to be collected from two depths (0.0–1.0 ft bgs and 3.0–4.0 ft bgs) in sediment catchments at three locations at the outfall and in the drainage below the outfall at SWMU 15-009(e). Because the soil-tuff contact was encountered close to the surface (0.3–1.0 ft bgs), samples were collected from two depth intervals ranging from 0.5–1.0 ft to 1.5–2.5 ft bgs at each location. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The septic tank at SWMU 15-010(a) identified for excavation and removal in the approved investigation work plan was not excavated because it had been removed previously. Before test trenches to locate the tank were excavated, areas of disturbed soil-tuff were evident in the area, indicating the septic tank may have been removed. Test trenches confirmed that the tank was not present. Subsequent discussions with knowledgeable site personnel also confirmed the tank's removal.
- The approved investigation work plan required 20 confirmation samples to be collected from 10 locations beneath the septic system (0.0–1.0 ft and 3.0–4.0 ft), along the inlet drain lines, and within the outfall area at SWMU 15-010(a). Because the septic system was not located, characterization samples were collected from the following locations and depth intervals: 6 samples from 3 locations associated with the former septic tank inlet, the former septic tank, and north of the former septic tank from 4.0–5.0 ft and 7.0–8.0 ft bgs; 3 samples from 1 location south of the former septic tank location from 4.0–5.0 ft, 7.0–8.0 ft, and 9.0–9.5 ft bgs where field-screening results were elevated at 7.0–8.0 ft bgs and refusal was encountered at 9.5 ft bgs; and 2 samples from one location associated with the former septic tank outlet from 4.0–5.0 ft and 6.0–7.0 ft bgs because refusal was encountered at 7.0 ft bgs. Information on specific locations and depth intervals is summarized in Table B-11.0-1.

- The approved investigation work plan proposed the excavation of four test pits and trenches at SWMU 36-001 (Material Disposal Area AA) to locate and define the inactive landfill boundaries (LANL 2009, 106657.8; NMED 2009, 106677). These activities were initiated but were suspended because of potential health and safety concerns. Specifically, higher than expected radiation levels and the potential presence of beryllium were encountered during the initial stages of waste removal at SWMU 36-001. Details are provided in section B-6.0 of this appendix.
- The approved investigation work plan required 34 confirmation and step-out samples to be collected from 17 locations beneath and around the landfill excavation at SWMU 36-001. The alternative sampling plan required using a hand auger to collect 3 samples from 3 depth intervals (0.0–5.0 ft, 5.0–10.0 ft, and 10.0–15.0 ft bgs) at 7 locations based on the results of the geophysical survey. Fifteen characterization samples were collected from 5 locations within the proposed landfill boundaries from 0.0–1.5 ft, 5.0–6.5 ft, and 10.0–11.5 ft bgs. Three characterization samples were collected at location 36-613721, which was within a test pit, from 2.0–4.0 ft, 5.0–6.5 ft, and 10.0–11.5 ft bgs. Four characterization samples were collected from location 36-613727 from 0.0–1.5 ft, 5.0–6.5 ft, 10.0–11.5 ft, and 13.5–15.0 ft bgs, based on elevated field-screening results at the 10.0–11.5-ft-bgs depth interval. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan required six samples to be collected from two depths (0.0–1.0 ft and 3.0–4.0 ft below structures) at three locations: next to the tank inlet, next to the tank outlet, and on the south side of the tank at SWMU 36-003(b). All six samples were inadvertently collected from 0.0–1.0 ft and 3.0–4.0 ft bgs and not below the structures. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan required four samples to be collected from two depths (0.0–1.0 ft and 3.0–4.0 ft beneath the drainline) at two locations along the tank inlet drainline at SWMU 36-003(b). All four samples were inadvertently collected from 0.0–1.0 ft and 3.0–4.0 ft bgs and not from below the drainline. Information on specific locations and depth intervals is summarized in Table B-11.0-1.
- The approved investigation work plan required 48 characterization samples to be collected at 16 locations from 3 depth intervals, and 6 sediment samples to be collected at 3 locations from 2 depths at SWMU 36-005. This sampling approach could not be implemented because of cultural resource restrictions (see section 7.4.4 of the supplemental investigation report). As a result of the cultural resources restrictions, 27 of the 30 characterization samples and 2 of the sediment samples were not collected. Twenty-one samples were collected, from three depth intervals, at seven alternate locations downgradient of the site.
- The approved investigation work plan required specific depth intervals (e.g., 0.0–1.0 ft and 2.0–3.0 ft bgs) for downgradient sediment samples from nine locations at SWMU 36-005. Since the sediment-tuff interface was encountered at variable depths below the ground surface, two samples were collected above the sediment-tuff interface at two of the three proposed locations. Information on specific locations and depth intervals is summarized in Table B-11.0-1.

B-12.0 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 or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH 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.

LANL (Los Alamos National Laboratory), July 2009. "Investigation Work Plan for Potrillo and Fence Canyons Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-09-4327, Los Alamos, New Mexico. (LANL 2009, 106657.8)

LANL (Los Alamos National Laboratory), November 12, 2010. "Status of Corrective Actions at Solid Waste Management Unit 36-001, Material Disposal Area AA," Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2010, 111304)

NMED (New Mexico Environment Department), July 30, 2009. "Approval, Investigation Work Plan for Potrillo and Fence Canyons Aggregate Area, Revision 1," 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 2009, 106677)

NMED (New Mexico Environment Department), December 2, 2010. "Status of Work Plan Implementation, Material Disposal Area (MDA) AA Solid Waste Management Unit 36-001, Technical Area 36, Potrillo-Fence Canyons Aggregate Area Work Plan " New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2010, 111464)

Table B-1.0-1
Summary of Field Investigation Methods

Method	Summary
Spade and Scoop Collection of Soil Samples	This method is typically used to collect shallow (i.e., approximately 0–12 in.) soil or sediment samples. The spade-and-scoop method involves digging a hole to the desired depth, as prescribed in the work plan, and collecting a discrete grab sample. Samples for VOC analysis were transferred immediately into sample containers. Containers for VOC analysis were filled as completely as possible and sealed with Teflon-lined caps. The remaining sample material was placed in a clean stainless-steel bowl for transfer into various sample containers.
Hand Auger Sampling	This method is typically used to sample soil or sediment at depths of less than 10–15 ft but may in some cases be used to collect samples of weathered or nonwelded tuff. The method involves hand-turning a stainless-steel bucket auger (typically 3–4 in. inside diameter), creating a vertical hole that can be advanced to the desired sampling depth. When the desired depth was reached during the investigation, the auger was decontaminated before the hole was advanced through the sampling depth. Samples for VOC analysis were transferred immediately into sample containers. Containers for VOC analysis were filled as completely as possible and sealed with Teflon-lined caps. The remaining sample material was placed in a clean stainless-steel bowl for transfer into various sample containers. The remaining sample material was transferred from the auger bucket to a stainless-steel sampling bowl before the other required sample containers were filled.
Headspace Vapor Screening	Individual soil, rock, or sediment samples were field screened for organic vapors by placing a portion of the sample in a plastic sample bag or in a glass container with a foil-sealed cover. The container was sealed and gently shaken and allowed to equilibrate for 5 min. The sample was then screened by inserting a PID probe into the container and measuring and recording any detected vapors.
Radiological Screening	Radiological field screening for gross-alpha, -beta, and -gamma radioactivity was performed to guide collection of additional samples. If elevated radioactivity was encountered (5000 dpm over the daily background), an additional sample was collected and submitted to ARS for analysis before shipment from the SMO. Screening measurements for all collected samples were recorded on the SCLs and COC forms. Screening measurements for locations not sampled were recorded in field logbooks and data collection forms.
XRF Screening	All collected samples were screened for metals using an XRF analyzer. Additional samples were collected for analysis if XRF results for barium, copper, lead, or uranium exceeded 2 times the BV of the sample matrix for screened locations not initially identified for sample collection. XRF screening measurements for all collected samples were recorded on the SCLs and COC forms. Screening measurements for locations not sampled were recorded in field logbooks and data collection forms.
Explosive Compounds Screening	All collected samples were screened for TNT and RDX. Additional samples were collected for analysis if TNT or RDX results exceeded the industrial SSLs for locations not initially identified for sample collection. Explosive compound–screening measurements for all samples collected were recorded on the SCLs and COC forms. Screening measurements for locations not sampled were recorded in field logbooks and data collection forms.
Handling, Packaging, and Shipping of Samples	Field team members sealed and labeled samples before packing them to ensure the sample containers and the containers used for transport were free of external contamination. Field team members packaged all samples to minimize the possibility of breakage during transport. After all environmental samples were collected, packaged, and preserved; a field team member transported them to the SMO. The SMO arranged for shipping the samples to analytical laboratories.

Table B-1.0-1 (continued)

Method	Summary
Sample Control and Field Documentation	The collection, screening, and transport of samples were documented on standard forms generated by the SMO. These included SCLs, COC forms, and sample container labels. SCLs were completed at the time of sample collection and the logs were signed by the sampler and a reviewer who verified the logs for completeness and accuracy. Corresponding labels were initialed and applied to each sample container, and custody seals were placed around each sample container. COC forms were completed and signed to verify that the samples were not left unattended.
Field QC Samples	Field QC samples were collected as follows: *Field Duplicates:* 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 10%; collected by rinsing sampling equipment with deionized water that was collected in a sample container and submitted for laboratory analysis. *Trip Blanks:* Required for all field events that include the collection of samples for VOC analysis. Trip blank containers of certified clean sand were opened and kept with the other sample containers during the sampling process.
Field Decontamination of Remediation and Sampling Equipment	Dry decontamination was used to minimize the generation of liquid waste. Dry decontamination included the use of a wire brush or other tool to remove soil or other material adhering to the sampling equipment, followed by use of a commercial cleaning agent (nonacid, waxless cleaners) and paper wipes.
Containers and Preservation of Samples	Specific requirements/processes for sample containers, preservation techniques, and holding times are based on EPA guidance for environmental sampling, preservation, and QA. Specific requirements for each sample were printed on the SCL provided by the SMO (size and type of container [e.g., glass, amber glass, or polyethylene]). All samples were preserved by placing them with ice in insulated containers to maintain a temperature of 4°C.
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 project standards IA-CB02, GIS Horizontal Spatial Reference System; and IA-D802, Geospatial Positioning Accuracy Standards for A/E/C and Facility Management. All coordinates were expressed as State Plane Coordinate System 83, NM Central, U.S. feet. All elevation data were reported relative to the National Geodetic Vertical Datum of 1983.
Geophysical Logging and Mapping	Nonintrusive geophysical investigations were performed at SWMUs 15-007(a) and 36-001 using GPR. Geophysical data were recorded with data loggers and transferred daily to a computer for QA, analysis, mapping, and archiving. The results of the geophysical surveys are included in Appendix E.
Management of Environmental Restoration Project Waste, Waste Characterization	IDW is managed, characterized, and stored in accordance with an approved waste characterization strategy form that documents site history, field activities, and characterization approach for each waste stream managed. Waste characterization complied with on- or off-site waste acceptance criteria. All stored IDW was marked with appropriate signage and labels and contained within an area of contamination. A waste storage area was established before waste was generated. Waste storage areas were located in controlled areas of the Laboratory to prevent unauthorized personnel from inadvertently adding or managing wastes. Each container of waste generated was individually labeled with waste classification, item identification number, and radioactivity (if applicable), immediately following containerization. All waste was segregated by classification and compatibility to prevent cross-contamination. Management of IDW is described in Appendix C.

Table B-1.0-2
SOPs Used for Investigation Activities Conducted at Potrillo and Fence Canyons Aggregate Area

P101-17, R0, Excavation/Fill/Soil Disturbance Permit Process
P101-18, R0, Procedure for Pause/Stop Work
PD315, R0, Conduct of Operations Manual
P409, R1, Waste Management
SOP-5181, R1, Notebook and Logbook Documentation for Environmental Directorate Technical and Field Activities
TPMC-SOP-01.12, R0 ICN2, Field Site Closeout Checklist
TPMC-SOP-01.13, R0, Initiating and Managing Data Set Requests
TPMC-SOP-06.09, Spade and Scoop Method for the Collection of Soil Samples
TPMC-SOP-06.10, R4, Hand Auger and Thin- Wall Tube Sampler
TPMC-SOP-06.33, Headspace Vapor Screening with a Photoionization Detector
TPMC-SOP-10.08, R2, Operation of the Spectrace 9000 Field-Portable X-Ray Fluorescence Instrument
TPMC-SOP-5028, R0, Coordinating and Evaluating Geodetic Surveys
TPMC-SOP-5030, R0, Contract Geophysical Logging
TPMC-SOP-5055, R0, General Instructions for Field Investigations
TPMC-SOP-5056, R0, Sample Containers and Preservation
TPMC-SOP-5057, R0, Handling, Packaging, and Transporting Field Samples
WES-EDA-QP-219, Sample Control and Field Documentation
TPMC-SOP-5059, R0, Field Quality Control Samples
TPMC-SOP-5060, Operational Guidelines for Taking Soil and Water Samples in Explosive Areas
TPMC-SOP-5061, R1, Field Decontamination of Equipment
TPMC-SOP-5238, R0, Characterization and Management of Environmental Program Waste
EP-DIR-SOP-2011, R4, Personnel Training and Qualification
EP-DIR-SOP-4004, R3, Record Transmittal and Retrieval Process

Note: Procedures used were approved subcontractor procedures technically equivalent to the procedures listed.

Table B-3.0-1
Field-Screening Results for Samples Collected and Not Submitted for Off-Site Analysis

SWMU	Screening Location ID	Depth (ft)	Easting (ft)	Northing (ft)	Alpha (dpm)	Beta/ Gamma (dpm)	High Explosives (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
TA-15												
15-004(f)	15-02102	0–1	1625935.56	1762180.05	21	2470	0.8	ND[a]	149	ND	15	ND
15-004(f)	15-02102	3–4	1625935.56	1762180.05	43	2710	ND	ND	ND	ND	ND	ND
15-004(f)	15-02103	0–1	1626135.57	1762180.05	26	2720	ND	ND	137	ND	21	ND
15-004(f)	15-02103	3–4	1626135.57	1762180.05	43	2410	ND	ND	180	ND	ND	ND
15-004(f)	15-02104	0–1	1626335.57	1762180.05	76	2210	ND	3.1	267	ND	ND	ND
15-004(f)	15-02104	3–4	1626335.57	1762180.05	46	1971	ND	2.1	158	ND	ND	ND
15-004(f)	15-02111	0–1	1625535.56	1761980.05	48	2610	ND	2.2	283	ND	ND	ND
15-004(f)	15-02111	3–4	1625535.56	1761980.05	70	2100	ND	1.1	133	ND	15	ND
15-004(f)	15-02120	0–1	1627335.57	1761980.05	92	2090	ND	ND	175	ND	28	ND
15-004(f)	15-02120	3–4	1627335.57	1761980.05	97	2000	ND	ND	283	ND	ND	ND
15-004(f)	15-02121	0–1	1627535.57	1761980.05	107	2080	ND	ND	181	ND	14	ND
15-004(f)	15-02121	3–4	1627535.57	1761980.05	92	2300	ND	2.2	ND	ND	ND	ND
15-004(f)	15-02122	0–1	1625535.56	1761780.05	80	2520	ND	ND	246	ND	ND	ND
15-004(f)	15-02122	3–4	1625535.56	1761780.05	32	2540	ND	1.1	277	ND	19	ND
15-004(f)	15-02126	0–1	1626335.56	1761780.05	21	2380	ND	ND	179	3	ND	ND
15-004(f)	15-02126	3–4	1626335.56	1761780.05	16	2130	ND	ND	83	ND	ND	ND
15-004(f)	15-02130	0–1	1627135.57	1761780.05	133	1891	ND	2.3	87	ND	ND	ND
15-004(f)	15-02130	3–4	1627135.57	1761780.05	30	2320	ND	ND	ND	ND	15	ND
15-004(f)	15-02133	0–1	1625535.57	1761580.05	102	2710	ND	1.1	145	ND	17	ND
15-004(f)	15-02133	3–4	1625535.57	1761580.05	43	2950	ND	ND	ND	ND	21	ND
15-004(f)	15-02135	0–1	1625935.56	1761580.05	117	1971	ND	ND	358	3	ND	ND
15-004(f)	15-02135	3–4	1625935.56	1761580.05	35	2050	ND	0.9	172	ND	16	ND
15-004(f)	15-02140	0–1	1626907.71	1761580.05	71	2570	ND	ND	133	ND	ND	ND

Table B-3.0-1 (continued)

SWMU	Screening Location ID	Depth (ft)	Easting (ft)	Northing (ft)	Alpha (dpm)	Beta/ Gamma (dpm)	High Explosives (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
15-004(f)	15-02140	3–4	1626907.71	1761580.05	40	2550	ND	ND	64	ND	17	ND
15-004(f)	15-02143	0–1	1627535.57	1761580.05	92	2470	ND	3.5	ND	ND	ND	ND
15-004(f)	15-02143	1–2	1627535.57	1761580.05	n/a[b]	n/a	ND	ND	ND	ND	ND	ND
15-004(f)	15-02146	0–1	1625935.57	1761380.05	39	449	ND	ND	62	ND	18	ND
15-004(f)	15-02146	3–4	1625935.57	1761380.05	71	2070	ND	ND	ND	ND	20	ND
15-004(f)	15-02154	0–1	1627535.57	1761380.05	71	2010	ND	ND	163	ND	18	ND
15-004(f)	15-02154	3–4	1627535.57	1761380.05	56	2270	ND	ND	ND	ND	ND	ND
15-004(f)	15-02158	0–1	1626135.57	1761180.05	126	2080	ND	ND	168	ND	14	ND
15-004(f)	15-02158	3–4	1626135.57	1761180.05	87	2760	ND	ND	75	ND	ND	ND
15-004(f)	15-02163	0–1	1627135.57	1761180.05	86	1927	ND	ND	255	ND	ND	ND
15-004(f)	15-02163	3–4	1627135.57	1761180.05	81	2050	ND	ND	107	ND	20	ND
15-004(f)	15-02164	0–1	1627335.57	1761180.05	51	1876	ND	2.8	181	ND	ND	ND
15-004(f)	15-02164	3–4	1627335.57	1761180.05	51	2290	ND	ND	ND	ND	ND	ND
15-004(f)	15-02165	0–1	1627535.57	1761180.05	56	1674	ND	2.8	196	ND	ND	ND
15-004(f)	15-02165	3–4	1627535.57	1761180.05	20	2290	ND	ND	ND	ND	ND	ND
15-004(f)	15-02174	0–1	1627135.57	1760980.05	97	2320	ND	ND	219	ND	ND	ND
15-004(f)	15-02174	3–4	1627135.57	1760980.05	56	2230	ND	ND	90	ND	20	ND
15-004(f)	15-02176	0–1	1627535.57	1760980.05	117	1804	ND	0.8	196	4	15	ND
15-004(f)	15-02176	3–4	1627535.57	1760980.05	61	2210	ND	ND	ND	ND	ND	ND
15-004(f)	15-02183	0–1	1626735.57	1760780.05	150	2230	ND	ND	173	ND	ND	ND
15-004(f)	15-02183	3–4	1626735.57	1760780.05	97	2230	ND	ND	188	ND	ND	ND
15-004(f)	15-02184	0–1	1626935.57	1760780.05	92	3210	ND	2.8	215	ND	ND	ND
15-004(f)	15-02184	3–4	1626935.57	1760780.05	48	2880	ND	ND	ND	ND	ND	ND
15-004(f)	15-02185	0–1	1627135.57	1760780.05	59	5330	ND	ND	201	ND	ND	ND
15-004(f)	15-02185	3–4	1627135.57	1760780.05	148	2230	ND	ND	117	ND	ND	ND

Table B-3.0-1 (continued)

SWMU	Screening Location ID	Depth (ft)	Easting (ft)	Northing (ft)	Alpha (dpm)	Beta/ Gamma (dpm)	High Explosives (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
15-004(f)	15-02186	0–1	1627335.57	1760780.05	76	2310	ND	ND	305	ND	15	ND
15-004(f)	15-02186	3–4	1627335.57	1760780.05	76	2020	ND	1.3	113	ND	ND	ND
15-004(f)	15-02187	0–1	1627535.57	1760780.05	86	1992	ND	ND	143	ND	ND	ND
15-004(f)	15-02187	3–4	1627535.57	1760780.05	97	2210	ND	ND	80	ND	25	ND
15-004(f)	15-02189	0–1	1625717.19	1760719.79	102	3050	ND	1.6	ND	ND	ND	ND
15-004(f)	15-02189	3–4	1625717.19	1760719.79	77	3190	ND	ND	ND	ND	ND	ND
15-004(f)	15-02194	0–1	1626735.57	1760580.05	92	3160	ND	ND	93	ND	ND	ND
15-004(f)	15-02194	3–4	1626735.57	1760580.05	102	3140	ND	ND	220	ND	ND	ND
15-004(f)	15-02199	0–1	1627335.57	1760980.05	143	1898	ND	ND	170	ND	17	ND
15-004(f)	15-02199	3–4	1627335.57	1760980.05	97	2010	ND	ND	ND	ND	ND	ND
15-004(f)	15-02200	0–1	1626935.57	1760580.05	97	2620	ND	ND	143	ND	ND	ND
15-004(f)	15-02200	3–4	1626935.57	1760580.05	48	2640	ND	ND	ND	ND	23	ND
15-004(f)	15-02201	0–1	1627135.57	1760580.05	117	1659	ND	ND	198	ND	19	ND
15-004(f)	15-02201	3–4	1627135.57	1760580.05	122	2020	ND	ND	81	ND	ND	ND
15-004(f)	15-02202	0–1	1627335.57	1760580.05	71	1789	ND	ND	192	ND	ND	ND
15-004(f)	15-02202	3–4	1627335.57	1760580.05	35	2270	ND	ND	ND	ND	ND	ND
15-004(f)	15-02210	0–1	1626735.57	1760380.05	111	4400	ND	ND	79	ND	ND	ND
15-004(f)	15-02210	3–4	1626735.57	1760380.05	126	3140	ND	ND	ND	ND	ND	ND
15-004(f)	15-02211	0–1	1626935.57	1760380.05	87	2500	ND	ND	63	ND	15	ND
15-004(f)	15-02211	3–4	1626935.57	1760380.05	150	2520	ND	ND	ND	ND	ND	ND
15-004(f)	15-02212	0–1	1627135.57	1760380.05	150	2510	ND	ND	182	ND	ND	ND
15-004(f)	15-02212	3–4	1627135.57	1760380.05	34	4170	ND	ND	ND	ND	ND	ND
15-004(f)	15-02213	0–1	1627335.57	1760380.05	163	1884	ND	ND	192	ND	14	ND
15-004(f)	15-02213	3–4	1627335.57	1760380.05	51	2100	ND	ND	ND	ND	ND	ND
15-004(f)	15-02214	0–1	1627535.57	1760380.05	66	1978	ND	ND	176	ND	ND	ND

Table B-3.0-1 (continued)

SWMU	Screening Location ID	Depth (ft)	Easting (ft)	Northing (ft)	Alpha (dpm)	Beta/ Gamma (dpm)	High Explosives (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
15-004(f)	15-02214	3–4	1627535.57	1760380.05	86	2230	ND	ND	ND	ND	ND	ND
15-004(b) and 15-004(c)	1	0–1	1622716.889	1761252.355	38	2270	ND	3.1	210	ND	ND	ND
15-004(b) and 15-004(c)	1	3–4	1622716.889	1761252.355	27	2370	ND	8.4	252	ND	ND	ND
15-004(b) and 15-004(c)	2	0–1	1622816.889	1761252.355	22	2530	ND	ND	222	ND	26	ND
15-004(b) and 15-004(c)	2	3–4	1622816.889	1761252.355	66	2360	ND	ND	178	ND	ND	ND
15-004(b) and 15-004(c)	3	0–1	1622916.889	1761252.355	77	2160	ND	ND	340	34	18	ND
15-004(b) and 15-004(c)	3	3–4	1622916.889	1761252.355	22	2280	ND	ND	147	ND	ND	ND
15-004(b) and 15-004(c)	4	0–1	1623016.889	1761252.355	22	2240	ND	ND	243	ND	19	ND
15-004(b) and 15-004(c)	4	3–4	1623016.889	1761252.355	27	2320	ND	ND	92	ND	ND	ND
15-004(b) and 15-004(c)	6	0–1	1623216.889	1761252.355	105	2950	ND	ND	233	ND	ND	ND
15-004(b) and 15-004(c)	6	3–4	1623216.889	1761252.355	111	2690	ND	ND	247	ND	ND	ND
15-004(b) and 15-004(c)	7	0–1	1623316.889	1761252.355	93	2860	ND	ND	105	ND	ND	ND
15-004(b) and 15-004(c)	7	3–4	1623316.889	1761252.355	134	2600	ND	ND	320	ND	21	ND
15-004(b) and 15-004(c)	8	0–1	1622716.889	1761152.355	55	2050	ND	ND	62	ND	ND	ND
15-004(b) and 15-004(c)	8	3–4	1622716.889	1761152.355	27	2360	ND	2.3	257	ND	ND	ND
15-004(b) and 15-004(c)	11	0–1	1623016.889	1761152.355	38	2300	ND	ND	271	ND	16	ND
15-004(b) and 15-004(c)	11	3–4	1623016.889	1761152.355	44	2100	ND	ND	268	ND	ND	ND
15-004(b) and 15-004(c)	14	0–1	1623316.889	1761152.355	158	2560	ND	ND	257	ND	22	ND
15-004(b) and 15-004(c)	14	3–4	1623316.889	1761152.355	105	2610	ND	ND	224	ND	ND	ND
15-004(b) and 15-004(c)	15	0–1	1622716.889	1761052.355	22	2550	ND	3.0	127	ND	19	ND
15-004(b) and 15-004(c)	15	3–4	1622716.889	1761052.355	38	2610	ND	1.0	142	ND	15	ND
15-004(b) and 15-004(c)	19	0–1	1623116.889	1761052.355	82	2670	ND	ND	185	ND	ND	ND
15-004(b) and 15-004(c)	19	3–4	1623116.889	1761052.355	99	2590	ND	ND	215	ND	ND	ND
15-004(b) and 15-004(c)	20	0–1	1623216.889	1761052.355	99	2640	ND	ND	225	ND	ND	ND
15-004(b) and 15-004(c)	20	3–4	1623216.889	1761052.355	76	3110	ND	ND	135	ND	21	ND

Table B-3.0-1 (continued)

SWMU	Screening Location ID	Depth (ft)	Easting (ft)	Northing (ft)	Alpha (dpm)	Beta/ Gamma (dpm)	High Explosives (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
15-004(b) and 15-004(c)	22	0–1	1622716.889	1760952.355	33	2490	ND	ND	116	ND	ND	ND
15-004(b) and 15-004(c)	22	3–4	1622716.889	1760952.355	27	2290	ND	1.8	168	ND	ND	ND
15-004(b) and 15-004(c)	23	0–1	1622816.889	1760952.355	105	2711	ND	2.8	224	ND	ND	ND
15-004(b) and 15-004(c)	23	3–4	1622816.889	1760952.355	76	2820	ND	ND	189	ND	ND	ND
15-004(b) and 15-004(c)	24	0–1	1622916.889	1760952.355	87	2820	ND	ND	214	ND	17	ND
15-004(b) and 15-004(c)	24	3–4	1622916.889	1760952.355	76	2830	ND	ND	282	ND	ND	ND
15-004(b) and 15-004(c)	25	0–1	1623016.889	1760952.355	82	2930	ND	ND	271	ND	ND	ND
15-004(b) and 15-004(c)	25	3–4	1623016.889	1760952.355	58	2640	ND	ND	160	ND	ND	ND
15-004(b) and 15-004(c)	26	0–1	1623116.889	1760952.355	61	2390	ND	ND	144	ND	15	ND
15-004(b) and 15-004(c)	26	3–4	1623116.889	1760952.355	61	2250	ND	ND	130	ND	ND	ND
15-004(b) and 15-004(c)	27	0–1	1623216.889	1760952.355	83	2590	ND	ND	172	ND	ND	ND
15-004(b) and 15-004(c)	27	3–4	1623216.889	1760952.355	71	2330	ND	ND	339	ND	ND	ND
15-004(b) and 15-004(c)	28	0–1	1623316.889	1760952.355	37	1036	ND	ND	200	ND	ND	ND
15-004(b) and 15-004(c)	28	3–4	1623316.889	1760952.355	48	1162	ND	ND	250	ND	ND	ND
15-004(b) and 15-004(c)	30	0–1	1622716.889	1760852.355	49	2310	ND	ND	272	24	ND	ND
15-004(b) and 15-004(c)	30	3–4	1622716.889	1760852.355	38	2470	ND	ND	174	ND	13	ND
15-004(b) and 15-004(c)	31	0–1	1622816.889	1760852.355	105	2870	ND	ND	132	ND	18	ND
15-004(b) and 15-004(c)	31	3–4	1622816.889	1760852.355	128	2710	ND	ND	192	ND	ND	ND
15-004(b) and 15-004(c)	33	0–1	1622916.889	1760852.355	128	3070	ND	5.6	149	ND	ND	ND
15-004(b) and 15-004(c)	33	3–4	1622916.889	1760852.355	111	3200	ND	1.2	201	ND	ND	ND
15-004(b) and 15-004(c)	35	0–1	1623116.889	1760852.355	46	2260	ND	ND	149	ND	ND	ND
15-004(b) and 15-004(c)	35	3–4	1623116.889	1760852.355	46	2260	ND	ND	201	ND	ND	ND
15-004(b) and 15-004(c)	37	0–1	1623316.889	1760852.355	41	2010	ND	ND	134	ND	ND	ND
15-004(b) and 15-004(c)	37	3–4	1623316.889	1760852.355	36	2360	ND	ND	261	ND	ND	ND
15-004(b) and 15-004(c)	38	0–1	1622716.889	1760752.355	33	2240	ND	ND	192	17	ND	ND

Table B-3.0-1 (continued)

SWMU	Screening Location ID	Depth (ft)	Easting (ft)	Northing (ft)	Alpha (dpm)	Beta/ Gamma (dpm)	High Explosives (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
15-004(b) and 15-004(c)	38	3–4	1622716.889	1760752.355	33	2490	ND	ND	172	ND	ND	ND
15-004(b) and 15-004(c)	39	0–1	1622816.889	1760752.355	140	2790	ND	1.7	145	ND	18	ND
15-004(b) and 15-004(c)	39	3–4	1622816.889	1760752.355	140	2610	ND	ND	152	ND	ND	ND
15-004(b) and 15-004(c)	40	0–1	1622916.889	1760752.355	76	2910	ND	ND	184	ND	15	ND
15-004(b) and 15-004(c)	40	3–4	1622916.889	1760752.355	105	2890	ND	ND	160	ND	ND	ND
15-004(b) and 15-004(c)	41	0–1	1623016.889	1760752.355	134	2710	ND	ND	352	ND	ND	ND
15-004(b) and 15-004(c)	41	3–4	1623016.889	1760752.355	123	2640	ND	ND	197	ND	ND	ND
15-004(b) and 15-004(c)	42	0–1	1623116.889	1760752.355	31	2240	ND	ND	176	ND	17	ND
15-004(b) and 15-004(c)	42	3–4	1623116.889	1760752.355	46	2020	ND	ND	199	ND	ND	ND
15-004(b) and 15-004(c)	43	0–1	1623216.889	1760752.355	51	2300	ND	ND	112	ND	ND	ND
15-004(b) and 15-004(c)	43	3–4	1623216.889	1760752.355	45	2260	ND	ND	118	ND	ND	ND
15-004(b) and 15-004(c)	44	0–1	1623316.889	1760752.355	36	2110	ND	ND	115	ND	17	ND
15-004(b) and 15-004(c)	44	3–4	1623316.889	1760752.355	31	2320	ND	ND	143	ND	15	ND
15-004(b) and 15-004(c)	45	0–1	1622716.889	1760652.355	61	2360	ND	ND	140	ND	ND	ND
15-004(b) and 15-004(c)	45	3–4	1622716.889	1760652.355	44	2420	ND	ND	251	ND	15	ND
15-004(b) and 15-004(c)	46	0–1	1622816.889	1760652.355	117	2650	ND	ND	189	ND	ND	ND
15-004(b) and 15-004(c)	46	3–4	1622816.889	1760652.355	134	2840	ND	ND	135	ND	ND	ND
15-004(b) and 15-004(c)	47	0–1	1622916.889	1760652.355	87	2670	ND	ND	185	12	ND	ND
15-004(b) and 15-004(c)	47	3–4	1622916.889	1760652.355	87	2570	ND	1.3	117	ND	33	ND
15-004(b) and 15-004(c)	48	0–1	1623016.889	1760652.355	93	2760	ND	0.9	237	ND	ND	ND
15-004(b) and 15-004(c)	48	3–4	1623016.889	1760652.355	111	2610	ND	ND	78	ND	ND	ND
15-004(b) and 15-004(c)	49	0–1	1623116.889	1760652.355	31	2210	ND	ND	245	ND	ND	ND
15-004(b) and 15-004(c)	49	3–4	1623116.889	1760652.355	40	2270	ND	ND	205	ND	ND	ND
15-004(b) and 15-004(c)	50	0–1	1623216.889	1760652.355	41	2200	ND	ND	188	ND	17	ND
15-004(b) and 15-004(c)	50	3–4	1623216.889	1760652.355	20	2390	ND	ND	176	ND	ND	ND

Table B-3.0-1 (continued)

SWMU	Screening Location ID	Depth (ft)	Easting (ft)	Northing (ft)	Alpha (dpm)	Beta/ Gamma (dpm)	High Explosives (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
15-004(b) and 15-004(c)	52	0–1	1622716.889	1760552.355	38	2430	ND	ND	152	ND	14	ND
15-004(b) and 15-004(c)	52	3–4	1622716.889	1760552.355	22	2500	ND	ND	ND	ND	19	ND
15-004(b) and 15-004(c)	53	0–1	1622816.889	1760552.355	39	55	ND	0.9	61	ND	19	ND
15-004(b) and 15-004(c)	53	3–4	1622816.889	1760552.355	1805	1878	ND	1.5	174	ND	17	ND
15-004(b) and 15-004(c)	54	0–1	1622916.889	1760552.355	93	2670	ND	5.0	247	ND	ND	ND
15-004(b) and 15-004(c)	54	3–4	1622916.889	1760552.355	76	3060	ND	1.6	68	ND	ND	ND
15-004(b) and 15-004(c)	55	0–1	1623016.889	1760552.355	146	2800	ND	1.8	236	ND	ND	ND
15-004(b) and 15-004(c)	55	3–4	1623016.889	1760552.355	105	2660	ND	ND	210	22	ND	ND
15-004(b) and 15-004(c)	56	0–1	1623116.889	1760552.355	152	2800	ND	12.1	206	ND	ND	ND
15-004(b) and 15-004(c)	56	3–4	1623116.889	1760552.355	82	2560	ND	1.4	240	ND	ND	ND
15-004(b) and 15-004(c)	57	0–1	1623216.889	1760552.355	82	2730	ND	ND	159	ND	ND	ND
15-004(b) and 15-004(c)	57	3–4	1623216.889	1760552.355	111	2820	ND	7.7	132	ND	ND	ND
15-004(b) and 15-004(c)	58	0–1	1623316.889	1760552.355	99	2640	ND	ND	245	ND	ND	ND
15-004(b) and 15-004(c)	58	3–4	1623316.889	1760552.355	82	2670	ND	ND	260	ND	ND	ND
15-004(b) and 15-004(c)	59	0–1	1622716.889	1760452.355	87	2470	ND	ND	ND	10	ND	ND
15-004(b) and 15-004(c)	59	3–4	1622716.889	1760452.355	140	2890	ND	2.0	ND	ND	13	ND
15-004(b) and 15-004(c)	61	0–1	1622916.889	1760452.355	123	2580	ND	1.1	190	15	ND	ND
15-004(b) and 15-004(c)	61	3–4	1622916.889	1760452.355	169	2910	ND	ND	126	ND	ND	ND
15-004(b) and 15-004(c)	62	0–1	1623016.889	1760452.355	99	2790	ND	1.8	162	ND	ND	ND
15-004(b) and 15-004(c)	62	3–4	1623016.889	1760452.355	128	2960	ND	ND	185	ND	ND	ND
15-004(b) and 15-004(c)	63	0–1	1623116.889	1760452.355	99	2660	ND	ND	263	ND	ND	ND
15-004(b) and 15-004(c)	63	3–4	1623116.889	1760452.355	70	2640	ND	0.8	117	ND	ND	ND
15-004(b) and 15-004(c)	64	0–1	1623216.889	1760452.355	99	2710	ND	ND	270	ND	30	ND
15-004(b) and 15-004(c)	64	3–4	1623216.889	1760452.355	93	2760	ND	1.1	346	11	ND	ND
15-004(b) and 15-004(c)	65	0–1	1623316.889	1760452.355	93	2530	ND	ND	259	ND	ND	ND

Table B-3.0-1 (continued)

SWMU	Screening Location ID	Depth (ft)	Easting (ft)	Northing (ft)	Alpha (dpm)	Beta/ Gamma (dpm)	High Explosives (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
15-004(b) and 15-004(c)	65	3–4	1623316.889	1760452.355	123	2560	ND	2.4	151	ND	18	ND
15-004(b) and 15-004(c)	66	0–1	1622716.889	1760352.355	87	2610	ND	1.6	ND	ND	37	ND
15-004(b) and 15-004(c)	66	1–2	1622716.889	1760352.355	76	2410	ND	ND	ND	ND	20	ND
15-004(b) and 15-004(c)	68	0–1	1622916.889	1760352.355	169	2680	ND	ND	128	ND	ND	ND
15-004(b) and 15-004(c)	68	3–4	1622916.889	1760352.355	58	2890	ND	ND	90	ND	ND	ND
15-004(b) and 15-004(c)	69	0–1	1623016.889	1760352.355	87	2890	ND	ND	239	24	ND	ND
15-004(b) and 15-004(c)	69	3–4	1623016.889	1760352.355	93	2570	ND	ND	62	ND	15	ND
15-004(b) and 15-004(c)	72	0–1	1623316.889	1760352.355	26	2150	ND	ND	79	ND	ND	ND
15-004(b) and 15-004(c)	72	3–4	1623316.889	1760352.355	36	1379	ND	ND	ND	ND	ND	ND
15-004(b) and 15-004(c)	73	0–1	1622816.889	1760252.355	15	2620	ND	ND	125	ND	16	ND
15-004(b) and 15-004(c)	73	1–2	1622816.889	1760252.355	20	2320	ND	ND	210	ND	ND	ND
15-004(b) and 15-004(c)	75	0–1	1623016.889	1760252.355	15	2540	ND	2.0	208	ND	15	ND
15-004(b) and 15-004(c)	75	1–2	1623016.889	1760252.355	51	1978	ND	1.1	185	ND	ND	ND
15-004(b) and 15-004(c)	76	0–1	1623116.889	1760252.355	46	2240	ND	0.8	204	ND	ND	ND
15-004(b) and 15-004(c)	76	1–2	1623116.889	1760252.355	30	2660	ND	ND	ND	ND	ND	ND
15-004(b) and 15-004(c)	78	0–1	1623316.889	1760252.355	31	2220	ND	ND	ND	ND	ND	ND
15-004(b) and 15-004(c)	78	3–4	1623316.889	1760252.355	10	2290	ND	ND	ND	ND	ND	ND
15-004(b) and 15-004(c)	80	0–1	1623016.889	1760152.355	31	2360	ND	ND	159	ND	ND	ND
15-004(b) and 15-004(c)	80	1–2	1623016.889	1760152.355	36	2540	ND	ND	284	ND	ND	ND
15-004(b) and 15-004(c)	81	0–1	1623116.889	1760152.355	26	2190	ND	ND	163	ND	ND	ND
15-004(b) and 15-004(c)	81	2–3	1623116.889	1760152.355	20	2140	ND	ND	ND	ND	ND	ND
15-004(b) and 15-004(c)	82	0–1	1623216.889	1760152.355	36	2490	ND	ND	202	ND	ND	ND
15-004(b) and 15-004(c)	82	1–2	1623216.889	1760152.355	20	2590	ND	ND	ND	ND	ND	ND
15-004(b) and 15-004(c)	83	0–1	1623316.889	1760152.355	31	2570	ND	ND	144	ND	ND	ND
15-004(b) and 15-004(c)	83	1–2	1623316.889	1760152.355	20	2440	ND	ND	139	ND	ND	ND

Table B-3.0-1 (continued)

SWMU	Screening Location ID	Depth (ft)	Easting (ft)	Northing (ft)	Alpha (dpm)	Beta/ Gamma (dpm)	High Explosives (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
15-007(a)	s4	2–2.4	1623314.218	1762779.827	<2×BV[c]	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	s7	2–2.4	1623338.733	1762720.552	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	s8	2–2.4	1623331.795	1762677.537	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	s10	2–2.4	1623305.849	1762703.523	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	s6	2–2.4	1623324.652	1762746.333	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	s1	2–2.4	1623278.596	1762735.118	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	s9	2–2.4	1623299.79	1762677.51	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	s5	2–2.4	1623339.367	1762773.525	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	s3	2–2.4	1623285.092	1762775.514	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	s2	2–2.4	1623266.926	1762748.595	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	b10	4–4.5	1623326.248	1762757.676	<2×BV	<2×BV	ND	1.6	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	b9	4–4.5	1623295.085	1762748.759	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	b8	4–4.5	1623305.663	1762770.407	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	b7	4–4.5	1623277.732	1762762.743	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	b6	4–4.5	1623292.071	1762729.748	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	b5	4–4.5	1623316.818	1762743.124	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	b4	4–4.5	1623330.022	1762722.66	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	b3	4–4.5	1623308.000	1762717.811	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	b2	4–4.5	1623324.939	1762692.817	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-007(a)	b1	4–4.5	1623317.449	1762674.234	<2×BV	<2×BV	ND	ND	<2×BV	<2×BV	<2×BV	<2×BV
15-008(a)	B-01	0–0.5	1626131.917	1760533.432	<2×BV	<2×BV	ND	ND	ND	459	24	822
15-008(a)	B-02	0–0.5	1626142.567	1760523.171	<2×BV	<2×BV	ND	ND	ND	35	22	23
15-008(a)	B-03	0–0.5	1626152.397	1760514.556	<2×BV	<2×BV	ND	ND	ND	298	73	459
15-008(a)	A-02	0–0.5	1626335.248	1760823.259	<2×BV	<2×BV	ND	ND	95	15	14	18
15-008(a)	A-01	0–0.5	1626368.284	1760852.778	<2×BV	<2×BV	ND	ND	149	108	24	350

Table B-3.0-1 (continued)

SWMU	Screening Location ID	Depth (ft)	Easting (ft)	Northing (ft)	Alpha (dpm)	Beta/ Gamma (dpm)	High Explosives (ppm)		Metals (ppm)			
							TNT	RDX	Barium	Copper	Lead	Uranium
15-008(a)	A-03	0–0.5	1626368.945	1760819.263	<2×BV	<2×BV	ND	ND	ND	298	28	1189
TA-36												
36-006	c1	0–0.5	1631159.588	1758644.007	<2×BV	<2×BV	ND	1.0	ND	54	219	100
36-006	c2	0–0.5	1631179.667	1758692.198	<2×BV	<2×BV	ND	ND	207	1188	63	31
36-006	b3	0–0.5	1631115.859	1758733.695	<2×BV	<2×BV	ND	ND	252	36	55	ND
36-006	a3	0–0.5	1631036.434	1758750.651	<2×BV	<2×BV	ND	ND	159	47	60	ND
36-006	se	0–0.5	1631200.193	1758628.39	<2×BV	<2×BV	ND	5.6	88	ND	ND	ND
36-006	nw	0–0.5	1630905.695	1758744.404	<2×BV	<2×BV	ND	2.4	ND	ND	ND	ND
36-006	b2	0–0.5	1631115.859	1758733.695	<2×BV	<2×BV	ND	ND	341	863	82	24
36-006	c3	0–0.5	1631223.396	1758695.321	<2×BV	<2×BV	ND	ND	224	ND	74	ND
36-006	b1	0–0.5	1631083.286	1758670.78	<2×BV	<2×BV	ND	ND	ND	53	250	102
36-006	a1	0–0.5	1630957.981	1758718.227	<2×BV	<2×BV	ND	ND	ND	58	254	134
36-006	a2	0–0.5	1630993.598	1758744.85	<2×BV	<2×BV	ND	ND	352	1325	87	17

[a] ND = Not detected.

[b] n/a = Not applicable.

[c] <2×BV = Result is less than 2 times instrument background reading.

Table B-11.0-1
Summary of Sampling Deviations from the Approved Work Plan

Site ID	Sampling Location	Description of Deviation
TA-15		
SWMU 15-002	15-613675	The location was moved 25 ft south because the proposed location was surveyed above the concrete apron of building 15-0534.
SWMUs 15-004(b) and 15-004(c)	15-613340	Step-out samples were collected approximately 15 ft from the edge of the excavation.
	15-613345	Samples were collected from 0–1 ft and 1–2 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the sediment-tuff contact was encountered at 0.25 ft bgs.
SWMU 15-004(f)	15-02141	Samples were collected from 3–3.5 ft instead of from 3–4 ft bgs because the soil-tuff contact was encountered at 0.5 ft bgs.
	15-02155	Samples were collected from 3–3.5 ft instead of from 3–4 ft bgs because the soil-tuff contact was encountered at 0.5 ft bgs.
	15-02166	Samples were collected from 3–3.5 ft instead of from 3–4 ft bgs because the soil-tuff contact was encountered at 0.5 ft bgs.
	15-02167	Samples were collected from 3–3.5 ft instead of from 3–4 ft bgs because the soil-tuff contact was encountered at 1 ft bgs.
	15-02177	Samples were collected from 3–3.5 ft instead of from 3–4 ft bgs because the soil-tuff contact was encountered at 0.5 ft bgs.
	15-02178	Samples were collected from 3–3.5 ft bgs of from 3–4 ft bgs because the soil-tuff contact was encountered at 0.5 ft bgs.
	15-02179	Samples were collected from 3–3.5 ft instead of from 3–4 ft bgs because tuff was encountered at ground surface.
	15-02206	Samples were collected from 3–3.5 ft instead of from 3–4 ft bgs because the soil-tuff contact was encountered at 0.5 ft bgs.
	15-02277	Samples were collected from 3–3.5 ft instead of from 3–4 ft bgs because the soil-tuff contact was encountered at 0.5 ft bgs.
	15-613370	Samples were collected from 0–1 ft, 6–7 ft, and 8–8.5 ft bgs instead of 9–10 ft bgs because of refusal at the base of the borehole at 8.5 ft bgs.
	15-613374	Samples were collected from 0–1 ft, 6–7 ft, and 8–8.5 ft bgs instead of 9–10 ft bgs because of refusal at the base of the borehole at 8.5 ft bgs.
	15-613380	Samples were collected from 0–1 ft, 6–7 ft, and 9–9.5 ft bgs instead of 9–10 ft bgs because of refusal at the base of the borehole at 9.5 ft bgs.
	15-613367	Samples were collected from 0–1 ft and 2–3 ft instead of 0–1 ft bgs 6–7 ft and 9–10 ft bgs because of refusal at the base of the borehole at 3 ft bgs.
	15-613373	Samples were collected from 0–1 ft and 6–6.25 ft bgs instead of 0–1 ft, 6–7 ft, and 9–10 ft bgs because of refusal at the base of the borehole at 6.25 ft bgs.
	15-613377	Samples were collected from 0–1 ft bgs and 3–3.5 ft bgs instead of 0–1 ft bgs, 6–7 ft bgs, and 9–10 ft bgs because of refusal at the base of the borehole at 3.5 ft bgs.
	15-613384	Samples were collected from 0–0.5 ft and 0.5–1 ft bgs instead of from 0–1 ft and 2–3 ft bgs because the sediment-tuff contact was encountered at 1 ft bgs.

Table B-11.0-1 (continued)

Site ID	Sampling Location	Description of Deviation
SWMU 15-004(f) (continued)	15-613385	Samples were collected from 0–1 ft and 1–1.5 ft bgs instead of from 0–1 ft and 2–3 ft bgs because the sediment-tuff contact was encountered at 1.5 ft bgs.
	15-613386	Samples were collected from 0–1 ft and 1–2 ft bgs instead of from 0–1 ft bgs and 2–3 ft bgs because the sediment-tuff contact was encountered at 2 ft bgs.
	15-613388	Samples were collected from 0–1 ft and 1–1.5 ft bgs instead of from 0–1 ft and 2–3 ft bgs because the sediment-tuff contact was encountered at 1.5 ft bgs.
	15-613389	Samples were collected from 0–0.5 ft and 0.5–1 ft bgs instead of from 0–1 ft and 2–3 ft bgs because the sediment-tuff contact was encountered at 1 ft bgs.
SWMU 15-007(a)	15-613395	Step-out samples were collected approximately 25 ft from the edge of the excavation.
	15-613396	Step-out samples were collected approximately 25 ft from the edge of the excavation.
	15-613397	Step-out samples were collected approximately 10 ft from the edge of the excavation.
	15-613398	Step-out samples were collected approximately 10 ft from the edge of the excavation.
	15-613399	Step-out samples were collected approximately 8 ft from the edge of the excavation.
SWMU 15-008(a)	15-613403	Samples were collected from 0–1 ft and 1–2 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the soil-tuff contact was encountered at 0.75 ft bgs.
	15-613404	Samples were collected from 0–1 ft bgs and 1–2 ft bgs instead of from 0–1 ft bgs and 3–4 ft bgs because the soil-tuff contact was encountered at 0.5 ft bgs.
	15-613405	Samples were collected from 0–1 ft and 1–2 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the soil-tuff contact was encountered at 0.5 ft bgs.
	15-613406	Samples were collected from 0–1 ft and 1–2 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the soil-tuff contact was encountered at 0.75 ft bgs.
	15-613407	Samples were collected from 0–1 ft and 2–3 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the soil-tuff contact was encountered at 1 ft bgs.

Table B-11.0-1 (continued)

Site ID	Sampling Location	Description of Deviation
SWMU 15-008(a) (continued)	15-613408	Samples were collected from 0–1 ft and 1–2 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the soil-tuff contact was encountered at 0.5 ft bgs.
	15-613409	Samples were collected from 0–1 ft and 1–2 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the soil-tuff contact was encountered at 0.25 ft bgs.
	15-613413	Samples were collected from 0–1 ft and 1–2 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the soil-tuff contact was encountered at 0.25 ft bgs.
	15-613414	Samples were collected from 0–1 ft and 1–2 ft bgs instead of from 0–1 ft and 3–4 ft bgs, because the soil-tuff contact was encountered at 0.25 ft bgs.
SWMU 15-009(e)	15-613421	Samples were collected from 0–1 ft and 2.5–3 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the soil-tuff contact was encountered at 2 ft bgs.
	15-613422	Samples were collected from 0–0.5 ft and 0.5–1 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the soil-tuff contact was encountered at 0.3 ft bgs.
	15-613423	Samples were collected from 0–1 ft and 2–2.5 ft bgs instead of from 0–1 ft and 3–4 ft bgs because the soil-tuff contact was encountered at 1 ft bgs.
	n/a*	Samples were inadvertently collected from 0–1 ft and 3–4 ft bgs instead of 0–1 ft and 3–4 ft below structures.
SWMU 15-010(a)	15-613427	Samples were collected from 4–5 ft and 7–8 ft bgs at the former septic tank location instead of 0–1 ft and 3–4 ft beneath the septic system because the septic system could not be located.
	15-613428	Samples were collected from 4–5 ft and 7–8 ft bgs at the former tank inlet instead of 0–1 ft and 3–4 ft beneath the septic system because the septic system could not be located.
	15-613429	Samples were collected from 4–5 ft, 7–8 ft, and 9–9.5 ft bgs directly south of the former septic tank location instead of 0–1 ft and 3–4 ft beneath the septic system because the septic system could not be located; field-screening results were elevated at 7–8 ft bgs, and refusal was encountered at 9.5 ft bgs.
	15-613430	Samples were collected from 4–5 ft and 6–7 ft bgs at the former septic tank outlet instead of 0–1 ft and 3–4 ft beneath the septic system because the septic system could not be located and because refusal was encountered at 7 ft bgs.
	15-613431	Samples were collected from 4–5 ft bgs and 7–8 ft bgs directly north of the former septic tank location instead of 0–1 ft and 3–4 ft beneath the septic system because the septic system could not be located.
	n/a	The septic tank and the inlet and outlet lines were not removed because they had been removed previously. An alternative confirmation sampling strategy was implemented.
TA 36		
SWMU 36-001	36-613721	Samples were collected from 2–4 ft, 5–6.5 ft, and 10–11.5 ft bgs instead of from beneath and around the excavated landfill because remediation activities were suspended as a result of health and safety concerns.
	36-613722	Samples were collected from 0–1.5 ft, 5–6.5 ft, and 10–11.5 ft bgs instead of from beneath and around the excavated landfill because remediation activities were suspended as a result of health and safety concerns.
	36-613723	Samples were collected from 0–1.5 ft, 5–6.5 ft, and 10–11.5 ft bgs instead of from beneath and around the excavated landfill because remediation activities were suspended as a result of health and safety concerns.

Table B-11.0-1 (continued)

Site ID	Sampling Location	Description of Deviation
SWMU 36-001 (continued)	36-613724	Samples were collected from 0–1.5 ft, 5–6.5 ft, and 10–11.5 ft bgs instead of from beneath and around the excavated landfill because remediation activities were suspended as a result of health and safety concerns.
	36-613725	Samples were collected from 0–1 ft, 5–6.5 ft, and 10–11.5 ft bgs instead of from beneath and around the excavated landfill because remediation activities were suspended as a result of health and safety concerns.
	36-613726	Samples were collected from 0–1.5 ft, 5–6.5 ft, and 10–11.5 ft bgs instead of from beneath and around the excavated landfill because remediation activities were suspended as a result of health and safety concerns.
	36-613727	Samples were collected from 0–1.5 ft, 5–6.5 ft,10–11.5 ft, and 13.5–15 ft bgs instead of from beneath and around the excavated landfill because remediation activities were suspended as a result of health and safety concerns and because field-screening results were elevated at 10–11.5 ft bgs.
	n/a	Remediation activities at SWMU 36-001 were suspended because of potential health and safety concerns, specifically, higher than expected radiation levels and the potential presence of beryllium encountered during the initial stages of waste removal.
SWMU 36-003(b)	15-613464, 15-613465, 15-613466	Samples were inadvertently collected from 0–1 ft and 3–4 ft bgs instead of 0–1 ft and 3–4 ft below structures.
SWMU 36-005	36-03020	Samples were collected from 0–1 ft and 1–2 ft bgs instead of from 0–1 ft and 2–3 ft bgs because the sediment-tuff contact was encountered at 2 ft bgs.
	36-03022	Samples were collected from 0–0.5 ft and 0.5–1 ft bgs instead of from 0–1 ft and 2–3 ft bgs because the sediment-tuff contact was encountered at 1 ft bgs.
	n/a	Sampling per the approved investigation work plan could not be implemented because of cultural resource restrictions (see section 7.10.4 of the investigation work plan).

*n/a = Not applicable.

Appendix C

Investigation-Derived Waste Management

C-1.0 INTRODUCTION

This appendix contains the waste management records for the investigation-derived waste (IDW) generated during the implementation of the investigation work plan for the Potrillo and Fence Canyons Aggregate Area of Los Alamos National Laboratory (LANL or the Laboratory). In general, IDW generated during the field investigation was managed in accordance with Standard Operating Procedure (SOP) 10021, Characterization and Management of Environmental Program Waste. This procedure incorporates the requirements of applicable U.S. Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED) regulations, U.S. Department of Energy orders, and Laboratory policies and procedures.

Consistent with Laboratory procedures, a waste characterization strategy form (WCSF) was prepared to address characterization approaches, on-site management, and final disposition options for wastes. Analytical data and information on wastes generated during previous investigations and/or acceptable knowledge (AK) were used to complete the WCSF. The WCSF is included in this appendix as Attachment C-1.

Areas of contamination were approved and granted for the investigation and remediation of Solid Waste Management Units (SWMUs) 15-007(a), 36-001, and 36-006 within Technical Area 15 (TA-15) and TA-36 (LANL 2010, 110838; NMED 2010, 110953). The purpose of requesting the area of contamination boundaries was to facilitate on-site staging and segregation of remediation waste without triggering a new point of generation or placement of waste subject to Resource Conservation and Recovery Act requirements. All staging and segregation of waste were conducted in an environmentally protective manner using a combination of containers and appropriately designed and controlled staging piles. Materials were managed in full accordance with hazardous waste regulatory requirements upon transfer outside of the area of contamination boundaries.

Following waste characterization, the selection of waste containers was based on appropriate U.S. Department of Transportation requirements, waste types, and volumes of IDW generated. Immediately following containerization, each waste container was individually labeled with a unique identification number and with information regarding waste classification, contents, and radioactivity, if applicable.

Before it was shipped, waste was staged in clearly marked, 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.

Investigation activities were conducted in a manner that minimized the generation of waste. Waste minimization was accomplished by implementing the most recent version of the “Los Alamos National Laboratory Hazardous Waste Minimization Report.”

C-2.0 WASTE STREAMS

The IDW streams generated and managed during the investigation of Potrillo and Fence Canyons Aggregate Area are described below and are summarized in Table C-2.0-1. The waste numbers correspond with those identified in the WCSF.

- WCSF Waste Stream #1: No drill cuttings were generated during the 2010 investigation.
- WCSF Waste Stream #2: Contact waste consisted of spent personal protective equipment used during sampling activities, supplies used for dry decontamination of sampling equipment, and materials that contacted, or potentially contacted, contaminated environmental media that could not be decontaminated. This waste stream consisted of gloves, paper towels, coveralls (e.g., Tyvek), booties, plastic and glass sample bottles, and disposable sampling supplies. These wastes were containerized at the well R-40 laydown area at TA-15 and were characterized based on AK of the waste materials, the methods of generation, and analytical data for the media with which they came into contact. Approximately 1.0 yd^3 of contact waste was generated and was disposed of at TA-54 through the Green is Clean program.
- WCSF Waste Stream #3: No decontamination fluids were generated during the 2010 investigation.
- WCSF Waste Stream #4: Excavated environmental media consisted of overburden spoils of soil and rock removed from within or next to the excavated areas. These wastes from SWMUs 15-008(a) and 36-006 were containerized in approved soft-sided bags. Overburden spoils of soil and rock from SWMU 15-007(a) were placed in 80-yd^3 soil piles and stored on the ground surface with best management practices. Approximately 2480 yd^3 of excavated environmental media was generated from SWMUs 15-007(a), 15-008(a), and 36-006. Waste from SWMUs 15-008(a) and 36-006 was characterized as low-level waste (LLW) and disposed of at TA-54. Waste from SWMU 15-007(a) was characterized as nonhazardous, passed residential cleanup standards, and was used to backfill the excavation.
- WCSF Waste Stream #5: Excavated manmade debris consisted of concrete, metal, wire, connectors, and miscellaneous metal. These wastes were containerized in approved soft-sided bags. Approximately 237 yd^3 of excavated manmade debris was generated from SWMUs 15-007(a), 15-008(a), and 36-006. Waste generated from SWMUs 15-008(a) and 36-006 was characterized as LLW and disposed of at TA-54. Waste from SWMU 15-007(a) was characterized as industrial solid waste and disposed of at an authorized off-site facility.
- WCSF Waste Stream #6: Municipal solid waste (MSW) consisted of noncontact trash and debris and empty sample preservation containers. Approximately 1 yd^3 of waste was generated and was determined to be nonhazardous, nonradioactive MSW. It was stored in plastic-lined trash cans and disposed of at the Los Alamos County landfill.
- WCSF Waste Stream #7: No petroleum-contaminated soils were generated during the 2010 investigation.
- WCSF Waste Stream #8: No returned samples were generated during the 2010 investigation.
- WCSF Waste Stream #9: High-explosive (HE) test kits consisted of spent solvent (acetone, water, and soil-crushed tuff). These wastes were containerized in locked 5-gal. buckets within a less than 90-d hazardous waste storage area. Approximately 9 gal. of spent acetone was generated from SWMUs 15-004(b), 15-004(c), 15-004(f), 15-007(a), 15-008(a), and 36-001. The soil-tuff was characterized using data from the soil from which the sample was collected. The waste was containerized at the point of generation and will be treated and disposed of at an authorized off-site mixed-waste facility.

C-3.0 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 or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH 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.

LANL (Los Alamos National Laboratory), September 29, 2010. "Submittal of Request for Approval of Areas of Contamination for Investigation and Remediation Actions at Potrillo and Fence Canyon Aggregate Area Excavation Sites," Los Alamos National Laboratory letter (EP2010-0429) to J.P. Bearzi (NMED-HWB) from M.J. Graham (LANL) and G.J. Rael (DOE-LASO), Los Alamos, New Mexico. (LANL 2010, 110838)

NMED (New Mexico Environment Department), October 7, 2010. "Response to Request for Approval of Areas of Contamination for Investigation and Remediation Actions at Potrillo and Fence Canyon Aggregate Area Excavation Sites [SWMUs 15-007(a), 15-008(a), 15-010(a), 36-001, and 36-006]," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2010, 110953)

Table C-2.0-1
Summary of IDW Generation and Management

Waste Stream	Waste Type	Volume	Characterization Method	On-Site Management	Disposition
Contact waste	LLW	1 yd^3	AK and analytical results of site characterization	Clamshell	TA-54
Excavated environmental media	Nonhazardous fill	2480 yd^3	AK and analytical results of site characterization	Waste piles	Passed residential cleanup standards and used to backfill excavation
Manmade media	LLW and industrial	237 yd^3	AK and analytical results of site characterization	Wrangler bags within area of contamination	TA-54 and an authorized off-site disposal facility
Municipal solid waste	MSW	<1 yd^3	AK	Plastic bags	Off-site municipal landfill
HE test kits	Mixed LLW	9 gal.	AK and analytical results of site characterization	<90 d	TA-54 and an authorized off-site disposal facility

Attachment C-1

Waste Characterization Strategy Form

Environmental Programs (EP)
Document Signature Form

Document Catalog Number: EP2010-0408

(Please prefix the name of all electronic versions of this document with this number.)

Document Title/Subject: Potrillo and Fence Canyons Aggregate Area Investigations

Associated Document Catalog Number(s):

Author: Buckley, Jocelyn Y 665 5209 jbuckley@lanl.gov

Organuzation: EP-CAP

Document Team:

Document Type: Waste Characterzation Strategy Form (WCSF)

Date Due: **Date Final Complete:**

Date To ADEP: **Date To DOE:**

Date To NMED: **Date To RPF:**

Comm Tracker #: **LAUR #** **ERID #:**

Status/Comments:

Reviewer Signatures: By signing below, the reviewer indicates that he/she **reviewed** and **approves** the document.

Document Catalog Number: EP2010-0408

Waste Characterization Strategy Form

Project Title	Potrillo and Fence Canyons Aggregate Area Investigations
Solid Waste Management Unit or Area of Concern #	**SWMUs:** 15-002; 15-007(a), 15-003, 15-006(a), 15-004(b), 15-004(c), 15-004(f), 15-008(a), 15-009(e), 15-010(a), 36-001, 36-003(b), 36-006, 36-004(d), 36-005, **AOCs:** 15-005(b), 15-006(e), 15-008(f), C-15-004, C-15-005, C-15-006, 36-004(a), 36-004(b), 36-004(c), 36-004(e), 36-001, C-36-006(e)
Activity Type	**Investigation and Remediation**
TPMC Task Manager	**Pattie C. Baucom**
Waste Management Coordinator	**Michael Le Scouarnec**
Completed by	**Jocelyn Buckley**
Date	**September 7, 2010**

1.0 Description of Activity

The work will be performed in accordance with the New Mexico Environment Department (NMED)-approved Investigation Work Plan, Revision 1, for Potrillo and Fence Canyons Aggregate Area and EXHIBIT "D" Scope of Work and Technical Implementation of the Potrillo and Fence Canyons Aggregate Area, Subcontract No.85785-001-10.

This waste characterization strategy form (WCSF) describes the management of investigation-derived waste (IDW) that is expected to be generated during the investigation and limited remediation in Technical Area (TA)-15 and TA-36. The IDW may include, but is not limited to, drill cuttings, contact waste, excavated environmental media and debris, decontamination fluids, petroleum-contaminated soils, and all other waste that has potentially come into contact with contaminants.

2.0 Relevant Site History and Description

2.1 TA-15

TA-15, also known as R-Site, has been used from the mid-1940s to the present for explosives experiments. Test explosions ranging from a few kilograms of HE to as much as 650 kg were conducted. These experiments used natural uranium metal, depleted uranium (DU) metal, lesser quantities of beryllium, and other metals. In most cases, the tests were carried out aboveground, which resulted in test materials being scattered over wide areas. Based on Laboratory records, some 75 metric tons of natural uranium and DU have been expended at the firing sites within TA-15 since the mid-1940s.

2.2 TA-36

TA-36, also known as Kappa Site, consists of a series of firing sites that support explosives experiments and has been used from the 1950s to the present. The firing sites and facilities at TA-36 accommodate shipping, receiving, transporting, and testing high explosives (HE). A total of over 30,000 test shots have been fired at Kappa Site, using an estimated 2200 to 4400 lb of DU. Initially Kappa Site consisted of

group offices; four firing sites, (Eenie, Meenie, Minie, and Lower Slobbovia); and a storage magazine at Moe. In 1983, the boundary of TA-36 was expanded to incorporate the I-J Firing Site.

3.0 Characterization Strategy

This WCSF identifies the types of wastes expected, based on the data from previous investigations; however, other types of wastes may be encountered. An amendment to this strategy form will be prepared and submitted for review and approval if any of the waste streams change in description or characterization approach or a new waste stream is generated. All IDW will be managed in accordance with Los Alamos National Laboratory (LANL) Standard Operating Procedure (SOP) 5238, *Characterization and Management of Environmental Program Waste.*

In accordance with the work plan, waste will initially be managed as hazardous or non-hazardous (unless stored within an Area of Contamination) in accordance with the due diligence reviews already prepared for all potential release sites covered by these investigations. Table 3.0-1 identifies whether initial management should be hazardous or non-hazardous. Waste accumulation area postings, regulated storage duration, and inspection requirements will be based on the type waste and its regulatory classification. The selection of waste containers will be based on U.S. Department of Transportation requirements, waste types, and estimated volumes of IDW to be generated. Immediately following containerization, each waste container will be individually labeled with a unique identification number and with information such as waste classification, contents, radioactivity, and date generated, if applicable. A non-hazardous waste label, date of generation, the generator's name, and container contents should be placed on non-hazardous waste containers as a best management practice. Waste streams with the same regulatory classification that are destined for the same receiving facility may be combined into a single container for disposal (e.g. contact waste with drill cuttings).

IDW characterization will be completed using investigation sampling data or by direct sampling of the IDW. If the waste is directly sampled, it will be sampled within 10 days of generation, and a 21 day turnaround time for analyses will be requested, unless the waste is generated and managed in an Area of Contamination. Samples must be collected using the methods described in this WCSF by trained and qualified sampling personnel. Sampling personnel must record waste sampling information in accordance with LANL's procedure, EP-ERSS-SOP-5058, *Sample Control and Field Documentation* and EP-ERSS-SOP-5181, *Documentation of Waste and Environmental Technical Field Activities.*

A waste determination will be made within 45 days of the generation date of waste unless the waste is stored in a Satellite Accumulation Area or an approved Area of Contamination. A Waste Acceptance Criteria (WAC) exception form (WEF) can be used if the generator does not meet the 45 day deadline. The generation of no path forward wastes must be approved by Department of Energy (DOE) prior to generation of the waste; however, no such wastes are anticipated for this project.

If documentation exist that the contaminant(s) originated from a listed source but the levels are below residential screening levels and the land disposal restriction treatment standards, a "contained-in" request may be submitted to the New Mexico Environment Department (NMED), who may approve removing the listings from the waste stream. A request to submit a "contained-in" determination to NMED must be submitted to Environmental Protection (ENV-RCRA) through the Subcontract Technical Representative (STR) within 70 days of generating the waste. A copy of the due diligence reviews already prepared for this investigation or the NMED "contained-in" approval letter should accompany all waste profiles prepared for the waste(s) with potentially listed contaminants.

Investigation activities will be conducted in a manner that minimizes the generation of waste. Waste minimization will be accomplished by implementing the most recent version of the "Los Alamos National

Laboratory Hazardous Waste Minimization Report." Waste streams will be recycled/reused, as appropriate.

3.1 Waste # 1: Drill Cuttings (IDW) (potential)

This waste stream consists of soil and rock cuttings generated from the drilling of boreholes. This may include small chips or unused core samples collected with a hollow-stem auger core barrel. Drill cuttings may include excess core samples not submitted for analysis and any returned drill cutting samples. Drill cuttings may be land applied if they meet the criteria in Quality Procedure QP-011, *Land Application of Drill Cuttings*. Approximately 20 yd^3 of drill cuttings are expected to be generated.

Anticipated Regulatory Status: Industrial, Hazardous, Low-level radioactive waste (LLW), Mixed low-level radioactive waste (MLLW), New Mexico Special Waste (NMSW), Land Applied

Characterization Approach: The drill cuttings will be characterized by direct sampling of the containerized cuttings. Cuttings not generated and managed within an Area of Contamination will be sampled within 10 days of generation and submitted for analysis with a 21 day turnaround time. A hand auger or thin-wall tube sampler will be used in accordance with LANL SOP-06.10, *Hand Auger and Thin-Wall Tube Sampler* to collect waste material from each container, augering from the surface to the bottom of the waste in a sufficient number of locations to obtain a representative sample. Samples will be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), radionuclides, total metals, and toxicity characteristic (TCLP) metals, if needed (see Table 3.1-1). High explosives (HE), perchlorates, nitrate, and total cyanide will be analyzed only if the work plan requires HE analysis for investigation samples from the potential release site. If process knowledge, odors, or staining indicate the cuttings may be contaminated with petroleum products, the materials will also be analyzed for total petroleum hydrocarbons (TPH [DRO/GRO]) and polychlorinated biphenyls (PCBs). Other constituents may be analyzed as necessary to meet the WAC for a receiving facility.

Storage and Disposal Method: Drill cuttings will be containerized at the point of generation in LANL approved 55-gallon steel drums, 1 yd^3 Wrangler Bags or other containers appropriate for the quantity of waste generated. Wastes will be stored in secure, designated areas. Drill cuttings from a single potential release site (PRS) may be combined into a single container before sampling, but cuttings from different PRSs will not be combined before sampling. If container sizes are small, the representative sample may be collected from more than one container (e.g., one sample for every 20 cy^3 generated from a single potential release site). Waste generated and managed within an Area of Contamination will initially be managed as non-hazardous. Wastes generated outside an Area of Contamination will initially be managed as hazardous or non-hazardous in accordance with Table 3.0-1. If analytical data changes the waste classification (e.g., PCB waste) or hazardous wastes are moved outside the boundary of the Area of Contamination, the waste will be stored in an area appropriate for the type of waste. Cuttings may be land applied if they meet the criteria of the NMED-approved NOI decision tree for land application. Land application will be conducted in accordance with ENV-RCRA-QP-011, *Land Application of Drill Cuttings*. Drill cuttings that cannot be land applied will be treated and/or disposed of at authorized off-site facilities appropriate for the waste classification.

3.2 Waste # 2: Contact Waste

This waste stream includes personnel protective equipment (PPE), contaminated sampling supplies, and dry decontamination waste that may have come in contact with contaminated environmental media and cannot be decontaminated. This includes, but is not limited to plastic sheeting (e.g., tarps and liners), gloves, coveralls (e.g. Tyvek), booties, paper towels, plastic and glass sample bottles, and disposable sampling supplies. Approximately 1 yd^3 of contact waste are expected to be generated.

Anticipated Regulatory Status: Industrial, Hazardous, LLW, MLLW, Green is Clean

Characterization Approach: Contact waste will be characterized using AK based on data from the media with which they came into contact, as follows:

- If generated during drilling, data from the associated drill cuttings will be used.
- If generated during hand augering, associated investigation sample data will be used.
- If generated during excavations, data from the associated excavated environmental media will be used.

All contact waste will be inspected before being placed in containers to determine if environmental media or staining is present, indicating contamination. If staining is present, an estimate of the portion or percentage of the item stained will be recorded. Results from the analytical data will be weighted by the extent of contamination for determining whether wastes are characteristic. If the material with which the contact waste came into contact is listed, the contact waste will be assumed to be listed unless a "contained-in" approval is obtained.

Storage and Disposal Method: The contact waste may be separately containerized in drums or it may be placed into the same containers as the media with which it is contaminated if the media will not be land applied. Wastes will be stored within secure, designated areas. Waste generated and managed within an Area of Contamination will initially be managed as non-hazardous. Wastes generated outside an Area of Contamination will initially be managed as hazardous or non-hazardous in accordance with Table 3.0-1. If analytical data changes the waste classification, the waste will be stored in an area appropriate for the type of waste. For disposal, separately containerized contact waste may also be combined with the material that it contacted (the WPF will document the decision to combine the waste streams). Wastes will be treated and/or disposed of in authorized off-site facilities appropriate for the waste classification.

3.3 Waste #3: Decontamination Fluids (potential)

The decontamination fluids waste stream will consist of liquid wastes generated from decontamination of excavation, sampling and drilling equipment. Consistent with waste minimization practices, the Laboratory employs dry decontamination methods to the extent possible. If dry decontamination cannot be performed, liquid decontamination wastes will be collected in appropriate containers at the point of generation. Less than 55 gal of decontamination fluids are expected to be generated.

Anticipated Regulatory Status: Industrial, Hazardous, LLW, MLLW

Characterization Approach: All drilling equipment and tooling will be steam-cleaned by the drilling subcontractor prior to arriving onsite. If tooling appears unclean or odors are detected, the equipment must be steam-clean onsite in accordance with EP-ERSS-SOP-5061, *Field Decontamination of Equipment* or an approved equivalent procedure. The rinsate must be separately collected and sampled (do not mix with any other decontamination fluids).

Decontamination fluids will be characterized by investigation samples from the media they contacted or by direct sampling. Unless decontamination fluids are generated and managed within an Area of Contamination, representative samples (if sampling is required) will be collected within 10 days of generation and submitted for analysis with a 21 day turnaround time. Samples will be collected from the storage container in accordance with LANL SOP-06.15, *COLIWASA Sampler for Liquids and Slurries.* If the container does not permit COLIWASA or bailer sampling, the type of sampling equipment used will be appropriate for the waste container and properly operated in accordance with Chapter 7 and Appendix E of the RCRA Waste Sampling Draft Technical Guidance (EPA 530-D-02-002, August 2002,

http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/rwsdtg.pdf). Samples will be analyzed for VOCs, SVOCs, radionuclides, and total metals (see Table 3.1-1). HE will be analyzed only if the decontamination water is generated from potential release site for which the work plan requires HE analysis for investigation samples. Other constituents may be analyzed as necessary to meet the WAC for a receiving facility. If wastes will be treated on-site at the Sanitary Waste Water System (SWWS) or the Radioactive Liquid Waste Treatment Facility (RLWTF), submit a sampling request to http://esp-esh-as01-f5.lanl.gov/~esh19/database/rfa_form.shtml for additional constituents identified in Table 3.1-1, footnote 1. If the fluids cannot be treated on-site, they may be solidified for disposal off-site. The Material Safety Data Sheet (MSDS) for any absorbent used for solidification will be used as AK for waste characterization.

Storage and Disposal Method: Decontamination fluids will be collected in appropriate containers at the point of generation and managed in secure, designated waste areas. Waste generated and managed within an Area of Contamination will initially be managed as non-hazardous. Wastes generated outside an Area of Contamination will initially be managed as hazardous or non-hazardous in accordance with Table 3.0-1. If analytical data changes the waste classification (e.g., PCB wastes) or hazardous wastes are moved outside the Area of Contamination boundaries, the waste will be stored in an area appropriate for the type of waste. It is expected that the decontamination fluids will be treated on-site at the TA-16 High Explosives Wastewater Treatment Facility (HEWTF), the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF), or the Sanitary Waste Water System (SWWS). Decontamination wastes not meeting the WAC for on-site facilities will be treated and/or disposed of in authorized off-site treatment/disposal facilities. If solidification of decontamination fluids is required for disposal, it may be solidified using an approved absorbent. Solidification activities must be reviewed by the ENV-RCRA before being conducted.

3.4 Waste #4: Excavated Environmental Media

Layback and overburden spoils (including environmental media mixed with buried debris after the debris is segregated from the media) will consist of soil and rock removed from within or next to (e.g., from benching to stabilize a trench) areas to be excavated. Excavated environmental media may be generated during excavation activities at SWMUs 15-007(a) and 15-010(a), 15-008(a), 36-001, 36-005, and 36-006. The amount of media removed is expected to be approximately 4,000 yd^3.

Anticipated Regulatory Status: Industrial, Hazardous, LLW, MLLW, NMSW, PCB, Fill

Characterization Approach: Where the amount of soil to be excavated is less than 5 yd^3, a minimum of one incremental sample of the spoils will be collected for each location as the spoils are excavated. For locations in which the amount of soil expected to be excavated is, at a minimum, approximately 500 yd^3, samples of the spoils will be collected as the spoils are excavated and composited, if appropriate (one composite sample for every 20 to 50 yd^3, depending on the homogeneity of spoils). More frequent samples will be collected if screening or visual observations indicate areas with potentially higher contamination. The incremental samples will be collected in accordance with SOP-06.09, *Spade and Scoop Method for Collection of Soil Samples*. Representative samples will be submitted for analysis with a 21 day turnaround time. Samples will be analyzed for VOCs, SVOCs, radionuclides, total metals, and TCLP metals, as needed (see Table 3.1-1). HE, perchlorates, nitrate, and total cyanide will be analyzed only if the work plan requires HE analysis for investigation samples from the potential release site. If process knowledge, odors, or staining indicate the excavated media may be contaminated with petroleum products, the materials will also be analyzed for TPH and PCBs. Other constituents may be analyzed as necessary to meet the WAC for a receiving facility.

Storage and Disposal Method: An Area of Contamination will be requested for each excavation area and materials generated and managed within the area will be managed as non-hazardous waste. If the

material is removed from the Area of Contamination, it will be managed as hazardous or non-hazardous in accordance with Table 3.0-1 or validated characterization data. This material will be field screened for radioactivity and VOCs during the excavation process. If contamination is not detected during screening, the spoils will be stored either in roll off bins, other suitable containers, or on the ground surface with appropriate best management practices. If field screening indicates the potential for contamination, the layback and overburden spoils will be placed in rolloff bins or other suitable containers. If analytical data changes the waste classification or hazardous waste is moved outside the boundaries of the Area of Contamination, the waste will be stored in an area appropriate for the type of waste. If the spoils are determined to be suitable for reuse (i.e., meets residential cleanup standards as determined using NMED's and DOE's soil screening guidance), the Laboratory will segregate any man-made debris from the soil, if practical, and use the soil to backfill the excavations. If the spoils do not meet residential cleanup standards, they will be treated and/or disposed of at an authorized facility appropriate for the waste regulatory classification.

3.5 Waste #5: Excavated Man-Made Debris

Excavated man-made debris may be generated during excavation activities at SWMUs 15-007(a) and 15-010(a), 15-008(a), 36-001, 36-005, and 36-006. The amount of debris removed is expected to be approximately 3,000 yd^3.

Anticipated Regulatory Status: Industrial, Hazardous, LLW, MLLW, PCB, Beryllium, NMSW, Recycle

Characterization Approach: Debris will be segregated as it is excavated, to the extent practical, based on factors such as the type and size of debris, field screening, process knowledge, and/or staining or odors. For debris that is difficult to characterize; acceptable knowledge (AK) will be used whenever possible, supplemented by sampling as needed. Sampling methods may be identified on a case-by-case basis by qualified sampling personnel. All decisions will be documented in the field activity notebook. Field personnel are responsible for using notebooks and logbooks in accordance with activities SOP 5181, *Notebook and Logbook Documentation for Environmental Directorate Technical and Field Activities*. If generated outside an Area of Contamination, samples must be collected within 10 days of waste generation and a 21-day analytical turnaround must be requested. Samples will be analyzed for asbestos for articles expected to be asbestos-containing, VOCs, SVOCs, radionuclides, total metals, and TCLP metals, if necessary (see Table 3.1-1). PCBs will be analyzed if oil staining on debris or PCB articles (e.g., capacitors) is unearthed. HE on the external portions of the debris generated at SWMU 20-001(c) will initially be analyzed by HE screening (DX HE Spot Test) or if the investigation samples indicate that HE is present. Waste configurations, process knowledge and additional HE analysis will be performed as needed to identify whether the debris is detonable. Other constituents may be analyzed as necessary to meet the WAC for a receiving facility. Non-radioactive materials (no LANL-added radioactivity) or those that can be decontaminated will be recycled, if practicable. For non-porous debris with only surface, non-fixed contamination, smears will be used to detect the presence of radiation.

Storage and Disposal Method: Debris will be containerized at the point of generation in LANL approved 55-gallon steel drums or other appropriate containers or on the ground surface with appropriate best management practices. Any debris that leaks as it is excavated must immediately be placed in an area with secondary contamination. The debris will initially be managed in a secure, designated area within the Area of Contamination. If analytical data changes the waste classification (e.g., PCB wastes) or the waste is hazardous and is moved outside the Area of Contamination boundaries, the waste will be stored in an area appropriate for the type of waste. The waste will be treated and/or disposed of at an authorized off-site facility appropriate for the waste classification.

3.6 Waste #6: Municipal Solid Waste (MSW)

This waste stream primarily consists of non- contact trash including, but not limited to paper, cardboard, wood, plastic, food and beverage containers, empty solution containers, but may also include commercial solid wastes which are derived from project activities. It is estimated that less than 1 yd^3 of MSW will be generated, but may change if vegetation removal is required.

Anticipated Regulatory Status: MSW

Characterization Approach: MSW will be characterized based on acceptable knowledge (AK) of the waste materials (including MSDS) and methods of generation.

Management and Disposal Method: MSW will be segregated from all other waste streams and managed in approved containers. It is anticipated that the waste will be stored in plastic trash bags or other appropriate containers and disposed of at the County of Los Alamos Transfer Station or other authorized solid waste landfill.

3.7 Waste #7: Petroleum Contaminated Soils (PCS), (potential)

PCS may be generated from releases of products such as hydraulic fluid, motor oil, unleaded gasoline, or diesel fuel (e.g. from the rupture of hydraulic or fuel hoses, or spills during maintenance or filling equipment) onto soil. PCS created by legacy contamination may also be encountered during investigations. Absorbent padding, paper towels, spill pillows or other absorbent material used to contain the released material may be added to the PCS waste for storage and disposal. It is estimated that less than 1 yd^3 of PCS will be generated.

Anticipated Regulatory Status: NMSW, Industrial, Hazardous, LLW, MLLW, PCB

Characterization Approach: The contaminated soil may either be sampled in-place (by gridding the spill location and collecting and combining incremental samples into one sample) or after containerization in accordance with LANL SOP-06.10, *Hand Auger and Thin-Wall Tube Sampler*. If the spill is shallow (in-place sampling) or containers are small, Spade and Scoop Method for Collection of Soil Samples (LANL SOP-06.09) may also be appropriate. If the spill is new, it must be immediately reported to ENV-RCRA and the contaminated material must be containerized the same day it is spilled unless permission is received from ENV-RCRA to leave it longer (generally only granted for large spills). Representative samples of containerized waste will be collected within 10 days of generation and submitted for analysis with a 21 day turnaround time. Samples will be analyzed at a minimum for VOCs, SVOCs, TPH (DRO/GRO), and total metals (see Table 3.1-1). HE, perchlorates, nitrate, and total cyanide will be analyzed only if screening indicates the presence of HE or if analysis of these constituents is required by the work plan for the contaminated area. If legacy petroleum contamination is present, the soils will also be analyzed for PCBs. Other constituents may be analyzed as necessary to meet the WAC for a receiving facility.

Storage and Disposal Method: PCS will be stored in clearly marked and appropriately constructed waste accumulation areas. Waste accumulation area postings, regulated storage duration, and inspection requirements will be based on the most restrictive waste classification appropriate to the area where the spill occurred. If the PCS is suspect or known hazardous or MLLW, it will initially be managed in a registered hazardous waste accumulation area pending analysis. All PCS will be treated and/or disposed of, at an authorized off-site facility appropriate for the waste classification.

3.8 Waste #8: Returned or Excess Samples

This waste stream consists of soil and tuff samples returned from a laboratory or samples collected but not submitted to the analytical laboratory. It is estimated that less than approximately 0.5 yd^3 of material will be generated from this activity.

Anticipated Regulatory Status: Industrial, Hazardous, LLW, MLLW, NMSW

Characterization Approach: Waste characterization will be based upon analytical results obtained from the direct sampling of containerized waste or from investigation or characterization data from media associated with the returned/excess samples. Direct sampling will be conducted in accordance with LANL SOP-06.10, *Hand Auger and Thin-Wall Tube Sampler* or SOP-06.09, *Spade and Scoop Method for Collection of Soil Samples*. Representative samples will be collected within 10 days of the return of the samples and submitted for analysis with a 21 day turnaround time. Samples will be analyzed for VOCs, SVOCs, total metals, and TCLP metals, as needed (see Table 3.1-1). HE, perchlorates, nitrate, and total cyanide will be analyzed only if the work plan requires HE analysis for investigation sample. If process knowledge, odors, or staining indicate the returned samples may be contaminated with petroleum products, the materials will also be analyzed for TPH and PCBs. Other constituents may be analyzed as necessary to meet the WAC for a receiving facility.

Storage and Disposal Method: These wastes will be containerized in 5 gallon buckets, 55 gallon drums, or placed into the same containers as the environmental media from which they were taken. They will initially be stored in secure, designated waste areas as hazardous or non-hazardous waste in accordance with Table 3.0-1. If analytical data changes the waste classification, the waste will be stored in an area appropriate for the type of waste. The wastes will be sent to an authorized on-site or off-site treatment or disposal facilities, as appropriate to their waste regulatory classification.

3.9 Waste #9: HE Test Kits

Test kits for HE sample screening includes a solvent (methanol and acetone). The approximate volume of waste generated is estimated to be less than 1 gallon.

Anticipated Regulatory Status: Hazardous, LLW, MLLW, Municipal, or Industrial

Characterization Approach: The waste will be characterized based upon acceptable knowledge of the type of solvent used and the analytical results for the environmental media that it contacted.

Storage and Disposal Method: Spent solvent will be containerized and stored in a satellite accumulation area (SAA). If the spent solvent is generated within an area of contamination, it will be managed as hazardous waste in an SAA upon removal from the area of contamination. After a waste determination is complete, which must be within 45 days of generation, the spent solvent will be sent to an off-site authorized hazardous waste treatment facility. The remainder of the kit is non-hazardous and will be disposed at an off-site municipal or industrial waste landfill.

4.0 References

LANL (Los Alamos National Laboratory) 2007. "Los Alamos National Laboratory Hazardous Waste Minimization Report," (LANL,2007).

LANL (Los Alamos National Laboratory), July 2009. "Potrillo and Fence Canyons Aggregate Area Investigation Work Plan, Revision 1," Los Alamos, New Mexico. (LANL 2009, 106657)

Table 3.0-1
Initial Waste Management

Potential Release Site	Initial Management	Comments
SWMU 15-002, Burn Pit	Non-hazardous	
SWMU 15-007(a), MDA N	Non-hazardous	
SWMU 15-003, PHERMEX Steel Firing Pad	Non-hazardous	
SWMU 15-006(a), PHERMEX Firing Site	Non-hazardous	
SWMU 15-004(b) and 15-004(c), Firing Sites A and B	Non-hazardous	15-004(b): Analyze IDW for toxicity characteristic metals
SWMU 15-004(f), E-F Firing Site	Non-hazardous	
SWMU 15-008(a), Two Surface Disposal Areas at E-F Firing Site	Non-hazardous	Analyze for PCBs (and TPH) if visible stain is observed
AOC 15-005(b), Storage Area	Non-hazardous	
AOC 15-006(e), Projective Test Area, Duplicate of AOC C-36-006(e)	Non-hazardous	Analyze for nitrates, perchlorates, and total cyanide in cuttings
AOC 15-008(f), Sand Mounds at I-J Firing Site (TA-36)	Non-hazardous	
SWMU 15-009(e), Septic Tank	Non-hazardous	
SWMU 15-010(a), Septic Tank	Non-hazardous	Analyze IDW for toxicity characteristic metals
AOC C-15-004, Former Transformer Station	Non-hazardous	Analyze for PCBs (and TPH) if visible stain is observed
AOC C-15-005, Potential Soil Contamination from Former Building	Non-hazardous	
AOC C-15-006, Potential Soil Contamination from Former Building	Non-hazardous	
SWMU 36-001, MDA AA	Non-hazardous	
SWMU 36-003(b), Septic System, I-J Firing Site	Non-hazardous	
AOC 36-004(a), Eenie Firing Site	Non-hazardous	
SWMU 36-006, Surface Disposal Site	Non-hazardous	Analyze IDW for toxicity characteristic metals
AOC 36-004(b), Meenie Firing Site	Non-hazardous	
AOC 36-004(c), Minie Firing Site	Non-hazardous	
SWMU 36-004(d), Skunk Works Firing Site, Lower Slobbovia Firing Site, and Burn Pits	Non-hazardous	
AOC 36-004(e), I-J Firing Site	Non-hazardous	
SWMU 36-005, Storage Area	Non-hazardous	
AOC C-36-001, Former Containment Vessel	Non-hazardous	
AOC C-36-006(e), Projectile Test Area	Non-hazardous	Analyze for nitrates, perchlorates, and total cyanide in cuttings

Table 3.1-1
Waste Characterization Table

Waste Description	Waste Stream #1 Drill Cuttings	Waste Stream #2 Contact Waste	Waste Stream #3 Decon. Fluids	Waste Stream #4 Excavated Media
Estimated Volume	20 CY	1 CY	< 55 gallons	4000 CY
Packaging	55-gallon steel drums or 1 yd^3 Wrangler Bags	55 gallon drums	30 or 55 gallon drums	Roll-offs, Wrangler Bags, or on ground
Regulatory Classification				
Radioactive Waste	X	X	X	X
Municipal Solid Waste (MSW)	—	—	—	—
Waste destined for LANL's SWWS or RLWTF or HEWTF[1]	—	—	X	—
Hazardous Waste	X	X	X	X
Mixed (hazardous and radioactive) Waste	X	X	X	X
Beryllium	—	—	—	—
Polychlorinated Biphenyls-Contaminated Waste (PCBs)	X	—	—	X
New Mexico Special Waste	X	—	—	X
Industrial Waste	X	X	X	X
Characterization Method				
Acceptable knowledge (AK): Existing Data/Documentation	—	X	X	X
AK: Site Characterization	—	X	X	X
Direct Sampling of Waste	X	—	X	X
Analytical Testing				
Volatile Organic Compounds (VOCs) (EPA 8260-B)	X	—	X	X
Semivolatile Organic Compounds (SVOCs) (EPA 8270-C)	X	—	X	X
Organic Pesticides (EPA 8081-A)	X[4]	—	—	X[4]
Organic Herbicides (EPA 8151-A)	X[4]	—	—	X[4]
PCBs (EPA 8082)	X[4]	—	—	X[4]
Total Metals (EPA 6010-B/7471-A or EPA 6020)	X	—	X	X
Total Cyanide (EPA 9012-A)	X[4]	—	X[4]	X[4]
High Explosives Constituents (EPA 8330/8321-A)	X[4]	—	X[4]	X[4]
Asbestos (EPA 600M4)	—	—	—	—
Total petroleum hydrocarbon (TPH)-GRO (EPA 8015-M)	X[4]	—	X[4]	X[4]
TPH-DRO (EPA 8015-M)	X[4]	—	X[4]	X[4]
Toxicity characteristic leaching procedure (TCLP) Metals (EPA 1311/6010-B)	X[4]	—	X[4]	X[4]

Table 3.1-1 (continued)

Waste Description	Waste Stream #1 Drill Cuttings	Waste Stream #2 Contact Waste	Waste Stream #3 Decon. Fluids	Waste Stream #4 Excavated Media
TCLP Organics (EPA 1311/8260-B & 1311/8270-C)	—	—	—	—
TCLP Pest. & Herb. (EPA 1311/8081-A/1311/8151-A)	—	—	—	—
Gross Alpha (alpha counting) (EPA 900)	X[4]	—	X[4]	X[4]
Gross Beta (beta counting) (EPA 900)	X[4]	—	X[4]	X[4]
Tritium (liquid scintillation) (EPA 906.0)	X	—	X	X
Gamma spectroscopy (EPA 901.1)	X[4]	—	X[4]	X[4]
Isotopic plutonium (HASL-300)	X	—	X	X
Isotopic uranium (HASL-300)	X	—	X	X
Total uranium (EPA 6020)	X	—	X	X
Strontium-90 (EPA 905)	X	—	X	X
Americium-241 (HASL-300)	X	—	X	X
Perchlorates (EPA 6850)	X[4]	—	X[4]	X[4]
Nitrates/Nitrites (EPA 300.09-soil or 343.2-water)	X[4]	—	X[1,4]	X[4]
Oil / Grease (EPA 1665)	—	—	X[1]	—
Fluorine, Chorine, Sulfate (EPA 300)	—	—	X[1]	—
TTO (EPA 8260-B and EPA 8270-C)[2]	Request VOCs and SVOCs above			
Total Suspended & Dissolved Solids (TSS) and Total Dissolved Solids (TDS) (EPA 160.1 and 160.2)	—	—	X[1]	—
Chemical Oxygen Demand (COD) (EPA 410.4)	—	—	X[1]	—
pH (EPA 904c)	—	—	X[1]	—
Microtox or Biological Oxygen Demand (BOD)[3]	—	—	X[1]	—

[1]in addition to other analytes needed to characterize the waste (e.g., VOC, SVOC, total metals), analyze for TSS, TDS, Oil and Grease, gross alpha, gross beta, tritium, and pH for liquids destined for the LANL sanitary waste water system (SWWS). For wastes destined for the RLWTF additional constituents include TTO,TSS, COD, pH, total nitrates/nitrites, and gross alpha, gross beta (not including tritium), and gross gamma or the sum of individual alpha-, beta-, and gamma-emitting nuclides. Submit a sampling request to http://esp-esh-as01-f5.lanl.gov/~esh19/database/rfa_form.shtml .

[2]TTO is the total of volatile organic and semi-volatile organic compound contaminants. Request methods EPA 8260-B (VOCs) and EPA 8270-C (SVOCs).

[3] If Microtox analysis is not available, request BOD. Submit a sampling request to http://esp-esh-as01-f5.lanl.gov/~esh19/database/rfa_form.shtml .

[4] If needed. **Note:** High explosives (HE), perchlorates, nitrate, and total cyanide will be analyzed only if the work plan requires HE analysis for investigation samples. The Investigation Work Plan does not require HE analysis for the following PRSs: C-15-004, AOC 36-004(e) (Deferred), and C-36-001 (Deferred).

--Continued on the next page

Table 3.1-1 (continued)

Waste Description	Waste Stream #5 Excavated Man Made Debris	Waste Stream #6 Municipal Solid Waste	Waste Stream #7 Petroleum Contam Soils	Waste Stream #8 Returned or Excess Samples
Estimated Volume	3,000 CY	< 1 CY	< 1 CY	0.5 CY
Packaging	55-gallon drums or other containers or on the ground surface	Plastic trash bags	30 or 55 gallon drums	Same containers as the environmental media from which they were taken or other drums.
Regulatory Classification				
Radioactive Waste	X	—	X	X
Municipal Solid Waste (MSW)	—	X	—	—
Waste destined for LANL's SWWS or RLWTF[1]	—	—	—	—
Hazardous Waste	X	—	X	X
Mixed (hazardous and radioactive) Waste	X	—	X	X
Beryllium	X	—	—	—
Polychlorinated Biphenyls-Contaminated Waste (PCBs)	X	—	X	—
New Mexico Special Waste	X	—	X	X
Industrial Waste	X	—	X	X
Characterization Method				
Acceptable knowledge (AK): Existing Data/Documentation	X	X	—	—
AK: Site Characterization	X	—	—	X
Direct Sampling of Waste	X	—	X	X
Analytical Testing				
Volatile Organic Compounds (VOCs) (EPA 8260-B)	X	—	X	X
Semivolatile Organic Compounds (SVOCs) (EPA 8270-C)	X	—	X	X
Organic Pesticides (EPA 8081-A)	—	—	—	—
Organic Herbicides (EPA 8151-A)	—	—	—	—
PCBs (EPA 8082)	X[4]	—	X[4]	X[4]
Total Metals (EPA 6010-B/7471-A or EPA 6020)	X[4]	—	X	X
Total Cyanide (EPA 9012-A)	X[4]	—	X[4]	X[4]
High Explosives Constituents (EPA 8330/8321-A)	X[4]	—	X[4]	X[4]
Asbestos (EPA 600M4)	X[4]	—	—	—
Total petroleum hydrocarbon (TPH)-GRO (EPA 8015-M)	X[4]	—	X	X[4]

Table 3.1-1 (continued)

Waste Description	Waste Stream # 5 Excavated Man Made Debris	Waste Stream #6 Municipal Solid Waste	Waste Stream #7 Petroleum Contaminated Soils	Waste Stream #8 Returned or Excess Samples
TPH-DRO (EPA 8015-M)	X[4]	—	X	X[4]
Toxicity characteristic leaching procedure (TCLP) Metals (EPA 1311/6010-B)	X[4]	—	X[4]	X[4]
TCLP Organics (EPA 1311/8260-B & 1311/8270-C)	—	—	—	—
TCLP Pest. & Herb. (EPA 1311/8081-A/1311/8151-A)	—	—	—	—
Gross Alpha (alpha counting) (EPA 900)	X[4]	—	X[4]	X[4]
Gross Beta (beta counting) (EPA 900)	X[4]	—	X[4]	X[4]
Tritium (liquid scintillation) (EPA 906.0)	X	—	X	X
Gamma spectroscopy (EPA 901.1)	X[4]	—	X[4]	X[4]
Isotopic plutonium (HASL-300)	X	—	X	X
Isotopic uranium (HASL-300)	X	—	X	X
Total uranium (EPA 6020)	X	—	X	X
Strontium-90 (EPA 905)	X	—	X	X
Americium-241 (HASL-300)	X	—	X	X
Perchlorates (EPA 6850)	X[4]	—	X[4]	X[4]
Nitrates/Nitrites (EPA 300.09-soil or 343.2-water)	X[4]	—	X[4]	X[4]
Oil / Grease (EPA 1665)	—	—	—	—
Fluorine, Chorine, Sulfate (EPA 300)	—	—	—	—
TTO (EPA 8260-B and EPA 8270-C)[2]	**Request VOCs and SVOCs above**			
Total Suspended & Dissolved Solids (TSS) and Total Dissolved Solids (TDS) (EPA 160.1 and 160.2)	—	—	—	—
Chemical Oxygen Demand (COD) (EPA 410.4)	—	—	—	—
pH (EPA 904c)	—	—	—	—
Microtox or Biological Oxygen Demand (BOD)[3]	—	—	—	—

[1]in addition to other analytes needed to characterize the waste (e.g., VOC, SVOC, total metals), analyze for TSS, TDS, Oil and Grease, gross alpha, gross beta, tritium, and pH for liquids destined for the LANL sanitary waste water system (SWWS). For wastes destined for the RLWTF additional constituents include TTO,TSS, COD, pH, total nitrates/nitrites, and gross alpha, gross beta (not including tritium), and gross gamma or the sum of individual alpha-, beta-, and gamma-emitting nuclides. Submit a sampling request to http://esp-esh-as01-f5.lanl.gov/~esh19/database/rfa_form.shtml .

[2]TTO is the total of volatile organic and semi-volatile organic compound contaminants. Request methods EPA 8260-B (VOCs) and EPA 8270-C (SVOCs).

[3] If Microtox analysis is not available, request BOD. Submit a sampling request to http://esp-esh-as01-f5.lanl.gov/~esh19/database/rfa_form.shtml .

[4] If needed. **Note:** High explosives (HE), perchlorates, nitrate, and total cyanide will be analyzed only if the work plan requires HE analysis for investigation samples. The Investigation Work Plan does not require HE analysis for the following PRSs: C-15-004, AOC 36-004(e) (Deferred), and C-36-001 (Deferred).

Table 3.1-1 (continued)

Waste Description	Waste Stream #9 HE Test Kits
Estimated Volume	<1 gallon
Packaging	Approved Containers
Regulatory Classification	
Radioactive Waste	X
Municipal Solid Waste (MSW)	X
Waste destined for LANL's SWWS or RLWTF[1]	
Hazardous Waste	X
Mixed (hazardous and radioactive) Waste	X
Beryllium	—
Polychlorinated Biphenyls-Contaminated Waste (PCBs)	—
New Mexico Special Waste	—
Industrial Waste	—
Characterization Method	
Acceptable knowledge (AK): Existing Data/Documentation	X
AK: Site Characterization	X
Direct Sampling of Waste	—
Analytical Testing	
Volatile Organic Compounds (VOCs) (EPA 8260-B)	—
Semivolatile Organic Compounds (SVOCs) (EPA 8270-C)	—
Organic Pesticides (EPA 8081-A)	—
Organic Herbicides (EPA 8151-A)	—
PCBs (EPA 8082)	—
Total Metals (EPA 6010-B/7471-A or EPA 6020)	—
Total Cyanide (EPA 9012-A)	—
High Explosives Constituents (EPA 8330/8321-A)	—
Asbestos (EPA 600M4)	—
Total petroleum hydrocarbon (TPH)-GRO (EPA 8015-M)	—

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Table 3.1-1 (continued)

Waste Description	Waste Stream # 9 HE Test Kits
TPH-DRO (EPA 8015-M)	—
Toxicity characteristic leaching procedure (TCLP) Metals (EPA 1311/6010-B)	—
TCLP Organics (EPA 1311/8260-B & 1311/8270-C)	—
TCLP Pest. & Herb. (EPA 1311/8081-A/1311/8151-A)	—
Gross Alpha (alpha counting) (EPA 900)	—
Gross Beta (beta counting) (EPA 900)	—
Tritium (liquid scintillation) (EPA 906.0)	—
Gamma spectroscopy (EPA 901.1)	—
Isotopic plutonium (HASL-300)	—
Isotopic uranium (HASL-300)	—
Total uranium (EPA 6020)	—
Strontium-90 (EPA 905)	—
Americium-241 (HASL-300)	—
Perchlorates (EPA 6850)	—
Nitrates/Nitrites (EPA 300.09-soil or 343.2-water)	—
Oil / Grease (EPA 1665)	—
Fluorine, Chorine, Sulfate (EPA 300)	—
TTO (EPA 8260-B and EPA 8270-C)[2]	**Request VOCs and SVOCs above**
Total Suspended & Dissolved Solids (TSS) and Total Dissolved Solids (TDS) (EPA 160.1 and 160.2)	—
Chemical Oxygen Demand (COD) (EPA 410.4)	—
pH (EPA 904c)	—
Microtox or Biological Oxygen Demand (BOD)[3]	—

[1]in addition to other analytes needed to characterize the waste (e.g., VOC, SVOC, total metals), analyze for TSS, TDS, Oil and Grease, gross alpha, gross beta, tritium, and pH for liquids destined for the LANL sanitary waste water system (SWWS). For wastes destined for the RLWTF additional constituents include TTO,TSS, COD, pH, total nitrates/nitrites, and gross alpha, gross beta (not including tritium), and gross gamma **or** the sum of individual alpha-, beta-, and gamma-emitting nuclides. Submit a sampling request to http://esp-esh-as01-f5.lanl.gov/~esh19/database/rfa_form.shtml .

[2]TTO is the total of volatile organic and semi-volatile organic compound contaminants. Request methods EPA 8260-B (VOCs) and EPA 8270-C (SVOCs).

[3] If Microtox analysis is not available, request BOD. Submit a sampling request to http://esp-esh-as01-f5.lanl.gov/~esh19/database/rfa_form.shtml .

[4] If needed. **Note:** High explosives (HE), perchlorates, nitrate, and total cyanide will be analyzed only if the work plan requires HE analysis for investigation samples. The Investigation Work Plan does not require HE analysis for the following PRSs: C-15-004, AOC 36-004(e) (Deferred), and C-36-001 (Deferred).

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Signatures	Date
Project Manager: John McCann	9-9-10
Waste Management Coordinator: Michael Le Scouarnec	9.9.10
ENV-RCRA Representative: Jocelyn Buckley	9/9/10
Waste Acceptance Representative: Andy Elicio	09/09/2010
Waste Certification Program Representative: Michelle Coriz Clarissa Sisneros for Michelle Coriz	09/09/2010

Appendix D

Radiological Survey Report

GPS-Based Radiological Survey of SWMUs 15-004(f), 15-007(a), and 36-001 at the Los Alamos National Laboratory

Prepared for:

TerranearPMC
4200 W. Jemez Rd, Suite P-502
Los Alamos, NM 87544

Prepared by:

Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113

March, 2011

GPS-Based Radiological Survey of SWMUs 15-004(f), 15-007(a), and 36-001

1.0 Introduction

TerranearPMC (TPMC) retained Environmental Restoration Group, Inc. (ERG) to conduct a GPS-based walkover radiological survey of Los Alamos National Laboratory (LANL) Technical Area 15 (TA-15) Solid Waste Management Units (SWMU) 15-004(f) and 15-007(a) and Technical Area 36 (TA-36) SWMU 36-001. The surveys were performed over a three week period from October 25, 2010 to November 12, 2010.

SWMU 15-004(f), also known as the E-F Firing Site, is a former firing site area used in the early 1950s. Natural uranium and depleted uranium (DU) are known to be present on this site and are considered the primary contaminants. Because of this a low-energy photon emission survey was performed using a Field Instrument for Detecting Low Energy Radiation (FIDLER) detector.

SWMU 15-007(a) is an inactive landfill known as Material Disposal Area (MDA) N. The site was used for the disposal of debris from the demolition of laboratory, dark room and shop buildings in the mid 1960s. Natural thorium was known to be present in the buildings. Due to the thorium presence a high-energy gamma survey, using a 2-inch by 2-inch sodium iodide (NaI) detector, was performed. In addition, since the physical dimensions of MDA-N are relatively small, a FIDLER survey was also performed.

SWMU 36-001 MDA-AA is an inactive landfill which reportedly consists of two disposal trenches containing burned debris from test shots conducted at the Lower Slobbovia Firing Site. Previous investigations at MDA-AA had identified DU as present in greater than background concentration at one location. Due to the suspected presence of DU, a FIDLER survey was performed. In addition, since the physical dimensions of MDA-AA are relatively small, a NaI survey was also performed.

2.0 Method

Each GPS-based radiological survey system consisted of a radiation detector and Ludlum Model 2221 ratemeter/scaler coupled to a Trimble Pro XRS mapping grade GPS. The Ludlum Model 2221 and GPS units were carried in backpacks. For the low-energy photon survey, Alpha Spectra FIDLER detectors were used and held approximately 6 inches above the ground surface. For the high-energy gamma survey, Ludlum Model 44-10 2-inch by 2-inch NaI detectors were used and held approximately 18 inches above the ground surface. At the E-F Firing Site the FIDLER survey was conducted with a detector spacing of approximately 5 feet and a survey speed of 2.5 feet per second (ft/sec). At MDA-N and MDA-AA FIDLER surveys were conducted with a detector spacing of approximately 3 feet and a survey speed of 2.5 ft/sec, while the NaI surveys were conducted with a detector spacing of approximately 5 feet and a survey speed of approximately 2.5 ft/sec. At the end of each survey day, the data were downloaded into a laptop computer and processed using a combination of Trimble Pathfinder Office and ESRI ArcView GIS computer applications.

3.0 Results

The survey data for both FIDLER and NaI detector surveys are presented as Figures A.1 through A.5, located in Appendix A. The data within each figure is presented with varying colors depicting the gamma count range for each individual reading. Some areas of the sites were inaccessible due to vegetation, terrain, or other obstacles.

3.1 FIDLER Survey

The FIDLER detector survey data statistics for all three sites is shown below in Table 3.1.

Table 3.1 FIDLER Detector Survey Results

Site	Readings	Mean (cpm)	Standard Deviation	Maximum Reading (cpm)	Minimum Reading (cpm)
15-004(f) E-F Firing Site	310,599	29,670	24,251	845,520	9,659
15-007(a) MDA-N	4,594	17,213	1,076	42,624	13,788
36-001 MDA-AA	6,519	22,763	1,367	40,541	16,044

Figure A.1 shows the FIDLER survey data for the E-F Firing Site. The count rates generally decrease with distance away from the firing-site soil berms located in the middle of the survey area. There is a number of isolated point sources scattered throughout the entire site. The density of these point sources also decrease with distance away from the soil berms. The survey data mean identified in Table 3.1 is not representative of site background levels. For the purpose of delineating the gamma count ranges to be used in Figure A.1, data collected from the outer half of the E-F Firing Site were used. This data subset, comprised of over 170,000 records with a statistical mean of roughly 22,500 cpm, is believed to better represent background levels for the site due to the distance from the firing-site soil berms and the similarity to the FIDLER survey values observed at MDA-AA.

Figure A.2 shows the FIDLER survey results for MDA-N and a small area contiguous to the MDA-N north-west corner that appeared to have been previously disturbed. The data mean of 17,000 cpm is used to represent site background levels for this site. The survey data identify one small area near the middle of MDA-N, approximately 5-feet by 15-feet, with FIDLER readings between 1.5 to 2.5 times background.

Figure A.3 shows the FIDLER survey results for MDA-AA. A data mean of 22,500 cpm is used to represent site background levels for this site. The survey data identify four locations with values above background. They consist of one location with readings of approximately 1.75 times background, one location with readings between 1.5 and 1.75 times background, and two locations with readings between 1.25 and 1.5 times background.

3.2 NaI Survey

The survey data statistics for the two sites surveyed with a NaI detector is shown below in Table 3.2.

Table 3.2 NaI Detector Survey Results

Site	Readings	Mean (cpm)	Standard Deviation	Maximum Reading (cpm)	Minimum Reading (cpm)
15-007(a) MDA-N	2,773	13,332	799	18,233	10,387
36-001 MDA-AA	2,512	18,136	1,083	21,509	13,757

Figure A.4 shows the NaI detector survey for MDA-N. A data mean of 13,000 cpm is used to represent background levels for the site. The survey data identify two locations greater than 1.25 times background (16,250 cpm), with one location corresponding to the location identified in the FIDLER survey, discussed above, and the other location being a single record at 1.26 times background.

Figure A.5 shows the NaI detector survey data for MDA-AA. A data mean of 18,000 cpm is used to represent background levels for the site. The survey revealed no readings greater than 1.25 times the background value (22,500 cpm).

4.0 Quality Control

All radiological instrumentation was calibrated within six months prior to use using NIST traceable sources and pulser. The instrumentation was also function checked before and after use each day. Function check forms and calibration sheets are included in Appendix B.

Appendix A

Survey Figures

Figure A.1 E-F Firing Site FIDLER Detector Survey

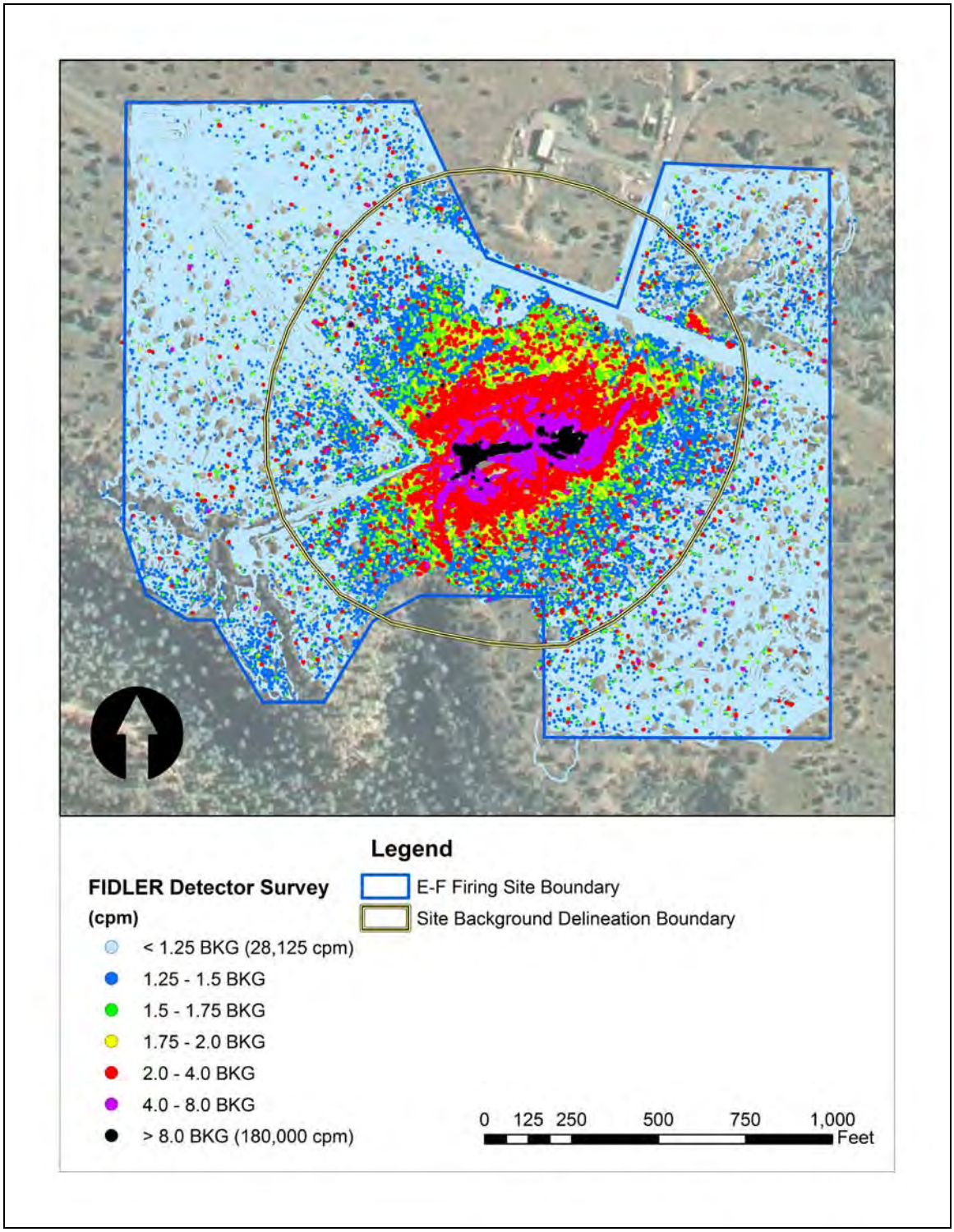


Figure A.2 MDA-N FIDLER Detector Survey



Figure A.3 MDA-AA FIDLER Detector Survey



Figure A.4 MDA-N NaI Detector Survey



Figure A.5 MDA-AA NaI Detector Survey



Appendix B

Calibration and Daily Function Check Forms

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
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Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

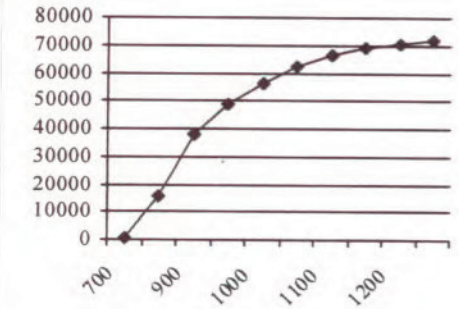
Meter:	Manufacturer:	Ludlum	Model Number:	2221	Serial Number:	228808
Detector:	Manufacturer:	Ludlum	Model Number:	44-10	Serial Number:	PR150852

☑ Mechanical Check ☑ Geotropism ☑ THR/WIN Operation ☑ Audio Check ☑ Battery Check (Min 4.4 VDC)
☑ F/S Response Check ☑ Meter Zeroed ☑ Reset Check HV Check (+/- 2.5%): ☑ 500 V ☑ 1000 V ☑ 1500 V
Source Distance: ☐ Contact ☑ 6 inches ☐ Other: Cable Length: ☐ 39-inch ☑ 72-inch ☐ Other:
Source Geometry: ☑ Side ☐ Below ☐ Other: Temperature: 75 °F Relative Humidity 20 %
Threshold: 10 mV Window: Barometric Pressure: 24.51 inches Hg
Instrument found within tolerance: ☑ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	398703	400
x 1000	100	100	100		100
x 100	40	400	400	39873	400
x 100	10	100	100		100
x 10	4	400	400	3980	400
x 10	1	100	100		100
x 1	400	400	400	398	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	451	
800	15297	
900	37725	
950	48518	
1000	56316	
1050	62674	
1100	66181	
1150	69304	
1200	70371	10384
1250	71921	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1-min. Recommended HV =1200

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ☑ 201932 Fluke multimeter serial number: ☐ 8749012
☐ Alpha Source: Th-230 @ 13,000 dpm (1/13/10) sn: 4098-03 ☑ Gamma Source Cs-137 @ 5.37 uCi (1/13/10) sn: 4097-03
☐ Beta Source: Tc-99 @ 17,700 dpm (1/13/10) sn: 4099-03 ☐ Other Source:

Calibrated By: Calibration Date: 10-4-10 Calibration Due: 10-4-11

Reviewed By: Review Date: 10/12/10

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 921-3 * Calibration of Radiation Detection Instrument Devices

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

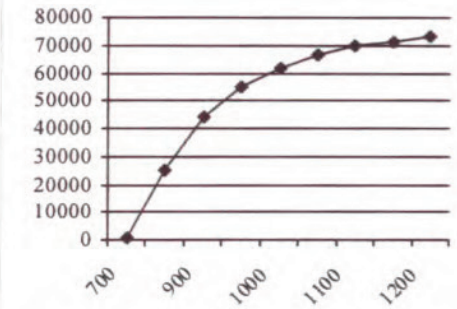
Meter:	Manufacturer:	Ludlum	Model Number:	2221	Serial Number:	268647
Detector:	Manufacturer:	Ludlum	Model Number:	44-10	Serial Number:	PR121990

☑ Mechanical Check ☑ Geotropism ☑ THR/WIN Operation ☑ Audio Check ☑ Battery Check (Min 4.4 VDC)
☑ F/S Response Check ☑ Meter Zeroed ☑ Reset Check HV Check (+/- 2.5%): ☑ 500 V ☑ 1000 V ☑ 1500 V
Source Distance: ☐ Contact ☑ 6 inches ☐ Other: Cable Length: ☐ 39-inch ☑ 72-inch ☐ Other:
Source Geometry: ☑ Side ☐ Below ☐ Other: Temperature: 76 °F Relative Humidity 20 %
Threshold: 10 mV Window: Barometric Pressure: 24.51 inches Hg
Instrument found within tolerance: ☑ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	399620	400
x 1000	100	100	100		100
x 100	40	400	400	39976	400
x 100	10	100	100		100
x 10	4	400	400	3998	400
x 10	1	100	100		100
x 1	400	400	400	400	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	733	
800	24767	
900	43898	
950	55077	
1000	61506	
1050	66247	
1100	69911	
1150	71265	9837
1200	73325	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1-min. Recommended HV =1150

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ☑ 201932 Fluke multimeter serial number: ☐ 8749012
☐ Alpha Source: Th-230 @ 13,000 dpm (1/13/10) sn: 4098-03 ☑ Gamma Source Cs-137 @ 5.37 uCi (1/13/10) sn: 4097-03
☐ Beta Source: Tc-99 @ 17,700 dpm (1/13/10) sn: 4099-03 ☐ Other Source:

Calibrated By: Calibration Date: 10-4-10 Calibration Due: 10-4-11

Reviewed By: Review Date: 10/4/10

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 921-3 * Calibration of Radiation Detection Instrument Devices

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

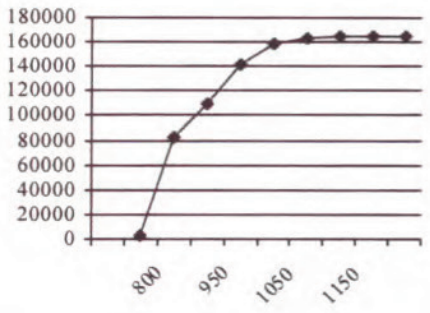
Meter:	Manufacturer: Ludlum	Model Number:	2221	Serial Number:	228808
Detector:	Manufacturer: Alpha Spectra	Model Number:	FIDLER	Serial Number:	010807E

☑ Mechanical Check ☑ Geotropism ☑ THR/WIN Operation ☑ Audio Check ☑ Battery Check (Min 4.4 VDC)
☑ F/S Response Check ☑ Meter Zeroed ☐ Reset Check HV Check (+/- 2.5%): ☑ 500 V ☑ 1000 V ☑ 1500 V
Source Distance: ☐ Contact ☐ 6 inches ☑ Other: 3/4" Cable Length: ☐ 39-inch ☑ 72-inch ☐ Other:
Source Geometry: ☐ Side ☑ Below ☐ Other: Temperature: 75 °F Relative Humidity 20 %
Threshold: 10 mV Window: Barometric Pressure: 24.51 inches Hg
Instrument found within tolerance: ☑ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	398703	400
x 1000	100	100	100		100
x 100	40	400	400	39873	400
x 100	10	100	100		100
x 10	4	400	400	3980	400
x 10	1	100	100		100
x 1	400	400	400	398	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	2343	
800	82482	
900	110268	
950	142430	
1000	159367	
1050	163923	
1100	165400	5579
1150	165017	
1200	165020	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 0.5-min. Recommended HV =1100

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ☑ 201932 Fluke multimeter serial number: ☐ 8749012
☐ Alpha Source: Th-230 @ 13,000 dpm (1/13/10) sn: 4098-03 ☐ Gamma Source Cs-137 @ 5.37 uCi (1/13/10) sn: 4097-03
☐ Beta Source: Tc-99 @ 17,700 dpm (1/13/10) sn: 4099-03 ☑ Other Source: Am-241 @ 1uCi

Calibrated By: Calibration Date: 10-4-10 Calibration Due: 10-4-11

Reviewed By: Review Date: 10/4/10

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 921-3 * Calibration of Radiation Detection Instrument Devices

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

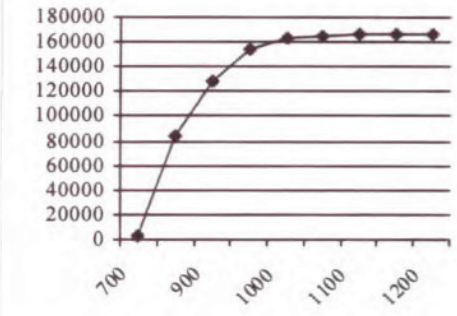
Meter:	Manufacturer: Ludlum	Model Number:	2221	Serial Number:	254783
Detector:	Manufacturer: Alpha Spectra	Model Number:	FIDLER	Serial Number:	010807J

☑ Mechanical Check ☑ Geotropism ☑ THR/WIN Operation ☑ Audio Check ☑ Battery Check (Min 4.4 VDC)
☑ F/S Response Check ☑ Meter Zeroed ☑ Reset Check HV Check (+/- 2.5%): ☑ 500 V ☑ 1000 V ☑ 1500 V
Source Distance: ☐ Contact ☐ 6 inches ☑ Other: 3/4" Cable Length: ☐ 39-inch ☑ 72-inch ☐ Other:
Source Geometry: ☐ Side ☑ Below ☐ Other: Temperature: 74 °F Relative Humidity 20 %
Threshold: 10 mV Window: Barometric Pressure: 24.45 inches Hg
Instrument found within tolerance: ☑ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	398531	400
x 1000	100	100	100		100
x 100	40	400	400	39821	400
x 100	10	100	100		100
x 10	4	400	400	3992	400
x 10	1	100	100		100
x 1	400	400	400	399	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	3592	
800	84359	
900	127382	
950	153448	
1000	162879	
1050	165171	
1100	166250	5923
1150	166359	
1200	166395	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 0.5-min. Recommended HV =1100

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ☑ 201932 Fluke multimeter serial number: ☐ 8749012
☐ Alpha Source: Th-230 @ 13,000 dpm (1/13/10) sn: 4098-03 ☐ Gamma Source Cs-137 @ 5.37 uCi (1/13/10) sn: 4097-03
☐ Beta Source: Tc-99 @ 17,700 dpm (1/13/10) sn: 4099-03 ☑ Other Source: Am-241 @ 1uCi

Calibrated By: Calibration Date: 10-4-10 Calibration Due: 10-4-11

Reviewed By: Review Date: 10/4/10

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 921-3 * Calibration of Radiation Detection Instrument Devices

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

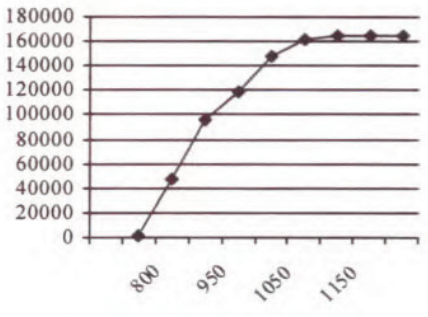
Meter:	Manufacturer: Ludlum	Model Number:	2221	Serial Number:	268647
Detector:	Manufacturer: Alpha Spectra	Model Number:	FIDLER	Serial Number:	010807D

☑ Mechanical Check ☑ Geotropism ☑ THR/WIN Operation ☑ Audio Check ☑ Battery Check (Min 4.4 VDC)
☑ F/S Response Check ☑ Meter Zeroed ☑ Reset Check HV Check (+/- 2.5%): ☑ 500 V ☑ 1000 V ☑ 1500 V
Source Distance: ☐ Contact ☐ 6 inches ☑ Other: 3/4" Cable Length: ☐ 39-inch ☑ 72-inch ☐ Other:
Source Geometry: ☐ Side ☑ Below ☐ Other: Temperature: 76 °F Relative Humidity 20 %
Threshold: 10 mV Window: Barometric Pressure: 24.51 inches Hg
Instrument found within tolerance: ☑ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	399620	400
x 1000	100	100	100		100
x 100	40	400	400	39976	400
x 100	10	100	100		100
x 10	4	400	400	3998	400
x 10	1	100	100		100
x 1	400	400	400	400	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	1417	
800	46705	
900	96517	
950	119004	
1000	147880	
1050	161869	
1100	164538	
1150	164372	5650
1200	165214	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 0.5-min. Recommended HV =1150

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ☑ 201932 Fluke multimeter serial number: ☐ 8749012
☐ Alpha Source: Th-230 @ 13,000 dpm (1/13/10) sn: 4098-03 ☐ Gamma Source Cs-137 @ 5.37 uCi (1/13/10) sn: 4097-03
☐ Beta Source: Tc-99 @ 17,700 dpm (1/13/10) sn: 4099-03 ☑ Other Source: Am-241 @ 1uCi

Calibrated By: Calibration Date: 10-4-10 Calibration Due: 10-4-11

Reviewed By: Review Date: 10/4/10

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 921-3 * Calibration of Radiation Detection Instrument Devices

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 228808 Cal. Due Date: 10/4/11

Detector: LUDLUM 44-10 Serial No. PR150852 Cal. Due Date: 10/4/11

Source: Cs-137 Activity: 4.74 μCi (5/11/94) Serial No. 328-94
DATED: 3.24 μCi (10/22/10)

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
10/25/10	08:30	5.7	1200	99	50883	8817	42066	–	cf
10/25/10	18:45	5.3	1204	99	50097	8829	41268	–	cf
10/26/10	06:00	5.5	1205	99	49083	8494	40589	–	cf
10/29/10	06:15	5.6	1205	100	48473	8680	39793	–	cf
10/29/10	16:30	5.5	1202	99	49399	9374	40025	–	cf

ABQ *

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 268647 Cal. Due Date: 10/4/11

Detector: LUDLUM 44-10 Serial No. PR121990 Cal. Due Date: 10/4/11

Source: Cs-137 Activity: 4.74 μCi (5/11/94) Serial No. 328-94
DATED: 3.24 μCi (10/24/10)

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
10/25/10	08:30	5.2	1155	102	50825	8819	42006	–	cf
10/25/10	18:45	5.1	1155	102	50567	8667	41900	–	cf
10/26/10	06:00	4.8	1156	101	50643	8422	42221	–	cf
10/29/10	06:15	5.1	1156	101	49297	8795	40502	–	cf
* 10/29/10	16:45	5.0	1153	101	49736	9697	40039	–	cf

ABQ

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 228808 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807E Cal. Due Date: 10/4/11

Source: Am-241 Activity: 1 μCi Serial No. _____

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
10/25/10	08:00	5.7	1200	99	171468	9991	161477	-	cf
10/25/10	18:45	5.3	1203	100	168639	9958	158681	-	cf
10/26/10	06:00	5.5	1204	99	168460	9554	158906	-	cf
10/27/10	07:00	5.7	1203	100	168780	9467	159313	-	cf
10/27/10	17:30	5.6	1204	99	168471	9538	158933	-	cf
10/28/10	06:00	5.7	1205	99	167746	9450	158296	-	cf
10/28/10	17:15	5.5	1202	99	168184	9404	158780	-	cf
10/29/10	06:15	5.6	1205	100	168591	9551	159040	-	cf
ABG * 10/29/10	16:30	5.5	1202	99	168723	10654	158069	-	cf
11/1/10	06:15	5.7	1205	99	168144	9870	158274	-	cf

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 228808 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807E Cal. Due Date: 10/4/11

Source: Am-241 Activity: 1 μCi Serial No. N/A

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
11/2/10	06:30	5.4	1205	99	168224	9760	158464	-	CF
11/2/10	17:15	5.5	1201	100	168244	8536	158708	-	cf
11/3/10	06:30	5.6	1204	99	168053	9602	158451	-	cf
11/3/10	17:15	5.4	1200	99	167952	9680	158272	-	cf
11/4/10	06:30	5.6	1204	100	168311	9714	158597	-	cf
11/4/10	17:38	5.3	1203	99	168265	9972	158293	-	cf
11/5/10	06:30	5.3	1204	100	167987	9771	158216	-	cf
ALQ * 10/5/10	15:40	5.3	1200	99	168747	10714	158033	-	cf
11/10/10	05:25	5.5	1204	100	168182	9460	158722	-	cf
11/10/10	16:25	5.2	1205	100	167928	9482	158446	-	cf

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

ERG

(1)

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. ~~254783~~ 228808 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807 ~~5~~ E Cal. Due Date: 10/4/11

Source: Am-241 Activity: 1 μCi Serial No. _____

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
11/11/10	05:30	5.4	1204	100	169071	9630	159441	–	[signature]
11/11/10	19:00	5.2	1203	99	167397	9645	157752	–	[signature]
11/12/10	08:00	5.3	1205	100	168152	9862	158290	–	[signature]
* ABQ 11/12/10	17:15	5.2	1206	100	168755	10373	158382	–	[signature]

Reviewed By: [signature] Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 254783 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807 J Cal. Due Date: 10/4/11

Source: Am-241 Activity: 1 μCi Serial No. _____

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
10/25/10	08:00	5.2	1102	100	172320	9991	162329	-	cf
11/3/10	06:30	5.0	1105	100	169110	10091	159019	-	cf
11/3/10	17:15	4.8	1100	100	168508	10082	158426	-	cf
11/4/10	06:30	5.6	1104	101	168713	10140	158573	-	cf
11/4/10	17:15	5.3	1103	100	168975	10234	158741	-	cf
11/5/10	06:30	5.4	1105	100	168437	10342	158095	-	cf
ABQ * 11/5/10	15:40	5.3	1101	100	170644	10823	159821	-	cf
11/10/10	05:20	5.4	1105	100	169268	9717	159551	-	cf
11/10/10	16:30	5.1	1105	100	169684	10118	159566	-	cf
11/11/10	05:15	5.2	1104	100	169341	9900	159441	-	cf

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 254783 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807 J Cal. Due Date: 10/4/11

Source: Am-241 Activity: 1 μCi Serial No. N/A

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
11/11/10	19:05	5.0	1104	100	169307	10085	159222	–	cf
11/12/10	07:10	5.1	1105	100	168765	10197	159568	–	cf
* ABQ 11/12/10	17:10	5.1	1106	100	167648	10576	157072	–	cf

Reviewed By: JC Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 268647 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807 D Cal. Due Date: 10/4/11

Source: AM-241 Activity: 1 μCi Serial No. _____

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
10/25/10	08:00	5.2	1152	101	172389	9650	162739	—	cf
10/25/10	18:45	5.1	1155	101	168423	9927	158496	—	cf
10/26/10	06:00	4.8	1156	101	168886	9784	159102	—	cf
10/27/10	07:00	5.2	1155	100	168512	9665	158847	—	cf
10/27/10	17:30	5.1	1154	101	169305	9398	159907	—	cf
10/28/10	06:00	5.2	1155	101	168912	9709	159203	—	cf
10/28/10	17:15	5.0	1153	101	169018	9672	159346	—	cf
10/29/10	06:15	5.1	1158	101	169015	9870	159145	—	cf
ABQ * 10/29/10	16:45	5.0	1153	101	169389	10945	158444	—	cf
11/1/10	06:15	5.2	1155	101	168650	10095	158555	—	cf

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 268647 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807D Cal. Due Date: 10/4/11

Source: AM-241 Activity: 1 μCi Serial No. N/A

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
11/2/10	06:30	5.2	1156	99	168698	9823	158875	-	cf
11/2/10	17:15	5.0	1153	100	169138	10152	158986	-	cf
11/3/10	06:30	5.1	1155	101	168056	10025	158031	-	cf
11/3/10	~~06~~ 17:30	5.0	1151	100	169537	9883	159654	-	cf
11/4/10	06:30	5.1	1155	101	168134	9836	158298	-	cf
11/4/10	17:15	5.0	1154	100	168537	9918	158619	-	cf
11/5/10	06:20	5.1	1156	101	168003	10077	157926	-	cf
ABQ * 11/5/10	15:50	4.9	1153	101	170070	10776	159294	-	cf
11/10/10	05:15	5.1	1156	101	168682	9817	158865	-	cf
11/10/10	16:35	4.9	1157	102	169283	9898	159385	-	cf

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 268647 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807 D Cal. Due Date: 10/4/11

Source: AM-241 Activity: 1 μCi Serial No. N/A

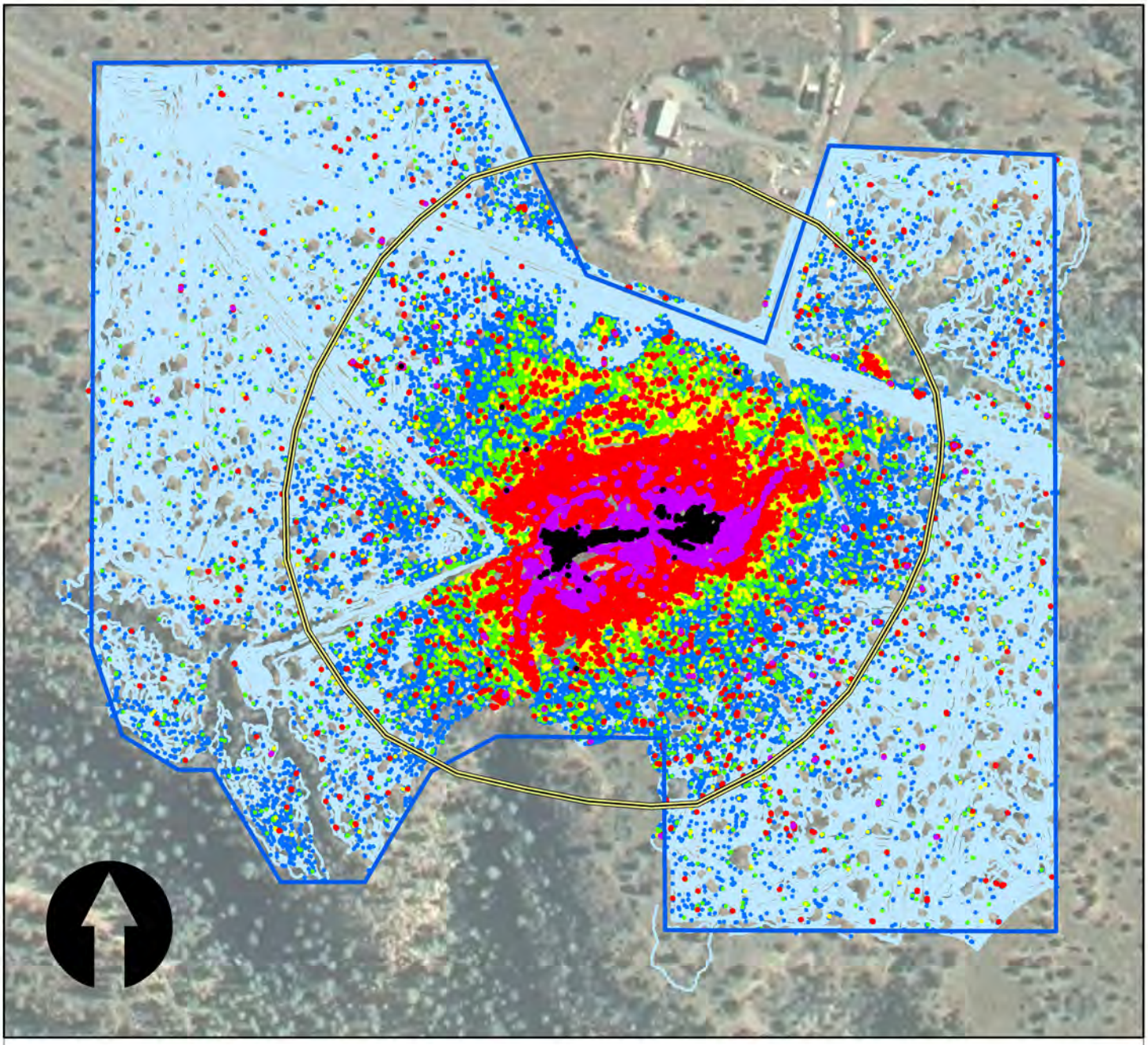
Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
11/11/10	05:10	5.0	1156	101	168923	9919	159004	-	cf
11/11/10	~~07~~:15	4.8	1155	101	169416	9813	159603	-	cf
11/12/10	07:50	5.0	1156	101	168792	9842	158950	-	cf
11/12/10	17:10	4.9	1157	101	169766	10413	159353	-	cf

* ABQ

Reviewed By: JC Date: 11/19/10

ERG Form 1.30A



Legend

FIDLER Survey

(cpm)

- < 1.25 BKG (28,125 cpm)
- 1.25 - 1.5 BKG
- 1.5 - 1.75 BKG
- 1.75 - 2.0 BKG
- 2.0 - 4.0 BKG
- 4.0 - 8.0 BKG
- > 8.0 BKG (180,000 cpm)

EF Firing Site Boundary

Site Background Delineation Boundry

0 125 250 500 750 1,000 Feet



Legend

FIDLER Survey

(cpm)

- < 1.25 BKG (21,250 cpm)
- 1.25 - 1.5 BKG
- 1.5 - 1.75 BKG
- 1.75 - 2.0 BKG
- > 2.0 BKG (34,000 cpm)

0 37.5 75 150 225 300

Feet



Legend

FIDLER Survey

(cpm)

- < 1.25 BKG (28,125 cpm)
- 1.25 - 1.5 BKG
- 1.5 - 1.75 BKG
- 1.75 - 2.0 BKG
- > 2.0 BKG (45,000 cpm)

0 37.5 75 150 225 300

Feet



Legend

Nal Detector Survey

(cpm)

- < 1.25 BKG (16,250 cpm)
- 1.25 - 1.5 BKG
- 1.5 - 1.75 BKG
- 1.75 - 2.0 BKG
- > 2.0 BKG (26,000 cpm)

0 37.5 75 150 225 300

Feet



Legend

NaI Detector Survey

(cpm)

- < 1.25 BKG (22,500 cpm)
- 1.25 - 1.5 BKG
- 1.5 - 1.75 BKG
- 1.75 - 2.0 BKG
- > 2.0 BKG (36,000 cpm)

0 37.5 75 150 225 300

Feet

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 228808 Cal. Due Date: 10/4/11

Detector: LUDLUM 44-10 Serial No. PR150852 Cal. Due Date: 10/4/11

Source: Cs-137 Activity: 4.74 μCi (5/11/94) Serial No. 328-94
DATED: 3.24 μCi (10/22/10)

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
10/25/10	08:30	5.7	1200	99	50883	8817	42066	–	cf
10/25/10	18:45	5.3	1204	99	50097	8829	41268	–	cf
10/26/10	06:00	5.5	1205	99	49083	8494	40589	–	cf
10/29/10	06:15	5.6	1205	100	48473	8680	39793	–	cf
10/29/10	16:30	5.5	1202	99	49399	9374	40025	–	cf

ABQ *

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 268647 Cal. Due Date: 10/4/11

Detector: LUDLUM 44-10 Serial No. PR121990 Cal. Due Date: 10/4/11

Source: Cs-137 Activity: 4.74 μCi (5/11/94) Serial No. 328-94
DATED: 3.24 μCi (10/24/10)

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
10/25/10	08:30	5.2	1155	102	50825	8819	42006	–	cf
10/25/10	18:45	5.1	1155	102	50567	8667	41900	–	cf
10/26/10	06:00	4.8	1156	101	50643	8422	42221	–	cf
10/29/10	06:15	5.1	1156	101	49297	8795	40502	–	cf
* 10/29/10	16:45	5.0	1153	101	49736	9697	40039	–	cf

ABQ

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 228808 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807E Cal. Due Date: 10/4/11

Source: Am-241 Activity: 1 μCi Serial No. _____

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
10/25/10	08:00	5.7	1200	99	171468	9991	161477	-	cf
10/25/10	18:45	5.3	1203	100	168639	9958	158681	-	cf
10/26/10	06:00	5.5	1204	99	168460	9554	158906	-	cf
10/27/10	07:00	5.7	1203	100	168780	9467	159313	-	cf
10/27/10	17:30	5.6	1204	99	168471	9538	158933	-	cf
10/28/10	06:00	5.7	1205	99	167746	9450	158296	-	cf
10/28/10	17:15	5.5	1202	99	168184	9404	158780	-	cf
10/29/10	06:15	5.6	1205	100	168591	9551	159040	-	cf
ABG * 10/29/10	16:30	5.5	1202	99	168723	10654	158069	-	cf
11/1/10	06:15	5.7	1205	99	168144	9870	158274	-	cf

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 228808 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807E Cal. Due Date: 10/4/11

Source: Am-241 Activity: 1 μCi Serial No. N/A

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
11/2/10	06:30	5.4	1205	99	168224	9760	158464	-	CF
11/2/10	17:15	5.5	1201	100	168244	8536	158708	-	cf
11/3/10	06:30	5.6	1204	99	168053	9602	158451	-	cf
11/3/10	17:15	5.4	1200	99	167952	9680	158272	-	cf
11/4/10	06:30	5.6	1204	100	168311	9714	158597	-	cf
11/4/10	17:38	5.3	1203	99	168265	9972	158293	-	cf
11/5/10	06:30	5.3	1204	100	167987	9771	158216	-	cf
ALQ * 10/5/10	15:40	5.3	1200	99	168747	10714	158033	-	cf
11/10/10	05:25	5.5	1204	100	168182	9460	158722	-	CF
11/10/10	16:25	5.2	1205	100	167928	9482	158446	-	cf

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

(1)

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. ~~254783~~ 228808 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807 ~~5~~ E Cal. Due Date: 10/4/11

Source: Am-241 Activity: 1 μCi Serial No. _____

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
11/11/10	05:30	5.4	1204	100	169071	9630	159441	–	
11/11/10	19:00	5.2	1203	99	167397	9645	157752	–	
11/12/10	08:00	5.3	1205	100	168152	9862	158290	–	
* ABQ 11/12/10	17:15	5.2	1206	100	168755	10373	158382	–	

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

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Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 254783 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807 J Cal. Due Date: 10/4/11

Source: Am-241 Activity: 1 μCi Serial No. _____

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
10/25/10	08:00	5.2	1102	100	172320	9991	162329	-	cf
11/3/10	06:30	5.0	1105	100	169110	10091	159019	-	cf
11/3/10	17:15	4.8	1100	100	168508	10082	158426	-	cf
11/4/10	06:30	5.6	1104	101	168713	10140	158573	-	cf
11/4/10	17:15	5.3	1103	100	168975	10234	158741	-	cf
11/5/10	06:30	5.4	1105	100	168437	10342	158095	-	cf
ABQ * 11/5/10	15:40	5.3	1101	100	170644	10823	159821	-	cf
11/10/10	05:20	5.4	1105	100	169268	9717	159551	-	cf
11/10/10	16:30	5.1	1105	100	169684	10118	159566	-	cf
11/11/10	05:15	5.2	1104	100	169341	9900	159441	-	cf

Reviewed By: _____ Date: 11/19/10

ERG

Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 254783 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807 J Cal. Due Date: 10/4/11

Source: Am-241 Activity: 1 μCi Serial No. N/A

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
11/11/10	19:05	5.0	1104	100	169307	10085	159222	–	cf
11/12/10	07:10	5.1	1105	100	168765	10197	159568	–	cf
* ABQ 11/12/10	17:10	5.1	1106	100	167648	10576	157072	–	cf

Reviewed By: JCQ Date: 11/19/10

ERG Form 1.30A

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Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 268647 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807 D Cal. Due Date: 10/4/11

Source: AM-241 Activity: 1 μCi Serial No. _____

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
10/25/10	08:00	5.2	1152	101	172389	9650	162739	—	cf
10/25/10	18:45	5.1	1155	101	168423	9927	158496	—	cf
10/26/10	06:00	4.8	1156	101	168886	9784	159102	—	cf
10/27/10	07:00	5.2	1155	100	168512	9665	158847	—	cf
10/27/10	17:30	5.1	1154	101	169305	9398	159907	—	cf
10/28/10	06:00	5.2	1155	101	168912	9709	159203	—	cf
10/28/10	17:15	5.0	1153	101	169018	9672	159346	—	cf
10/29/10	06:15	5.1	1156	101	169015	9870	159145	—	cf
ABQ * 10/29/10	16:45	5.0	1153	101	169389	10945	158444	—	cf
11/1/10	06:15	5.2	1155	101	168650	10095	158555	—	cf

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

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Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 268647 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807D Cal. Due Date: 10/4/11

Source: AM-241 Activity: 1 μCi Serial No. N/A

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
11/2/10	06:30	5.2	1156	99	168698	9823	158875	-	cf
11/2/10	17:15	5.0	1153	100	169138	10152	158986	-	cf
11/3/10	06:30	5.1	1155	101	168056	10025	158031	-	cf
10/3/10	~~06~~ 17:30	5.0	1151	100	169537	9883	159654	-	cf
11/4/10	06:30	5.1	1155	101	168134	9836	158298	-	cf
11/4/10	17:15	5.0	1154	100	168537	9918	158619	-	cf
11/5/10	06:20	5.1	1156	101	168003	10077	157926	-	cf
ABCQ * 11/5/10	15:50	4.9	1153	101	170070	10776	159294	-	cf
11/10/10	05:15	5.1	1156	101	168682	9817	158865	-	cf
11/10/10	16:35	4.9	1157	102	169283	9898	159385	-	cf

Reviewed By: _____ Date: 11/19/10

ERG Form 1.30A

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Function Check Form
Single Channel Detector

Ratemeter: LUDLUM 2221 Serial No. 268647 Cal. Due Date: 10/4/11

Detector: ALPHA SPECTRA FIDLER Serial No. 010807 D Cal. Due Date: 10/4/11

Source: AM-241 Activity: 1 μCi Serial No. N/A

Comments: _____

Date	Time	Battery	High Voltage	Threshold	Gross Counts	Background	Net Counts	Efficiency	Initial
11/11/10	05:10	5.0	1156	101	168923	9919	159004	-	cf
11/11/10	~~07~~:15	4.8	1155	101	169416	9813	159603	-	cf
11/12/10	07:50	5.0	1156	101	168792	9842	158950	-	cf
11/12/10	17:10	4.9	1157	101	169766	10413	159353	-	cf

* ABQ

Reviewed By: JC Date: 11/19/10

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Calibration and Voltage Plateau

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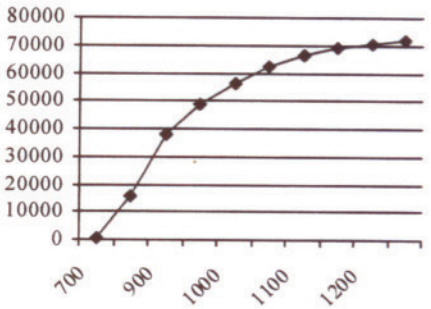
Meter: Manufacturer:	Ludlum	Model Number:	2221	Serial Number:	228808
Detector: Manufacturer:	Ludlum	Model Number:	44-10	Serial Number:	PR150852

☑ Mechanical Check ☑ Geotropism ☑ THR/WIN Operation ☑ Audio Check ☑ Battery Check (Min 4.4 VDC)
☑ F/S Response Check ☑ Meter Zeroed ☑ Reset Check HV Check (+/- 2.5%): ☑ 500 V ☑ 1000 V ☑ 1500 V
Source Distance: ☐ Contact ☑ 6 inches ☐ Other: Cable Length: ☐ 39-inch ☑ 72-inch ☐ Other:
Source Geometry: ☑ Side ☐ Below ☐ Other: Temperature: 75 °F Relative Humidity 20 %
Threshold: 10 mV Window: Barometric Pressure: 24.51 inches Hg
Instrument found within tolerance: ☑ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	358703	400
x 1000	100	100	100		100
x 100	40	400	400	39873	400
x 100	10	100	100		100
x 10	4	400	400	3980	400
x 10	1	100	100		100
x 1	400	400	400	398	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	451	
800	15297	
900	37725	
950	48518	
1000	56316	
1050	62674	
1100	66181	
1150	69304	
1200	70371	10384
1250	71921	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1-min. Recommended HV =1200

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ☑ 201932 Fluke multimeter serial number: ☐ 8749012
☐ Alpha Source: Th-230 @ 13,000 dpm (1/13/10) sn: 4098-03 ☑ Gamma Source Cs-137 @ 5.37 uCi (1/13/10) sn: 4097-03
☐ Beta Source: Tc-99 @ 17,700 dpm (1/13/10) sn: 4099-03 ☐ Other Source:

Calibrated By: Calibration Date: 10-4-10 Calibration Due: 10-4-11

Reviewed By: Review Date: 10/12/10

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 921-3 * Calibration of Radiation Detection Instrument Devices

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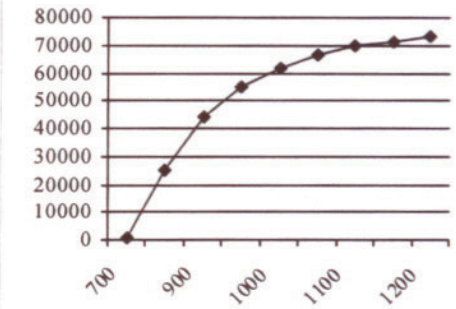
Meter:	Manufacturer:	Ludlum	Model Number:	2221	Serial Number:	268647
Detector:	Manufacturer:	Ludlum	Model Number:	44-10	Serial Number:	PR121990

☑ Mechanical Check ☑ Geotropism ☑ THR/WIN Operation ☑ Audio Check ☑ Battery Check (Min 4.4 VDC)
☑ F/S Response Check ☑ Meter Zeroed ☑ Reset Check HV Check (+/- 2.5%): ☑ 500 V ☑ 1000 V ☑ 1500 V
Source Distance: ☐ Contact ☑ 6 inches ☐ Other: Cable Length: ☐ 39-inch ☑ 72-inch ☐ Other:
Source Geometry: ☑ Side ☐ Below ☐ Other: Temperature: 76 °F Relative Humidity 20 %
Threshold: 10 mV Window: Barometric Pressure: 24.51 inches Hg
Instrument found within tolerance: ☑ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	399620	400
x 1000	100	100	100		100
x 100	40	400	400	39976	400
x 100	10	100	100		100
x 10	4	400	400	3998	400
x 10	1	100	100		100
x 1	400	400	400	400	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	733	
800	24767	
900	43898	
950	55077	
1000	61506	
1050	66247	
1100	69911	
1150	71265	9837
1200	73325	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1-min. Recommended HV =1150

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ☑ 201932 Fluke multimeter serial number: ☐ 8749012
☐ Alpha Source: Th-230 @ 13,000 dpm (1/13/10) sn: 4098-03 ☑ Gamma Source Cs-137 @ 5.37 uCi (1/13/10) sn: 4097-03
☐ Beta Source: Tc-99 @ 17,700 dpm (1/13/10) sn: 4099-03 ☐ Other Source:

Calibrated By: Calibration Date: 10-4-10 Calibration Due: 10-4-11

Reviewed By: Review Date: 10/4/10

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 921-3 * Calibration of Radiation Detection Instrument Devices

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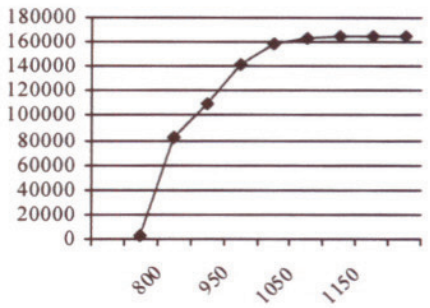
Meter: Manufacturer:	Ludlum	Model Number:	2221	Serial Number:	228808
Detector: Manufacturer:	Alpha Spectra	Model Number:	FIDLER	Serial Number:	010807E

☑ Mechanical Check ☑ Geotropism ☑ THR/WIN Operation ☑ Audio Check ☑ Battery Check (Min 4.4 VDC)
☑ F/S Response Check ☑ Meter Zeroed ☐ Reset Check HV Check (+/- 2.5%): ☑ 500 V ☑ 1000 V ☑ 1500 V
Source Distance: ☐ Contact ☐ 6 inches ☑ Other: 3/4" Cable Length: ☐ 39-inch ☑ 72-inch ☐ Other:
Source Geometry: ☐ Side ☑ Below ☐ Other: Temperature: 75 °F Relative Humidity 20 %
Threshold: 10 mV Window: Barometric Pressure: 24.51 inches Hg
Instrument found within tolerance: ☑ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	398703	400
x 1000	100	100	100		100
x 100	40	400	400	39873	400
x 100	10	100	100		100
x 10	4	400	400	3980	400
x 10	1	100	100		100
x 1	400	400	400	398	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	2343	
800	82482	
900	110268	
950	142430	
1000	159367	
1050	163923	
1100	165400	5579
1150	165017	
1200	165020	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 0.5-min. Recommended HV =1100

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ☑ 201932 Fluke multimeter serial number: ☐ 8749012
☐ Alpha Source: Th-230 @ 13,000 dpm (1/13/10) sn: 4098-03 ☐ Gamma Source Cs-137 @ 5.37 uCi (1/13/10) sn: 4097-03
☐ Beta Source: Tc-99 @ 17,700 dpm (1/13/10) sn: 4099-03 ☑ Other Source: Am-241 @ 1uCi

Calibrated By: Calibration Date: 10-4-10 Calibration Due: 10-4-11

Reviewed By: Review Date: 10/4/10

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 921-3 * Calibration of Radiation Detection Instrument Devices

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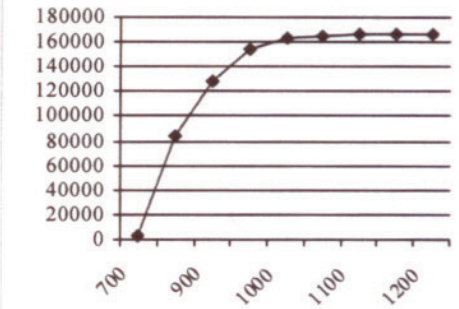
Meter: Manufacturer:	Ludlum	Model Number:	2221	Serial Number:	254783
Detector: Manufacturer:	Alpha Spectra	Model Number:	FIDLER	Serial Number:	010807J

☑ Mechanical Check ☑ Geotropism ☑ THR/WIN Operation ☑ Audio Check ☑ Battery Check (Min 4.4 VDC)
☑ F/S Response Check ☑ Meter Zeroed ☑ Reset Check HV Check (+/- 2.5%): ☑ 500 V ☑ 1000 V ☑ 1500 V
Source Distance: ☐ Contact ☐ 6 inches ☑ Other: 3/4" Cable Length: ☐ 39-inch ☑ 72-inch ☐ Other:
Source Geometry: ☐ Side ☑ Below ☐ Other: Temperature: 74 °F Relative Humidity 20 %
Threshold: 10 mV Window: Barometric Pressure: 24.45 inches Hg
Instrument found within tolerance: ☑ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	398531	400
x 1000	100	100	100		100
x 100	40	400	400	39821	400
x 100	10	100	100		100
x 10	4	400	400	3992	400
x 10	1	100	100		100
x 1	400	400	400	399	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	3592	
800	84359	
900	127382	
950	153448	
1000	162879	
1050	165171	
1100	166250	5923
1150	166359	
1200	166395	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 0.5-min. Recommended HV =1100

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ☑ 201932 Fluke multimeter serial number: ☐ 8749012
☐ Alpha Source: Th-230 @ 13,000 dpm (1/13/10) sn: 4098-03 ☐ Gamma Source Cs-137 @ 5.37 uCi (1/13/10) sn: 4097-03
☐ Beta Source: Tc-99 @ 17,700 dpm (1/13/10) sn: 4099-03 ☑ Other Source: Am-241 @ 1uCi

Calibrated By: Calibration Date: 10-4-10 Calibration Due: 10-4-11

Reviewed By: Review Date: 10/4/10

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 921-3 * Calibration of Radiation Detection Instrument Devices

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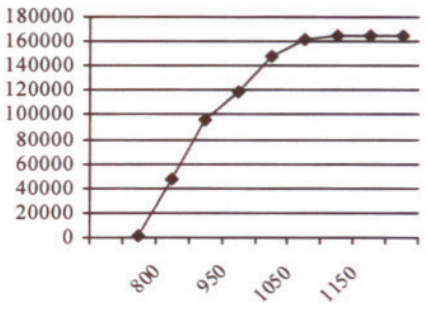
Meter: Manufacturer:	Ludlum	Model Number:	2221	Serial Number:	268647
Detector: Manufacturer:	Alpha Spectra	Model Number:	FIDLER	Serial Number:	010807D

☑ Mechanical Check ☑ Geotropism ☑ THR/WIN Operation ☑ Audio Check ☑ Battery Check (Min 4.4 VDC)
☑ F/S Response Check ☑ Meter Zeroed ☑ Reset Check HV Check (+/- 2.5%): ☑ 500 V ☑ 1000 V ☑ 1500 V
Source Distance: ☐ Contact ☐ 6 inches ☑ Other: 3/4" Cable Length: ☐ 39-inch ☑ 72-inch ☐ Other:
Source Geometry: ☐ Side ☑ Below ☐ Other: Temperature: 76 °F Relative Humidity 20 %
Threshold: 10 mV Window: Barometric Pressure: 24.51 inches Hg
Instrument found within tolerance: ☑ Yes ☐ No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	399620	400
x 1000	100	100	100		100
x 100	40	400	400	39976	400
x 100	10	100	100		100
x 10	4	400	400	3998	400
x 10	1	100	100		100
x 1	400	400	400	400	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	1417	
800	46705	
900	96517	
950	119004	
1000	147880	
1050	161869	
1100	164538	
1150	164372	5650
1200	165214	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 0.5-min. Recommended HV =1150

Reference Instruments and/or Sources:

Ludlum pulser serial number: ☐ 97743 ☑ 201932 Fluke multimeter serial number: ☐ 8749012
☐ Alpha Source: Th-230 @ 13,000 dpm (1/13/10) sn: 4098-03 ☐ Gamma Source Cs-137 @ 5.37 uCi (1/13/10) sn: 4097-03
☐ Beta Source: Tc-99 @ 17,700 dpm (1/13/10) sn: 4099-03 ☑ Other Source: Am-241 @ 1uCi

Calibrated By: Calibration Date: 10-4-10 Calibration Due: 10-4-11

Reviewed By: Review Date: 10/4/10

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 921-3 * Calibration of Radiation Detection Instrument Devices

Appendix E

Geophysical Survey Report

SUNBELT GEOPHYSICS P.O. Box 208 Socorro, New Mexico 87801 (575) 838-2941

Geophysical Investigations at SWMU 36-001 (MDA AA) and SWMU 15-007(a) (MDA N) Los Alamos National Laboratory Los Alamos, New Mexico

Prepared for:

TerranearPMC, LLC
4200 W. Jemez Road
4th Floor, Suite P-502
Los Alamos, New Mexico 87544

Prime Contract No: 85785-001-10
TPMC Project No.: 82100
Agreement No.: Sunbeltgeo82100
Task Order No.: 1

David A. Hyndman

December 2010

Introduction

Geophysical investigations have been conducted at two sites within the Los Alamos National Laboratory complex in Los Alamos, New Mexico. These site have been identified as SWMU-36-001, an inactive landfill known as MDA AA, and SWMU 15-007(a), an inactive landfill known as MDA N. The objectives of the geophysical investigation at each site were to delineate the landfill boundaries and to identify anomalous features within the landfills in order to enhance planning for subsequent intrusive characterization and remediation.

The field work for the geophysical investigations was conducted during the period 28 – 31 October, 2010, following required health and safety training. Geophysical methods employed included magnetometry, electromagnetic ground conductivity, ground penetrating radar and high-resolution electromagnetic metal detection.

Labor, instrumentation and technical expertise for the geophysical investigations were provided by Sunbelt Geophysics of Socorro, New Mexico. Coordination, preparation, and oversight were provided by TerranearPMC, LLC (TPMC) of Los Alamos, New Mexico.

Methods

Several geophysical instruments were mobilized for these investigations, including:

- Geometrics Inc. G-858 magnetometer
- Geonics Ltd. EM-31 ground conductivity meter
- Geonics Ltd. EM-61 high-resolution metal detector
- Sensors & Software Ltd. 250 MHz ground penetrating radar (GPR)
- Advanced Geosciences Inc. Sting earth resistivity/IP meter

A total of three (3) different instruments were selected for each site after an examination of local site conditions and brief tests of the instruments to select the methods likely to provide the most robust subsurface characterizations.

A spatial control and data acquisition grid was placed at each site using a transit and tape. The grids established parallel data acquisition traverses separated by 5 ft which were marked with wooden stakes and small dots of spray paint. The areas expected to contain buried wastes as described in ***Portillo and Fence Canyons Aggregate Area Investigation Work Plan, Revision 1, July 2009*** (hereafter the *Work Plan*) had been marked by TPMC prior to the geophysical investigations. The geophysical survey grids were positioned to overlap and extend the marked areas as seemed reasonable.

Data from the instruments were recorded with data loggers intrinsic to each system. These data were downloaded to a computer at the end of each day and examined for quality assurance, archiving and determination of any required re-surveying. The DAT61 (Geonics Ltd.), DAT31 (Geonics Ltd.), MagMapper (Geometrics Inc.), Ekko-View (Sensors & Software Inc.) and the Oasis montaj (Geosoft Ltd.) programs were used for processing and image preparation.

Results

SWMU-36-001, MDA AA

MDA AA is located in an open and relatively level area covering approximately one acre. It is described in the *Work Plan* as having two burial trenches containing burned debris that consisted of wood, sand, plastics, and HE. One trench was suspected to be approximately 80 feet long and 40 feet wide, the other to be 120 feet long and 20 feet wide. The debris was described as being covered with approximately 4 feet of soil. An east – west trending surface depression can be observed running near the southern boundary of the site. This depression appears to be either a partially filled and poorly compacted burial trench or part of erosion-control measures mentioned in the *Work Plan* to have been implemented in 1996. There is rip-rap stabilized by chain link fencing at the eastern end of this depression and at other small areas along the eastern edge of the site.

MDA AA was investigated by conducting surveys with a Geonics Ltd. EM-61 high-resolution metal detector, a Geometrics Inc. G-858 magnetometer, and a Sensors & Software Ltd. 250 MHz GPR system. The survey grid extended 200 feet north – south and 195 feet east – west.

An image of the EM-61 metal detection data is presented in Figure 1. These data have been processed to accentuate the major concentrations of buried metal at the expense of small and shallow metal ("Difference" response). Three distinct burial trenches are observed which have no surface expression. There is also a significant occurrence of buried metal at the western end of the surface depression, and minor buried metal along the run of the surface depression. Approximate depths of burial (soil cover) are annotated on the figure.

An image of the magnetometer data is provided in Figure 2. These data are consistent with the EM-61 data in delineating the three trenches containing buried metal and buried material in the western end of the surface depression. The response from rip-rap is noted near the southeast corner of the survey. The approximate boundaries of the burial trenches are indicated by a dashed line.

A mild magnetic feature is observed to the northeast of the three trenches containing buried metal. This feature is marked "?" and consists of two faint but linear and parallel magnetic ridges. This magnetic feature is approximately the same size and is oriented parallel to the burial trenches to the south. This feature suggests that a fourth trench may have been excavated but backfilled with soil. This is assumed to be an empty trench but there is a possibility this trench was filled with non-metallic material such as sand that was mentioned in the *Work Plan*.

The GPR survey was disappointing with effective penetration limited to approximately 4 feet. This was not deep enough to robustly image the buried metal in the trenches, estimated from the EM-61 data (Figure 1) to be in the range of 4 to 5 feet. North – south GPR profiles along 130E and 190E are given in Figure 3 as examples.

The profile along 130E (top – Figure 3) shows no subsurface features from the surface depression or the southern-most trench. The middle trench provides only some reflected signal. Reasonable reflected signal is obtained from the northern-most trench, some of which is probably from backfill above the wastes and the edges of the trench. This profile along 130E

does demonstrate that the northern-most trench is wider that suggested by the EM-61 and magnetometer data. No subsurface response is seen from the possible empty trench suggested by the magnetic data.

The profile along 190E (bottom – Figure 3) shows a compacted soil layer to the east of the surface depression and the three trenches containing buried metal. This helps to confirm the eastward extent of these features. No subsurface response is seen from the possible empty trench suggested by the magnetic data.

SWMU 15-007(a), MDA N

MDA N is located in a relatively level area with scattered clumps of mature trees and some knee-high vegetation. The *Work Plan* describes a single burial trench suspected to be approximately 300 feet long and 30 feet wide containing debris from the demolition of two buildings. Previous geophysical investigations at this site failed to locate or delineate the suspected trench.

MDA N was investigated by conducting surveys with a Geonics Ltd. EM-61 high-resolution metal detector, a Geometrics Inc. G-858 magnetometer, and a Geonics Ltd. EM-31 ground conductivity meter. The survey grid extended 365 feet north – south and 115 feet east – west.

An image of the EM-61 metal detection data is provided in Figure 4. These data have been processed to display the response from both the large, deep buried metal and the smaller, shallow buried metal ("Primary" response). Gaps are present in the image where mature trees blocked surveying. Approximate depths of burial (soil cover) are annotated on the figure, together with the response from a water line that was marked on site.

Figure 4 reveals a concentration of buried metal from approximately 150N to 265N, 50E to 90E. This area is roughly coincident with the suspected position of the burial trench as given in the *Work Plan*, but not extending as far to the south and significantly wider than expected to the north. Scattered metallic debris can be observed across the site.

An alternate image of the EM-61 data is given in Figure 5. This image is the "Difference" response accentuating the more significant (larger, deeper) buried metal objects. The more significant deposits of waste are seen to be confined to a short and narrow area from approximately 150N to 225N, 75E to 100E. This projection of the buried wastes is more consistent with the trench described in the *Work Plan*, but significantly shorter to both the north and south.

The depth of the buried metal is generally deeper by 1 – 3 feet for the waste in the narrow area identified on Figure 5 than the much broader and longer deposit seen on Figure 4. It is possible that the larger area containing buried metal as seen on Figure 4 is due to old scattered surface debris that was later covered by soil during landscaping and earthmoving after the building demolition mentioned in the *Work Plan*.

An image of the EM-31 ground conductivity data is provided in Figure 6. The response of this instrument can be of two different types. The intended response is a measurement of the apparent electrical conductivity of the soil, but there can also be a strong response when in the

presence of significant metal, either buried or at the surface. Both lateral changes in soil conductivity and the presence of metal are observed in Figure 6. A high response from the metal fence is seen at the southwest corner and a high – low – high response is seen when traversing over the water line in the northern portion of the survey. Of primary interest is the area of low ground conductivity observed from approximately 115N to 225N, 65E to105E.

This area of low ground conductivity is suggestive of disturbed soil. It is coincident with the suspected position of the burial trench as given in the *Work Plan* and is roughly coincident but extends farther to the south than the buried metal seen in Figure 4 and Figure 5. It is possible that the burial trench extends further to the south than indicated by the buried metal, but is filled with soil or non-metallic wastes.

An image of the magnetometer data is provided in Figure 7 with interpretations of the positions of disturbed ground (Figure 6), all buried metal (Figure 4) and the deep buried metal (Figure 5). The magnetic data do not appear to be well correlated to the results of the other instruments except for one isolated occurrence at approximately 225N, 30E. The magnetic data are dominated by northwest to southeast trends or "fabric" that is interpreted to be due to the remnant magnetic character of the underlying rock.

The relatively sparse EM-61 response seen in Figure 4 and Figure 5 and the lack of magnetic response seen in Figure 7 indicate that the waste in this trench is relatively poor in metal content.

Conclusions

The geophysical investigations at MDA AA and MDA N were generally successful in delineating the landfill boundaries and identifying anomalous features within the landfills, although some uncertainties remain.

SWMU-36-001, MDA AA

MDA AA is shown to have three (3) distinct landfill trenches containing significant buried wastes, all approximately 20 feet wide and ranging in length from approximately 70 feet to 130 feet. There is a shallow surface depression to the south of these three trenches that appears to be either a partially filled and poorly compacted burial trench or an erosion-control channel that subsequently received wastes. There may be an excavated trench to the north of the three primary trenches that was backfilled with soil or sand. These interpretations are provided on Figure 8.

SWMU 15-007(a), MDA N

MDA N is shown to contain buried wastes but different interpretations of the extent of the landfill are possible. If all buried metal is considered (Figure 4), the landfill is shorter but wider than anticipated based on the information provided in the *Work Plan*. If only the deeply buried waste (Figure 5) and the possible disturbed soil (Figure 6) is considered, the position of the landfill is coincident with expectations, but significantly shorter to the north and south. These different interpretations are given on Figure 9.

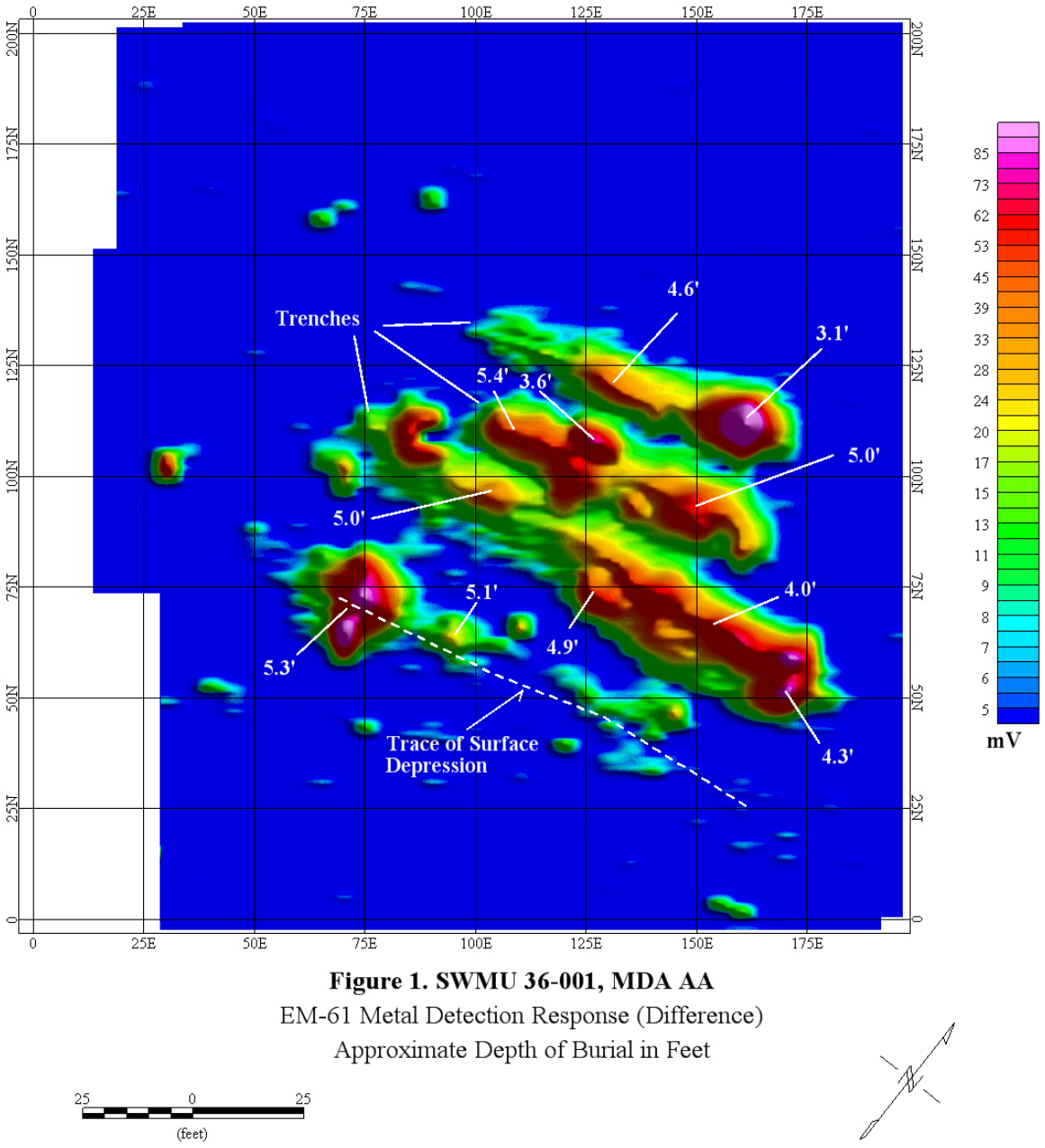


Figure 1. SWMU 36-001, MDA AA

EM-61 Metal Detection Response (Difference)

Approximate Depth of Burial in Feet

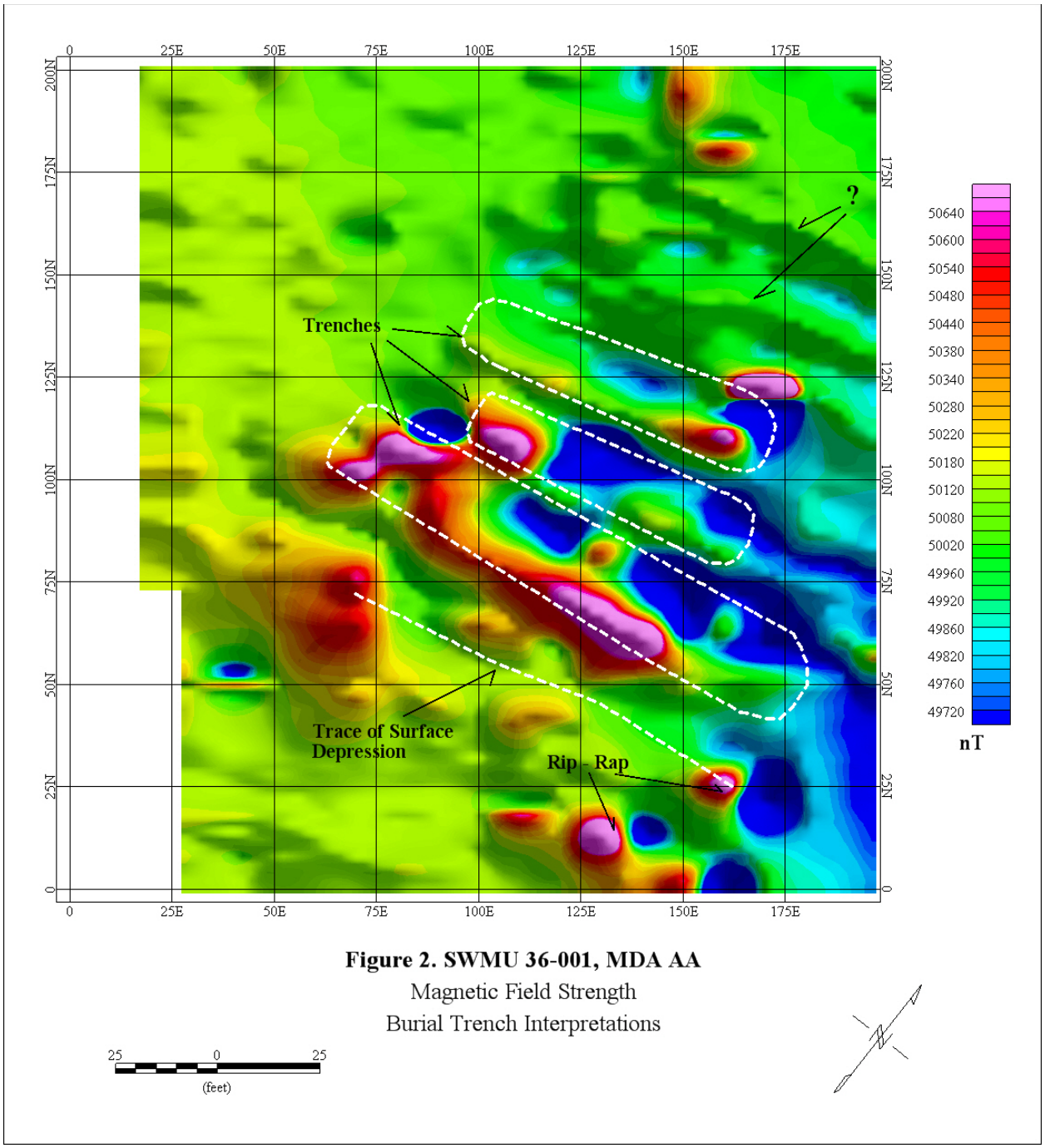


Figure 2. SWMU 36-001, MDA AA

Magnetic Field Strength

Burial Trench Interpretations

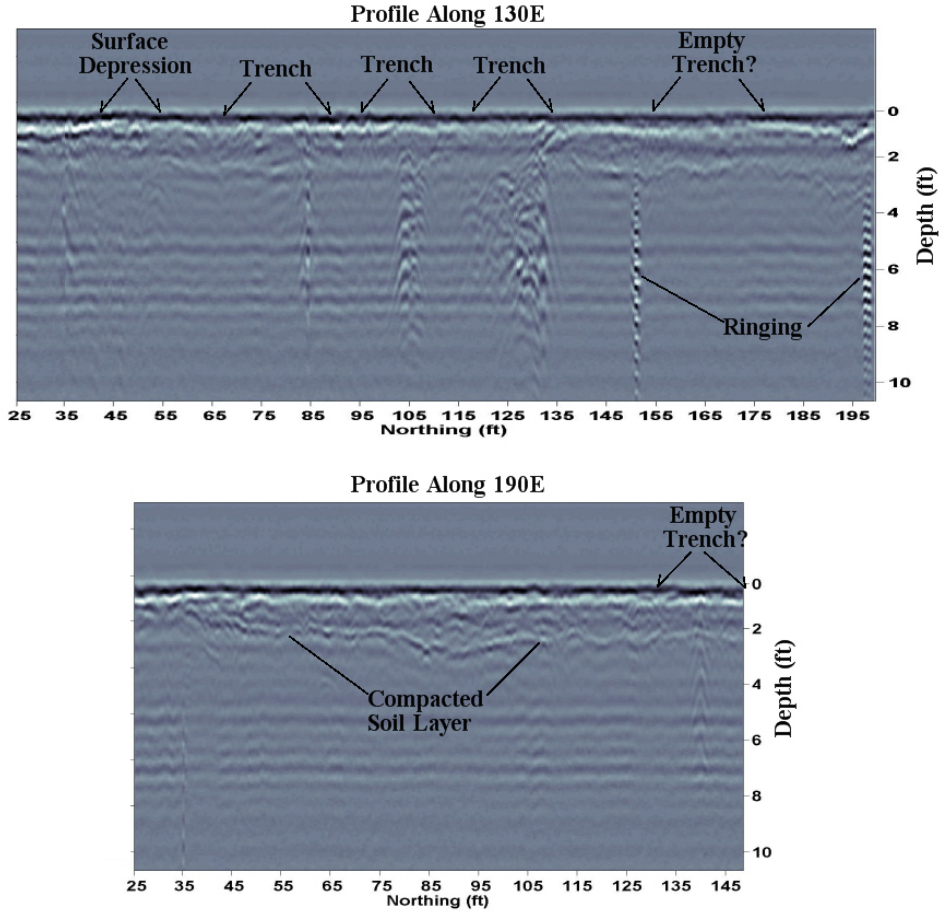


Figure 3. SWMU 36-001, MDA AA

Example GPR Profiles

25 0 25

(feet)

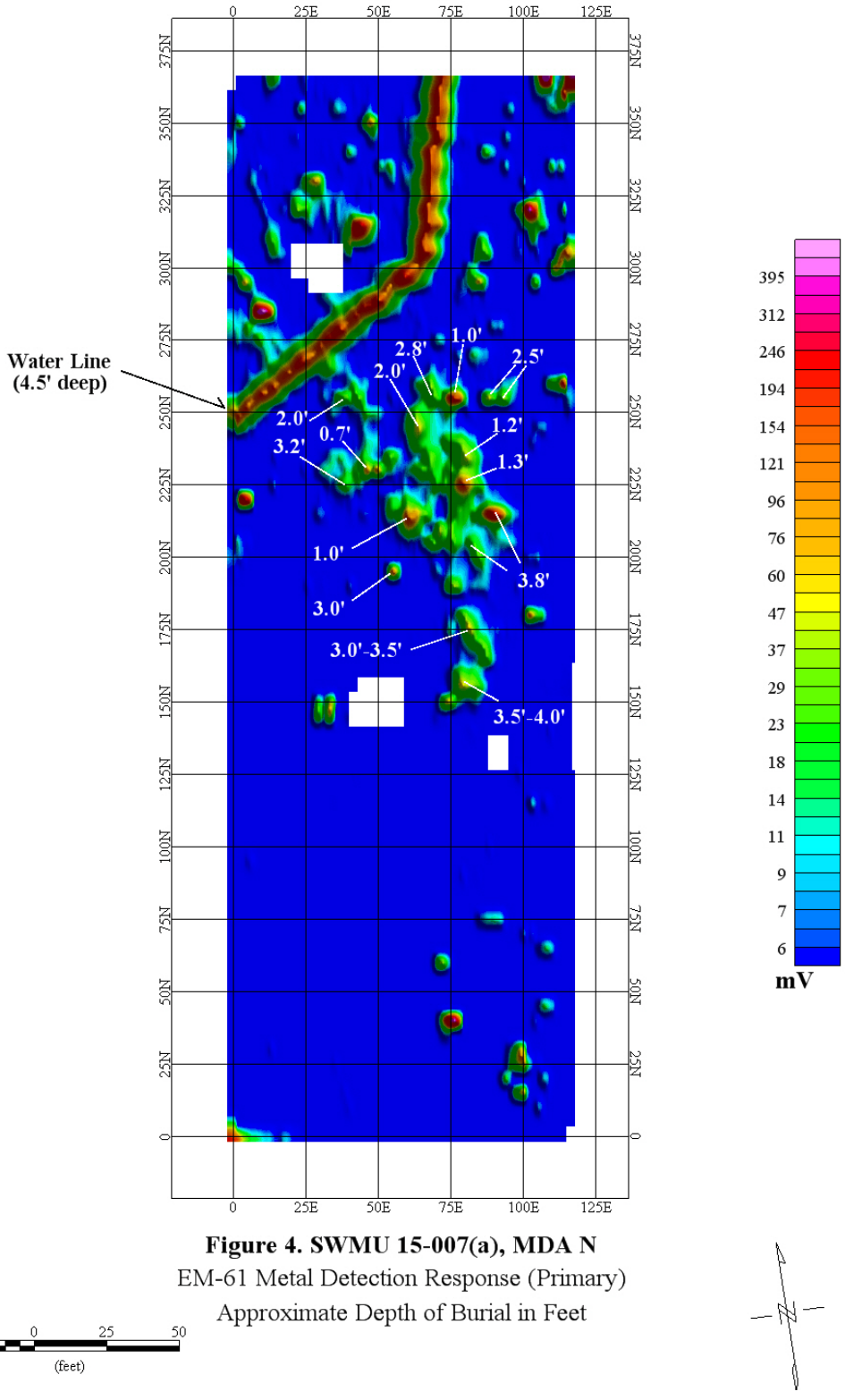


Figure 4. SWMU 15-007(a), MDA N

EM-61 Metal Detection Response (Primary)

Approximate Depth of Burial in Feet

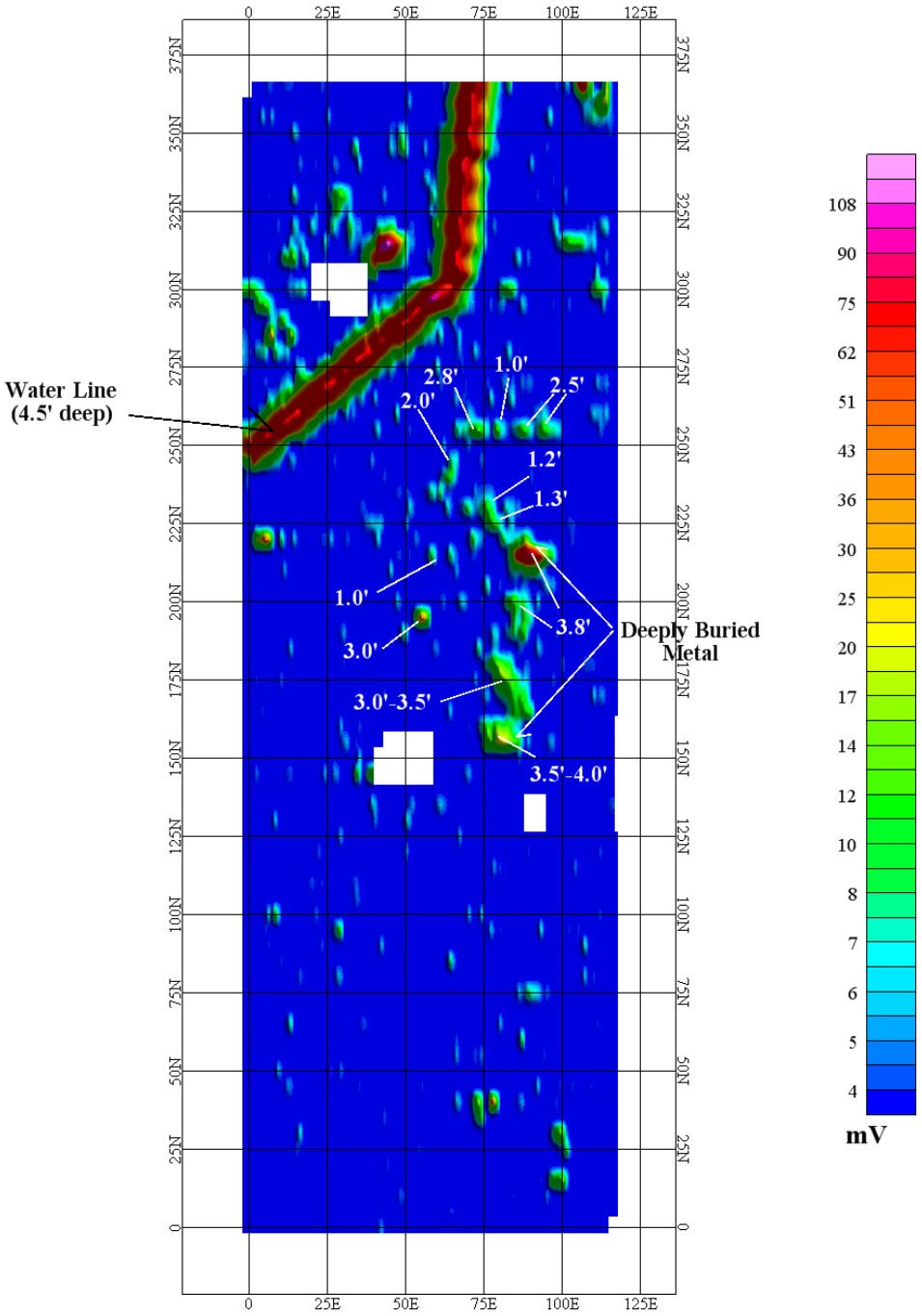


Figure 5. SWMU 15-007(a), MDA N

EM-61 Metal Detection Response (Difference)

Approximate Depth of Burial in Feet

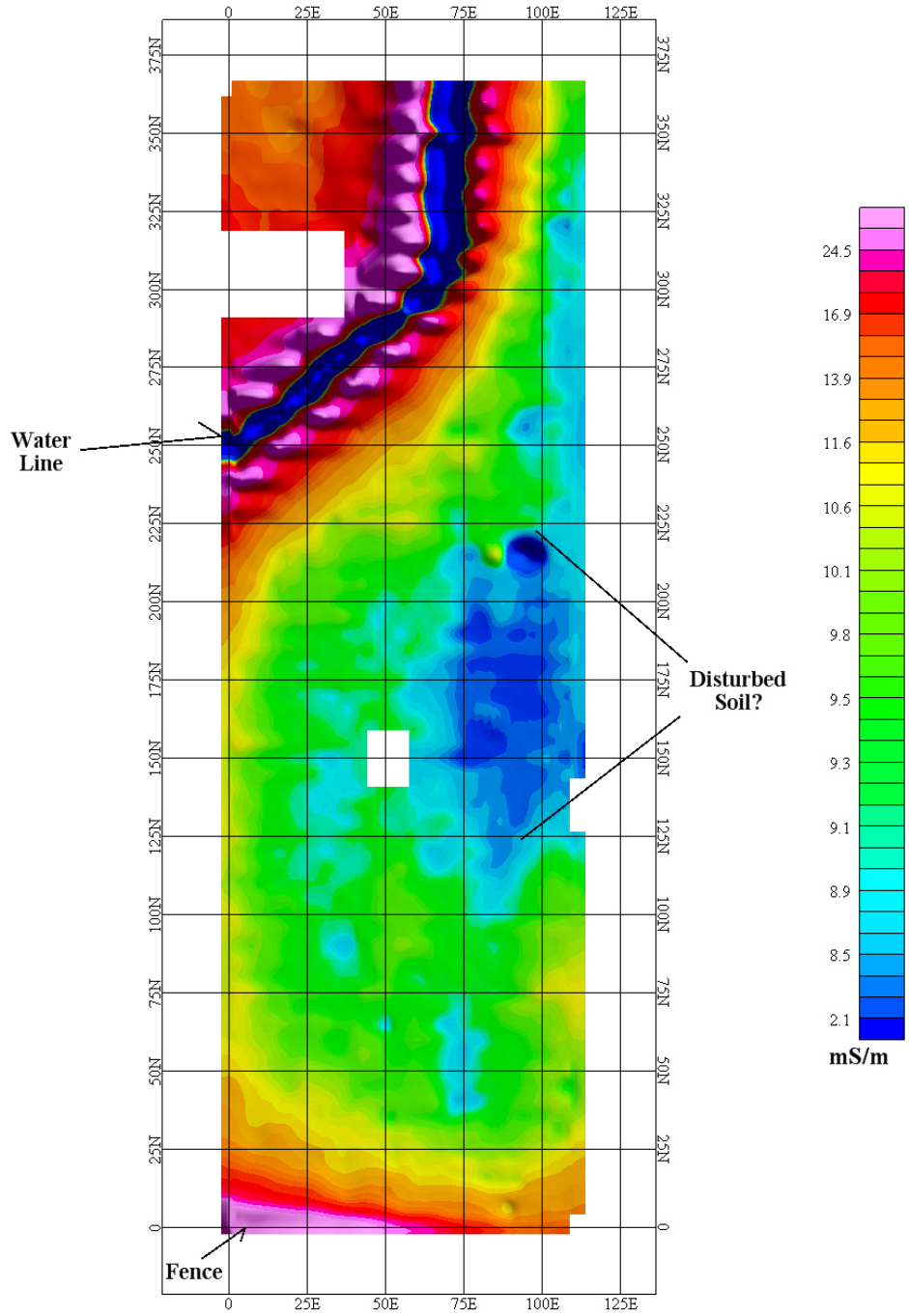


Figure 6. SWMU 15-007(a), MDA N

EM-31 Ground Conductivity

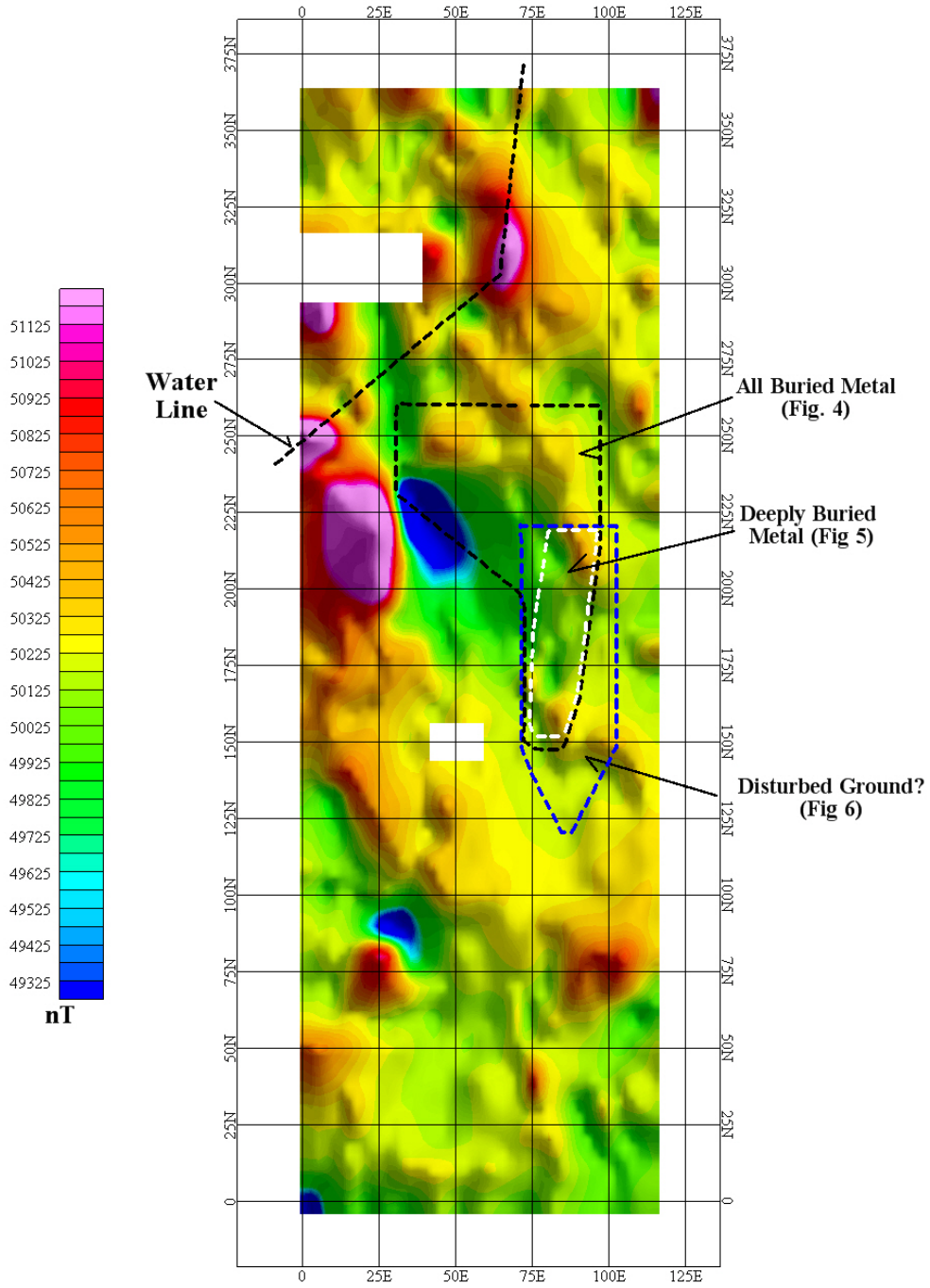


Figure 7. SWMU 15-007(a), MDA N

Magnetic Field Strength

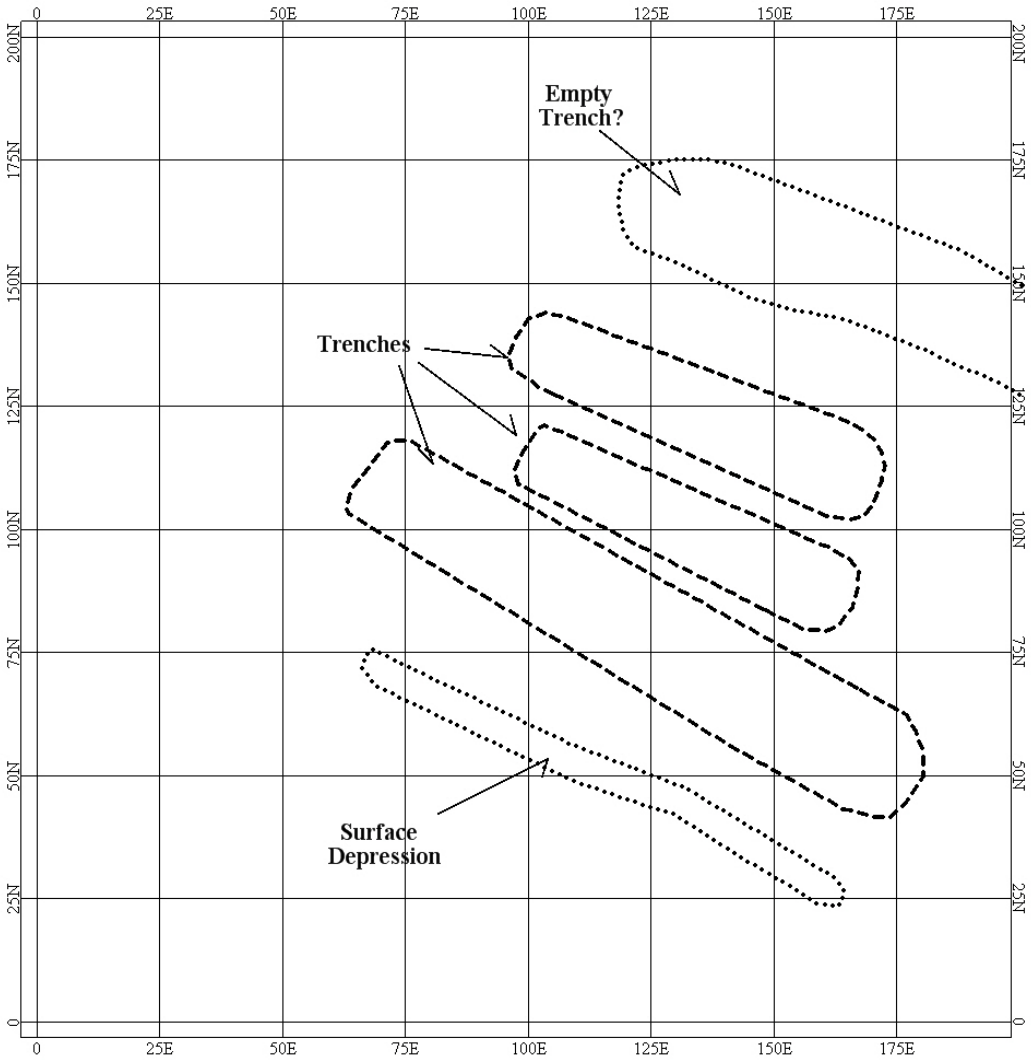


Figure 8. SWMU 36-001, MDA AA

Trench Interpretations

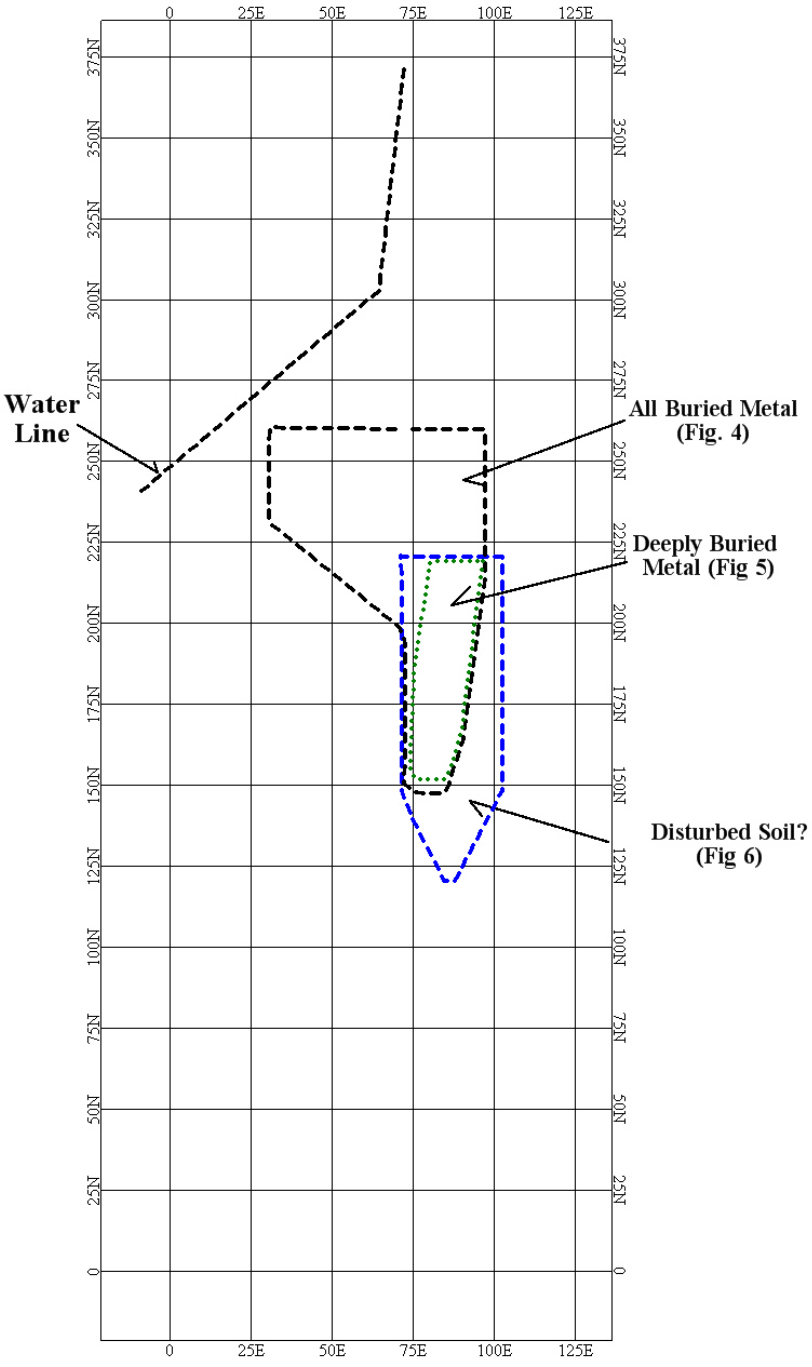
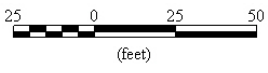
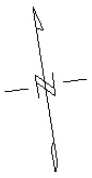


Figure 9. SWMU 15-007(a), MDA N
Interpretations





Appendix F

Analytical Program

F-1.0 INTRODUCTION

This appendix presents the analytical methods and discusses the data-assessment review for samples collected during investigations at the Potrillo and Fence Canyons Aggregate Area at Los Alamos National Laboratory (LANL or the Laboratory). Additionally, this appendix summarizes the effects of data-quality issues on the acceptability of the analytical data.

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 LANL's statements of work (SOWs) for analytical laboratory services (LANL 1995, 049738; LANL 2008, 109962). 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 (MSs), laboratory control samples (LCSs), internal standards (ISs), initial calibration verifications (ICVs) and continuing calibration verifications (CCVs), surrogates, and tracers.

The type and frequency of laboratory QC analyses are described in the SOWs for analytical services (LANL 1995, 049738; LANL 2008, 109962). Other QC factors, such as sample preservation and holding times, were also assessed in accordance with the requirements outlined in Standard Operating Procedure (SOP) 5056, Sample Containers and Preservation.

The following SOPs, available at eprr.lanl.gov, were used for data validation:

- SOP-5161, Routine Validation of Volatile Organic Compound (VOC) Analytical Data
- SOP-5162, Routine Validation of Semivolatile Organic Compound (SVOC) Analytical Data
- SOP-5163, Routine Validation of Organochlorine Pesticides (PEST) and Polychlorinated Biphenyls (PCBs) Analytical Data
- SOP-5164, Routine Validation of High Explosives (HE) Analytical Data
- SOP-5165, Routine Validation of Metals Analytical Data
- SOP-5166, Routine Validation of Gamma Spectroscopy Data, Chemical Separation Alpha Spectrometry, Gas Proportional Counting, and Liquid Scintillation Analytical Data
- SOP-5168, Routine Validation of LC/MS/MS High Explosive Analytical Data
- SOP-5169, Routine Validation of Dioxin Furan Analytical Data (EPA Method 1618 and SW-846 EPA Method 8290)
- SOP-5171, Routine Validation of Total Petroleum Hydrocarbons Gasoline Range Organics/Diesel Range Organics Analytical Data (Method 8015B)
- SOP-5191, Routine Validation of LC/MS/MS Perchlorate Analytical Data (SW-846 EPA Method 6850)

Routine data validation was performed for each data package (also referred to as request number), and analytical data were reviewed and evaluated based on U.S. Environmental Protection Agency (EPA) National Functional Guidelines, where applicable (EPA 1994, 048639; EPA 1999, 066649). As a result of the data validation and assessment efforts, qualifiers are assigned to the analytical records as appropriate. The data-qualifier definitions are provided in Appendix A. Sample collection logs (SCLs) and chain-of-custody (COC) forms are provided in Appendix G. The analytical data, instrument printouts, and data validation reports are provided in Appendix G.

F-2.0 ANALYTICAL DATA ORGANIZATION

The investigation of the Potrillo and Fence Canyons Aggregate Area consisted of 27 solid waste management units (SWMUs) and areas of concern (AOCs) within Technical Area 15 (TA-15) and TA-36: SWMUs 15-002, 15-007(a), 15-003; 15-006(a), 15-004(b), 15-004(c), 15-004(f), 15-008(a), 15-009(e), and 15-010(a) and AOCs 15-005(b), 15-006(e), 15-008(f), C-15-004, C-15-005, and C-15-006 at TA-15; and SWMUs 36-001, 36-003(b), 36-006, 36-004(d), and 36-005 and AOCs 36-004(a), 36-004(b), 36-004(c), 36-004(e), C-36-001, and C-36-006(e) at TA-36.

Current and historical data evaluated in this report were collected during Resource Conservation and Recovery Act facility investigations, other corrective actions, and recent investigations. All historical investigation samples were submitted to and analyzed by approved off-site laboratories. These data are determined to be of sufficient quality for decision-making purposes, have been reviewed, and have been revalidated to current QA standards.

F-3.0 INORGANIC CHEMICAL ANALYSES

TA-15

A total of 380 samples (241 soil/fill, 25 sediment, and 114 tuff), plus 33 field duplicates, collected within the Potrillo and Fence Canyons Aggregate Area at TA-15 were analyzed for inorganic chemicals. All 380 samples, plus 33 field duplicates, were analyzed for target analyte list (TAL) metals; 207 samples, plus 21 field duplicates, were analyzed for nitrate, perchlorate, and total cyanide; and 19 samples were analyzed for uranium.

TA-36

A total of 152 samples (99 soil/fill, 40 sediment, and 13 tuff), plus 12 field duplicates, collected within the Potrillo and Fence Canyons Aggregate Area at TA-36 were analyzed for inorganic chemicals. All 152 samples, plus 12 field duplicates, were analyzed for TAL metals; 122 samples, plus 11 field duplicates, were analyzed for nitrate; and 131 samples, plus 12 field duplicates, were analyzed for perchlorate and total cyanide.

The analytical methods used for inorganic chemicals are listed in Table F-1.0-1.

Tables in the investigation report summarize the samples collected and the analyses requested for each site within the Potrillo and Fence Canyons Aggregate Area. All decision-level analytical results are presented in Appendix G (on DVD).

F-3.1 Inorganic Chemical QA/QC Samples

The use of QA/QC samples is designed to provide measures of the accuracy and precision of the data. The results of the QA/QC analyses performed on a sample provide confidence about whether the analyte is present and whether the concentration reported is accurate. To assess the accuracy and precision of inorganic chemical analyses, LCSs, preparation blanks, MSs, laboratory duplicate samples, interference check samples (ICSs), and serial dilution samples were analyzed as part of the investigation. Each of these QA/QC sample types is defined in the analytical services SOWs (LANL 1995, 049738; LANL 2008, 109962) and is described briefly in the sections below.

The LCS serves as a monitor of the overall performance of each step during the analysis, including sample digestion. For inorganic chemicals in soil or tuff, LCS percent recoveries (%R) should fall within the control limits of 75%–125% (LANL 1995, 049738; LANL 2008, 109962).

The preparation blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as those used in the environmental sample processing; it is extracted and analyzed in the same manner as the corresponding environmental samples. Preparation blanks are used to measure bias and potential cross-contamination. All inorganic chemical results should be below the method detection limit (MDL).

MS samples assess the accuracy of inorganic chemical analyses. These samples are designed to provide information about the effect of the sample matrix on the sample preparation procedures and analytical technique. The MS acceptance criterion is 75%–125%, inclusive, for all spiked analytes (LANL 1995, 049738; LANL 2008, 109962).

Laboratory duplicate samples assess the precision of inorganic chemical analyses. All relative percent differences (RPDs) between the sample and laboratory duplicate should be ±35% for soil (LANL 1995, 049738; LANL 2008, 109962).

The ICSs assess the accuracy of the analytical laboratory's interelement and background correction factors used for inductively coupled plasma emission spectroscopy. The ICS %R should be within the acceptance range of 80%–120%. The QC acceptance limits are ±20%.

Serial dilution samples measure potential physical or chemical interferences and correspond to a sample dilution ratio of 1:5. The chemical concentration in the undiluted sample must be at least 50 times the MDL (100 times for inductively coupled plasma mass spectroscopy) for valid comparison. For sufficiently high concentrations, the RPD should be within 10%.

F-3.2 Data Quality Results for Inorganic Chemicals

The majority of the analytical results are qualified as not detected (U) because the analytes were not detected by the respective analytical methods. These data do not have any quality issues associated with the values presented.

F-3.2.1 Maintenance of COC

SCL/COC forms were properly maintained for all samples analyzed for inorganic chemicals (Appendix G).

F-3.2.2 Sample Documentation

All samples analyzed for inorganic chemicals were properly documented on SCL/COC forms in the field (Appendix G).

F-3.2.3 Sample Dilutions

Some samples were diluted for inorganic chemical analyses. No qualifiers were applied to any inorganic chemical sample results because of dilutions.

F-3.2.4 Sample Preservation

Preservation criteria were met for all samples analyzed for inorganic chemicals.

F-3.2.5 Holding Times

F-3.2.5.1 TA-15

Five perchlorate results were qualified as estimated not detected (UJ) because the extraction and/or analytical holding times were exceeded by less than 2 times the published method for holding times.

One perchlorate result was qualified as estimated and biased low (J-) because the extraction and/or analytical holding times were exceeded by less than 2 times the published method for holding times.

F-3.2.5.2 TA-36

One perchlorate result was qualified as estimated not detected (UJ) because the extraction and/or analytical holding times were exceeded by less than 2 times the published method for holding times.

Three perchlorate results were qualified as estimated and biased low (J-) because the extraction and/or analytical holding times were exceeded by less than 2 times the published method for holding times.

F-3.2.6 ICVs and CCVs

ICV and CCV criteria were met for all samples analyzed for inorganic chemicals.

F-3.2.7 Interference Check Sample and/or Serial Dilutions

ICS and/or serial dilution criteria were met for all samples analyzed for inorganic chemicals.

F-3.2.8 Laboratory Duplicate Samples

F-3.2.8.1 TA-15

A total of 204 TAL metals results were qualified as estimated (J) because the sample and the duplicate sample results were greater than or equal to 5 times the reporting limit (RL), and the duplicate RPD was greater than 35% for soil samples.

F-3.2.8.2 TA-36

A total of 67 TAL metals results were qualified as estimated (J) because the sample and the duplicate sample results were greater than or equal to 5 times the RL, and the duplicate RPD was greater than 35% for soil samples.

One TAL metals result was qualified as estimated (J) because the duplicate sample was not prepared and/or analyzed with the samples for unspecified reasons. The duplicate information is missing.

F-3.2.9 Blanks

F-3.2.9.1 TA-15

A total of 227 TAL metals results and 5 total cyanide results were qualified as not detected (U) because the sample results were less than or equal to 5 times the concentration of the related analytes in the method blank.

A total of 148 TAL metals results and 2 total cyanide results were qualified as not detected (U) because the sample results were less than or equal to the concentration of the related analytes in the initial calibration blank and/or continuing calibration blank.

A total of 128 TAL metals results were qualified as not detected (U) because the sample result was less than or equal to 5 times the concentration of the related analytes in the equipment or rinsate blank.

A total of 110 TAL metals results were qualified as estimated (J) because the sample results were greater than 5 times the concentration of the related analytes in the method blank.

F-3.2.9.2 TA-36

A total of 123 TAL metals results were qualified as not detected (U) because the sample results were less than or equal to 5 times the concentration of the related analytes in the method blank.

A total of 73 TAL metals results were qualified as not detected (U) because the sample results were less than or equal to the concentration of the related analytes in the initial calibration blank and/or continuing calibration blank.

A total of 68 TAL metals results were qualified as not detected (U) because the sample result was less than or equal to 5 times the concentration of the related analytes in the equipment or rinsate blank.

A total of 45 TAL metals results were qualified as estimated (J) because the sample results were greater than 5 times the concentration of the related analytes in the method blank.

F-3.2.10 MS Samples

F-3.2.10.1 TA-15

Four TAL metals results and seven total cyanide results were qualified as estimated not detected (UJ) because a low recovery (%R <75%) was observed for these analytes in the associated spike sample.

Two TAL metals results and 16 total cyanide results were qualified as estimated not detected (UJ) because a high recovery (%R >125%) was observed for these analytes in the associated spike sample.

A total of 181 TAL metals results were qualified as estimated and biased low (J-) because a low recovery (%R <75%) was observed for these analytes in the associated spike sample.

A total of 699 TAL metals results and 7 total cyanide results were qualified as estimated and biased high (J+) because a high recovery (%R >125%) was observed for these analytes in the associated spike sample.

F-3.2.10.2 TA-36

Two perchlorate results were qualified as estimated not detected (UJ) because the MS/MS duplicate (MSD) %R difference was greater than 20%.

Nine TAL metals results and eight perchlorate results were qualified as estimated not detected (UJ) because a low recovery (%R <75%) was observed for these analytes in the associated spike sample.

Three TAL metals results and 31 total cyanide results were qualified as estimated not detected (UJ) because a high recovery (%R >125%) was observed for these analytes in the associated spike sample.

A total of 63 TAL metals results were qualified as estimated and biased low (J-) because a low recovery (%R <75%) was observed for these analytes in the associated spike sample.

Two perchlorate results were qualified as estimated (J) because the MS/MSD %R difference was greater than 20%.

One perchlorate result was qualified as estimated (J) because a low recovery (%R <75%) was observed for this analyte in the associated spike sample.

A total of 402 TAL metals results were qualified as estimated and biased high (J+) because a high recovery (%R >125%) was observed for these analytes in the associated spike sample.

F-3.2.11 LCS Recoveries

F-3.2.11.1 TA-15

Eight TAL metals results were qualified as estimated not detected (UJ) because a low recovery (%R <75%) was observed for these analytes in the associated LCS.

One total cyanide result was qualified as estimated and biased high (J+) because a high recovery (%R >125%) was observed for this analyte in the associated LCS.

F-3.2.11.2 TA-36

A total of 24 TAL metals results were qualified as estimated not detected (UJ) because a low recovery (%R <75%) was observed for these analytes in the associated LCS.

Two TAL metals results were qualified as estimated and biased low (J-) because a low recovery (%R <75%) was observed for these analytes in the associated LCS.

Two TAL metals results and two total cyanide results were qualified as estimated and biased high (J+) because a high recovery (%R > 125%) was observed for these analytes in the associated LCS.

F-3.2.12 Detection Limits

F-3.2.12.1 TA-15

A total of 118 TAL metals results were qualified as estimated (J) because the sample result was reported as detected between the estimated detection limit (EDL) and the MDL.

A total of 608 TAL metals results, 71 nitrate results, 36 perchlorate results, and 8 total cyanide results were qualified as estimated (J) because the sample result was reported as detected between the practical quantitation limit (PQL) and the MDL.

F-3.2.12.2 TA-36

A total of 35 TAL metals results were qualified as estimated (J) because the sample result was reported as detected between the EDL and the MDL.

A total of 221 TAL metals results, 18 nitrate results, 8 perchlorate results, and 6 total cyanide results were qualified as estimated (J) because the sample result was reported as detected between the PQL and the MDL.

F-3.2.13 Rejected Results

F-3.2.13.1 TA-15

Eight perchlorate results were qualified as rejected (R) because ion abundance ratios did not meet specifications.

F-3.2.13.2 TA-36

One perchlorate result was qualified as rejected (R) because ion abundance ratios did not meet specifications.

One mercury result was qualified as rejected (R) because the extraction and/or analytical holding times were exceeded by greater than 2 times the published method for holding times.

The rejected data were not used to determine the nature and extent of contamination. However, sufficient data of good quality were available to characterize the sites. The results of other qualified data were used as reported and do not affect the usability of the sampling results.

F-4.0 ORGANIC CHEMICAL ANALYSES

TA-15

A total of 361 samples (222 soil/fill, 25 sediment, and 114 tuff), plus 33 field duplicates, collected within the Potrillo and Fence Canyons Aggregate Area at TA-15 were analyzed for organic chemicals. A total of 357 samples plus 32 field duplicates were analyzed for high explosives (HE) or explosive compounds; 48 samples, plus 3 field duplicates, were analyzed for dioxin/furans; 46 samples, plus 3 field duplicates, were analyzed for polychlorinated biphenyls (PCBs); 205 samples, plus 21 field duplicates, were analyzed for semivolatile organic compounds (SVOCs); 30 samples, plus 3 field duplicates, were analyzed for total petroleum hydrocarbon (TPH) diesel range organics (DRO) and TPH-gasoline range organics (GRO); and 201 samples, plus 21 field duplicates, were analyzed for volatile organic compounds (VOCs). All QC procedures were followed as required by the analytical services SOWs (LANL 1995, 049738; LANL 2008, 109962).

TA-36

A total of 152 samples (99 soil/fill, 40 sediment, and 13 tuff) plus 12 field duplicates collected within the Potrillo and Fence Canyons Aggregate Area at TA-36 were analyzed for organic chemicals. A total of 148 samples plus 12 field duplicates, were analyzed for HE or explosive compounds; 32 samples, plus 2 field duplicates were analyzed for dioxin/furans; 34 samples, plus 2 field duplicates, were analyzed for PCBs; 146 samples plus 11 field duplicates were analyzed for SVOCs; and 146 samples plus 11 field duplicates, were analyzed for VOCs. All QC procedures were followed as required by the analytical services SOWs (LANL 1995, 049738; LANL 2008, 109962).

The analytical methods used for organic chemicals are listed in Table F-1.0-1.

Tables within the supplemental investigation report summarize samples collected and the analyses requested from the Potrillo and Fence Canyons Aggregate Area sites. All decision-level analytical results are provided on DVD in Appendix G.

F-4.1 Organic Chemical QA/QC Samples

The use of QA/QC samples is designed to provide measures of the accuracy and precision of the data. The results of the QA/QC analyses performed on a sample provide confidence about whether the analyte is present and whether the concentration reported is accurate. Calibration verifications, LCSs, method blanks, MSs, surrogates, and ISs were analyzed to assess the accuracy and precision of organic chemical analyses. Each of these QA/QC sample types is defined in the analytical services SOWs (LANL 1995, 049738; LANL 2008, 109962) and described briefly below.

Calibration verification is the establishment of a quantitative relationship between the response of the analytical procedure and the concentration of the target analyte. There are two aspects of calibration verification: initial and continuing. The initial calibration verifies the accuracy of the calibration curve as well as the individual calibration standards used to perform the calibration. The continuing calibration ensures that the initial calibration is still holding and is correct as the instrument is used to process samples. The continuing calibration also serves to determine that analyte identification criteria such as retention times and spectral matching are being met (LANL 1995, 049738; LANL 2008, 109962).

The LCS is a sample of a known matrix that has been spiked with compounds that are representative of the target analytes, and it serves as a monitor of overall performance on a “controlled” sample. The LCS is the primary demonstration, on a daily basis, of the ability to analyze samples with good qualitative and quantitative accuracy. The LCS recoveries should within the method-specific acceptance criteria (LANL 1995, 049738; LANL 2008, 109962).

A method blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as those used in the environmental sample processing; it is extracted and analyzed in the same manner as the corresponding environmental samples. Method blanks are used to assess the potential for sample contamination during extraction and analysis. All target analytes should be below the contract-required detection limit in the method blank (LANL 1995, 049738; LANL 2008, 109962).

MS samples are used to measure the ability to recover prescribed analytes from a native sample matrix and consist of aliquots of the submitted samples spiked with a known concentration of the target analyte(s). Spiking typically occurs before sample preparation and analysis. The spike sample recoveries should be between the lower acceptance limit (LAL) and upper acceptance limit (UAL) (LANL 1995, 049738; LANL 2008, 109962).

A surrogate compound (surrogate) is an organic compound used in the analyses of target analytes that is similar in composition and behavior to the target analytes but is not normally found in environmental samples. Surrogates are added to every blank, sample, and spike to evaluate the efficiency with which analytes are recovered during extraction and analysis. The recovery percentage of the surrogates must be within specified ranges or the sample may be rejected or assigned a qualifier (LANL 1995, 049738; LANL 2008, 109962).

ISs are chemical compounds added to every blank, sample, and standard extract at a known concentration. They are used to compensate for (1) analyte concentration changes that might occur during storage of the extract and (2) quantitation variations that can occur during analysis. ISs are used as the basis for quantitation of target analytes. The %R for ISs should be within the range of 50%–200% (LANL 1995, 049738; LANL 2008, 109962).

F-4.2 Data Quality Results for Organic Chemicals

The majority of the analytical results are qualified as not detected (U) because the analytes were not detected by the respective analytical methods. These data do not have any quality issues associated with the values presented.

TA-15

One SVOC result was qualified as not detected (U) because the mass spectra did not meet specifications.

A total of 12 dioxin/furan results were qualified as not detected (U) because the project chemist identified quality deficiencies in the reported data that require further qualification.

TA-36

One dioxin/furan result was qualified as not detected (U) because 2,3,7,8-tetraclorodibenzofuran was detected in a sample, and the result was not confirmed on a second column with successful analysis of the gas chromatography (GC) column performance mix.

A total of 24 dioxin/furan results were qualified as not detected (U) because the project chemist identified quality deficiencies in the reported data that require further qualification.

Two dioxin/furan results were qualified as estimated not detected (UJ) because the project chemist identified quality deficiencies in the reported data that require further qualification.

F-4.2.1 Maintenance of COC

SCL/COC forms were maintained properly for all samples analyzed for organic chemicals (Appendix G).

F-4.2.2 Sample Documentation

All samples analyzed for organic chemicals were properly documented on the SCL in the field (Appendix G).

F-4.2.3 Sample Dilutions

Some samples were diluted for organic chemical analyses. No qualifiers were applied to any organic chemical sample results because of dilutions.

F-4.2.4 Sample Preservation

Preservation criteria were met for all samples analyzed for organic chemicals.

F-4.2.5 Holding Times

F-4.2.5.1 TA-15

A total of 3017 SVOC results and 58 VOC results were qualified as estimated not detected (UJ) because the extraction holding time was exceeded by less than 2 times the published method for holding times.

A total of 19 SVOC results were qualified as estimated and biased low (J-) because the extraction holding time was exceeded by less than 2 times the published method for holding times.

F-4.2.5.2 TA-36

A total of 84 HE or explosive compounds results and 814 SVOC results were qualified as estimated not detected (UJ) because the extraction holding time was exceeded by less than 2 times the published method for holding times.

A total of 20 SVOC results were qualified as estimated and biased low (J-) because the extraction holding time was exceeded by less than 2 times the published method for holding times.

F-4.2.6 ICVs and CCVs

F-4.2.6.1 TA-15

A total of 10 HE or explosive compounds results, 31 PCB results, 6 SVOC results, and 125 VOC results were qualified as estimated not detected (UJ) because the ICV and/or CCV were recovered outside the method-specific limits.

A total of 1102 HE or explosive compounds results and 71 VOC results were qualified as estimated not detected (UJ) because the affected analytes were analyzed with a relative response factor (RRF) of less than 0.05 in the ICV and/or CCV.

A total of 185 SVOC results and 5 VOC results were qualified as estimated not detected (UJ) because the affected analytes were analyzed with an initial calibration curve that exceeded the percent relative standard deviation (%RSD) criteria and/or the associated multipoint calibration correlation coefficient was less than 0.995.

Three SVOC results were qualified as estimated (J) because the affected analytes were analyzed with an initial calibration curve that exceeded the %RSD criteria and/or the associated multipoint calibration correlation coefficient was less than 0.995.

One PCB result was qualified as estimated (J) because the ICV and/or CCV were recovered outside the method-specific limits.

F-4.2.6.2 TA-36

A total of 407 HE or explosive compounds results and 51 VOC results were qualified as estimated not detected (UJ) because the affected analytes were analyzed with a RRF of less than 0.05 in the ICV and/or CCV.

A total of 55 SVOC results and 38 VOC results were qualified as estimated not detected (UJ) because the affected analytes were analyzed with an initial calibration curve that exceeded the %RSD criteria and/or the associated multipoint calibration correlation coefficient was <0.995.

Three PCB results, 36 SVOC results, and 209 VOC results were qualified as estimated not detected (UJ) because the ICV and/or CCV were recovered outside the method-specific limits.

One SVOC result was qualified as estimated (J) because the affected analyte was analyzed with an initial calibration curve that exceeded the %RSD criteria and/or the associated multipoint calibration correlation coefficient was <0.995.

A total of nine HE or explosive compounds results were qualified as estimated (J) because the ICV and/or CCV were recovered outside the method-specific limits.

One VOC result was qualified as estimated (J) because the affected analytes were analyzed with a RRF of less than 0.05 in the ICV and/or CCV.

F-4.2.7 Surrogate Recoveries

F-4.2.7.1 TA-15

Five VOC results were qualified as estimated and biased high (J+) because the surrogate %R value was greater than the UAL, indicating a potential for a high bias in the results and a potential for false positive results.

F-4.2.7.2 TA-36

A total of 13 VOC results were qualified as estimated and biased high (J+) because the surrogate %R value was greater than the UAL, indicating a potential for a high bias in the results and a potential for false positive results.

F-4.2.8 IS Responses

F-4.2.8.1 TA-15

The IS response criteria were met for all samples analyzed for organic chemicals.

F-4.2.8.2 TA-36

A total of 304 VOC results were qualified as estimated not detected (UJ) because the associated IS counts were less than 50% but greater than 10% of the previous calibration standard.

F-4.2.9 Method Blanks

F-4.2.9.1 TA-15

A total of 95 dioxin/furan results, 2 SVOC results, and 123 VOC results were qualified as not detected (U) because the associated sample concentration was less than 5 times (10 times for common laboratory contaminants) the concentration of the related analytes in the method blank.

A total of 110 VOC results were qualified as not detected (U) because the sample results were less than or equal to 5 times (10 times for common laboratory contaminants) the concentration of the related analytes in the trip, rinsate, or equipment blank.

A total of 10 dioxin/furan results were qualified as estimated (J) because the sample results were greater than 5 times (10 times for common laboratory contaminants) the concentration of the related analytes in the method blank.

F-4.2.9.2 TA-36

A total of 44 dioxin/furan results, 3 SVOC results, and 101 VOC results were qualified as not detected (U) because the associated sample concentration was less than 5 times (10 times for common laboratory contaminants) the concentration of the related analytes in the method blank.

A total of 43 VOC results were qualified as not detected (U) because the sample results were less than or equal to 5 times (10 times for common laboratory contaminants) the concentration of the related analyte in the trip, rinsate, or equipment blank.

Nine dioxin/furan results were qualified as estimated (J) because the sample results were greater than 5 times (10 times for common laboratory contaminants) the concentration of the related analytes in the method blank.

F-4.2.10 MS Samples

F-4.2.10.1 TA-15

A total of 214 HE or explosive compounds results were qualified as estimated not detected (UJ) because the MS/MSD %R difference was greater than 30%.

A total of 16 HE or explosive compounds results, 14 TPH-DRO results, and 15 TPH-GRO results were qualified as estimated not detected (UJ) because a low recovery (%R <70%) was observed for these analytes in the associated spike sample.

Three HE or explosive compounds results and one TPH-DRO result were qualified as estimated (J) because a low recovery (%R <70%) was observed for these analytes in the associated spike sample.

F-4.2.10.2 TA-36

A total of 54 HE or explosive compounds results were qualified as estimated not detected (UJ) because the MS/MSD %R difference was greater than 30%.

Three HE or explosive compounds results were qualified as estimated not detected (UJ) because a low recovery (%R <70%) was observed for these analytes in the associated spike sample.

One dioxin/furan result was qualified as estimated (J) because a low recovery (%R <70%) was observed for this analyte in the associated spike sample.

Three dioxin/furan results and three HE or explosive compounds results were qualified as estimated and biased high (J+) because the MS/MSD %R was greater than 130%.

F-4.2.11 Laboratory Duplicate Samples

Laboratory duplicates collected for organic chemical analyses indicated acceptable precision for all samples.

F-4.2.12 LCS Recoveries

F-4.2.12.1 TA-15

Four HE or explosive compounds results and 22 VOC results were qualified as estimated not detected (UJ) because the LCS %R was less than the LAL but greater than 10%.

F-4.2.12.2 TA-36

LCS criteria were met for all samples analyzed for organic chemicals.

F-4.2.13 PQLs and MDLs

F-4.2.13.1 TA-15

A total of 143 dioxin/furan results, 21 HE or explosive compounds results, 1 PCB result, 118 SVOC results, 3 TPH-DRO results, and 40 VOC results were qualified as estimated (J) because the sample result was reported as detected between the PQL and the MDL.

F-4.2.13.2 TA-36

A total of 141 dioxin/furan results, 8 HE or explosive compounds results, 4 PCB results, 72 SVOC results, and 38 VOC results were qualified as estimated (J) because the sample result was reported as detected between the PQL and the MDL.

F-4.2.14 Rejected Data

F-4.2.14.1 TA-15

A total of 138 HE or explosive compounds results and 11 VOC results were qualified as rejected (R) because the IS retention time shifted by more than 30 s.

Nine HE or explosive compounds results were qualified as rejected (R) because the ICV and/or CCV were recovered outside the method limits.

F-4.2.14.2 TA-36

One dioxin/furan result and four HE or explosive compounds results were qualified as rejected (R) because the MS/MSD %R was less than 10%.

One VOC result was qualified as rejected (R) because the surrogate recovery was <10%, which indicates the potential for a severely low bias in the results.

Two VOC results were qualified as rejected (R) because the quantitating IS area count was <10% of the expected value.

Four HE or explosive compounds results were qualified as rejected (R) because the required method blank information was missing.

The rejected data were not used to characterize the nature and extent of contamination. However, sufficient data of good quality were available to characterize the sites. The results of other qualified data were used as reported and do not affect the usability of the sampling results.

F-5.0 RADIONUCLIDE ANALYSES

TA-15

A total of 356 samples (223 soil/fill, 25 sediment, and 108 tuff), plus 30 field duplicates, collected within the Potrillo and Fence Canyons Aggregate Area at TA-15 were analyzed for radionuclides. A total of 42 samples plus 4 field duplicates were analyzed for americium-241; 91 samples plus 7 field duplicates were analyzed for gamma-emitting radionuclides; 30 samples plus 3 field duplicates were analyzed for isotopic plutonium; 74 samples plus 7 field duplicates were analyzed for isotopic thorium; and 337 samples plus 30 field duplicates were analyzed for isotopic uranium.

TA-36

A total of 146 samples (93 soil/fill, 40 sediment, and 13 tuff), plus 12 field duplicates, collected within the Potrillo and Fence Canyons Aggregate Area at TA-36 were analyzed for radionuclides. A total of 22 samples plus 2 field duplicates were analyzed for americium-241; 86 samples plus 8 field duplicates were analyzed for gamma-emitting radionuclides; 22 samples plus 2 field duplicates were analyzed for gross-alpha- and beta-emitting radionuclides; 22 samples plus 2 field duplicates were analyzed for strontium-90; 22 samples plus 2 field duplicates were analyzed for tritium; 22 samples plus 2 field duplicates were analyzed for isotopic plutonium; 22 samples plus 2 field duplicates were analyzed for isotopic thorium; and 142 samples plus 12 field duplicates were analyzed for isotopic uranium.

The analytical methods used for radionuclides are listed in Table F-1.0-1.

Tables in the investigation report summarize all samples collected and analyses requested from the Potrillo and Fence Canyons Aggregate Area sites. All decision-level analytical results are provided on DVD (Appendix G).

F-5.1 Radionuclide QA/QC Samples

All procedures were followed as required by the analytical services SOWs (LANL 1995, 049738; LANL 2008, 109962). 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 qualified as not detected (U) because the associated sample concentration was less than or equal to 3 times the total propagated uncertainty (TPU). This data qualification is related to detection status only, not to the quality of the data.

To assess the accuracy and precision of radionuclide analyses, LCSs, method blanks, MS samples, laboratory duplicate samples, and tracers were analyzed as part of the investigations. Each of these QA/QC sample types is defined in the analytical services SOWs (LANL 1995, 049738; LANL 2008, 109962) and is described briefly below.

The LCS serves as a monitor of the overall performance of each step during the analysis, including sample digestion. For radionuclides in soil or tuff, LCS %R should fall between the control limits of 80%–120% (LANL 1995, 049738; LANL 2008, 109962).

A method blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as those used in the environmental sample processing; it is analyzed in the same manner as the corresponding environmental samples. Method blanks are used to assess the potential for sample contamination during analysis. All radionuclide results should be below the MDC (LANL 1995, 049738; LANL 2008, 109962).

MS samples assess the accuracy of radionuclide analyses. These samples are designed to provide information about the effect of the sample matrix on the sample preparation procedures and analytical technique. The MS acceptance criterion is 75%–125% (LANL 1995, 049738; LANL 2008, 109962).

Tracers are radioisotopes added to a sample for the purposes of monitoring losses of the target analyte. The tracer is assumed to behave in the same manner as the target analytes. The tracer recoveries should fall between the LAL and UAL (LANL 1995, 049738; LANL 2008, 109962).

Laboratory duplicate samples assess the precision of radionuclide analyses. All RPDs between the sample and laboratory duplicate should be ±35% for soil (LANL 1995, 049738; LANL 2008, 109962).

F-5.2 Data Quality Results for Radionuclides

TA-15

Six isotopic uranium results were qualified as estimated (J) because the project chemist identified quality deficiencies in the reported data that require further qualification.

F-5.2.1 Maintenance of COC

SCL/COC forms were maintained properly for all samples (Appendix G).

F-5.2.2 Sample Documentation

All samples were properly documented on the SCL/COC forms in the field (Appendix G).

F-5.2.3 Sample Dilutions

Some samples were diluted for radionuclide analyses. No qualifiers were applied to any radionuclide sample results because of dilutions.

F-5.2.4 Sample Preservation

Preservation criteria were met for all samples analyzed for radionuclides.

F-5.2.5 Holding Times

Holding-time criteria were met for all samples analyzed for radionuclides.

F-5.2.6 Method Blanks

Results for samples analyzed for radionuclides were not qualified because of blank contamination.

F-5.2.7 MS Samples

F-5.2.7.1 TA-15

MS criteria were met for all samples analyzed for radionuclides.

F-5.2.7.2 TA-36

Ten gross-alpha results were qualified as estimated and biased low (J-) because the associated MS recovery was less than 10%.

F-5.2.8 Tracer Recoveries

F-5.2.8.1 TA-15

Six isotopic uranium results were qualified as estimated and biased high (J+) because the tracer %R was greater than the UAL.

F-5.2.8.2 TA-36

Three isotopic uranium results were qualified as estimated and biased high (J+) because the tracer %R was greater than the UAL.

F-5.2.9 LCS Recoveries

LCS recovery criteria were met for all samples analyzed for radionuclides.

F-5.2.10 Laboratory Duplicate Sample Recoveries

F-5.2.10.1 TA-15

A total of 53 isotopic uranium results were qualified as estimated (J) because the associated duplicate sample had a duplicate error ratio or a relative error ratio greater than the analytical laboratory's acceptance limits.

A total of 48 isotopic uranium results were qualified as estimated (J) because the duplicate sample was not prepared and/or analyzed with the samples for unspecified reasons and the duplicate information is missing.

F-5.2.10.2 TA-36

Laboratory duplicate sample recovery criteria were met for all samples analyzed for radionuclides.

F-5.2.11 Rejected Data

F-5.2.11.1 TA-15

A total of 18 isotopic uranium results were qualified as rejected (R) because the MDC or TPU documentation was missing.

F-5.2.11.2 TA-36

No results for samples analyzed for radionuclides were qualified as rejected (R).

The rejected data were not used to determine the nature and extent of contamination. However, sufficient data of good quality were available to characterize the sites. The results of other qualified data were used as reported and do not affect the usability of the sampling results.

F-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 or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH 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.

EPA (U.S. Environmental Protection Agency), February 1994. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," EPA-540/R-94/013, Office of Emergency and Remedial Response, Washington, D.C. (EPA 1994, 048639)

EPA (U.S. Environmental Protection Agency), October 1999. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," EPA540/R-99/008, Office of Emergency and Remedial Response, Washington, D.C. (EPA 1999, 066649)

LANL (Los Alamos National Laboratory), July 1995. "Statement of Work (Formerly Called "Requirements Document") - Analytical Support, (RFP number 9-XS1-Q4257), (Revision 2 - July, 1995)," Los Alamos National Laboratory, 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), June 30, 2008. "Exhibit "D" Scope of Work and Technical Specifications, Analytical Laboratory Services for General Inorganic, Organic, Radiochemical, Asbestos, Low-Level Tritium, Particle Analysis, Bioassay, Dissolved Organic Carbon Fractionation, and PCB Congeners," Los Alamos National Laboratory document RFP No. 63639-RFP-08, Los Alamos, New Mexico. (LANL 2008, 109962)

Table F-1.0-1
Inorganic Chemical, Organic Chemical, and Radionuclide Analytical Methods for Samples Collected in the Potrillo and Fence Canyons Aggregate Area

Analytical Method	Analytical Description	Analytical Suite
EPA 300.0	Ion chromatography	Anions (nitrate)
EPA 905.0	Gas proportional counting	Strontium-90
EPA SW-846: 6010/1610A/6010B	Inductively coupled plasma emission spectroscopy—atomic emission spectroscopy	Aluminum, antimony, arsenic, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, uranium, vanadium, and zinc (TAL metals)
EPA SW-846:6020	Inductively coupled plasma mass spectrometry	Aluminum, antimony, arsenic, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc (TAL metals)
EPA SW-846: 9012A	Automated colorimetric/offline distillation	Total cyanide
EPA SW-846:6850	Liquid chromatography–mass spectrometry	Perchlorate
EPA SW-846:7470A	Cold vapor atomic absorption (CVAA)	Mercury
EPA SW-846:7471	CVAA	Mercury
EPA SW-846:7471A	CVAA	Mercury
EPA SW-846 8015B	GC/flame ionization detection	TPH-DRO, TPH-GRO
EPA SW-846: 8082	GC	PCBs
EPA SW-846: 8260 and 8260B	GC-mass spectrometry (GC/MS)	VOCs
EPA SW-846: 8270 and 8270C	GC/MS	SVOCs
EPA SW-846: 8321A and 8330	High-performance liquid chromatography	Explosive compounds, nitroaromatics and nitramines
EPA Method 1618 and SW-846 EPA Method 8290	High-resolution gas chromatography/high-resolution mass spectrometry	Dioxins/furans
Generic: Gamma spectroscopy, EPA Methods 900.0, and 901.1	Gamma spectroscopy	Cesium-134, cesium-137, cobalt-60, sodium-22
Generic: KPA	Kinetic phosphorescence	Uranium
HASL Method 300	Chemical separation alpha spectrometry	Isotopic uranium, isotopic thorium, isotopic plutonium, americium-241
EPA Method: 906.0	Liquid scintillation	Tritium

Appendix G

Analytical Suites and Results and Analytical Reports
(on DVDs included with this document)

Appendix H

Box Plots and Statistical Results

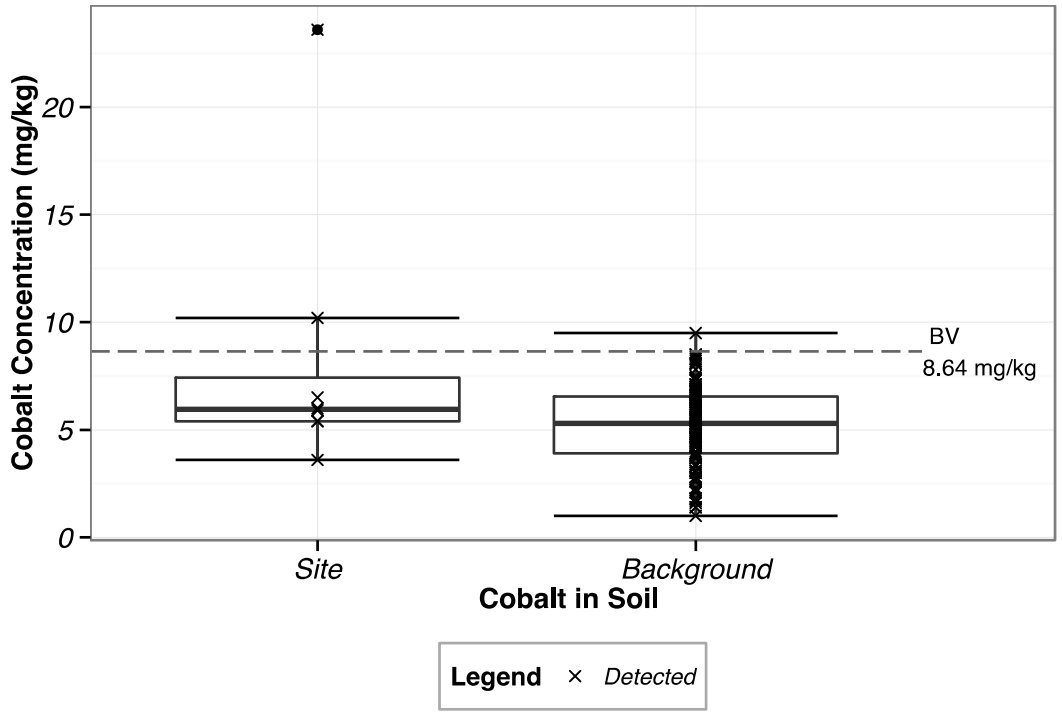


Figure H-1 Box plots for cobalt in soil at SWMU 15-002 former north burn pit

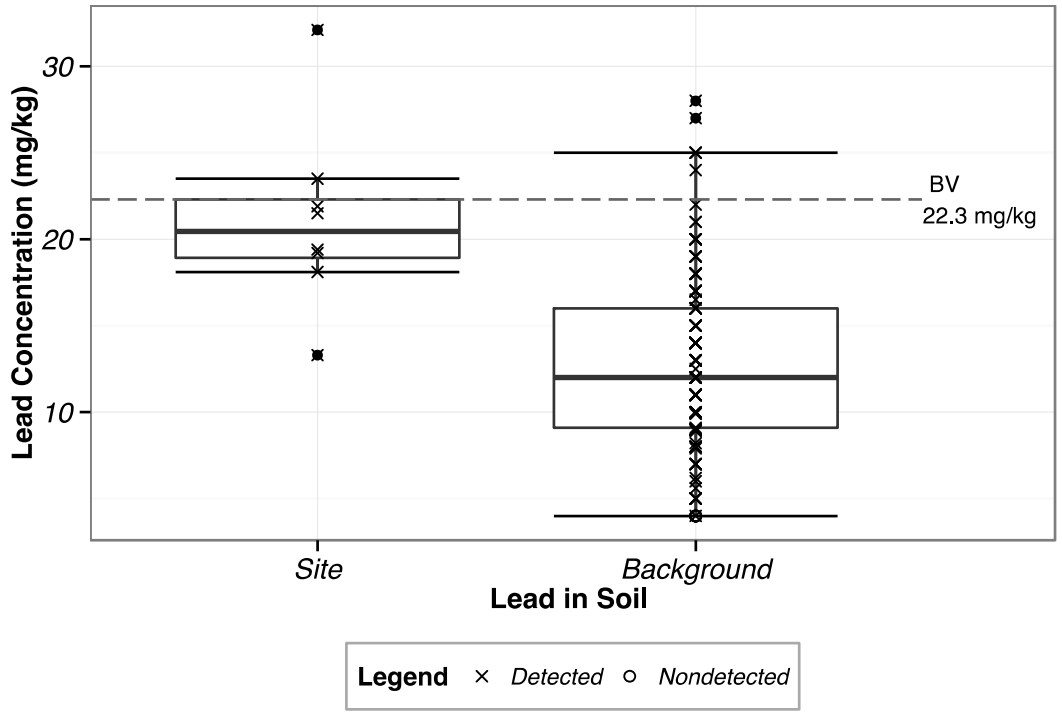


Figure H-2 Box plots for lead in soil at SWMU 15-002 former north burn pit

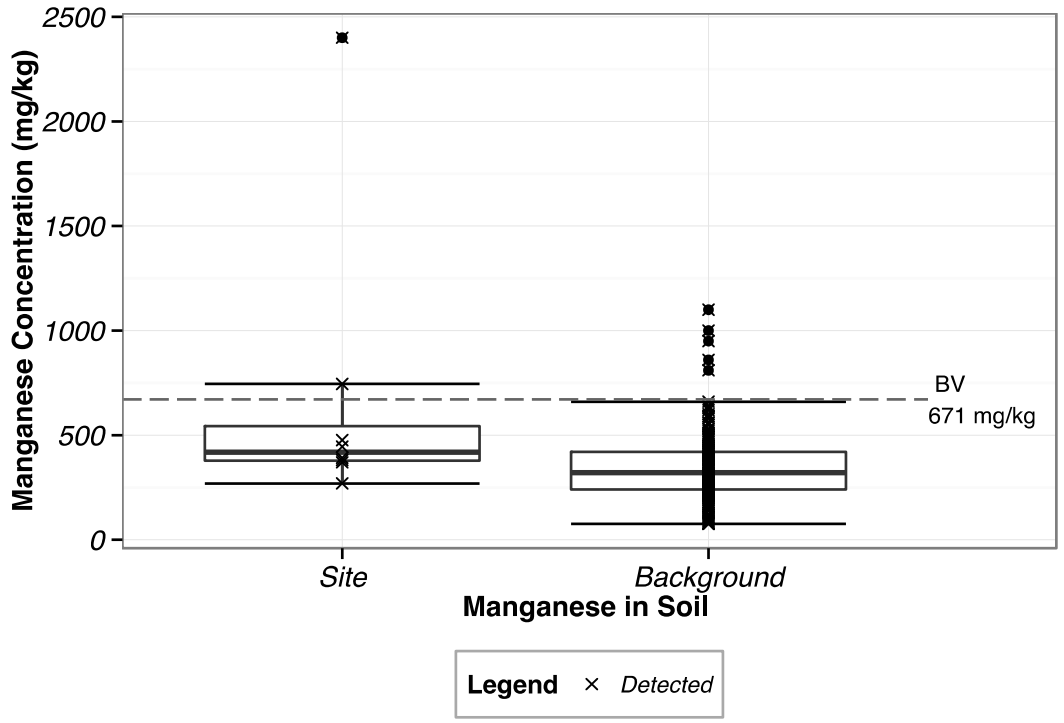


Figure H-3 Box plots for manganese in soil at SWMU 15-002 former north burn pit

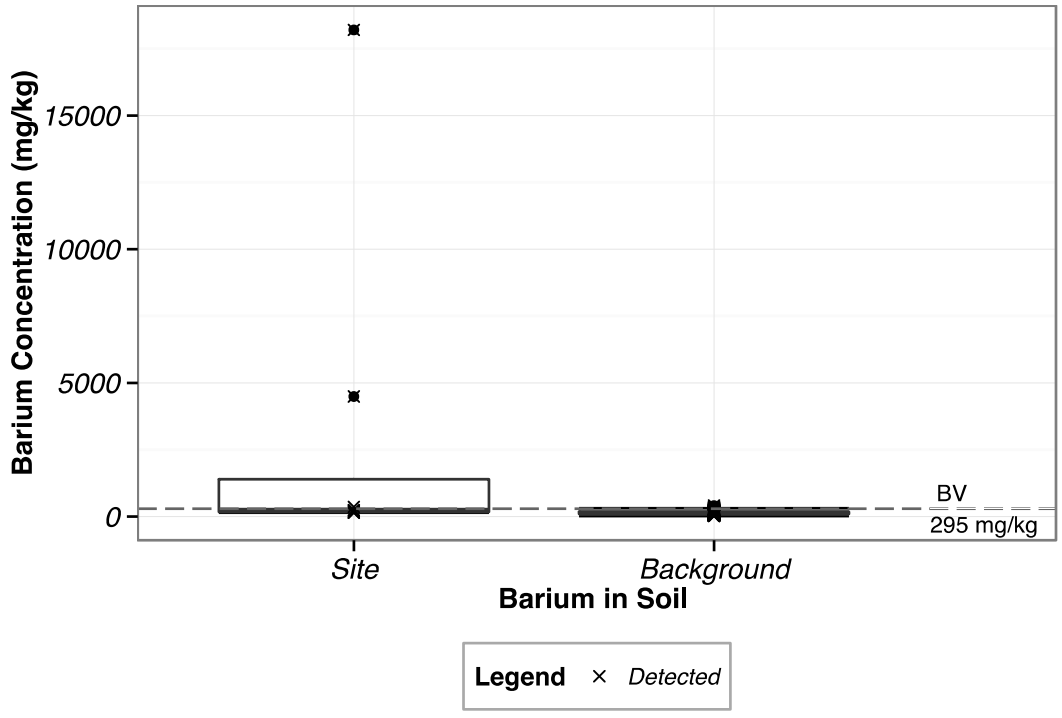


Figure H-4 Box plots for barium in soil at SWMU 15-002 former south burn pit

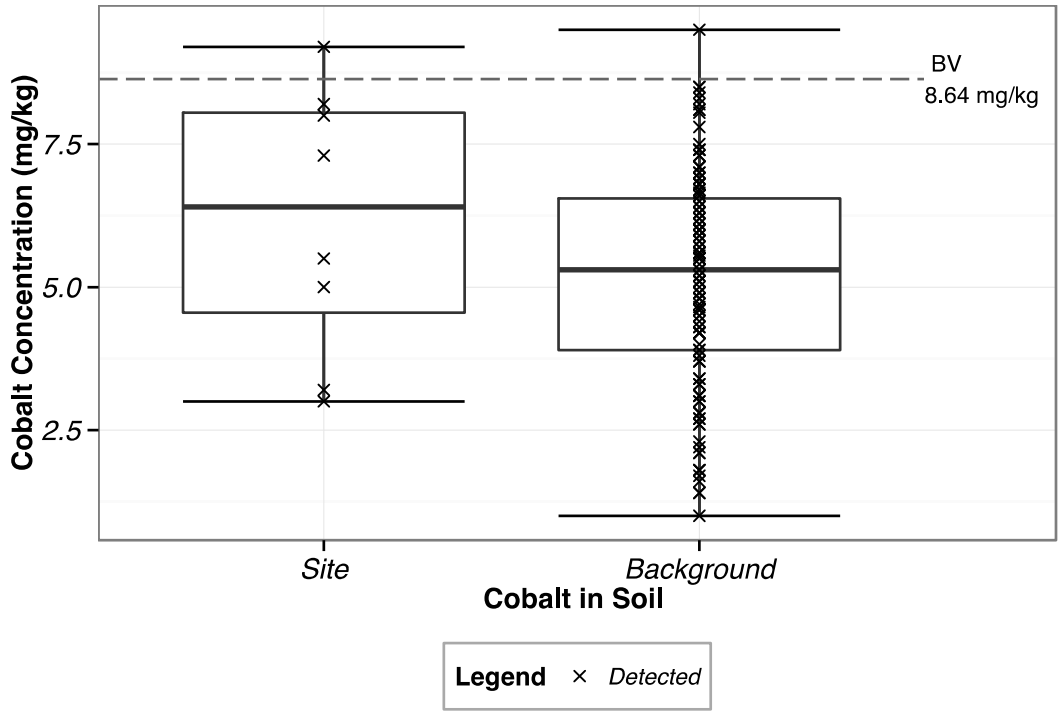


Figure H-5 Box plots for cobalt in soil at SWMU 15-002 former south burn pit

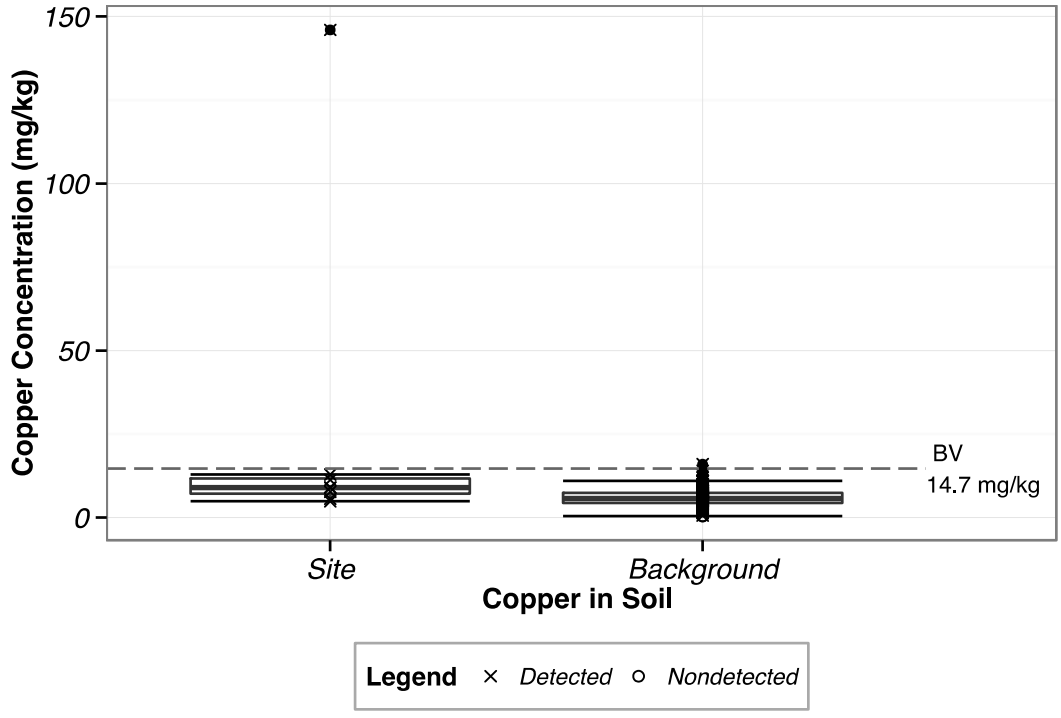


Figure H-6 Box plots for copper in soil at SWMU 15-002 former south burn pit

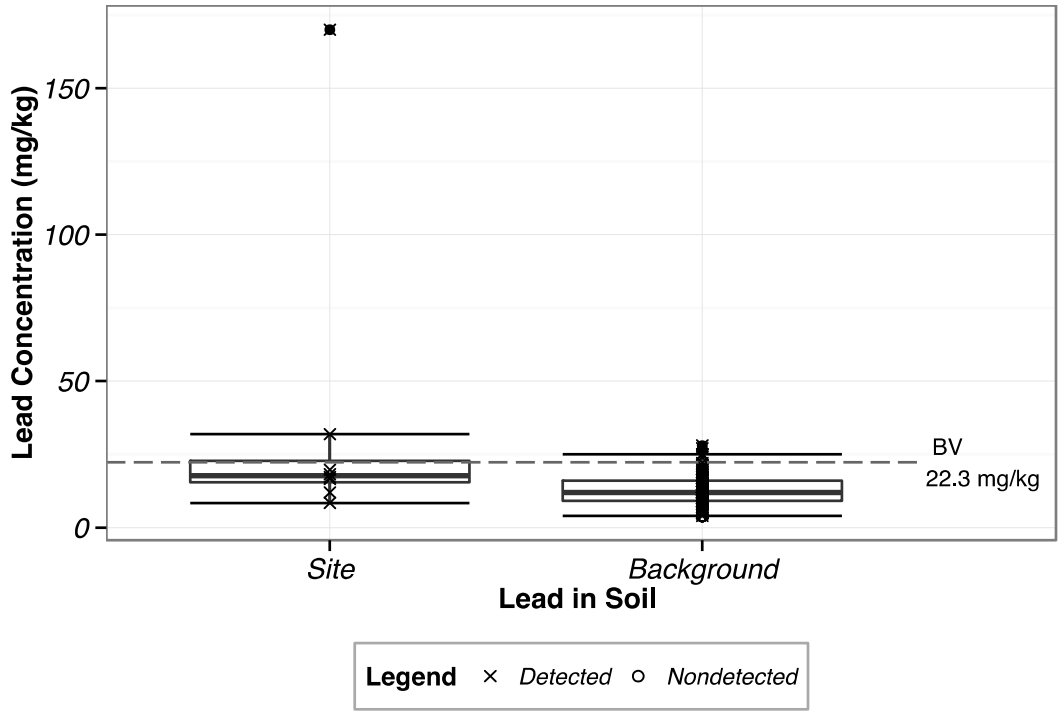


Figure H-7 Box plots for lead in soil at SWMU 15-002 former south burn pit

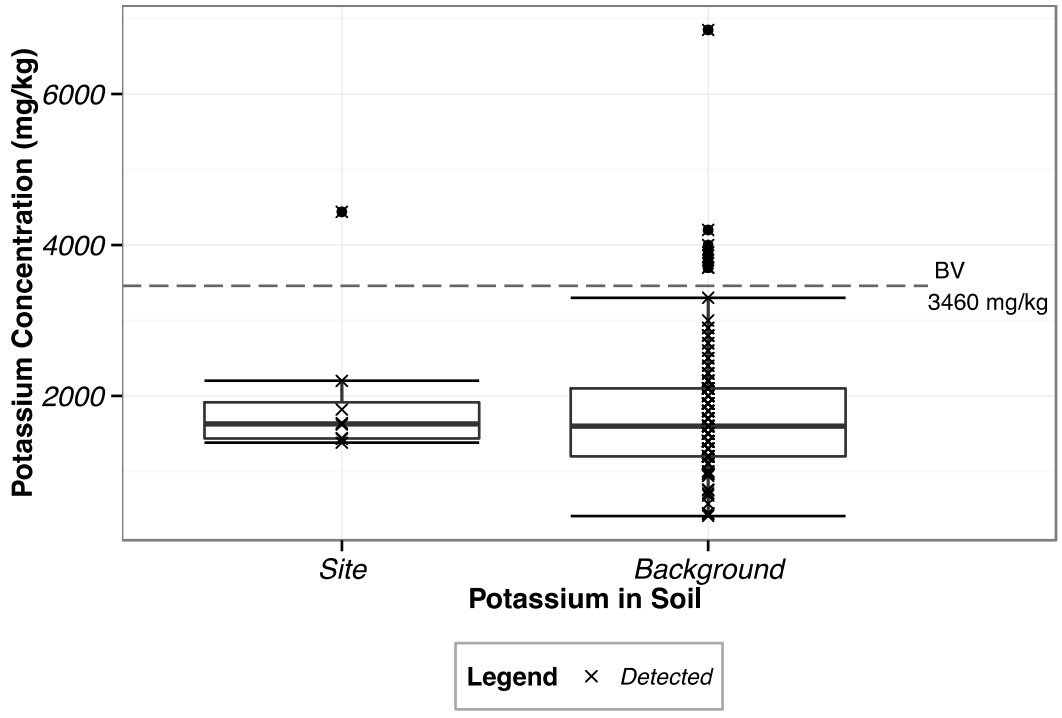


Figure H-8 Box plots for potassium in soil at SWMU 15-002 former south burn pit

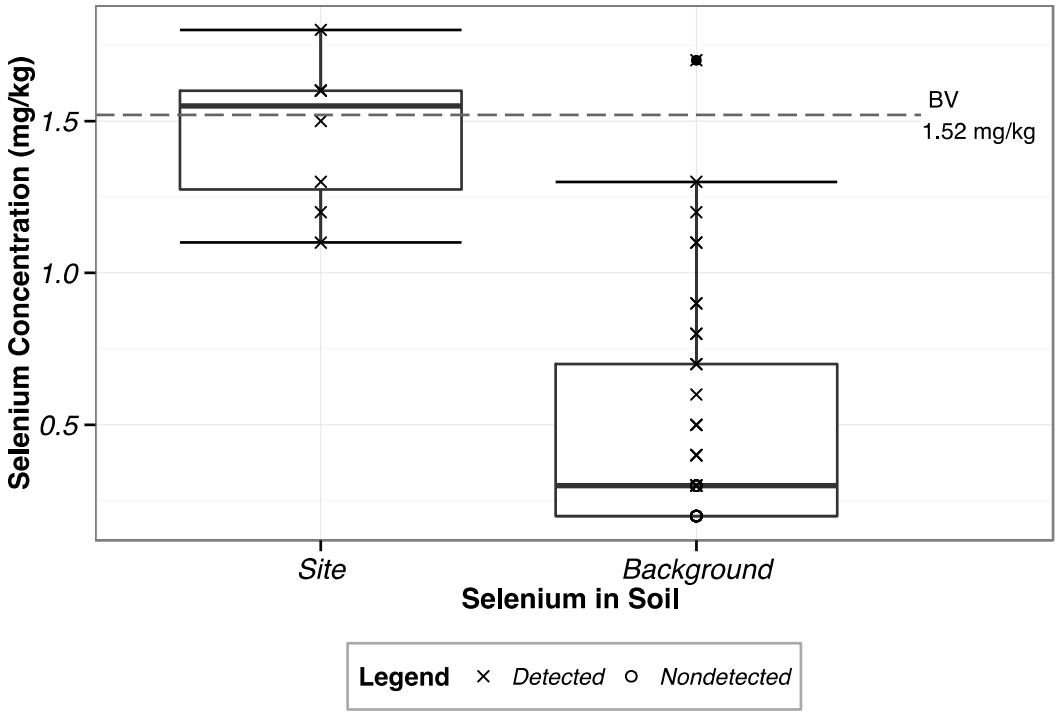


Figure H-9 Box plots for selenium in soil at SWMU 15-002 former south burn pit

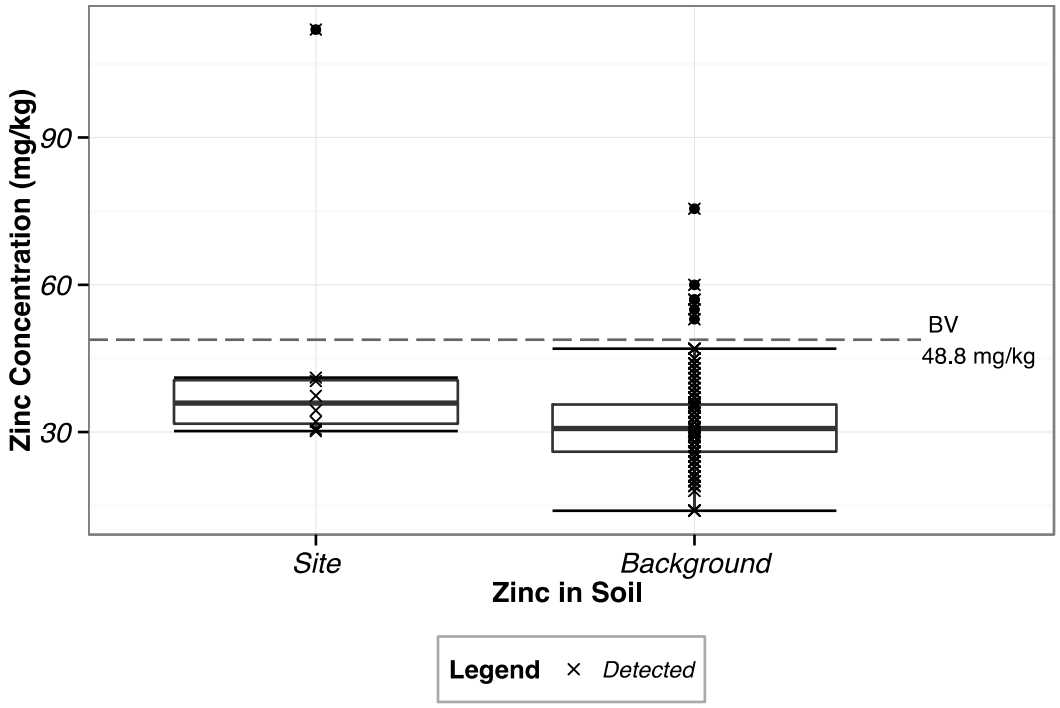


Figure H-10 Box plots for zinc in soil at SWMU 15-002 former south burn pit

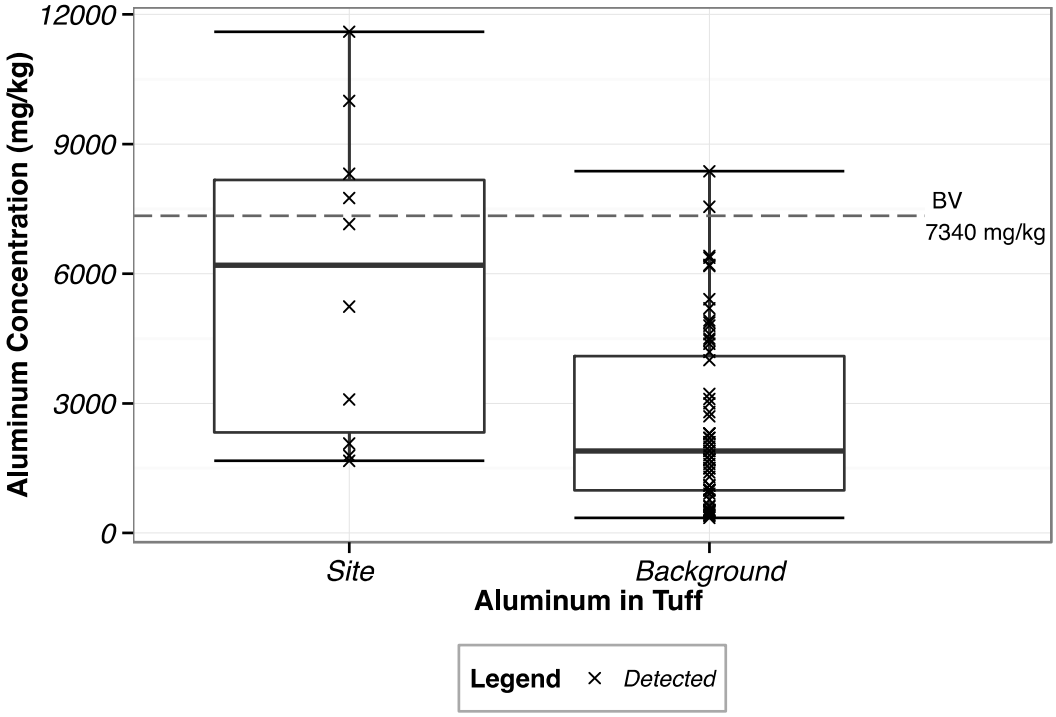


Figure H-11 Box plots for aluminum in tuff at SWMU 15-007(a)

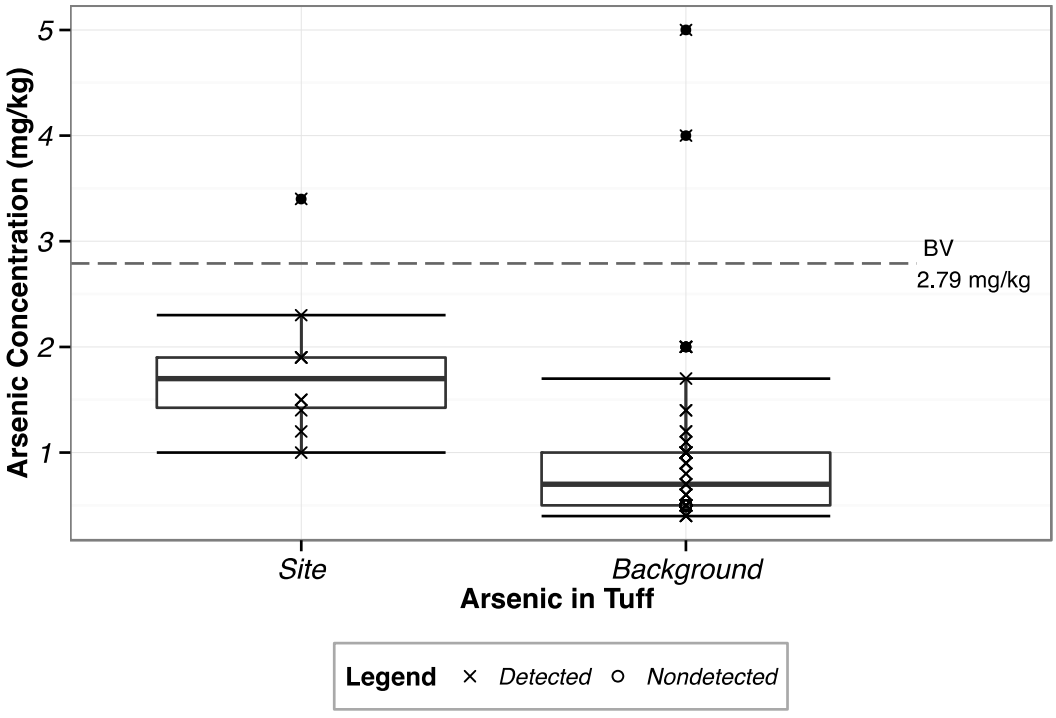


Figure H-12 Box plots for arsenic in tuff at SWMU 15-007(a)

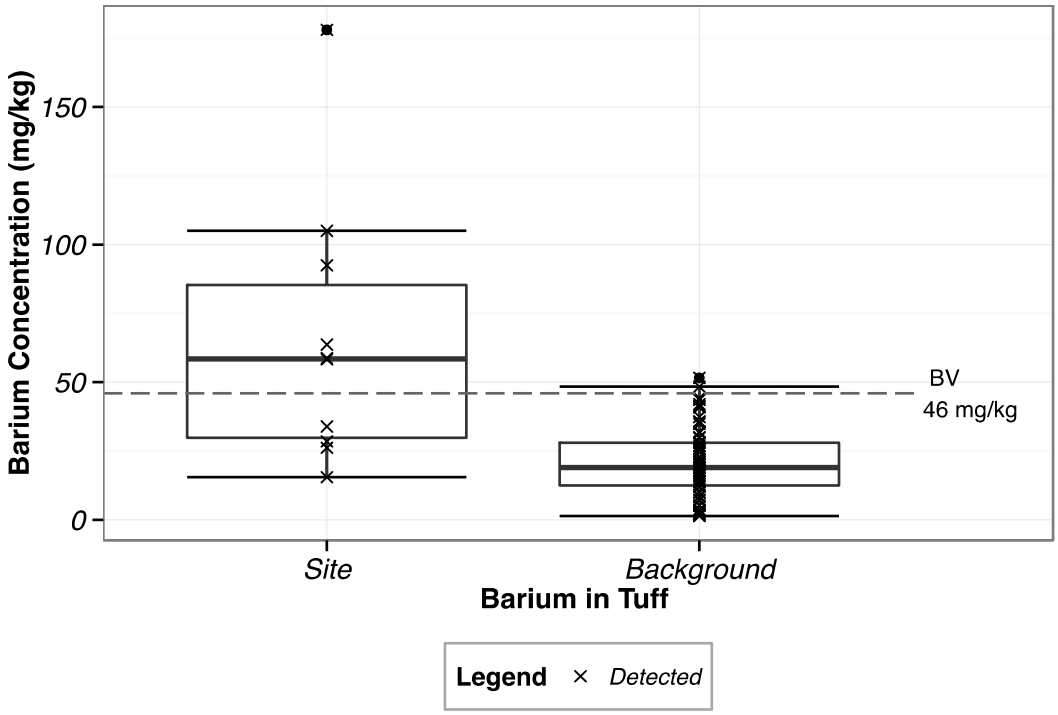


Figure H-13 Box plots for barium in tuff at SWMU 15-007(a)

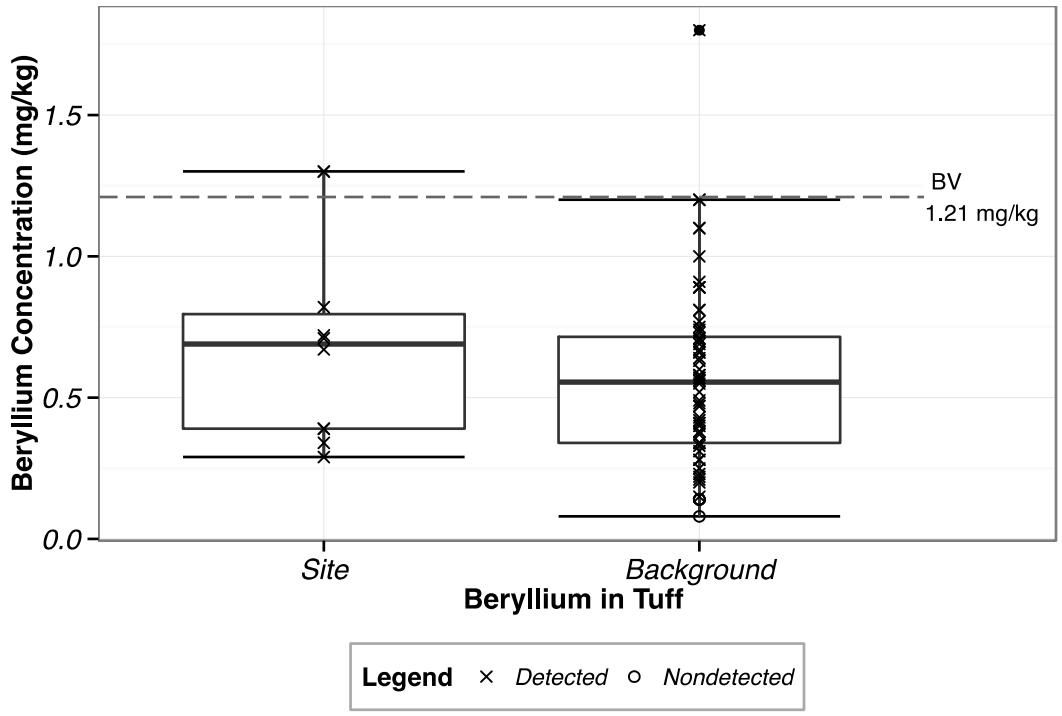


Figure H-14 Box plots for beryllium in tuff at SWMU 15-007(a)

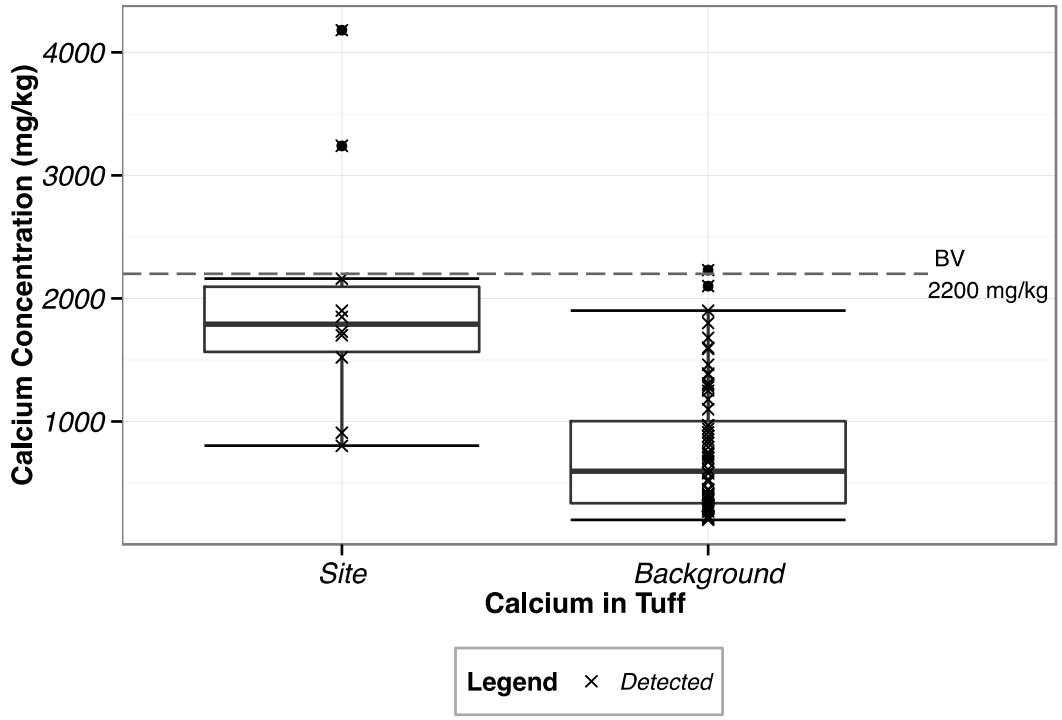


Figure H-15 Box plots for calcium in tuff at SWMU 15-007(a)

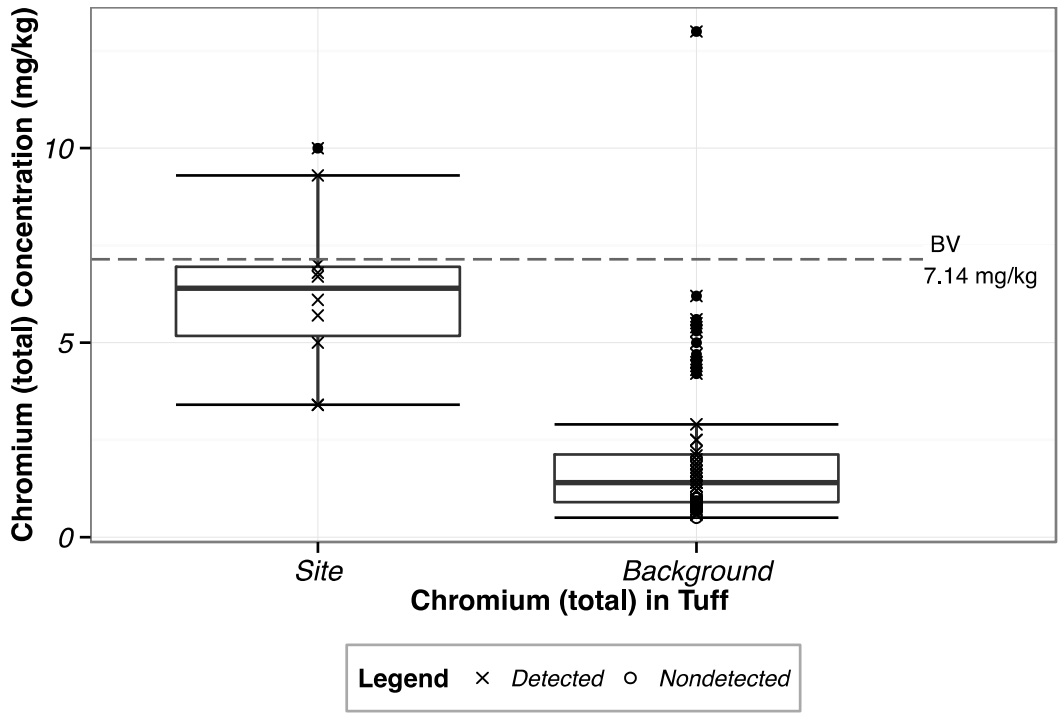


Figure H-16 Box plots for chromium (total) in tuff at SWMU 15-007(a)

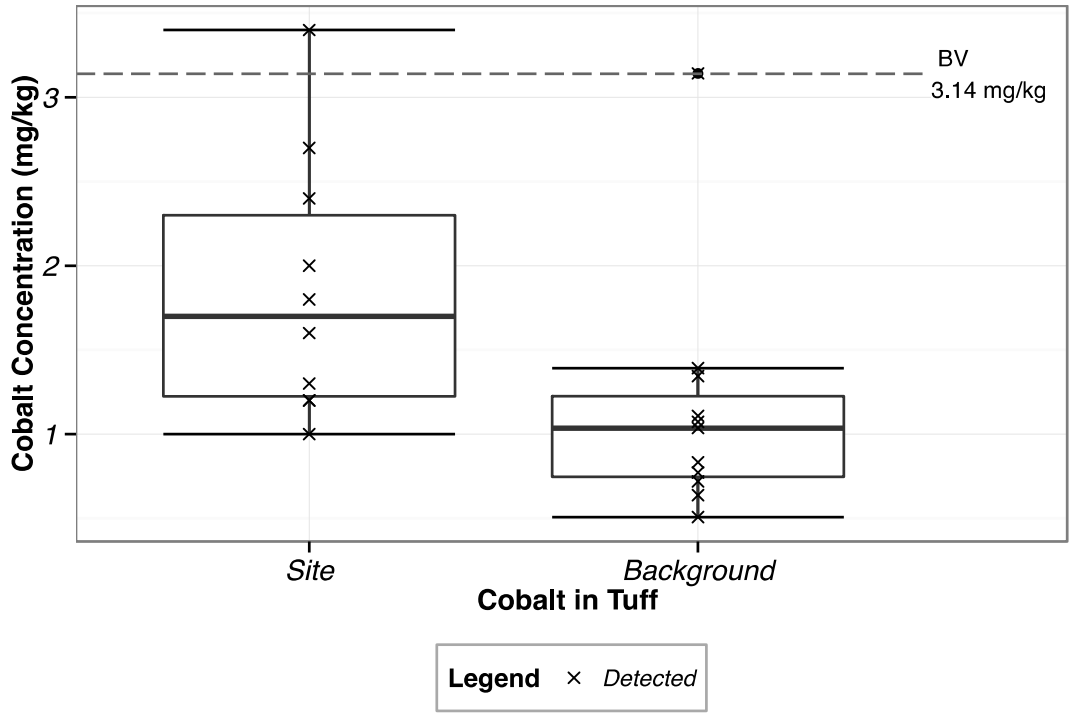


Figure H-17 Box plots for cobalt in tuff at SWMU 15-007(a)

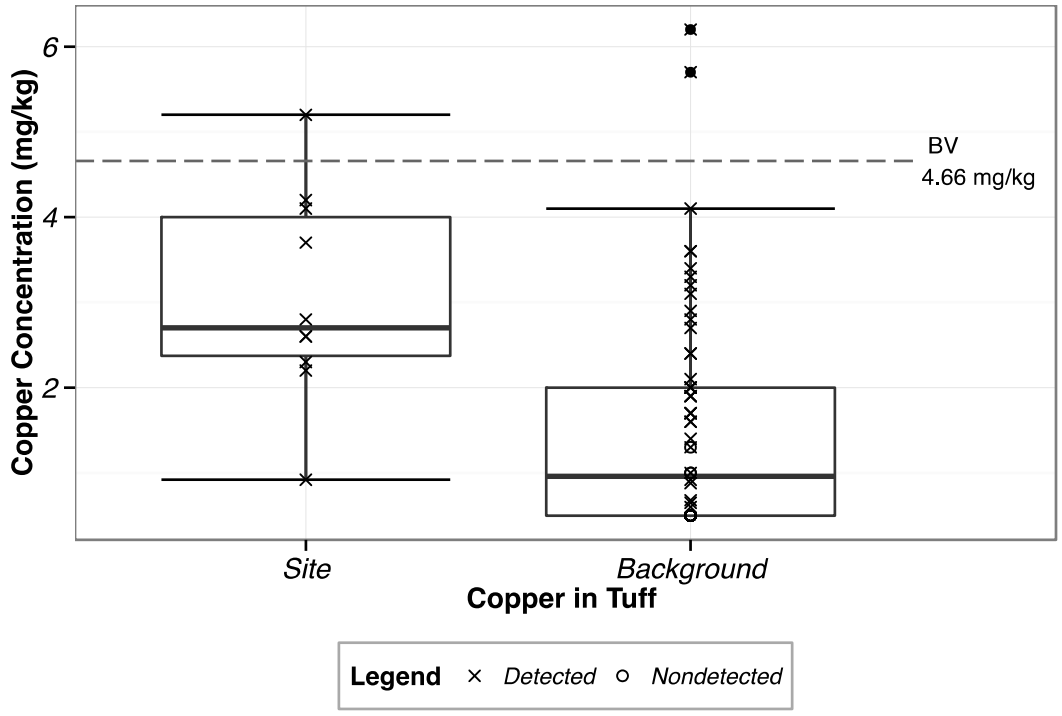


Figure H-18 Box plots for copper in tuff at SWMU 15-007(a)

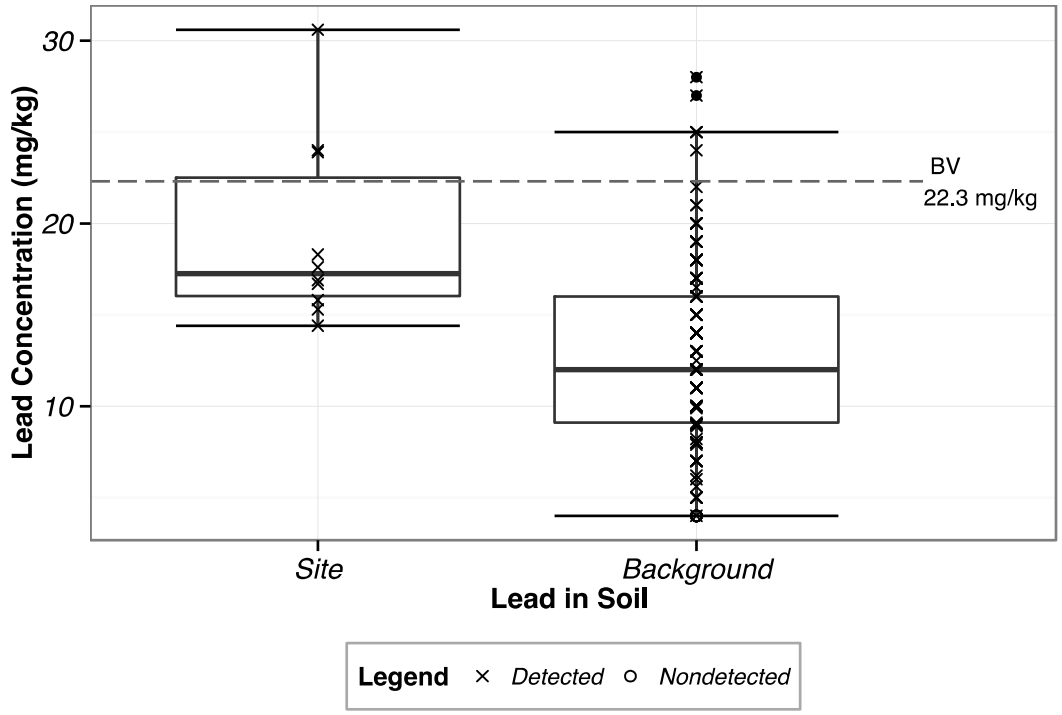


Figure H-19 Box plots for lead in soil at SWMU 15-007(a)

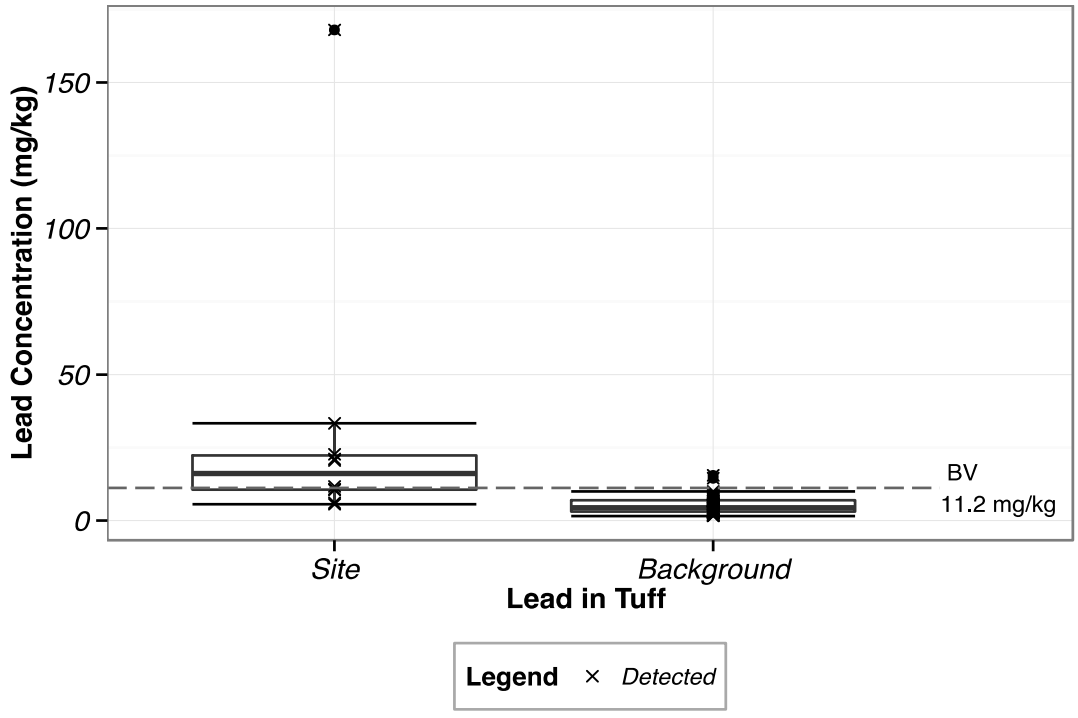


Figure H-20 Box plots for lead in tuff at SWMU 15-007(a)

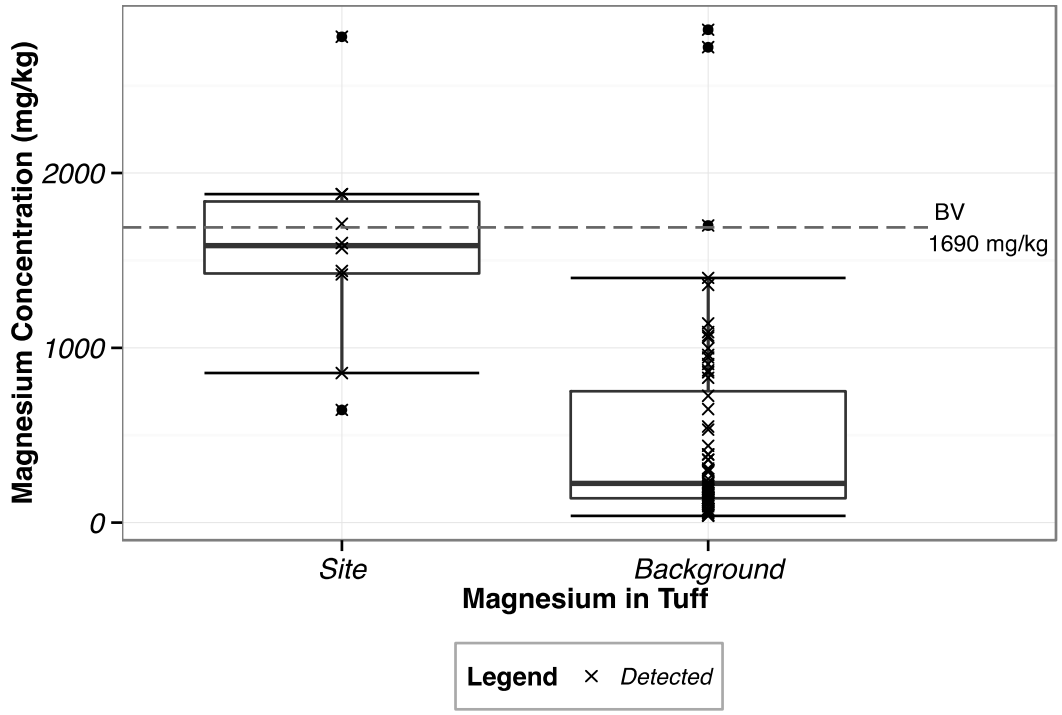


Figure H-21 Box plots for magnesium in tuff at SWMU 15-007(a)

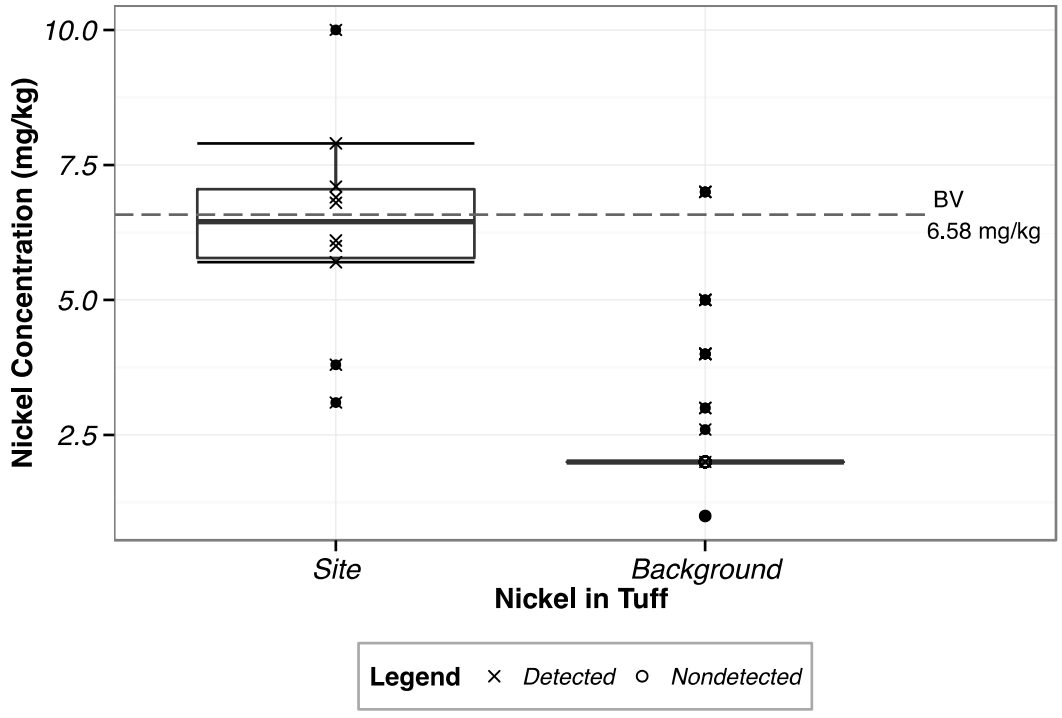


Figure H-22 Box plots for nickel in tuff at SWMU 15-007(a)

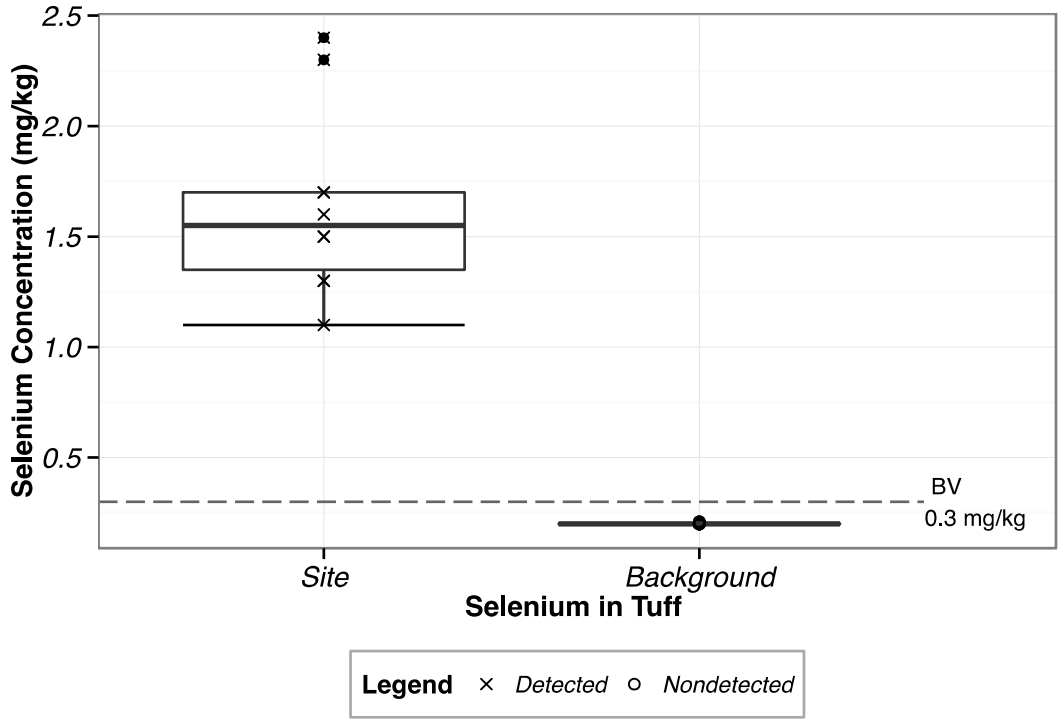


Figure H-23 Box plots for selenium in tuff at SWMU 15-007(a)

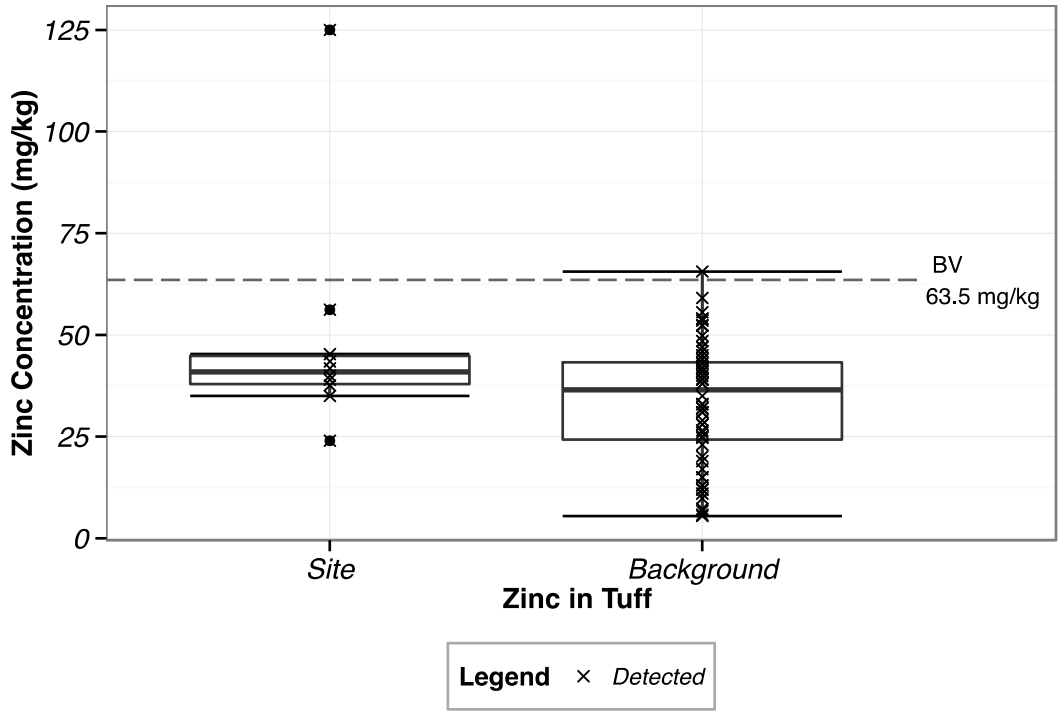


Figure H-24 Box plots for zinc in tuff at SWMU 15-007(a)

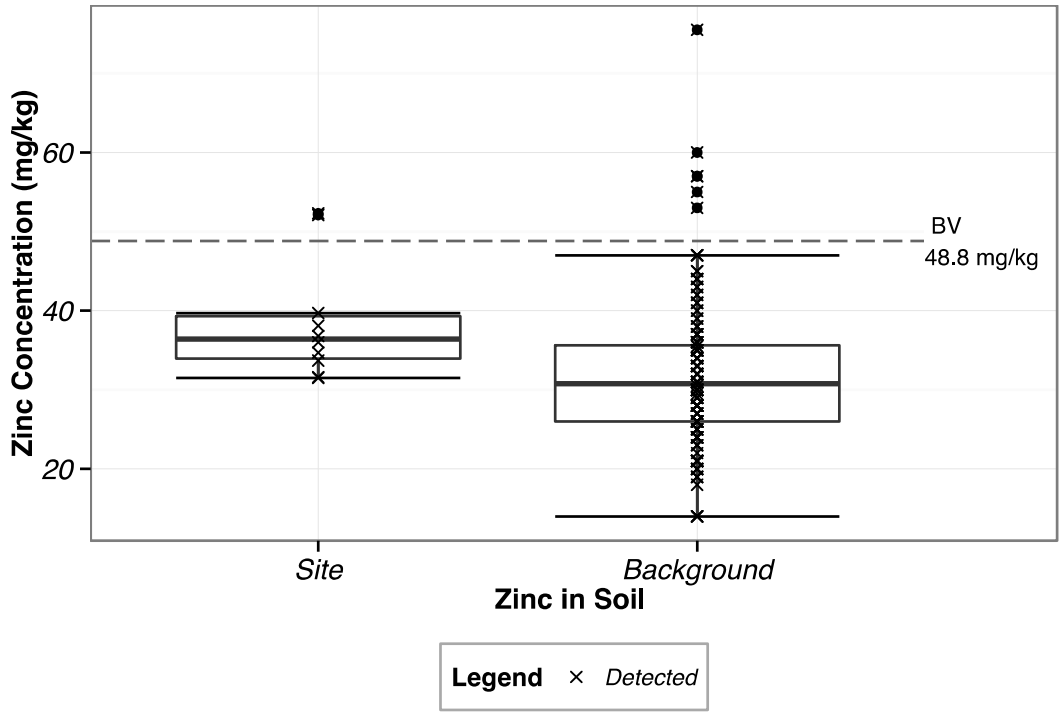


Figure H-25 Box plots for zinc in soil at SWMU 15-007(a)

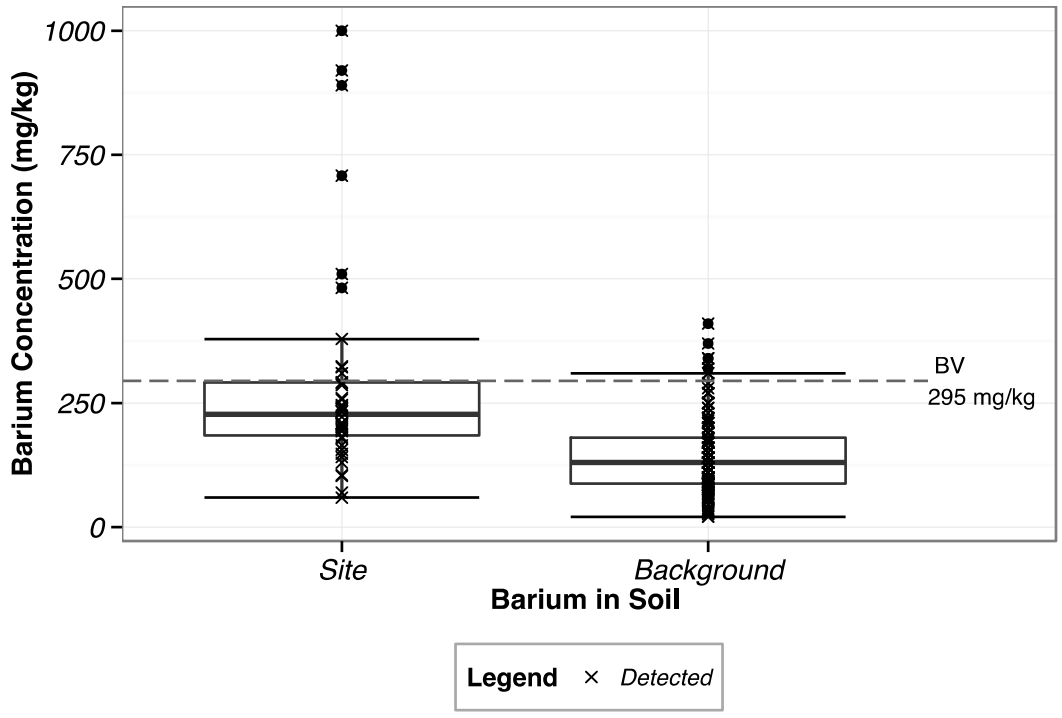


Figure H-26 Box plots for barium in soil at SWMUs 15-004(b) and 15-004(c)

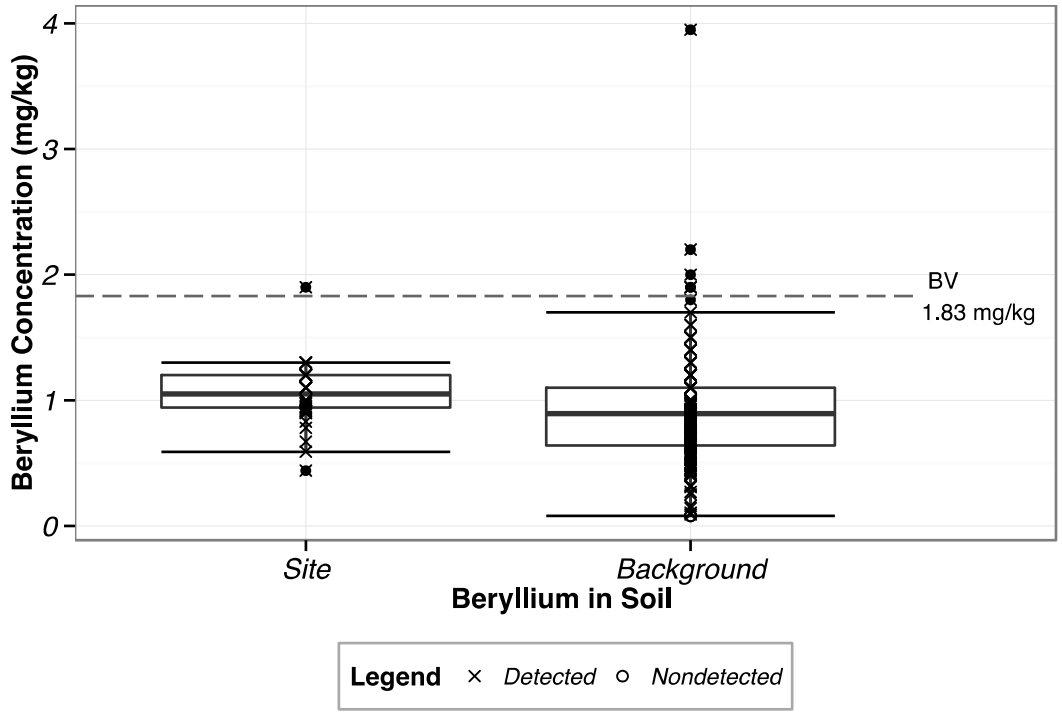


Figure H-27 Box plots for beryllium in soil at SWMUs 15-004(b) and 15-004(c)

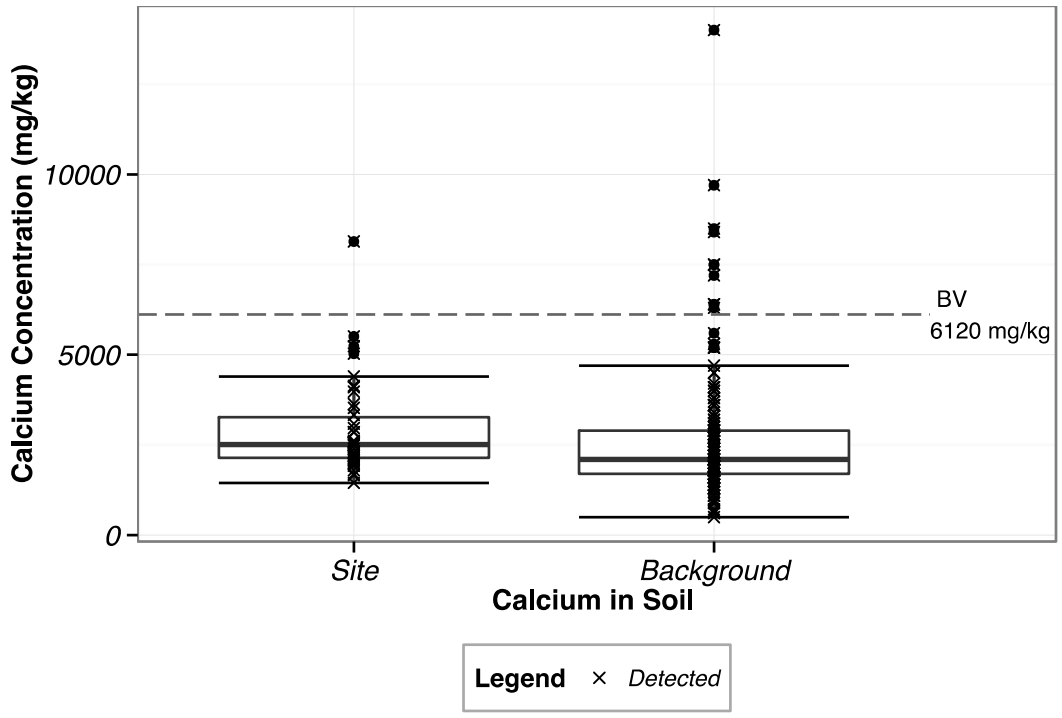


Figure H-28 Box plots for calcium in soil at SWMUs 15-004(b) and 15-004(c)

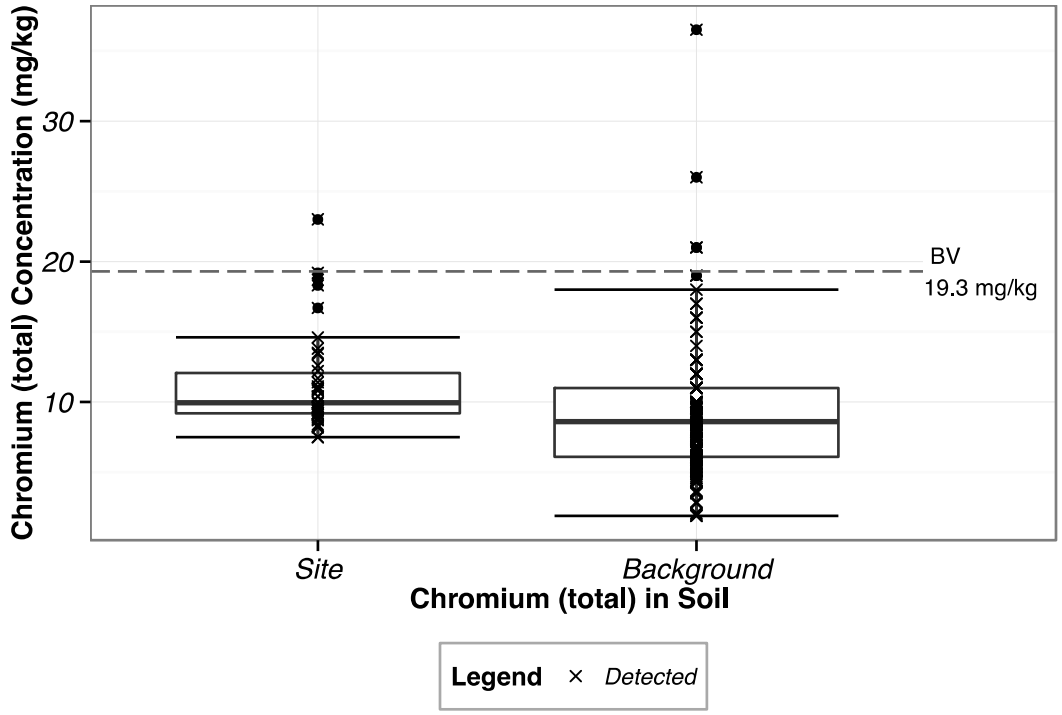


Figure H-29 Box plots for chromium (total) in soil at SWMUs 15-004(b) and 15-004(c)

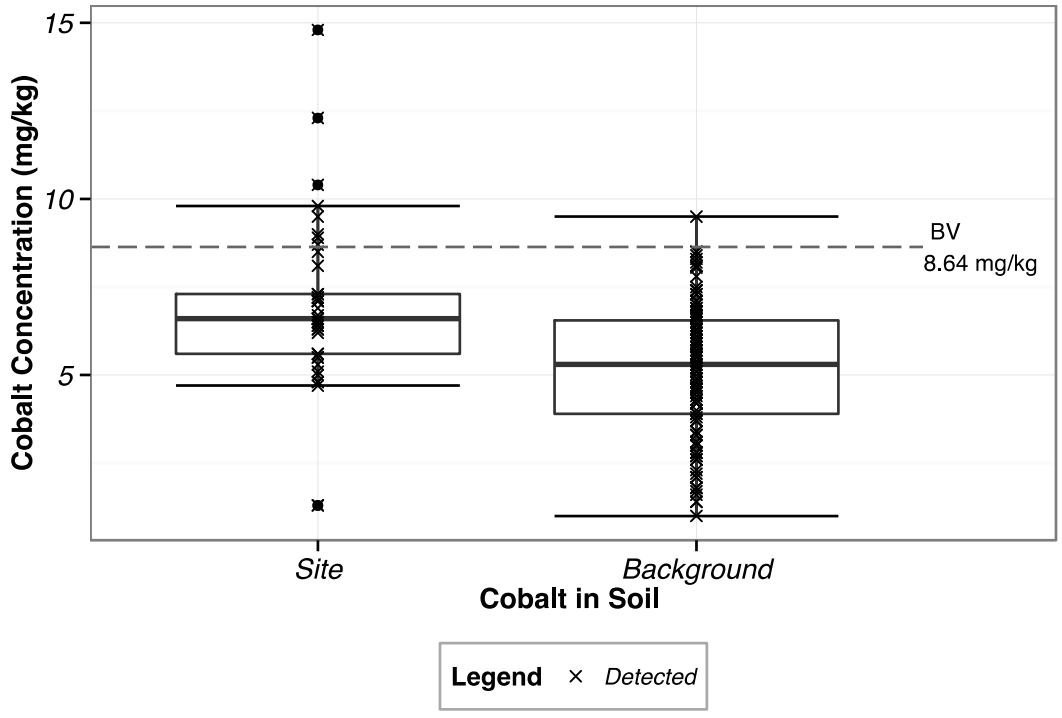


Figure H-30 Box plots for cobalt in soil at SWMUs 15-004(b) and 15-004(c)

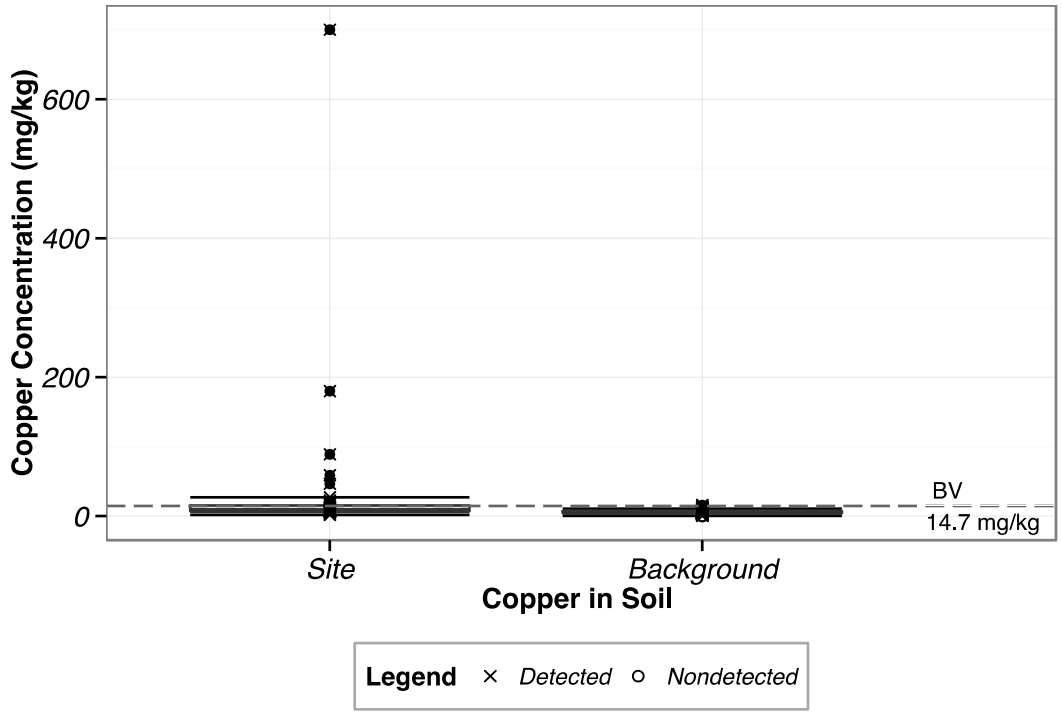


Figure H-31 Box plots for copper in soil at SWMUs 15-004(b) and 15-004(c)

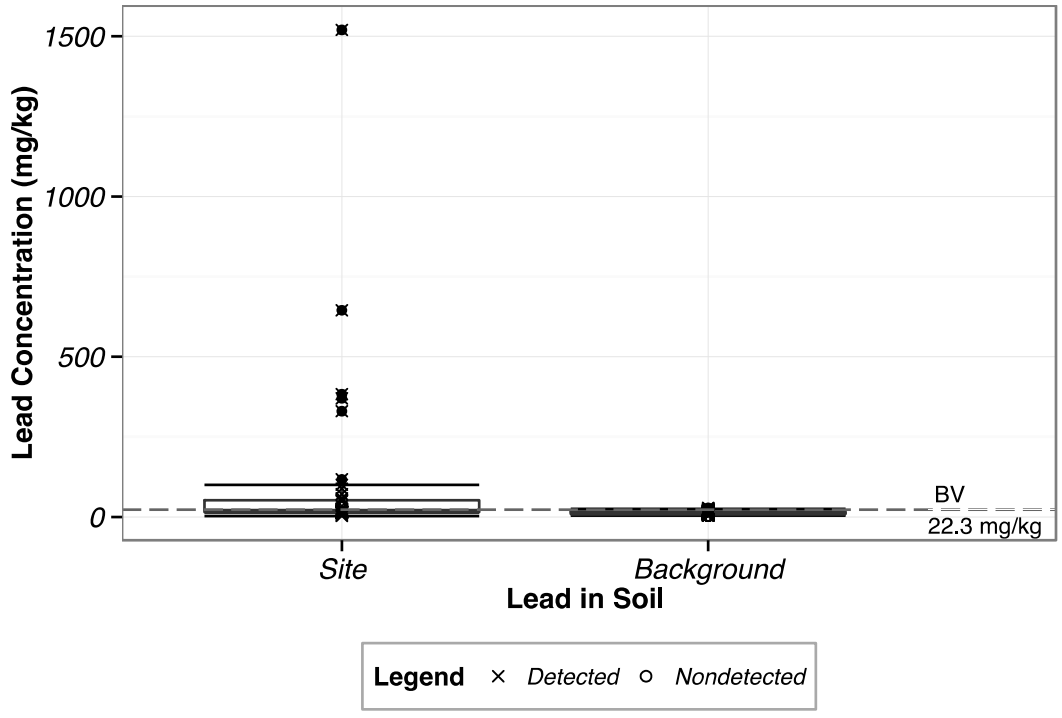


Figure H-32 Box plots for lead in soil at SWMUs 15-004(b) and 15-004(c)

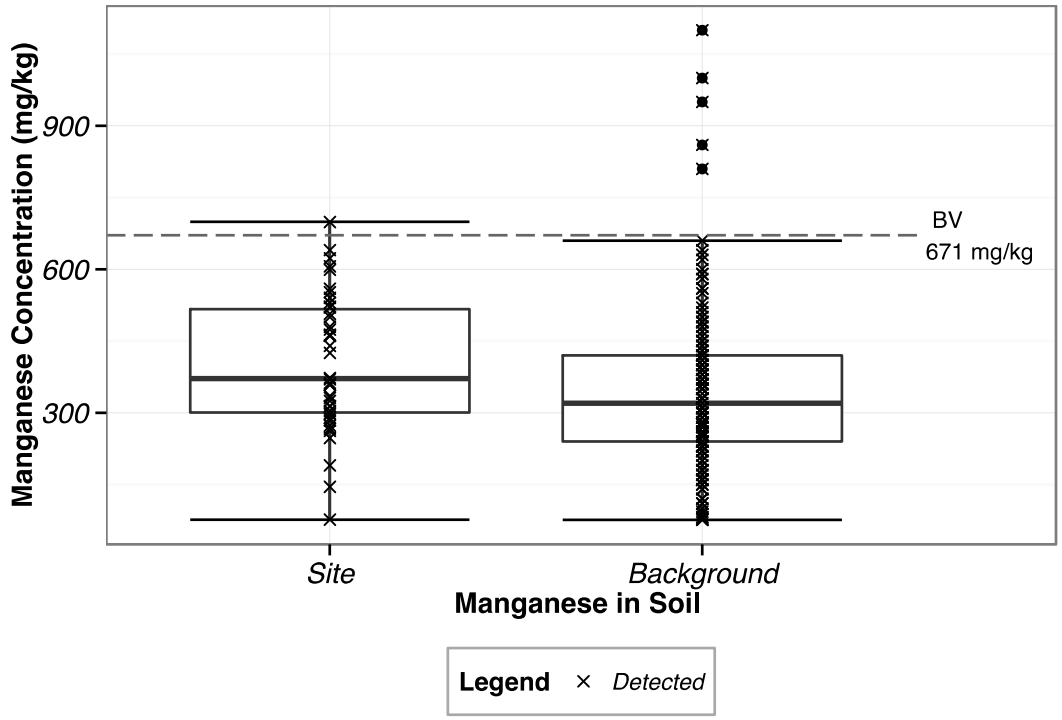


Figure H-33 Box plots for manganese in soil at SWMUs 15-004(b) and 15-004(c)

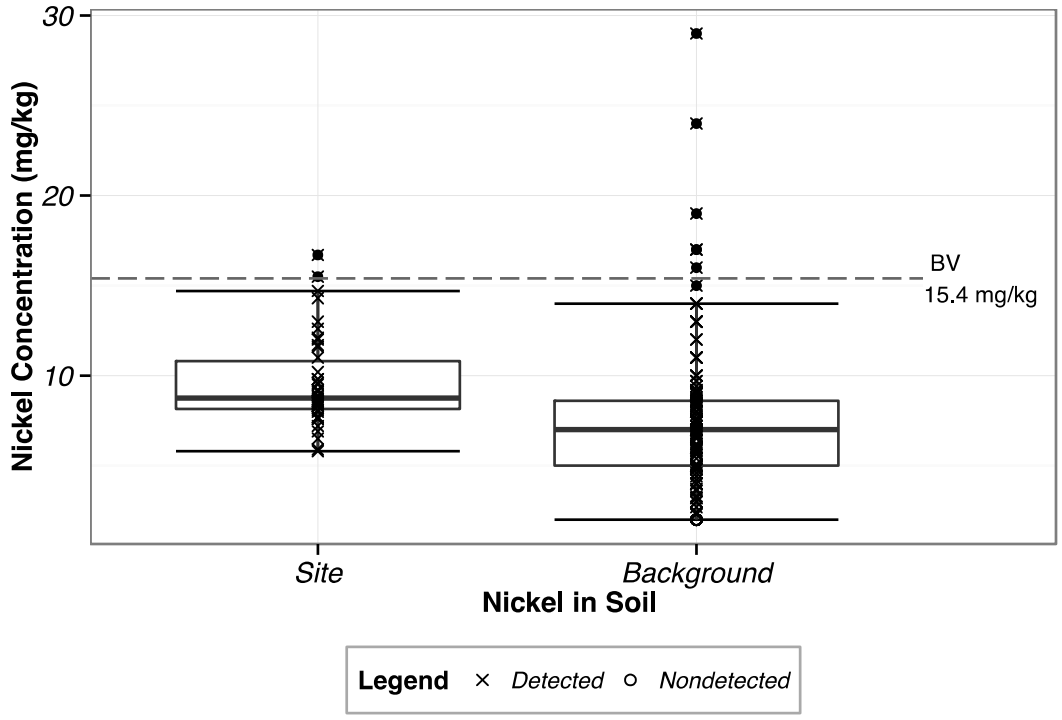


Figure H-34 Box plots for nickel in soil at SWMUs 15-004(b) and 15-004(c)

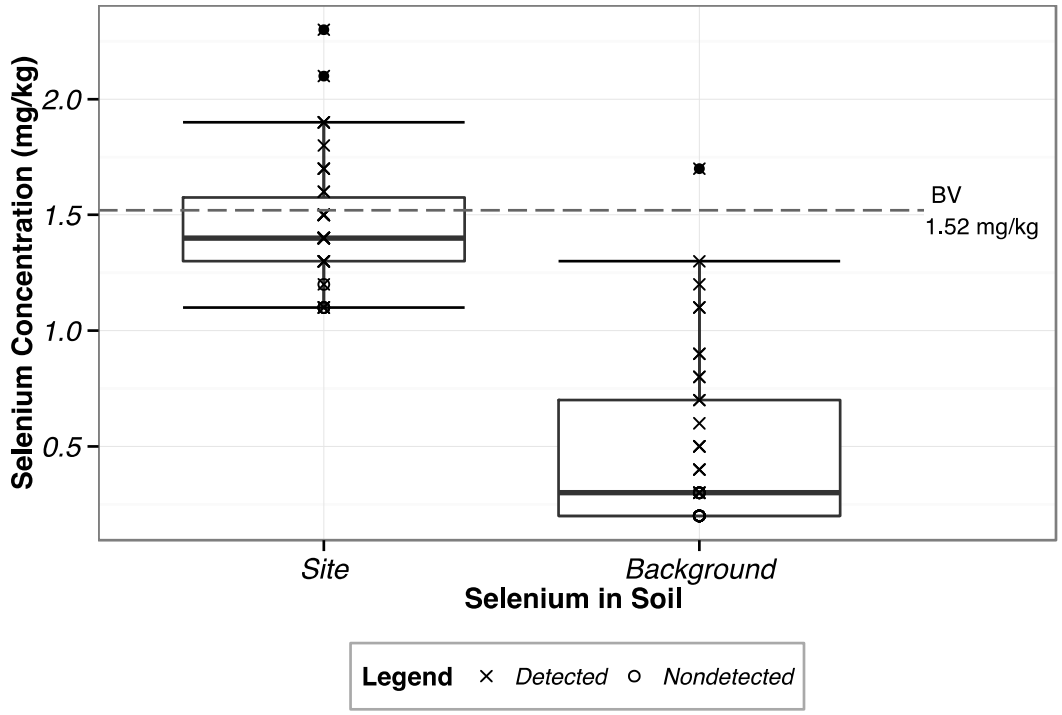


Figure H-35 Box plots for selenium in soil at SWMUs 15-004(b) and 15-004(c)

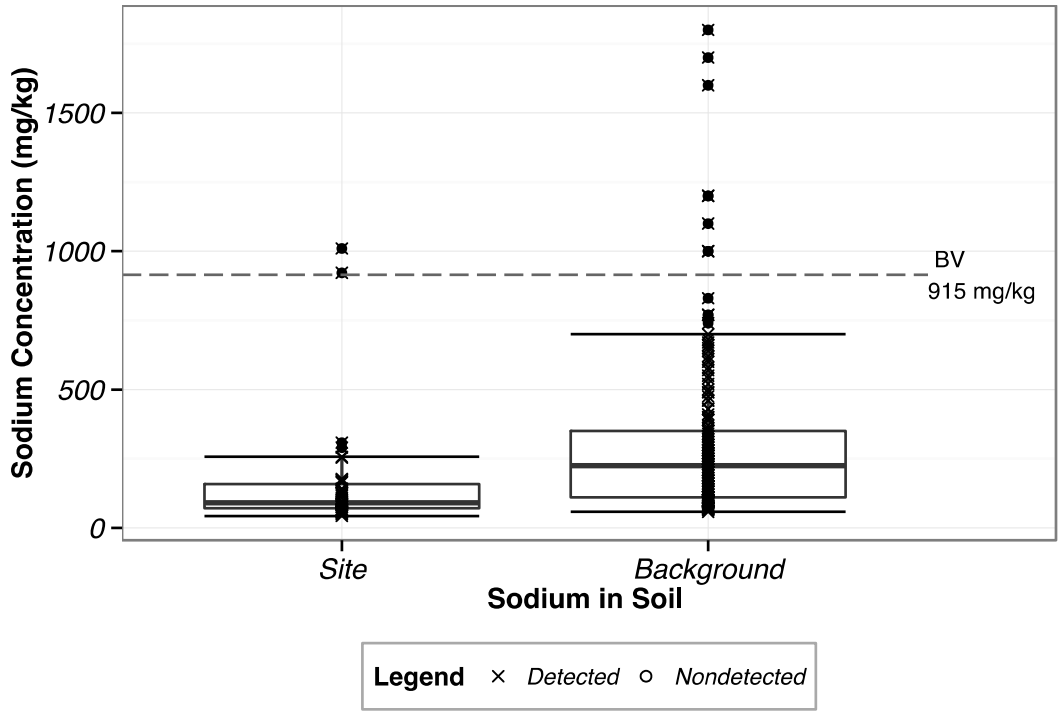


Figure H-36 Box plots for sodium in soil at SWMUs 15-004(b) and 15-004(c)

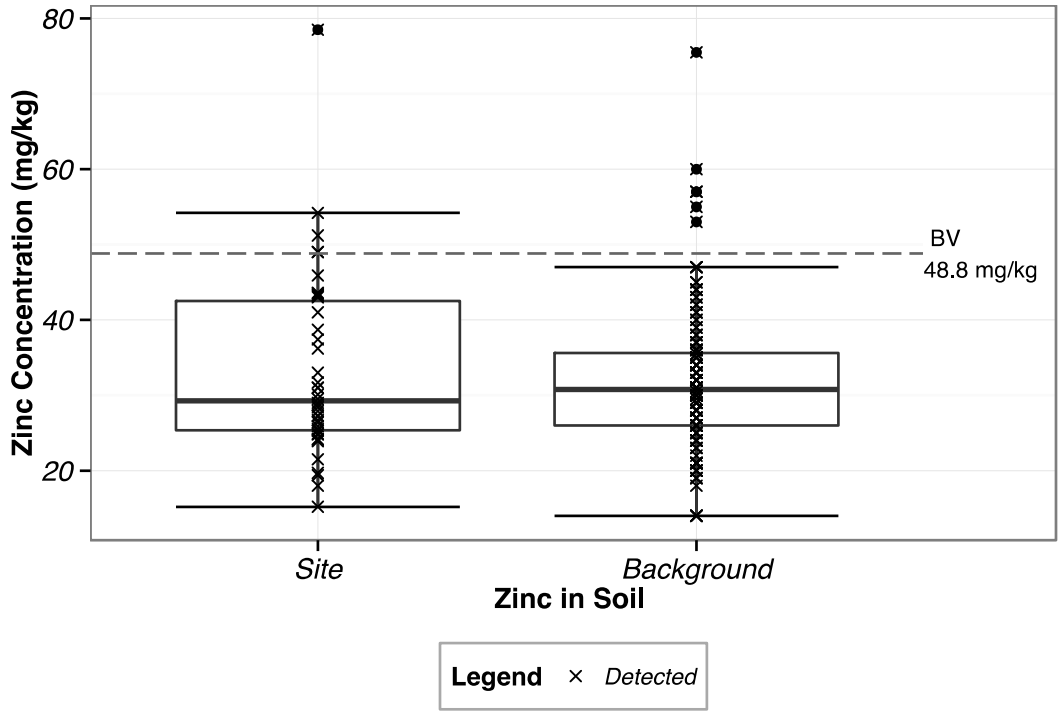


Figure H-37 Box plots for zinc in soil at SWMUs 15-004(b) and 15-004(c)

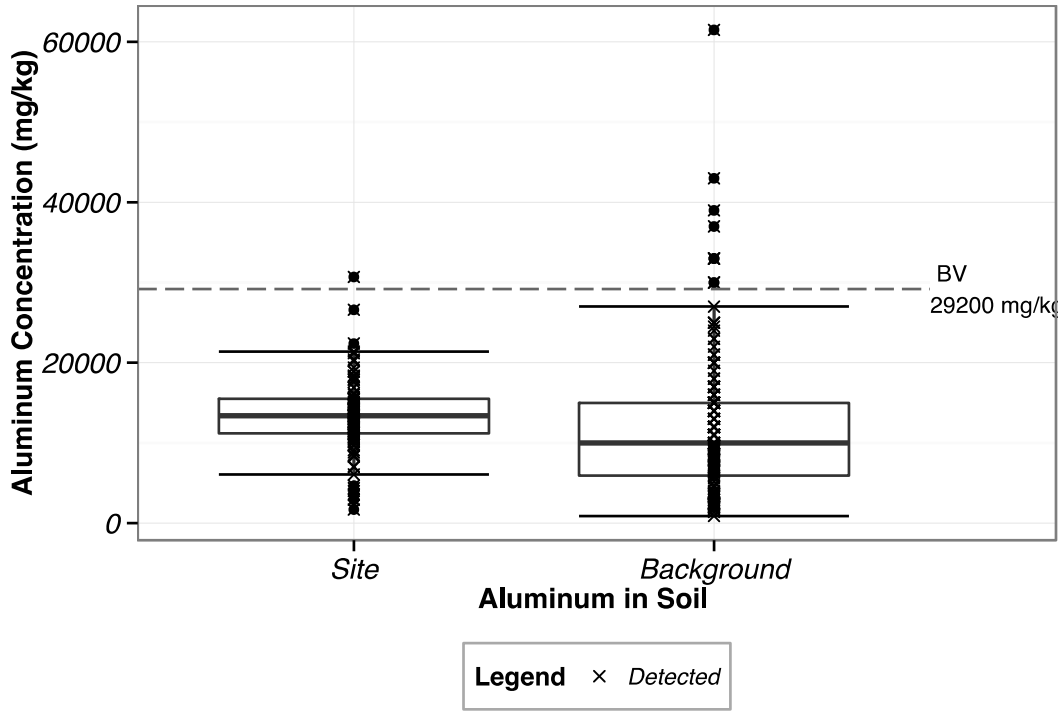


Figure H-38 Box plots for aluminum in soil at SWMU 15-004(f)

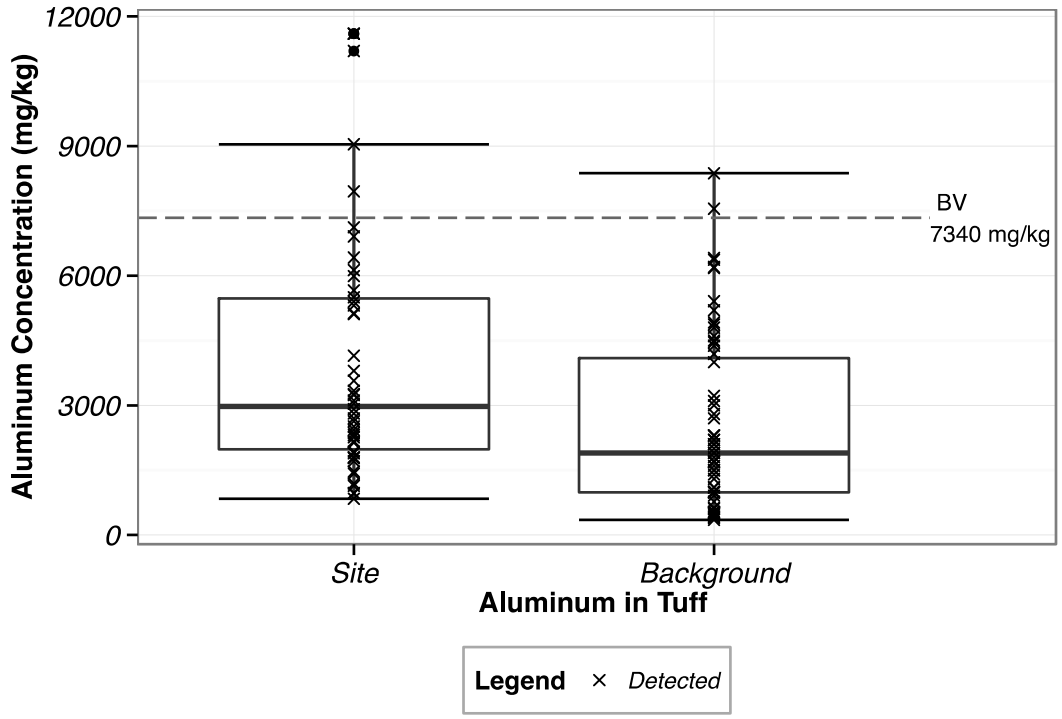


Figure H-39 Box plots for aluminum in tuff at SWMU 15-004(f)

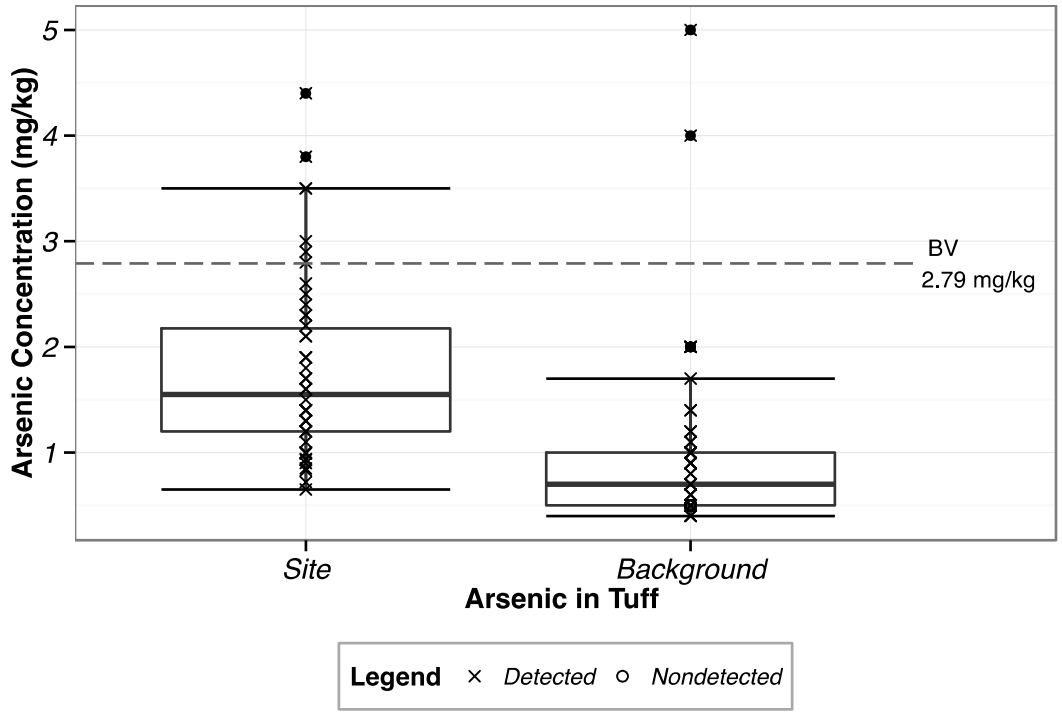


Figure H-40 Box plots for arsenic in tuff at SWMU 15-004(f)

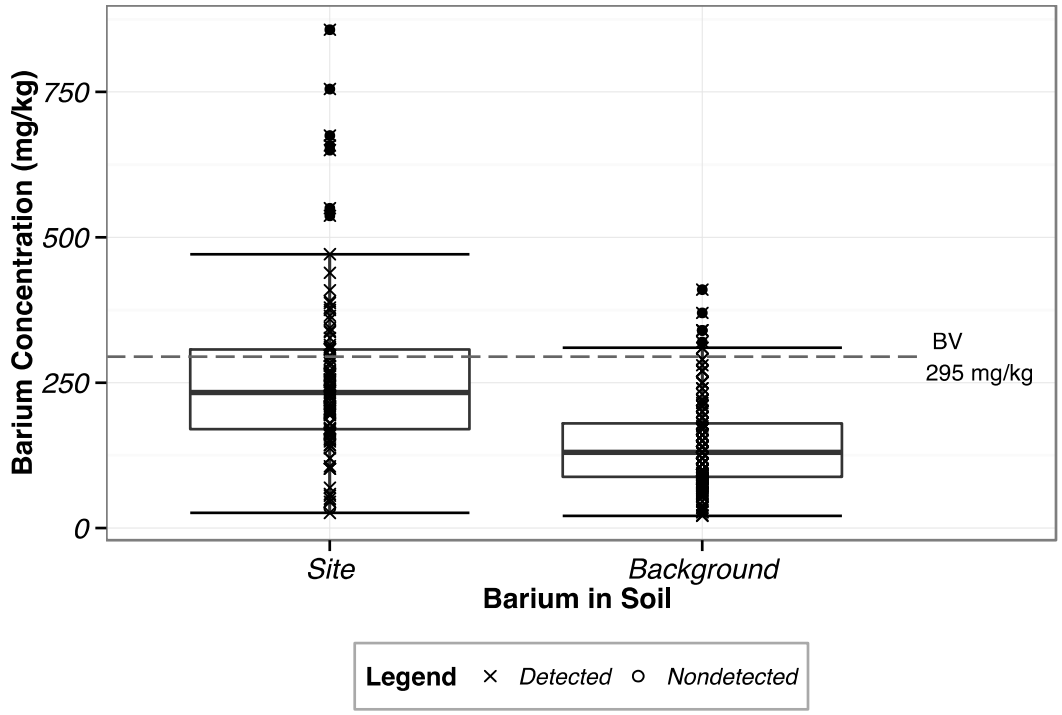


Figure H-41 Box plots for barium in soil at SWMU 15-004(f)

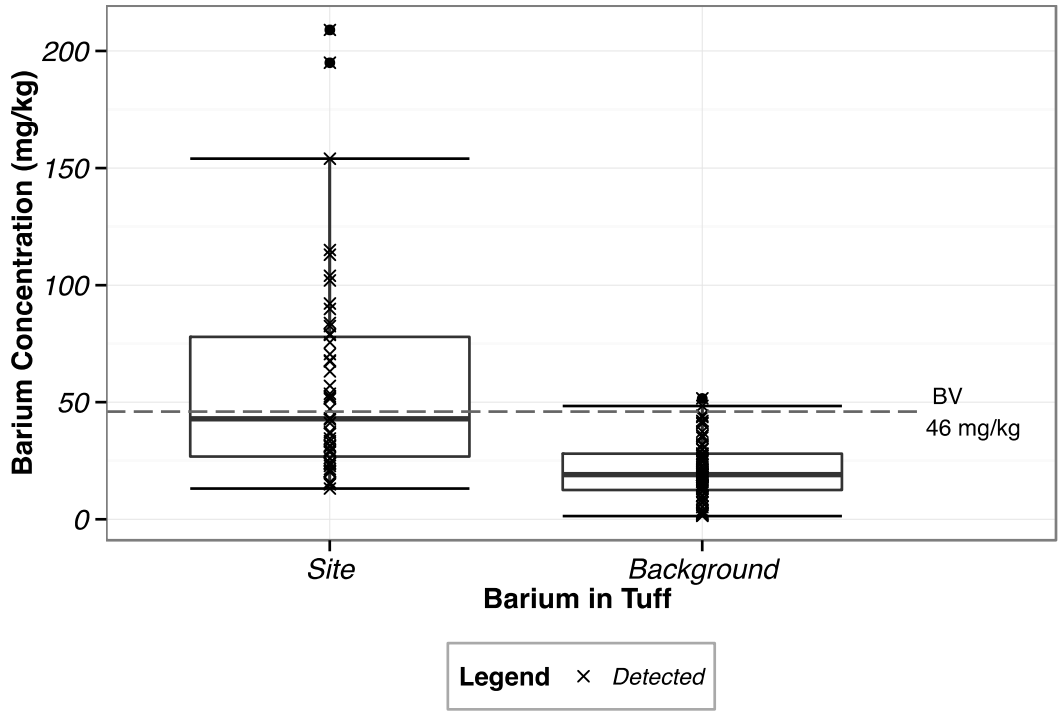


Figure H-42 Box plots for barium in tuff at SWMU 15-004(f)

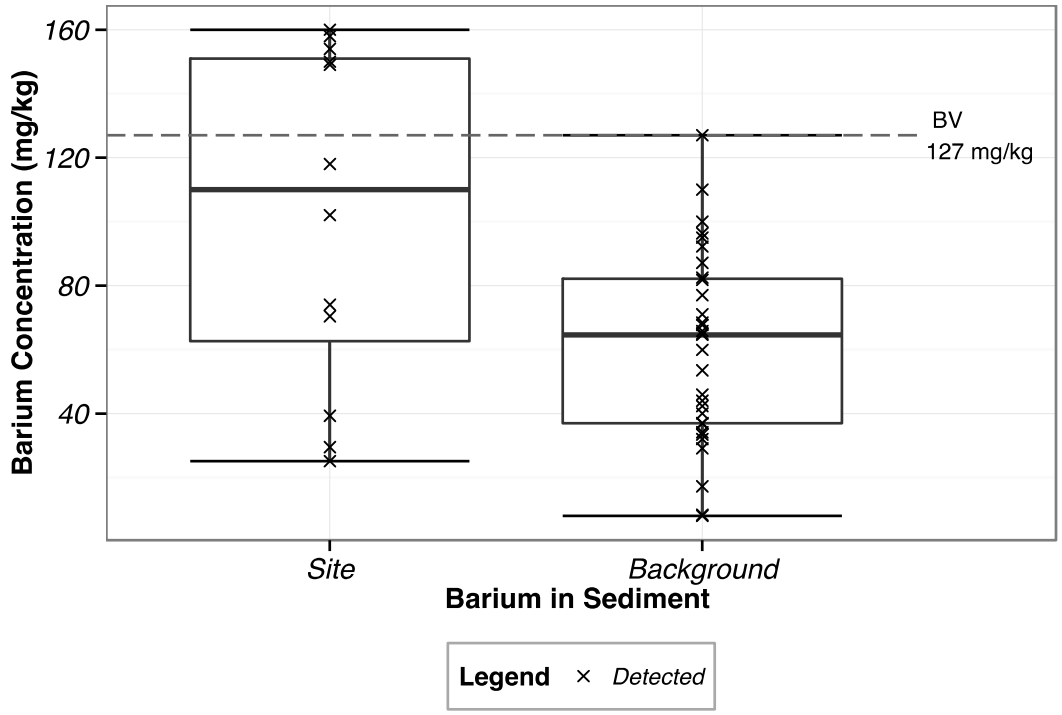


Figure H-43 Box plots for barium in sediment at SWMU 15-004(f)

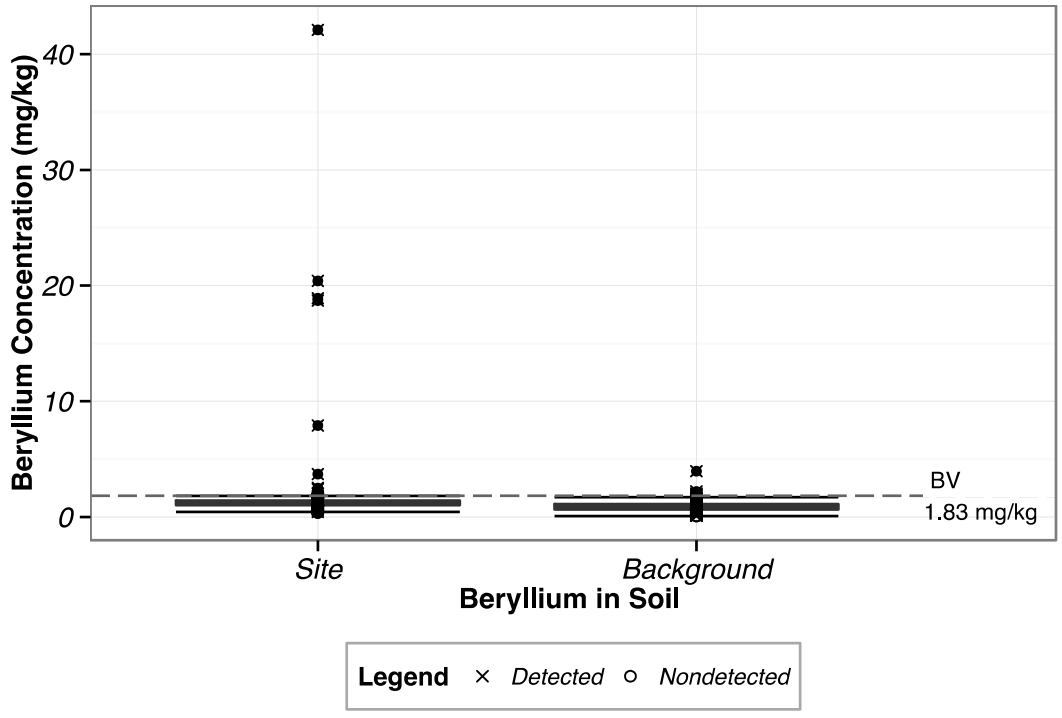


Figure H-44 Box plots for beryllium in soil at SWMU 15-004(f)

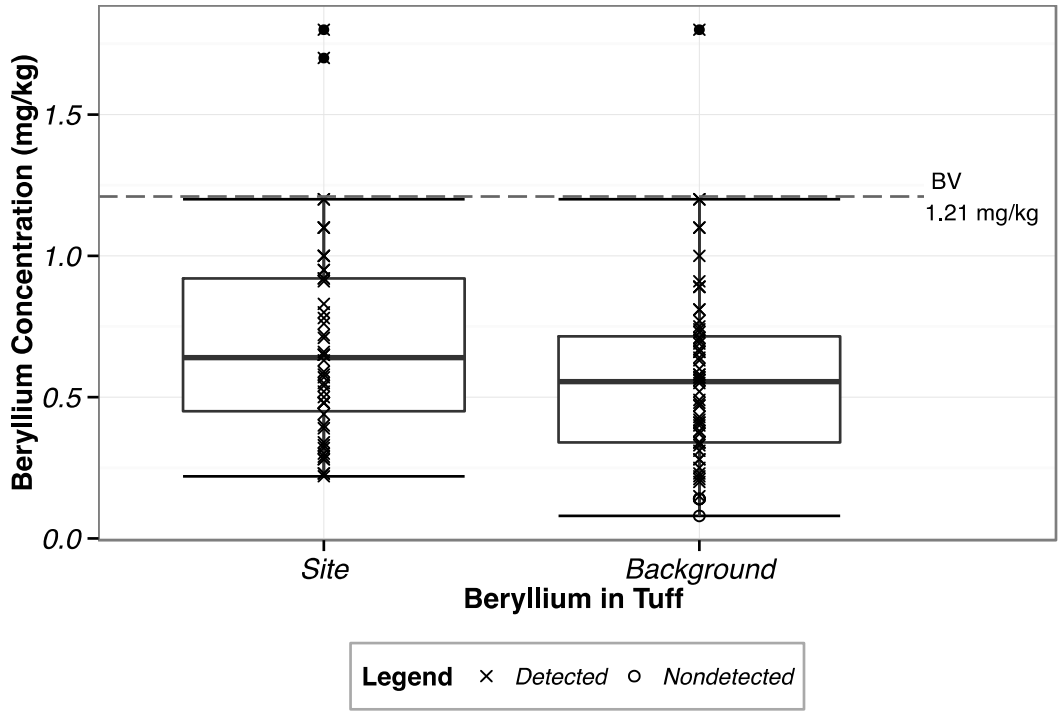


Figure H-45 Box plots for beryllium in tuff at SWMU 15-004(f)

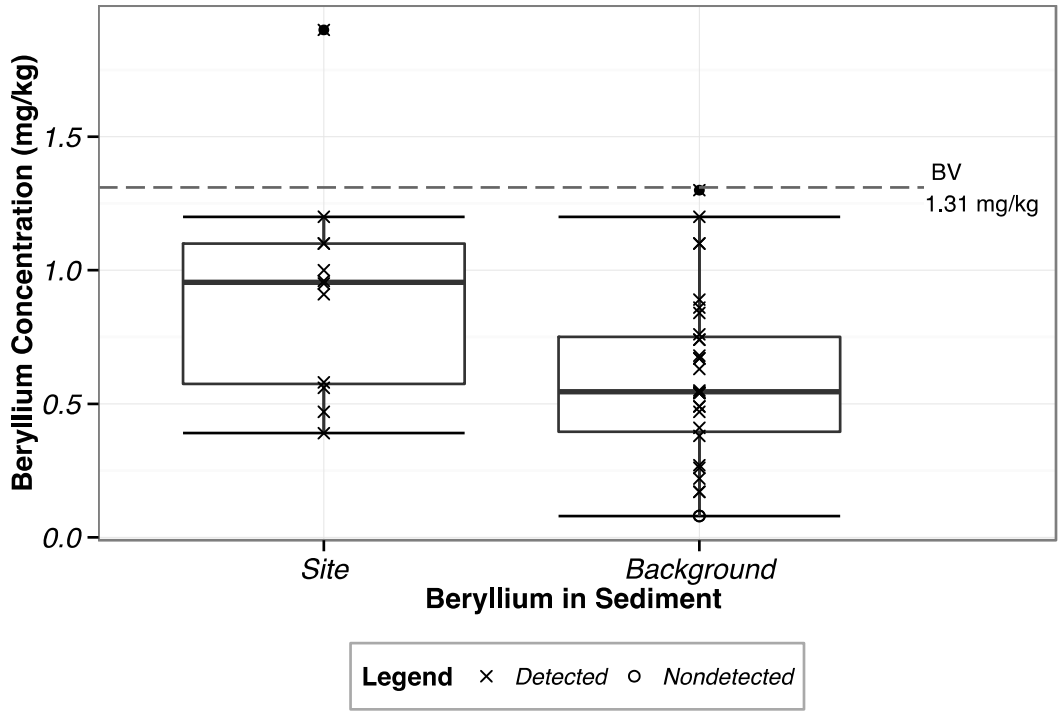


Figure H-46 Box plots for beryllium in sediment at SWMU 15-004(f)

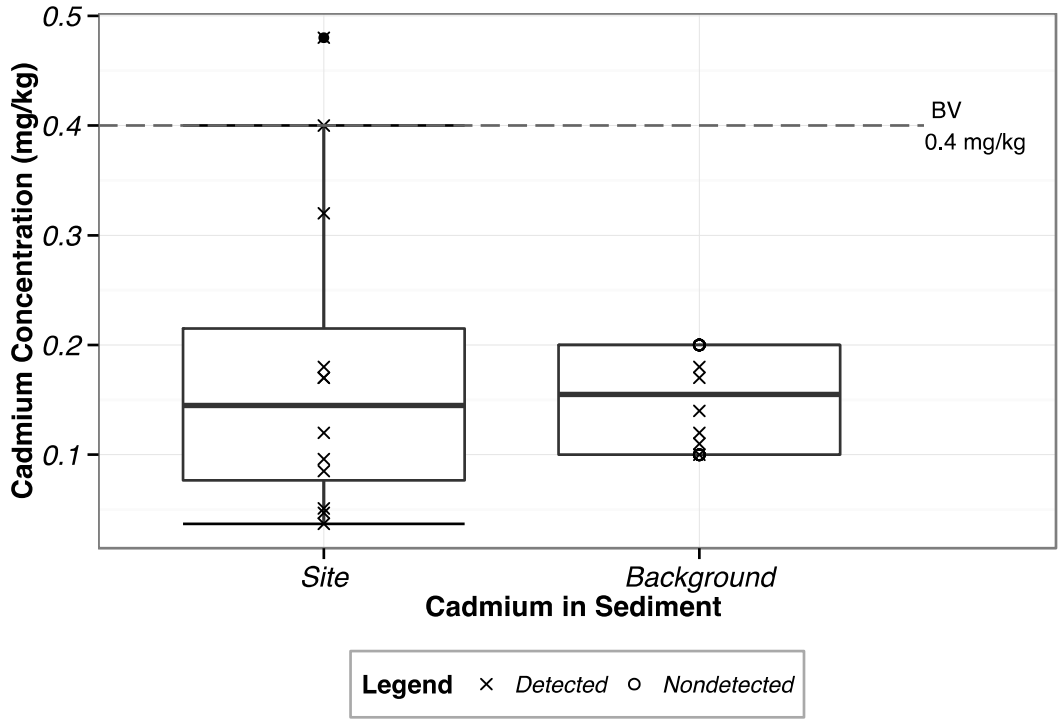


Figure H-47 Box plots for cadmium in sediment at SWMU 15-004(f)

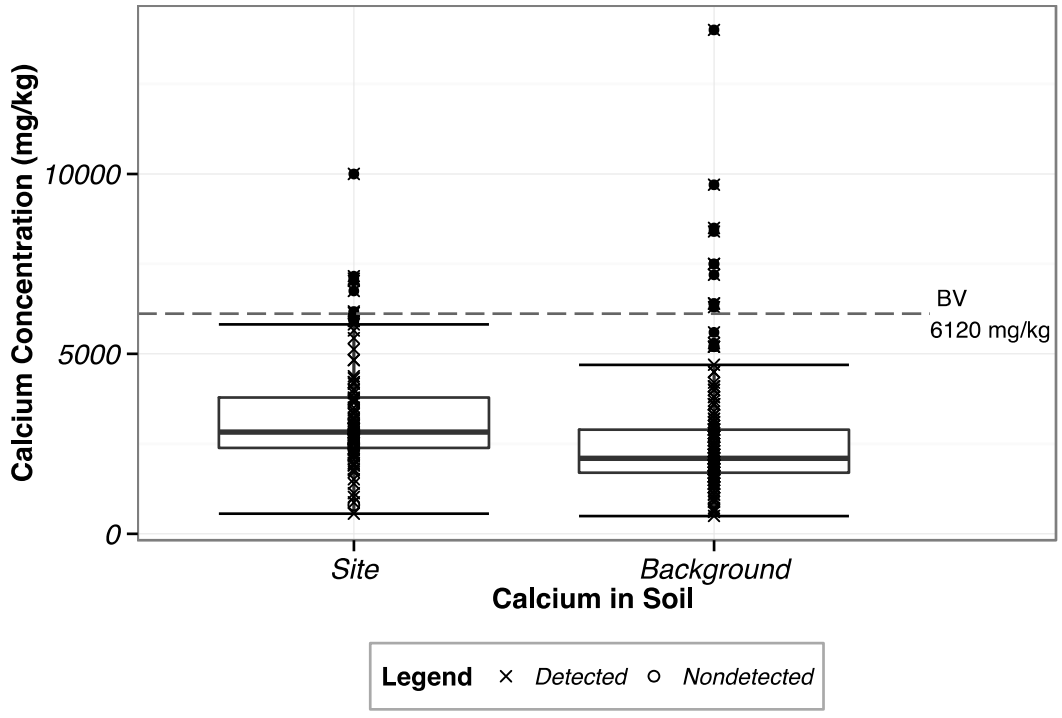


Figure H-48 Box plots for calcium in soil at SWMU 15-004(f)

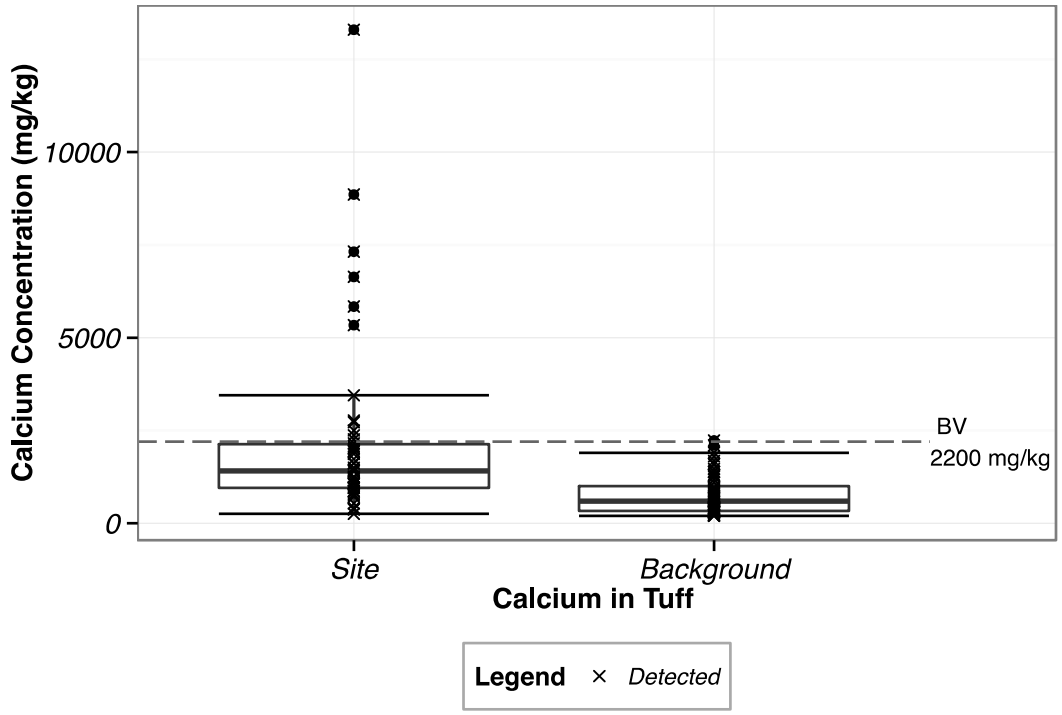


Figure H-49 Box plots for calcium in tuff at SWMU 15-004(f)

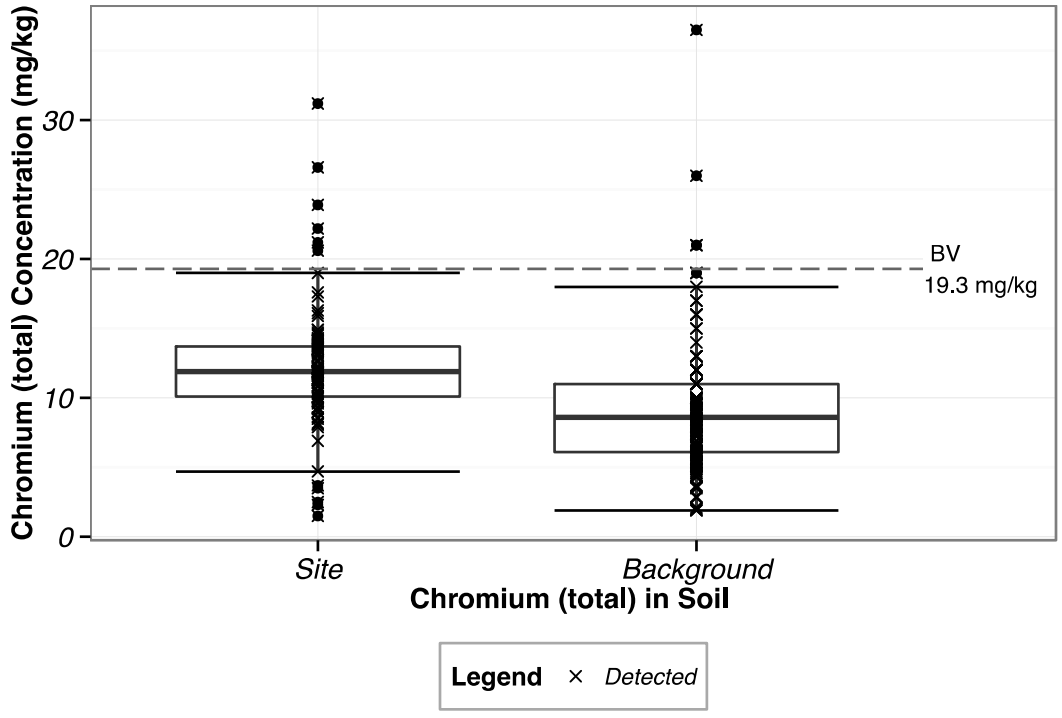


Figure H-50 Box plots for chromium (total) in soil at SWMU 15-004(f)

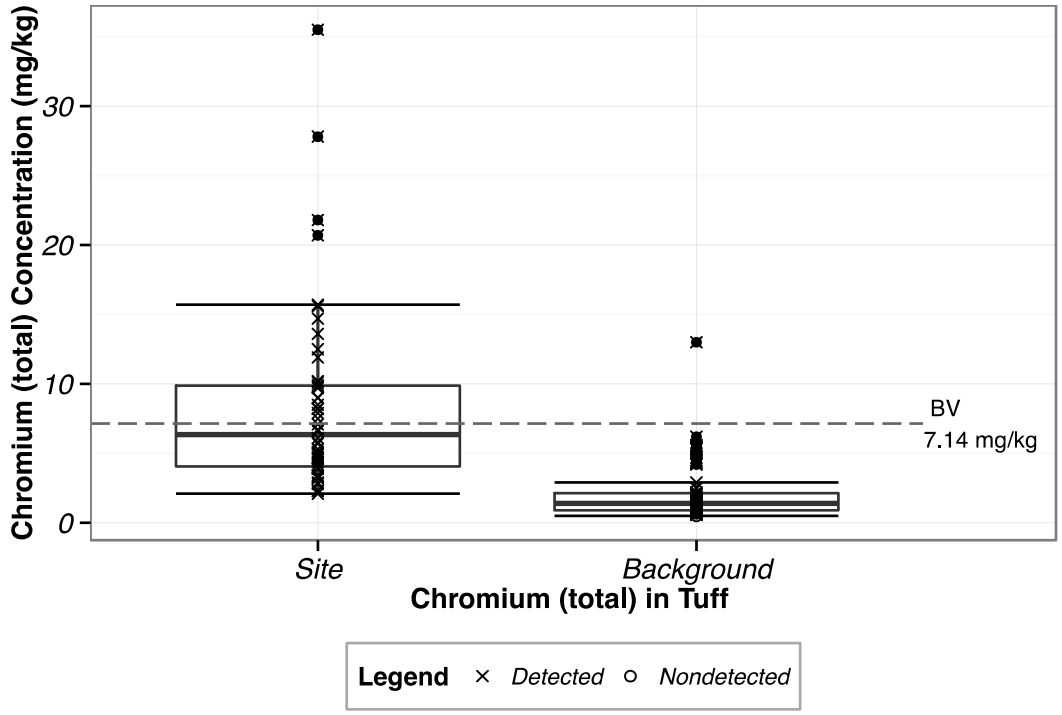


Figure H-51 Box plots for chromium (total) in tuff at SWMU 15-004(f)

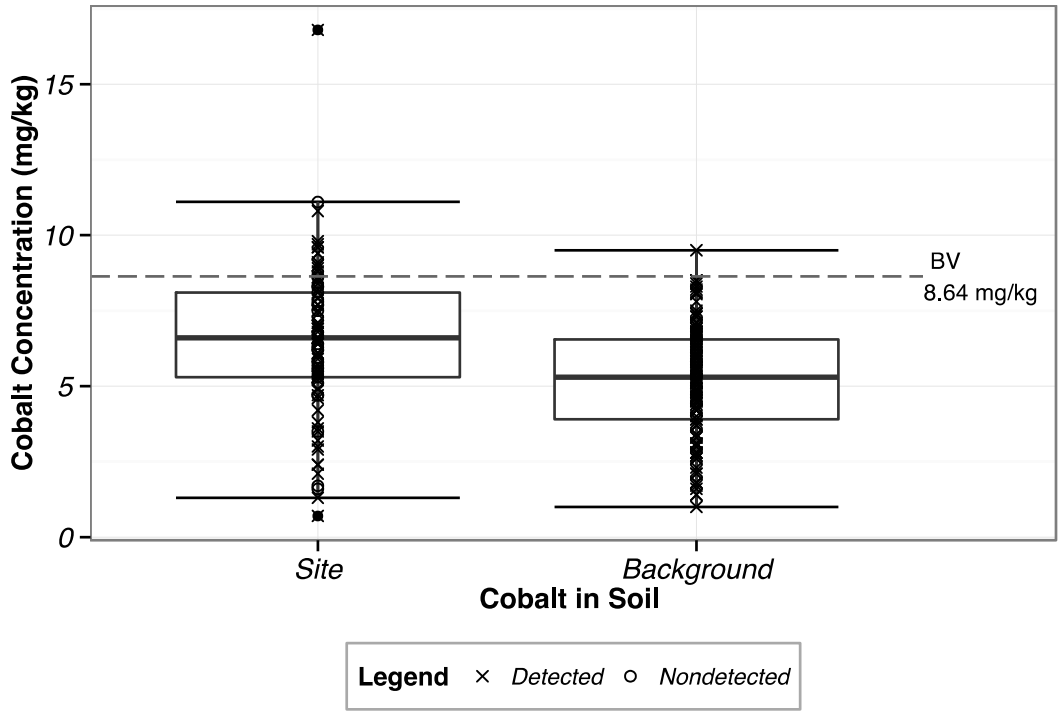


Figure H-52 Box plots for cobalt in soil at SWMU 15-004(f)

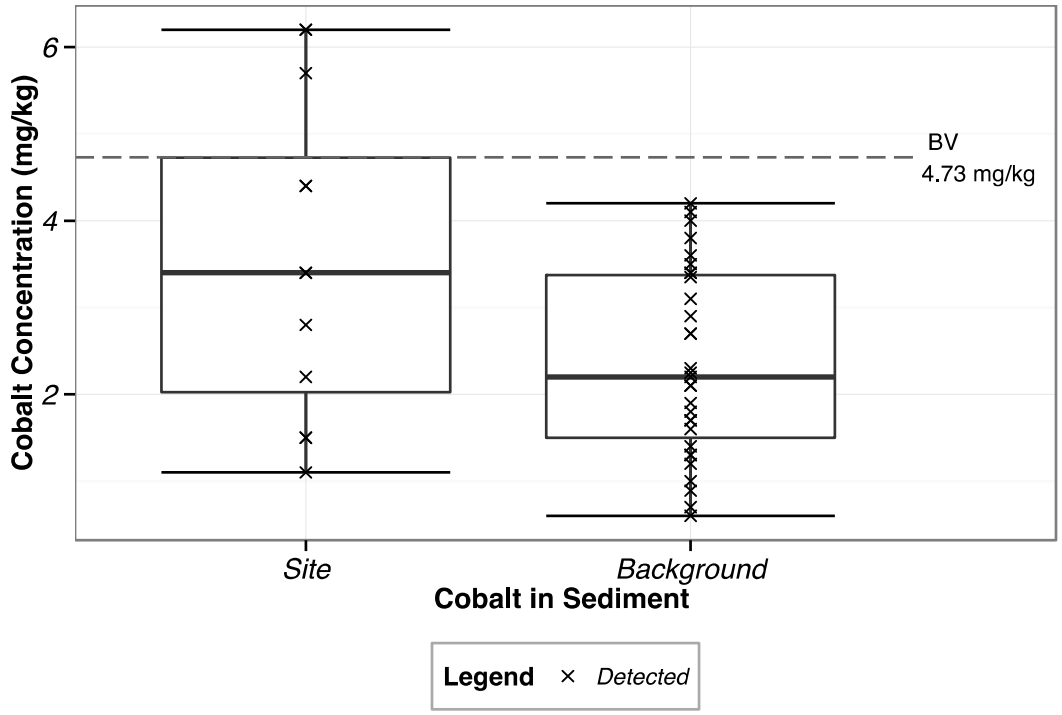


Figure H-53 Box plots for cobalt in sediment at SWMU 15-004(f)

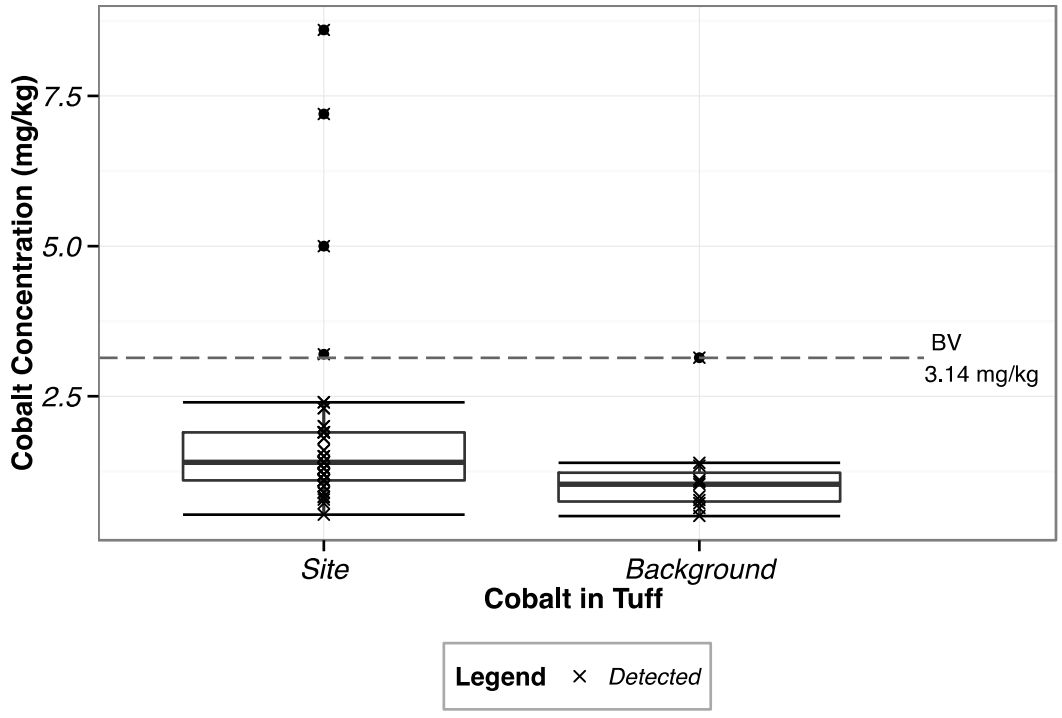


Figure H-54 Box plots for cobalt in tuff at SWMU 15-004(f)

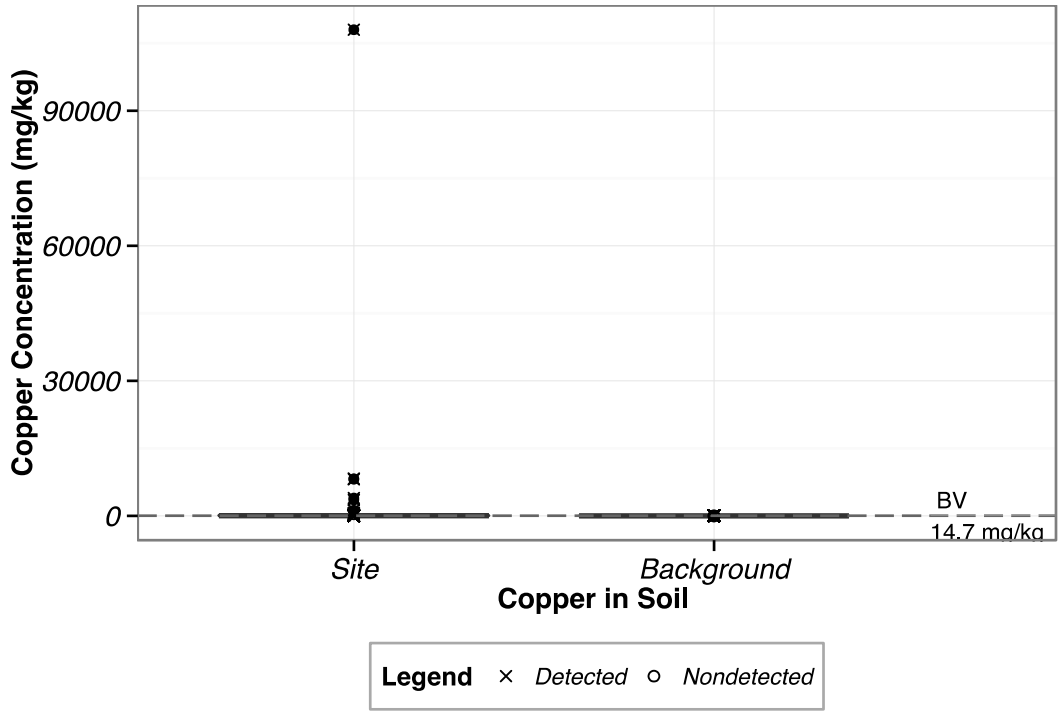


Figure H-55 Box plots for copper in soil at SWMU 15-004(f)

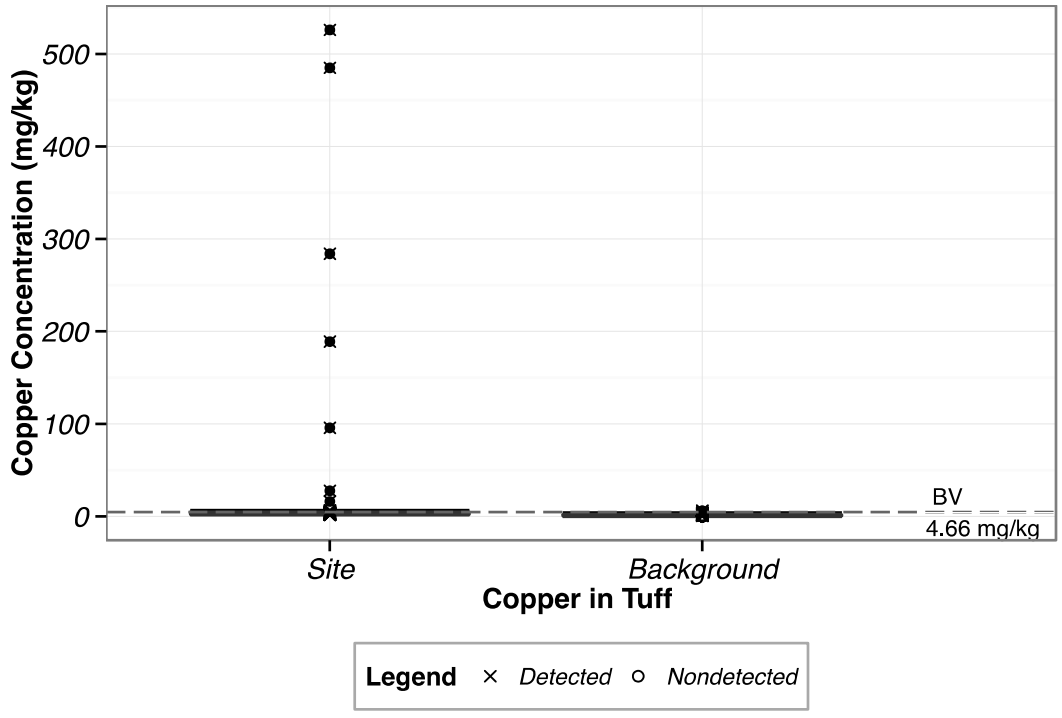


Figure H-56 Box plots for copper in tuff at SWMU 15-004(f)

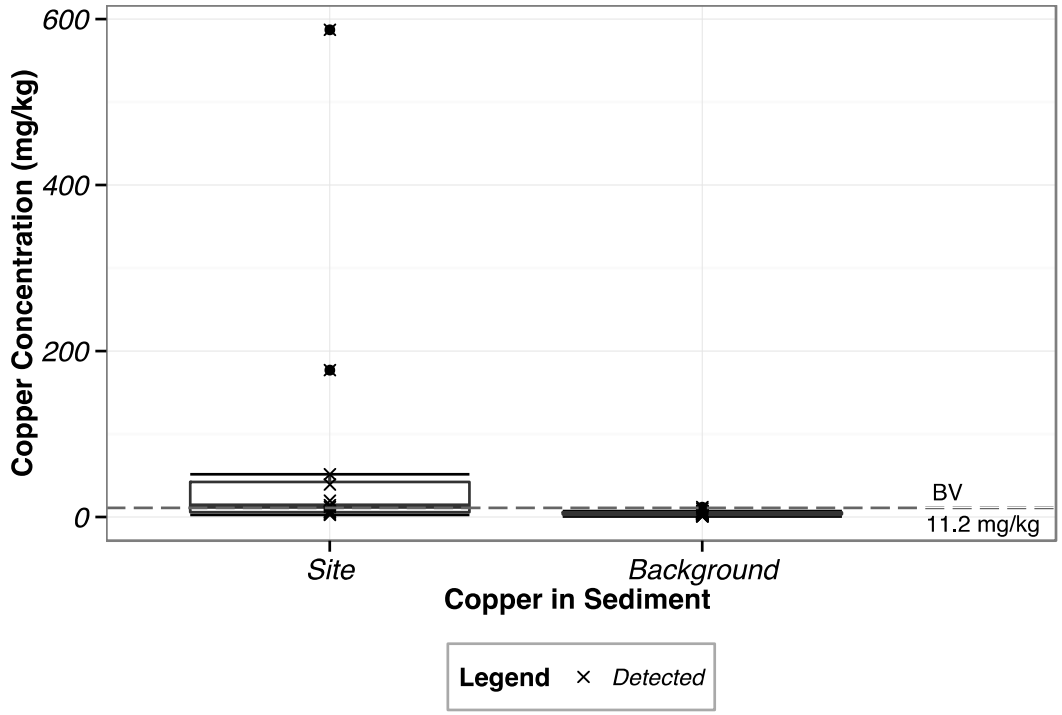


Figure H-57 Box plots for copper in sediment at SWMU 15-004(f)

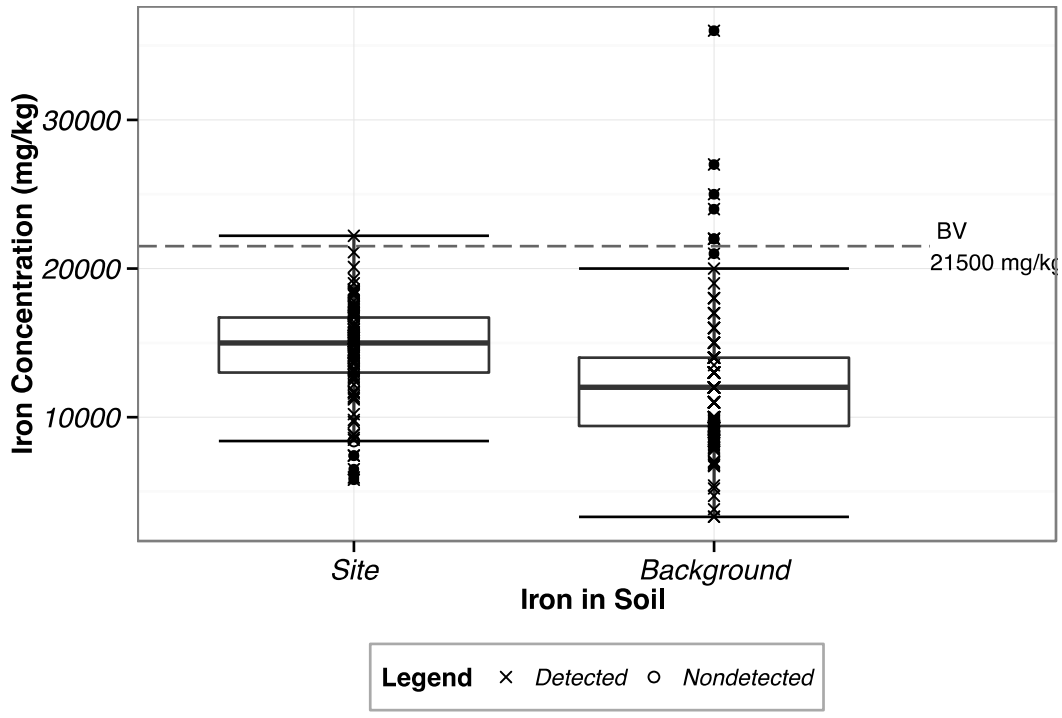


Figure H-58 Box plots for iron in soil at SWMU 15-004(f)

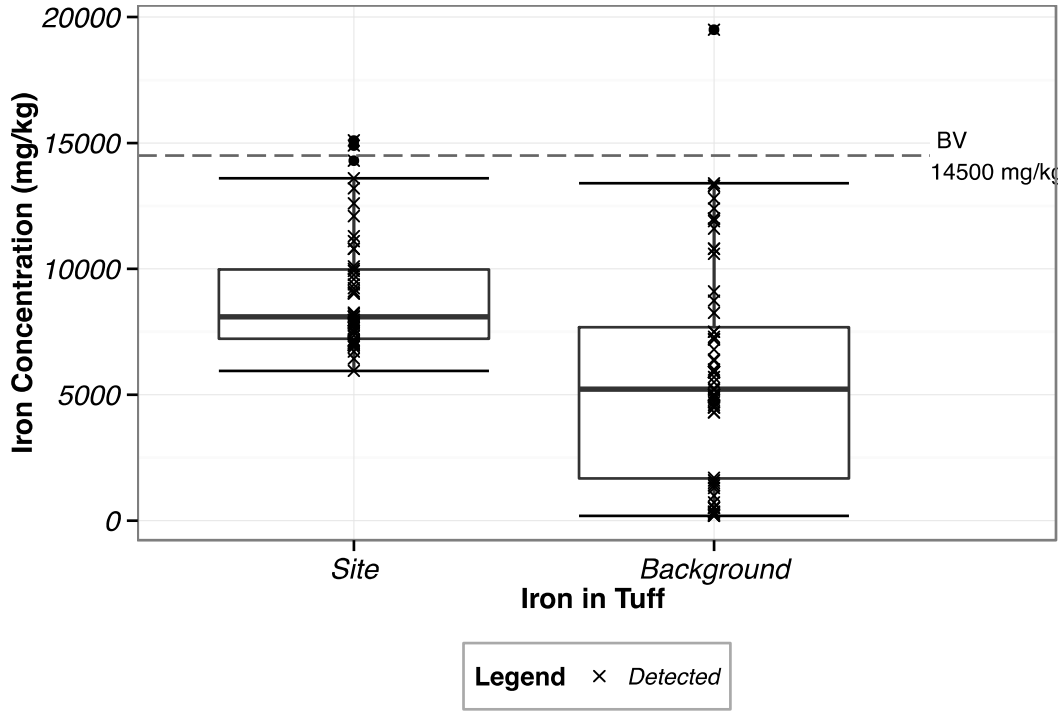


Figure H-59 Box plots for iron in tuff at SWMU 15-004(f)

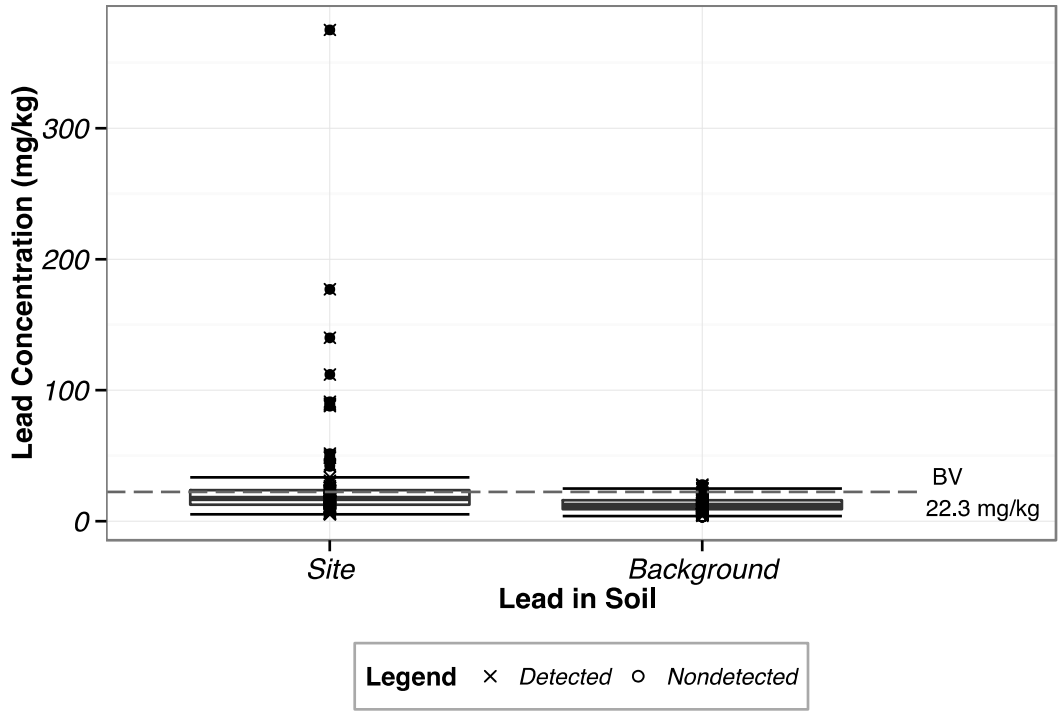


Figure H-60 Box plots for lead in soil at SWMU 15-004(f)

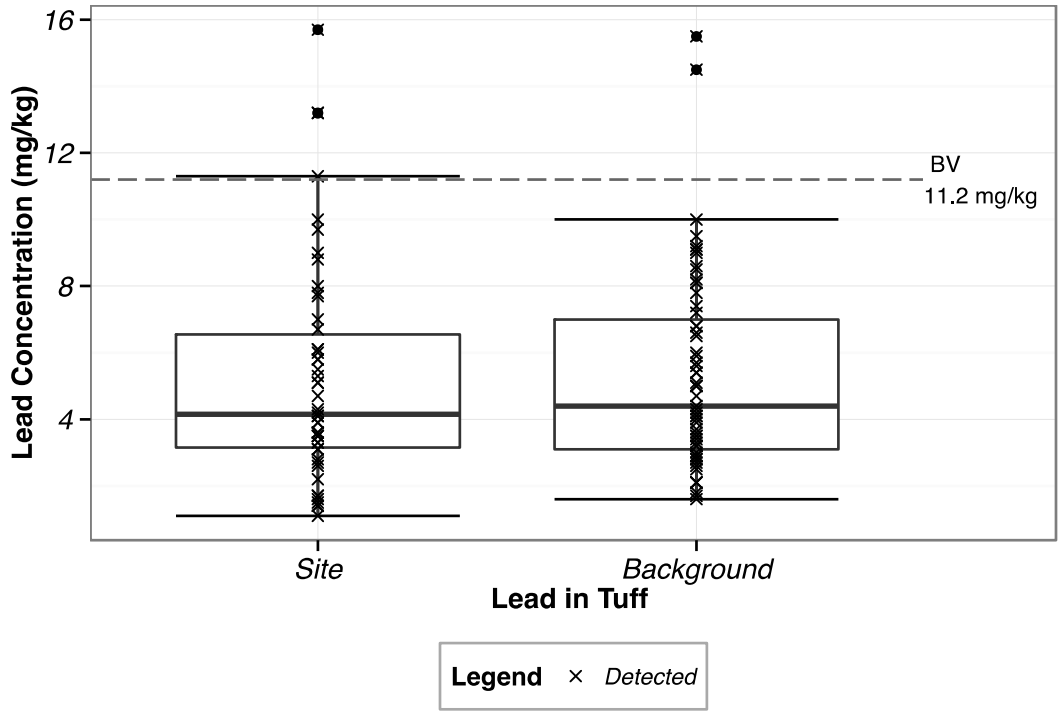


Figure H-61 Box plots for lead in tuff at SWMU 15-004(f)

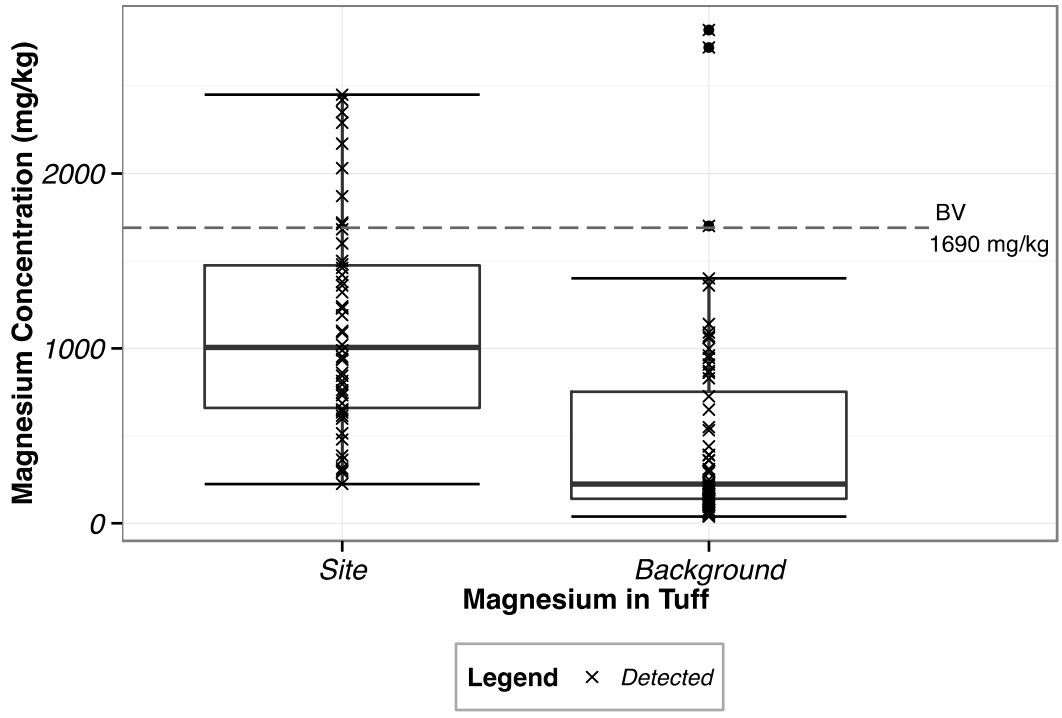


Figure H-62 Box plots for magnesium in tuff at SWMU 15-004(f)

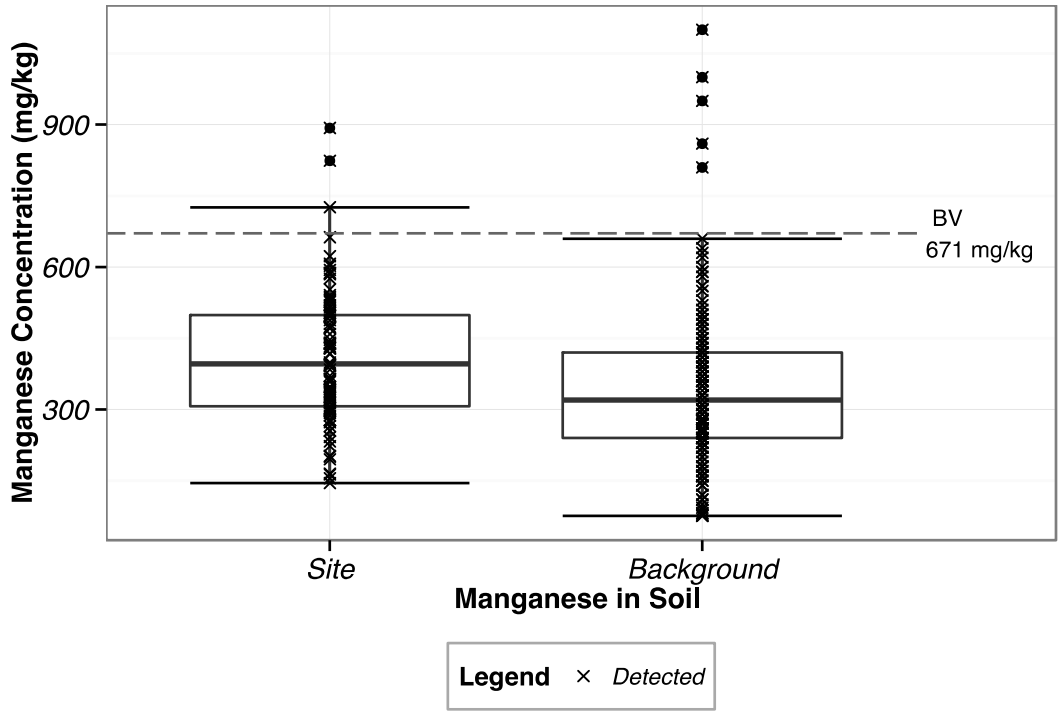


Figure H-63 Box plots for manganese in soil at SWMU 15-004(f)

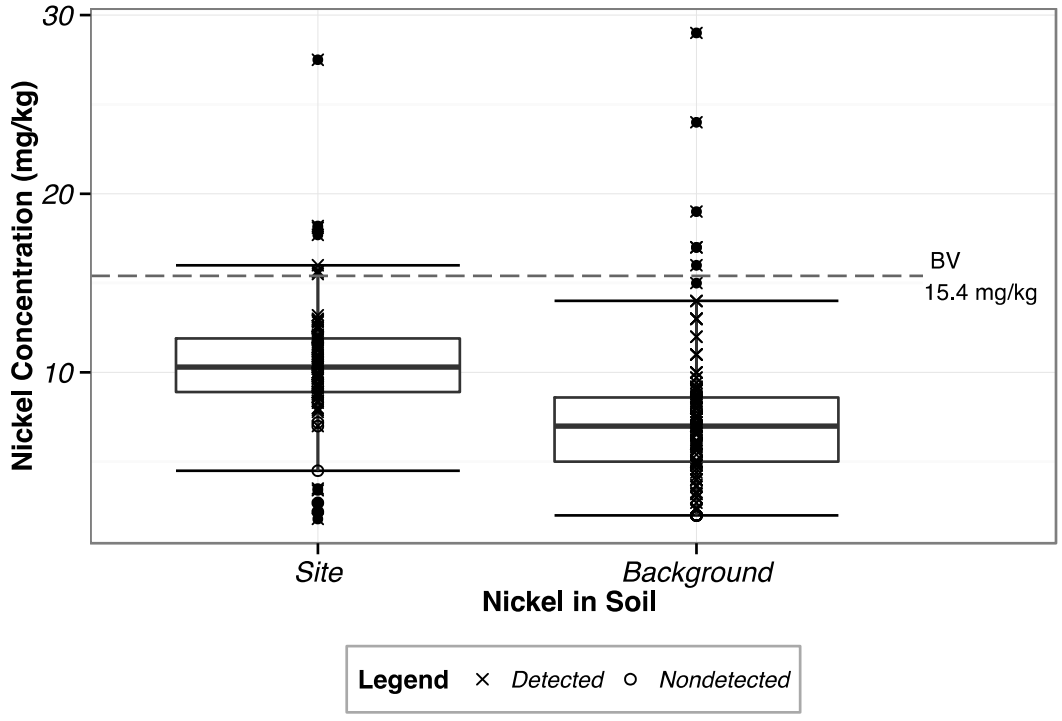


Figure H-64 Box plots for nickel in soil at SWMU 15-004(f)

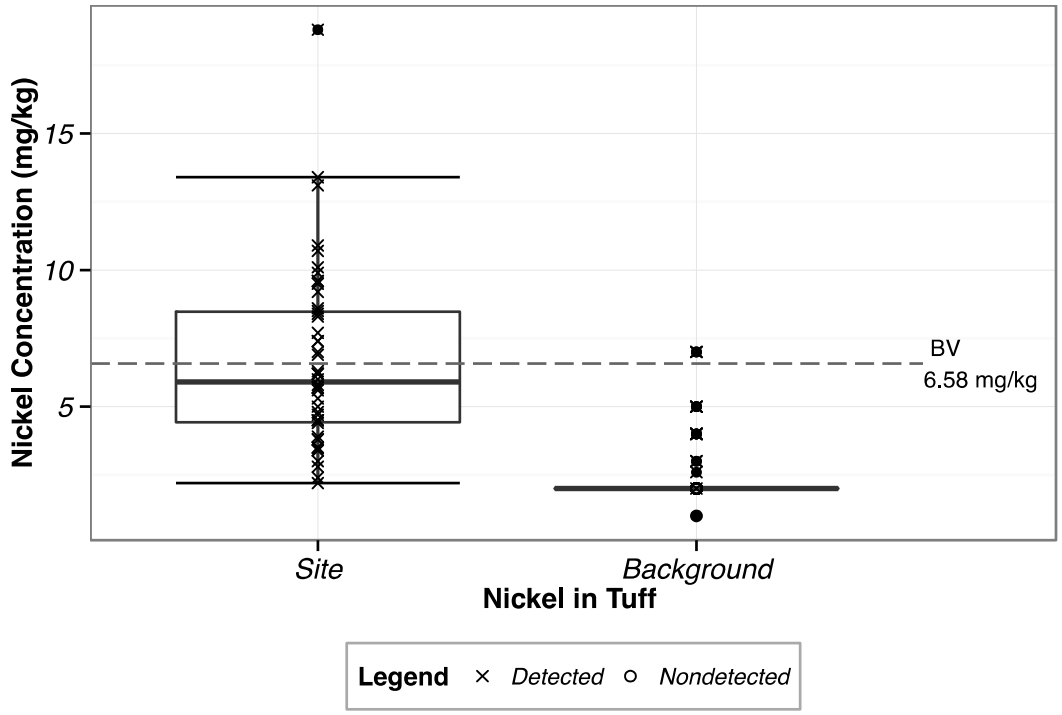


Figure H-65 Box plots for nickel in tuff at SWMU 15-004(f)

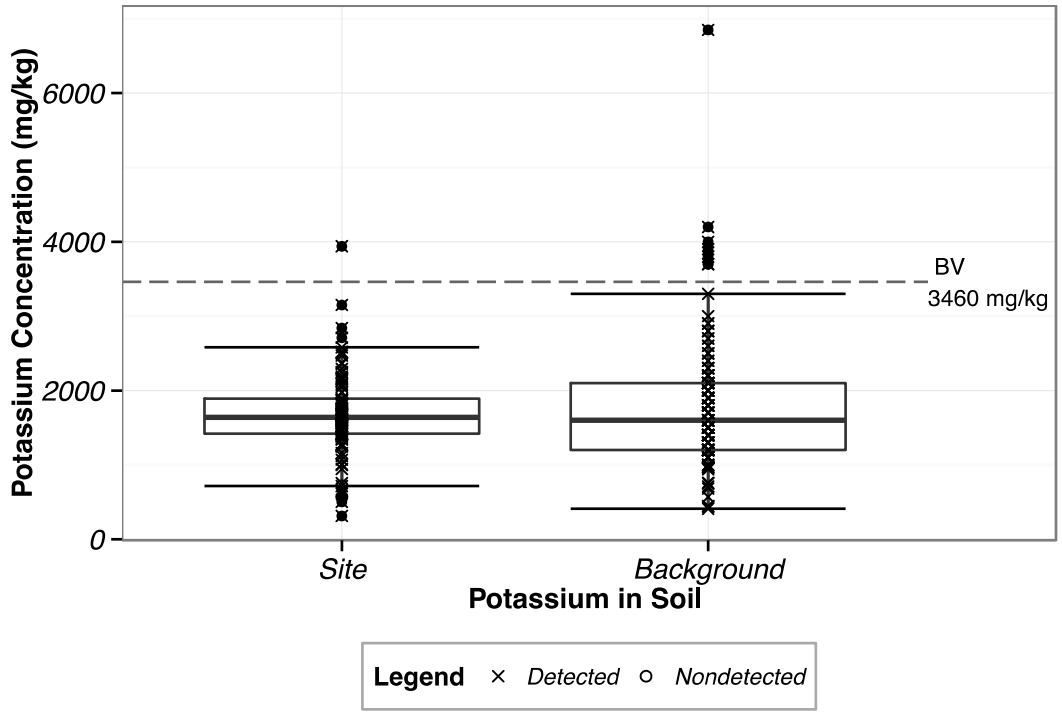


Figure H-66 Box plots for potassium in soil at SWMU 15-004(f)

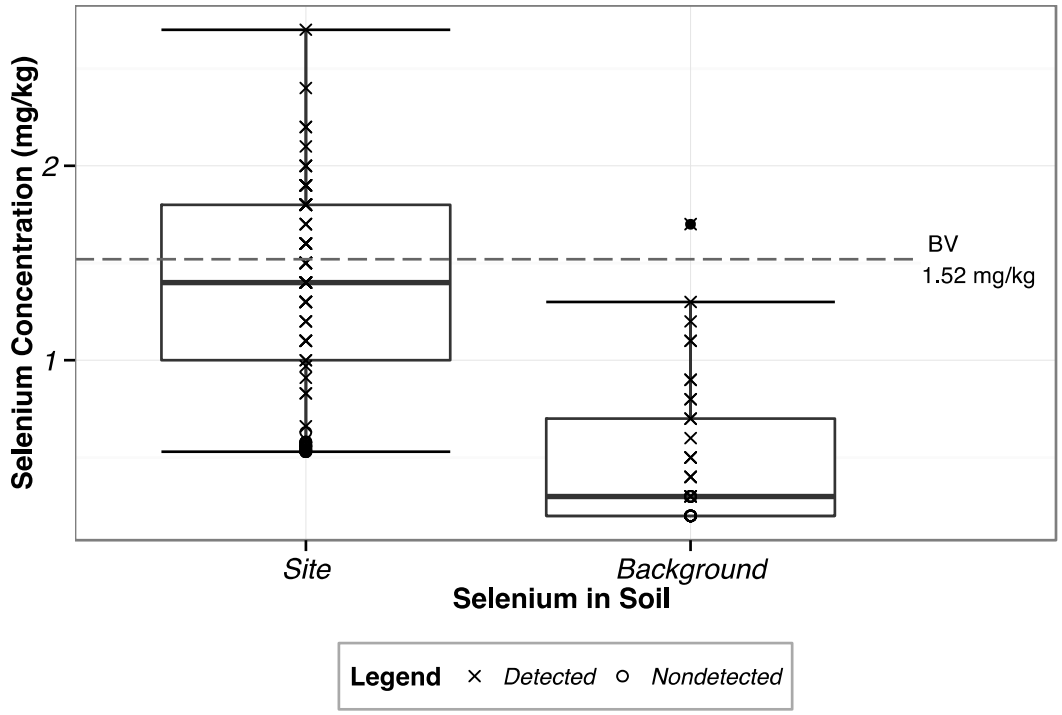


Figure H-67 Box plots for selenium in soil at SWMU 15-004(f)

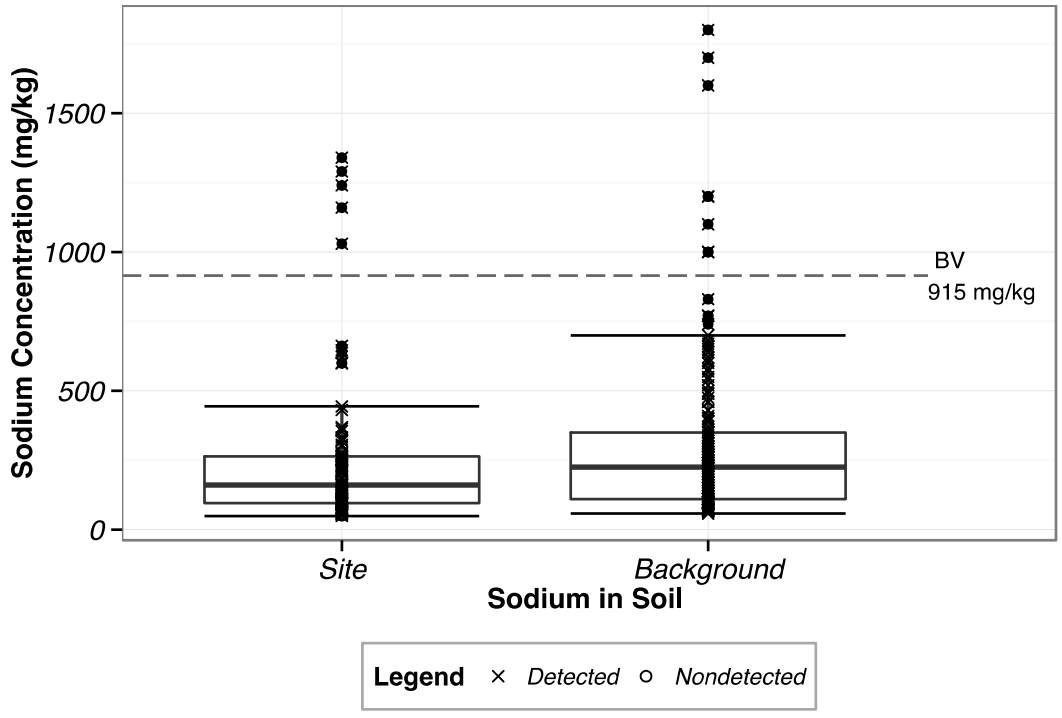


Figure H-68 Box plots for sodium in soil at SWMU 15-004(f)

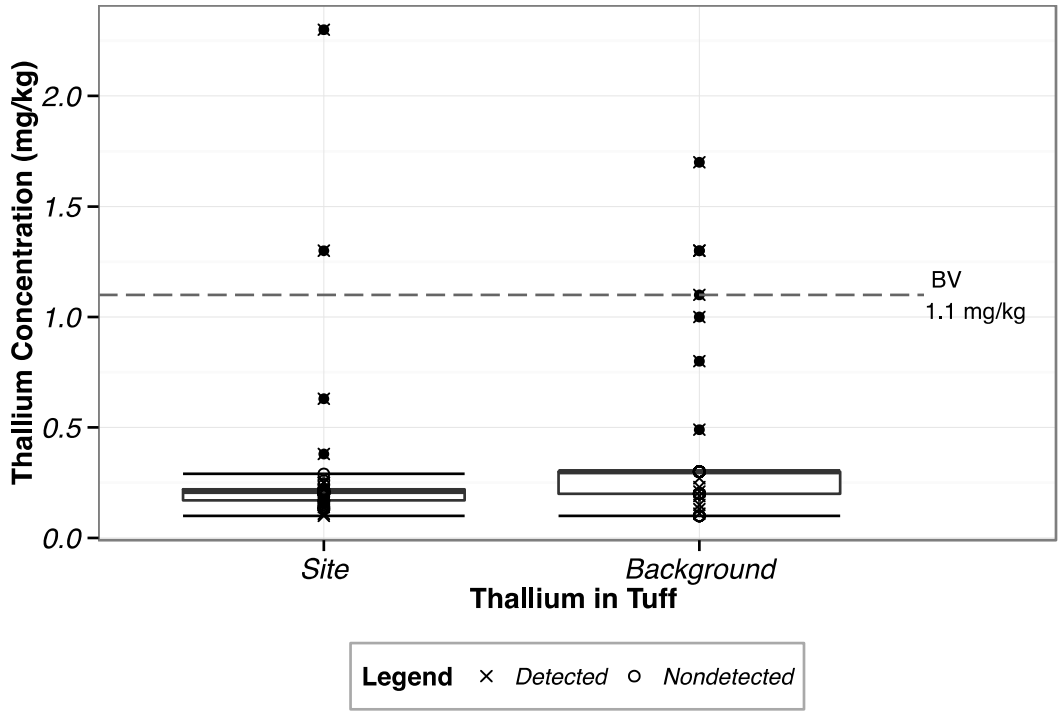


Figure H-69 Box plots for thallium in tuff at SWMU 15-004(f)

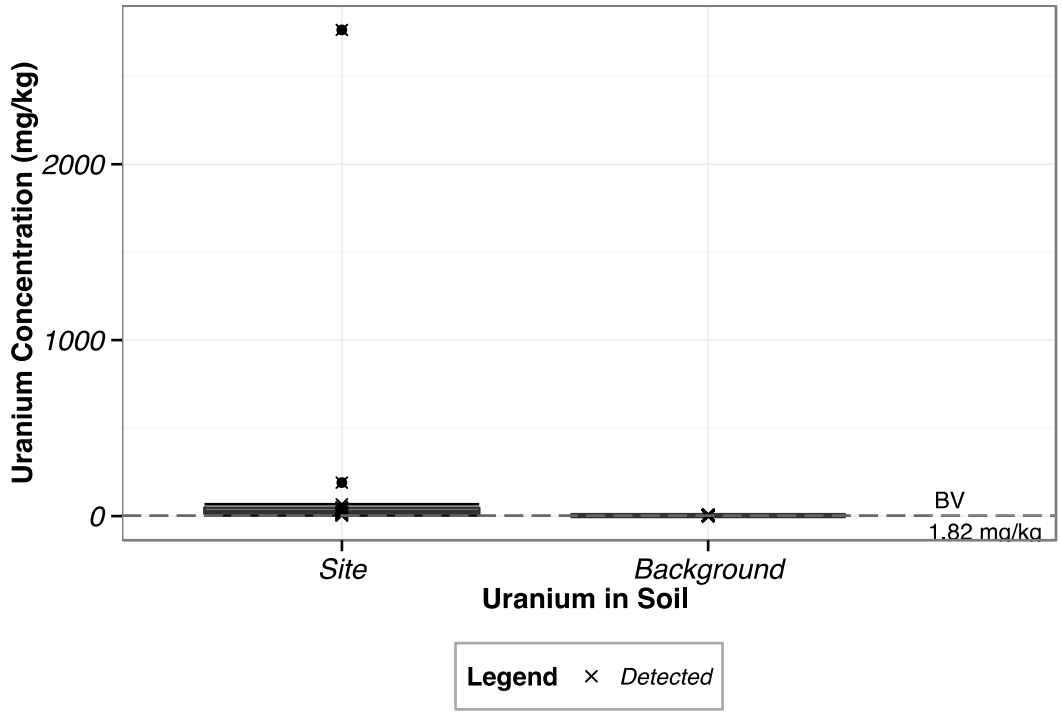


Figure H-70 Box plots for uranium in soil at SWMU 15-004(f)

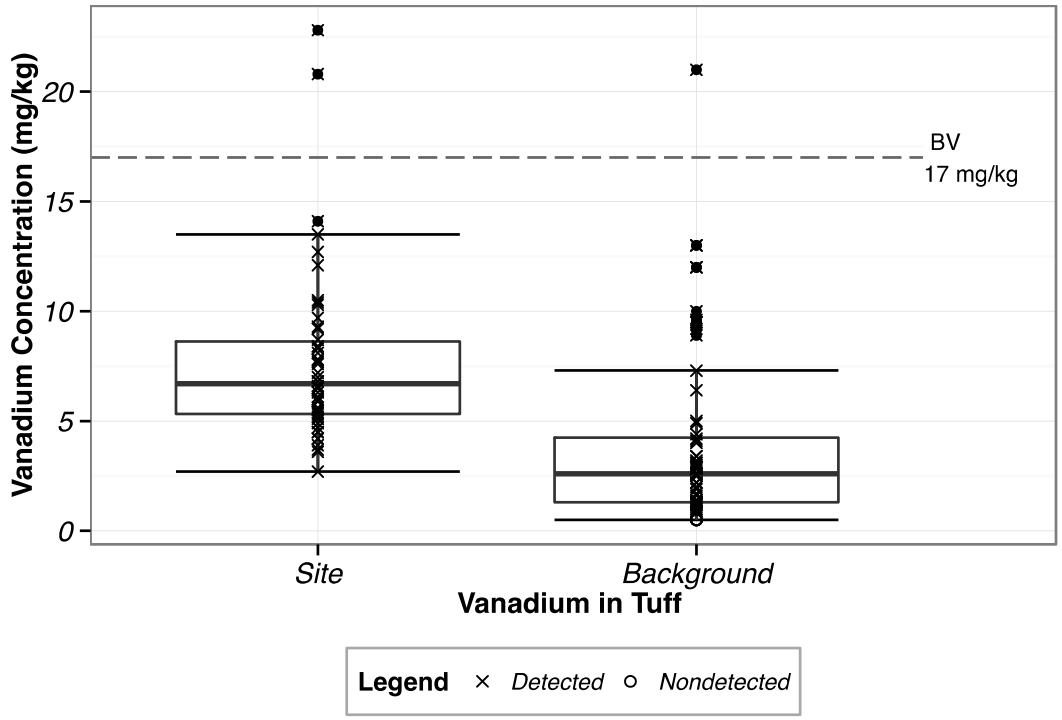


Figure H-71 Box plots for vanadium in tuff at SWMU 15-004(f)

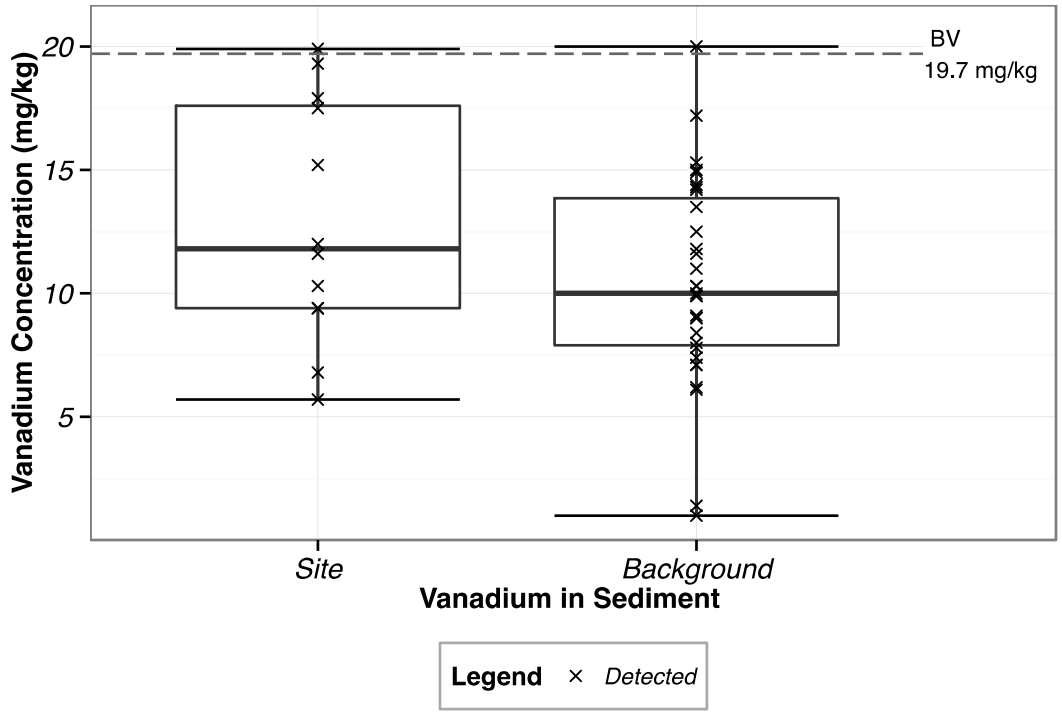


Figure H-72 Box plots for vanadium in sediment at SWMU 15-004(f)

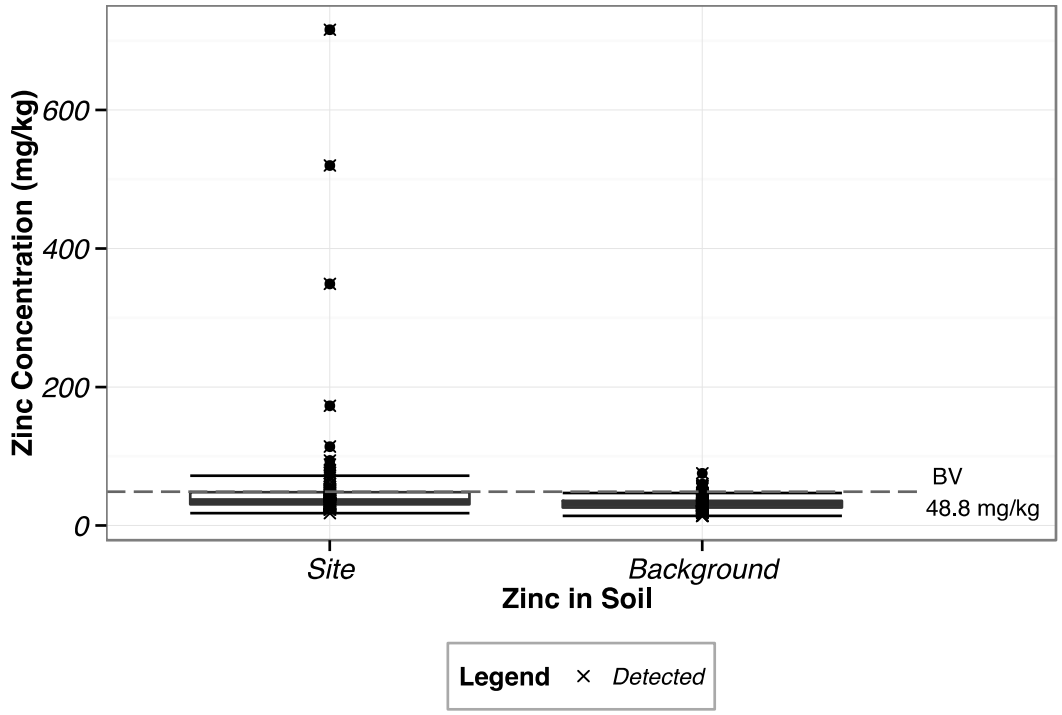


Figure H-73 Box plots for zinc in soil at SWMU 15-004(f)

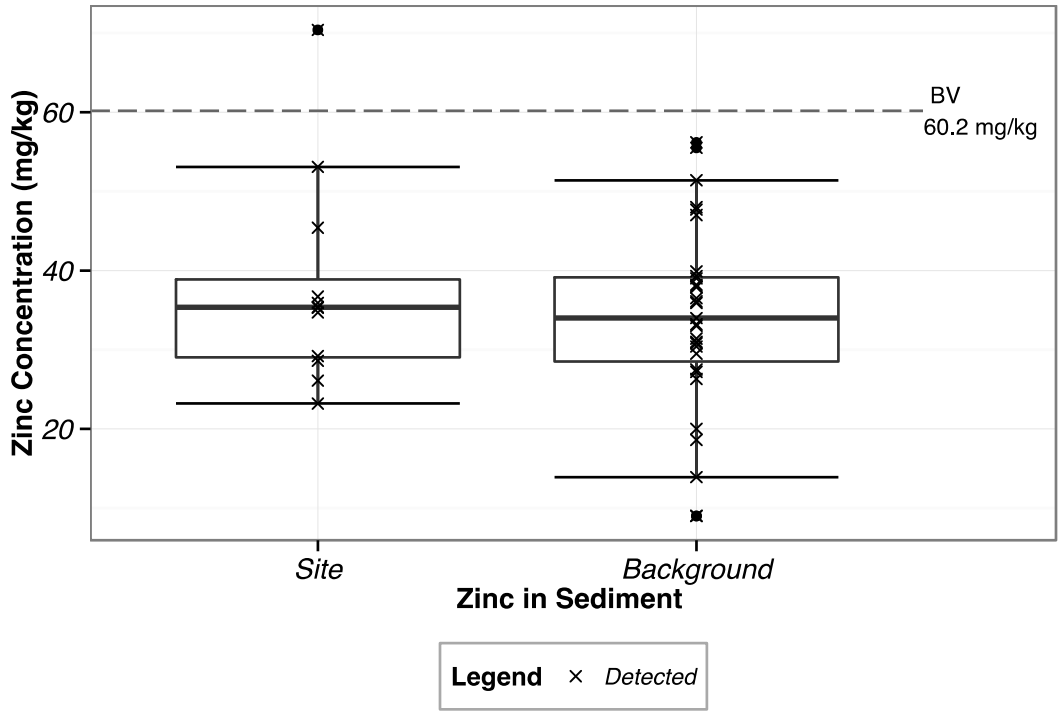


Figure H-74 Box plots for zinc in sediment at SWMU 15-004(f)

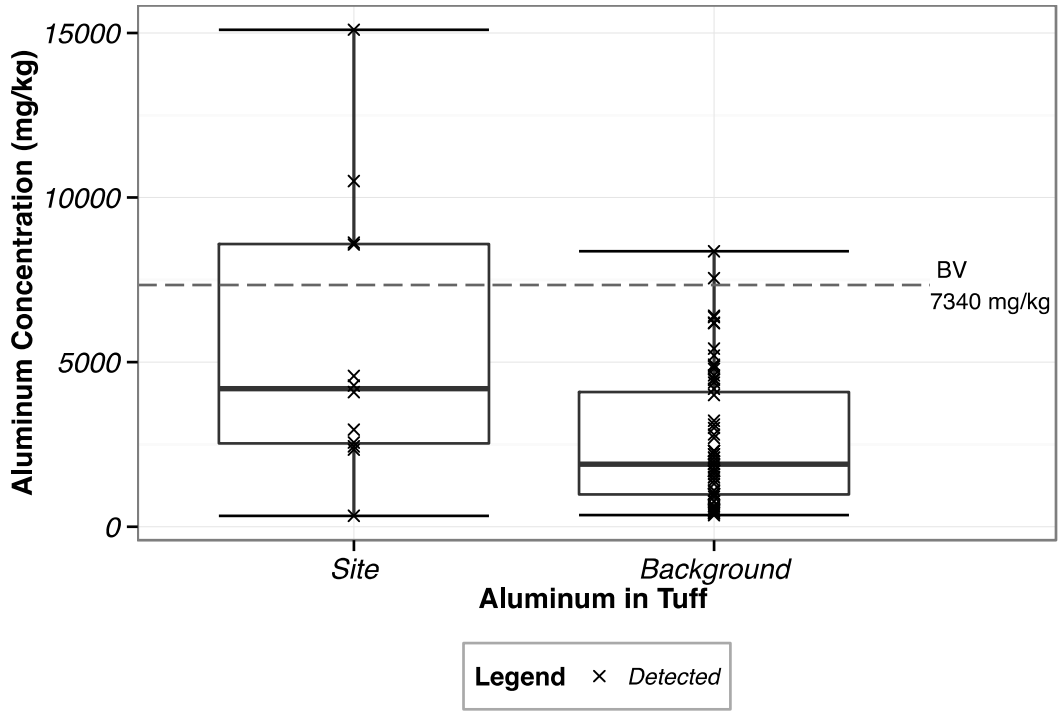


Figure H-75 Box plots for aluminum in tuff at SWMU 15-008(a)

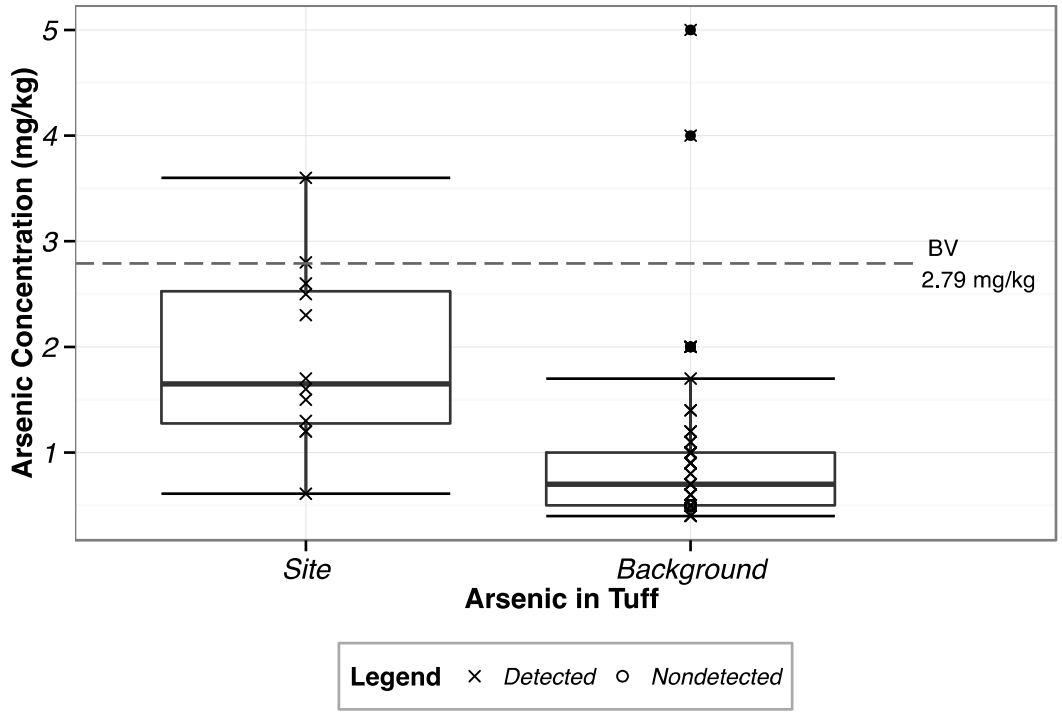


Figure H-76 Box plots for arsenic in tuff at SWMU 15-008(a)

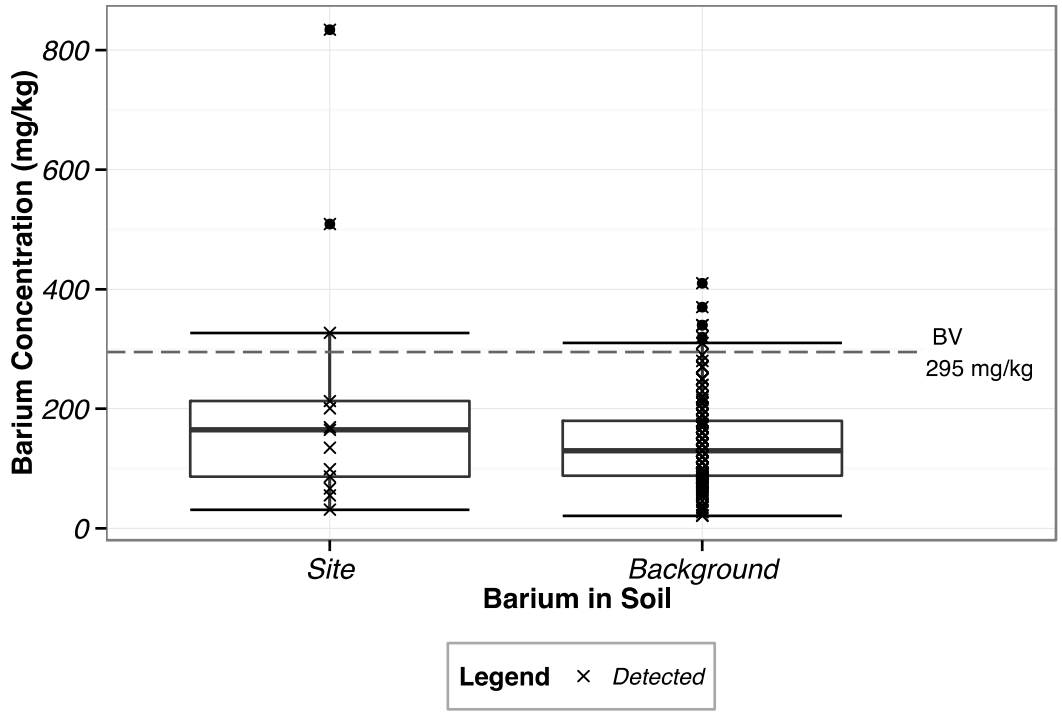


Figure H-77 Box plots for barium in soil at SWMU 15-008(a)

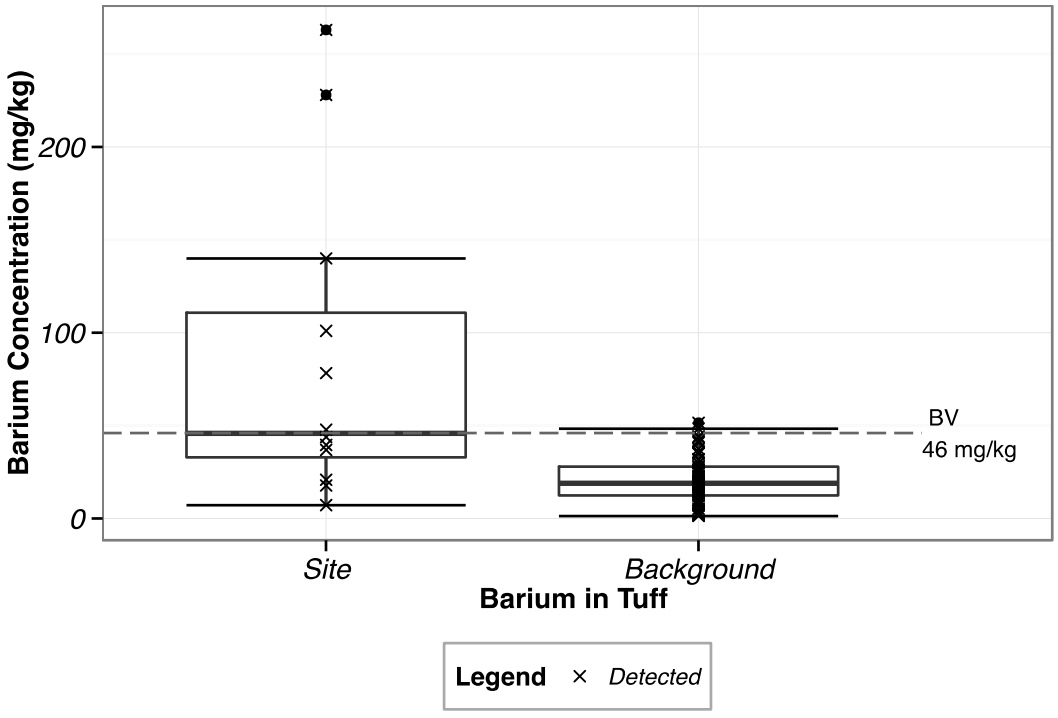


Figure H-78 Box plots for barium in tuff at SWMU 15-008(a)

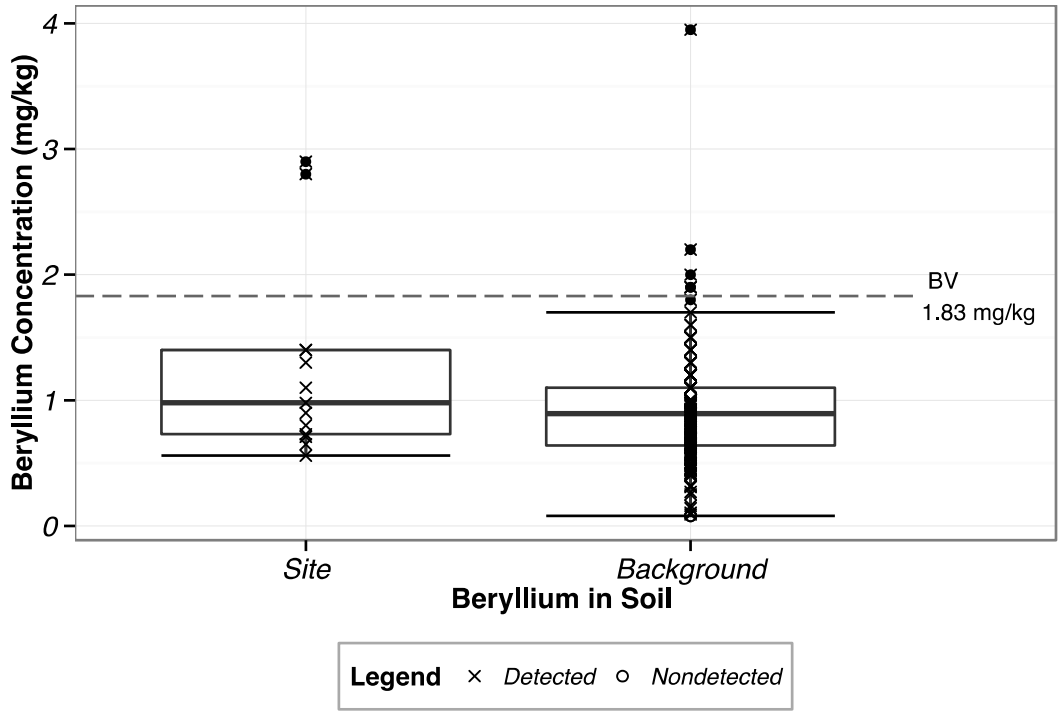


Figure H-79 Box plots for beryllium in soil at SWMU 15-008(a)

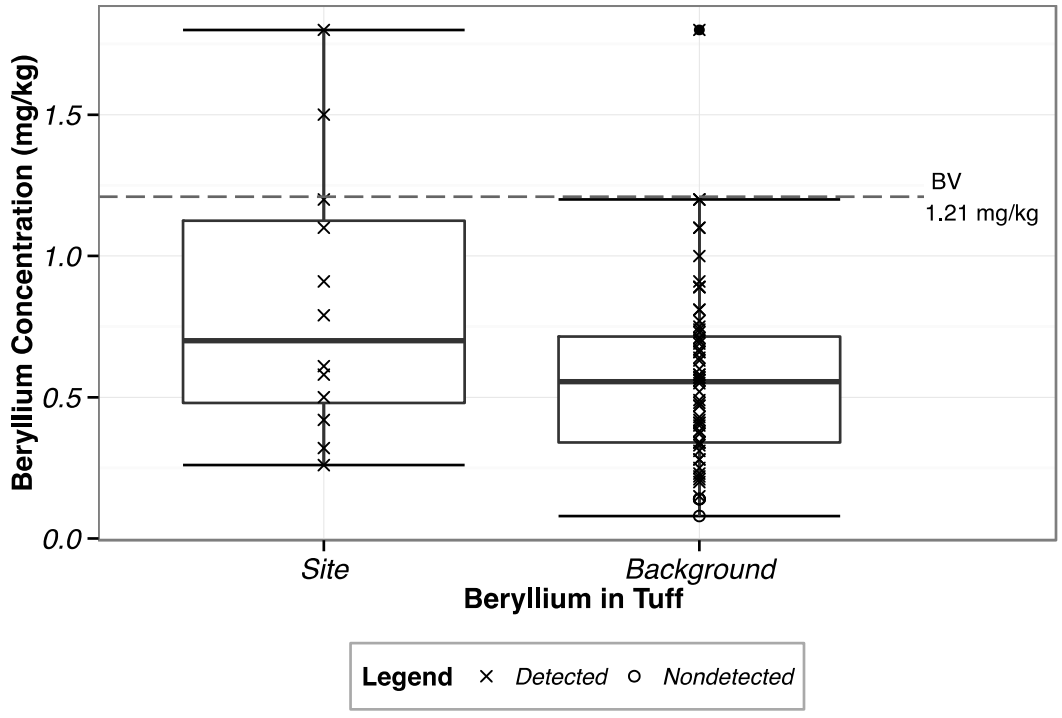


Figure H-80 Box plots for beryllium in tuff at SWMU 15-008(a)

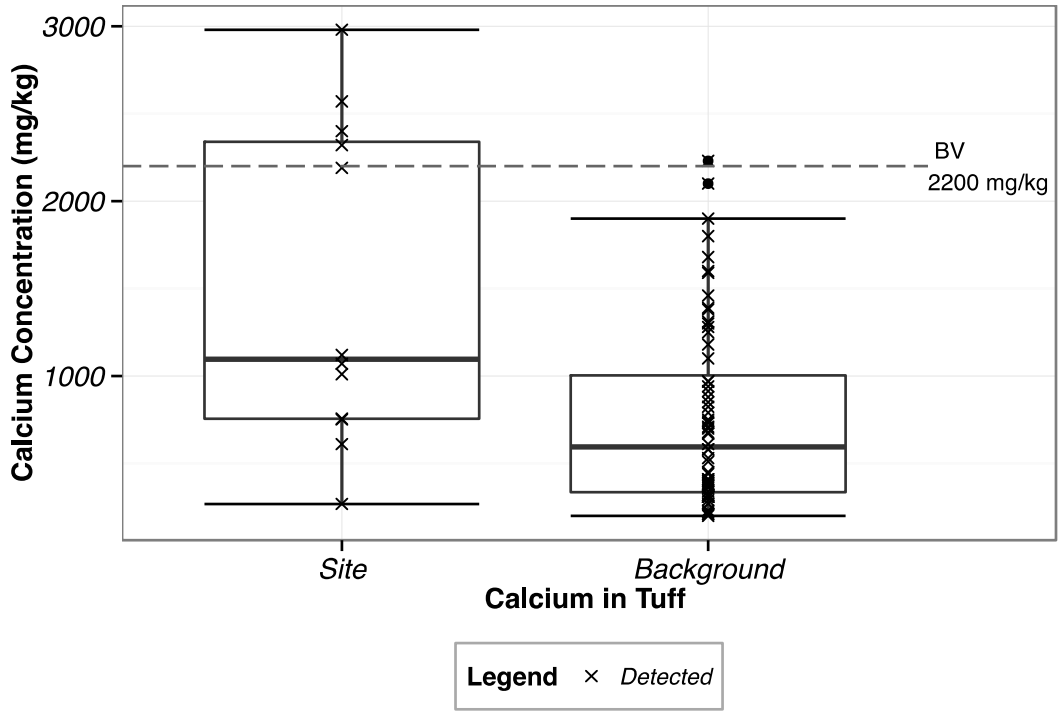


Figure H-81 Box plots for calcium in tuff at SWMU 15-008(a)

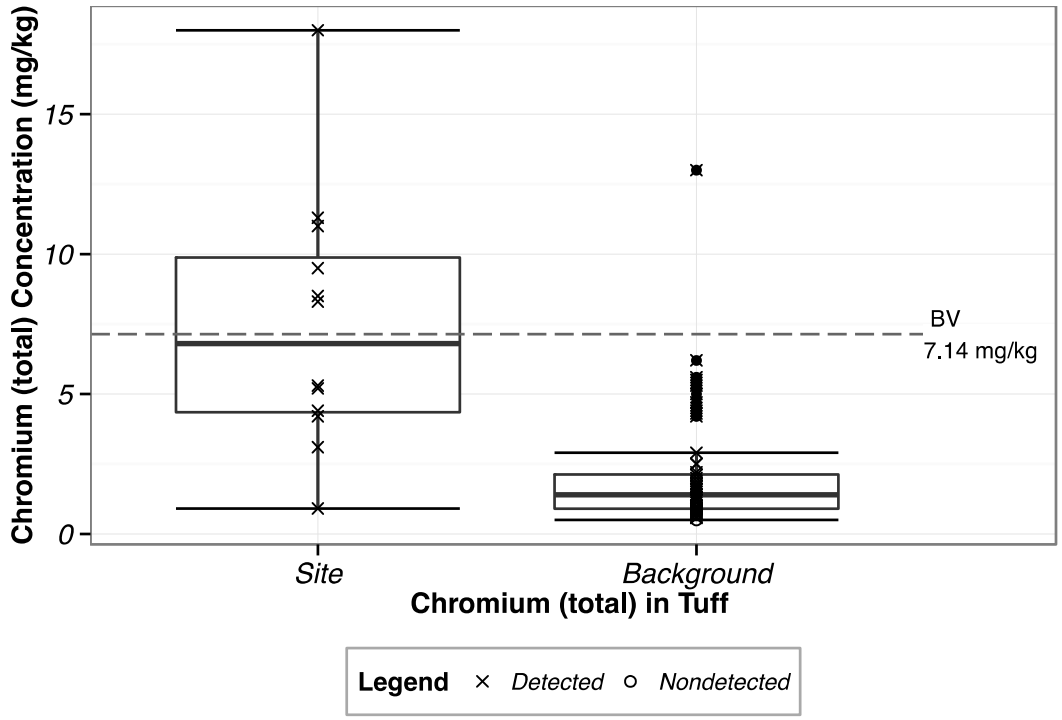


Figure H-82 Box plots for chromium (total) in tuff at SWMU 15-008(a)

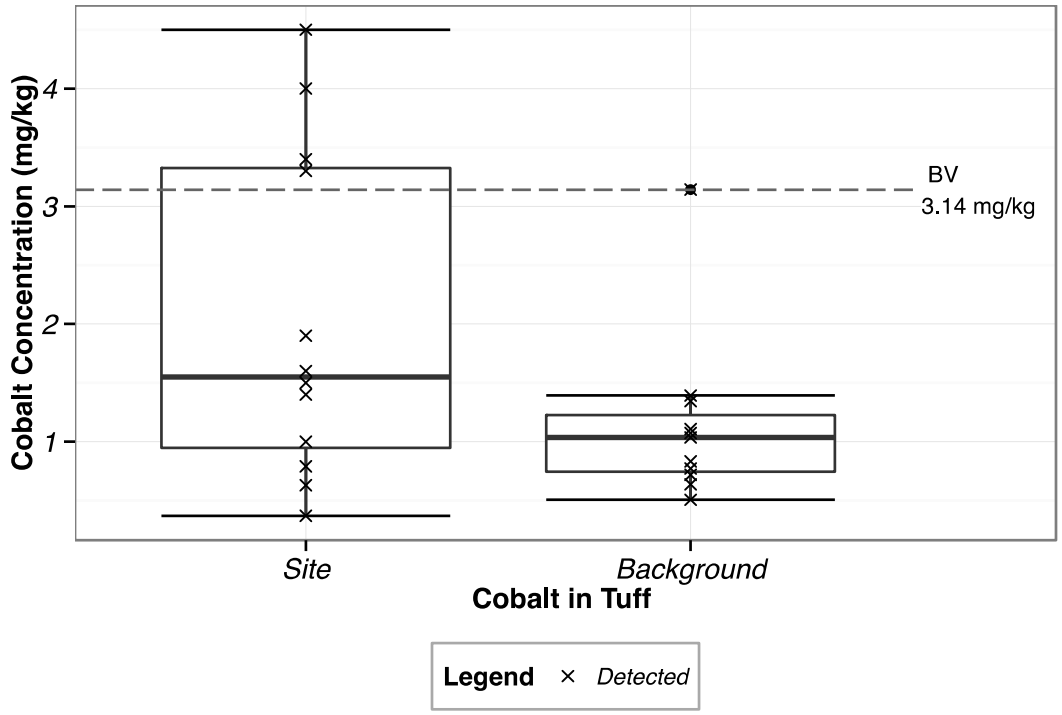


Figure H-83 Box plots for cobalt in tuff at SWMU 15-008(a)

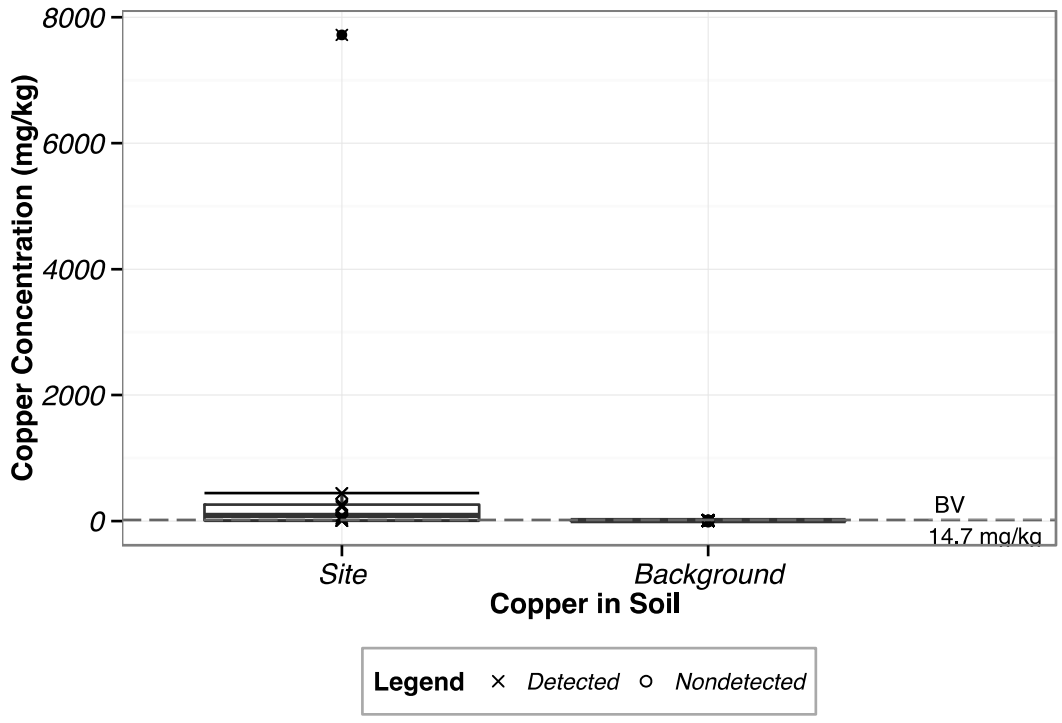


Figure H-84 Box plots for copper in soil at SWMU 15-008(a)

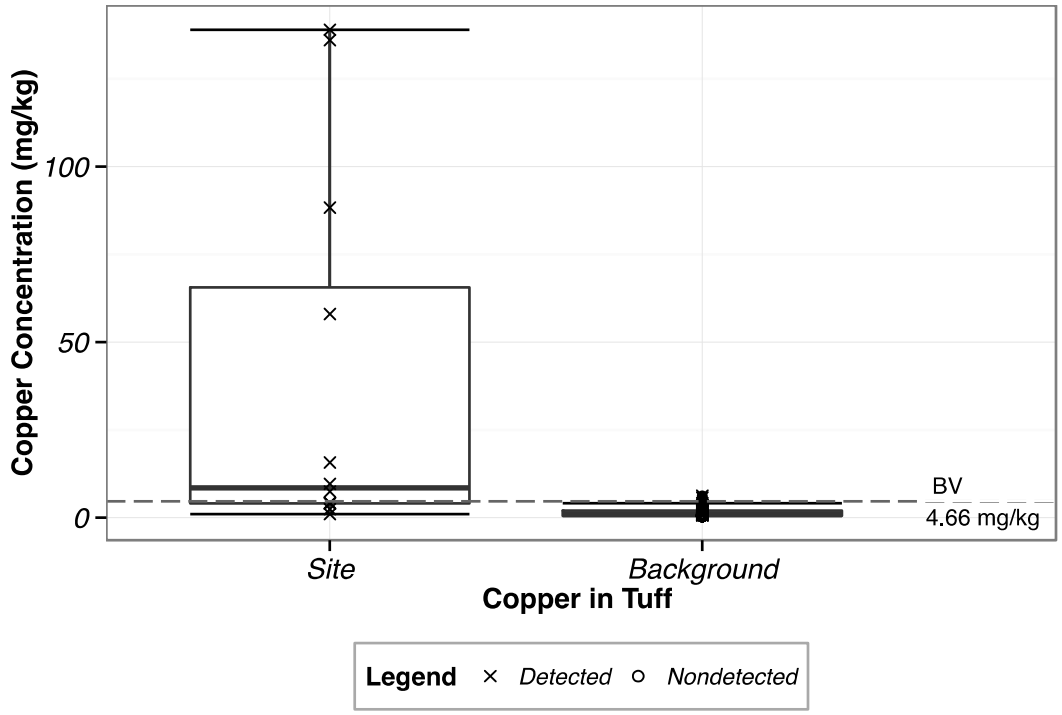


Figure H-85 Box plots for copper in tuff at SWMU 15-008(a)

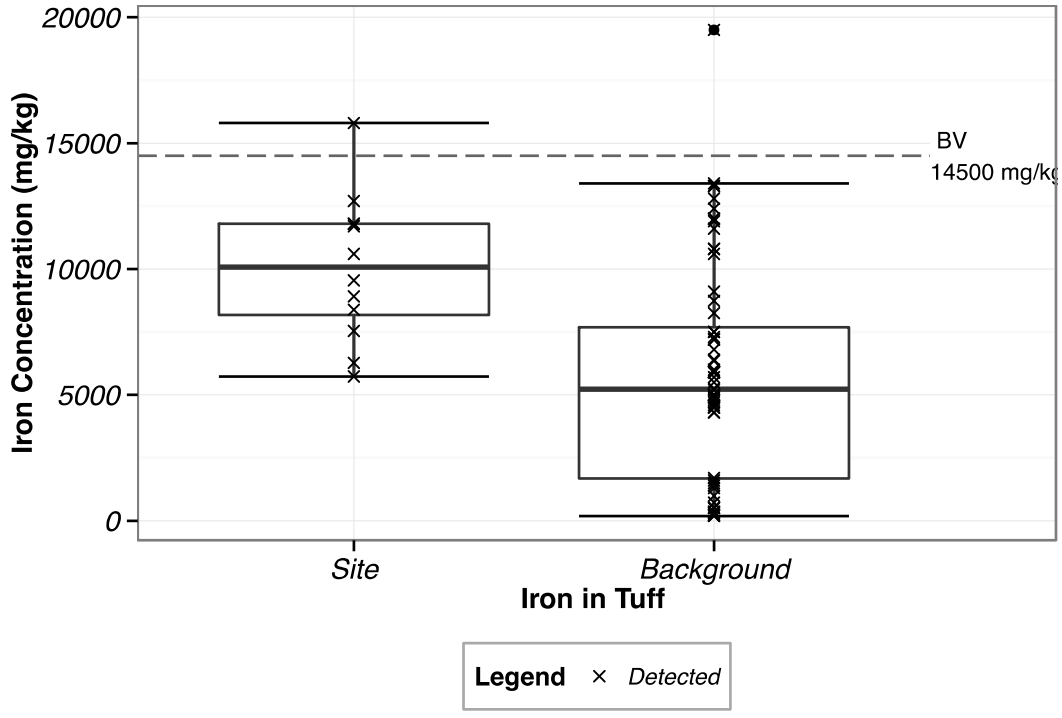


Figure H-86 Box plots for iron in tuff at SWMU 15-008(a)

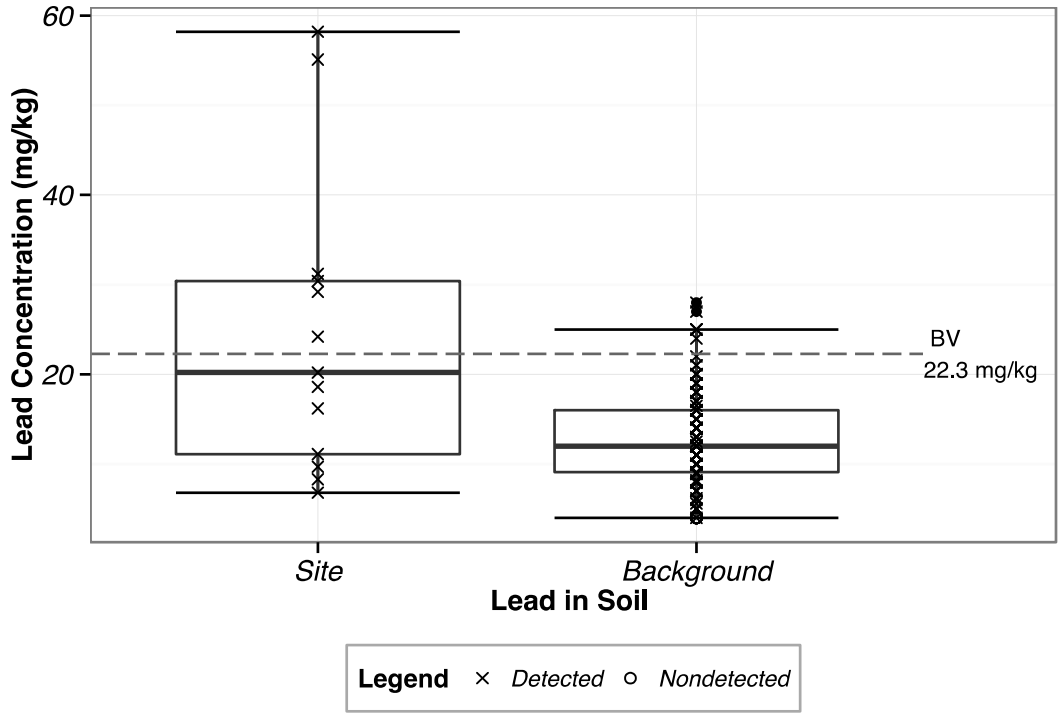


Figure H-87 Box plots for lead in soil at SWMU 15-008(a)

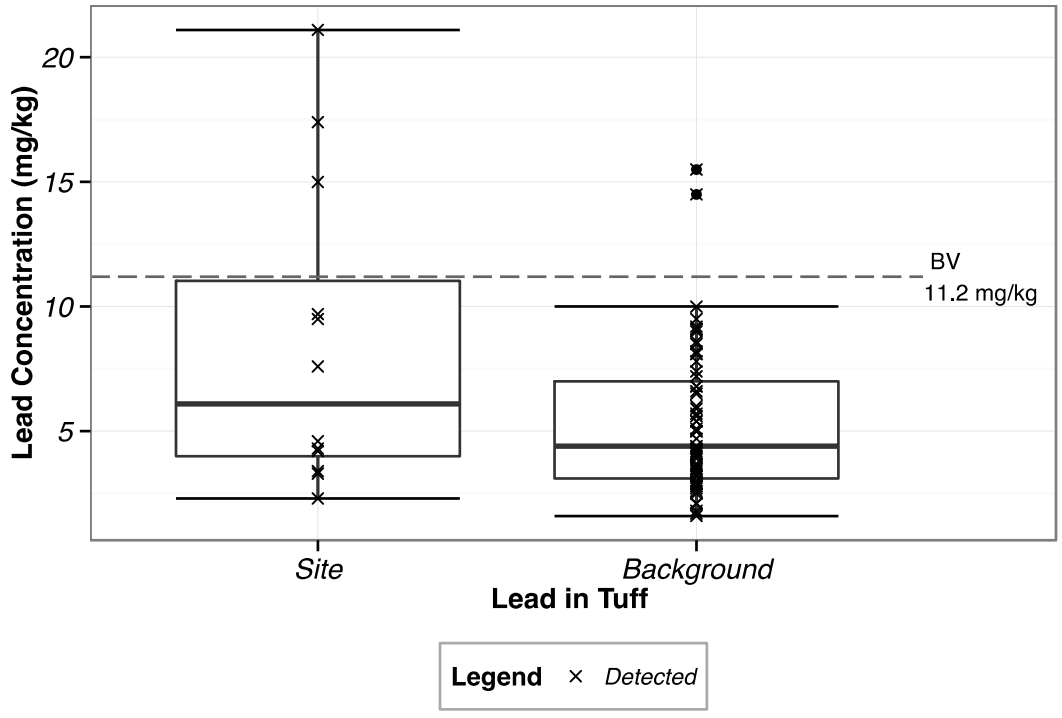


Figure H-88 Box plots for lead in tuff at SWMU 15-008(a)

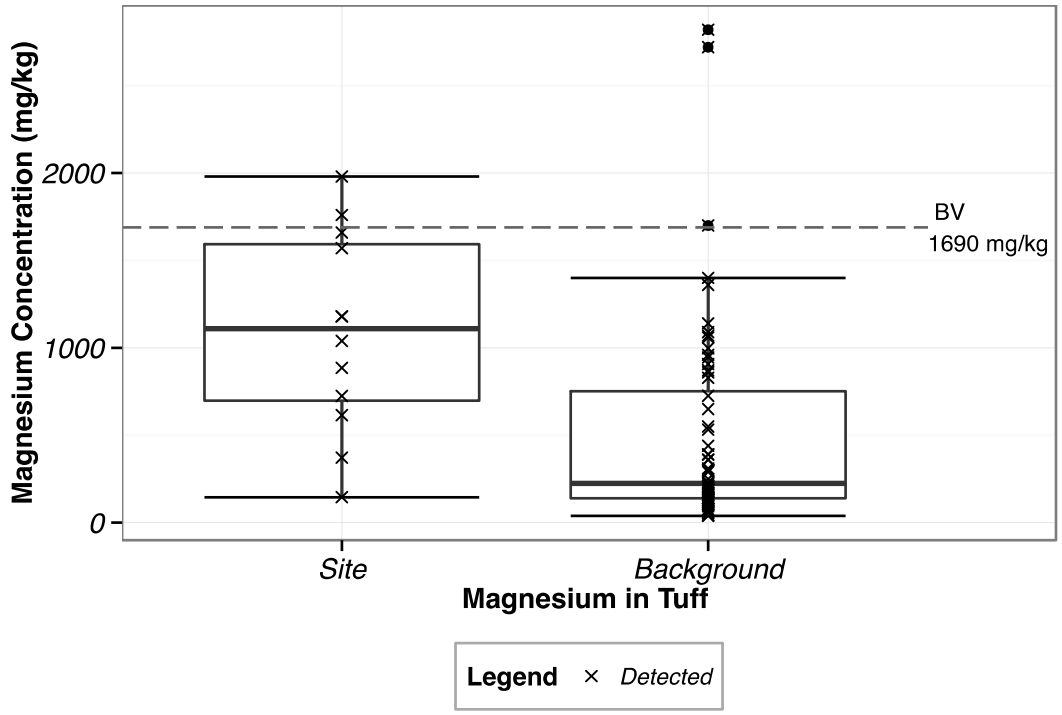


Figure H-89 Box plots for magnesium in tuff at SWMU 15-008(a)

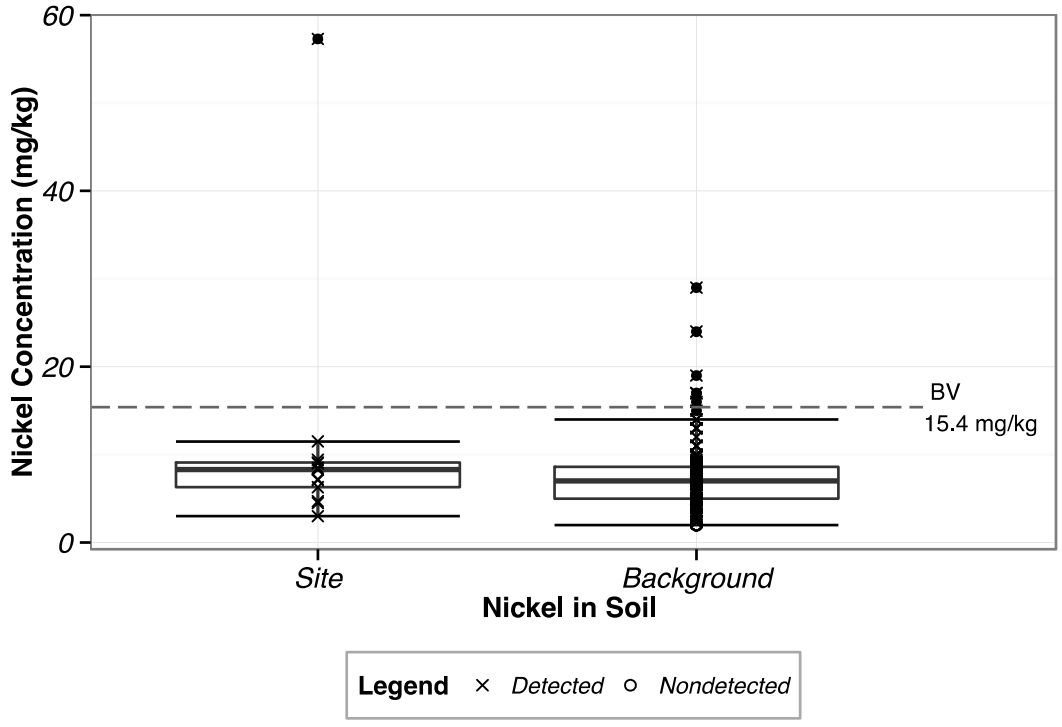


Figure H-90 Box plots for nickel in soil at SWMU 15-008(a)

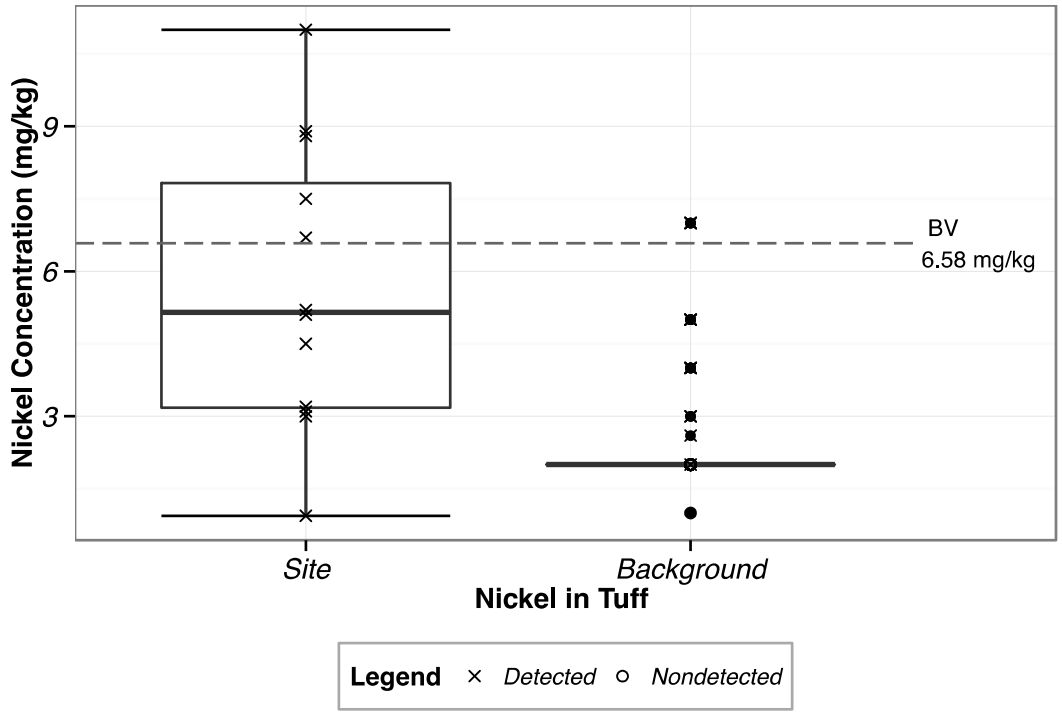


Figure H-91 Box plots for nickel in tuff at SWMU 15-008(a)

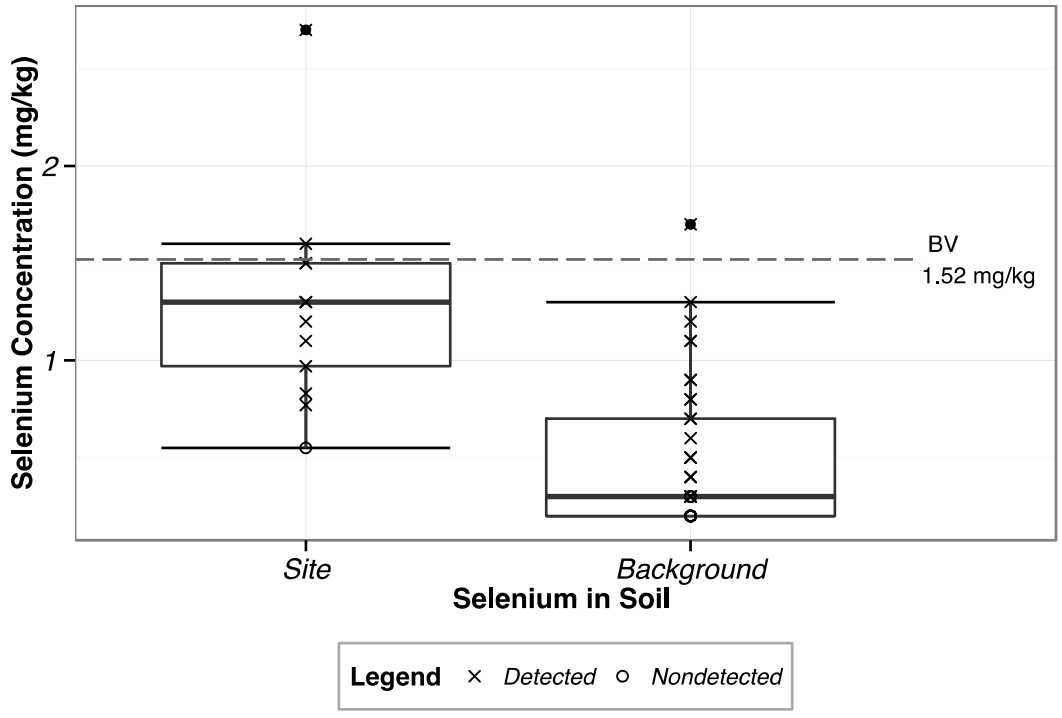


Figure H-92 Box plots for selenium in soil at SWMU 15-008(a)

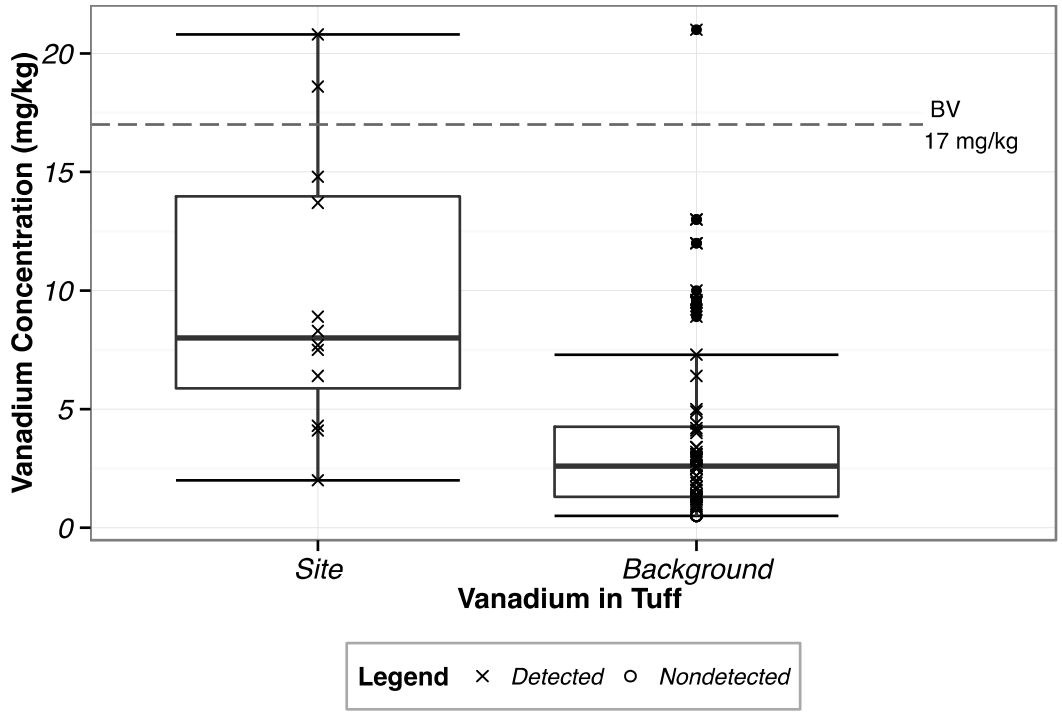


Figure H-93 Box plots for vanadium in tuff at SWMU 15-008(a)

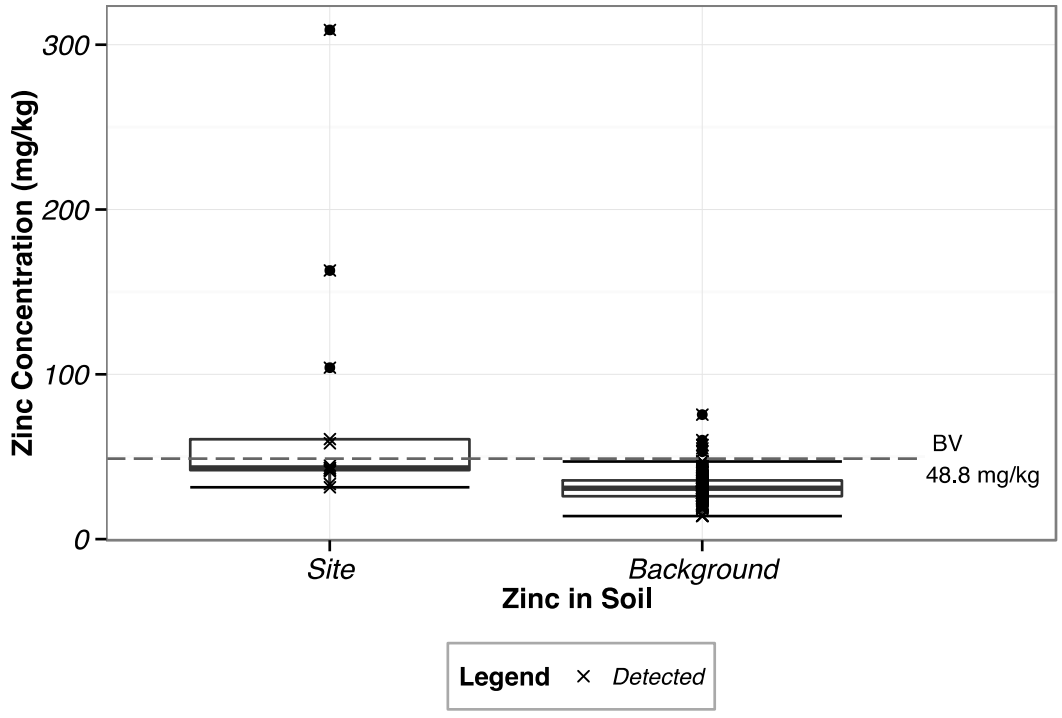


Figure H-94 Box plots for zinc in soil at SWMU 15-008(a)

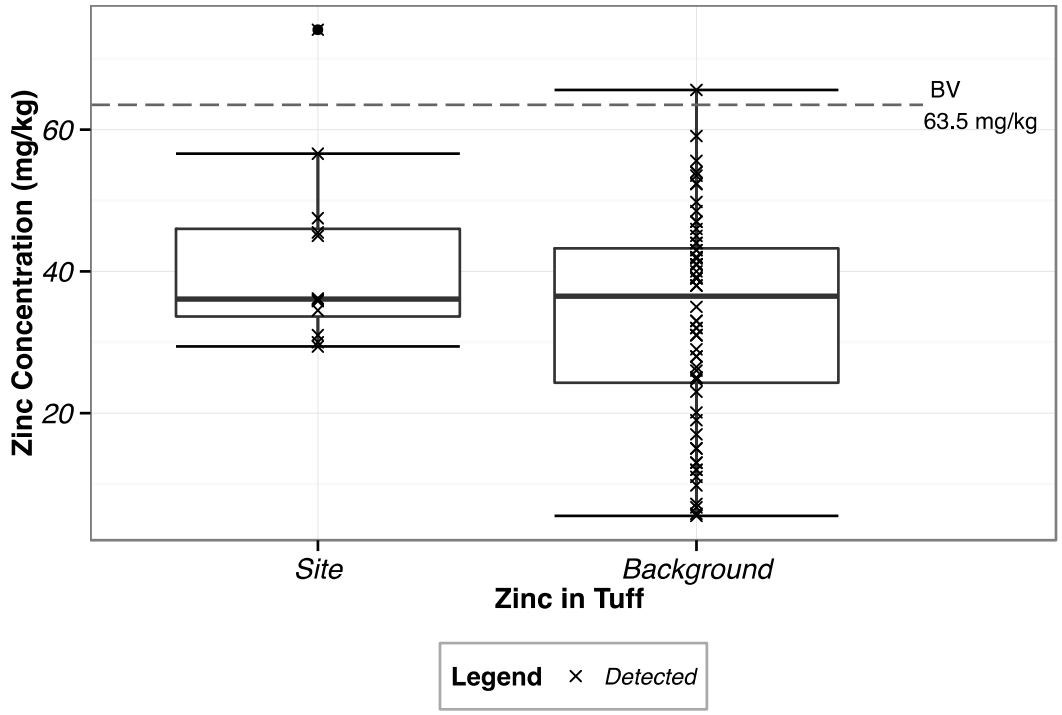


Figure H-95 Box plots for zinc in tuff at SWMU 15-008(a)

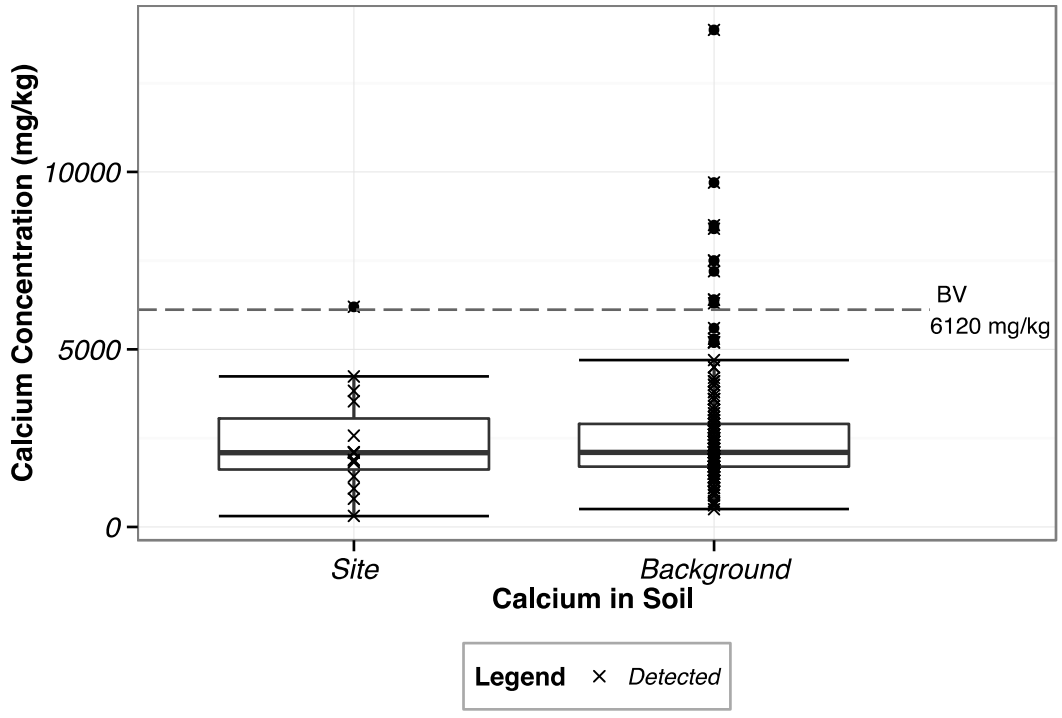


Figure H-96 Box plots for calcium in soil at SWMU 15-009(e)

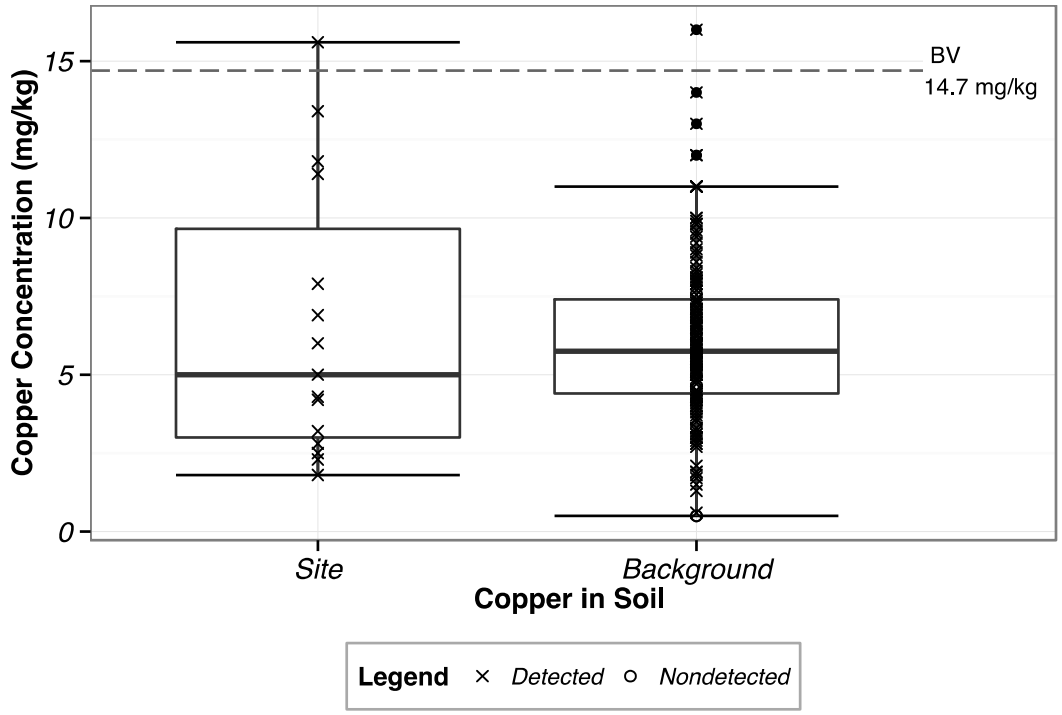


Figure H-97 Box plots for copper in soil at SWMU 15-009(e)

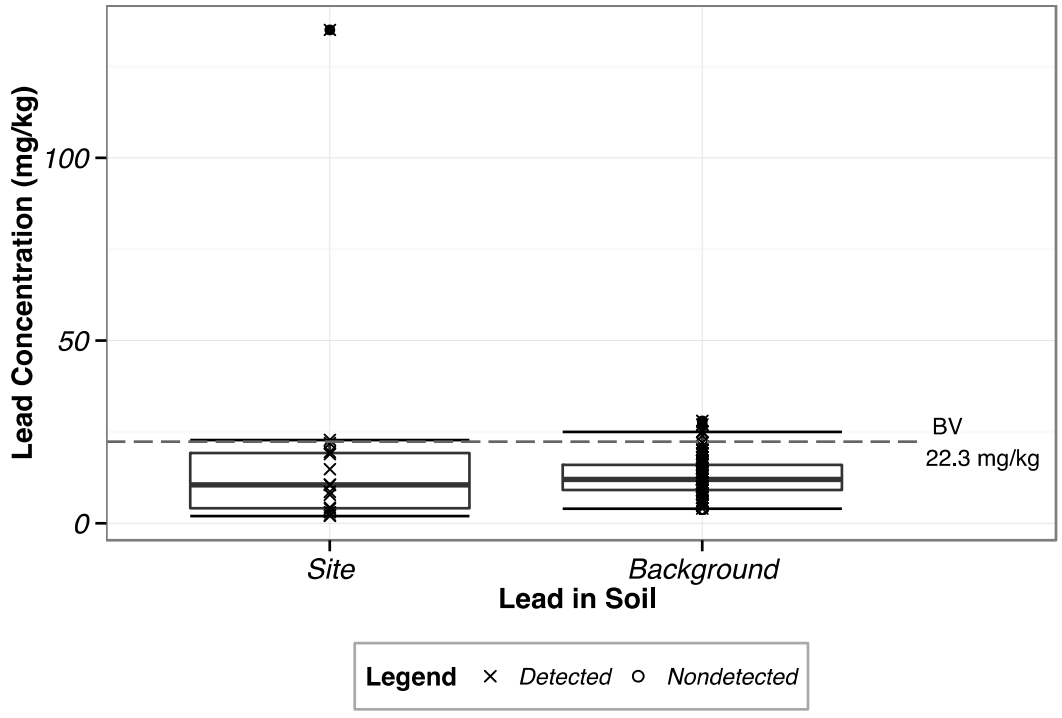


Figure H-98 Box plots for lead in soil at SWMU 15-009(e)

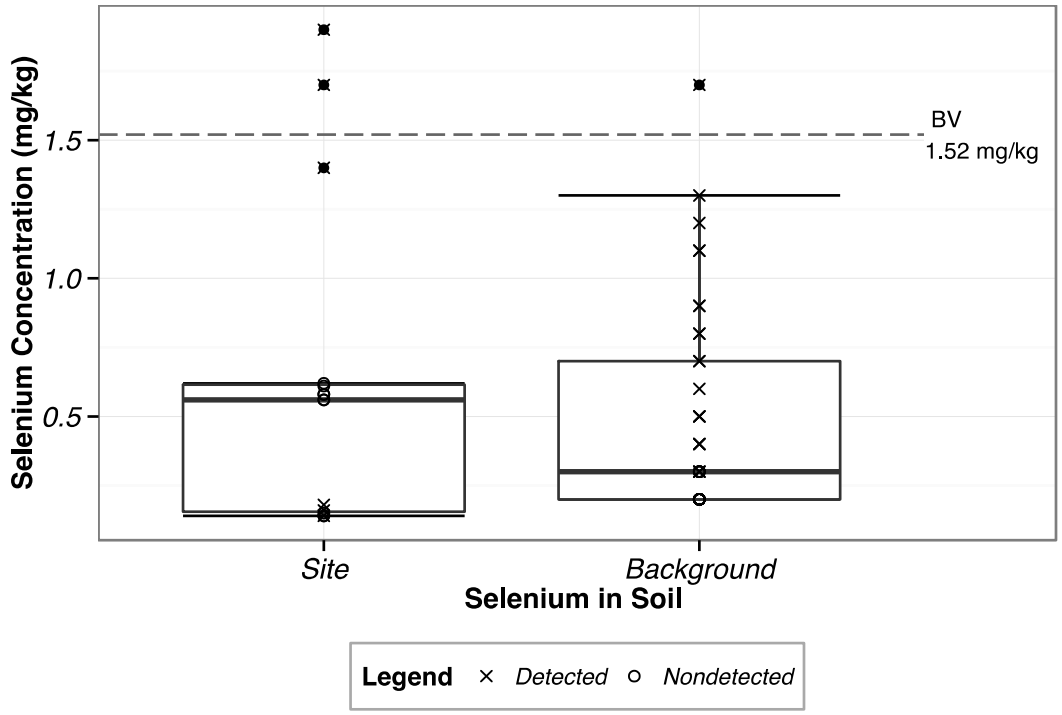


Figure H-99 Box plots for selenium in soil at SWMU 15-009(e)

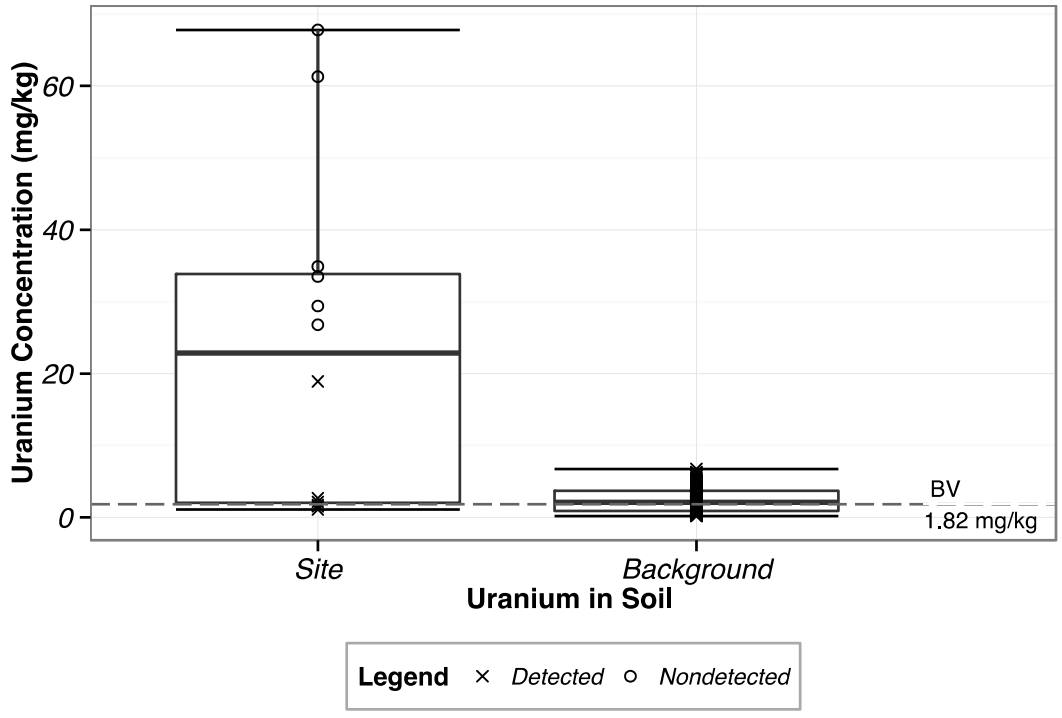


Figure H-100 Box plots for uranium in soil at SWMU 15-009(e)

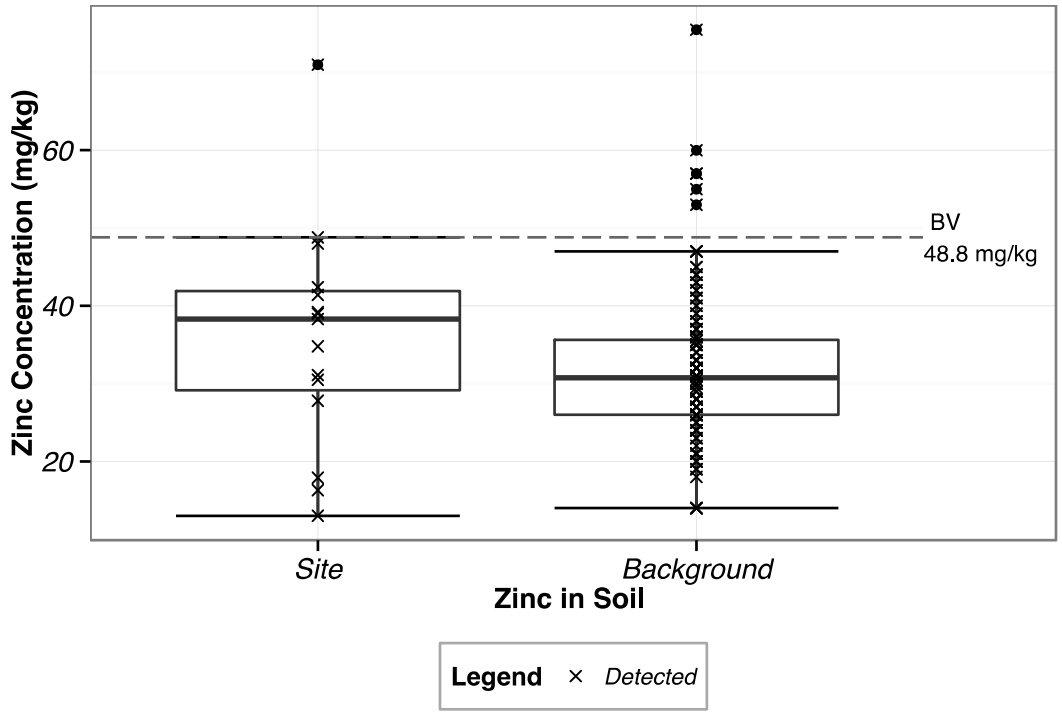


Figure H-101 Box plots for zinc in soil at SWMU 15-009(e)

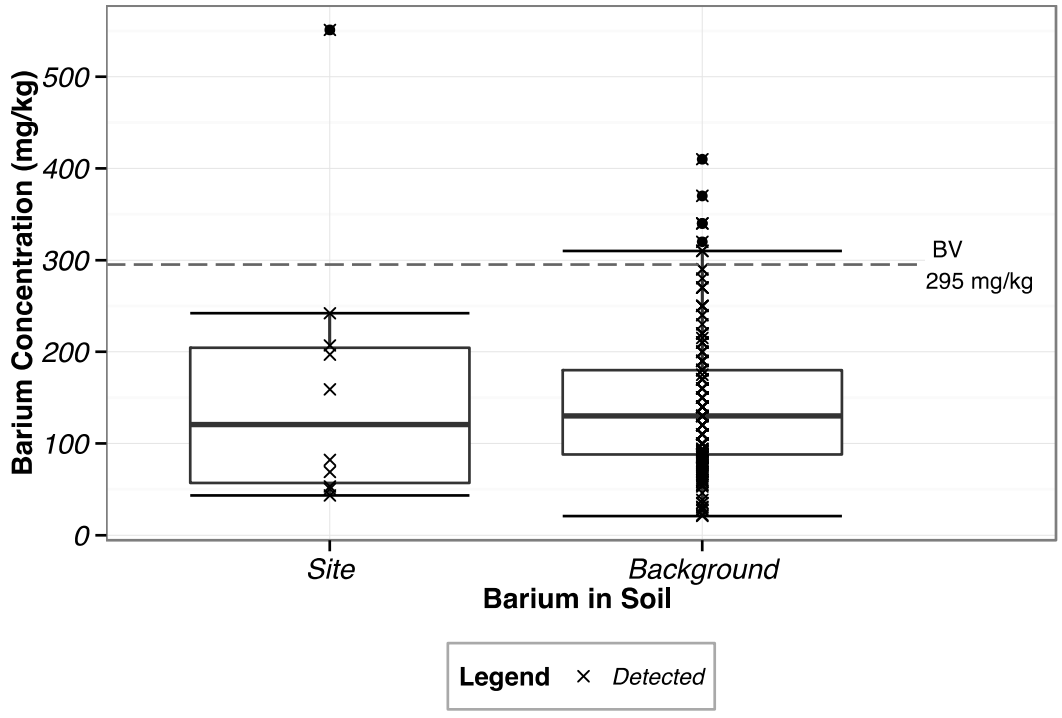


Figure H-102 Box plots for barium in soil at SWMU 15-010(a)

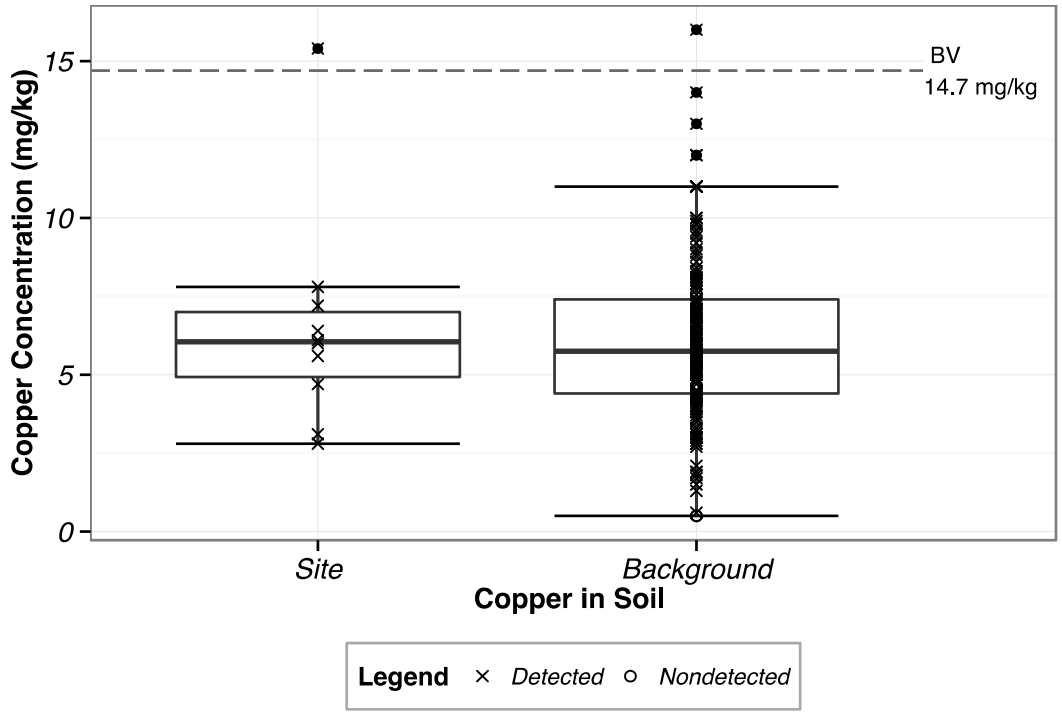


Figure H-103 Box plots for copper in soil at SWMU 15-010(a)

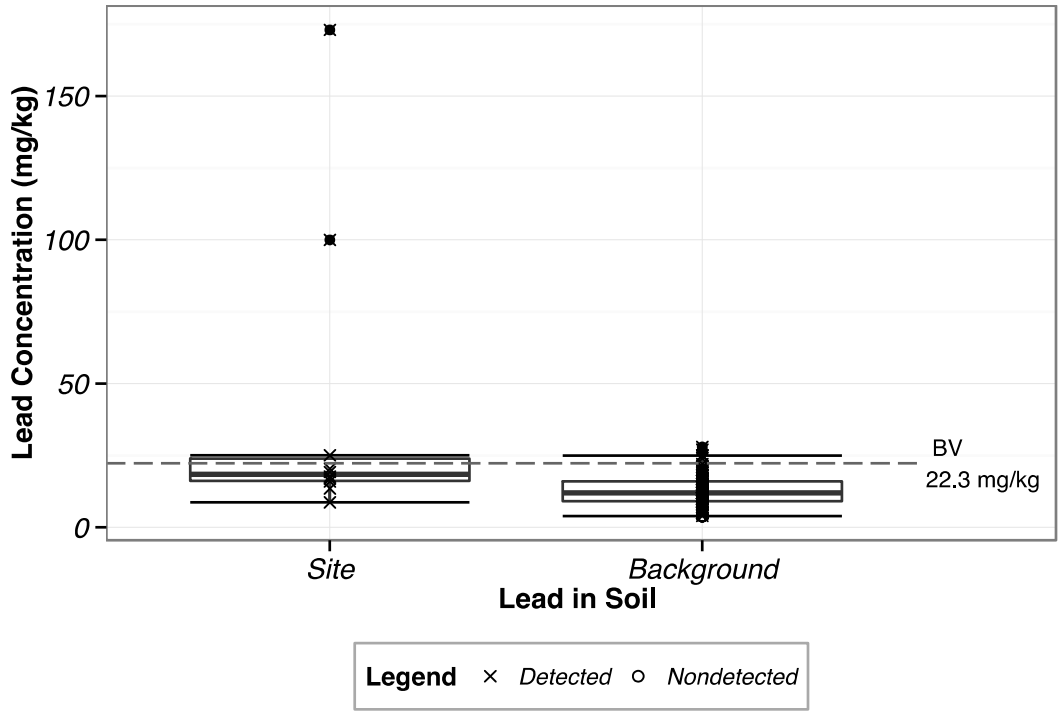


Figure H-104 Box plots for lead in soil at SWMU 15-010(a)

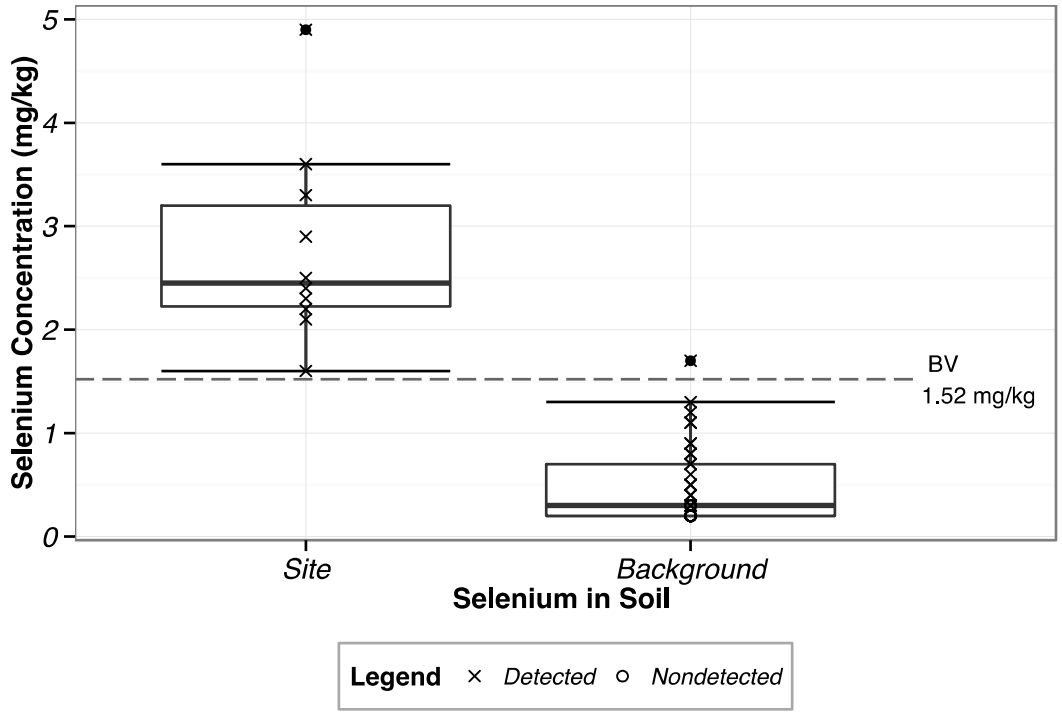


Figure H-105 Box plots for selenium in soil at SWMU 15-010(a)

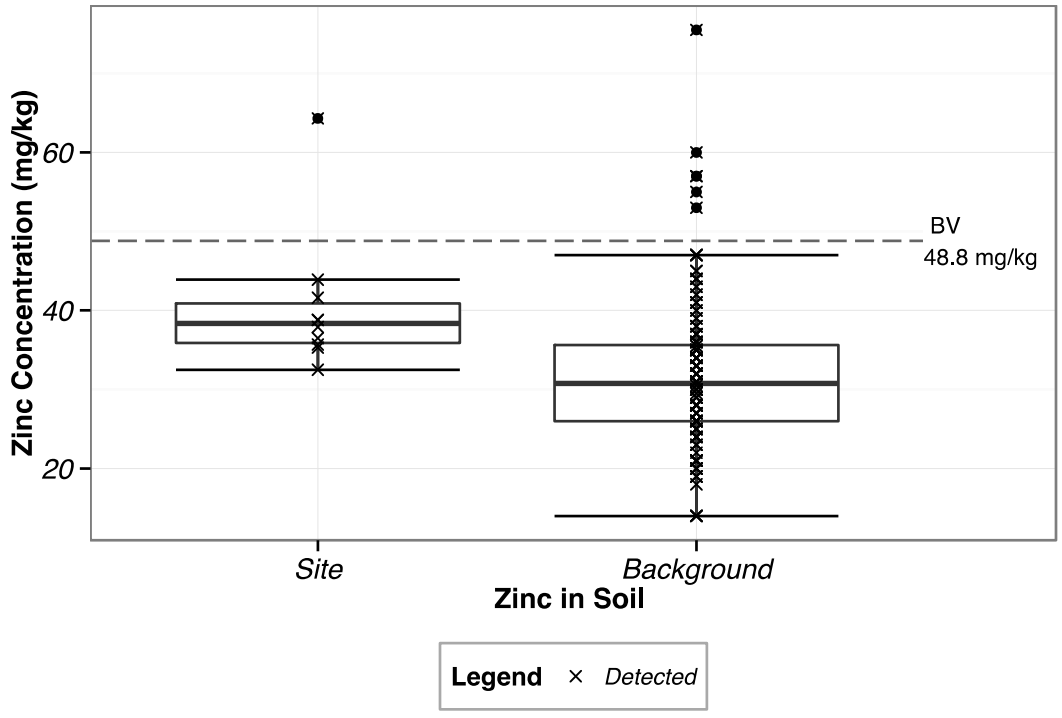


Figure H-106 Box plots for zinc in soil at SWMU 15-010(a)

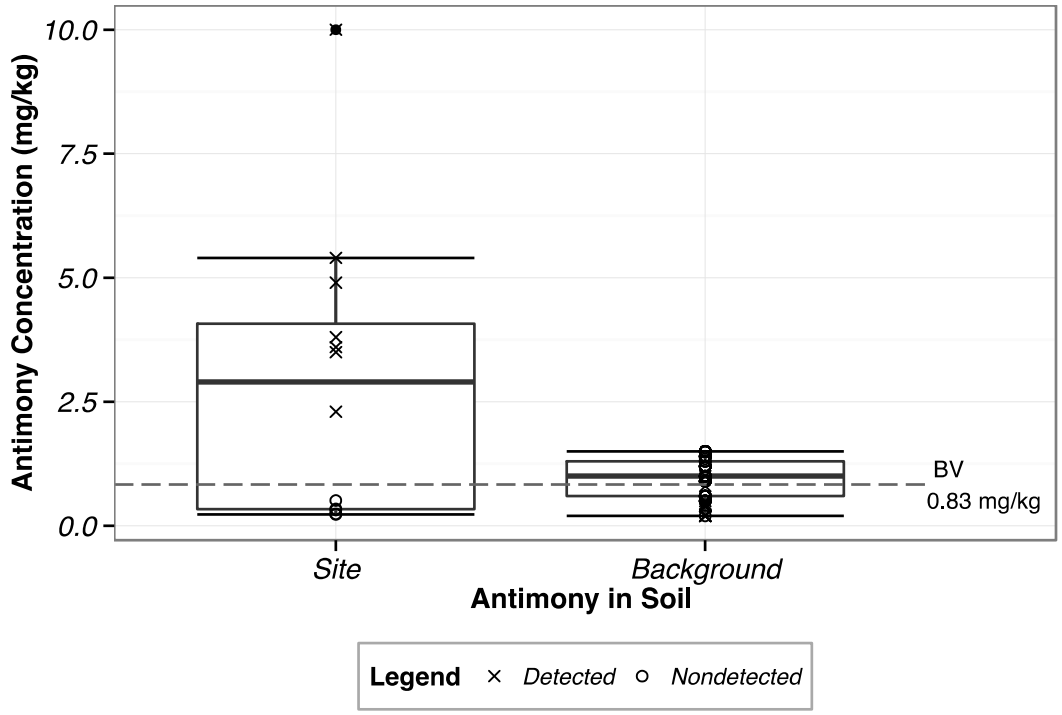


Figure H-107 Box plots for antimony in soil at AOC C-15-006

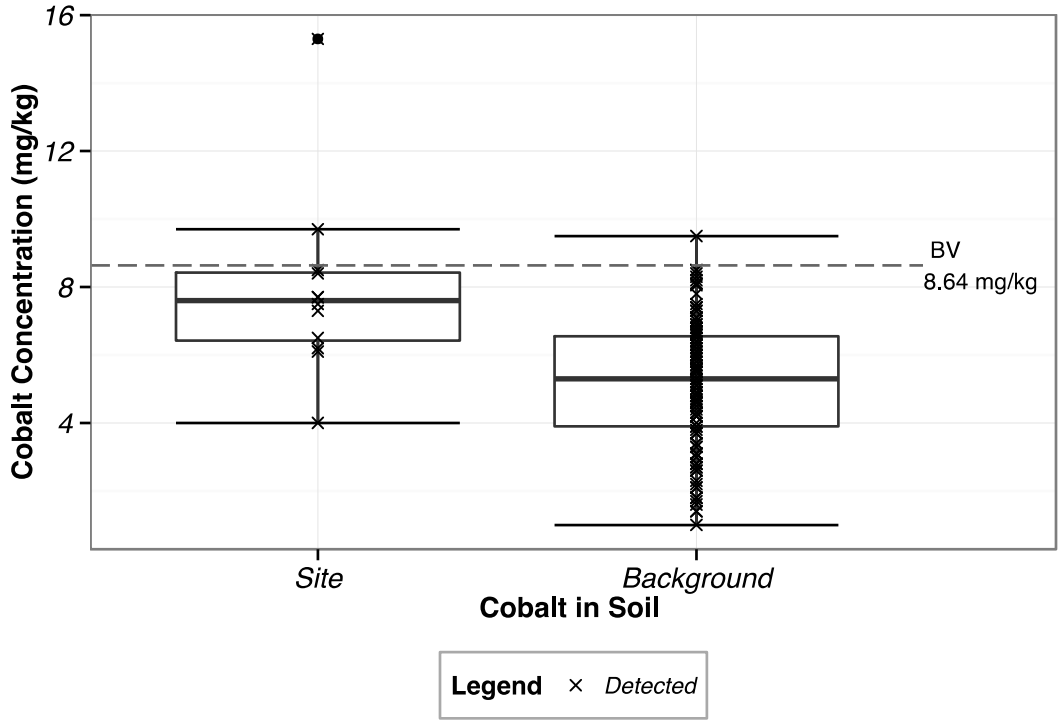


Figure H-108 Box plots for cobalt in soil at AOC C-15-006

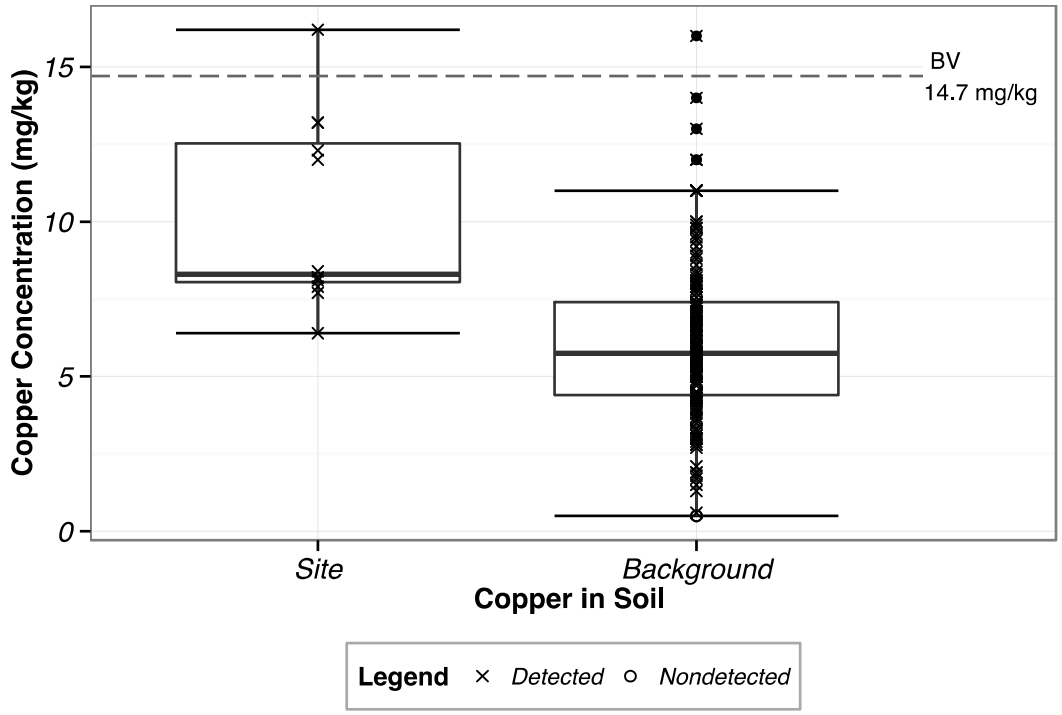


Figure H-109 Box plots for copper in soil at AOC C-15-006

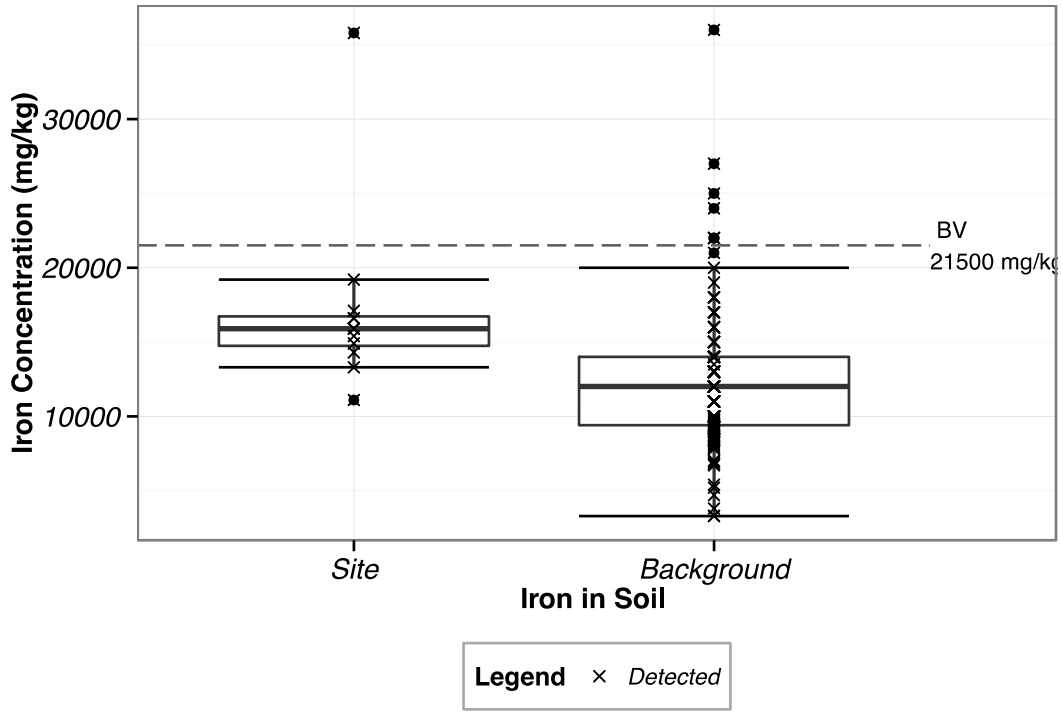


Figure H-110 Box plots for iron in soil at AOC C-15-006

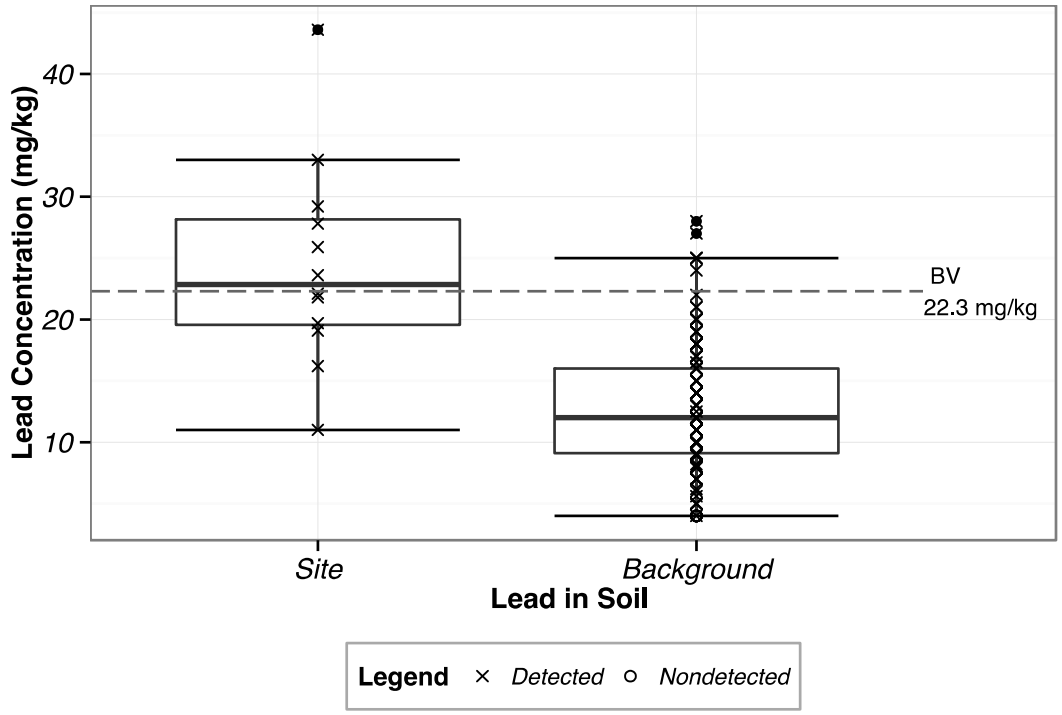


Figure H-111 Box plots for lead in soil at AOC C-15-006

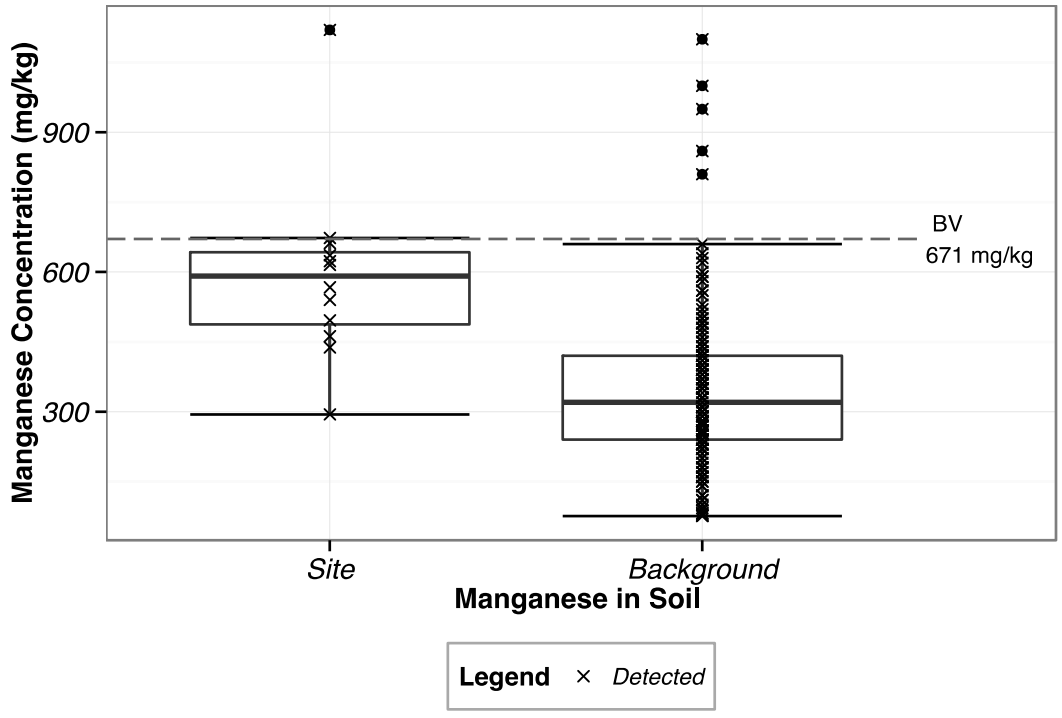


Figure H-112 Box plots for manganese in soil at AOC C-15-006

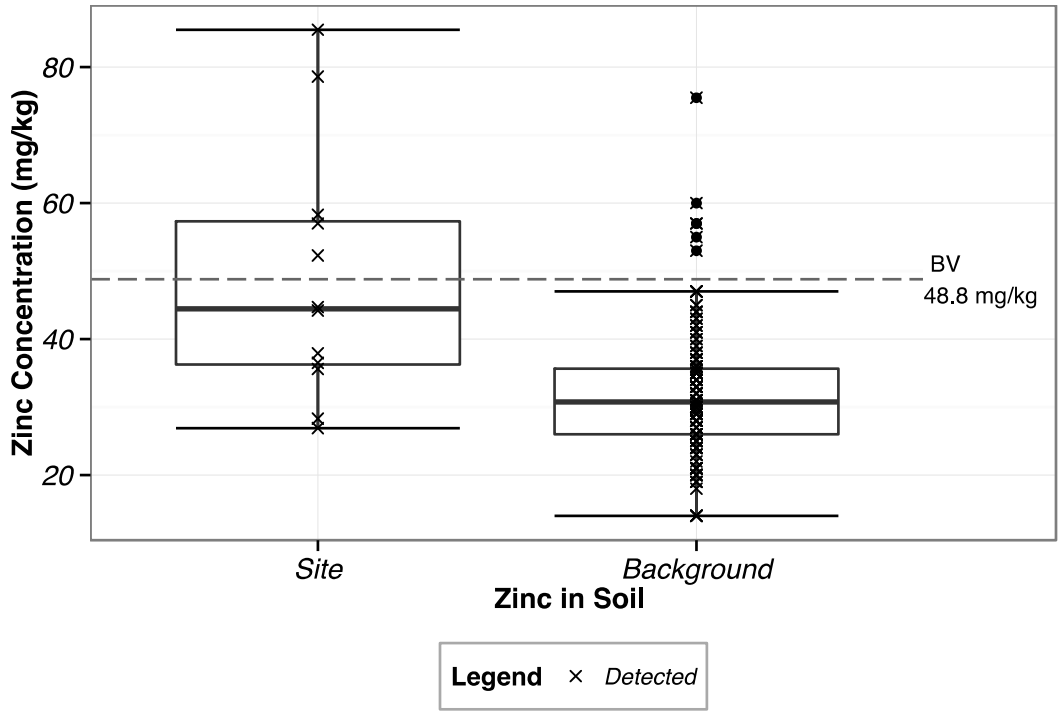


Figure H-113 Box plots for zinc in soil at AOC C-15-006

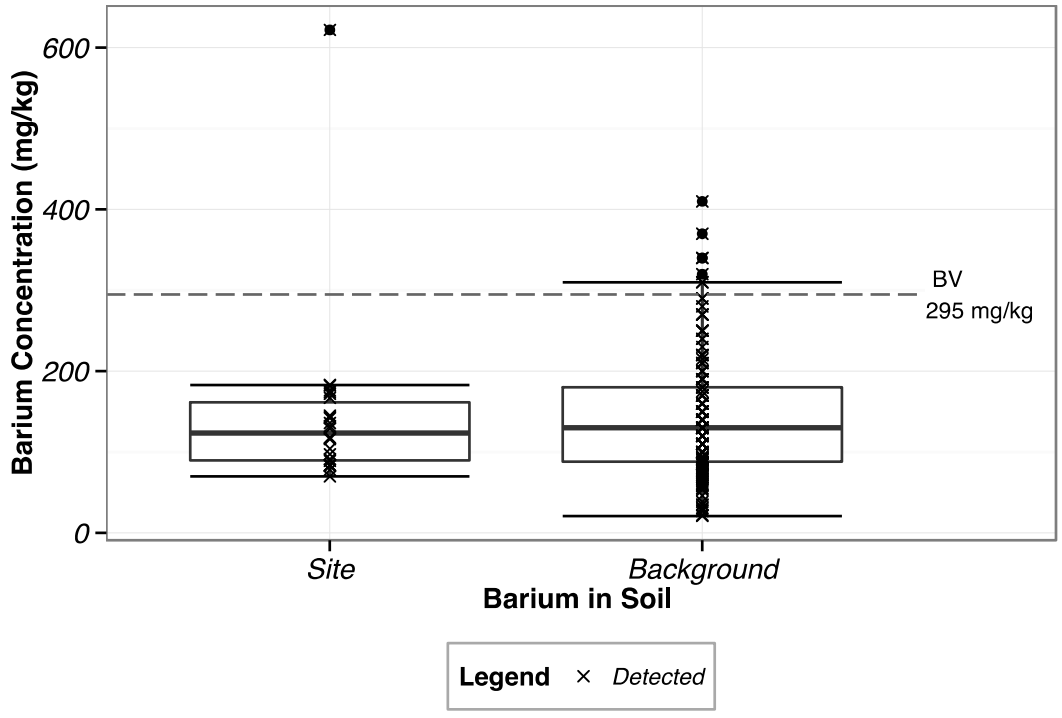


Figure H-114 Box plots for barium in soil at SWMU 36-001

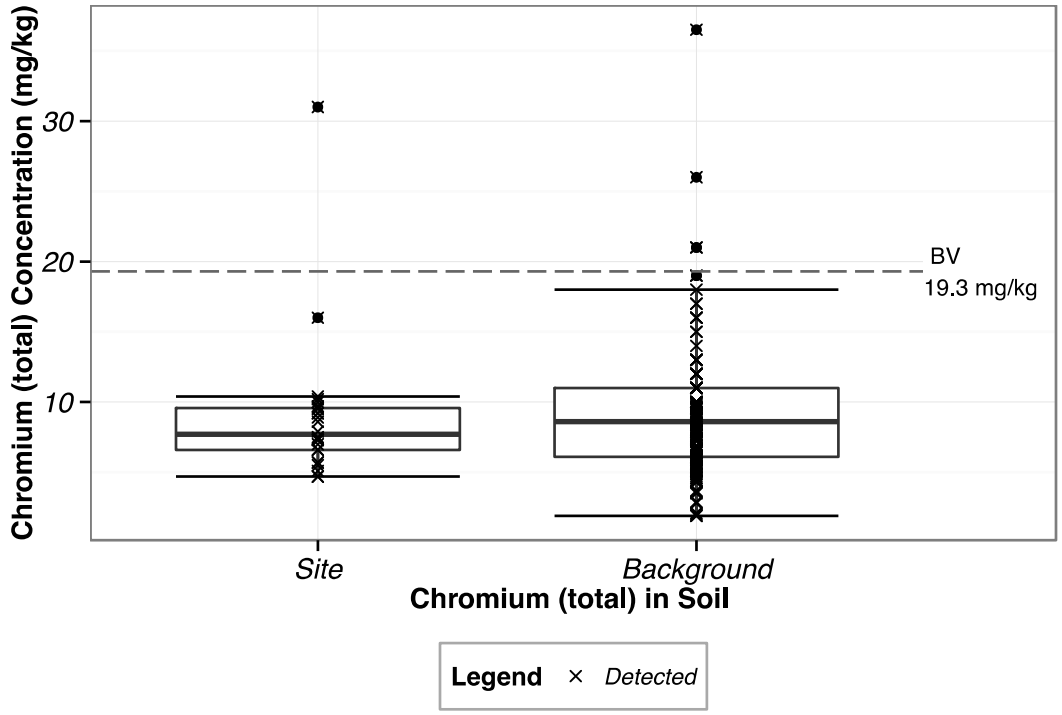


Figure H-115 Box plots for chromium (total) in soil at SWMU 36-001

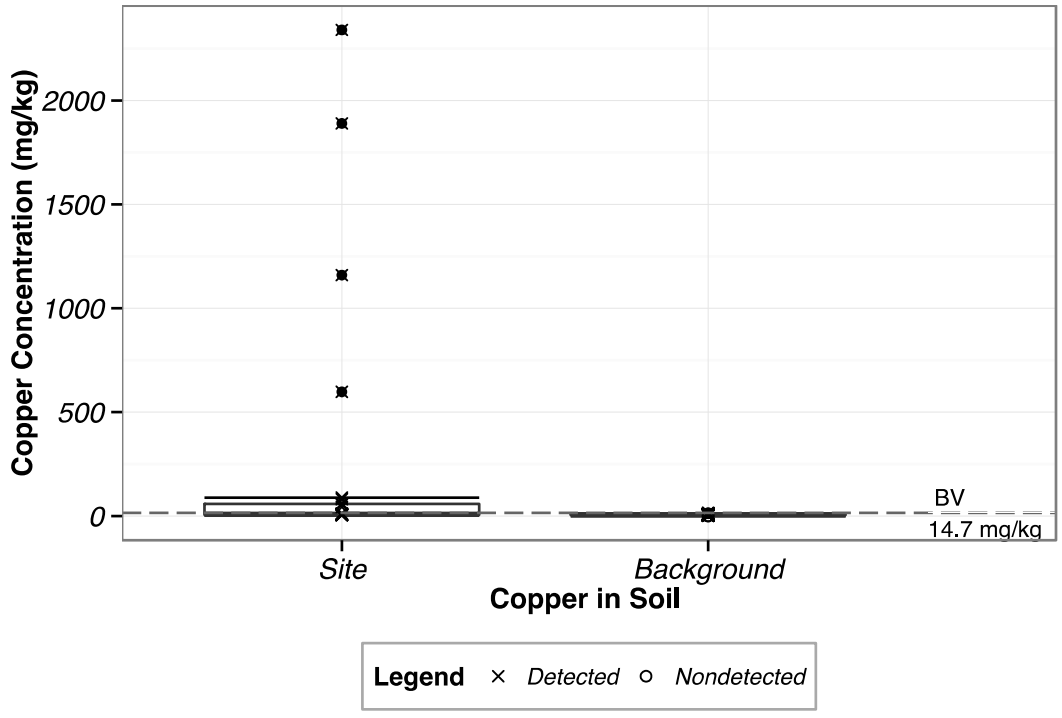


Figure H-116 Box plots for copper in soil at SWMU 36-001

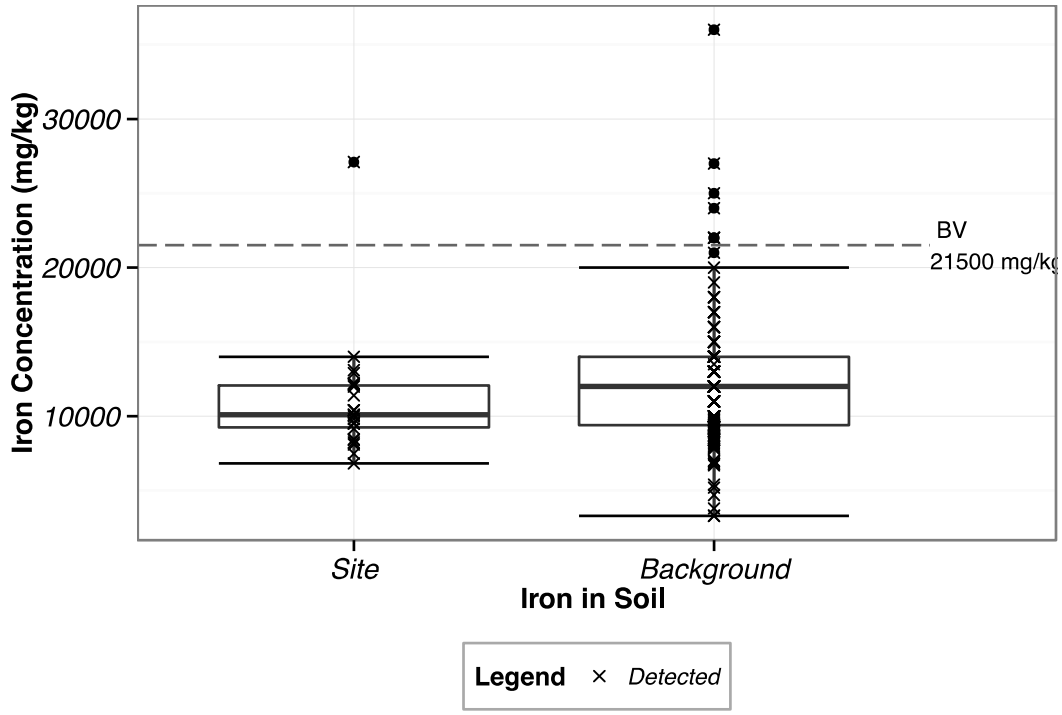


Figure H-117 Box plots for iron in soil at SWMU 36-001

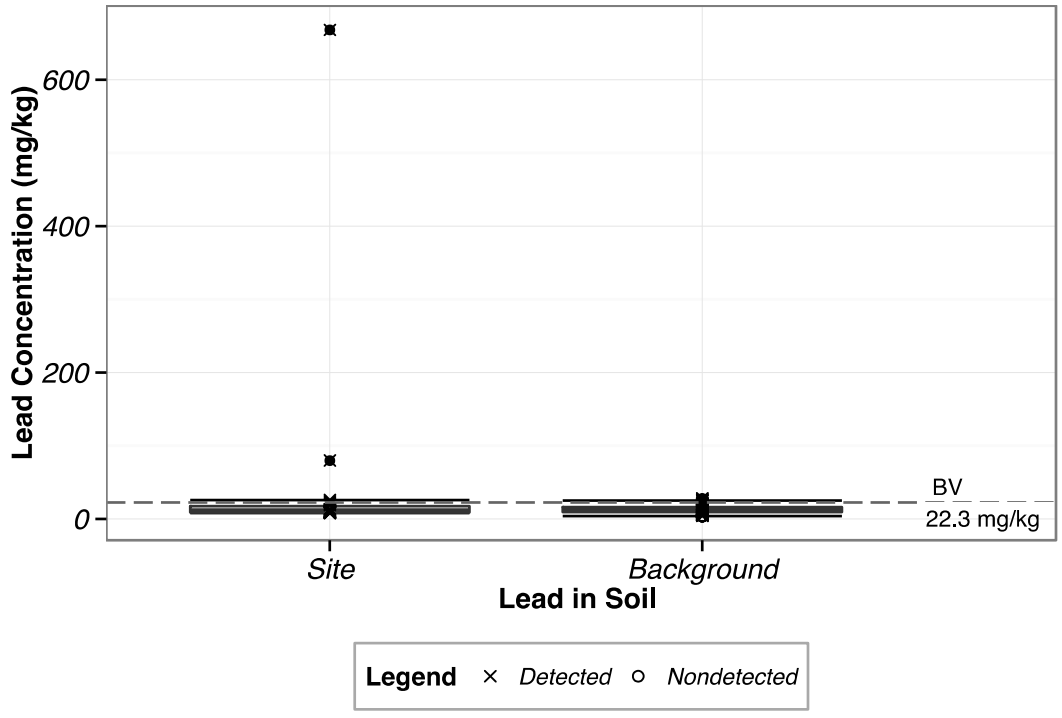


Figure H-118 Box plots for lead in soil at SWMU 36-001

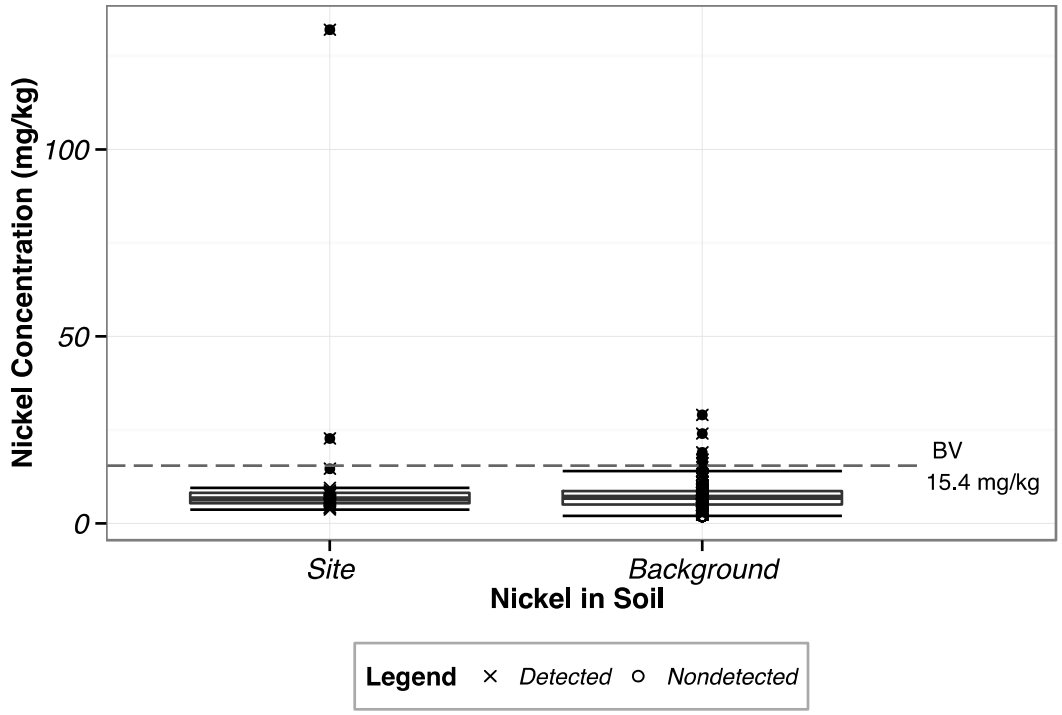


Figure H-119 Box plots for nickel in soil at SWMU 36-001

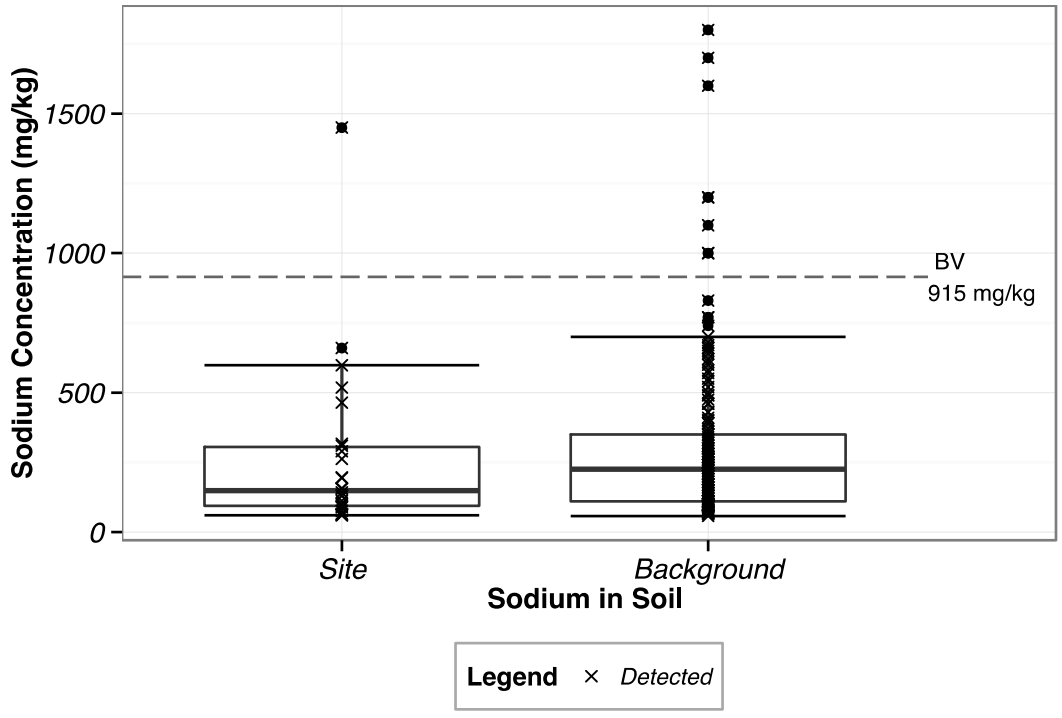


Figure H-120 Box plots for sodium in soil at SWMU 36-001

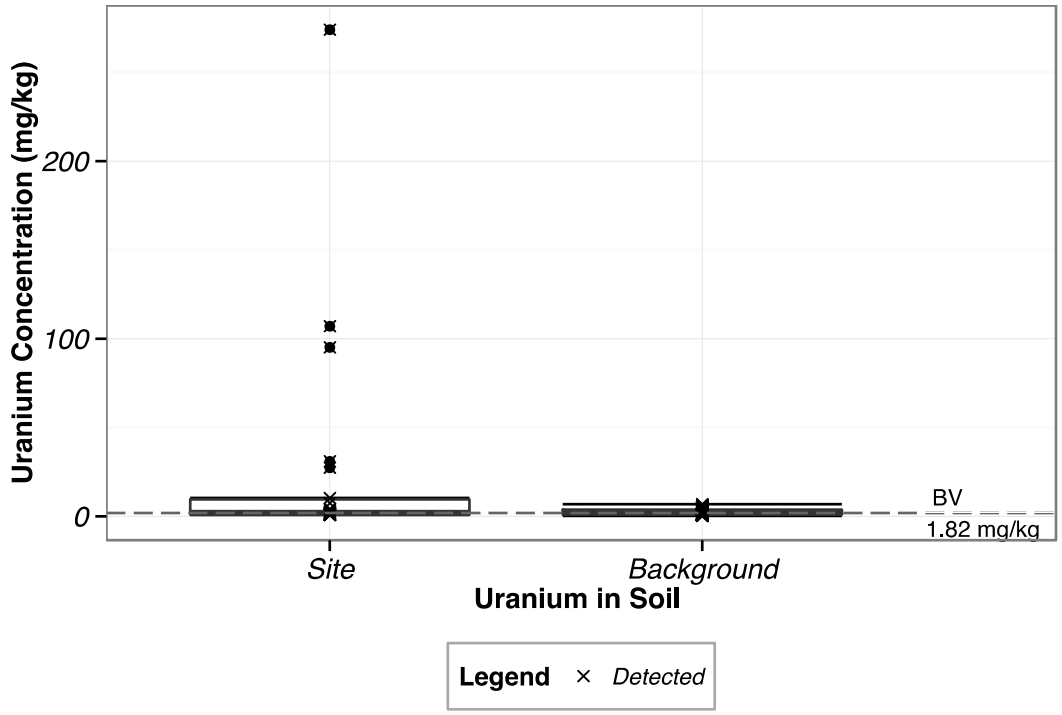


Figure H-121 Box plots for uranium in soil at SWMU 36-001

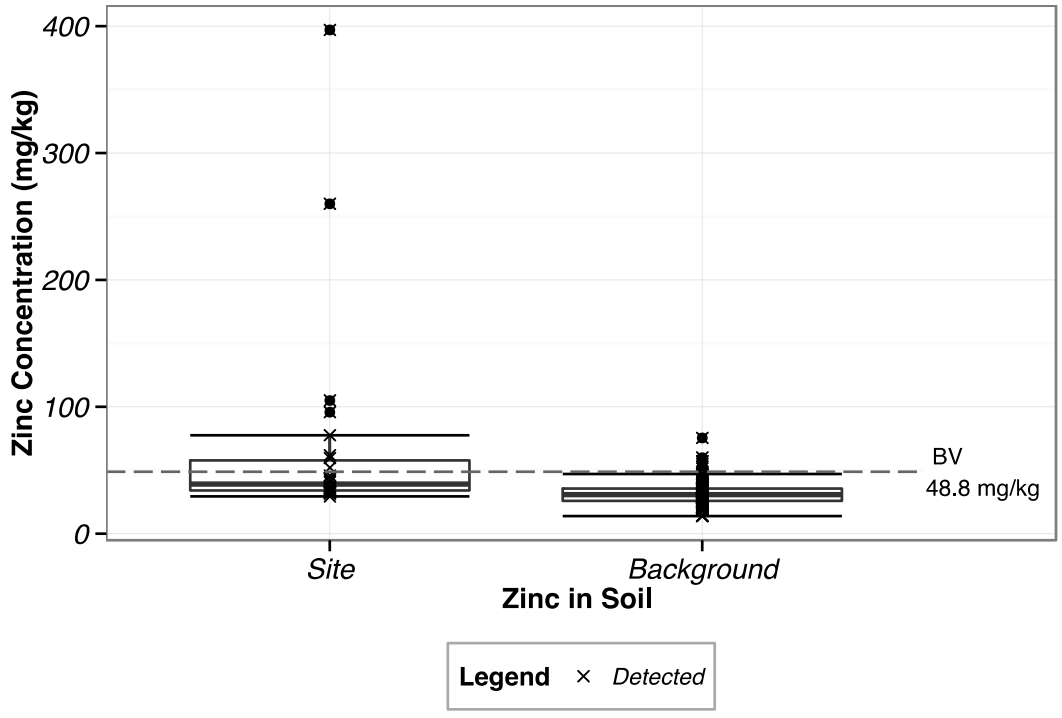


Figure H-122 Box plots for zinc in soil at SWMU 36-001

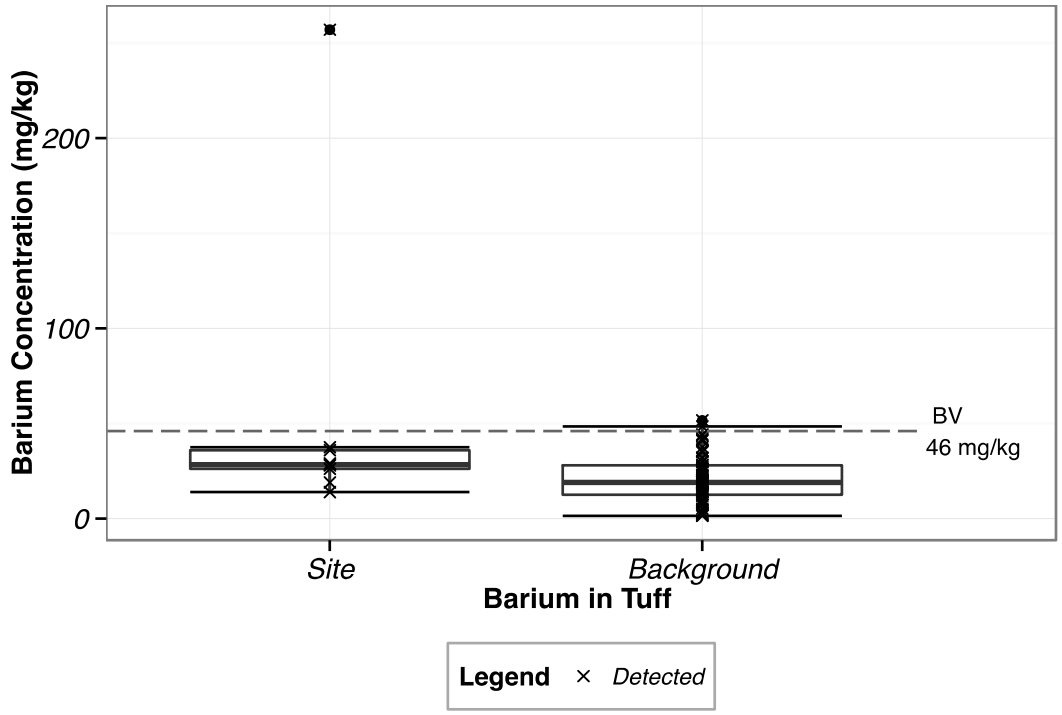


Figure H-123 Box plots for barium in tuff at SWMU 36-005

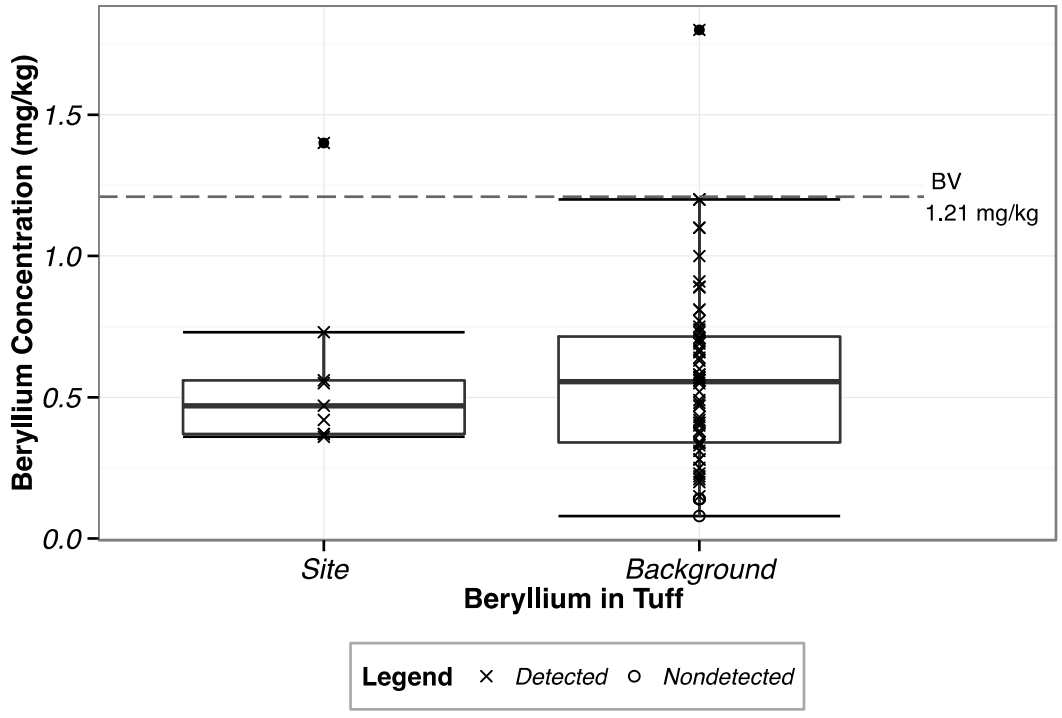


Figure H-124 Box plots for beryllium in tuff at SWMU 36-005

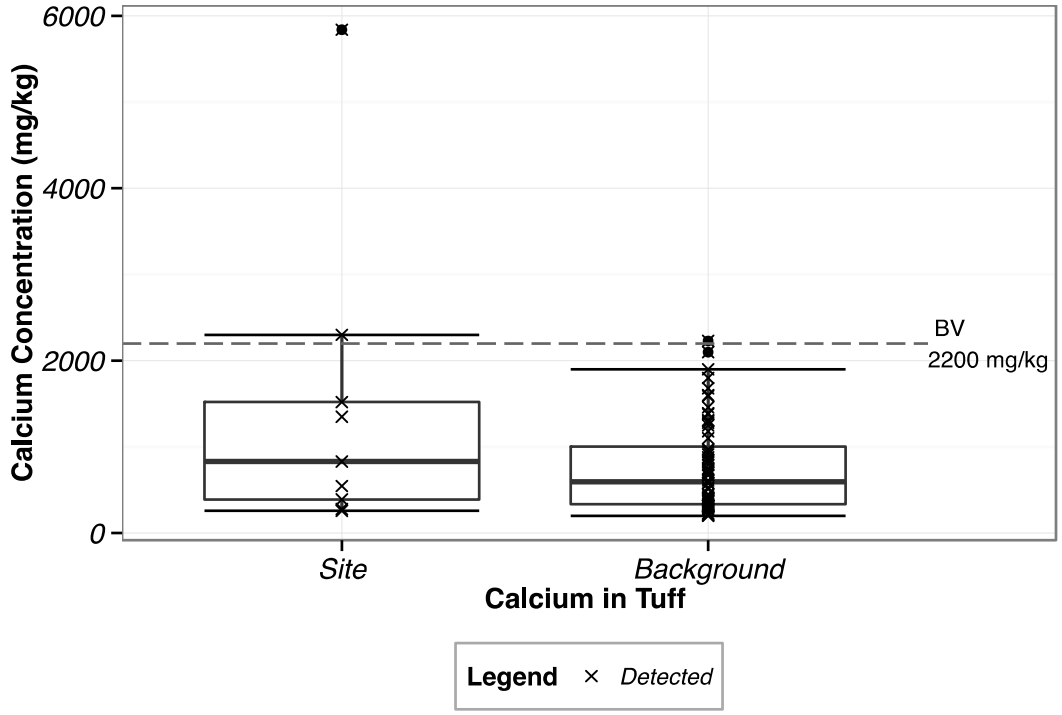


Figure H-125 Box plots for calcium in tuff at SWMU 36-005

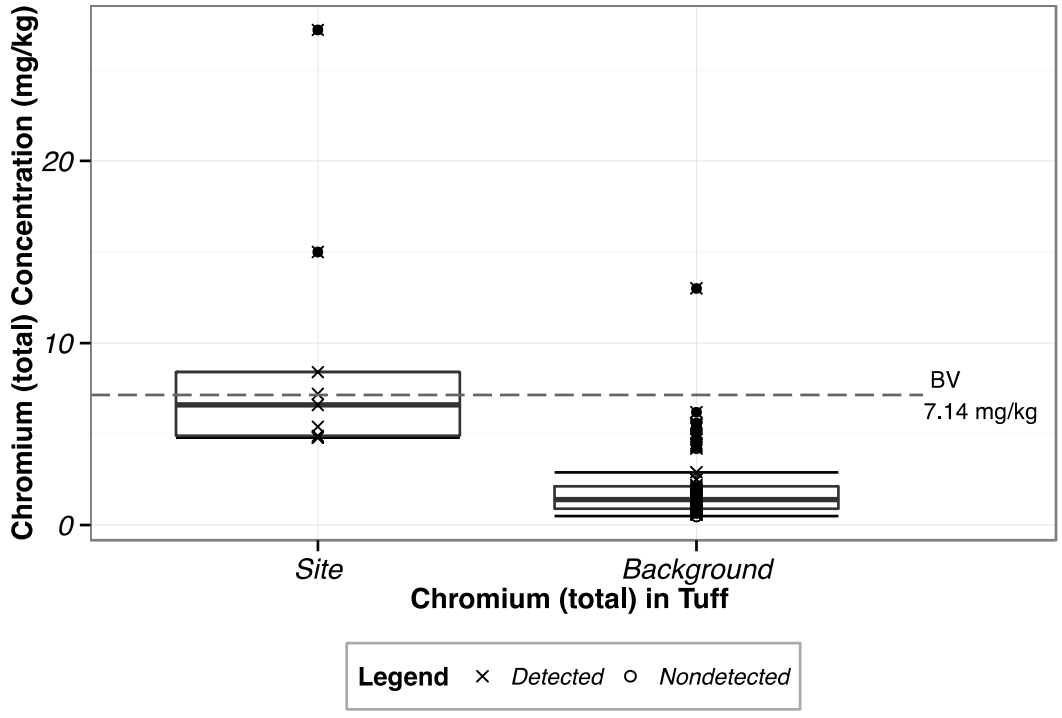


Figure H-126 Box plots for chromium (total) in tuff at SWMU 36-005

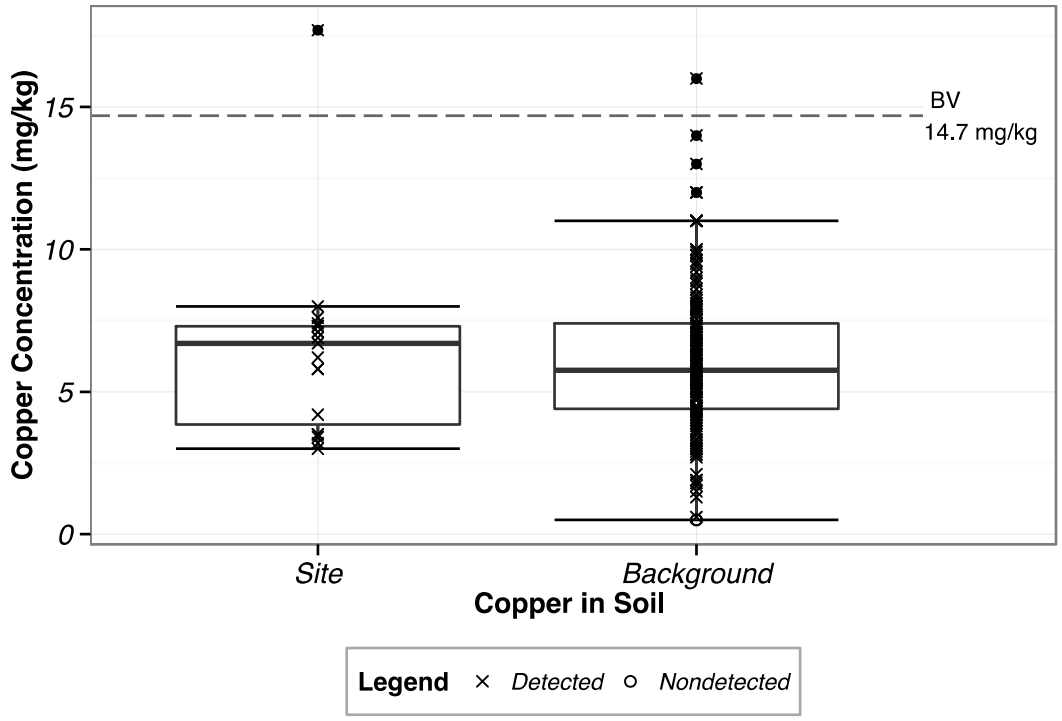


Figure H-127 Box plots for copper in soil at SWMU 36-005

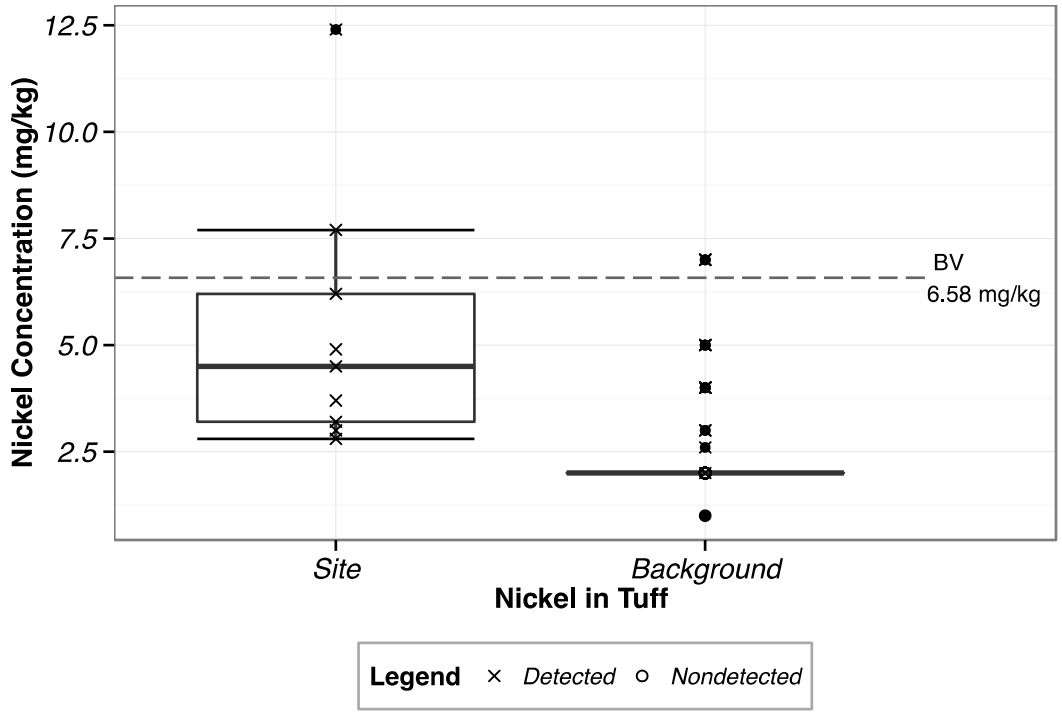


Figure H-128 Box plots for nickel in tuff at SWMU 36-005

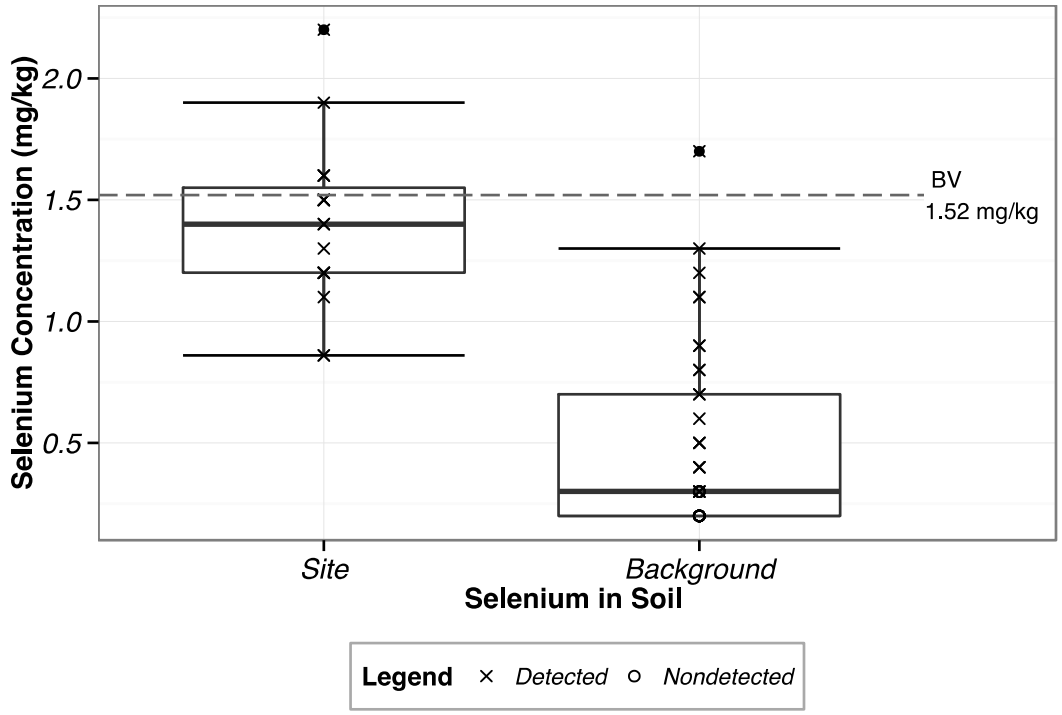


Figure H-129 Box plots for selenium in soil at SWMU 36-005

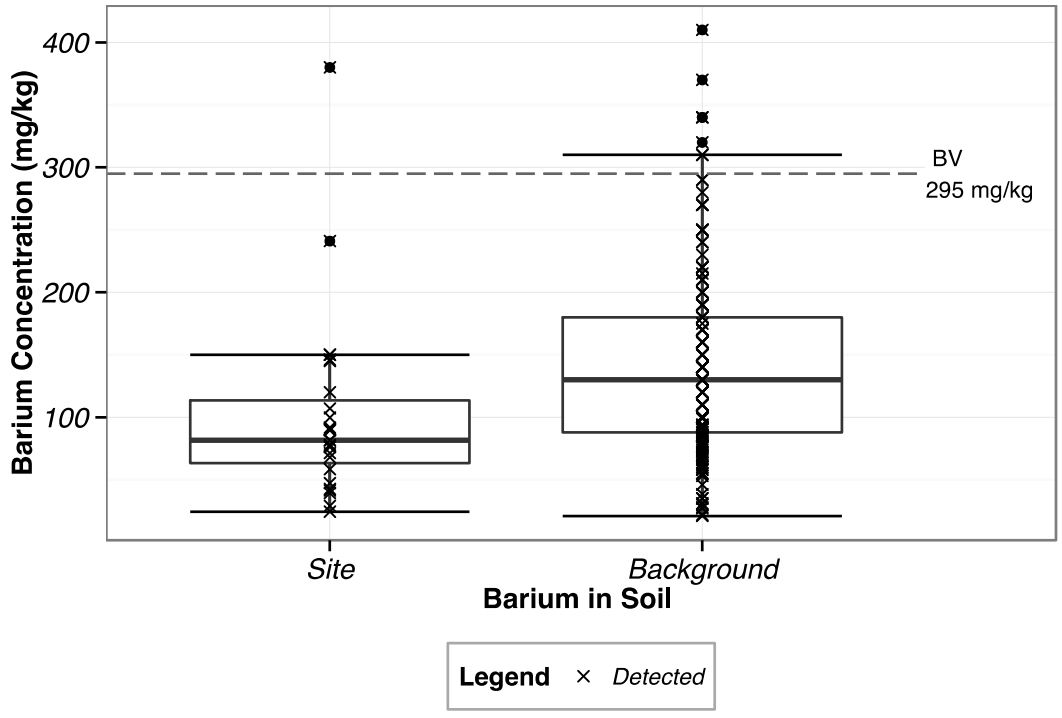


Figure H-130 Box plots for barium in soil at SWMU 36-006

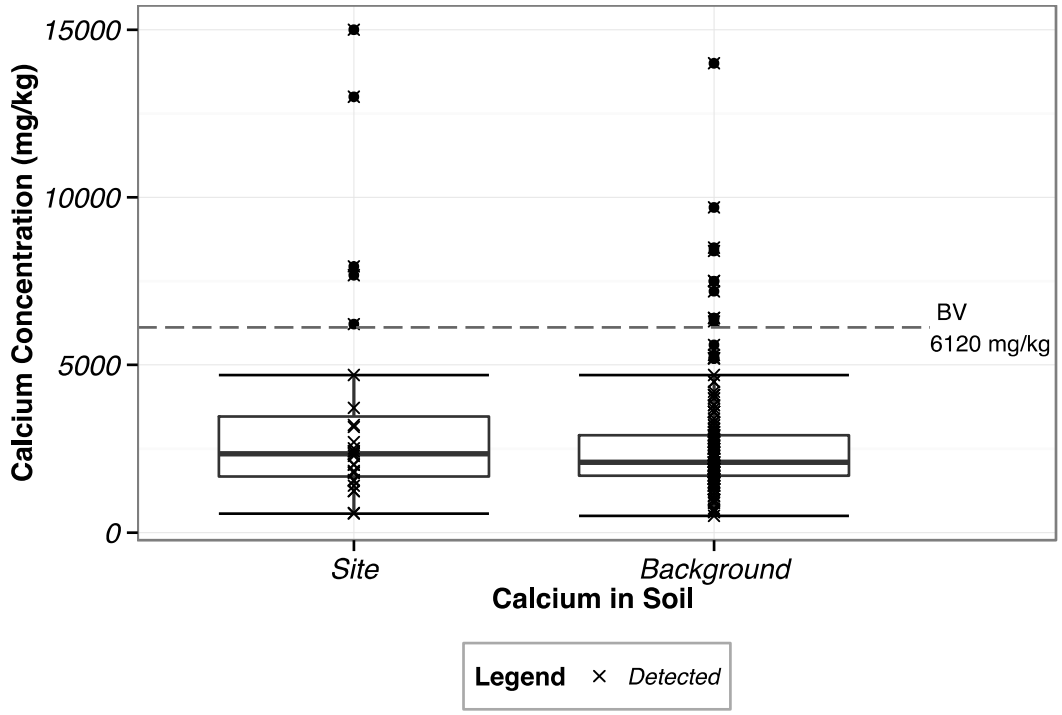


Figure H-131 Box plots for calcium in soil at SWMU 36-006

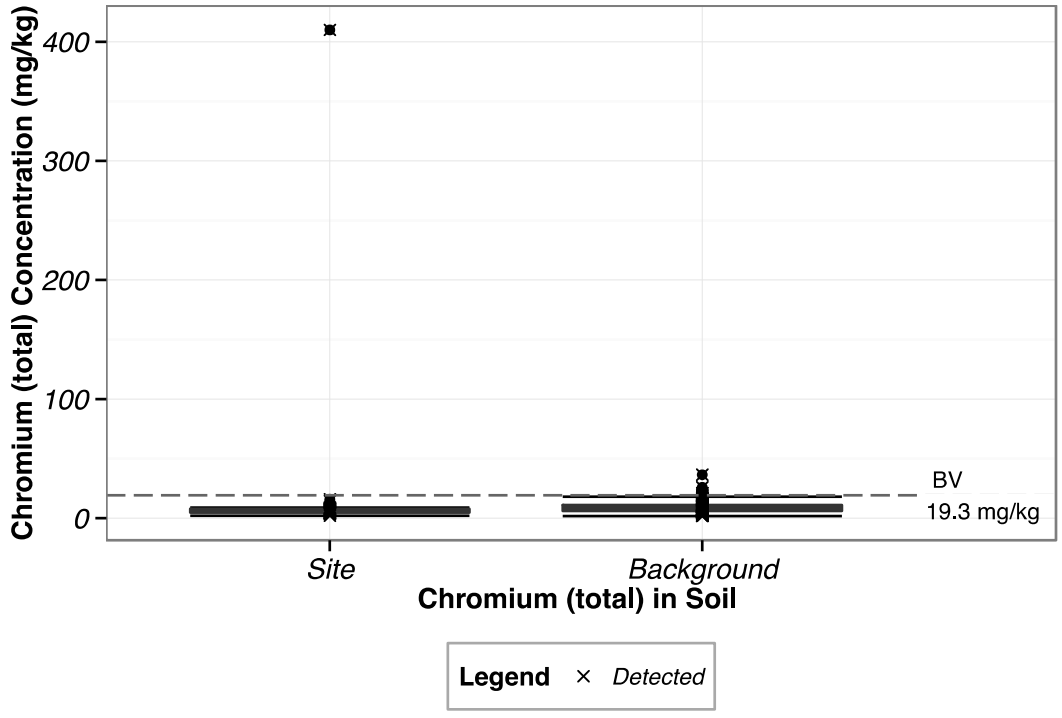


Figure H-132 Box plots for chromium (total) in soil at SWMU 36-006

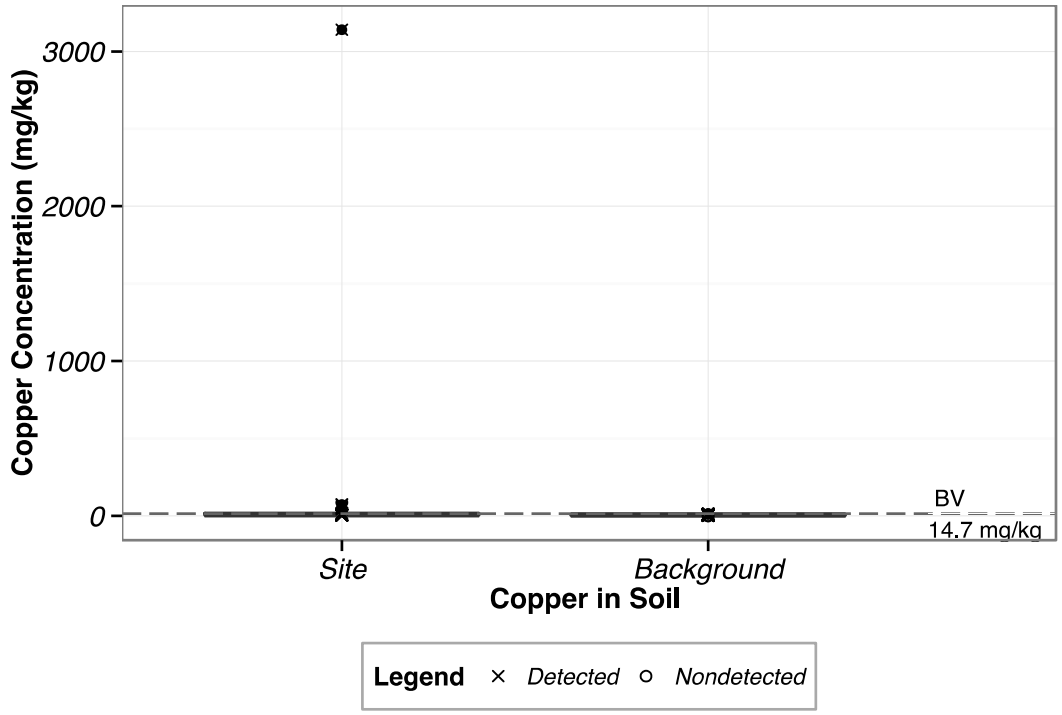


Figure H-133 Box plots for copper in soil at SWMU 36-006

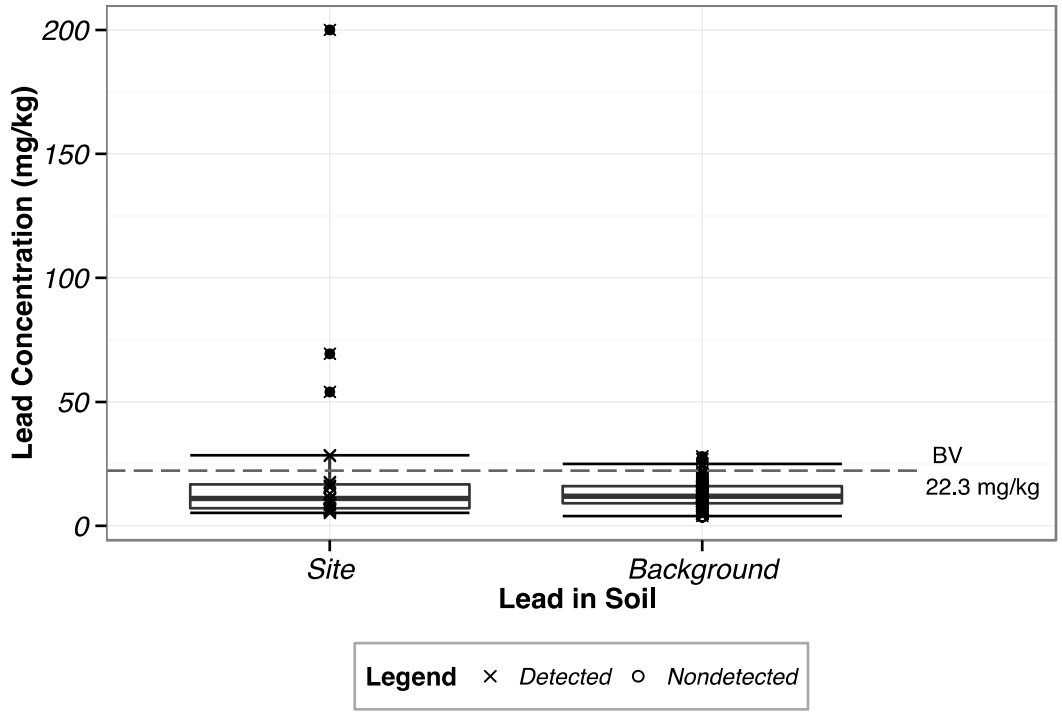


Figure H-134 Box plots for lead in soil at SWMU 36-006

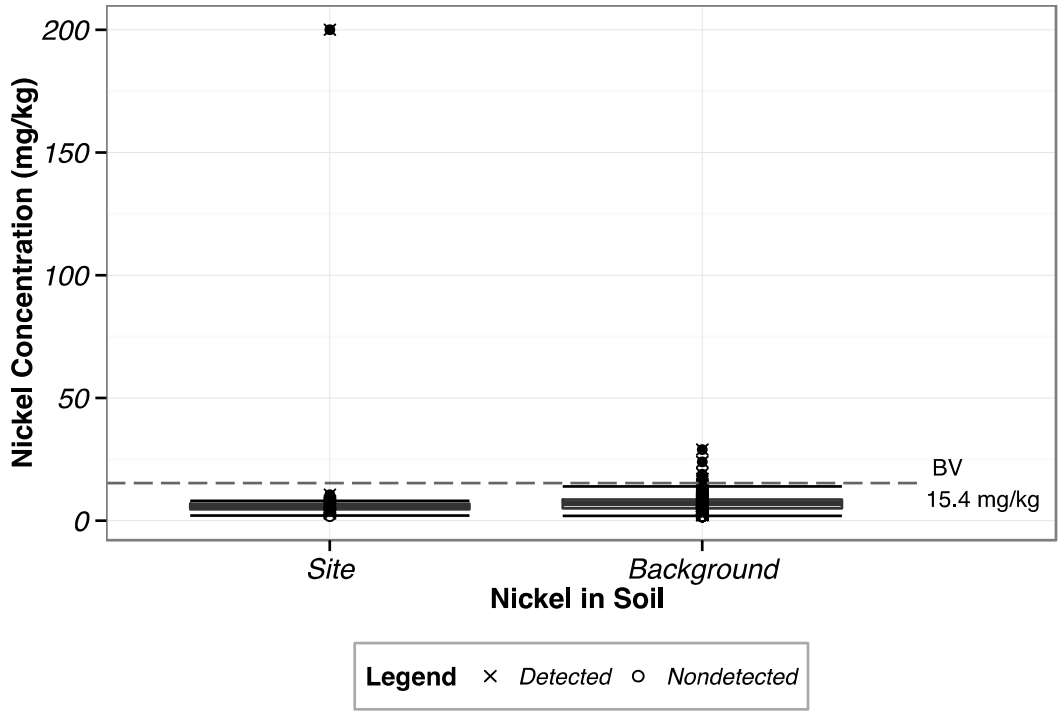


Figure H-135 Box plots for nickel in soil at SWMU 36-006

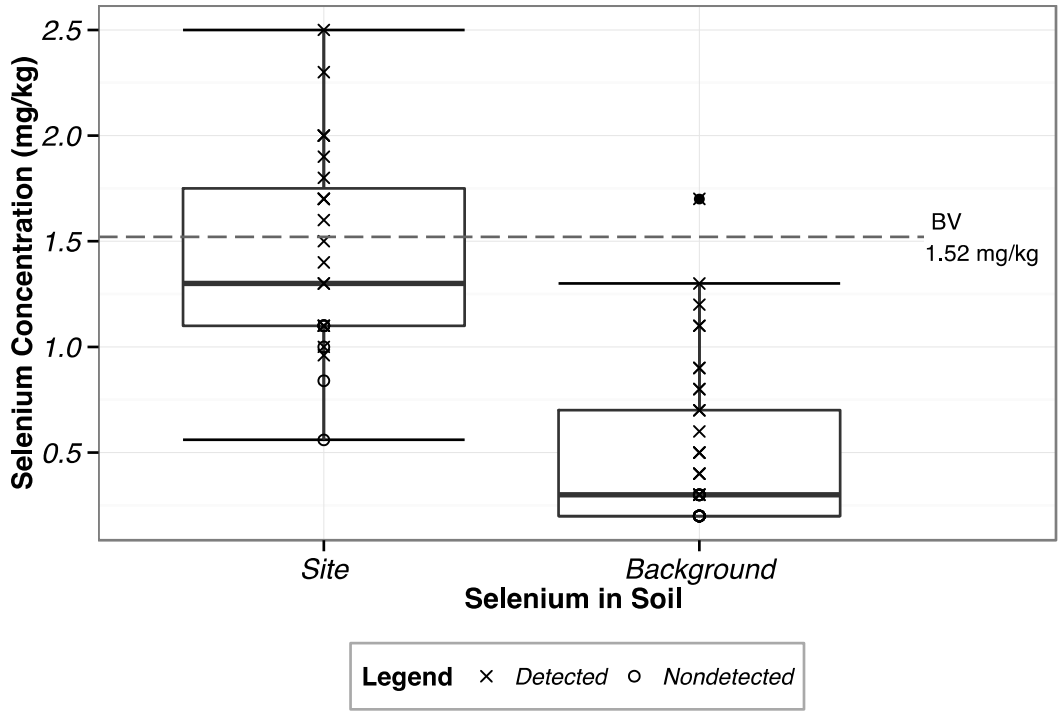


Figure H-136 Box plots for selenium in soil at SWMU 36-006

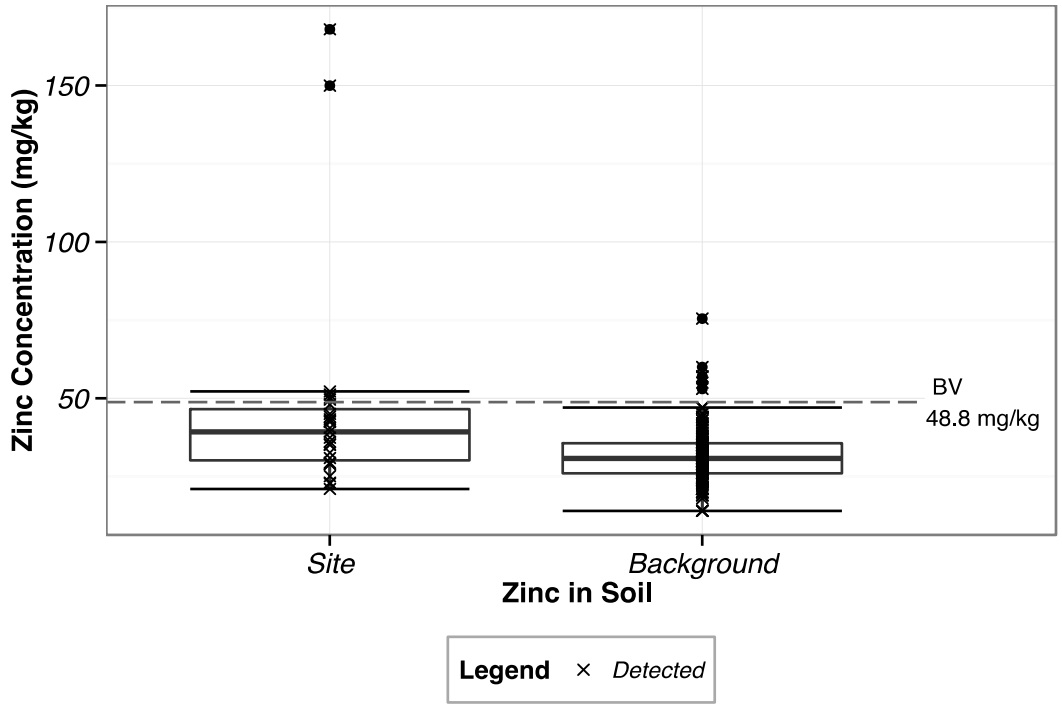


Figure H-137 Box plots for zinc in soil at SWMU 36-006

Table H-1
Results of Statistical Tests
for Inorganic Chemicals in Soil at SWMU 15-002 Former North Burn Pit

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Cobalt	0.493	0.072	n/a*	N
Lead	<0.001	<0.001	n/a	Y
Manganese	0.053	0.009	0.044	Y

* n/a = Not applicable.

Table H-2
Results of Statistical Tests for
Inorganic Chemicals in Soil at SWMU 15-002 Former South Burn Pit

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Barium	0.009	<0.001	n/a*	Y
Cobalt	0.049	0.103	1	N
Copper	0.009	0.004	n/a	Y
Lead	0.009	0.01	n/a	Y
Potassium	0.493	0.249	n/a	N
Selenium	<0.001	<0.001	n/a	Y
Zinc	0.05	0.013	n/a	Y

* n/a = Not applicable.

Table H-3
Results of Statistical Tests
for Inorganic Chemicals in Tuff at SWMU 15-007(a)

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Aluminum	0.003	0.001	n/a*	Y
Arsenic	<0.001	<0.001	n/a	Y
Barium	0.003	<0.001	n/a	Y
Beryllium	0.326	0.215	n/a	N
Calcium	<0.001	<0.001	n/a	Y
Chromium (Total)	<0.001	<0.001	n/a	Y
Cobalt	0.067	0.007	0.476	N
Copper	0.025	0.013	n/a	Y
Lead	<0.001	<0.001	n/a	Y
Magnesium	<0.001	<0.001	n/a	Y
Nickel	<0.001	<0.001	n/a	Y
Selenium	0.012	0.5	<0.001	Y
Zinc	0.65	0.059	n/a	N

* n/a = Not applicable.

Table H-4
Results of Statistical Tests
for Inorganic Chemicals in Soil at SWMU 15-007(a)

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Lead	0.027	<0.001	n/a*	Y
Zinc	0.112	0.003	1	N

* n/a = Not applicable.

Table H-5
Results of Statistical Tests for
Inorganic Chemicals in Soil at SWMUs 15-004(b) and 15-004(c)

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Barium	<0.001	<0.001	n/a*	Y
Beryllium	0.042	<0.001	n/a	Y
Calcium	0.304	0.005	0.195	N
Chromium (Total)	0.093	<0.001	1	N
Cobalt	<0.001	<0.001	n/a	Y
Copper	<0.001	<0.001	n/a	Y
Lead	<0.001	<0.001	n/a	Y
Manganese	0.006	0.002	n/a	Y
Nickel	0.002	<0.001	n/a	Y
Selenium	<0.001	<0.001	n/a	Y
Sodium	1	1	n/a	N
Zinc	0.044	0.422	0.196	N

* n/a = Not applicable.

Table H-6
Results of Statistical Tests
for Inorganic Chemicals in Soil at SWMU 15-004(f)

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Aluminum	0.464	<0.001	1	N
Barium	<0.001	<0.001	n/a*	Y
Beryllium	<0.001	<0.001	n/a	Y
Calcium	0.018	<0.001	n/a	Y
Chromium (Total)	<0.001	<0.001	n/a	Y
Cobalt	<0.001	<0.001	n/a	Y
Copper	<0.001	<0.001	n/a	Y
Iron	0.002	<0.001	n/a	Y
Lead	<0.001	<0.001	n/a	Y
Manganese	0.004	<0.001	n/a	Y
Nickel	<0.001	<0.001	n/a	Y
Potassium	0.582	0.329	n/a	N
Selenium	0.003	<0.001	n/a	Y
Sodium	1	0.246	n/a	N
Uranium	<0.001	<0.001	n/a	Y
Zinc	<0.001	<0.001	n/a	Y

* n/a = Not applicable.

Table H-7
Results of Statistical Tests for Inorganic Chemicals in Tuff at SWMU 15-004(f)

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Aluminum	0.025	<0.001	n/a*	Y
Arsenic	0.001	<0.001	n/a	Y
Barium	<0.001	<0.001	n/a	Y
Beryllium	0.032	0.092	1	N
Calcium	<0.001	<0.001	n/a	Y
Chromium (Total)	<0.001	<0.001	n/a	Y
Cobalt	0.014	0.004	n/a	Y
Copper	<0.001	<0.001	n/a	Y
Iron	0.42	<0.001	1	N
Lead	0.547	0.626	n/a	N
Magnesium	<0.001	<0.001	n/a	Y
Nickel	<0.001	0. 022	n/a	Y
Thallium	0.998	0.982	n/a	N
Vanadium	0.268	<0.001	0.439	N

* n/a = Not applicable.

Table H-8
Results of Statistical Tests for
Inorganic Chemicals in Sediment at SWMU 15-004(f)

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Barium	<0.001	0.011	n/a*	Y
Beryllium	0.049	0.012	n/a	Y
Cadmium	0.399	0.998	n/a	N
Cobalt	0.049	0.025	n/a	Y
Copper	<0.001	<0.001	n/a	Y
Vanadium	0.028	0.084	1	N
Zinc	0.449	0.409	n/a	N

* n/a = Not applicable.

Table H-9
Results of Statistical Tests for
Inorganic Chemicals in Tuff at SWMU 15-008(a)

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Aluminum	0.179	0.004	<0.001	Y
Arsenic	<0.001	<0.001	n/a*	Y
Barium	0.001	<0.001	n/a	Y
Beryllium	0.0501	0.058	1	N
Calcium	0.0501	0.002	<0.001	Y
Chromium (Total)	<0.001	<0.001	n/a	Y
Cobalt	0.163	0.042	0.056	N
Copper	<0.001	<0.001	n/a	Y
Iron	0.05	<0.001	n/a	Y
Lead	0.052	0.046	0.024	Y
Magnesium	<0.001	0.001	n/a	Y
Nickel	<0.001	<0.441	<0.001	Y
Vanadium	0.05	<0.001	n/a	Y
Zinc	0.42	0.081	n/a	N

* n/a = Not applicable.

Table H-10
Results of Statistical Tests for
Inorganic Chemicals in Soil at SWMU 15-008(a)

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Barium	0.094	0.228	n/a*	N
Beryllium	0.092	0.082	n/a	N
Copper	<0.001	<0.001	n/a	Y
Lead	<0.001	0.004	n/a	Y
Nickel	0.092	0.169	n/a	N
Selenium	<0.001	<0.001	n/a	Y
Zinc	<0.001	<0.001	n/a	Y

* n/a = Not applicable.

Table H-11
Results of Statistical Tests for
Inorganic Chemicals in Soil at SWMU 15-009(e)

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Calcium	0.338	0.686	n/a*	N
Copper	0.354	0.675	n/a	N
Lead	0.149	0.895	n/a	N
Selenium	0.639	1	0.278	N
Uranium	0.003	0.997	1	N
Zinc	0.003	0.057	1	N

* n/a = Not applicable.

Table H-12
Results of Statistical Tests for
Inorganic Chemicals in Soil at SWMU 15-010(a)

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Barium	0.311	0.653	n/a*	N
Copper	0.9	0.457	n/a	N
Lead	0.005	<0.001	n/a	Y
Selenium	<0.001	<0.001	n/a	Y
Zinc	0.005	<0.001	n/a	Y

* n/a = Not applicable.

Table H-13
Results of Statistical Tests for
Inorganic Chemicals in Soil at AOC C-15-006

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Antimony	0.003	0.14	<0.001	Y
Cobalt	<0.001	<0.001	n/a*	Y
Copper	<0.001	<0.001	n/a	Y
Iron	<0.001	<0.001	n/a	Y
Lead	<0.001	<0.001	n/a	Y
Manganese	<0.001	<0.001	n/a	Y
Zinc	0.003	<0.001	n/a	Y

* n/a = Not applicable.

Table H-14
Results of Statistical Tests for
Inorganic Chemicals in Soil at SWMU 36-001

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Barium	1	0.692	n/a*	N
Chromium (Total)	1	0.786	n/a	N
Copper	<0.001	<0.001	n/a	Y
Iron	1	1	n/a	N
Lead	0.242	0.758	n/a	N
Nickel	0.806	0.577	n/a	N
Sodium	0.624	0.934	n/a	N
Uranium	0.05	0.1	<0.001	Y
Zinc	<0.001	<0.001	n/a	Y

* n/a = Not applicable.

Table H-15
Results of Statistical Tests for
Inorganic Chemicals in Tuff at SWMU 36-005

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Barium	0.248	0.018	0.125	N
Beryllium	0.874	0.699	n/a*	N
Calcium	0.068	0.172	n/a	N
Chromium (Total)	<0.001	<0.001	n/a	Y
Nickel	0.013	0.403	0.014	Y

* n/a = Not applicable.

Table H-16
Results of Statistical Tests for
Inorganic Chemicals in Soil at SWMU 36-005

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Copper	0.924	0.383	n/a*	N
Selenium	<0.001	<0.001	n/a	Y

* n/a = Not applicable.

Table H-17
Results of Statistical Tests for Inorganic Chemicals in Soil at SWMU 36-006

Analyte	Quantile Test p-Value	Gehan Test p-Value	Slippage Test p-value	COPC?
Barium	1	1	n/a*	N
Calcium	0.269	0.274	n/a	N
Chromium (Total)	1	1	n/a	N
Copper	0.002	0.005	n/a	Y
Lead	0.269	0.799	n/a	N
Nickel	1	1	n/a	N
Selenium	<0.001	<0.001	n/a	Y
Zinc	<0.001	<0.001	n/a	Y

* n/a = Not applicable.

Appendix I

Risk Assessments

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Attachments

Attachment I-1 Dioxin and Furan Toxicity Equivalency Factor Calculations (on CD included with this document)

Attachment I-2 ProUCL Files (on CD included with this document)

Attachment I-3 Vapor-Intrusion Model Spreadsheets (on CD included with this document)

Attachment I-4 Ecological Scoping Checklists

I-1.0 INTRODUCTION

This appendix presents the results of the human health and ecological risk-screening evaluations conducted in support of the environmental characterization of the Potrillo and Fence Canyons Aggregate Area at Los Alamos National Laboratory (LANL or the Laboratory). The solid waste management units (SWMUs) and areas of concern (AOCs) discussed in this appendix are located in Technical Area 15 (TA-15) and TA-36 (Figure 1.1-1 of the report). This appendix presents the evaluation of potential risk and dose at 16 sites (SWMUs or AOCs) based on decision-level data collected from 1994 to 2011 and site remediation that resulted in the removal of contaminated media.

I-2.0 BACKGROUND

I-2.1 Site Descriptions and Operational History

Descriptions and operational histories of the SWMUs and AOCs evaluated by the Potrillo and Fence Canyons Aggregate Area investigation are presented in sections 6.0 and 7.0 of the investigation report. Brief descriptions of the Potrillo and Fence Canyons Aggregate Area SWMUs and AOCs assessed for potential risk/dose are presented in this section.

I-2.1.1 TA-15

TA-15, also known as R-Site, occupies portions of Threemile Mesa on the Pajarito Plateau near the southwestern boundary of the Laboratory in a roughly rectangular area approximately 1.3 mi wide by 1.5 mi long. TA-15 occupies approximately 1200 acres and is bounded by TA-66 and TA-67 to the north, TA-14, TA-16, TA-37, TA-49 to the west and south, and TA-36 to the east. The eastern portion of TA-15 is located within the Potrillo and Fence Canyons Aggregate Area; Potrillo Canyon intersects the eastern half of TA-15.

TA-15 was used from the mid-1940s to the present for explosives experiments. In that capacity, test explosions ranging from a few kilograms of high explosives (HE) to as much as 650 kg were conducted. These experiments used natural uranium metal, depleted uranium (DU) metal, lesser quantities of beryllium, and other metals. In most cases, the tests were carried out aboveground, which resulted in the test materials being scattered over areas. Based on Laboratory records, it is estimated that some 75 metric tons of natural uranium and DU have been expended at the TA-15 firing sites since the mid-1940s (LANL 1993, 020946, pp. E2, E9). TA-15 was used for HE research, development, and testing, primarily through hydrodynamic testing and dynamic experimentation. TA-15 contains the Pulsed High-Energy Radiographic Machine Emitting X-rays facility, the Dual Axis Radiographic Hydrodynamic Test facility, and building 15-0206, all of which are or were previously used for testing weapons under development. Other activities at TA-15 include the investigation of weapons functioning and systems behavior in nonnuclear testing. Potential contaminants at TA-15 may have been released into the environment through drainages downgradient of active firing sites, inactive landfills, inactive surface disposal areas, former firing sites, former septic systems, former storage areas, former transformer platforms, or former building locations.

SWMU 15-002, Former Burn Pits

SWMU 15-002 is described in the 1990 SWMU report as an inactive burn pit west of E-F Firing Site at TA-15 (LANL 1990, 007512, p. 88). This burn pit (south pit) was surrounded on three sides by a 3-ft-high, 10-ft-diameter earthen berm (LANL 1993, 020946, p. 8-28). A recent review of engineering drawings and

aerial photographs demonstrates that SWMU 15-002 actually consists of two former burn pits. The burn pit originally identified in the 1990 SWMU report is located south of building 15-0534, referred to in this appendix as the former north burn pit. The second burn pit is an approximate 5-ft to 10-ft rectangular area located east of former buildings 15-0001 and 15-0023, referred to in this appendix as the former south burn pit.

SWMUs 15-004(b) and 15-004(c), Firing Sites A and B

SWMU 15-004(b) is inactive Firing Site A, located approximately 450 ft southeast of building 15-0183, and SWMU 15-004(c) is inactive Firing Site B, located approximately 525 ft southeast of building 15-0183, at TA-15 (LANL 1995, 050294). Firing Sites A and B are located approximately 75 ft apart. Both firing sites and associated structures were removed and the ground surface was regraded in 1967.

SWMU 15-004(f), E-F Firing Sites

SWMU 15-004(f) is inactive E-F Firing Site consisting of three inactive firing points (D, E, and F) covering a total area of approximately 60 acres at TA-15. Firing Point E was used for large-scale shots containing up to 2500 lb of HE and Firing Point F was used for smaller-scale shots. Both firing points were either regraded or backfilled with gravel to fill in the depressions. Eventually, nearby soil was mounded on the north and south sides of Firing Point E to protect TA-15 structures from shrapnel. Tests at E-F Firing Site involved HE, uranium, beryllium, lead, and mercury (LANL 1993, 020946, p. 7-8).

SWMU 15-007(a), Landfill

SWMU 15-007(a), the former location of an inactive landfill known as Material Disposal Area (MDA) N, was located west of buildings 15-0563 and 15-0565 and east of R-Site Road at TA-15. MDA N was used to dispose of debris from the demolition of a laboratory and shop (building 15-0001) and a control room and darkroom (building 15-0007). Hazardous materials known to be present in these buildings included thorium in building 15-0001 and mercury and photographic chemicals in building 15-0007. MDA N was excavated and removed during the 2010 investigation.

SWMU 15-008(a), Surface Disposal Areas

SWMU 15-008(a) consists of two small surface disposal areas located on the edge of Potrillo Canyon, one south and one east of E-F Firing Site [SWMU 15-004(f)], at TA-15. The disposal areas are located within approximately 350 ft of each other, with each disposal area having dimensions of approximately 8 ft in diameter × 2 ft high. Both areas were used to dispose of debris from tests conducted at the E-F Firing Site, including soil, rock, pebbles, metal fragments, plastic, electrical cable, and electrical accessories. All debris was removed from both surface disposal areas during the 2010 investigation.

SWMU 15-009(e), Septic Tank

SWMU 15-009(e) is a decommissioned 1500-gal. septic tank (structure 15-0072) at E-F Firing Site [SWMU 15-004(f)] at TA-15. The septic tank was constructed in 1947 and received sanitary waste from the E-F Firing Site control building (15-0027), located approximately 175 ft northeast of the tank. The drainline goes around structure 15-0463, which is a transportable used for storage. Discharges from the septic tank flowed through a vitrified clay pipe to an outfall located approximately 30 ft from the tank at the edge of Potrillo Canyon.

SWMU 15-010(a), Septic Tank

SWMU 15-010(a) is the location of a former decommissioned septic tank (structure 15-0080) located east of former buildings 15-0001 and 15-0023 at R-Site at TA-15. The septic tank was connected to a laboratory and shop (former building 15-0001), a laboratory storage building (former building 15-0023), and a photography laboratory (former building 15-0007). During the 2010 investigation, the SWMU 15-010(a) septic tank was not located and test trenches confirmed that the septic tank had been removed between 1995 and 2010.

AOC C-15-004, Former Transformer Station

AOC C-15-004 is a former transformer station (former structure 15-0056) that was located approximately 30 ft southwest of the former E-F Firing Site control room (building 15-0027) at TA-15. Each transformer contained mineral oil with polychlorinated biphenyls of unknown concentration.

AOC C-15-005, Potential Contamination from Former Building

AOC C-15-005 is an area of potential soil contamination associated with the footprint of a former laboratory and shop (former building 15-0001) at TA-15 (Figure 6.15-1). Former building 15-0001 was constructed in 1944 to support experiments performed at Firing Sites C and D (LANL 1993, 020946).

AOC 15-005(b), Storage Area

AOC 15-005(b) is a former storage area located inside an HE make-up building (15-0242) at TA-15. This area was used to store containers of waste HE.

AOC C-15-006, Potential Contamination from Former Building

AOC C-15-006 is an area of potential soil contamination associated with the footprint of a former control building and darkroom (former building 15-0007) at TA-15. Former building 15-0007 was constructed in 1944 to support activities performed at Firing Sites C and D.

I-2.1.2 TA-36

TA-36, also known as Kappa Site, is located in the Potrillo and Fence Canyons in a remote area near the eastern boundary of the Laboratory. TA-36 occupies approximately 3.7 mi^2 in the central-south-central portion of the Laboratory and is bounded to the west and northwest by TA-15, to the east by TA-71 and White Rock, and to the south by TA-39 and TA-68. TA-68 and TA-71 are buffer areas and have not been used for Laboratory operations. Potrillo Canyon intersects TA-36 and Fence Canyon parallels the southern boundary of TA-36.

TA-36 consists of a series of firing sites and has been used to support explosives experiments from the 1950s to the present. The firing sites and facilities at TA-36 accommodate the shipping, receiving, transporting, and testing of HE. Over 30,000 test shots, using an estimated 2200 to 4400 lb of DU, have been fired at Kappa Site. Initially, the Kappa Site consisted of group offices; four firing sites named Eenie, Meenie, Minie and Lower Slobbovia; and a storage magazine. In 1983, the boundary of TA-36 was expanded to incorporate the I-J Firing Site, previously located in TA-15 (LANL 1993, 015313, p. 2-2). Sites investigated at TA-36 include a landfill, a septic system, a surface disposal area, a storage area, and the location of a former shot-containment-vessel, a project test area, former burn pits, and an inactive firing site. Potential contaminants at TA-36 may have been released into the environment through

drainages downgradient of active firing sites, inactive landfills, inactive surface disposal sites, former firing sites, former septic systems, former storage areas, or former burn pits.

SWMU 36-001, MDA AA

SWMU 36-001 consists of MDA AA, an inactive landfill located at TA-36 approximately 240 ft southwest of a control bunker (building 36-0120) and 100 ft southwest of the x-ray device building (building 36-0086). MDA AA consists of two disposal trenches containing burned debris from test shots conducted at the Lower Slobbovia Firing Site. Once a trench was filled, it was covered with approximately 4 ft of soil.

SWMU 36-003(b), Septic System, I-J Firing Site

SWMU 36-003(b) is a decommissioned septic system located at the west end of TA-36. The septic system served building 36-0055, the control bunker for the I-J Firing Site, and consists of a septic tank (structure 36-0061) and its associated drain lines and outfall. The septic tank sits near the edge of Mesita del Potrillo, approximately 100 ft southwest of building 36-0055, (LANL 1993, 015313, p. 5-24). The tank has a buried overflow pipe that previously discharged near the north rim of Potrillo Canyon.

SWMU 36-005, Storage Area

SWMU 36-005 is an inactive storage area (known as the “Boneyard”) located at TA-36 near the head of Fence Canyon between the Meenie and Minie Firing Sites [AOCs 36-004(b) and 36-004(c), respectively] This approximately 260 ft × 300 ft storage area is an undeveloped area, largely covered with grass and ponderosa pine.

SWMU 36-006, Surface Disposal Area

SWMU 36-006 consists of an inactive surface disposal area located at TA-36 on the southern slope of Potrillo Canyon, approximately 600 ft north of the Eenie Firing Site [AOC 36-004(a)] at TA-36. The majority of the debris covers an area approximately 75 ft wide that extends approximately 100 ft down the south canyon slope. The remainder of the debris was scattered laterally 300 ft along the south canyon slope.

I-2.2 Investigation Sampling

The final data set used to identify chemicals of potential concern (COPCs) and evaluate potential risks/doses to human health and the environment for the Potrillo and Fence Canyons Aggregate Area consists of all qualified analytical results compiled from both historical sampling activities and the 2010 investigation. Only those data determined to be of decision-level quality are included in the final data sets evaluated in this appendix.

I-2.3 Determination of COPCs

Section 5.0 summarizes the COPC selection process and provides a data summary. Only COPCs detected above background (inorganic chemicals and radionuclides), with detection limits greater than background values (BVs) (inorganic chemicals) and detected (organic chemicals, inorganic chemicals with no BVs and radionuclides) were retained. The industrial scenario and the ecological screening utilize data for samples collected from 0.0–1.0 ft below ground surface (bgs) and 0.0–5.0 ft bgs, respectively. The construction worker and the residential scenarios utilize data for samples collected from 0.0–10.0 ft bgs. However, sampling depths often overlapped because of multiple investigations; therefore, all samples with

a starting depth less than the lower bound of the interval for each scenario were included in the risk-screening assessments for a given scenario.

As discussed in section 5.0 of the report, the identification of a chemical or radionuclide as a COPC does not mean the constituent(s) is related to the site and is a result of site operations. A COPC is identified because it is present at a site based on the criteria discussed but might be present because of nearby and/or upgradient operations and/or infrastructure typical of industrial and metropolitan development. If such origins are evident, the constituents might be excluded from the data analyses and risk assessments. For the sites evaluated in the Potrillo and Fence Canyons Aggregate Area, polycyclic aromatic hydrocarbons (PAHs) are a class of semivolatile organic chemicals (SVOCs) frequently detected as a result of environmental sampling, yet are generally not present as a result of releases from SWMUs or AOCs. As a result, PAHs unrelated to site activities are often detected in samples analyzed for the presence of SVOCs that are potentially site-related. PAHs are known to be widely distributed in the environment from a number of sources, both natural, such as forest fires and anthropogenic, such as combustion of fossil fuels, oil drips off motor vehicles, vehicle tires, coal tar pitch, and weathering or eroding of asphalt pavement. Urban runoff is a major source of PAHs and includes components from spilled oils and breakdown components from tires and asphalt. Because the Potrillo and Fence Canyons Aggregate Area sites are typically associated with industrially developed areas, the PAHs detected were not associated with site-related operations and were not evaluated for potential risk, except at SWMU 36-006. In addition, some of the COPCs identified in this report may not be evaluated for potential risk under one or more scenarios because they were not within the specified depth intervals associated with a given scenario.

I-3.0 CONCEPTUAL SITE MODEL

The primary mechanisms of release related to historical contaminant sources were described in section 2.3.2 of the approved investigation work plan (LANL 2009, 106657.8; NMED 2009, 106677). In the source areas, both potential surface and subsurface sources of contamination exist and include releases from storage areas, explosives testing at firing sites, septic systems waste lines, and outfalls.

The lack of saturated conditions in the source areas restricts the vertical migration of contaminants. No zones of perched groundwater have been identified beneath the Potrillo and Fence Canyons Aggregate Area.

I-3.1 Receptors and Exposure Pathways

The primary exposure pathway for human receptors is surface soil and subsurface soil/tuff that may be brought to the surface through intrusive activities. Migration of contamination to groundwater through the vadose zone is unlikely given the depth to groundwater (greater than 1000 ft bgs). Human receptors (industrial worker, construction worker, and resident) may be exposed through direct contact with soil or suspended particulates by ingestion, inhalation, dermal contact, and external irradiation pathways. Direct contact exposure pathways from subsurface contamination to human receptors are complete for the resident, industrial worker, and the construction worker, where appropriate. The exposure pathways are the same as those for surface soil. The beef ingestion pathway is not complete because most sites are less than 2 acres in size and grazing of cattle is prohibited in all Laboratory areas evaluated in this report. In addition, most areas are highly industrialized and are not conducive to grazing cattle. Sources, exposure pathways, and receptors are shown in the conceptual site model (CSM) (Figure I-3.1-1).

The sites in the Potrillo and Fence Canyons Aggregate Area are industrial areas on Laboratory property. The developed sites provide minimal or no potential habitat for ecological receptors, especially where sites are covered with asphalt. For unpaved sites or areas where potential habitat is present, exposure pathways are complete to surface soil and tuff for ecological receptors. Weathering of tuff is the only viable natural process that may result in the exposure of receptors to COPCs in tuff. However, because of the slow rate of weathering expected for tuff, exposure to COPCs in tuff is negligible, although it is included in the assessments. Exposure pathways to subsurface contamination below 5.0 ft are not complete unless contaminated soil or tuff were excavated and brought to the surface. The potential pathways are root uptake by plants, inhalation of vapors (burrowing animals only), inhalation of dust, dermal contact, incidental ingestion of soil, external irradiation, and food web transport. Pathways from subsurface releases may be complete for plants. Surface water was not evaluated because of the lack of surface water features. Sources, exposure pathways, and receptors are presented in the CSM (Figure I-3.1-1).

I-3.2 Environmental Fate and Transport

The evaluation of environmental fate addresses the chemical processes affecting the persistence of a chemical in the environment; the evaluation of transport addresses the physical processes affecting mobility of a contaminant along a migration pathway. Migration through soil and tuff depends on properties such as soil pH, rate of precipitation or snowmelt, soil moisture content, soil-tuff hydraulic properties, and properties of the COPCs. Migration into and through tuff also depends on the unsaturated flow properties of the tuff and the presence of joints and fractures.

The most important factor with respect to the potential for COPCs to migrate to groundwater is the presence of saturated conditions. Downward migration in the vadose zone is also limited by a lack of hydrostatic pressure as well as the lack of a source for the continued release of contamination. Without sufficient moisture and a source, little or no potential migration of materials through the vadose zone to groundwater occurs.

Contamination at depth is addressed in the discussion of nature and extent. Results from the deepest samples collected showed either no detected concentrations of COPCs or low/trace-level concentrations of only a few inorganic, organic, and/or radionuclide COPCs in tuff. The limited extent of contamination is related to the absence of the key factors that facilitate migration, as discussed above. Given how long the contamination has been present in the subsurface, physical and chemicals properties of the COPCs, and the lack of saturated conditions, the potential for contaminant migration to groundwater is very low.

The New Mexico Environment Department (NMED) guidance (NMED 2015, 600575) contains screening levels that consider the potential for contaminants in soil to result in groundwater contamination. These screening levels consider equilibrium partitioning of contaminants among solid, aqueous and vapor phases and account for dilution and attenuation in groundwater using dilution attenuation factors (DAFs). These DAF soil screening levels (SSLs) can be used to identify chemical concentrations in soil that have the potential to contaminate groundwater (EPA 1996, 059902). Screening contaminant concentrations in soil against these DAF SSLs, however, does not provide an indication of the potential for contaminants to migrate to groundwater. The assumptions used in the development of these DAF SSLs include an assumption of uniform contaminant concentrations from the contaminant source to the water table (i.e., it is assumed that migration to groundwater has already occurred). Furthermore, this assumption is inappropriate for cases such as the Potrillo and Fence Canyons Aggregate Area where sampling has shown that contamination is vertically bounded near the surface and the distance from the surface to the water table is large. For these reasons, screening of contaminant concentrations in soil against the DAF SSLs was not performed.

The best indication of the potential for future contaminant migration to groundwater is the current vertical distribution of contaminants in the subsurface. Most releases at the Potrillo and Fence Canyons Aggregate Area are historical (i.e., they occurred decades ago). The regional aquifer beneath the aggregate area is greater than 1000 ft bgs. Therefore, for migration of contaminants to occur from shallow soil to the regional aquifer in a meaningful time frame (e.g., 100 to 1000 yr.), significant vertical migration should have already occurred. Sampling has shown that this migration has not occurred, indicating a very low potential for future contaminant migration to groundwater.

The relevant release and transport processes of the COPCs are a function of chemical-specific properties that include the relationship between the physical form of the constituents and the nature of the constituent transport processes in the environment. Specific properties include the degree of saturation, the potential for ion exchange or sorption, and the potential for natural bioremediation. The transport of volatile organic compounds (VOCs) occurs primarily in the vapor phase by diffusion or advection in subsurface air. The chemical and physical properties of the Potrillo and Fence Canyons Aggregate Area COPCs are presented in Tables I-3.2-1, I-3.2-2, and I-3.2-3.

The primary release and transport mechanisms that may lead to the potential exposure of receptors in the Potrillo and Fence Canyons Aggregate Area include

- dissolution and/or particulate transport of surface contaminants from precipitation and runoff,
- airborne transport of contaminated surface soil or particulates,
- continued dissolution and advective/dispersive transport of chemical and radiological contaminants contained in subsurface soil and bedrock,
- biotic perturbation and/or translocation of contaminants in subsurface contaminated media, and
- uptake of contaminants from soil and water by biota.

Contaminant distributions at the sites indicate that after the initial deposition of contaminants from operational activities and historical remediation efforts, elevated levels of contaminants tend to remain concentrated near the original release points. The primary potential release and transport mechanisms identified for Potrillo and Fence Canyons Aggregate Area include direct discharge; precipitation, sorption and mechanical transport; dissolution and advective transport in water; and volatilization, diffusion, and dispersion. Less significant transport mechanisms include wind entrainment and, given the asphalt pavement covering most sites, dispersal of surface soil, and uptake of contaminants from soil and water by biota.

Gas or vapor-phase contaminants such as VOCs are likely to volatilize to the atmosphere from near-surface soil and sediment and/or migrate by diffusion through air-filled pores in the vadose zone. Migration of vapor-phase contaminants from tuff into ambient air may occur by diffusion or advection driven by barometric pressure changes.

I-3.2.1 Inorganic Chemicals

In general, and particularly in a semiarid climate such as that found at the sites within the Potrillo and Fence Canyons Aggregate Area, inorganic chemicals are not highly soluble or mobile in the environment. The primary physical and chemical factors that determine and describe the distribution of inorganic COPCs within the soil and tuff are the water solubility of the inorganic chemical and the soil-water partition coefficient (K_d). Other factors besides the K_d values, such as speciation in soil and oxidation-reduction potential (Eh) and pH also play a role in the likelihood that inorganic chemicals will migrate. The K_d values provide a general assessment of the potential for migration through the

subsurface; chemicals with higher K_d values are less likely to be mobile than those with lower K_d values. Inorganic chemicals with K_d values greater than 40 are very unlikely to migrate through soil towards the water table (Kincaid et al. 1998, 093270). Table I-3.2-1 presents the K_d values for the inorganic COPCs identified at the Potrillo and Fence Canyons Aggregate Area sites. Based on this criterion, aluminum, antimony, barium, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, thallium, uranium, vanadium, and zinc have a low potential to mobilize and migrate through soil and the vadose zone. The K_d values for arsenic, copper, cyanide, iron, nitrate, perchlorate, selenium, and silver are less than 40 or unknown and may indicate that these inorganic chemicals have a greater potential to mobilize and migrate through soil and the vadose zone.

These inorganic chemicals are discussed further in the following sections. 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). Information for these inorganic chemicals is also available from the ATSDR website at http://www.atsdr.cdc.gov/toxpro2.html.

- Arsenic may undergo a variety of reactions, including oxidation-reduction reactions, ligand exchange, precipitation, and biotransformation. Arsenic forms insoluble complexes with iron, aluminum, and magnesium oxides found in soil and, in this form, arsenic is relatively immobile. However, under low pH and reducing conditions, arsenic can become soluble and may potentially leach into groundwater or result in runoff of arsenic into surface waters. Arsenic is expected to have low mobility under the environmental conditions (neutral to alkaline soil pH and oxidizing near-surface conditions) present in the Potrillo and Fence Canyons Aggregate Area.
- Chromium is a naturally occurring element found in rocks, animals, plants, and soil and in volcanic dust and gases. Chromium is present in the environment in several different forms. The most common forms are chromium(0); trivalent [or chromium(III)], a noncarcinogen; and hexavalent [or chromium(VI)], a carcinogen. Trivalent chromium occurs naturally in the environment and is an essential nutrient required by the human body to promote the action of insulin in body tissues so that the body can use sugar, protein, and fat. Hexavalent chromium and chromium are generally produced by industrial processes. Chromium can attach strongly to soil and is therefore not very mobile. The movement of chromium in soil depends on the type and condition of the soil and other environmental factors. Organic matter in soil is expected to convert soluble chromate, hexavalent chromium, to insoluble trivalent chromium oxide (site environmental conditions of neutral to alkaline soil pH and oxidizing near-surface conditions promote this conversion). The reduction of hexavalent chromium to trivalent chromium is facilitated by low pH (average soil pH = 6.7). The extent of chromium is defined.
- Copper movement in soil is determined by physical and chemical interactions with the soil components. Most copper deposited in soil is strongly adsorbed and remains in the upper few centimeters. Copper will adsorb to organic matter, carbonate minerals, clay minerals, hydrous iron, and manganese oxides. In most temperate soil, pH, organic matter, and ionic strength of the soil solutions are the key factors affecting adsorption. Copper binds to soil more strongly than other divalent cations and the distribution of copper in the soil solution is less affected by pH than other metals. Copper is expected to be bound to the soil and move in the system by way of transport of soil particles by water as opposed to movement as dissolved species. The average soil pH is 6.7 in the Potrillo and Fence Canyons Aggregate Area, so leaching of copper is unlikely.
- Cyanide tends to adsorb onto various natural media, including clay and sediment; however, sorption is insignificant relative to the potential for cyanide to volatilize and/or biodegrade. At soil surfaces, volatilization of hydrogen cyanide is a significant mechanism for cyanide loss. Cyanide occurring at low concentrations in subsurface soil is likely to biodegrade under both aerobic and anaerobic conditions. The extent of cyanide is defined.

- Iron is naturally occurring in soil and tuff and may be relatively mobile under reducing conditions. Iron is sensitive to soil pH conditions and occurs in two oxidation states: iron(III), the insoluble oxidized form, and iron(II), the reduced soluble form. Most iron in well-drained neutral to alkaline soil is present as precipitates of iron(III) hydroxides and oxides. With time, these precipitates are mineralized and form various iron-bearing minerals, such as lepidcrocite, hematite and goethite. Iron is not expected to be mobile in the neutral soil (average soil pH = 6.7) in the Potrillo and Fence Canyons Aggregate Area. The extent of iron is defined.
- Nitrate (and to a lesser degree perchlorate) is highly soluble in water and may migrate with water molecules in saturated soil. As noted above, the subsurface material beneath the Potrillo and Fence Canyons Aggregate Area sites has low moisture content, which would inhibit the mobility of nitrate as well as most other inorganic chemicals. The extent of nitrate is defined.
- Perchlorate is soluble in water and may migrate with water molecules in saturated soil. As noted above, the subsurface material beneath the Potrillo and Fence Canyons Aggregate Area has low moisture content, which would inhibit the mobility of perchlorate as well as most other inorganic chemicals. The extent of perchlorate is defined.
- 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 average soil pH within the Potrillo and Fence Canyons Aggregate Area is 6.7, which indicates that selenium is not likely to migrate. The extent of selenium is defined.
- Silver can be released to air and water through natural processes, such as the weathering of rock and the erosion of soil. Silver sorbs onto soil and sediment and tends to form complexes with inorganic chemicals and humic substances in soil. Organic matter complexes with silver and reduces its mobility. Silver compounds tend to leach from well-drained soil so that it may potentially migrate into the subsurface. Site conditions are neutral to slightly alkaline (average soil pH = 6.7), and silver is not expected to be mobile. The extent of silver is defined.

I-3.2.2 Organic Chemicals

Table I-3.2-2 presents the physical and chemical properties (organic carbon–water partition coefficient [K_{oc}], logarithm to the base 10 octanol-water partition coefficient [log K_{ow}] and solubility) of the organic COPCs identified for the Potrillo and Fence Canyons Aggregate Area. Physical and chemical properties of organic chemicals are important when evaluating their fate and transport. The following physiochemical property information illustrates some aspects of the fate and transport tendencies of the Potrillo and Fence Canyons Aggregate Area COPCs. The information is summarized from Ney (1995, 058210).

Water solubility may be the most important chemical characteristic used to assess 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. The COPCs identified as having water solubilities similar to or greater than 1000 mg/L are acetone; benzoic acid; benzyl alcohol; diethylphthalate; di-n-butylphthalate; octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX); methylene chloride; 2-methylphenol; 4-methylphenol; phenol; trichlorofluoromethane 1,3,5-trinitrobenzene; and 2,4,6-trinitrotoluene.

The lower the water solubility of a chemical, especially below 10 mg/L, the more likely it will be immobilized by adsorption. Chemicals with lower water solubilities are more likely to accumulate or bioaccumulate and persist in the environment, to be slightly prone to biodegradation, and to be metabolized in plants and animals. The COPCs identified as having water solubilities less than 10 mg/L are acenaphthene; anthracene; Aroclor-1254; Aroclor-1260; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; bis(2-ethylhexyl)phthalate; butylbenzylphthalate; chrysene; dibenz(a,h)anthracene; dibenzofuran; di-n-octylphthalate; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; phenanthrene; pyrene; 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD); and tris(o-cresyl)phosphate.

Vapor pressure is a chemical characteristic used to evaluate the tendency of organic chemicals to volatize. Chemicals with vapor pressure greater than 0.01 millimeters of mercury (mm Hg) are likely to volatilize and therefore, concentrations at the site are reduced over time; vapors of these chemicals are more likely to travel toward the atmosphere and not migrate toward groundwater. Acetone; benzyl alcohol, 4-isopropyltoluene; methylene chloride; 2-methylnaphthalene; 2-methylphenol; 4-methylphenol; naphthalene; phenol; toluene; 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, trichlorofluoromethane; and xylene (total) have vapor pressures greater than 0.01 mm Hg.

Chemicals with vapor pressures less than 0.000001 mm Hg are less likely to volatilize and, therefore, tend to remain immobile. Benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; bis(2-ethylhexyl)phthalate; chrysene; dibenz(a,h)anthracene; di-n-octylphthalate; HMX; indeno(1,2,3-cd)pyrene; 1,3,5-trinitroperhydro-1,3,5-triazine (RDX); and tris(o-cresyl)phosphate have vapor pressures less than 0.000001 mm Hg.

The K_{ow} is an indicator of a chemical's potential to bioaccumulate or bioconcentrate in the fatty tissues of living organisms. The unitless K_{ow} value is an indicator of water solubility, mobility, sorption, and bioaccumulation. The higher the K_{ow} is above 1000, the greater the affinity the chemical has for bioaccumulation in the food chain, the greater its potential for sorption in the soil and the lower its mobility (Ney 1995, 058210). The COPCs with a K_{ow} greater than 1000 include 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene, 3,5-dinitroaniline and HMX. A K_{ow} of less than 500 indicates high water solubility, high mobility, little to no affinity for bioaccumulation, and degradability by microbes, plants and animals. The COPCs with a K_{ow} less than 500 include acenaphthene; acetone; anthracene; Aroclor-1254; Aroclor-1260; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; benzoic acid; benzyl alcohol; bis(2-ethylhexyl)phthalate; butylbenzylphthalate; chrysene; di-n-butylphthalate; di-n-octylphthalate; dibenz(a,h)anthracene; dibenzofuran; diethylphthalate; 2,4-dinitrotoluene; 2,6-dinitrotoluene; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; 4-isopropyltoluene; methylene chloride; 2-methylnaphthalene; 2-methylphenol; 4-methylphenol; naphthalene; pentachlorophenol; phenanthrene; phenol, pyrene; RDX; toluene; trichlorofluoromethane; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; 1,3,5-trinitrobenzene; 2,4,6-trinitrotoluene; tris(o-cresyl)phosphate; and xylene (total).

The K_{oc} measures the tendency of a chemical to adsorb to organic carbon in soil. K_{oc} values above 500 L/kg indicate a strong tendency to adsorb to soil, leading to low mobility (NMED 2015, 600575). Acenaphthene; anthracene; Aroclor-1254; Aroclor-1260; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; bis(2-ethylhexyl)phthalate; butylbenzylphthalate; chrysene; dibenz(a,h)anthracene; dibenzofuran; di-n-octylphthalate; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; 2-methylnaphthalene; naphthalene; phenanthrene; pyrene; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; 2,3,7,8-TCDD; and tris(o-cresyl)phosphate have K_{oc} values above 500 L/kg, indicating a very low potential to migrate toward groundwater. The COPCs with K_{oc} values less than 500 L/kg are acetone; 3,5-dinitroaniline; 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; benzoic acid; benzyl alcohol; 2,4-dinitrotoluene; 2,6-dinitrotoluene;

diethylphthalate; di-n-butylphthlate; HMX, methylene chloride; 2-methylphenol; 4-methyphenol; pentachlorophenol; phenol, 1,3,5-trinitrobenzene; 2,4,6-trinitrotoluene; RDX; toluene; trichlorofluoromethane; and xylene (total).

Anthracene; Aroclor-1254; Aroclor-1260; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; bis(2-ethylhexyl)phthalate; chrysene; dibenz(a,h)anthracene; dibenzofuran; di-n-butylphthalate; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; 2-methylnaphthalene; naphthalene; phenanthrene; pyrene; and 2,3,7,8-TCDD are the least mobile and the most likely to bioaccumulate. The more soluble and volatile COPCs include acetone; benzoic acid; benzyl alcohol; bis(2-ethylhexyl)phthalate; butylbenzylphthalate; di-n-butylphthalate; di-n-octylphthalate; dibenzofuran; diethylphthalate; 4-isopropyltoluene; methylene chloride; 2-methylphenol; 4-methylphenol; pentachlorophenol; phenol; toluene; total petroleum hydrocarbons–diesel range organics (TPH-DRO); trichlorofluoromethane; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; and xylene (total), which are more mobile but are also more likely to travel toward the atmosphere and not migrate toward groundwater. Because the organic COPCs were detected at low concentrations and the vertical extent is defined, they are not likely to migrate to groundwater.

I-3.2.3 Radionuclides

Radionuclides are generally not highly soluble or mobile in the environment, particularly in the semiarid climate of the Laboratory. The physical and chemical factors that determine the distribution of radionuclides within soil and tuff are the K_d, the pH of the soil and other soil characteristics (e.g., sand or clay content), and the Eh. The interaction of these factors is complex, but K_d values provide a general assessment of the potential for migration through the subsurface; chemicals with higher K_d values are less likely to be mobile than those with lower values. Radionuclides with K_d values greater than 40 are very unlikely to migrate through soil towards the water table (Kincaid et al. 1998, 093270).

Table I-3.2-3 gives physical and chemical properties of the radionuclide COPCs identified at the Potrillo and Fence Canyons Aggregate Area sites. Based on K_d values, americium-241 and cesium-137 have a very low potential to migrate towards groundwater at the sites within the Potrillo and Fence Canyons Aggregate Area. The K_d values for uranium-234, uranium-235/236, and uranium-238 are less than 40 and indicate a potential to migrate towards groundwater.

Uranium is a natural and commonly occurring radioactive element that is present in nearly all rock and soil. The mobility of uranium in soil and its vertical transport to groundwater depend on properties of the soil such as pH, Eh, concentration of complexing anions, porosity of the soil, soil-particle size, and sorption properties as well as the amount of water available. In general, the actinide nuclides form comparatively insoluble compounds in the environment and are therefore not considered biologically mobile. The actinides are transported in ecosystems mainly by physical and sometimes chemical processes. They tend to attach, sometimes strongly, to surfaces and tend to accumulate in soil and sediment, which ultimately serve as strong reservoirs. Subsequent movement is largely associated with geological processes such as erosion and sometimes leaching.

I-3.2.4 Summary

Saturation is the primary factor in determining the potential for COPCs to migrate to groundwater. Based on investigation results, saturated conditions are not currently present within the Potrillo and Fence Canyons Aggregate Area. The lack of saturated conditions and hydrostatic pressure severely limits the movement of contamination toward groundwater within the Potrillo and Fence Canyons Aggregate Area.

Without sufficient moisture, little or no potential migration of materials occurs through the vadose zone to groundwater. As a result, the potential for COPC migration to groundwater is very low based on the site conditions, the physical/chemical properties of the COPCs, and the distance to the regional aquifer below the site.

I-3.3 Exposure Point Concentration Calculations

The exposure point concentrations (EPCs) represent upper-bound concentrations of COPCs. For comparison to risk-screening levels, the upper confidence limit (UCL) of the arithmetic mean was calculated when possible and used as the EPC. The UCLs were calculated using all available decision-level data within the depth range of interest. If an appropriate UCL of the mean could not be calculated or if the UCL exceeded the maximum concentration, the maximum detected concentration of the COPC was used as the EPC. The summary statistics, including the EPC for each COPC for the human health and the ecological risk-screening assessments and the distribution used for the calculation, are presented in Tables I-3.3-1 to I-3.3-52.

The EPCs for the dioxin and furan congeners are the sums of the detected congeners weighted by the toxic equivalency factors (TEFs) (NMED 2015, 600575); the sum is expressed as the 2,3,7,8-TCDD–equivalent concentration. The TEFs used are presented in Table I-3.3-53. The results of the TEF calculations for each site are presented in Attachment I-1 and the 2,3,7,8-TCDD-equivalent concentrations (95% UCLs or maximum concentrations) for each site are presented in Tables I-3.3-1 to I-3.3-52.

Calculation of UCLs of the mean concentrations was done using the EPA ProUCL 5.0.00 software (EPA 2013, 251074), which is based on EPA guidance (EPA 2002, 085640). The ProUCL program calculates 95%, 97.5%, and 99% UCLs and recommends a distribution and UCL. The 95% UCL for the recommended calculation method was used as the EPC. The ProUCL software performs distributional tests on the data set for each COPC and calculates the most appropriate UCL based on the distribution of the data set. Environmental data may have a normal, lognormal, or gamma distribution but are often nonparametric (no definable shape to the distribution). The ProUCL documentation strongly recommends against using the maximum detected concentration for the EPC. The maximum detected concentration was used to represent the EPC for COPCs only when detects were too few to calculate a UCL. Input and output data files for ProUCL calculations are provided on CD as Attachment I-2.

I-4.0 HUMAN HEALTH RISK-SCREENING ASSESSMENTS

The human health risk-screening assessments were conducted for each site within the Potrillo and Fence Canyons Aggregate Area. All sites were screened for the residential and construction worker scenarios using data from 0.0 to 10.0 ft bgs. Sites were also screened for the industrial scenario using data from 0.0 to 1.0 ft bgs, where available. The human health risk-screening assessments compare either the 95% UCL of the mean concentration, the maximum detected concentration, or the maximum detection limit of each COPC with SSLs for chemicals and screening action levels (SALs) for radionuclides.

I-4.1 Human Health SSLs and SALs

Human health risk-screening assessments for chemicals were conducted using SSLs for the industrial, construction worker, and residential scenarios obtained from NMED guidance (NMED 2015, 600575). The NMED SSLs are based on a target noncarcinogenic hazard quotient (HQ) of 1 and a target cancer risk of 1×10^{-5} (NMED 2015, 600575). If SSLs were not available from NMED guidance, values from the EPA

regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) were used. The EPA SSLs for carcinogens were multiplied by 10 to adjust from a 10^{-6} cancer risk level to the NMED target cancer risk level of 10^{-5}. EPA regional screening levels are not available for construction workers; therefore, when regional screening levels were used, the construction worker SSLs were calculated using toxicity values from the EPA regional screening tables (http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm) and NMED exposure parameters and equation (NMED 2015, 600575). Surrogate SSLs were used for some COPCs based on structural similarity or breakdown products. Exposure parameters used to calculate the industrial, construction worker, and residential SSLs are presented in Table I-4.1-1.

Essential nutrients (calcium, magnesium, potassium, and sodium) were screened using the NMED essential nutrient SSLs (NMED 2015, 600575). Because these values are a different toxicity basis than other COPCs, essential nutrient ratios are presented separately from the HQs for the individual COPCs.

TPH-DRO data were compared with the NMED TPH screening guidelines for diesel fuel No. 2 (NMED 2015, 600575). The New Mexico State TPH screening guidelines do not provide screening levels for the construction worker scenario; therefore, the construction worker scenario was evaluated using the industrial screening guideline. The TPH toxicity is based only on the weighted sum of the toxicity of the hydrocarbon fractions (NMED 2015, 600575). Because this value has a different toxicity basis than other COPCs, the TPH HQs are presented separately from the HQs for the individual COPCs. However, the constituents of the TPH, if detected, were compared with the individual SSLs in the screening tables.

Radionuclide SALs were used for comparison with radionuclide COPC EPCs and were derived using the RESRAD (residual radioactive) model, Version 6.5 (LANL 2014, 600064). The SALs are based on a 25-mrem/yr dose as authorized by DOE Order 458.1. Exposure parameters used to calculate the SALs are presented in Tables I-4.1-2 and I-4.1-3.

I-4.2 Results of the Human Health Risk-Screening Evaluations

The EPC of each COPC was compared with the SSLs for the industrial, construction worker, and residential scenarios. For carcinogenic chemicals, the EPCs were divided by the SSL and multiplied by 1×10^{-5}. The sum of the carcinogenic risks was compared with the NMED target cancer risk level of 1×10^{-5}. For noncarcinogenic chemicals, an HQ was generated for each COPC by dividing the EPC by the SSL. The HQs were summed to generate a hazard index (HI). The HI was compared with the NMED target HI of 1. The radionuclide EPCs were divided by the SAL and multiplied by 25 mrem/yr. The total doses were compared with the DOE target level of 25 mrem/yr, as authorized by DOE Order 458.1. The human health risk-screening results are presented in Tables I-4.2-1 to I-4.2-132 and are described below for each SWMU and AOC evaluated.

I-4.2.1 SWMU 15-002

Because the two former burn pits are not in the vicinity of each other (over 600 ft apart), risk was evaluated separately for each pit. Data from sampling locations 15-613318 through 15-613322 were used to evaluate the former north burn pit, and data from sampling locations 15-613671 through 15-613675 were used to evaluate the former south burn pit.

Former North Burn Pit

Calcium, magnesium, and potassium were screened using the NMED essential nutrient SSLs provided in Table I-4.2-1. The maximum detected concentrations of calcium, magnesium, and potassium were below the SSLs and were eliminated from further evaluation in the human health risk assessment.

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-2, I-4.2-3, and I-4.2-7. The total excess cancer risk for the industrial scenario is 6×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.06, which is below the NMED target HI of 1 (NMED 2015, 600575). The industrial HI for TPH-DRO is 0.003, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-4 and I-4.2-8. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 3, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese. The construction worker HI for TPH-DRO is 0.003, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-5, I-4.2-6, and I-4.2-9. The total excess cancer risk for the residential scenario is 2×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). The residential HI for TPH-DRO is 0.008, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

Former South Burn Pit

Calcium, magnesium, and potassium were screened using the NMED essential nutrient SSLs provided in Table I-4.2-10. The maximum detected concentrations of calcium, magnesium, and potassium were below the SSLs and eliminated from further evaluation in the human health risk assessment.

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-11, I-4.2-12, and I-4.2-16. The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 3, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from mercury. The industrial HI for TPH-DRO is 0.006, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-13 and I-4.2-17. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 8, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from barium and mercury. The construction worker HI for TPH-DRO is 0.001, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-14, I-4.2-15, and I-4.2-18. The total excess cancer risk for the residential scenario is 1×10^{-5}, which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 19, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from barium and mercury. The residential HI for TPH-DRO is 0.004, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.2.2 SWMUs 15-004(b) and 15-004(c)

Calcium was screened using the NMED essential nutrient SSLs provided in Table I-4.2-19. The maximum detected concentration of calcium was below the SSLs and eliminated from further evaluation in the human health risk assessment.

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-20, I-4.2-21, and I-4.2-22. The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.7, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.06 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-23 and I-4.2-24. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from aluminum, lead, and manganese. The total dose is 0.1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-25, I-4.2-26, and I-4.2-27. The total excess cancer risk for the residential scenario is 1×10^{-5}, which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is approximately 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from lead. The total dose is 0.4 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

I-4.2.3 SWMU 15-004(f)

In order to determine whether portions of SWMU 15-004(f) present the greater or lesser potential unacceptable risks/doses to receptors, risk/dose assessments were performed for the entire SWMU, the SWMU excluding Firing Point E samples, and the SWMU using only Firing Point E samples.

Calcium and magnesium were screened using the NMED essential nutrient SSLs in provided Table I-4.2-28. The maximum detected concentrations of calcium and magnesium were below the SSLs and eliminated from further evaluation in the human health risk assessment.

SWMU 15-004(f), Entire Site

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-29, I-4.2-30, and I-4.2-31. The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 19 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-32 and I-4.2-33. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 5, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from uranium and manganese. The total dose is 15 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-34, I-4.2-35, and I-4.2-36. The total excess cancer risk for the residential scenario is 9×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 6, which is above the

NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from copper and uranium. The total dose is 41 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238.

SWMU 15-004(f), Excluding Firing Point E Sampling Locations

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-37, I-4.2-38, and I-4.2-39. The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.1, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 4 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-40 and I-4.2-41. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is approximately 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese. The total dose is 2 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-42, I-4.2-43, and I-4.2-44. The total excess cancer risk for the residential scenario is 7×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.9, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 7 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

SWMU 15-004(f), Firing Point E Sampling Locations Only

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-45, I-4.2-46, and I-4.2-47. The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is above the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is approximately 1, which is equivalent to the NMED target HI of 1 (NMED 2015, 600575). The total dose is 41 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-48 and I-4.2-49. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 13, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese and uranium. The total dose is 29 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-50, I-4.2-51, and I-4.2-52. The total excess cancer risk for the residential scenario is 1×10^{-5}, which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 17, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from copper and uranium. The total dose is 79 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238.

I-4.2.4 SWMU 15-007(a)

Calcium and magnesium were screened using the NMED essential nutrient SSLs in provided Table I-4.2-53. The maximum detected concentrations of calcium and magnesium were below the SSLs and eliminated from further evaluation in the human health risk assessment.

Because samples were not collected from 0.0–1.0-ft-bgs depth interval, no COPCs were identified for the industrial scenario.

The results of the risk-screening assessment for the construction worker scenario are presented in Table I-4.2-54. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-55 and I-4.2-56. The total excess cancer risk for the residential scenario is 8×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.2.5 SWMU 15-008(a)

Calcium and magnesium were screened using the NMED essential nutrient SSLs provided in Table I-4.2-57. The maximum detected concentrations of calcium and magnesium were below the SSLs and eliminated from further evaluation in the human health risk assessment.

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-58, I-4.2-59, and I-4.2-60. The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.9, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 15 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-61 and I-4.2-62. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 11, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from uranium. The total dose is 15 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-63, I-4.2-64, and I-4.2-65. The total excess cancer risk for the residential scenario is 7×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 13, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from uranium. The total dose is 42 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238.

I-4.2.6 SWMU 15-009(e)

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-66, I-4.2-67, and I-4.2-68. The total excess cancer risk for the industrial scenario is 3×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.02, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.7 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-69, I-4.2-70, and I-4.2-71. The total excess cancer risk for the construction worker scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction

worker HI is 0.2, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-72, I-4.2-73, and I-4.2-74. The total excess cancer risk for the residential scenario is 5×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 4 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

I-4.2.7 SWMU 15-010(a)

Calcium was screened using the NMED essential nutrient SSLs provided in Table I-4.2-75. The maximum detected concentration of calcium was below the SSLs and eliminated from further evaluation in the human health risk assessment.

Because samples were not collected from the 0.0–1.0-ft-bgs depth interval, no COPCs were identified for the industrial scenario.

The results of the risk-screening assessment for the construction worker scenario are presented in Table I-4.2-76. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-77 and I-4.2-78. The total excess cancer risk for the residential scenario is 1×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.7, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.2.8 AOC C-15-004

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-79, I-4.2-80, and I-4.2-81. The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.0009, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.6 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-82 and I-4.2-83. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.03, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-84, I-4.2-85, and I-4.2-86. The total excess cancer risk for the residential scenario is 1×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.02, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 3 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

I-4.2.9 AOC C-15-005

Calcium was screened using the NMED essential nutrient SSLs provided in Table I-4.2-87. The maximum detected concentration of calcium was below the SSLs and eliminated from further evaluation in the human health risk assessment.

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-88 and I-4.2-89. The total excess cancer risk for the industrial scenario is 2×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.07, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

The results of the risk-screening assessment for the construction worker scenario are presented in Table I-4.2-90. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-91 and I-4.2-92. The total excess cancer risk for the residential scenario is 1×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.2.10 AOC 15-005(b)

Calcium was screened using the NMED essential nutrient SSLs provided in Table I-4.2-93. The maximum detected concentration of calcium was below the SSLs and eliminated from further evaluation in the human health risk assessment.

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-94 and I-4.2-95. The total excess cancer risk for the industrial scenario is 2×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.03, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

The results of the risk-screening assessment for the construction worker scenario are presented in Table I-4.2-96. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.6, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-97 and I-4.2-98. The total excess cancer risk for the residential scenario is 1×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.2.11 AOC C-15-006

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-99 and I-4.2-100. The total excess cancer risk for the industrial scenario is 7×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.2, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-101 and I-4.2-102. The total excess cancer risk for the construction worker scenario is 2×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese. No radionuclide COPCs were identified for the construction worker scenario.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-103 and I-4.2-104. The total excess cancer risk for the residential scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is approximately 1, which is equivalent to NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.2.12 SWMU 36-001

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-105, I-4.2-106, and I-4.2-107. The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.01, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-108 and I-4.2-109. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is approximately 1, which is equivalent to the NMED target HI of 1 (NMED 2015, 600575). The total dose is 11 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-110, I-4.2-111 and I-4.2-112. The total excess cancer risk for the residential scenario is 7×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from antimony, lead, and uranium. The total dose is 31 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238.

I-4.2.13 SWMU 36-003(b)

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-113 and I-4.2-114. The total excess cancer risk for the industrial scenario is 7×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.0002, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

The results of the risk-screening assessment for the construction worker scenario are presented in Table I-4.2-115. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.002, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-116 and I-4.2-117. The total excess cancer risk for the residential scenario is 3×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.004, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.2.14 SWMU 36-005

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-118 and I-4.2-119. The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.0005, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-120 and I-4.2-121. The total excess cancer risk for the construction worker scenario is 1×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 0.08, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-122 and I-4.2-123. The total excess cancer risk for the residential scenario is 1×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.009, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.2.15 SWMU 36-006

The results of the risk-screening assessment for the industrial scenario are presented in Tables I-4.2-124, I-4.2-125, and I-4.2-126. The total excess cancer risk for the industrial scenario is 1×10^{-5}, which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.03, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.08 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables I-4.2-127, I-4.2-128, and I-4.2-129. The total excess cancer risk for the construction worker scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 0.07, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-130, I-4.2-131, and I-4.2-132. The total excess cancer risk for the residential scenario is 3×10^{-4}, which is above the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The cancer risk is primarily from benzo(a)pyrene. The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.3 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

I-4.3 Vapor-Intrusion Pathway

NMED guidance (NMED 2015, 600575) requires an evaluation of the vapor-intrusion pathway. The vapor-intrusion pathway of VOCs into a building was evaluated where appropriate. The evaluation can be qualitative for a potentially complete pathway if the following criteria are met.

- Volatile and toxic compounds are minimally detected.
- Concentrations are below NMED's vapor-intrusion screening levels for soil-gas and/or groundwater.

- There is no suspected source(s) for volatile and toxic compounds.
- Concentrations are decreasing with depth (for soil).

Because only bulk soil data are available for the sites in the Potrillo and Fence Canyons Aggregate Area, the vapor-intrusion screening levels are not applicable for the evaluation. Residential soil screening values were calculated using the Johnson and Ettinger model (http://www.epa.gov/swerrims/riskassessment/airmodel/johnson_ettinger.htm) for subsurface vapor intrusion into buildings (EPA 2002, 094114). The advanced soil model (SL-ADV-Feb04.xls) was used to calculate risk-based soil concentrations for VOCs at sites, where appropriate. The maximum detected concentration of each VOC COPC was compared with the risk-based concentration generated by the model for each site. The model inputs and risk-based concentrations generated are provided in Attachment I-3 (on CD). HQs and HIs were calculated for noncarcinogenic COPCs and total excess cancer risks were calculated for carcinogenic COPCs. The NMED target risk level of 1×10^{-5} and NMED target HI of 1 were applied.

No VOCs were detected at SWMU 15-002, the former south burn pit, SWMU 15-004(f), SWMU 36-003(b), AOC C-15-004, and AOC C-15-006. SWMUs 15-008(a), 15-009(e), and 36-006 are located on the edge or slope of Potrillo Canyon and are not suitable for placing a structure. Therefore, the vapor-intrusion pathway is incomplete and was not evaluated for these sites.

I-4.3.1 SWMU 15-002, Former North Burn Pit

SWMU 15-002 consists of the former north burn pit west of E-F Firing Site at TA-15. The inactive former burn pit is located south of building 15-0534. The operation precludes the burn pit being a source of VOCs; the burning would have volatilized any VOCs.

The former burn pit and associated sampling locations were more than 10 ft from the base of the foundation of any buildings. One VOC was detected in one sample. The concentration was not at a significant level (0.083 mg/kg for acetone) and decreased with depth. In addition, the screening of the bulk soil data using the Johnson and Ettinger model, as presented below, indicates the soil has not been impacted. The vapor-intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600575), but no additional evaluation is necessary.

The results of the residential vapor-intrusion screening assessments are presented in Table I-4.3-1. The HQ is approximately 0.000009, which is below the NMED target HI of 1 (NMED 2015, 600575). The result does not change the HI in section I-4.2.

I-4.3.2 SWMUs 15-004(b) and 15-004(c)

SWMU 15-004(b) is inactive Firing Site A, located approximately 450 ft southeast of building 15-0183, and SWMU 15-004(c) is inactive Firing Site B, located approximately 525 ft southeast of building 15-0183, at TA-15. Firing Site A was among the first firing sites to be used at the Laboratory and operated from 1945 to 1953. Most of the experiments conducted at SWMU 15-004(b) involved small amounts of HE (i.e., up to 50 lb.). Tests involving larger quantities of HE were conducted at Firing Site B, SWMU 15-004(c) (LANL 1995, 050294, p. 4-3) (LANL 1995, 050294, p. 4-3) (LANL 1995, 050294, p. 4-3) (LANL 1995, 050294, p. 4-3) (LANL 1995, 050294, p. 4-3) (LANL 1995, 050294, p. 4-3) (LANL 1995, 050294, p. 4-3) (LANL 1995, 050294, p. 4-3). Both firing sites and associated structures were removed and the ground surface was regraded in 1967. Before they were removed, the bunker and the control building were surveyed and were found to contain no detectable levels of HE or radionuclides. Other materials used at Firing Sites A

and B included natural uranium, beryllium, lead, mercury, and HE. Solvents or other potential sources of VOCs were not used and the firing sites are not sources of VOCs.

The firing sites and associated sample locations were more than 10 ft from the base of the foundation of any buildings. Five VOCs were detected in one, two, and five samples. Concentrations were not at significant levels (0.012 mg/kg for acetone, 0.001 mg/kg or less for 1,2,4-trimethylbenzene, and below 0.001 mg/kg for 4-isopropyltoluene, 1,3,5-trimethylbenzene, and xylene) and were below the EQLs. Concentrations of 4-isopropyltoluene and 1,3,5-trimethylbenzene decreased with depth at all locations and the concentrations of 1,2,4-trimethylbenzene decreased with depth at three of five locations. In addition, the screening of the bulk soil data using the Johnson and Ettinger model, as presented below, indicates the soil has not been impacted. The vapor-intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600575), but no additional evaluation is necessary.

The results of the residential vapor-intrusion screening assessments are presented in Table I-4.3-2. The HI is approximately 0.002, which is below the NMED target HI of 1 (NMED 2015, 600575). The result does not change the HI in section I-4.2.

I-4.3.3 SWMU 15-007(a)

SWMU 15-007(a) is an inactive landfill known as MDA N located west of buildings 15-0563 and 15-0565 and east of R-Site Road at TA-15. MDA N was used between 1962 and 1965 to dispose of debris from the demolition of buildings 15-0001 and 15-0007. Building 15-0001 housed a laboratory and shop and building 15-0007 housed a control room and darkroom. Hazardous materials known to be present in these buildings included thorium in building 15-0001 and mercury and photographic chemicals in building 15-0007. MDA N was closed by 1965 and was excavated and removed during the 2010 investigation. The site may have had some residual levels of VOCs in the building, debris but the site no longer exists.

The inactive landfill and associated sampling locations were more than 10 ft from the base of the foundation of any buildings. One VOC was detected in five samples. Concentrations were not at significant levels (0.14 mg/kg or less for acetone) and did not change substantially with depth (0.12 mg/kg or less). In addition, the screening of the bulk soil data using the Johnson and Ettinger model, as presented below, indicates the soil has not been impacted. The vapor-intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600575), but no additional evaluation is necessary.

The results of the residential vapor-intrusion screening assessments are presented in Table I-4.3-3. The HQ is approximately 0.00007, which is below the NMED target HI of 1 (NMED 2015, 600575). The result does not change the HI in section I-4.2.

I-4.3.4 SWMU 15-010(a)

SWMU 15-010(a) is the location of a former decommissioned septic tank (former structure 15-0080) located east of former buildings 15-0001 and 15-0023 at R-Site. The septic tank was constructed in 1944 and was connected to a laboratory and shop (former building 15-0001) that were removed in 1962. The septic tank was later connected to relocated laboratory storage building 15-0023. The septic tank was reactivated after 1961 to provide sanitary facilities to former building 15-0007, which housed a photography laboratory. Building 15-0007 was destroyed in 1962. The septic tank was surveyed in 1965, was found to be free of HE and radioactivity, and was filled with sand and left in place. The septic tank was removed between 1995 and 2010. The septic tank may have received some waste containing solvents from the photography laboratory over 50 yr ago. However, because the tank has been removed, there is no source of VOCs.

The former septic tank and associated sampling locations were more than 10 ft from the base of the foundation of any buildings. One VOC was detected in one sample. The concentration was not at a significant level (0.0017 mg/kg for 4-isopropyltoluene) and was below the EQL. Concentrations decreased with depth. In addition, the screening of the bulk soil data using the Johnson and Ettinger model, as presented below, indicates the soil has not been impacted. The vapor-intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600575), but no additional evaluation is necessary.

The results of the residential vapor-intrusion screening assessments are presented in Table I-4.3-4. The HQ is approximately 0.00001, which is below the NMED target HI of 1 (NMED 2015, 600575). The result does not change the HI in section I-4.2.

I-4.3.5 AOC C-15-005

AOC C-15-005 is an area of potential soil contamination associated with the footprint of a former laboratory and shop (former building 15-0001). Former building 15-0001 was constructed in 1944 to support experiments performed at Firing Sites C and D and was destroyed by burning in 1962. The remaining debris from the demolition of building 15-0001 was disposed of at MDA N [SWMU 15-007(a)] in 1962. Information about the use of materials in this building is limited, but thorium contamination was discovered in the building and cleaned up. It is unlikely that the AOC or the former building was a source of VOCs. Because the building was destroyed and disposal of over 50 yr ago, there is no source of VOCs.

The area of potential soil contamination and associated sample locations were more than 10 ft from the base of the foundation of any buildings. One VOC was detected in four samples. Concentrations were not at significant levels (0.0093 mg/kg to 0.012 mg/kg for acetone) and were below the EQLs. Concentrations did not change or did not change substantially with depth (0.002 mg/kg). In addition, the screening of the bulk soil data using the Johnson and Ettinger model, as presented below, indicates the soil has not been impacted. The vapor-intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600575), but no additional evaluation is necessary.

The results of the residential vapor-intrusion screening assessments are presented in Table I-4.3-5. The HQ is approximately 0.000004, which is below the NMED target HI of 1 (NMED 2015, 600575). The result does not change the HI in section I-4.2.

I-4.3.6 AOC 15-005(b)

AOC 15-005(b) is a former storage area located inside a HE make-up building (15-0242). This area was used to store containers of waste HE. Experiments were assembled, approved adhesives were used during the assembly process, and solvents may have been used to clean some of the parts. The period of operation of this site and the quantities of wastes stored are not known. Although solvents may have been used, the storage area was inside of the building.

The AOC is inside building 15-0242. Three VOCs were detected in one or eight samples collected outside the building. Concentrations were not at significant levels (0.0041 mg/kg to 0.0065 mg/kg for methylene chloride, 0.043 mg/kg for 2-methylnaphthalene, and 0.075 mg/kg for naphthalene) and were below the EQLs (except for the two highest methylene chloride concentrations). Concentrations of 2-methylnaphthalene and naphthalene decreased with depth and did not change substantially with depth (0.0001 mg/kg to 0.0011 mg/kg) for methylene chloride. Methylnaphthalene[2-] and naphthalene are PAHs, were detected in one sample each, and are associated with the asphalt that is prevalent around the area as indicated by the data that includes the full suite of PAH analytes detected in the sample.

Therefore, 2-methylnaphthalene and naphthalene are not indicative of a VOC source. In addition, the screening of the bulk soil data using the Johnson and Ettinger model, as presented below, indicates the soil has not been impacted. The vapor-intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600575), but no additional evaluation is necessary.

The results of the residential vapor-intrusion screening assessments are presented in Tables I-4.3-6 and I-4.3-7. The HI is approximately 0.01, which is below the NMED target HI of 1 (NMED 2015, 600575). The total excess cancer risk is approximately 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The results do not change the HI but change the cancer risk in section I-4.2.

I-4.3.7 SWMU 36-001

SWMU 36-001 consists of MDA AA, which is an inactive landfill located approximately 240 ft southwest of a control bunker (building 36-0120) and 100 ft southwest of the x-ray device building (building 36-0086). MDA AA consists of two disposal trenches containing burned debris from test shots conducted at the Lower Slobbovia Firing Site. The debris included wood and sand contaminated with barium, uranium, other inorganic chemicals, plastics, and HE. The debris was transported by truck from the Lower Slobbovia Firing Site, placed in the trenches, and burned. Once a trench was filled, it was covered with approximately 4 ft of soil. The disposal trenches were originally constructed in the mid-1960s; the site was closed in 1989. Based on operational history, the site is not a source of VOCs. In addition, burning would have volatilized any VOCs if present.

The inactive landfill and associated sampling locations were more than 10 ft from the base of the foundation of any buildings. Three VOCs were detected in one or two samples. Concentrations were not at significant levels (0.041 mg/kg for acetone; 0.006 mg/kg or less for methylene chloride; and 0.00071 mg/kg for trichlorofluoromethane) and were below the EQLs for methylene chloride and trichlorofluoromethane. In addition, each VOC was detected in different samples and at different depths, indicating no concentrated source of VOCs (acetone and methylene chloride were detected only in 1996 samples). Concentrations of trichlorofluoromethane decreased with depth and did not change substantially with depth (0.002 mg/kg) for methylene chloride. In addition, the screening of the bulk soil data using the Johnson and Ettinger model, as presented below, indicates the soil has not been impacted. The vapor-intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600575), but no additional evaluation is necessary.

The results of the residential vapor-intrusion screening assessments are presented in Table I-4.3-8. The HI is approximately 0.0002, which is below the NMED target HI of 1 (NMED 2015, 600575). The result does not change the HI in section I-4.2.

I-4.3.8 SWMU 36-005

SWMU 36-005 is an inactive storage area (known as the “Boneyard”) located at TA-36 near the head of Fence Canyon between the Meenie and Minie Firing Sites [AOCs 36-004(b) and 36-004(c), respectively]. This storage area is undeveloped and largely covered with grass and ponderosa pine. From the 1950s to the late 1970s, the Boneyard was used as a parking lot for trailers and a storage area for large non-waste items. From the late 1970s to the late 1980s, the site was used to store large waste items exposed to explosives tests, including metal drums, cans, cylinders, and scrap metals such as lead sheets, copper, uranium-contaminated steel, and iron. In the late 1980s, a major cleanup was conducted at the site. Cans labeled isopentane, uranium-contaminated iron and steel, drums, and cylinders were removed during this cleanup effort. The site is not a source of VOCs.

The inactive storage area and associated sampling locations were more than 10 ft from the base of the foundation of any buildings. Samples were collected from the slope below the storage area, which is not suitable for placement of a structure, because of cultural resource issues raised by Laboratory archaeologists. Two VOCs were detected in 4 and 16 samples. Concentrations were not at significant levels (0.029 mg/kg to 0.31 mg/kg for acetone and 0.0018 mg/kg to 0.0063 mg/kg for methylene chloride); 14 of 16 methylene chloride concentrations were below the EQLs. Concentrations did not change substantially with depth (less than 0.2 mg/kg for acetone and 0.0034 mg/kg or less for methylene chloride). In addition, the screening of the bulk soil data using the Johnson and Ettinger model, as presented below, indicates the soil has not been impacted. The vapor-intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600575), but no additional evaluation is necessary.

The results of the residential vapor-intrusion screening assessments are presented in Table I-4.3-9. The HI is approximately 0.0003, which is below the NMED target HI of 1 (NMED 2015, 600575). The result does not change the HI in section I-4.2.

I-4.4 Uncertainty Analysis

The 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.

I-4.4.1 Data Evaluation and COPC Identification Process

A primary uncertainty associated with the COPC identification process is the possibility that a chemical may be identified as a COPC when it is actually not a COPC or that a chemical may not be identified as a COPC when it actually should be identified as a COPC. Inorganic chemicals and radionuclides are appropriately identified as COPCs through statistics or maximum detected concentration comparisons. However, established BVs may not accurately represent certain subunits of the Bandelier Tuff (e.g., fractured, clay-rich material) encountered during sampling because such data are not included in the background data set. There are no established BVs for organic chemicals and all detected organic chemicals are identified as COPCs.

Other uncertainties may include errors in sampling, laboratory analysis, and data analysis. However, because concentrations used in the risk-screening assessments include detected less than estimated quantitation limits and nondetects above BVs, data evaluation uncertainties have little effect on the risk-screening results.

I-4.4.2 Exposure Assessment

The following exposure assessment uncertainties were identified for the risk assessment: (1) the applicability of the scenarios, (2) the assumptions underlying the exposure pathways, and (3) the derivation of the EPCs.

A worker may be subject to exposures in a different manner than the exposure assumptions used to derive the industrial SSLs. The assumptions for the SSLs are that the potentially exposed individual is outside on-site for a full workday, for 225 d/yr and 25 yr (NMED 2015, 600575). The construction worker scenario is based on exposure of 8 h/d, 250 d/yr, and 1 yr (NMED 2015, 600575). For the sites evaluated, workers are not on-site for that frequency and duration. This assumption is particularly true of the hill slope areas and areas outside of the security fences. As a result, the industrial and construction worker scenarios overestimate the potential exposure and risk/dose. The residential scenario is based on

exposure of 24 h/d, 350 d/yr, and 30 yr (NMED 2015, 600575) and also overestimates the potential exposure and risk/dose.

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 (NMED 2015, 600575). When several upper-bound values (as are found in NMED [2015, 600575] or EPA regional screening tables at http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) are combined to estimate exposure for any one pathway, the resulting risk can exceed the 99th percentile and, therefore, can exceed the range of risk that may be reasonably expected. In addition, the assumption that residual concentrations of chemicals in the tuff are available and result in exposure in the same manner as if they were in soil overestimates the potential exposure and risk to receptors.

Uncertainty is introduced in the concentration aggregation of data for estimating the EPCs at a site. The use of a UCL is intended to provide a protective, upper bound estimate of the COPC concentration and is assumed to be representative of the average exposure to a COPC across the entire site. Potential risk and exposure from a single location or area with relatively high COPC concentrations may be underestimated if a representative, site-wide value is used. The use of the maximum detected concentration for the EPC overestimates the exposure to contamination because receptors are not consistently exposed to the maximum detected concentration across the site.

Arsenic

The June 2015 EPA regional screening values for arsenic employ a relative bioavailability value of 60% in calculating the industrial and residential soil screening levels (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm). The EPA document "Compilation and Review of Data on Relative Bioavailability of Arsenic in Soil" (EPA 2012, 262543) provides supporting information and the EPA policy memorandum "Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil" (EPA 2012, 262542) recommends using this value, recognizing the default value is an estimate not likely to be exceeded at most sites and is preferable to the assumption of a relative bioavailability equal to 100%.

The use of the residential EPA regional screening value for arsenic of 6.8 mg/kg changed the total excess cancer risks for SWMU 15-002 (former south burn pit) and SWMUs 15-004(b) and 15-004(c) from approximately 1×10^{-5} to 7×10^{-6}.

SWMU 15-002, Former North Burn Pit

The construction worker HI is approximately 3 primarily from manganese (HQ = 2.36). Although the manganese soil data were found to be statistically different from the soil background data set, only one concentration was detected outside of the range of soil background concentrations. The sampling location where the maximum concentration was detected is approximately 45 ft east of the former burn pit and concentrations decrease to below the soil BV at 476 mg/kg in the 3.0–4.0-ft sample. The resulting EPC (95% UCL) of 1094 mg/kg is within the range of soil background concentrations. In addition, the construction worker SSL (464 mg/kg) is less than the soil BV by 207 mg/kg and 636 mg/kg below the maximum soil background concentration. Therefore, the construction worker SSL is comparable with naturally occurring manganese levels. The resulting construction worker HQs using the EPC, the soil BV, and the maximum soil background concentration (100 mg/kg) are 2.36, 1.45, and 2.37, respectively. Therefore, the potential construction worker risk from manganese at the site is similar to naturally occurring concentrations, the HI is overestimated, and does not indicate any potential risk to the construction worker at the former north burn pit.

SWMUs 15-004(b) and 15-004(c)

The construction worker HI is approximately 2 primarily from manganese (HQ = 0.89) as well as from lead (HQ = 0.3) and aluminum (HQ = 0.3).

Manganese was detected above the BV in one sample of 47 samples at a concentration of 699 mg/kg, resulting in an EPC of 415 mg/kg. Although the manganese data set was found to be statistically different from the soil background data set, only one concentration was detected above the BV. The concentration was only 28 mg/kg above the soil BV (671 mg/kg) and 401 mg/kg below the maximum soil background concentration (1100 mg/kg). The concentration is comparable with naturally occurring manganese levels. In addition, the construction worker SSL (464 mg/kg) is less than the soil BV by 207 mg/kg and 636 mg/kg below the maximum soil background concentration. Therefore, the construction worker SSL is comparable with naturally occurring manganese levels. The resulting construction worker HQs using the maximum detected concentration and the soil BV are approximately the same (1.51 and 1.45, respectively). Therefore, the potential construction worker risk from manganese at the site is similar to naturally occurring concentrations.

The construction worker HQ for lead is 0.3. Because the lead SSL is based upon blood lead levels, lead can be evaluated separately from the other noncarcinogenic COPCs. The lead EPC (251 mg/kg) is less than the construction worker SSL (800 mg/kg). Without lead, the construction worker HI is reduced by 0.3.

The construction worker HQ for aluminum is 0.3. Aluminum was detected above a BV in two samples of 47 samples, resulting in an EPC of 13,256 mg/kg. Only five tuff samples were collected so statistical comparisons were not performed; aluminum was not detected above the soil BV in 42 samples. In addition, the tuff concentrations above the BV were not the highest concentrations detected (4 soil concentrations exceeded the maximum tuff concentration [16,600 mg/kg] and 33 soil concentrations exceeded the other tuff concentration [10,400 mg/kg]). Therefore, the potential risk from aluminum is overestimated.

Without lead, and with the overestimation of risks from aluminum and manganese, the construction worker HI is at least equivalent to the NMED target HI.

The residential HI is 2 from aluminum (HI = 0.2), cadmium (HI = 0.1), cobalt (HI = 0.4), lead (HI = 0.6), and thallium (HI = 0.7). Because the lead SSL is based upon blood lead levels, lead can be evaluated separately from the other noncarcinogenic COPCs. The lead EPC (251 mg/kg) is less than the residential SSL (400 mg/kg). Without lead, the residential HI is approximately 1.

The residential HQ for aluminum is 0.2. Aluminum was detected above a BV in 2 samples of 47 samples, resulting in an EPC of 13,256 mg/kg. Only 5 tuff samples were collected so statistical comparisons were not performed; aluminum was not detected above the soil BV in 42 samples. In addition, the tuff concentrations above the BV were not the highest concentrations detected (4 soil concentrations exceeded the maximum tuff concentration [16,600 mg/kg] and 33 soil concentrations exceeded the other tuff concentration [10,400 mg/kg])]. Therefore, the potential risk from aluminum is overestimated.

The residential HQ for thallium is 0.7. Thallium was only detected above BVs in 4 of 47 samples (8.5%), was detected below BV in 2 samples, and was not detected in 41 samples (87%). In addition, the residential SSL (0.782 mg/kg) is similar to the soil BV (0.73 mg/kg). Therefore, the risk from thallium is not distinguishable from background concentrations, and the concentrations exceeding the SSL are infrequently detected across the site. The EPC (0.54 mg/kg), which is the 95% UCL, is comparable to naturally occurring concentrations of thallium (range of detected concentrations in the background data set is 0.2 mg/kg to 1.7 mg/kg) and indicates the average exposure across the site is similar to background.

Without lead and with the overestimation of risks from aluminum and thallium, the residential HI is at least equivalent to the NMED target HI.

AOC C-15-006

The construction worker HI is approximately 2 primarily from manganese (HQ = 1.6). Manganese was detected above the soil BV (671 mg/kg) in two samples with a maximum concentration of 1120 mg/kg. The maximum concentration was only 20 mg/kg above the maximum soil background concentration (1100 mg/kg), and the other concentration (673 mg/kg) was almost equivalent to the soil BV and 427 mg/kg below the maximum soil background concentration. Although manganese concentrations were statistically different from background, the concentrations are comparable with naturally occurring manganese levels. In addition, the construction worker SSL (464 mg/kg) is less than the soil BV by 207 mg/kg and 636 mg/kg below the maximum soil background concentration. The resulting construction worker HQs using the EPC (726 mg/kg) and the soil BV are approximately the same (1.56 and 1.45, respectively). Therefore, the potential risk from manganese at the site is similar to naturally occurring concentrations. In addition, the 95% UCL is above all concentrations, except the maximum concentration, and is not a good representation of 88% of the data.

Because the construction worker EPC and risk are overestimated for manganese, the construction worker HI does not exceed the NMED target HI.

SWMU 36-001

The construction worker HI is approximately 1 in part from lead (HQ = 0.3). Because the lead SSL is based upon blood lead levels, lead can be evaluated separately from the other noncarcinogenic COPCs. The lead EPC (237 mg/kg) is less than the construction worker SSL (800 mg/kg). Without lead, the HI for SWMU 36-001 is approximately 0.9, which is less than the NMED target HI.

The residential HI is 2 from antimony (HI = 0.7), lead (HI = 0.6), and uranium (HI = 0.5). Because the lead SSL is based upon blood lead levels, lead can be evaluated separately from the other noncarcinogenic COPCs. The lead EPC (237 mg/kg) is less than the residential SSL (400 mg/kg). Without lead, the HI for SWMU 36-001 is 1.6.

The antimony EPC (22.6 mg/kg) is the maximum concentration. If a 95% UCL is calculated, the EPC is 5.8 mg/kg, which results in a HQ of 0.2. Without lead and the revised antimony EPC, the residential HI is approximately 1, which is equivalent to the NMED target HI.

SWMU 36-006

The industrial total excess cancer risk at SWMU 36-006 is approximately 1×10^{-5} from PAHs and primarily benzo(a)pyrene (80%). The potential cancer risk is based on the maximum detected concentrations of the PAHs, which were detected only in 1 to 3 of 15 samples within 0.0–1.0 ft. The next highest concentrations (if there is more than one detected concentration) are an order of magnitude lower and concentrations decreased with depth (1 to 2 orders of magnitude or to nondetect) at the 1 to 3 locations where detected and decreased downgradient. The maximum concentrations were also detected in a sample collected approximately 15 ft south of the paved road, which runs parallel to the disposal area. Therefore, the potential risk to the industrial receptor is overestimated.

In addition, the exposure of a worker to the PAHs represented by the industrial SSLs is impractical given the limited extent and location of the maximum concentrations. The site is an inactive surface disposal area where the majority of the debris covers an area approximately 75 ft wide and extends approximately 100 ft down the south canyon slope; the location of the maximum concentrations is near the mesa edge.

Therefore, the exposure frequency used for the industrial scenario (225 d/yr) is not an accurate representation of the potential exposure at this site. The total excess cancer risk under the industrial scenario does not exceed the NMED target risk level.

I-4.4.3 Toxicity Assessment

The primary uncertainty associated with the screening values is related to the derivation of toxicity values used in their calculation. Toxicity values (slope factors [SFs] and reference doses [RfDs]) were used to derive the risk-based screening values used in the screening evaluation (NMED 2015, 600575). Uncertainties were identified in five areas with respect to the toxicity values: (1) extrapolation from other animals to humans, (2) interindividual variability in the human population, (3) the derivation of RfDs and SFs, (4) the chemical form of the COPC, and (5) the use of surrogate chemicals.

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 between animals and humans in chemical absorption, metabolism, excretion, and toxic responses. 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 in each of these steps, resulting in the overestimation of potential risk.

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.

Derivation of RfDs and SFs: The RfDs and SFs for different chemicals are derived from experiments conducted by different laboratories that may have different accuracy and precision that could lead to an over- or underestimation of the risk. The uncertainty associated with the toxicity factors for noncarcinogens is measured by the uncertainty factor, the modifying factor, and the confidence level. For carcinogens, the weight of evidence classification indicates the likelihood that a contaminant is a human carcinogen. Toxicity values with high uncertainties may change as new information is evaluated.

Chemical Form of the COPC: COPCs may be bound to the environmental matrix and not available for absorption into the human body. However, the exposure scenarios default to the assumption that the COPCs are bioavailable. This assumption can lead to an overestimation of the total risk.

Use of Surrogate Chemicals: The use of surrogates for chemicals that do not have EPA-approved or provisional toxicity values also contributes to uncertainty in risk assessment. Surrogates were used to provide SSLs for benzo(g,h,i)perylene; 3,5-dinitroaniline; 4-isopropyltoluene; 2,4,6-triamino-1,3,5-trinitrobenzene (TATB); and tris(o-cresyl)phosphate based on structural similarity. The overall impact of surrogates on the risk assessment is minimal because these COPCs were generally detected at low concentrations (less than 1 mg/kg).

I-4.4.4 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.

I-4.5 Interpretation of Human Health Risk-Screening Results

I-4.5.1 SWMU 15-002,

Former North Burn Pit

Industrial Scenario

The total excess cancer risk for the industrial scenario is 6×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.06, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

TPH-DRO was identified as a COPC. The New Mexico State industrial screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The industrial HI is 0.003, which is below the NMED target HI of 1 (NMED 2015, 600575).

Construction Worker Scenario

The construction worker HI is 3, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is from manganese. As discussed in the uncertainty analysis (section I-4.4.2), the potential risk from manganese is overestimated and is comparable with naturally occurring manganese concentrations. Therefore, the HI does not exceed the NMED target HI. No carcinogenic or radionuclide COPCs were identified for the construction worker scenario.

TPH-DRO was identified as a COPC. The New Mexico State industrial screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The construction worker HI for TPH-DRO is 0.003, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 2×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

TPH-DRO was identified as a COPC. The New Mexico State industrial screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The residential HI for TPH-DRO is 0.008, which is below the NMED target HI of 1 (NMED 2015, 600575).

Former South Burn Pit

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 3, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from mercury. No radionuclide COPCs were identified for the industrial scenario.

TPH-DRO was identified as a COPC. The New Mexico State industrial screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The industrial HI for TPH-DRO is 0.006, which is below the NMED target HI of 1 (NMED 2015, 600575).

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 8, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from barium and mercury. No carcinogenic or radionuclide COPCs were identified for the construction worker scenario.

TPH-DRO was identified as a COPC. The New Mexico State industrial screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The construction worker HI for TPH-DRO is 0.001, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-5} (7×10^{-6} using the EPA regional screening value for arsenic), which is equivalent to (or less than) the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 19, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from barium and mercury. No radionuclide COPCs were identified for the residential scenario.

TPH-DRO was identified as a COPC. The New Mexico State industrial screening guideline for diesel No. 2/crankcase oil (NMED 2015, 600575) was compared with the TPH-DRO EPC. The residential HI for TPH-DRO is 0.004, which is below the NMED target HI of 1 (NMED 2015, 600575).

I-4.5.2 SWMUs 15-004(b) and 15-004(c)

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.7, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.06 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the industrial scenario is equivalent to a total risk of 1×10^{-6} based on conversion from dose using RESRAD Version 6.5, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600575).

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from aluminum, lead, and manganese. As discussed in the uncertainty analysis (section I-4.4.2), the potential risk from aluminum and manganese is overestimated and is comparable with naturally occurring levels of aluminum and manganese. The lead EPC is below the construction worker SSL (800 mg/kg). Therefore, the HI does not exceed the NMED target HI. The total dose is 0.1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the construction worker scenario is equivalent to a total risk of 9×10^{-8} based on conversion from dose using RESRAD Version 6.5.

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-5} (7×10^{-6} using the EPA regional screening value for arsenic), which is equivalent to (or less than) the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is approximately 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from aluminum, lead, and thallium. As discussed in the uncertainty analysis (section I-4.4.2), the potential risk from aluminum and thallium is overestimated and is comparable with naturally occurring levels of aluminum and thallium. The lead EPC is below the residential SSL (400 mg/kg). Therefore, the HI does not exceed the NMED target HI. The total dose is 0.4 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the residential scenario is equivalent to a total risk of 4×10^{-6} based on conversion from dose using RESRAD Version 6.5.

I-4.5.3 SWMU 15-004(f)

As noted in section I-4.2.3, risk/dose assessments were performed for the entire SWMU, the SWMU excluding Firing Point E, and the SWMU using only Firing Point E to identify portions of SWMU 15-004(f) that present the highest potential risks/doses to receptors.

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 19 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the industrial scenario is equivalent to a total risk of 3×10^{-4} based on conversion from dose using RESRAD Version 6.5.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 5, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from uranium and manganese. The total dose is 15 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the construction worker scenario is equivalent to a total risk of 1×10^{-5} based on conversion from dose using RESRAD Version 6.5.

Residential Scenario

The total excess cancer risk for the residential scenario is 9×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 6, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from copper and uranium. The total dose is 41 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from isotopic uranium (uranium-234, uranium-235/236, and uranium-238). The total dose for the residential scenario is equivalent to a total risk of 6×10^{-4} based on conversion from dose using RESRAD Version 6.5.

SWMU 15-004(f), Excluding Firing Point E Sampling Locations

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.1, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 4 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the industrial scenario is equivalent to a total risk of 7×10^{-5} based on conversion from dose using RESRAD Version 6.5.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 2, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese. The total dose is 2 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the construction worker scenario is equivalent to a total risk of 2×10^{-6} based on conversion from dose using RESRAD Version 6.5.

Residential Scenario

The total excess cancer risk for the residential scenario is 7×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.9, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 7 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the residential scenario is equivalent to a total risk of 1×10^{-4} based on conversion from dose using RESRAD Version 6.5.

SWMU 15-004(f), Firing Point E Sampling Locations Only

Industrial Scenario

The total excess cancer risk for the industrial scenario is the NMED target risk level of 2×10^{-6} (NMED 2015, 600575). The industrial HI is approximately 1, which is equivalent to the NMED target HI of 1 (NMED 2015, 600575). The total dose is 41 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238. The total dose for the industrial scenario is equivalent to a total risk of 7×10^{-4} based on conversion from dose using RESRAD Version 6.5.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 13, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese and uranium. The total dose is 29 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238. The total dose for the construction worker scenario is equivalent to a total risk of 2×10^{-5} based on conversion from dose using RESRAD Version 6.5.

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-5}, which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 17, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from copper and uranium. The total dose is 79 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238. The total dose for the residential scenario is equivalent to a total risk of 1×10^{-3} based on conversion from dose using RESRAD Version 6.5.

Summary of Additional Analyses

The results of the risk/dose assessments indicate that Firing Point E contains most of contamination at SWMU 15-004(f) and is the primary area for potential unacceptable risk and/or dose at the site. The industrial risk/dose for the entire SWMU is below target levels, but the dose exceeds the 25 mrem/yr target at Firing Point E. The construction worker risk/dose for the entire SWMU exceeds the HI and does not exceed the dose target level. The construction worker HI is primarily confined to Firing Point E with some potential risk in the remaining SWMU. The residential risk/dose for the entire SWMU exceeds the HI and dose target levels, but the potential unacceptable risk and dose are confined to Firing Point E.

Specifically, no potential unacceptable cancer risks exist for the industrial, construction worker, or residential scenarios at SWMU 15-004(f) for the site as a whole. However, there is potential unacceptable noncancer risk under the construction worker scenario from uranium and manganese, unacceptable noncancer risk under the residential scenario from copper and uranium, and potential unacceptable dose under the residential scenario from isotopic uranium. For the site excluding Firing Point E, there is potential unacceptable noncancer risk under the construction worker scenario from manganese. For Firing Point E only, there is potential unacceptable noncancer risk under the construction worker scenario from manganese and uranium, unacceptable noncancer risk under the residential scenario from copper and uranium, and unacceptable dose under all three scenarios from uranium-238.

I-4.5.4 SWMU 15-007(a)

Industrial Scenario

Because samples were not collected from 0.0–1.0-ft-bgs depth interval, the industrial scenario was not evaluated.

Construction Worker Scenario

No carcinogenic or radionuclide COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 8×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.5.5 SWMU 15-008(a)

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.9, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 15 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the industrial scenario is equivalent to a total risk of 3×10^{-4} based on conversion from dose using RESRAD Version 6.5.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 11, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from uranium. The total dose is 15 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the construction worker scenario is equivalent to a total risk of 1×10^{-5} based on conversion from dose using RESRAD Version 6.5.

Residential Scenario

The total excess cancer risk for the residential scenario is 7×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 13, which is above the NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from uranium. The total dose is 42 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is from isotopic uranium. The total dose for the residential scenario is equivalent to a total risk of 6×10^{-4} based on conversion from dose using RESRAD Version 6.5.

I-4.5.6 SWMU 15-009(e)

Industrial Scenario

The total excess cancer risk for the industrial scenario is 3×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.02, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.7 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the industrial scenario is equivalent to a total risk of 1×10^{-5} based on conversion from dose using RESRAD Version 6.5.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 0.2, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the construction worker scenario is equivalent to a total risk of 1×10^{-6} based on conversion from dose using RESRAD Version 6.5.

Residential Scenario

The total excess cancer risk for the residential scenario is 5×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 4 mrem/yr, which is below the target dose of 25 mrem/yr as

authorized by DOE Order 458.1. The total dose for the residential scenario is equivalent to a total risk of 5×10^{-5} based on conversion from dose using RESRAD Version 6.5.

I-4.5.7 SWMU 15-010(a)

Industrial Scenario

Because samples were not collected from 0.0–1.0-ft-bgs depth interval, the industrial scenario was not evaluated.

Construction Worker Scenario

No carcinogenic or radionuclide COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.7, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.5.8 AOC C-15-004

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.0009, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.6 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the industrial scenario is equivalent to a total risk of 1×10^{-5} based on conversion from dose using RESRAD Version 6.5.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.03, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the construction worker scenario is equivalent to a total risk of 8×10^{-7} based on conversion from dose using RESRAD Version 6.5.

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.02, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 3 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the residential scenario is equivalent to a total risk of 4×10^{-5} based on conversion from dose using RESRAD Version 6.5.

I-4.5.9 AOC C-15-005

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.07, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

Construction Worker Scenario

No carcinogenic or radionuclide COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.5.10 AOC 15-005(b)

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.03, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

Construction Worker Scenario

No carcinogenic or radionuclide COPCs were identified for the construction worker scenario. The construction worker HI is 0.6, which is below the NMED target HI of 1 (NMED 2015, 600575).

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-8} (2×10^{-6} based on the vapor-intrusion screening), which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.5, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.5.11 AOC C-15-006

Industrial Scenario

The total excess cancer risk for the industrial scenario is 7×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.2, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 2×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 2, which is above the

NMED target HI of 1 (NMED 2015, 600575). The elevated HI is primarily from manganese. As discussed in the uncertainty analysis (section I-4.4.2), the potential risk from manganese at the site is comparable with naturally occurring concentrations of manganese. Therefore, the HI does not exceed the NMED target HI. No radionuclide COPCs were identified for the construction worker scenario.

Residential Scenario

The total excess cancer risk for the residential scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is approximately 1, which is equivalent to the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.5.12 SWMU 36-001

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.02, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.1 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the industrial scenario is equivalent to a total risk of 2×10^{-6} based on conversion from dose using RESRAD Version 6.5.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 1, which is equivalent to the NMED target HI of 1 (NMED 2015, 600575). The HI is 0.9 without lead, which is less than the NMED target HI of 1 (uncertainty section I-4.4.2). The lead EPC is below the construction worker SSL (800 mg/kg).The total dose is 11 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the construction worker scenario is equivalent to a total risk of 8×10^{-6} based on conversion from dose using RESRAD Version 6.5.

Residential Scenario

The total excess cancer risk for the residential scenario is 7×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is approximately 2 from antimony, lead, and uranium. The HI is approximately 1 without lead and using the 95% UCL for antimony as the EPC, which is equivalent to the NMED target HI of 1 (uncertainty section I-4.4.2). The lead EPC is below the residential SSL (400 mg/kg). The total dose is 31 mrem/yr, which is above the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The elevated dose is primarily from uranium-238. The total dose for the residential scenario is equivalent to a total risk of 5×10^{-4} based on conversion from dose using RESRAD Version 6.5.

I-4.5.13 SWMU 36-003(b)

Industrial Scenario

The total excess cancer risk for the industrial scenario is 7×10^{-9}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.0002, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.002, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

Residential Scenario

The total excess cancer risk for the residential scenario is 4×10^{-8} which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.004, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.5.14 SWMU 36-005

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The industrial HI is 0.0005, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the industrial scenario.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 1×10^{-8}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 0.08, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the construction worker scenario.

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The residential HI is 0.009, which is below the NMED target HI of 1 (NMED 2015, 600575). No radionuclide COPCs were identified for the residential scenario.

I-4.5.15 SWMU 36-006

Industrial Scenario

The total excess cancer risk for the industrial scenario is 1×10^{-5}, which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). As discussed in the uncertainty analysis (section I-4.4.2), the potential exposure to PAHs under the industrial scenario is impractical for a worker given the limited extent and location of concentrations. The industrial HI is 0.03, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.08 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the industrial scenario is equivalent to a total risk of 2×10^{-6} based on conversion from dose using RESRAD Version 6.5.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 2×10^{-6}, which is below the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The construction worker HI is 0.07, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.1 mrem/yr, which is below the target dose

of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the construction worker scenario is equivalent to a total risk of 7×10^{-8} based on conversion from dose using RESRAD Version 6.5.

Residential Scenario

The total excess cancer risk for the residential scenario is 3×10^{-4}, which is above the NMED target risk level of 1×10^{-5} (NMED 2015, 600575). The elevated cancer risk is from PAHs. The residential HI is 0.3, which is below the NMED target HI of 1 (NMED 2015, 600575). The total dose is 0.3 mrem/yr, which is below the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The total dose for the residential scenario is equivalent to a total risk of 4×10^{-6} based on conversion from dose using RESRAD Version 6.5.

I-5.0 ECOLOGICAL RISK-SCREENING ASSESSMENTS

The approach for conducting ecological assessments is described in the "Screening Level Ecological Risk Assessment Methods, Revision 3.2" (LANL 2014, 262559). The assessment consists of the following four parts: a scoping evaluation, a screening evaluation, an uncertainty analysis, and an interpretation of the results.

I-5.1 Scoping Evaluation

The scoping evaluation establishes the breadth and focus of the screening assessment. The ecological scoping checklists are useful tools for organizing existing ecological information (Attachment I-4). The information in the scoping checklists is used to determine whether ecological receptors might be affected, identify the types of receptors that might be present, and develop the ecological conceptual site model for each site. All of the sites are in an industrial area; some sites are in undeveloped areas, while other sites are in developed areas with pavement overlying the site. For the sites that are undeveloped, the area typically provides minimal potential habitat for ecological receptors. However, because of the presence of Laboratory facilities, the quality of the habitat varies.

The scoping portion of the assessment indicated that terrestrial receptors were appropriate for evaluating the concentrations of contaminants in soil and tuff samples. Aquatic receptors were not evaluated because no aquatic communities and no aquatic habitat or perennial source of water exist at any of the sites within the aggregate area. The depth of the regional aquifer (above 1000 ft bgs) and the semiarid climate limit transport to groundwater. The potential exposure pathways for terrestrial receptors in soil and tuff are root uptake, inhalation, soil ingestion, dermal contact, external irradiation, and food-web transport (Figure I-3.1-1). The weathering of tuff is the only viable natural process that may result in the exposure of receptors to contaminants in tuff. Because of the slow rate of weathering expected for tuff, exposure in tuff is negligible, although it is included in the assessment. Plant exposure in tuff is largely limited to fractures near the surface, which does not produce sufficient biomass to support an herbivore population. Consequently, the contaminants in tuff are unavailable to receptors. Much of the area on the mesa tops in the Potrillo and Fence Canyons Aggregate Area is developed with buildings, parking lots, and roads.

The potential risk was evaluated in the risk-screening assessments for the following ecological receptors representing several trophic levels:

- a plant;
- soil-dwelling invertebrates (represented by the earthworm);
- the deer mouse (mammalian omnivore);

- the montane shrew (mammalian insectivore);
- the desert cottontail (mammalian herbivore);
- the red fox (mammalian carnivore);
- the American robin (avian insectivore, avian omnivore, and avian herbivore); and
- the American kestrel (avian intermediate carnivore and avian carnivore). The avian carnivore is the surrogate for threatened and endangered (T&E) species (primarily the Mexican spotted owl).

The rationale for these receptors is presented in "Screening Level Ecological Risk Assessment Methods, Revision 3.2" (LANL 2014, 262559). The Mexican spotted owl is the only T&E species known to frequent the Laboratory area. The owl's primary habitat is densely forested canyons and it has not been observed roosting in the Potrillo and Fence Canyons Aggregate Area. However, the owl may use the canyon and surrounding area to forage.

I-5.2 Assessment Endpoints

An assessment endpoint is an explicit expression of the environmental value to be protected. The endpoints are ecologically relevant and help sustain the natural structure, function, and biodiversity of an ecosystem or its components (EPA 1998, 062809). In a screening-level ecological evaluation, receptors represent the populations and/or communities and assessment endpoints are any adverse effects on the chosen ecological receptors. The purpose of the ecological evaluation is to protect populations and communities of biota rather than individual organisms, except for listed or candidate T&E species and treaty-protected species, when individuals must be protected (EPA 1999, 070086) because populations of protected species tend to be small and the loss of an individual adversely affects the species as a whole (EPA 1997, 059370).

In accordance with this guidance, the Laboratory has developed generic assessment endpoints (LANL 1999, 064137) to ensure that values at all levels of ecological organization are considered in the ecological screening process. These general assessment endpoints can be measured using impacts on reproduction, growth, and survival to represent categories of effects that may adversely impact populations. In addition, specific receptor species were chosen to represent each functional group. The receptor species were chosen because of their presence at the site, their sensitivity to the chemicals of potential ecological concern (COPECs), and their potential for exposure to those COPECs. These categories of effects and the chosen receptor species were used to select the types of effects seen in toxicity studies considered in the development of the toxicity reference values (TRVs). Toxicity studies used in the development of TRVs included only studies in which the adverse effect evaluated affected reproduction, survival, and/or growth.

The selection of receptors and assessment endpoints is designed to be protective of both the representative species used as screening receptors and the other species within their feeding guilds and the overall food web for the terrestrial and aquatic ecosystems. Focusing the assessment endpoints on the general characteristics of species that affect populations (rather than the biochemical and behavioral changes that may affect only the studied species) also ensures the applicability to the ecosystem of concern.

I-5.3 Ecological Risk Screening Evaluation

The ecological risk-screening assessments identify COPECs and are based on the comparison of EPCs (95% UCLs, maximum detected concentrations, or maximum detection limits) to ecological screening levels (ESLs) in accordance with Laboratory guidance (LANL 2014, 262559).

The ESLs were obtained from the ECORISK Database, Version 3.2 (LANL 2014, 262559) and are presented in Table I-5.3-1. 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 TRVs, is presented in the ECORISK Database, Version 3.2 (LANL 2014, 262559).

The analysis begins with a comparison of the minimum ESL for a given COPC to the EPC. The HQ is defined as the ratio of the EPC to the concentration that has been determined to be acceptable to a given ecological receptor (i.e., the ESL). 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. HQs above 0.3 are used to identify COPECs requiring additional evaluation (LANL 2014, 262559). Individual HQs for a receptor are summed to derive an HI; COPCs without ESLs are retained as COPECs and evaluated further in the uncertainty section. An HI greater than 1 indicates further assessment may be needed to ensure exposure to multiple COPECs at a site will not lead to potential adverse impacts to a given receptor population. The HQ and HI analysis is a conservative indication of potential adverse effects and is designed to minimize the potential of overlooking possible COPECs at the site.

I-5.3.1 SWMU 15-002

Because the two former burn pits are not in the vicinity of each other (over 600 ft apart), risk was evaluated for each pit separately. Data from sampling locations 15-613318 through 15-613322 were used to evaluate the former north burn pit, and data from sampling locations 15-613671 through 15-613675 were used to evaluate the former south burn pit.

Former North Burn Pit

The results of the minimum ESL comparisons are presented in Table I-5.3-2. Barium, copper, lead, manganese, mercury, selenium, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, and 2,3,7,8-TCDD are retained as COPECs because the HQs were above 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the Potrillo and Fence Canyons Aggregate Area is 6.7.

Perchlorate and TPH-DRO do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-3. The HI analysis indicates that the kestrel (intermediate carnivore and top carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, desert cottontail, earthworm, and plant have HIs above 1. The red fox has an HI less than 1. The COPECs and receptors are discussed in the uncertainty section.

Former South Burn Pit

The results of the minimum ESL comparisons are presented in Table I-5.3-4. Antimony, arsenic, barium, beryllium, chromium, copper, cyanide, lead, mercury, nickel, selenium, zinc, bis(2-ethylhexyl)phthalate, RDX, and 2,3,7,8-TCDD are retained as COPECs because the HQs were above 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the Potrillo and Fence Canyons Aggregate Area is 6.7.

Perchlorate and TPH-DRO do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-5. The HI analysis indicates that all receptors have HIs above 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.2 SWMUs 15-004(b) and 15-004(c)

The results of the minimum ESL comparisons are presented in Table I-5.3-6. Arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, thallium, bis(2-ethylhexyl)phthalate, and di-n-butylphthalate are retained as COPECs because the HQs were above 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the Potrillo and Fence Canyons Aggregate Area is 6.7.

Calcium, magnesium, 4-isopropyltoluene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-7. The HI analysis indicates that the kestrel (intermediate carnivore and top carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, desert cottontail, earthworm, and plant have HIs above 1. The red fox has an HI less than 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.3 SWMU 15-004(f)

To determine whether portions of SWMU 15-004(f) present the greater or lesser potential unacceptable risks/doses to receptors, risk/dose assessments were performed for the entire SWMU.

The results of the minimum ESL comparisons are presented in Table I-5.3-8. Antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, uranium, zinc, 2,3,7,8-TCDD, and uranium-238 are retained as COPECs because the HQs were above 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the Potrillo and Fence Canyons Aggregate Area is 6.7.

Calcium, iron, and tris(o-cresyl)phosphate do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-9. The HI analysis indicates that the kestrel (intermediate carnivore and top carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, desert cottontail, earthworm, and plant have HIs above 1. The red fox has an HI less than 1. The COPECs and receptors are discussed in the uncertainty section.

The data indicate that Firing Point E contains the majority of contamination at SWMU 15-004(f) and is the primary area for risk at the site. Additional risk analyses were performed on the site, excluding Firing Point E samples, and using only Firing Point E samples.

SWMU 15-004(f) Excluding Firing Point E Sampling Locations

The results of the minimum ESL comparisons are presented in Table I-5.3-10. Arsenic, barium, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, uranium, and zinc are retained as COPECs because the HQs were above 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the Potrillo and Fence Canyons Aggregate Area is 6.7.

Iron and magnesium do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-11. The HI analysis indicates that the kestrel (intermediate carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, earthworm, and plant have HIs above 1. The desert cottontail has an HI equivalent to 1. The American kestrel (top carnivore) and red fox have HIs less than 1.

SWMU 15-004(f) Firing Point E Sampling Locations Only

The results of the minimum ESL comparisons are presented in Table I-5.3-12. Antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, uranium, zinc, 2,3,7,8-TCDD, uranium-234, and uranium-238 are retained as COPECs because the HQs were above 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the Potrillo and Fence Canyons Aggregate Area is 6.7.

Magnesium and tris(o-cresyl)phosphate do not have ESLs, are retained as a COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-13. The HI analysis indicates that all receptors have HIs above 1.

Summary of Additional Analyses

The results of the risk screening assessments indicate that Firing Point E contains the majority of contamination at SWMU 15-004(f). The inorganic COPECs for SWMU 15-004(f) and Firing Point E overlap completely with uranium-234 being the only additional COPEC at Firing Pont E. The HIs for Firing Point E are the highest with all receptors having HIs greater than 1 while the SWMU without Firing Point

E has the lowest HIs with the red fox, desert cottontail, and kestrel (top carnivore) having HIs equivalent to or less than 1. However, both parts of the SWMU (with and without Firing Point E) present potential ecological risks to multiple receptors.

I-5.3.4 SWMU 15-007(a)

The results of the minimum ESL comparisons are presented in Table I-5.3-14. Arsenic, barium, chromium, copper, lead, nickel, and selenium are retained as COPECs because the HQs were above 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the Potrillo and Fence Canyons Aggregate Area is 6.7.

Calcium, magnesium, and perchlorate do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-15. The HI analysis indicates that the robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, earthworm, and plant have HIs above 1. The desert cottontail has an HI equivalent to 1. The kestrel (top and intermediate carnivore) and red fox have HIs less than 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.5 SWMU 15-008(a)

The results of the minimum ESL comparisons are presented in Table I-5.3-16. Arsenic, barium, chromium, copper, lead, mercury, nickel, selenium, silver, uranium, vanadium, zinc, acenaphthene, benzoic acid, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, 2,3,7,8-TCDD, uranium-234, and uranium-238 are retained as COPECs because the HQs were above 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the Potrillo and Fence Canyons Aggregate Area is 6.7.

Calcium, iron, magnesium, perchlorate, and 4-isopropyltoluene do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-17. The HI analysis indicates that the kestrel (intermediate carnivore and top carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, desert cottontail, earthworm, and plant have HIs above 1. The red fox has an HI equivalent to 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.6 SWMU 15-009(e)

The results of the minimum ESL comparisons are presented in Table I-5.3-18. Antimony, selenium, silver, and uranium are retained as COPECs because the HQs were above 0.3.

Isopropyltoluene [4-] does not have an ESL, is retained as a COPEC, and is discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-19. The HI analysis indicates that the robin (insectivore and omnivore), deer mouse, montane shrew, desert cottontail, and plant have HIs above 1. The kestrel (intermediate carnivore and top carnivore), robin (herbivore), red fox and earthworm have HIs less than or equivalent to 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.7 SWMU 15-010(a)

The results of the minimum ESL comparisons are presented in Table I-5.3-20. Antimony, barium, chromium, cobalt, copper, lead, mercury, selenium, zinc, acenapthene, di-n-butylphthalate, and 2,3,7,8-TCDD are retained as COPECs because the HQs were above 0.3.

Calcium, nitrate, perchlorate, and 4-isopropyltoluene do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-21. The HI analysis indicates that the kestrel (intermediate carnivore and top carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, desert cottontail, earthworm, and plant have HIs above 1. The red fox has an HI less than 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.8 AOC C-15-004

The results of the minimum ESL comparisons are presented in Table I-5.3-22. Copper, zinc, and 2,3,7,8-TCDD are retained as COPECs because the HQs were above 0.3.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-23. The HI analysis indicates that the robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, earthworm, and plant have HIs above 1. The kestrel (intermediate carnivore and top carnivore), desert cottontail, and red fox have HIs less than or equivalent to 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.9 AOC C-15-005

The results of the minimum ESL comparisons are presented in Table I-5.3-24. Antimony, barium, lead, mercury, nickel, selenium, zinc, and di-n-butylphthalate are retained as COPECs because the HQs were above 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the Potrillo and Fence Canyons Aggregate Area is 6.7.

Calcium and perchlorate do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-25. The HI analysis indicates that the kestrel (intermediate carnivore and top carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, desert cottontail, earthworm, and plant have HIs above 1. The red fox has an HI less than 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.10 AOC 15-005(b)

The results of the minimum ESL comparisons are presented in Table I-5.3-26. Barium, cobalt, nickel, selenium, and bis(2-ethylhexyl)phthalate are retained as COPECs because the HQs were above 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the Potrillo and Fence Canyons Aggregate Area is 6.7.

Calcium and perchlorate do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-27. The HI analysis indicates that the kestrel (intermediate carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, and plant have HIs above 1. The earthworm has an HI equivalent to 1. The kestrel (top carnivore), desert cottontail, and red fox have HIs less than 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.11 AOC C-15-006

The results of the minimum ESL comparisons are presented in Table I-5.3-28. Antimony, cobalt, copper, lead, manganese, mercury, zinc, Aroclor-1254, benzoic acid, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, and 2,3,7,8-TCDD are retained as COPECs because the HQs were above 0.3.

Iron and perchlorate do not have ESLs, are retained as COPECs, and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-29. The HI analysis indicates that the kestrel (intermediate carnivore and top carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, desert cottontail, earthworm, and plant have HIs above 1. The red fox has an HI less than 1.The COPECs and receptors are discussed in the uncertainty section.

I-5.3.12 SWMU 36-001

The results of the minimum ESL comparisons are presented in Table I-5.3-30. Antimony, copper, lead, nickel, uranium, zinc, bis(2-ethylhexyl)phthalate, di-n–butylphthalate, phenol, and 2,3,7,8-TCDD are retained as COPECs because the HQs were above 0.3.

Nitrate does not have an ESL, is retained as a COPEC, and is discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-31. The HI analysis indicates that the kestrel (intermediate carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, desert cottontail, earthworm, and plant have HIs above 1. The kestrel (top carnivore) has an HI equivalent to 1. The red fox has an HI less than 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.13 SWMU 36-003(b)

The results of the minimum ESL comparisons are presented in Table I-5.3-32. Selenium and 2,3,7,8-TCDD are retained as COPECs because the HQs were above 0.3.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-33. The HI analysis indicates that the robin (insectivore and omnivore), deer mouse, montane shrew, and plant have HIs above 1. The Kestrel (intermediate carnivore and top carnivore), robin (herbivore), desert cottontail, red fox and earthworm have HIs less than or equivalent to 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.14 SWMU 36-005

The results of the minimum ESL comparisons are presented in Table I-5.3-34. Chromium, nickel, selenium, benzoic acid, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, and pentachlorophenol are retained as COPECs because the HQs were above 0.3.

Perchlorate does not have an ESL, is retained as a COPEC, and is discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-35. The HI analysis indicates that the kestrel (intermediate carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, montane shrew, and plant have HIs above 1. The kestrel (top carnivore), desert cottontail, red fox, and earthworm have HIs less than or equivalent to 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.3.15 SWMU 36-006

The results of the minimum ESL comparisons are presented in Table I-5.3-36. Antimony, copper, mercury, selenium, zinc, acenaphthene, benzo(a)anthracene, benzoic acid, chrysene, fluoranthene, naphthalene, phenanthrene, pyrene, and the 2,3,7,8-TCDD are retained as COPECs because the HQs were above 0.3.

Isopropyltoluene[4-] and TATB do not have ESLs, are retained as a COPEC and are discussed in the uncertainty section.

The HQs and HIs for each COPEC and receptor combination are presented in Table I-5.3-37. The HI analysis indicates that the kestrel (intermediate carnivore), robin (insectivore, omnivore, and herbivore), deer mouse, desert cottontail, montane shrew, earthworm, and plant have HIs above 1. The kestrel (top carnivore) has an HI equivalent to 1. The red fox has an HI less than 1. The COPECs and receptors are discussed in the uncertainty section.

I-5.4 Uncertainty Analysis

The uncertainty analysis describes the key sources of uncertainty related to the screening evaluations. This analysis can result in either adding or removing chemicals from the list of COPECs. This section contains a qualitative uncertainty analysis of the issues relevant to evaluating the potential ecological risk at each site.

I-5.4.1 Chemical Form

The assumptions used in the ESL derivations are conservative and not necessarily representative of actual conditions. These assumptions include maximum chemical bioavailability, maximum receptor ingestion rates, minimum bodyweight, and additive effects of multiple COPECs. These factors tend to result in conservative ESL estimates, which may lead to an overestimation of the potential risk. The assumption of additive effects for multiple COPECs may result in an over- or underestimation of the potential risk to receptors.

The chemical form of the individual COPCs was not determined as part of the investigation. Toxicological data are typically based on the most toxic and bioavailable chemical species, which are not typically found in the environment. Inorganic, radionuclide, and organic COPECs are generally not 100% bioavailable to receptors in the natural environment because of interference from other natural processes, such as the adsorption of chemical constituents to matrix surfaces (e.g., soil) or rapid oxidation or reduction changes that render harmful chemical forms unavailable to biotic processes. The ESLs were calculated to ensure a conservative indication of potential risk (LANL 2014, 262559) and the values are biased toward overestimating the potential risk to receptors.

I-5.4.2 Exposure Assumptions

The EPCs used in the calculations of HQs are UCLs or the maximum detected concentration to depths of 5 ft bgs and are conservative estimates of exposure to each COPEC. The sampling efforts focused on areas of suspected contamination and receptors were assumed to ingest 100% of their food and spend 100% of their time at the site. These assumptions regarding the exposure for terrestrial receptors in the Potrillo and Fence Canyons Aggregate Area are likely to result in an overestimation of potential ecological exposure and risk.

I-5.4.3 Toxicity Values

The HQs were calculated using ESLs, which 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. The use of NOAELs leads to an overestimation of potential risk to ecological receptors. 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 likely 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 tend to lead to an overestimation of potential risk.

I-5.4.4 Area Use Factors

In addition to the direct comparison of the EPC 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 (HR). The AUFs for individual organisms were developed by dividing the size of the site by the HR for that receptor. Because T&E species must be assessed on an individual basis (EPA 1999, 070086), the AUF is used for the Mexican spotted owl. The HR for the Mexican spotted owl is 366 ha and the site areas and AUFs are presented in Table I-5.4-1. The kestrel (top carnivore) is used as the surrogate receptor for the Mexican spotted owl.

The unadjusted HIs for the kestrel (top carnivore) are greater than 1 at 8 sites; 2 sites had HIs equivalent to 1. The AUFs for the Mexican spotted owl range from 0.000002 to 0.073 (Table I-5.4-1). Application of the AUFs for the Mexican spotted owl to the kestrel (top carnivore) HIs results in adjusted HIs from 0.0000003 to 0.6. Therefore, there are no potential adverse impacts to the Mexican spotted owl at any of the sites.

I-5.4.5 Population Area Use Factors

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 address the potential effects on populations is to estimate the spatial extent of the area inhabited by the local population that overlaps with the contaminated area. The population area for a receptor is based on the individual receptor HR and its dispersal distance (Bowman et al. 2002, 073475). Bowman et al. estimate that the median dispersal distance for mammals is 7 times the linear dimension of the HR, which is equivalent to 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 can be derived by $\pi(3.6\sqrt{HR})^2$ or approximately 40 HR.

The population area use factors (PAUFs) are calculated by dividing the site area by the population area of each receptor. The HQs are adjusted by multiplying by the PAUFs. HIs are recalculated using the PAUF-adjusted HQs. If the PAUF is above 1, the HQs are not adjusted for that receptor. The HQs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs. The adjusted HQs are summed for each receptor to calculate the adjusted HIs. PAUFs are greater than 1 for the deer mouse at SWMUs 15-004(b) and 15-004(c) and are therefore not used to adjust the deer mouse HI at this site. PAUFs are greater than 1 for the robin, deer mouse, and montane shrew at SWMU 15-004(f) and are not used to adjust these HIs for this site.

SWMU 15-002

Former North Burn Pit

The former north burn pit area of SWMU 15-002 is approximately 0.023 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-2). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMU 15-002 are less than 1 for all receptors. The earthworm and plant had unadjusted HIs of 16 and 10 (Table I-5.4-3).

Former South Burn Pit

The former south burn pit area of SWMU 15-002 is approximately 0.1 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-4). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMU 15-002 are less than 1 for the kestrel (intermediate carnivore and top carnivore), desert cottontail, and red fox and greater than 1 for the robin (herbivore, insectivore, and omnivore), deer mouse and shrew (Table I-5.4-5). The earthworm and plant had unadjusted HIs of 12,114 and 119 (Table I-5.4-5).

SWMUs 15-004(b) and 15-004(c)

The area of SWMUs 15-004(b) and 15-004(c) is approximately 5.85 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-6). The HQs and HIs

are recalculated using the PAUFs. The deer mouse HI was not adjusted because the PAUF is greater than 1. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMUs 15-004(b) and 15-004(c) are less than 1 for the kestrel (intermediate carnivore and top carnivore), desert cottontail, and red fox and greater than 1 for the robin (herbivore, insectivore, and omnivore), deer mouse, and shrew (Table I-5.4-7). The earthworm and plant had unadjusted HIs of 7 and 25 (Table I-5.4-7).

SWMU 15-004(f)

The area of SWMU 15-004(f) is approximately 26.6 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-8). The HQs and HIs are recalculated using the PAUFs. The robin (herbivore, insectivore, and omnivore), deer mouse, and montane shrew HIs were not adjusted because the PAUFs are above 1. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMU 15-004(f) are less than 1 for the kestrel (intermediate carnivore and top carnivore), and red fox, equivalent to 1 for the cottontail, and greater than 1 for the robin (herbivore, insectivore, and omnivore), deer mouse, and shrew (Table I-5.4-9). The earthworm and plant had unadjusted HIs of 15 and 52 (Table I-5.4-9).

SWMU 15-007(a)

The area of SWMU 15-007(a) is approximately 0.15 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-10). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMU 15-007(a) are less 1 for all receptors. The earthworm and plant had unadjusted HIs of 2 and 6 (Table I-5.4-11).

SWMU 15-008(a)

The area of SWMU 15-008(a) is approximately 0.04 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-12). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMU 15-008(a) are less than 1 for all receptors. The earthworm and plant had unadjusted HIs of 33 and 146 (Table I-5.4-13).

SWMU 15-009(e)

The area of SWMU 15-009(e) is approximately 0.014 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-14). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for 15-009(e) are less than 1 for all receptors. The earthworm had an unadjusted HI less than 1 and the plant had an unadjusted HI of 4 (Table I-5.4-15).

SWMU 15-010(a)

The area of SWMU 15-010(a) is approximately 0.0023 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-16). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMU 15-010(a) are less than 1 for all receptors. The earthworm and plant had unadjusted HIs of 233 and 12 (Table I-5.4-17).

AOC C-15-004

The area of AOC C-15-004 is approximately 0.0007 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-18). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for AOC C-15-004 are less than 1 for all receptors. The earthworm and plant had unadjusted HIs of 2 (Table I-5.4-19).

AOC C-15-005

The area of AOC C-15-005 is approximately 0.033 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-20). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for AOC C-15-005 are less than 1 for all receptors. The earthworm and plant had unadjusted HIs of 61 and 5 (Table I-5.4-21).

AOC 15-005(b)

The area of AOC 15-005(b) is approximately 0.014 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-22). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for AOC 15-005(b) are less than 1 for all receptors. The earthworm had an unadjusted HI equivalent to 1 and the plant had an unadjusted HI of 5 (Table I-5.4-23).

AOC C-15-006

The area of AOC C-15-006 is approximately 0.01 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-24). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for AOC C-15-006 are less than 1 for all receptors. The earthworm and plant had unadjusted HIs of 144 and 5 (Table I-5.4-25).

SWMU 36-001

The area of SWMU 36-001 is approximately 0.083 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-26). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMU 36-001 are less than 1 for all receptors, except for the deer mouse, which had an adjusted HI equivalent to 1. The earthworm and plant had unadjusted HIs of 17 and 25 (Table I-5.4-27).

SWMU 36-003(b)

The area of SWMU 36-003(b) is approximately 0.005 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-28). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMU 36-003(b) are less than 1 for all receptors. The earthworm had an unadjusted HI of less than 1 and the plant had an unadjusted HI of 3 (Table I-5.4-29).

SWMU 36-005

The area of SWMU 36-005 is approximately 0.27 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-30). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMU 36-005 are less than 1 for all receptors. The earthworm had an unadjusted HI of less than 1 and the plant had an unadjusted HI of 4 (Table I-5.4-31).

SWMU 36-006

The area of SWMU 36-006 is approximately 0.22 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table I-5.4-32). The HQs and HIs are recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs.

The adjusted HIs for SWMU 36-006 are less than 1 for all receptors, except for the deer mouse, which had an adjusted HI equivalent to 1. The earthworm and plant had unadjusted HIs of 15 and 19 (Table I-5.4-33).

I-5.4.6 Exposure Pathways

Much of the area on the mesa tops within the Potrillo and Fence Canyons Aggregate Area is developed with buildings, structures, parking lots, and roads. Because no sites are completely covered by asphalt, except for roads and parking areas, complete exposure pathways to ecological receptors exist.

I-5.4.7 LOAEL Analyses

Several sites have HIs greater than 1 for one or more receptors. To address the HIs and reduce the associated uncertainty, analyses were conducted using ESLs calculated based on a LOAEL rather than a NOAEL. The LOAEL-based ESLs were calculated based on toxicity information in the ECORISK Database, Release 3.2 (LANL 2014, 262559) and are presented in Table I-5.4-34. The analyses address some of the uncertainties and conservativeness of the ESLs used in the initial screening assessments. HI analyses and adjusted HI analyses were conducted using the LOAEL-based ESLs.

SWMU 15-002

Former North Burn Pit

The unadjusted HIs for SWMU 15-002 are greater than 1 for the earthworm and plant with barium, manganese, mercury, and selenium being the primary COPECs for one or both receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 2 for the earthworm and the plant (Table I-5.4-35).

The earthworm HI (2) is primarily from mercury (HQ = 1.3). The LOAEL-based earthworm ESL for mercury (0.5 mg/kg) is only 0.4 mg/kg above the soil BV (0.1 mg/kg) and the EPC (0.63 mg/kg) is only 0.5 mg/kg above the BV, indicating the potential ecological risk to the earthworm is overestimated.

The plant HI (2) is primarily from manganese (HQ = 1). The LOAEL-based plant ESL for manganese (1100 mg/kg) is the same as the maximum soil background concentration and only the maximum concentration exceeded the soil BV (all other concentrations were within the range of the soil background concentrations). Therefore, the risk to the plant is overestimated.

In addition, the former north burn pit is a small site with an area of 0.023 ha. Although HR and population area information is not available for soil invertebrates and plants, it is unlikely that the inorganic COPECs would have population impacts on earthworms or plants. Field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment I-4). The site does provide habitat and has a healthy plant community. Therefore, the HIs do not indicate potential risk to the plants or other biota.

Former South Burn Pit

The adjusted and unadjusted HIs for the SWMU 15-002 former south burn pit are greater than 1 for the robin (herbivore, insectivore, and omnivore), deer mouse, montane shrew, earthworm, and plant with antimony, arsenic, barium, beryllium, copper, lead, mercury, selenium, zinc, and RDX being the primary COPECs for one or several receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 863, 4646, and 2745 for the robin (herbivore, insectivore, and omnivore); 20 for the deer mouse; 36 for the montane shrew; 1212 for the earthworm; and 50 for the plant (Table I-5.4-36). The adjusted HI analyses using LOAEL-based ESLs resulted in HIs of 5, 28, and 16 for the robin (herbivore, insectivore, and omnivore) and less than 1 for the montane shrew and deer mouse (Table I-5.4-37).

SWMUs 15-004(b) and 15-004(c)

The adjusted and unadjusted HIs for SWMUs 15-004(b) and 15-004(c) are greater than 1 for the robin (herbivore, insectivore, and omnivore), deer mouse, montane shrew, earthworm, and plant, with arsenic, barium, beryllium, cadmium, cobalt, copper, lead, manganese, mercury, nickel, selenium, thallium, bis(2-ethylhexylphthalate), and di-n-butylphthalate being the primary COPECs for one or several receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 8, 26 and 18 for the robin

(herbivore, insectivore, and omnivore); 6 for the deer mouse; 10 for the montane shrew; 0.7 for the earthworm; and 4 for the plant (Table I-5.4-38). The adjusted HI analyses using LOAEL-based ESLs resulted in HIs of 3, 9, and 6 for the robin (herbivore, insectivore, and omnivore); and 4 for the montane shrew (Table I-5.4-39). The deer mouse HI could not be adjusted because the PAUF is greater than one.

The adjusted LOAEL-based HIs for the robin (herbivore, insectivore, and omnivore) and montane shrew and the unadjusted LOAEL-based HI for the deer mouse are partially from selenium. Selenium concentrations were consistent across the site with a range of 1.7 mg/kg and only 4 of 47 results above 2 mg/kg. The EPC for selenium (1.72 mg/kg) is similar to the maximum soil background concentration (1.7 mg/kg) and only 0.2 mg/kg above the soil BV (1.52 mg/kg). In addition, the LOAEL-based ESLs for the receptors range from 0.99 mg/kg (montane shrew) to 2 mg/kg (robin herbivore). Therefore, the selenium concentrations and the ESLs are similar to background and the ecological risk from selenium is overestimated.

At SWMUs 15-004(b) and 15-004(c), the majority of contamination is located in the northern portion of the site in an area of approximately 0.4 ha compared with the entire site area of 5.85 ha. Within this smaller area are all of the cadmium concentrations above background, all but one copper concentration above background, 14 of 19 lead concentrations above background, all mercury concentrations above background, 2 of 4 nickel concentrations above background, 7 of 16 selenium concentrations above background, and the elevated detection limits for thallium. This area also includes all of the detected concentrations of di-n-butylphthalate and 6 of 9 detected concentrations of bis(2-ethylhexyl)phthalate. All the maximum concentrations of the primary COPECs, except for nickel (concentrations are comparable to the maximum above background), selenium (concentrations did not change markedly across the entire site), and bis(2-ethylhexyl)phthalate, were detected in this area. Therefore, this area is evaluated separately for potential ecological risk to the robin, deer mouse, and shrew (Tables I-5.4-40 and I-5.4-41). The adjusted LOAEL-based HIs for the robin (herbivore, insectivore, and omnivore), montane shrew, and deer mouse are 0.4, 1, 0.7, 2, and 0.6, respectively (Table I-5.4-41). The deer mouse HI is from cadmium and is biased high by the maximum site concentration (87 mg/kg). All other cadmium concentrations in this area are an order of magnitude or more below the maximum concentration. The cadmium EPC without the maximum concentration is 3.83 mg/kg and the adjusted LOAEL-based HIs are 0.03 and 0.1, respectively. Therefore, the risk from cadmium is overestimated for the deer mouse.

Another area to the south of the firing sites (1.4 ha) contains the majority of the rest of the concentrations above background for copper, lead, and selenium. However, except for the selenium maximum concentrations (2.8 mg/kg) and bis(2-ethylhexyl)phthalate (0.47 mg/kg), the concentrations are lower than those in the northern area. As noted above the selenium concentrations did not change markedly across the entire site (1.1 mg/kg to 2.8 mg/kg). The adjusted LOAEL-based HQs selenium and bis(2-ethylhexyl)phthalate in this area are 0.1 or less.

In addition, field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment I-4). The site does provide habitat and has a healthy plant community. Therefore, the HI does not indicate potential risk to the plants.

SWMU 15-004(f)

The adjusted and unadjusted HIs for SWMU 15-004(f) are greater than 1 for the robin (herbivore, insectivore, and omnivore), deer mouse, montane shrew, desert cottontail, earthworm, and plant, with antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, uranium, zinc, 2,3,7,8-TCDD, and uranium-238 being the primary COPECs for one or several receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 7, 17, and 12 for the robin; 8 for the deer mouse; 14 for the montane shrew; 2 for the earthworm; and 6 for the plant

(Table I-5.4-42). The HI for the desert cottontail was equivalent to 1. The adjusted HI analyses using LOAEL-based ESLs resulted in an HI of 0.3 for the desert cottontail (Table I-5.4-43). The robin (herbivore, insectivore, and omnivore), deer mouse, and montane shrew HIs were not adjusted because the PAUFs are above 1.

As noted in section I-5.3.3, Firing Point E contains the majority of contamination at SWMU 15-004(f). The inorganic COPECs for SWMU 15-004(f) and Firing Point E overlap completely with uranium-234 being the only additional COPEC at Firing Pont E. The HIs for Firing Point E are the highest, while the HIs without Firing Point E are the lowest with the red fox, desert cottontail, and kestrel (top carnivore) having HIs equivalent to or less than 1.

SWMU 15-007(a)

The unadjusted HIs for SWMU 15-007(a) are greater than 1 for the earthworm and plant, with arsenic, barium, and selenium being the COPECs for one or both receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.2 for the earthworm and approximately 1 for the plant (Table I-5.4-44).

SWMU 15-007(a) is a small site with an area of 0.15 ha. Although HR and population area information is not available for soil invertebrates and plants, it is unlikely that the inorganic COPECs would have population impacts on plants. Field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment I-4). The site does provide habitat and has a healthy plant community. Therefore, the HI does not indicate potential risk to the plants.

SWMU 15-008(a)

The unadjusted HIs for SWMU 15-008(a) are greater than 1 for earthworm and the plant, with arsenic, barium, copper, mercury, nickel, selenium, uranium, zinc, uranium-234, and uranium-238 being the primary COPECs for one or both receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 4 for the earthworm and 17 for the plant (Table I-5.4-45).

The LOAEL-based earthworm and plant HIs are primarily from barium, copper, mercury, and uranium. The maximum concentrations of barium, copper, mercury, and uranium are collocated at location 15-02242 from 0.0–1.0 ft, which was the only 1994 RFI sample. The maximum concentrations are 300 mg/kg higher than the next highest barium concentration, approximately an order of magnitude higher than the next highest copper and mercury concentrations, and the only sample analyzed for uranium (2010 samples were analyzed for isotopic uranium); LOAEL-based HQs for uranium-234 and uranium-238 were 0.033 and 0.037, respectively. These concentrations bias the EPCs for the site and overestimate the potential risks.

SWMU 15-008(a) is a small site with an area of 0.04 ha. Although HR and population area information is not available for soil invertebrates and plants, it is unlikely that the inorganic COPECs would have population impacts on plants. Field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment I-4). The site does provide habitat and has a healthy plant community. Therefore, the HI does not indicate potential risk to the plants.

SWMU 15-009(e)

The unadjusted HI for SWMU 15-009(e) is greater than 1 for the plant with antimony, selenium, and uranium being the primary COPECs. The HI analysis using LOAEL-based ESLs resulted in an HI of 0.6 for the plant (Table I-5.4-46).

SWMU 15-010(a)

The unadjusted HIs for SWMU 15-010(a) are greater than 1 for the earthworm and the plant, with barium, cobalt, mercury, selenium, and zinc being the COPECs for one or both receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 23 for the earthworm and 3 for the plant (Table I-5.4-47).

The LOAEL-based earthworm HI (23) is from mercury (HQ = 23). The maximum concentration (11.5 mg/kg) was used as the EPC and a 95% UCL of 8.99 mg/kg was calculated with the five samples from 0.0–5.0 ft. The UCL reduces the mercury HQ for the earthworm to 18. The LOAEL-based earthworm ESL for mercury (0.5 mg/kg) is only 0.4 mg/kg above the soil BV (0.1 mg/kg), indicating the potential ecological risk to the earthworm is overestimated.

The LOAEL-based plant HI (3.3) is primarily from barium (HQ = 2.1) and selenium (HQ =0.8). Barium was detected above the soil BV of 295 mg/kg in one sample from 0.0–5.0 ft. The maximum concentration (551 mg/kg) was used as the EPC and a 95% UCL of 423 mg/kg was calculated with the five samples from 0.0–5.0 ft. The UCL reduces the barium HQ for the plant to 1.6. The selenium concentrations were consistent in the five 0.0–5.0-ft samples, ranging from 2.1 mg/kg to 2.5 mg/kg. The LOAEL-based plant ESL for barium (260 mg/kg) is below the soil BV and all other concentrations in the 0.0–5.0-ft samples are below the LOAEL-based ESL and the soil BV. The LOAEL-based plant ESL for selenium (3 mg/kg) is only twice the soil BV (approximately 1.5 mg/kg difference). Therefore, the potential risks to the plant from barium and selenium are overestimated.

SWMU 15-010(a) is a small site with an area of 0.0023 ha and is entirely subsurface. Although HR and population area information is not available for soil invertebrates and plants, it is unlikely that the inorganic COPECs would have population impacts on earthworms or plants. Field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment I-4). The site does provide habitat and has a healthy plant community. Therefore, the HIs do not indicate potential risk to the plants or other biota.

AOC C-15-004

The unadjusted HIs for AOC C-15-004 are greater than 1 for the earthworm and the plant, with copper and zinc being the primary COPECs for both receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.3 for both the earthworm and the plant (Table I-5.4-48).

AOC C-15-005

The unadjusted HIs for AOC C-15-005 are greater than 1 for the earthworm and the plant with barium, mercury, selenium, and zinc being the primary COPECs for one or both receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 6 for the earthworm and approximately 1 for the plant (Table I-5.4-49).

The LOAEL-based earthworm HI (6) is primarily from mercury (HQ = 5.9). The maximum concentration was used as the EPC and a 95% UCL of 1.27 mg/kg was calculated. The UCL reduces the mercury HQ for the earthworm to 3. The LOAEL-based earthworm ESL for mercury (0.5 mg/kg) is only 0.4 mg/kg above the soil BV (0.1 mg/kg), indicating the potential ecological risk to the earthworm is overestimated. In addition, mercury was only detected above BV in surface samples and only in 1/3 of the samples collected.

The EPCs for barium (124 mg/kg) and selenium (1.59 mg/kg) are less than or equivalent to the soil BVs for these COPECs. As a result, the average exposure across the site is similar to background. Selenium concentrations are consistent across the (1.1 mg/kg to 1.9 mg/kg) and the highest barium concentrations are in soil and below the soil BV (all concentrations are below the soil BV). The LOAEL-based plant ESL for selenium (3 mg/kg) is only twice the soil BV (approximately 1.5 mg/kg difference). The potential ecological risks to the plant from barium and selenium are overestimated.

AOC C-15-005 is a small site with an area of 0.033 ha. Although HR and population area information is not available for soil invertebrates and plants, it is unlikely that the inorganic COPECs would have population impacts on earthworms or plants. Field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment I-4). The site does provide habitat and has a healthy plant community. Therefore, the HIs do not indicate potential risk to the plants or other biota.

AOC 15-005(b)

The unadjusted HI for AOC 15-005(b) are equivalent to 1 for the earthworm and greater than 1 for the plant with barium, cobalt, and selenium being the primary COPECs for the plant. The HI analysis using LOAEL-based ESLs resulted in an HI equivalent to 1 for the plant and 0.07 for the earthworm (Table I-5.4-50).

The LOAEL-based plant HI (1) is primarily from barium (HQ = 0.8) and selenium (HQ =0.4). Barium was detected above BVs in three samples. However, the maximum barium concentration (310 mg/kg) was within the range of background soil concentrations and one tuff concentration was only 0.4 mg/kg above the maximum Qbt 2,3,4 background concentration. The remaining barium concentration above background (192 mg/kg) results in a HQ of 0.7. In addition, the LOAEL-based plant ESL for barium (260 mg/kg) is below the soil BV and all other concentrations are below the LOAEL-based ESL and the soil BV. Selenium was detected above the Qbt 2,3,4 BV in two samples; higher concentrations were below the soil BV. The maximum concentration above BV (0.96 mg/kg) results in a HQ of 0.3. The plant HI is equivalent to 1 and the potential risk is overestimated.

AOC 15-005(b) is a small site with an area of 0.014 ha. Although HR and population area information is not available for soil invertebrates and plants, it is unlikely that the inorganic COPECs would have population impacts on earthworms or plants. Field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment I-4). The site does provide habitat and has a healthy plant community. Therefore, the HIs do not indicate potential risk to the plants.

AOC C-15-006

The unadjusted HIs for AOC C-15-006 are greater than 1 for the earthworm and the plant, with antimony, cobalt, manganese, mercury, and zinc being the primary COPECs for one or several receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 14 for the earthworm and 0.9 for the plant (Table I-5.4-51).

The LOAEL-based earthworm HI (14) is from mercury (HQ = 14.2). The maximum concentration was approximately three times the next highest concentration and the EPC is between the two concentrations. Because over 90% of the concentrations are below the EPC, the exposure and risk to the earthworm is biased high and overestimated. In addition, the LOAEL-based earthworm ESL for mercury (0.5 mg/kg) is only 0.4 mg/kg above the soil BV (0.1 mg/kg), indicating the potential ecological risk to the earthworm is overestimated.

AOC C-15-006 is a small site with an area of 0.0095 ha. Although HR and population area information is not available for soil invertebrates and plants, it is unlikely that the inorganic COPECs would have population impacts on earthworms or plants. Field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment I-4). The site does provide habitat and has a healthy plant community. Therefore, the HIs do not indicate potential risk to the plants or other biota.

SWMU 36-001

The adjusted and unadjusted HIs for SWMU 36-001 are greater than 1 for the earthworm and the plant and equivalent to 1 for the deer mouse, with antimony, copper, lead, uranium, zinc, phenol, and 2,3,7,8-TCDD being the primary COPECs for one or several receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 3 for the earthworm and plant, and 14 for the deer mouse (Table I-5.4-52). The adjusted HI analyses using LOAEL-based ESLs resulted in an HI of 0.4 for the deer mouse (Table I-5.4-53).

The LOAEL-based earthworm and plant HIs are primarily from copper (HQ = 2.2 and 2.4). Copper and the other inorganic COPECs were detected above the soil BVs in the same sample in the 0.0–5.0-ft-bgs depth interval. The maximum concentrations are the EPCs. The maximum concentrations are 7 times to more than two orders of magnitude higher than the other concentrations, which are below the soil BVs. If 95% UCLs are calculated, the EPCs are biased high by the maximum concentrations and are not representative of the potential exposure and risk. Therefore, the potential risk to the earthworm is limited to a small portion of the SWMU and is overestimated.

SWMU 36-001 is a small site with an area of 0.083 ha. Although HR and population area information is not available for soil invertebrates and plants, it is unlikely that the inorganic COPECs would have population impacts on earthworms or plants. Field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment I-4). The site does provide habitat and has a healthy plant community. Therefore, the HIs do not indicate potential risk to the plants or other biota.

SWMU 36-003(b)

The unadjusted HI for SWMU 36-003(b) is greater than 1 for the plant, with selenium being the primary COPEC. The HI analysis using LOAEL-based ESLs resulted in an HI of 0.5 for the plant (Table I-5.4-54).

SWMU 36-005

The unadjusted HI for SWMU 36-005 is greater than 1 for the plant, with selenium being the primary COPEC. The HI analysis using LOAEL-based ESLs resulted in an HI of 0.6 for the plant (Table I-5.4-55).

SWMU 36-006

The adjusted and unadjusted HIs for SWMU 36-006 are greater than 1 for the earthworm and plant and equivalent to 1 for the deer mouse, with copper, mercury, selenium, zinc, acenaphthene, fluoranthene, naphthalene, phenanthrene, and pyrene being the primary COPCs for one or several receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 3 for both the earthworm and plant and 6 for the deer mouse (Table I-5.4-56). The adjusted HI analyses using LOAEL-based ESLs resulted in an HI of 0.4 for the deer mouse (Table I-5.4-57).

The LOAEL-based earthworm HI (3) is from copper (HQ = 1.2), mercury (0.4), phenanthrene (HQ = 0.6), fluoranthene (HQ = 0.4), and pyrene (HQ = 0.3). Copper was detected with a maximum concentration of 3140 mg/kg, which is approximately 43 times higher than the next highest concentration (73.7 mg/kg). The other copper concentrations are similar to the ESL (80 mg/kg) and more than an order of magnitude below the LOAEL-based ESL (530 mg/kg). Therefore, the copper EPC (615 mg/kg) is biased high, and the risk to the earthworm is overestimated (the LOAEL-based earthworm HQ without the maximum concentration is 0.06). The maximum detected concentrations were used as EPCs for fluoranthene, phenanthrene, and pyrene. The 95% UCLs were calculated for these three organic COPECs and resulted in EPCs of 1.14 mg/kg, 0.913 mg/kg, and 0.829 mg/kg, respectively, which are almost an order of magnitude lower than the maximum concentrations. Using the UCLs, the HQs are 0.05, 0.076, and 0.041. In addition, the mercury EPC (0.19 mg/kg) is only 0.09 mg/kg above the BV and the LOAEL-based earthworm ESL for mercury (0.5 mg/kg) is only 0.4 mg/kg above the soil BV (0.1 mg/kg), indicating the potential ecological risk to the earthworm from mercury is overestimated.

The LOAEL-based plant HI (3) is from copper (HQ = 1.3), acenaphthene (HQ = 0.7), and selenium (HQ = 0.5). Copper was detected with a maximum concentration of 3140 mg/kg, which is approximately 43 times higher than the next highest concentration (73.7 mg/kg). The remaining copper concentrations are similar to the ESL (70 mg/kg) and more than an order of magnitude below the LOAEL (490 mg/kg). Therefore, the EPC (615 mg/kg) is biased high and the risk to the plant is overestimated (the LOAEL-based HQ without the maximum concentration is 0.07). The EPC for acenaphthene is the maximum detected concentration (1.4 mg/kg) of two detected concentrations. The 95% UCL was calculated and resulted in an EPC of 0.412 mg/kg, which is approximately 30% of the maximum concentration. The acenaphthene HQ is 0.2 based on the UCL. The selenium EPC (1.56 mg/kg) is equivalent to the soil BV; detected concentrations ranged from below the soil BV to less than twice the soil BV. As a result, the average exposure across the site is similar to background. The LOAEL-based plant ESL for selenium (3 mg/kg) is only twice the soil BV (approximately 1.5 mg/kg difference). The potential ecological risk to the plant from selenium is overestimated.

In addition, field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment I-4). The site does provide habitat and has a healthy plant community. Therefore, the HI does not indicate potential risk to the plants or other biota.

I-5.4.8 COPECs without ESLs

Several COPECs do not have ESLs for any receptor in Version 3.2 of the ECORISK Database (LANL 2014, 262559). In an effort to address this uncertainty and to provide a quantitative assessment of potential ecological risk, online toxicity databases searches have been conducted to determine if any relevant toxicity information is available. The online searches of the following databases were conducted: EPA Ecotox Database, EPA Office of Pesticide Programs Aquatic Life Benchmarks, U.S. Army Corps of Engineers/EPA Environmental Residue-Effects, California Cal/Ecotox Database, Pesticide Action Network Pesticide Database, U.S. Army Wildlife Toxicity Assessment Program, U.S. Department of Agriculture Integrated Pesticide Management Database, American Bird Conservancy Pesticide Toxicity Database, and Oak Ridge National Laboratory Risk Assessment Information System. Some COPECs without ESLs do not have chemical-specific toxicity data or surrogate chemicals to be used in the screening assessments and cannot be assessed quantitatively for potential ecological risk. These COPECs are infrequently detected across the site.

Toxicity data are not available for calcium, 3,5-dinitroaniline, iron, 4-isopropyltoluene, magnesium, nitrate, perchlorate, TATB, TPH-DRO, 1,2,4-trimethylbenzene, 1,3,5-trimethybenzene, and tris(o-cresyl)phosphate. For calcium, iron, magnesium, nitrate, perchlorate, and TPH-DRO, no surrogate

or other toxicity information is available. For the other COPECs, surrogates are used based on structural similarity to evaluate the potential toxicity.

Calcium was detected above sediment, soil, or Qbt 2,3,4 BVs (4420 mg/kg, 6120 mg/kg, and 2200 mg/kg) in 12 sediment, 130 soil and 84 tuff samples at 12 sites from 0.0–5.0 ft, with a maximum concentration of 13,300 mg/kg. One sample (15,000 mg/kg at SWMU 36-006) was above the maximum soil background concentration (14,000 mg/kg). As discussed in section I-4.2, concentrations of calcium are substantially less than the NMED residential essential nutrient SSLs. Therefore, calcium is not retained as a COPEC.

Dinitroaniline[3,5-] was detected in two samples at SWMU 15-002 former south burn pit, one sample at SWMU 15-004(f), and one sample at SWMU 36-006 from 0.0–5.0 ft, with a maximum concentration of 0.037 mg/kg. The minimum ESL for 1,3,5-trinitrobenzene (10 mg/kg for the earthworm) is used to screen 3,5-dinitroaniline and results in a HQ of 0.004. Because the maximum HQ is less than 0.3, 3,5-dinitroaniline is not retained as a COPEC.

Iron was detected above the sediment, soil, or Qbt 2,3,4 BVs (13,800 mg/kg, 14,500 mg/kg, and 19,500 mg/kg) in 5 sediment, 130 soil, and 88 tuff samples at 12 sites from 0.0–5.0 ft, with a maximum concentration of 35,800 mg/kg. Iron is essential for plant growth and is generally considered to be a micronutrient. The concentrations did not exceed the maximum soil background concentration (36,000 mg/kg). The maximum iron concentration is below the NMED residential SSL (54,800 mg/kg). Therefore, iron is not retained as a COPEC.

Isopropyltoluene[4-] was detected in one sample at SWMUs 15-004(b) and 15-004(c), 15-009(e), and 36-006 and in three samples at SWMU 15-008(a) from 0.0–5.0 ft with concentrations ranging from 0.00043 mg/kg to 0.013 mg/kg. The minimum ESL for toluene (23 mg/kg for the montane shrew) is used to screen 4-isopropyltoluene and results in a maximum HQ of 0.0006. Because the maximum HQ is less than 0.3, 4-isopropyltoluene is not retained as a COPEC.

Magnesium was detected above sediment, soil, or Qbt 2,3,4 BVs (4420 mg/kg, 6120 mg/kg, and 2200 mg/kg) in 12 sediment, 95 soil and 108 tuff samples at 12 sites from 0.0–5.0 ft with a maximum concentration of 4050 mg/kg. The concentrations are below the maximum soil background concentration (10,000 mg/kg). As presented in section I-4.2, concentrations of magnesium are substantially less than the NMED residential essential nutrient SSLs. Therefore, magnesium is not retained as a COPEC.

Nitrate was detected at elevated concentrations in two samples at SWMU 15-010(a) from 0.0–5.0 ft with a maximum concentration of 29.5 mg/kg. Nitrate is naturally occurring, and the vast majority of the detected concentrations reflect naturally occurring levels. The NMED residential SSL for nitrate is 125,000 mg/kg, indicating its potential toxicity is very low. Because of the potential very low toxicity and infrequent detection at elevated concentrations, nitrate is not retained as a COPEC.

Perchlorate was detected in 33 samples at 8 sites from 0.0–5.0 ft with concentrations ranging from 0.0022 mg/kg to 0.023 mg/kg. The NMED residential SSL for perchlorate is 54.5 mg/kg, indicating its potential toxicity is low. Because of the potential low toxicity, perchlorate is not retained as a COPEC.

TATB was detected in one sample at SWMU 36-006 from 0.0–5.0 ft bgs at a concentration of 2.7 mg/kg. The minimum ESL for 1,3,5-trinitrobenzene (10 mg/kg for the earthworm) is used to screen TATB and results in a HQ of 0.27. Because the maximum HQ is less than 0.3, TATB is not retained as a COPEC.

TPH-DRO was detected in four samples at SWMU 15-002 (one detected concentration at the former north burn pit and three detected concentrations at the former south burn pit) from 0.0–5.0 ft with a maximum concentration of 18 mg/kg. The concentrations are below the NMED TPH-DRO residential

screening level of 1000 mg/kg (NMED 2015, 600575) and no TPH-DRO organic constituents were detected. Therefore, because of the potential low toxicity and infrequent detection, TPH-DRO is not retained as a COPEC.

Trimethylbenzene[1,2,4-] was detected in five samples at SWMUs 15-004(b) and 15-004(c) from 0.0–5.0 ft with a concentration range of 0.00081 mg/kg to 0.0011 mg/kg. The minimum ESL for benzene (24 mg/kg for the deer mouse) is used to screen 1,2,4-trimethylbenzene and results in a maximum HQ of 0.00005. Because the maximum HQ is less than 0.3, 1,2,4-trimethylbenzene is not retained as a COPEC.

Trimethylbenzene[1,3,5-] was detected in two samples at SWMUs 15-004(b) and 15-004(c) from 0.0–5.0 ft at concentrations of 0.00045 mg/kg and 0.00061 mg/kg. The minimum ESL for benzene (24 mg/kg for the deer mouse) is used to screen 1,3,5-trimethylbenzene and results in a maximum HQ of 0.00003. Because the maximum HQ is less than 0.3, 1,3,5-trimethylbenzene is not retained as a COPEC.

Tris(o-cresyl)phosphate was detected in two samples at SWMU 15-004(f) from 0.0–5.0 ft at concentrations of 0.025 mg/kg and 0.064 mg/kg. The EPA residential SSL for tricresyl phosphate, which is a mixture of the cresyl phosphate isomers (m-, o-, p-) is 5800 mg/kg, indicating potential low toxicity. Because of the potential low toxicity and infrequent detection, tris(o-cresyl)phosphate is not retained as a COPEC.

I-5.4.9 DOE Tier I Bioconcentration Guide

The DOE Tier I Biota Concentration Guide (BCG) (DOE 2002, 085637) provides a lower value for cesium-137 (21.6 pCi/g) than the ECORISK Database minimum ESL (1200 pCi/g). Cesium-137 was a COPC only at SWMU 15-004(f). Using the EPC for cesium-137 (0.28 mg/kg) and the DOE Tier I BCG, the HQ is less than 0.3. 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 et al. 1996, 056035). Therefore, the ESL comparison is more representative than the BCG comparison.

I-5.5 Interpretation of Ecological Risk-Screening Results

I-5.5.1 Receptor Lines of Evidence

Based on the ecological risk-screening assessments, several COPECs (including COPECs without ESLs) were identified within the Potrillo and Fence Canyons Aggregate Area. Receptors were evaluated using several lines of evidence: minimum ESL comparisons, HI analyses, LOAEL analyses, and potential effects to populations (individuals for T&E species).

Red Fox (Carnivore)

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the red fox, were below 0.3.
- The HIs were greater than 1 for the red fox at SWMU 15-002, former south burn pit and was equivalent to 1 at SWMU 15-008(a).
- The HIs were adjusted by the PAUF, which is the ratio of the site area to the red fox's population area. The adjusted HIs were below 1 for all sites.

These lines of evidence support the conclusion that no potential ecological risk to the red fox population exists within the Potrillo and Fence Canyons Aggregate Area.

Kestrel (Intermediate Carnivore)

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the kestrel, were below 0.3.
- The HIs were greater than 1 for the kestrel (intermediate carnivore) at SWMU 15-002 former north burn pit; SWMU 15-002 former south burn pit; SWMUs 15-004(b) and 15-004(c); SWMUs 15-004(f), 15-008(a), and 15-010(a) and AOCs C-15-005, AOC 15-005(b), and AOC C-15-006 as well as SWMUs 36-001, 36-005, and 36-006. The HI was equivalent to 1 at AOC C-15-004.
- The HIs were adjusted by the PAUF, which is the ratio of the site area to the kestrel's population area. The adjusted HIs were below 1 for all sites.

These lines of evidence support the conclusion that no potential ecological risk to the kestrel (intermediate carnivore) population exists within the Potrillo and Fence Canyons Aggregate Area.

Kestrel (Top Carnivore)

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the kestrel, were below 0.3.
- The HIs were greater than 1 for the kestrel (top carnivore) at SWMU 15-002 former north burn pit; SWMU 15-002 former south burn pit; SWMUs 15-004(b) and 15-004(c); SWMUs 15-004(f), 15-008(a), and15-010(a) and AOCs C-15-005, and C-15-006. The HI was equivalent to 1 at SWMUs 36-001 and 36-006.
- The HIs were adjusted by the PAUF, which is the ratio of the site area to the kestrel's population area. The adjusted HIs were below 1 for all sites.
- The kestrel (top carnivore) is a surrogate for the Mexican spotted owl. The HIs were adjusted by the respective Mexican spotted owl AUFs. The adjusted HIs were below 1 for all sites.

These lines of evidence support the conclusion that no potential ecological risks to the kestrel (top carnivore) population and the Mexican spotted owl exist within the Potrillo and Fence Canyons Aggregate Area.

Robin (All Feeding Guilds)

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the robin, were below 0.3.
- The HIs were greater than 1 for the robin (all feeding guilds) at all sites, except at SWMUs 15-009(e) and 36-003(b), where the herbivore HIs were equivalent to 1.
- The HIs were adjusted by the PAUF, which is the ratio of the site area to the robin's population area. The HIs were not adjusted at SWMU 15-004(f) because the PAUF for the robin is above 1. The adjusted HIs were equivalent to or below 1 at all other sites, except at SWMU 15-002 former south burn pit and SWMUs 15-004(b) and 15-004(c).
- The HI analyses, using the LOAEL-based ESLs and adjusted by the PAUF, resulted in HIs greater than 1 at SWMU 15-002 former south burn pit, SWMUs 15-004(b) and 15-004(c), and SWMU 15-004(f).

- Additional analysis of smaller areas within the larger site using the LOAEL-based ESLs and adjusted by the PAUF, resulted in HIs less than or equivalent to 1 at SWMUs 15-004(b) and 15-004(c).

These lines of evidence support the conclusion that no potential ecological risk to the robin (all feeding guilds) exists within the Potrillo and Fence Canyons Aggregate Area, except at SWMU 15-002 former south burn pit and SWMU 15-004(f).

Deer Mouse (Omnivore)

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the deer mouse, were below 0.3.
- The HIs were greater than 1 for the deer mouse at all sites.
- The HIs were adjusted by the PAUF, which is the ratio of the site area to the deer mouse's population area. The HIs were not adjusted at SWMUs 15-004(b) and 15-004(c) and SWMU 15-004(f) because the PAUFs for the deer mouse are above 1. The adjusted HI was greater than 1 at SWMU 15-002 south burn pit, and the HIs were equivalent to 1 at SWMUs 36-001 and 36-006.
- The HI analyses using the LOAEL-based ESLs resulted in HIs greater than 1 at SWMU 15-002 former south burn pit, SWMUs 15-004(b) and 15-004(c), and SWMU 15-004(f).
- The HI analyses using the LOAEL-based ESLs and adjusted by the PAUF resulted in an HI less than 1 for SWMU 15-002 former south burn pit, SWMU 36-001, and SWMU 36-006.
- The HIs using the LOAEL-based ESLs were not adjusted by the PAUF at SWMUs 15-004(b) and 15-004(c) and SWMU 15-004(f) because the PAUFs for the deer mouse are above 1.
- Additional analysis of smaller areas within the larger site using the LOAEL-based ESLs and adjusted by the PAUF found the HI at SWMUs 15-004(b) and 15-004(c) is overestimated for the deer mouse.

These lines of evidence support the conclusion that no potential ecological risk to the deer mouse population exists within the Potrillo and Fence Canyons Aggregate Area, except at SWMU 15-004(f).

Desert Cottontail (Herbivore)

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the desert cottontail, were below 0.3.
- The HIs were greater than 1 for the desert cottontail at all sites, except at AOC 15-005(b) and SWMU 36-003(b), and the HIs were equivalent to 1 at SWMUs 15-007(a) and 36-005, and AOC C-15-004.
- The HIs were adjusted by the PAUF, which is the ratio of the site area to the desert cottontail's population area. The adjusted HIs were below 1 for all sites, except for SWMU 15-004(f), where the HI was equivalent to 1.
- The HI analyses using the LOAEL-based ESLs and adjusted by the PAUF resulted in an HI of 0.3 at SWMU 15-004(f).

These lines of evidence support the conclusion that no potential ecological risk to the desert cottontail population exists within the Potrillo and Fence Canyons Aggregate Area.

Montane Shrew (Insectivore)

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the montane shrew, were below 0.3.
- The HIs were greater than 1 for the montane shrew at all sites.
- The HIs were adjusted by the PAUF, which is the ratio of the site area to the montane shrew's population area. The HIs were not adjusted at SWMU 15-004(f) because the PAUF for the montane shrew was above 1. The adjusted HIs were greater than 1 at SWMU 15-002 former south burn pit and SWMUs 15-004(b) and 15-004(c). All other sites had adjusted HIs below 1.
- The HI analyses using the LOAEL-based ESLs resulted in HIs greater than 1 at SWMU 15-002 former south burn pit, SWMUs 15-004(b) and 15-004(c), and SWMU 15-004(f).
- The HI analysis using the LOAEL-based ESLs were not adjusted by the PAUF at SWMU 15-004(f) because the PAUF for the montane shrew is above 1.
- The HI analyses using the LOAEL-based ESLs and adjusted by the PAUFs, resulted in HIs less than 1 at SWMU 15-002 former south burn pit and greater than 1 at SWMUs 15-004(b) and 15 004(c).
- Additional analysis of smaller areas within the larger site using the LOAEL-based ESLs and adjusted by the PAUF, resulted an HI less than 1 at SWMUs 15-004(b) and 15-004(c).

These lines of evidence support the conclusion that no potential ecological risk to the montane shrew population exists within the Potrillo and Fence Canyons Aggregate Area, except at SWMU 15-004(f).

Earthworm (Invertebrate)

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the earthworm, were below 0.3.
- The HIs were greater than 1 for the earthworm at all sites, except for SWMUs 15-009(e), 36-003(b), and 36-005. The HI was equivalent to 1 at AOC 15-005(b).
- The HI analyses using the LOAEL-based ESL resulted in HIs greater than 1 at SWMU 15-002 former north and south burn pits; SWMUs 15-004(f), 15-008(a), and 15-010(a) and AOCs C-15-005, C-15-006 as well as SWMUs 36-001 and SWMU 36-006.
- As discussed in section I-5.4.7, the potential risks to the earthworm at the majority of sites are overestimated and/or are not representative of the sites, except at SWMU 15-002 former south burn pit and SWMU 15-004(f).

These lines of evidence support the conclusion that no potential ecological risk to the soil invertebrate population exists within the Potrillo and Fence Canyons Aggregate Area, except at SWMU 15-002 former south burn pit and SWMU 15-004(f).

Plant

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the plant, were below 0.3.
- The HIs were greater than 1 for the plant at all sites.
- The HI analyses, using the LOAEL-based ESL, resulted in HIs greater than 1 at SWMU 15-002 former north and south burn pits; SWMUs 15-004(f), 15-008(a), 15-010(a), 36-001, and 36-006.

The HIs were equivalent to 1 at SWMU 15-007(a), AOCs C-15-005, 15-005(b), and C-15-006 and were less than 1 at SWMUs 15-009(e), 36-003(b), and 36-005 and AOC C-15-004.

- Field observations made during the site visit found no indication of adverse effects on the plant community from COPECs. In addition, the areas in and/or around the sites are industrially developed with many structures, roads, and other paved areas present and do not provide good quality habitat in many cases.
- As discussed in section I-5.4.7, the potential risks to the plant are overestimated and/or are not representative of the sites, except at SWMU 15-002 former south burn pit and SWMU 15-004(f).

These lines of evidence support the conclusion that no potential ecological risk to the plant community exists within the Potrillo and Fence Canyons Aggregate Area, except at SWMU 15-002 former south burn pit and SWMU 15-004(f).

I-5.5.2 Summary

No potential ecological risks to populations or T&E individuals were found for 14 SWMUs/AOCs following evaluations based on minimum ESL, HI analyses, LOAEL analyses, and potential effects to populations (individuals for T&E species). These lines of evidence and the analysis of COPECs with no ESLs support the conclusion that no potential ecological risk exists at these 14 sites. The exceptions are SWMU 15-002, former south burn pit and SWMU 15-004(f) where potential ecological risks may exist for several receptors.

I-6.0 CONCLUSIONS

I-6.1 Human Health Risk

As noted in section I-2.3, PAHs were not typically evaluated for potential risk because they are not site-related in the Potrillo and Fence Canyons Aggregate Area sites and surrounding areas. The exceptions are SWMUs 15-008(a) and 36-006, which were surface disposal areas, where there is uncertainty in the types of materials disposed and SWMUs 15-009(e) and 15-010(a), which were septic tanks connected to the E-F Firing Site control building, and a shop building, a storage building, and a photography laboratory.

The human health risk-screening assessments indicated no potential unacceptable risks or doses from COPCs for the industrial, construction worker, and residential scenarios for SWMUs or AOCs. The total excess cancer risks were below or equivalent to the NMED target risk level of 1×10^{-5}, the HIs were below or equivalent to the NMED target HI of 1, and total doses were below the DOE target dose of 25 mrem/yr.

The sites having potential unacceptable risk and/or dose included the following.

- SWMU 15-002 former south burn pit (noncancer risk from mercury for all three scenarios and barium for construction worker and residential).
- SWMU 15-004(f) (construction worker noncancer risk from uranium and manganese; residential noncancer risk from copper and uranium; residential dose from isotopic uranium, primarily uranium-238). Note: The results of the risk/dose assessments indicate that Firing Point E contains the majority of contamination at SWMU 15-004(f) and is the primary area for potential unacceptable risk and/or dose at the site. However, both parts of the SWMU present potential risks to receptors.

- SWMU 15-008(a) (construction worker and residential noncancer risk from uranium; residential dose from isotopic uranium, primarily uranium-238).
- SWMU 36-001 (residential dose from uranium-238).
- SWMU 36-006 (residential cancer risk from PAHs).

The equivalent total risks for radionuclides were estimated based on conversion from dose using RESRAD Version 6.5. The equivalent total risks from radionuclides for the industrial scenario ranged from 2×10^{-6} at SWMUs 36-001 and 36-006 to 7×10^{-4} at SWMU 15-004(f), Firing Point E. The equivalent total risk for the construction worker scenario ranged from 7×10^{-8} at SWMU 36-006 to 2×10^{-5} at SWMU 15-004(f) Firing Point E. The equivalent total risks for the residential scenario ranged from 4×10^{-6} at SWMUs 15-004(b) and 15-004(c), and 36-006 to 1×10^{-3} at SWMU 15-004(f), Firing Point E.

Sites at TA-15 and TA-36 are inaccessible to the public and are not planned for release by DOE in the foreseeable future. Therefore, an as low as reasonably achievable (ALARA) evaluation for radiological exposure to the public is not currently required. Should DOE's plans for releasing these areas change, an ALARA evaluation will be conducted at that time. It should be noted that the Laboratory addresses considerations for radiation exposures to workers under the Laboratory's occupational radiological protection program in compliance with 10 Code of Federal Regulations 835. The Laboratory's radiation protection program implements ALARA and consists of the following elements: management commitment, training, design review, radiological work review, performance assessments, and documentation.

I-6.2 Ecological Risk

No potential ecological risks to populations or T&E individuals were found at all but two sites following evaluations based on minimum ESL, HI analyses, LOAEL analyses, and potential effects to populations (individuals for T&E species). The lines of evidence and the analysis of COPECs with no ESLs support the conclusion that no potential ecological risk exists at most sites within the Potrillo and Fence Canyons Aggregate Area.

Potential ecological risks were found at the following sites:

- SWMU 15-002, former south burn pit was found to have potential ecological risks to the robin (all feeding guilds), earthworm, and plant from mercury and from barium for the earthworm and plant.
- SWMU 15-004(f) was found to have potential ecological risks to the robin (herbivore, insectivore, omnivore), deer mouse, montane shrew, earthworm, and plant from copper, lead, mercury, and uranium.

I-7.0 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 or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH 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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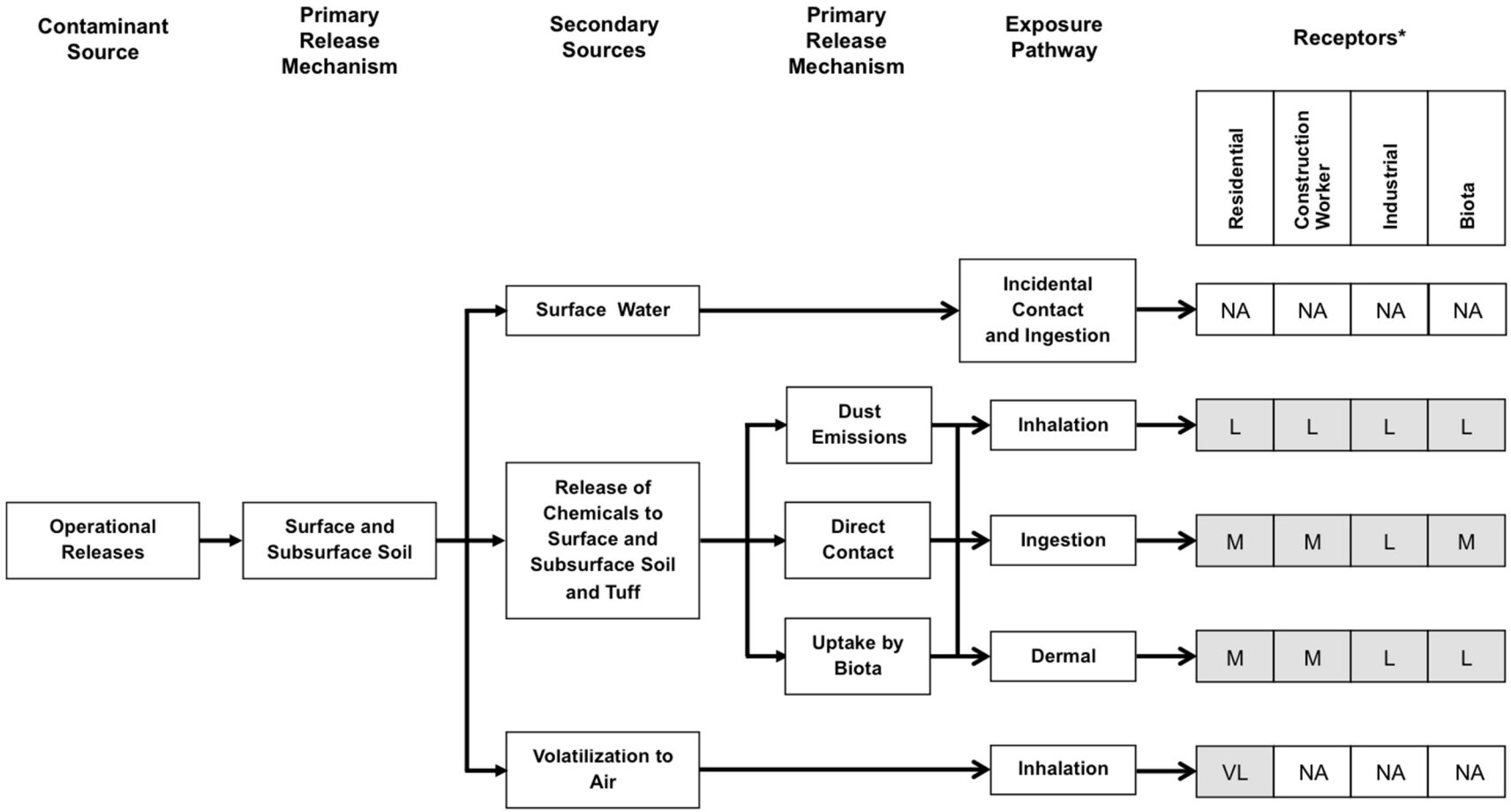
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Note: *Shaded* boxes indicate complete pathways.
* Very Low (VL), Low (L), and Moderate (M) designations indicate the pathway is a potentially complete pathway and is evaluated in the risk assessments.
NA denotes not applicable indicating incomplete pathways that are not evaluated in the risk assessments.

Figure I-3.1-1 Conceptual Site Model for Potrillo and Fence Canyons Aggregate Area

Table I-3.2-1
Physical and Chemical Properties of Inorganic COPCs
at Potrillo and Fence Canyons Aggregate Area

COPC	K_d[a] (cm^3/g)	Water Solubility[a, b] (g/L)
Aluminum	1500	Insoluble
Antimony	45	Insoluble
Arsenic	29	Insoluble
Barium	41	Insoluble
Beryllium	790	Insoluble
Cadmium	75	Insoluble
Chromium (Total)	850	Insoluble
Cobalt	45	Insoluble
Copper	35	Insoluble
Cyanide (Total)	9.9	na[c]
Iron	25	Insoluble
Lead	900	Insoluble
Manganese	65	Insoluble
Mercury	52	Insoluble
Nickel	65	Insoluble
Nitrate	0.0356	na
Perchlorate	na	245
Selenium	5	Insoluble
Silver	8.3	Insoluble
Thallium	71	Insoluble
Uranium	450	Insoluble
Vanadium	1000	Insoluble
Zinc	62	Insoluble

[a] Information from http://rais.ornl.gov/cgi-bin/tox/TOX_select?select=nrad.

[b] Denotes reference information from http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm.

[c] na = Not available.

Table I-3.2-2
Physical and Chemical Properties of Organic COPCs
at Potrillo and Fence Canyons Aggregate Area

COPC	Water Solubility[a] (mg/L)	Organic Carbon Coefficient K_{oc}[a] (L/kg)	Log Octanol-Water Partition Coefficient K_{ow}[a]	Vapor Pressure[a] (mm Hg at 25°C)
Acenaphthene	3.60E+00[b]	6.12E+03	3.92E+00[b]	2.50E-03[b]
Acetone	1.00E+06[b]	1.98E+00	2.40E-01[b]	2.31E+02[b]
Amino-2,6-dinitrotoluene[4-]	1.01E+02	1.84E+00	1.22E+03	3.65E-06
Amino-4,6-dinitrotoluene[2-]	1.01E+02	1.84E+00	1.22E+03	3.33E-06
Anthracene	4.34E-02[b]	2.04E+04	4.45E+00[b]	2.67E-06[b]
Aroclor-1254	3.40E-03[b]	5.30E+05[c]	6.79E+00[b]	6.53E-06[b]
Aroclor-1260	2.84E-04[b]	5.30E+05[c]	8.27E+00[b]	4.05E-05[b]
Benzo(a)anthracene	9.40E-03[b]	2.31E+05	5.76E+00[b]	1.90E-06[b]
Benzo(a)pyrene	1.62E-03[b]	7.87E+05	6.13E+00[b]	5.49E-09[b]
Benzo(b)fluoranthene	1.50E-03[b]	8.03E+05	5.78E+00[b]	5.00E-07 [b]
Benzo(g,h,i)perylene	2.60E-04[b]	2.68E+06	6.63E+00[b]	1.00E-10[b]
Benzo(k)fluoranthene	8.00E-04[b]	7.87E+05	6.10E+00[b]	9.65E-10[b]
Benzoic acid	3.40E+03[b]	1.45E+01	1.87E+00[b]	7.00E-04[b]
Benzyl alcohol	4.29E+04	2.15E+01	1.10E+00	9.40E-02
Bis(2-ethylhexyl)phthalate	2.70E-01[b]	1.65E+05	7.60E+00[b]	1.42E-07[b]
Butylbenzylphthalate	2.69E+00	9.36E+03	4.73E+00	8.25E-06
Chrysene	6.30E-03[b]	2.36E+05	5.81E+00[b]	6.23E-09[b]
Dibenz(a,h)anthracene	1.03E-03	2.62E+06	6.54E+00	1.39E-11
Dibenzofuran	3.10E+00	1.13E+04	4.12E+00	2.48E-03
Diethylphthalate	1.08E+03	1.05E+02	2.42E+00	2.10E-03
Dinitroaniline[3,5-]	5.96E+02	1.89E+00	1.29E+03	8.54E-06
Dinitrotoluene[2,4-]	3.64E+02[c]	1.98E+00	2.70E+02[c]	1.47E-04
Dinitrotoluene[2,6-]	2.70E+02	1.28E+00	2.00E+00	5.10E-03
Di-n-butylphthalate	1.46E+03	4.50E+00	4.70E+00[b]	2.01E-05
Di-n-octylphthalate	2.20E-02	1.45E+05	8.10E+00	1.00E-07
Fluoranthene	2.06E-01[c]	7.09E+04[c]	5.16E+00[c]	9.22E-06[c]
Fluorene	1.89E+00[b]	1.13E+04	4.18E+00[b]	8.42E-04[b]
HMX	1.85E+03[c]	1.60E-01	9.44E+03[c]	3.30E-14
Indeno(1,2,3-cd)pyrene	1.90E-04	1.95E+05	6.70E+00	1.25E-12
Isopropyltoluene[4-]	2.34E+01[b]	na[d]	4.10E+00[b]	1.64E+00[b]
Methylene chloride	1.30E+04[b]	2.37E+01	1.30E+00[b]	4.30E+02[b]
Methylnaphthalene[2-]	2.46E+01	2.98E+03	3.86E+00	5.50E-02
Methylphenol[2-]	2.59E+04	3.07E+02	1.95E+00	1.70E-01
Methylphenol[4-]	2.15E+04	3.00E+02	1.94E+00	1.70E-01

Table I-3.2-2 (continued)

COPC	Water Solubility[a] (mg/L)	Organic Carbon Coefficient K_{oc}[a] (L/kg)	Log Octanol-Water Partition Coefficient K_{ow}[a]	Vapor Pressure[a] (mm Hg at 25°C)
Naphthalene	3.10E+01	1.84E+03	3.30E+00	8.50E-02
Pentachlorophenol	8.00E+01[b]	3.88E+02	5.01E+00[b]	1.10E-04
Phenanthrene	1.15E+00[b]	2.08E+04	4.46E+00[b]	1.12E-04[b]
Phenol	8.28E+04	1.87E+02	1.46E+00	3.50E-01
Pyrene	1.35E-01[b]	6.94E+04	4.88E+00[b]	4.50E-06[b]
RDX	1.95E+02[c]	8.70E-01	5.97E+01[c]	4.10E-09
TATB	na	na	na	na
TCDD[2,3,7,8-]	2.00E-04	1.46E+05	na	na
Toluene	5.26E+02	2.68E+02	2.73E+00	2.84E+01
TPH-DRO	na	na	na	na
Trichlorofluoromethane	1.10E+03	4.39E+01	2.53E+00	8.03E+02
Trimethylbenzene[1,2,4-]	5.70E+01	7.18E+02	3.63E+00	2.10E+00
Trimethylbenzene[1,3,5-]	4.82E+01	6.02E+02	3.42E+00	2.10E+00
Trinitrobenzene[1,3,5-]	1.09E+03	1.18E+00	2.78E+02	6.40E-06
Trinitrotoluene[2,4,6-]	1.85E+03	1.60E+00	1.38E+02	8.02E-06
Tris(o-cresyl)phosphate	3.60E-01	4.71E+04	5.11E+00	6.00E-07
Xylenes	1.78E+02	3.83E+02	3.12E+00	7.99E+00

[a] Information from http://rais.ornl.gov/cgi-bin/tools/TOX_search, unless noted otherwise.

[b] Information from http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm.

[c] Information from NMED (2015, 600575).

[d] na = Not available.

Table I-3.2-3
Physical and Chemical Properties of Radionuclide
COPCs for the Potrillo and Fence Canyons Aggregate Area

COPC	Soil-Water Partition Coefficient, K_d[a] (cm^3/g)	Water Solubility[b] (g/L)
Cesium-137	1000	Insoluble
Uranium-234	0.4	Insoluble
Uranium-235/236	0.4	Insoluble
Uranium-238	0.4	Insoluble

[a] Superfund Chemical Data Matrix (EPA 1996, 064708).

[b] Information from http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm.

Table I-3.3-1
EPCs at SWMU 15-002, Former North Burn Pit, for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	5	5	10300	12700	n/a*	12700	Maximum detected concentration
Barium	5	5	116	271	n/a	271	Maximum detected concentration
Copper	5	5	7.7	9.1	n/a	9.1	Maximum detected concentration
Lead	5	5	13.3	21.9	n/a	21.9	Maximum detected concentration
Manganese	5	5	370	2400	n/a	2400	Maximum detected concentration
Mercury	5	3	0.0708 (U)	1.29	n/a	1.29	Maximum detected concentration
Selenium	5	5	0.9	1.5	n/a	1.5	Maximum detected concentration
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	5	1	0.14	0.36 (UJ)	n/a	0.14	Maximum detected concentration
Di-n-butylphthalate	5	2	0.037	0.69	n/a	0.69	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	5	5	1.78E-08	1.26E-07	n/a	1.26E-07	Maximum detected concentration
TPH-DRO	5	1	8.1	27 (UJ)	n/a	8.1	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-2
EPCs at SWMU 15-002, Former North Burn Pit, for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Barium	10	10	116	271	Gamma	187	95% Adjusted Gamma KM
Copper	10	10	3.6	9.1	Normal	8.17	95% Student's-t
Lead	10	10	13.3	50.1	Lognormal	29.9	95% Student's-t
Manganese	10	10	177	2400	Lognormal	1104	95% Chebyshev (MVUE)
Mercury	10	8	0.0708 (U)	1.29	Approx. normal	0.63	95% KM (Percentile Bootstrap)
Selenium	20	20	0.9	2	Normal	1.51	95% Student's-t
Organic Chemicals (mg/kg)							
Acetone	10	1	0.0095 (U)	0.083	n/a*	0.083	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	10	3	0.077	0.36 (UJ)	n/a	0.14	Maximum detected concentration
Diethylphthalate	10	1	0.18	0.36 (UJ)	n/a	0.18	Maximum detected concentration
Di-n-butylphthalate	10	2	0.037	0.69	n/a	0.69	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	10	10	5.52E-10	1.55E-07	Normal	8.85E-08	95% Student's-t

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-3
EPCs at SWMU 15-002, Former North Burn Pit, for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	15	15	2630	15200	Normal	10887	95% Student's-t
Barium	15	15	29.1	271	Normal	148	95% Student's-t
Copper	15	15	1.9	9.1	Nonparametric	8.69	95% Chebyshev (Mean, Sd)
Lead	15	15	11	50.1	Gamma	25.8	95% Adjusted Gamma KM
Manganese	15	15	177	2400	Lognormal	1094	95% Chebyshev (Mean, Sd)
Mercury	15	12	0.0581 (U)	1.29	Nonparametric	0.52	95% KM (BCA)
Perchlorate	15	1	0.0032	0.022 (U)	n/a*	0.0032	Maximum detected concentration
Selenium	15	15	0.9	2.2	Normal	1.69	95% Student's-t
Organic Chemicals (mg/kg)							
Acetone	15	1	0.0095 (U)	0.083	n/a	0.083	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	15	7	0.077	0.36 (UJ)	Normal	0.15	95% KM (Percentile Bootstrap)
Diethylphthalate	15	1	0.18	0.36 (UJ)	n/a	0.18	Maximum detected concentration
Di-n-butylphthalate	15	2	0.037	0.69	n/a	0.69	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	15	14	4.44E-10	1.55E-07	Gamma	8.01E-08	95% Adjusted gamma KM
TPH-DRO	15	1	8.1	28 (UJ)	n/a	8.1	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable

Table I-3.3-4
EPCs at SWMU 15-002, Former South Burn Pit, for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	5	5	8020	14300	n/a*	14300	Maximum detected concentration
Antimony	5	1	0.2 (U)	12.5	n/a	12.5	Maximum detected concentration
Arsenic	5	5	2	3.6	n/a	3.6	Maximum detected concentration
Barium	5	5	182	18200	n/a	18200	Maximum detected concentration
Beryllium	5	5	0.55	1.1	n/a	1.1	Maximum detected concentration
Chromium (Total)	5	5	8.5	12.7	n/a	12.7	Maximum detected concentration
Copper	5	5	7.7	146	n/a	146	Maximum detected concentration
Cyanide (Total)	5	1	0.53 (U)	1.9	n/a	1.9	Maximum detected concentration
Lead	5	5	12	170	n/a	170	Maximum detected concentration
Mercury	5	5	0.0511	1120	n/a	1120	Maximum detected concentration
Nickel	5	5	8.1	11.8	n/a	11.8	Maximum detected concentration
Perchlorate	5	1	0.0022	0.022 (U)	n/a	0.0022	Maximum detected concentration
Selenium	5	5	1.1	1.6	n/a	1.6	Maximum detected concentration
Zinc	5	5	30.2	112	n/a	112	Maximum detected concentration

Table I-3.3-4 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Amino-2,6-dinitrotoluene[4-]	5	1	0.053 (U)	0.15	n/a	0.15	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	5	1	0.053 (U)	0.12	n/a	0.12	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	5	1	0.13	0.37 (UJ)	n/a	0.13	Maximum detected concentration
Dinitroaniline[3,5-]	5	1	0.037	0.056 (U)	n/a	0.037	Maximum detected concentration
Dinitrotoluene[2,4-]	10	1	0.012	0.37 (UJ)	n/a	0.012	Maximum detected concentration
HMX	5	1	0.11 (U)	0.44	n/a	0.44	Maximum detected concentration
RDX	5	1	0.11 (UJ)	2.6	n/a	2.6	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	5	5	6.5E-09	2.15E-06	n/a	2.15E-06	Maximum detected concentration
TPH-DRO	5	2	11	28 (U)	n/a	18	Maximum detected concentration
Trinitrobenzene[1,3,5-]	5	1	0.0097	0.056 (U)	n/a	0.0097	Maximum detected concentration
Trinitrotoluene[2,4,6-]	5	1	0.053 (U)	0.11	n/a	0.11	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-5
EPCs at SWMU 15-002, Former South Burn Pit, for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	10	1	0.2 (U)	12.5	n/a*	12.5	Maximum detected concentration
Arsenic	10	10	1.5	6	Normal	3.84	95% Student's-t
Barium	10	10	37.9	18200	Nonparametric	10283	95% Chebyshev (Mean, Sd)
Beryllium	10	10	0.54	1.1	Normal	1.03	95% Student's-t
Chromium (Total)	10	10	7.3	12.7	Normal	11.7	95% Student's-t
Copper	10	10	2.6	146	Approx. lognormal	81.9	95% Chebyshev (Mean, Sd)
Cyanide (Total)	10	2	0.51 (U)	1.9	n/a	1.9	Maximum detected concentration
Lead	10	10	5.3	170	Lognormal	61.6	95% Chebyshev (MVUE)
Mercury	10	9	0.0368 (U)	1120	Nonparametric	604	95% KM Chebyshev
Nickel	10	10	6.9	11.8	Normal	9.93	95% Student's-t
Selenium	10	10	1.1	2	Normal	1.7	95% Student's-t
Zinc	10	10	30.2	112	Nonparametric	57.3	95% Student's-t
Organic Chemicals (mg/kg)							
Amino-2,6-dinitrotoluene[4-]	10	2	0.0068	0.15	n/a	0.15	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	10	1	0.051 (U)	0.12	n/a	0.12	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	10	1	0.13	0.41 (UJ)	n/a	0.13	Maximum detected concentration
Dinitrotoluene[2,4-]	20	1	0.012	0.41 (UJ)	n/a	0.012	Maximum detected concentration
HMX	10	2	0.1 (U)	0.6	n/a	0.6	Maximum detected concentration
RDX	10	2	0.1 (U)	2.6	n/a	2.6	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	10	6	6.5E-09	2.15E-06	Nonparametric	1.20E-06	95% KM Chebyshev
Trinitrobenzene[1,3,5-]	10	1	0.0097	0.062 (U)	n/a	0.0097	Maximum detected concentration
Trinitrotoluene[2,4,6-]	10	1	0.051 (U)	0.11	n/a	0.11	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-6
EPCs at SWMU 15-002, Former South Burn Pit, for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	15	15	1830	15300	Nonparametric	14954	95% Chebyshev (Mean, Sd)
Antimony	15	1	0.11 (U)	12.5	n/a*	12.5	Maximum detected concentration
Arsenic	15	15	1.1	6	normal	3.4	95% Student's-t
Barium	15	15	28.1	18200	Approx. lognormal	6981	95% Chebyshev (Mean, Sd)
Beryllium	15	15	0.48	2.2	Lognormal	1.13	95% Student's-t
Chromium (Total)	15	15	6.2	32.6	Nonparametric	14.6	95% Student's-t
Copper	15	15	2.3	795	Nonparametric	298	95% Chebyshev (Mean, Sd)
Cyanide (Total)	15	3	0.16	1.9	n/a	1.9	Maximum detected concentration
Lead	15	15	4.4	170	Lognormal	44.6	95% Chebyshev (MVUE)
Mercury	15	14	0.0368 (U)	1120	Nonparametric	402	95% KM (Chebyshev)
Nickel	15	15	4.9	21	Gamma	11.3	95% Adjusted Gamma KM
Perchlorate	14	2	0.0022	0.027 (U)	n/a	0.0029	Maximum detected concentration
Selenium	15	15	1.1	2.9	Normal	2.03	95% Student's-t
Zinc	15	15	26.1	112	Approx. lognormal	51.3	95% Student's-t

Table I-3.3-6 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Amino-2,6-dinitrotoluene[4-]	15	3	0.0068	0.15	n/a	0.15	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	15	2	0.013	0.12	n/a	0.12	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	15	2	0.068	0.45 (UJ)	n/a	0.13	Maximum detected concentration
Dinitroaniline[3,5-]	15	3	0.0043	0.068 (U)	n/a	0.037	Maximum detected concentration
Dinitrotoluene[2,4-]	30	1	0.012	0.45 (UJ)	n/a	0.012	Maximum detected concentration
HMX	15	3	0.1 (U)	0.6	n/a	0.6	Maximum detected concentration
RDX	15	3	0.1 (U)	2.6	n/a	2.6	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	15	7	6.5E-09	2.15E-06	Lognormal	8.15E-07	95% KM (Chebyshev)
TPH-DRO	15	3	4.3	34 (U)	n/a	4.3	Maximum detected concentration
Trinitrobenzene[1,3,5-]	15	1	0.0097	0.068 (U)	n/a	0.0097	Maximum detected concentration
Trinitrotoluene[2,4,6-]	15	1	0.051 (U)	0.11	n/a	0.11	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-7
EPCs at SWMUs 15-004(b) and 15-004(c) for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	24	24	8010	16500	Normal	12578	95% Student's-t
Arsenic	24	24	2.1	5	Normal	3.61	95% Student's-t
Barium	24	24	103	1000	Approx. lognormal	512	95% Chebyshev (Mean, Sd)
Beryllium	24	24	0.67	1.2	Normal	1.06	95% Student's-t
Cadmium	24	23	0.053	87	Nonparametric	20.1	95% KM (Chebyshev)
Chromium (Total)	24	24	7.5	14.6	Gamma	11.1	95% Adjusted Gamma KM
Cobalt	24	24	4.8	14.8	Gamma	8.27	95% Adjusted Gamma KM
Copper	24	24	4.8	700	Nonparametric	171	95% Chebyshev (Mean, Sd)
Lead	24	24	10.4	1520	Nonparametric	439	95% Chebyshev (Mean, Sd)
Manganese	24	24	145	699	Normal	498	95% Student's-t
Mercury	23	21	0.0141	0.575	Nonparametric	0.19	95% KM (Chebyshev)
Nickel	24	24	5.9	12.6	Normal	9.69	95% Student's-t
Selenium	24	21	1.1 (U)	1.9	Approx. normal	1.5	95% KM (Percentile Bootstrap)
Thallium	24	3	0.18 (U)	1.7	n/a*	1.7	Maximum detected concentration

Table I-3.3-7 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Amino-2,6-dinitrotoluene[4-]	24	1	0.0074	0.086 (U)	n/a	0.0074	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	24	1	0.0076	0.084 (U)	n/a	0.0076	Maximum detected concentration
Benzyl alcohol	21	2	0.061	0.41 (U)	n/a	0.063	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	21	4	0.064	0.47	n/a	0.47	Maximum detected concentration
Di-n-butylphthalate	21	3	0.18	0.99	n/a	0.99	Maximum detected concentration
Isopropyltoluene[4-]	21	1	0.00058	0.0061 (U)	n/a	0.00058	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	2	2	3.03E-10	8.16E-10	n/a	8.16E-10	Maximum detected concentration
Trimethylbenzene[1,2,4-]	21	3	0.00081	0.0058 (U)	n/a	0.001	Maximum detected concentration
Trimethylbenzene[1,3,5-]	21	2	0.00045	0.0061 (U)	n/a	0.00061	Maximum detected concentration
Trinitrotoluene[2,4,6-]	21	1	0.0072	0.061 (U)	n/a	0.0072	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	24	24	0.63	2.98	Nonparametric	1.4	95% Student's-t
Uranium-238	24	24	0.762	3.76	Nonparametric	1.5	95% Student's-t

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-8
EPCs at SWMUs 15-004(b) and 15-004(c) for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Arsenic	47	46	1.2 (U)	6	Normal	3.71	95% KM (Percentile Bootstrap)
Barium	47	47	28.1	1000	Lognormal	404	95% Chebyshev (Mean, Sd)
Beryllium	47	47	0.28	1.9	Nonparametric	1.07	95% Student's-t
Cadmium	47	45	0.016	87	Nonparametric	10.5	95% KM (Chebyshev)
Chromium (Total)	47	47	6.9	30.1	Nonparametric	12.5	95% Student's-t
Cobalt	47	47	0.96	14.8	Nonparametric	8.12	95% Chebyshev (Mean, Sd)
Copper	47	47	1.7	700	Nonparametric	97.1	95% Chebyshev (Mean, Sd)
Lead	47	47	1.4	1520	Nonparametric	251	95% Chebyshev (Mean, Sd)
Manganese	47	47	64.7	699	Normal	415	95% Student's-t
Mercury	46	37	0.0141	0.575	Nonparametric	0.11	95% KM (Chebyshev)
Nickel	47	47	4.6	18.9	Lognormal	10.2	95% Student's-t
Selenium	47	47	1.1 (U)	2.8	Nonparametric	1.72	95% KM (Chebyshev)
Thallium	47	6	0.12 (U)	5	Normal	0.543	95% KM (t)

Table I-3.3-8 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Acetone	42	1	0.0093 (U)	0.025 (U)	n/a*	0.012	Maximum detected concentration
Amino-2,6-dinitrotoluene[4-]	46	1	0.0074	0.41 (U)	n/a	0.0074	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	45	1	0.0076	0.084 (U)	n/a	0.0076	Maximum detected concentration
Benzyl alcohol	42	5	0.045	0.41 (U)	Normal	0.079	95% KM (t)
Bis(2-ethylhexyl)phthalate	42	9	0.05	0.47	Gamma	0.13	95% Adjusted Gamma KM
Di-n-butylphthalate	42	4	0.15	0.99	n/a	0.99	Maximum detected concentration
HMX	47	1	0.086	1.9 (U)	n/a	0.086	Maximum detected concentration
RDX	47	1	0.1 (U)	0.85 (U)	n/a	0.31	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	2	2	3.03E-10	8.16E-10	n/a	8.16E-10	Maximum detected concentration
Trinitrotoluene[2,4,6-]	46	2	0.0072	0.22 (U)	n/a	0.0098	Maximum detected concentration
Xylene (Total)	42	1	0.00095	0.0061 (U)	n/a	0.00095	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	47	47	0.223	2.98	Approx. normal	1.28	95% Chebyshev (Mean, Sd)
Uranium-238	47	47	0.23	3.76	Nonparametric	1.38	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-9
EPCs at SWMUs 15-004(b) and 15-004(c) for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	47	47	1270	19300	Normal	13256	95% Student's-t
Arsenic	47	46	1.2 (U)	6	Normal	3.71	95% KM (Percentile Bootstrap)
Barium	47	47	28.1	1000	Lognormal	404	95% Chebyshev (Mean, Sd)
Beryllium	47	47	0.28	1.9	Nonparametric	1.07	95% Student's-t
Cadmium	47	45	0.016	87	Nonparametric	10.5	95% KM (Chebyshev)
Chromium (Total)	47	47	6.9	30.1	Nonparametric	12.5	95% Student's-t
Cobalt	47	47	0.96	14.8	Nonparametric	8.12	95% Chebyshev (Mean, Sd)
Copper	47	47	1.7	700	Nonparametric	97.1	95% Chebyshev (Mean, Sd)
Lead	47	47	1.4	1520	Nonparametric	251	95% Chebyshev (Mean, Sd)
Manganese	47	47	64.7	699	Normal	415	95% Student's-t
Mercury	46	37	0.0141	0575	Nonparametric	0.11	95% KM (Chebyshev)
Nickel	47	47	4.6	18.9	Lognormal	10.2	95% Student's-t
Selenium	47	42	1.1 (U)	2.8	Nonparametric	1.72	95% KM (Chebyshev)
Thallium	47	6	0.12 (U)	5	Normal	0.54	95% KM (t)

Table I-3.3-9 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Acetone	42	1	0.0093 (U)	0.025 (U)	n/a*	0.012	Maximum detected concentration
Amino-2,6-dinitrotoluene[4-]	46	1	0.0074	0.41 (U)	n/a	0.0074	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	45	1	0.0076	0.084 (U)	n/a	0.0076	Maximum detected concentration
Benzyl alcohol	42	5	0.045	0.41 (U)	Nonparametric	0.079	95% KM (t)
Bis(2-ethylhexyl)phthalate	42	9	0.05	0.47	Approx. gamma	0.13	95% Adjusted Gamma KM
Di-n-butylphthalate	42	4	0.15	0.99	Normal	0.99	Maximum detected concentration
HMX	47	1	0.086	1.9 (U)	n/a	0.086	Maximum detected concentration
Isopropyltoluene[4-]	42	1	0.00058	0.0061 (U)	n/a	0.00058	Maximum detected concentration
RDX	47	1	0.1 (U)	0.85 (U)	n/a	0.31	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	2	2	3.03E-10	8.16E-10	n/a	8.16E-10	Maximum detected concentration
Trimethylbenzene[1,2,4-]	42	5	0.00081	0.006 (U)	Normal	0.0011	95% KM (t)
Trimethylbenzene[1,3,5-]	42	2	0.00045	0.0061 (U)	n/a	0.00061	Maximum detected concentration
Trinitrotoluene[2,4,6-]	46	2	0.0072	0.22 (U)	n/a	0.0098	Maximum detected concentration
Xylene (Total)	42	1	0.00095	0.0061 (U)	n/a	0.00095	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	47	47	0.223	2.98	Approx. lognormal	1.28	95% Chebyshev (Mean, Sd)
Uranium-238	47	47	0.23	3.76	Nonparametric	1.38	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-10
EPCs at SWMU 15-004(f) for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	53	53	2080	19400	Normal	11835	95% Student's-t
Antimony	53	12	0.076 (U)	17.5	Gamma	2.17	95% Approximate Gamma
Arsenic	53	52	1	5.4	Nonparametric	3.88	95% KM (Chebyshev)
Barium	53	52	25.1	755	Approx.normal	243	95% KM (Percentile Bootstrap)
Beryllium	53	45	0.23	42.1	Nonparametric	6.7	95% KM (Chebyshev)
Cadmium	53	45	0.025	12.9	Lognormal	1.8	95% KM (Chebyshev)
Chromium (Total)	53	53	2.3	31.2	Nonparametric	12.5	95% Chebyshev (Mean, Sd)
Cobalt	53	42	1.1	10.8	Nonparametric	5.92	95% KM (BCA)
Copper	53	53	2.6	8250	Nonparametric	1329	95% Chebyshev (Mean, Sd)
Iron	53	52	5790	22200	Normal	13835	95% KM (Percentile Bootstrap)
Lead	53	53	1.7	375	Nonparametric	63.1	95% Chebyshev (Mean, Sd)
Manganese	53	53	155	824	Normal	425	95% Student's-t
Mercury	53	35	0.0135	2.3	Nonparametric	0.3	95% KM (Chebyshev)
Nickel	53	48	2	27.5	Nonparametric	11.5	95% KM (Chebyshev)
Selenium	53	42	0.53 (U)	1.9	Approx. normal	1.31	95% KM (Percentile Bootstrap)
Silver	53	43	0.018	25.5	Nonparametric	3.11	95% KM (Chebyshev)
Uranium	11	11	12.1	2763	Nonparametric	1375	95% Chebyshev (Mean, Sd)
Zinc	53	53	23.2	716	Nonparametric	131	95% Chebyshev (Mean, Sd)

Table I-3.3-10 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Amino-4,6-dinitrotoluene[2-]	40	1	0.0072	0.058 (U)	n/a*	0.0072	Maximum detected concentration
Dinitroaniline[3,5-]	43	1	0.0048	0.058 (U)	n/a	0.0048	Maximum detected concentration
Dinitrotoluene[2,4-]	39	2	0.0038	0.058 (U)	n/a	0.004	Maximum detected concentration
Dinitrotoluene[2,6-]	39	1	0.0064	0.058 (U)	n/a	0.0064	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	3	3	1.4E-08	1.31E-07	n/a	1.31E-07	Maximum detected concentration
Tris(o-cresyl)phosphate	42	1	0.051 (U)	0.064	n/a	0.064	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-137	11	10	0.019 (U)	0.66	Nonparametric	0.4	95% KM (Percentile bootstrap)
Uranium-234	42	42	0.421	523	Approx. gamma	85.8	95% Adjusted Gamma KM
Uranium-235/236	42	39	0.0112 (U)	73	Approx. gamma	10.2	95% Adjusted Gamma KM
Uranium-238	42	42	0.557	3140	Approx. lognormal	477	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-11
EPCs at SWMU 15-004(f) for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	122	16	0.076 (U)	17.5	Nonparametric	0.81	95% KM (t)
Arsenic	122	121	0.65	5.4	Nonparametric	2.88	95% KM (BCA)
Barium	122	121	13.1	755	Nonparametric	180	95% KM (BCA)
Beryllium	122	113	0.22	42.1	Nonparametric	2.5	95% KM (BCA)
Cadmium	122	122	0.014	12.9	Nonparametric	1.02	95% Chebyshev (Mean, Sd)
Chromium (Total)	122	122	1.5	35.5	Nonparametric	12.3	95% Chebyshev (Mean, Sd)
Cobalt	122	104	0.53	11.1 (U)	Nonparametric	4.19	95% KM (BCA)
Copper	122	122	1.5	8250	Nonparametric	598	95% Chebyshev (Mean, Sd)
Lead	122	122	1.1	375	Nonparametric	34.2	95% Chebyshev (Mean, Sd)
Manganese	122	122	114	824	Normal	345	95% Student's-t
Mercury	122	63	0.0124	2.3	Nonparametric	0.2	95% KM (Chebyshev)
Nickel	122	117	1.8	27.5	Nonparametric	8.94	95% KM (percent bootstrap)
Selenium	122	104	0.53 (U)	3.6	Gamma	1.45	95% KM (BCA)
Silver	122	103	0.012	25.5	Nonparametric	1.61	95% KM (Chebyshev)
Uranium	18	18	3.17	2763	Nonparametric	849	95% Chebyshev (Mean, Sd)
Zinc	122	122	14.2	716	nonparametric	76.4	95% Chebyshev (Mean, Sd)

Table I-3.3-11 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Amino-4,6-dinitrotoluene[2-]	93	1	0.0072	0.061 (U)	n/a*	0.0072	Maximum detected concentration
Dinitrotoluene[2,4-]	92	2	0.0038	0.061 (U)	n/a	0.004	Maximum detected concentration
Dinitrotoluene[2,6-]	92	1	0.0064	0.061 (U)	n/a	0.0064	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	4	4	1.43E-09	1.31E-07	n/a	1.31E-07	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-137	18	12	-0.011 (U)	0.66	Nonparametric	0.28	95% KM (Percentile Bootstrap)
Uranium-234	104	104	0.131	523	Nonparametric	59.5	95% Chebyshev (Mean, Sd)
Uranium-235/236	104	54	0.0052 (U)	73	Nonparametric	5.7	95% KM (Chebyshev)
Uranium-238	104	104	0.163	3140	Nonparametric	235	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-12
EPCs at SWMU 15-004(f) for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	153	153	839	30700	Nonparametric	11941	95% Chebyshev (Mean, Sd)
Antimony	153	25	0.076 (U)	17.5	Nonparametric	0.7	95% KM (BCA)
Arsenic	153	152	0.65	5.4	Nonparametric	3.05	95% KM (BCA)
Barium	153	152	13.1	857	Nonparametric	204	95% KM (BCA)
Beryllium	153	144	0.22	42.1	Nonparametric	2.3	95% KM (BCA)
Cadmium	153	153	0.014	44.9	Nonparametric	2.1	95% Chebyshev (Mean, Sd)
Chromium (Total)	153	153	1.5	35.5	Nonparametric	12.5	95% Chebyshev (Mean, Sd)
Cobalt	153	135	0.53	11.1 (U)	Nonparametric	4.6	95% KM (BCA)
Copper	153	153	1.5	108000	Nonparametric	4014	95% Chebyshev (Mean, Sd)
Iron	153	152	5790	22200	Nonparametric	12756	95% KM (BCA)
Lead	153	153	1.1	375	Nonparametric	33.6	95% Chebyshev (Mean, Sd)
Manganese	153	153	114	824	Gamma	361	95% Approximate Gamma
Mercury	153	78	0.0124	2.3	Nonparametric	0.17	95% KM (Chebyshev)
Nickel	153	148	1.8	27.5	Nonparametric	9.34	95% KM (BCA)
Selenium	153	135	0.53 (U)	4.2	Nonparametric	1.55	95% KM (BCA)
Silver	153	134	0.012	25.5	Nonparametric	1.39	95% KM (Chebyshev)
Uranium	18	18	3.17	2763	Nonparametric	849	95% Chebyshev (Mean, Sd)
Zinc	153	153	14.2	716	nonparametric	73.8	95% Chebyshev (Mean, Sd)

Table I-3.3-12 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Amino-4,6-dinitrotoluene[2-]	120	1	0.0072	0.061 (U)	n/a*	0.0072	Maximum detected concentration
Dinitroaniline[3,5-]	136	1	0.0048	0.061 (U)	n/a	0.0048	Maximum detected concentration
Dinitrotoluene[2,4-]	115	2	0.0038	0.061 (U)	n/a	0.004	Maximum detected concentration
Dinitrotoluene[2,6-]	115	1	0.0064	0.061 (U)	n/a	0.0064	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	4	4	1.43E-09	1.31E-07	n/a	1.31E-07	Maximum detected concentration
Tris(o-cresyl)phosphate	126	2	0.025	0.064	n/a	0.064	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-137	18	12	-0.011 (U)	0.66	Nonparametric	0.28	95% KM (Percentile Bootstrap)
Uranium-234	135	135	0.131	523	Nonparametric	58.4	95% Chebyshev (Mean, Sd)
Uranium-235/236	135	84	0.0052 (U)	73	Nonparametric	4.9	95% KM (Chebyshev)
Uranium-238	135	135	0.163	3140	Nonparametric	191	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-13
EPCs at 15-004(f), Excluding Firing Point E for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	35	35	2080	19400	Normal	11219	95% Student's-t
Antimony	35	2	0.076 (U)	3.9 (U)	n/a*	0.55	Maximum detected concentration
Arsenic	35	33	1	5.4	Nonparametric	3.2	95% KM (Percentile Bootstrap)
Barium	35	33	25.1	307	Nonparametric	166	95% KM (Percentile Bootstrap)
Beryllium	35	26	0.23	1.9	Nonparametric	0.98	95% KM (t)
Cadmium	35	35	0.025	3.2	Nonparametric	0.73	95% Chebyshev (Mean, Sd)
Chromium (Total)	35	35	2.3	14.3	Nonparametric	10.3	95% Chebyshev (Mean, Sd)
Cobalt	35	24	1.1	10.8	Nonparametric	5	95% KM (Percentile Bootstrap)
Copper	35	35	2.6	587	Nonparametric	113	95% Chebyshev (Mean, Sd)
Iron	35	33	5790	22200	Nonparametric	12947	95% KM (Percentile Bootstrap)
Lead	35	35	1.7	91.2	Nonparametric	28.7	95% Chebyshev (Mean, Sd)
Manganese	35	35	165	824	Gamma	413	95% Adjusted Gamma KM
Mercury	35	24	0.0135	2.3	Normal	0.45	95% Student’s-t
Nickel	35	29	2	12.5	Nonparametric	7.6	95% KM (Percentile Bootstrap)
Selenium	35	24	0.53 (U)	1.8	Nonparametric	1.1	95% KM (Percentile Bootstrap)
Silver	35	25	0.018	4.1	Nonparametric	0.69	95% KM (Chebyshev)
Uranium	10	10	12.1	190	Gamma	86.7	95% Adjusted Gamma KM
Zinc	34	34	23.2	70.4	gamma	36.6	95% Adjusted Gamma KM

Table I-3.3-13 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Amino-4,6-dinitrotoluene[2-]	24	1	0.0072	0.058 (U)	n/a	0.0072	Maximum detected concentration
Dinitroaniline[3,5-]	25	1	0.0048	0.058 (U)	n/a	0.0048	Maximum detected concentration
Dinitrotoluene[2,4-]	24	1	0.004	0.058 (U)	n/a	0.004	Maximum detected concentration
Dinitrotoluene[2,6-]	24	1	0.0064	0.058 (U)	n/a	0.0064	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	2	2	1.4E-08	1.61E-08	n/a	1.61E-08	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-137	11	10	-0.008 (U)	0.66	Normal	0.402	95% KM (percentile bootstrap)
Uranium-234	24	24	0.421	110	Nonparametric	44.7	95% Chebyshev (Mean, Sd)
Uranium-235/236	24	21	0.0112 (U)	6.64	Nonparametric	2.72	95% KM (Chebyshev)
Uranium-238	24	24	0.557	184	Nonparametric	76.6	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-14
EPCs at 15-004(f), Excluding Firing Point E for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	101	5	0.076 (U)	4.3 (U)	Normal	0.118	95% KM (t)
Arsenic	101	100	0.65	5.4	Nonparametric	2.65	95% KM (BCA)
Barium	101	100	13.1	650	Nonparametric	140	95% KM (BCA)
Beryllium	101	92	0.22	1.9	Nonparametric	0.89	95% KM (BCA)
Cadmium	101	101	0.014	3.2	Nonparametric	0.303	95% KM (Chebyshev)
Chromium (Total)	101	101	1.5	35.5	Nonparametric	11.6	95% Chebyshev (Mean, Sd)
Cobalt	101	84	0.53	11.1 (U)	Nonparametric	3.46	95% KM (BCA)
Copper	101	101	1.5	587	Nonparametric	43.4	95% Chebyshev (Mean, Sd)
Lead	101	101	1.1	91.2	Gamma	12.3	95% Approximate Gamma
Manganese	101	101	114	824	Normal	322	95% Student's-t
Mercury	101	50	0.0124	2.3	Nonparametric	0.166	95% KM (t)
Nickel	101	96	1.8	18.8	Normal	7.94	95% KM (t)
Selenium	101	84	0.53 (U)	3.6	Lognormal	1.43	95% KM (BCA)
Silver	101	83	0.012	4.1	Nonparametric	0.166	95% KM (BCA)
Uranium	17	17	3.17	190	Gamma	59.7	95% Adjusted Gamma KM
Zinc	101	101	14.2	70.4	normal	33.4	95% Student's-t

Table I-3.3-14 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Amino-4,6-dinitrotoluene[2-]	75	1	0.0072	0.061 (U)	n/a*	0.0072	Maximum detected concentration
Dinitrotoluene[2,4-]	75	1	0.004	0.061 (U)	n/a	0.004	Maximum detected concentration
Dinitrotoluene[2,6-]	75	1	0.0064	0.061 (U)	n/a	0.0064	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	3	3	1.43E-09	1.61E-08	n/a	1.61E-08	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-137	17	12	-0.011 (U)	0.66	Normal	0.3	95% KM (Percentile Bootstrap)
Uranium-234	84	84	0.131	110	Nonparametric	15.6	95% Chebyshev (Mean, Sd)
Uranium-235/236	84	34	0.0052 (U)	6.64	Lognormal	0.61	95% KM (BCA)
Uranium-238	84	84	0.163	184	Nonparametric	25.9	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-15
EPCs at 15-004(f), Excluding Firing Point E for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	101	101	839	30700	Nonparametric	11034	95% Chebyshev (Mean, Sd)
Antimony	101	5	0.076 (U)	4.3 (U)	Normal	0.12	95% KM (t)
Arsenic	101	100	0.65	5.4	Nonparametric	2.65	95% KM (BCA)
Barium	101	100	13.1	650	Nonparametric	140	95% KM (BCA)
Beryllium	101	92	0.22	1.9	Nonparametric	0.89	95% KM (BCA)
Cadmium	101	101	0.014	3.2	Nonparametric	0.303	95% KM (Chebyshev)
Chromium (Total)	101	101	1.5	35.5	Nonparametric	11.6	95% Chebyshev (Mean, Sd)
Cobalt	101	84	0.53	11.1 (U)	Nonparametric	3.46	95% KM (BCA)
Copper	101	101	1.5	587	Nonparametric	43.4	95% Chebyshev (Mean, Sd)
Iron	101	100	5790	22200	Nonparametric	11741	95% KM (BCA)
Lead	101	101	1.1	91.2	Gamma	12.3	95% Approximate Gamma
Manganese	101	101	114	824	Normal	322	95% Student's-t
Mercury	101	50	0.0124	2.3	Nonparametric	0.166	95% KM (BCA)
Nickel	101	96	1.8	18.8	Approx. normal	7.94	95% KM (t)
Selenium	101	84	0.53 (U)	3.6	Lognormal	1.43	95% KM (BCA)
Silver	101	83	0.012	4.1	Nonparametric	0.166	95% KM (BCA)
Uranium	17	17	3.17	190	Gamma	59.7	95% Adjusted Gamma KM
Zinc	101	101	14.2	70.4	normal	33.4	95% Student's-t

Table I-3.3-15 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Amino-4,6-dinitrotoluene[2-]	75	1	0.0072	0.061 (U)	n/a*	0.0072	Maximum detected concentration
Dinitroaniline[3,5-]	85	1	0.0048	0.061 (U)	n/a	0.0048	Maximum detected concentration
Dinitrotoluene[2,4-]	75	1	0.004	0.061 (U)	n/a	0.004	Maximum detected concentration
Dinitrotoluene[2,6-]	75	1	0.0064	0.061 (U)	n/a	0.0064	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	3	3	1.43E-09	1.61E-08	n/a	1.61E-08	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-137	17	12	-0.011 (U)	0.66	Normal	0.3	95% KM (Percentile Bootstrap)
Uranium-234	84	84	0.131	110	Nonparametric	15.6	95% Chebyshev (Mean, Sd)
Uranium-235/236	84	34	0.0052 (U)	6.64	Lognormal	0.61	95% KM (BCA)
Uranium-238	84	84	0.163	184	Nonparametric	25.9	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-16
EPCs at 15-004(f), Firing Point E Only for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	19	19	4010	18300	Normal	14222	95% Student's-t
Antimony	19	10	0.12 (U)	17.5	Nonparametric	4.28	95% KM (BCA)
Arsenic	19	19	1.7	4.9	Nonparametric	4.15	95% Modified-t
Barium	19	19	153	755	Normal	395	95% Student's-t
Beryllium	19	19	1	42.1	Nonparametric	16.5	95% Chebyshev (Mean, Sd)
Cadmium	19	19	0.12	12.9	Lognormal	4.28	95% KM (Chebyshev)
Chromium (Total)	19	19	9.2	31.2	Nonparametric	15.2	95% Student's-t
Cobalt	19	18	3.8	9.6	Normal	7.64	95% KM (Percentile Bootstrap)
Copper	19	19	24	8250	Nonparametric	3553	95% Chebyshev (Mean, Sd)
Iron	19	19	7410	18400	Normal	16272	95% Student’s-t
Lead	19	19	14.2	375	Nonparametric	139	95% Chebyshev (Mean, Sd)
Manganese	19	19	155	594	Normal	476	95% Student's-t
Mercury	19	11	0.0151	0.11 (U)	Normal	0.034	95% KM (Percentile Bootstrap)
Nickel	19	19	8.9	27.5	Normal	14.3	95% Student's-t
Selenium	19	18	0.55	1.9	Approx. normal	1.68	95% KM (Percentile Bootstrap)
Silver	19	18	0.06	25.5	Lognormal	8.13	95% KM (Chebyshev)
Uranium	1	1	2763	2763	n/a*	2763	Maximum detected concentration
Zinc	19	19	27.7	716	nonparametric	295	95% Chebyshev (Mean, Sd)

Table I-3.3-16 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Dinitrotoluene[2,4-]	15	1	0.0038	0.056 (U)	n/a	0.0038	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	1.31E-07	1.31E-07	n/a	1.31E-07	Maximum detected concentration
Tris(o-cresyl)phosphate	18	1	0.052 (U)	0.064	n/a	0.064	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	18	18	7.9	523	Gamma	176	95% Adjusted Gamma
Uranium-235/236	18	18	0.656	73	Nonparametric	26.1	95% Chebyshev (Mean, Sd)
Uranium-238	18	18	16.3	3140	Nonparametric	1050	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-17
EPCs at 15-004(f), Firing Point E Only for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	21	11	0.12 (U)	17.5	Nonparametric	4.05	95% KM (BCA)
Arsenic	21	21	1.7	4.9	Nonparametric	4.08	95% Modified-t
Barium	21	21	153	755	Normal	386	95% Student's-t
Beryllium	21	21	1	42.1	Nonparametric	16.3	95% Chebyshev (Mean, Sd)
Cadmium	21	21	0.12	12.9	Lognormal	4.91	95% Chebyshev (Mean, Sd)
Chromium (Total)	21	21	9.2	31.2	Nonparametric	16.2	95% Student's-t
Cobalt	21	20	3.8	9.7	Normal	7.65	95% KM (Percentile Bootstrap)
Copper	21	21	24	8250	Nonparametric	3282	95% Chebyshev (Mean, Sd)
Lead	21	21	14.2	375	Nonparametric	136	95% Chebyshev (Mean, Sd)
Manganese	21	21	155	663	Normal	482	95% Student's-t
Mercury	21	13	0.0151	0.11(U)	Approx. normal	0.033	95% KM (Percentile Bootstrap)
Nickel	21	21	8.9	27.5	Nonparametric	14.6	95% Student's-t
Selenium	21	20	0.55	1.9	Approx. normal	1.65	95% KM (Percentile Bootstrap)
Silver	21	20	0.06	25.5	Lognormal	8.57	95% KM (Chebyshev)
Uranium	1	1	2763	2763	n/a*	2763	Maximum detected concentration
Zinc	21	21	27.7	716	Nonparametric	278	95% Chebyshev (Mean, Sd)

Table I-3.3-17 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Dinitrotoluene[2,4-]	17	1	0.0038	0.056 (U)	n/a	0.0038	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	1.31E-07	1.31E-07	n/a	1.31E-07	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	20	20	7.9	523	Gamma	184	95% Adjusted Gamma KM
Uranium-235/236	20	20	0.656	73	Nonparametric	26.2	95% Chebyshev (Mean, Sd)
Uranium-238	20	20	16.3	3140	Nonparametric	1122	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-18
EPCs at 15-004(f), Firing Point E Only for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	52	52	1790	26600	Nonparametric	15484	95% Chebyshev (Mean, Sd)
Antimony	52	20	0.08 (U)	17.5	Lognormal	1.87	95% KM (BCA)
Arsenic	52	52	0.93	5.4	Nonparametric	3.94	95% Modified-t
Barium	52	52	33.3	857	Nonparametric	406	95% Chebyshev (Mean, Sd)
Beryllium	52	52	0.58	42.1	Nonparametric	7.55	95% Chebyshev (Mean, Sd)
Cadmium	52	52	0.027	44.9	Lognormal	5.78	95% Chebyshev (Mean, Sd)
Chromium (Total)	52	52	4.4	31.2	Nonparametric	14.3	95% Student's-t
Cobalt	52	51	1.1	9.7	Nonparametric	7.07	95% KM (Percentile Bootstrap)
Copper	52	52	4.7	108000	Nonparametric	11739	95% Chebyshev (Mean, Sd)
Iron	52	52	6430	21100	Nonparametric	15482	95% Modified Student’s-t
Lead	52	52	3.6	375	Nonparametric	74.5	95% Chebyshev (Mean, Sd)
Manganese	52	52	116	726	Normal	451	95% Student's-t
Mercury	52	28	0.0151	0.342	Nonparametric	0.047	95% KM (t)
Nickel	52	52	4.7	27.5	Nonparametric	12.4	95% Student's-t
Selenium	52	51	0.55	4.2	Nonparametric	2.06	95% KM (Chebyshev)
Silver	52	51	0.031	25.5	Nonparametric	3.84	95% KM (Chebyshev)
Uranium	1	1	2763	2763	n/a*	2763	Maximum detected concentration
Zinc	52	52	20.6	716	nonparametric	152	95% Chebyshev (Mean, Sd)

Table I-3.3-18 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Dinitrotoluene[2,4-]	40	1	0.0038	0.057 (U)	n/a	0.0038	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	1.31E-07	1.31E-07	n/a	1.31E-07	Maximum detected concentration
Tris(o-cresyl)phosphate	51	2	0.025	0.064	n/a	0.064	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	51	51	0.62	523	Gamma	98.4	95% Adjusted Gamma KM
Uranium-235/236	51	50	0.051 (U)	73	Lognormal	12	95% KM (Chebyshev)
Uranium-238	51	51	0.91	3140	Lognormal	375	95% Chebyshev (MVUE)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-19
EPCs at SWMU 15-007(a) for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Arsenic	7	7	1.5	3.8	n/a*	3.8	Maximum detected concentration
Barium	7	7	58.7	217	n/a	217	Maximum detected concentration
Chromium (Total)	7	7	7	13.5	n/a	13.5	Maximum detected concentration
Copper	7	7	2.8	8.5	n/a	8.5	Maximum detected concentration
Lead	7	7	10.5	23.9	n/a	23.9	Maximum detected concentration
Nickel	7	7	6.9	10.7	n/a	10.7	Maximum detected concentration
Selenium	7	7	0.86	1.5	n/a	1.5	Maximum detected concentration
Organic Chemicals (mg/kg)							
Acetone	7	1	0.0073	0.022 (U)	n/a	0.0073	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	5.25E-10	5.25E-10	n/a	5.25E-10	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-20
EPCs at SWMU 15-007(a) for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	20	20	1670	17600	Normal	11601	95% Student's-t
Arsenic	20	20	1	3.8	Normal	2.9	95% Student's-t
Barium	20	20	15.5	217	Normal	147	95% Student's-t
Chromium (Total)	20	20	3.4	13.5	Normal	9.65	95% Student's-t
Copper	20	20	0.92	8.5	Normal	5.8	95% Student's-t
Lead	20	20	5.6	168	Nonparametric	58.7	95% Chebyshev (Mean, Sd)
Nickel	20	20	3.1	11.4	Normal	8.74	95% Student's-t
Perchlorate	20	5	0.0024	0.024 (U)	Normal	0.003	95% KM (t)
Selenium	20	20	0.86	2.4	Gamma	1.55	95% Adjusted Gamma KM
Organic Chemicals (mg/kg)							
Acetone	20	5	0.0073	0.14	Nonparametric	0.029	95% KM (t)
Bis(2-ethylhexyl)phthalate	20	2	0.048	0.4 (U)	n/a*	0.14	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	3	3	3.84E-10	1.18E-08	n/a	1.18E-08	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-21
EPCs at SWMU 15-008(a) for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	13	13	3820	18000	Normal	11770	95% Student's-t
Antimony	13	4	0.12 (U)	3.8 (U)	n/a*	2.5	Maximum detected concentration
Arsenic	13	13	1.5	3.7	Normal	2.91	95% Student's-t
Barium	13	13	31.3	834	Gamma	387	95% Adjusted Gamma KM
Chromium (Total)	13	13	2.6	11.4	Normal	8.76	95% Student's-t
Copper	13	13	3.6	7720	Nonparametric	3278	95% Chebyshev (Mean, Sd)
Iron	13	13	8130	15300	Normal	12677	95% Student's-t
Lead	13	13	6.8	58.2	Normal	32.7	95% Student's-t
Mercury	13	13	0.0231	1.4	Nonparametric	0.67	95% Chebyshev (Mean, Sd)
Nickel	13	13	3	57.3	Nonparametric	28.2	95% Chebyshev (Mean, Sd)
Perchlorate	12	4	0.0024	0.022 (U)	n/a	0.0044	Maximum detected concentration
Selenium	13	12	0.55 (U)	2.7	Nonparametric	1.52	95% KM (Percentile Bootstrap)
Silver	13	12	0.033	0.63 (U)	Nonparametric	0.34	95% KM Bootstrap
Uranium	1	1	2820	2820	n/a	2820	Maximum detected concentration
Vanadium	13	13	5.9	26.1	Normal	19.4	95% Student's-t
Zinc	13	13	31.4	309	Nonparametric	173	95% Chebyshev (Mean, Sd)

Table I-3.3-21 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Acenaphthene	12	4	0.044	0.37 (U)	n/a	0.21	Maximum detected concentration
Acetone	12	5	0.0089 (U)	0.2	Nonparametric	0.059	95% KM (t)
Bis(2-ethylhexyl)phthalate	12	8	0.06	0.35 (U)	Nonparametric	0.17	95% KM (Percentile Bootstrap)
Di-n-butylphthalate	12	3	0.044	0.37 (U)	n/a	0.21	Maximum detected concentration
Di-n-octylphthalate	12	1	0.069	0.37 (U)	n/a	0.069	Maximum detected concentration
Isopropyltoluene[4-]	12	2	0.00043	0.013	n/a	0.013	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	2	2	5.09E-08	1.34E-06	n/a	1.34E-06	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	12	12	0.792	492	Gamma	227	95% Adjusted Gamma KM
Uranium-235/236	12	11	0.013 (U)	26.5	Nonparametric	13.5	95% KM (Chebyshev)
Uranium-238	12	12	0.938	681	Gamma	321	95% Adjusted Gamma KM

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-22
EPCs at SWMU 15-008(a) for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	25	5	0.077 (U)	3.8 (U)	Normal	0.71	95% KM (Percentile Bootstrap)
Arsenic	25	25	0.61	3.7	Normal	2.53	95% Student's-t
Barium	25	25	7.2	834	Gamma	233	95% Adjusted Gamma KM
Chromium (Total)	25	25	0.91	18	Normal	8.7	95% Student's-t
Copper	25	25	0.99	7720	Nonparametric	1734	95% Chebyshev (Mean, Sd)
Lead	25	25	2.3	58.2	Normal	22	95% Student's-t
Mercury	25	25	0.0159	1.4	Nonparametric	0.42	95% Chebyshev (Mean, Sd)
Nickel	25	25	0.94	57.3	Nonparametric	17.7	95% Chebyshev (Mean, Sd)
Selenium	25	24	0.48	3	Nonparametric	1.61	95% KM (BCA)
Silver	25	24	0.0082	3.1	Nonparametric	0.81	95% KM (Chebyshev)
Uranium	1	1	2820	2820	n/a*	2820	Maximum detected concentration
Vanadium	25	25	2	26.1	Normal	15.4	95% Student's-t
Zinc	25	25	29.4	309	Nonparametric	112	95% Chebyshev (Mean, Sd)

Table I-3.3-22 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Acenaphthene	24	6	0.044	0.37 (U)	Normal	0.152	95% KM (t)
Acetone	24	8	0.0089 (U)	0.2	Nonparametric	0.047	95% KM (t)
Benzoic acid	24	1	0.8	1.8 (UJ)	n/a	0.8	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	24	13	0.06	1.7	Approx. lognormal	0.31	95% KM (t)
Diethylphthalate	24	1	0.05	0.37 (U)	n/a	0.05	Maximum detected concentration
Di-n-butylphthalate	24	3	0.044	0.37 (U)	n/a	0.21	Maximum detected concentration
Di-n-octylphthalate	24	1	0.069	0.37 (U)	n/a	0.069	Maximum detected concentration
Methylene chloride	24	7	0.002 (U)	0.012 (U)	Normal	0.0031	95% KM (t)
TCDD[2,3,7,8-] equivalent	2	2	5.09E-08	1.34E-06	n/a	1.34E-06	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	24	24	0.316	492	Nonparametric	145	95% Chebyshev (Mean, Sd)
Uranium-235/236	24	18	0.0122(U)	26.5	Gamma	7.07	95% Adjusted Gamma KM
Uranium-238	24	24	0.394	681	Gamma	147	95% Adjusted Gamma KM

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-23
EPCs at SWMU 15-008(a) for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	25	25	330	18000	Normal	9243	95% Student's-t
Antimony	25	5	0.077 (U)	3.8 (U)	Normal	0.71	95% KM (Percentile Bootstrap)
Arsenic	25	25	0.61	3.7	Normal	2.53	95% Student's-t
Barium	25	25	7.2	834	Gamma	233	95% Adjusted Gamma KM
Chromium (Total)	25	25	0.91	18	Normal	8.7	95% Student's-t
Copper	25	25	0.99	7720	Nonparametric	1734	95% Chebyshev (Mean, Sd)
Iron	25	25	5730	15800	Normal	11728	95% Student's-t
Lead	25	25	2.3	58.2	Normal	22	95% Student's-t
Mercury	25	25	0.0159	1.4	Nonparametric	0.42	95% Chebyshev (Mean, Sd)
Nickel	25	25	0.94	57.3	Nonparametric	17.7	95% Chebyshev (Mean, Sd)
Perchlorate	24	9	0.0022	0.022 (U)	Approx. lognormal	0.0036	95% KM (Percentile Bootstrap)
Selenium	25	24	0.48	3	Nonparametric	1.61	95% KM (BCA)
Silver	25	24	0.0082	3.1	Nonparametric	0.81	95% KM (Chebyshev)
Uranium	1	1	2820	2820	n/a*	2820	Maximum detected concentration
Vanadium	25	25	2	26.1	Normal	15.4	95% Student's-t
Zinc	25	25	29.4	309	Nonparametric	112	95% Chebyshev (Mean, Sd)

Table I-3.3-23 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Acenaphthene	24	6	0.044	0.37 (U)	Normal	0.152	95% KM (t)
Acetone	24	8	0.0089 (U)	0.2	Nonparametric	0.0047	95% KM (t)
Benzoic acid	24	1	0.8	1.8 (UJ)	n/a*	0.8	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	24	13	0.06	1.7	Approx. lognormal	0.306	95% KM (t)
Diethylphthalate	24	1	0.05	0.37 (U)	n/a	0.05	Maximum detected concentration
Di-n-butylphthalate	24	3	0.044	0.37 (U)	n/a	0.21	Maximum detected concentration
Di-n-octylphthalate	24	1	0.069	0.37 (U)	n/a	0.069	Maximum detected concentration
Isopropyltoluene[4-]	24	3	0.00043	0.013	n/a	0.013	Maximum detected concentration
Methylene chloride	24	7	0.002 (U)	0.012 (U)	Normal	0.0031	95% KM (t)
TCDD[2,3,7,8-] equivalent	2	2	5.09E-08	1.34E-06	n/a	1.34E-06	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	24	24	0.316	492	Nonparametric	145	95% Chebyshev (Mean, Sd)
Uranium-235/236	24	18	0.0122 (U)	26.5	Gamma	7.07	95% Adjusted Gamma KM
Uranium-238	24	24	0.394	681	Gamma	147	95% Adjusted Gamma KM

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-24
EPCs at SWMU 15-009(e) for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	10	2	0.14 (U)	8.6	n/a*	8.6	Maximum detected concentration
Chromium (Total)	10	10	1.8	11.7	Normal	6.27	95% Student's-t
Selenium	10	7	0.14	1.9	Approx. lognormal	1.18	95% KM (Percentile Bootstrap)
Silver	10	6	0.028	4.1	Normal	1.63	95% KM (Percentile Bootstrap)
Organic Chemicals (mg/kg)							
Benzo(a)anthracene	4	1	0.067	0.38(U)	n/a	0.067	Maximum detected concentration
Benzo(a)pyrene	4	1	0.048	0.38(U)	n/a	0.048	Maximum detected concentration
Benzo(b)fluoranthene	4	1	0.05	0.36(U)	n/a	0.05	Maximum detected concentration
Benzo(k)fluoranthene	4	1	0.045	0.35(U)	n/a	0.045	Maximum detected concentration
Chrysene	4	1	0.066	0.38(U)	n/a	0.066	Maximum detected concentration
Fluoranthene	4	1	0.089	0.38(U)	n/a	0.089	Maximum detected concentration
Isopropyltoluene[4-]	4	1	0.003	0.0053 (U)	n/a	0.003	Maximum detected concentration
Pyrene	4	1	0.073	0.38(U)	n/a	0.073	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	8.19E-08	8.19E-08	n/a	8.19E-08	Maximum detected concentration
Toluene	4	1	0.0021	0.0053 (UJ)	n/a	0.0021	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	4	4	0.702	8.85	n/a	8.85	Maximum detected concentration
Uranium-235/236	4	3	0.038 (U)	0.488	n/a	0.488	Maximum detected concentration
Uranium-238	4	4	0.702	16.1	n/a	16.1	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.
*n/a = Not applicable.

Table I-3.3-25
EPCs at SWMU 15-009(e) for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	14	2	0.14 (U)	8.6	n/a*	8.6	Maximum detected concentration
Chromium (Total)	14	14	1.8	13	Normal	7.45	95% Student's-t
Selenium	14	9	0.14	1.9	Approx. normal	1.11	95% KM (Percentile Bootstrap)
Silver	14	8	0.023	4.1	Lognormal	2.04	95% KM (Chebyshev)
Uranium	8	2	2.67	67.8 (U)	n/a	18.9	Maximum detected concentration
Organic Chemicals (mg/kg)							
Benzo(a)anthracene	8	1	0.067	0.38(U)	n/a	0.067	Maximum detected concentration
Benzo(a)pyrene	8	1	0.048	0.38(U)	n/a	0.048	Maximum detected concentration
Benzo(b)fluoranthene	8	3	0.05	0.36(U)	n/a	0.058	Maximum detected concentration
Benzo(k)fluoranthene	8	1	0.045	0.35(U)	n/a	0.045	Maximum detected concentration
Chrysene	8	1	0.066	0.38(U)	n/a	0.066	Maximum detected concentration
Fluoranthene	8	1	0.089	0.38(U)	n/a	0.089	Maximum detected concentration
Pyrene	8	1	0.073	0.38(U)	n/a	0.073	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	8.19E-08	8.19E-08	n/a	8.19E-08	Maximum detected concentration
Toluene	8	1	0.0021	0.0057 (U)	n/a	0.0021	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	6	6	0.467	8.85	n/a	8.85	Maximum detected concentration
Uranium-235/236	6	3	0.012 (U)	0.488	n/a	0.49	Maximum detected concentration
Uranium-238	6	6	0.513	16.1	n/a	16.1	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.
*n/a = Not applicable.

Table I-3.3-26
EPCs at SWMU 15-009(e) for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	18	2	0.14 (U)	8.6	n/a*	8.6	Maximum detected concentration
Chromium (Total)	18	18	1.8	13	Gamma	7.23	95% Adjusted Gamma KM
Selenium	18	9	0.14	8.6	Approx. normal	0.93	95% KM (Percentile Bootstrap)
Silver	18	8	0.023	4.1	Nonparametric	1.61	95% KM (Chebyshev)
Uranium	12	6	1.09	67.8 (U)	Approx. lognormal	10.5	95% KM (BCA)
Organic Chemicals (mg/kg)							
Acetone	12	2	0.0053 (U)	0.021 (U)	n/a	0.0093	Maximum detected concentration
Benzo(a)anthracene	12	1	0.067	0.38(U)	n/a	0.067	Maximum detected concentration
Benzo(a)pyrene	12	1	0.048	0.38(U)	n/a	0.048	Maximum detected concentration
Benzo(b)fluoranthene	12	3	0.05	0.36(U)	n/a	0.058	Maximum detected concentration
Benzo(k)fluoranthene	12	1	0.045	0.35(U)	n/a	0.045	Maximum detected concentration
Chrysene	12	1	0.066	0.38(U)	n/a	0.066	Maximum detected concentration
Fluoranthene	12	1	0.089	0.38(U)	n/a	0.089	Maximum detected concentration
Isopropyltoluene[4-]	12	1	0.003	0.0057 (U)	n/a	0.003	Maximum detected concentration
Pyrene	12	1	0.073	0.38(U)	n/a	0.073	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	8.19E-08	8.19E-08	n/a	8.19E-08	Maximum detected concentration
Toluene	12	1	0.0021	0.0057 (U)	n/a	0.0021	Maximum detected concentration
Uranium-234	6	6	0.467	8.85	n/a	8.85	Maximum detected concentration
Uranium-235/236	6	3	0.012 (U)	0.488	n/a	0.488	Maximum detected concentration
Uranium-238	6	6	0.513	16.1	n/a	16.1	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-27
EPCs at SWMU 15-010(a) for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	5	1	0.14 (U)	0.97	n/a*	0.97	Maximum detected concentration
Barium	5	5	159	551	n/a	551	Maximum detected concentration
Chromium (Total)	5	5	8.4	13.7	n/a	13.7	Maximum detected concentration
Cobalt	5	5	4.1	5.9	n/a	5.9	Maximum detected concentration
Copper	5	5	6.1	15.4	n/a	15.4	Maximum detected concentration
Lead	5	5	17	25.1	n/a	25.1	Maximum detected concentration
Mercury	5	5	2.35	11.5	n/a	11.5	Maximum detected concentration
Selenium	5	5	2.1	2.5	n/a	2.5	Maximum detected concentration
Silver	5	5	0.09	0.6	n/a	0.6	Maximum detected concentration
Zinc	5	5	35.3	64.3	n/a	64.3	Maximum detected concentration
Organic Chemicals (mg/kg)							
Acenaphthene	5	1	0.096	0.36 (U)	n/a	0.096	Maximum detected concentration
Di-n-butylphthalate	5	2	0.048	0.35 (U)	n/a	0.077	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	1.95E-07	1.95E-07	n/a	1.95E-07	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-28
EPCs at SWMU 15-010(a) for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	15	1	0.073 (U)	6.7 (UJ)	n/a*	0.97	Maximum detected concentration
Barium	15	15	43.4	824	Gamma	326	95% Adjusted Gamma KM
Chromium (Total)	15	15	6.2	18	Normal	11.4	95% Student's-t
Cobalt	15	15	1.6	5.9	Normal	4.53	95% Student's-t
Copper	15	15	2.5	15.4	Normal	9	95% Student's-t
Lead	15	15	8.7	173	Nonparametric	83.9	95% Chebyshev (Mean, Sd)
Mercury	15	15	0.0295	11.5	Normal	5.45	95% Student's-t
Nitrate	11	11	0.28	65	Gamma	50.3	95% Adjusted Gamma KM
Perchlorate	9	6	0.0021	0.021 (U)	approx. normal	0.0028	95% KM (Percentile Bootstrap)
Selenium	15	11	0.35 (U)	4.9	Normal	2.74	95% KM (Percentile Bootstrap)
Silver	15	13	0.014	4.9	Gamma	2.31	95% Adjusted Gamma KM
Zinc	15	15	31.6	64.3	Lognormal	44.1	95% Student's-t
Organic Chemicals (mg/kg)							
Acenaphthene	15	1	0.096	0.37 (U)	n/a	0.096	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	15	5	0.044	0.36 (U)	Normal	0.076	95% KM (t)
Diethylphthalate	15	1	0.34 (U)	1.5	n/a	1.5	Maximum detected concentration
Di-n-butylphthalate	15	7	0.047	0.35 (U)	Normal	0.13	95% KM (t)
Isopropyltoluene[4-]	11	1	0.0017	0.0054 (U)	n/a	0.0017	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	1.95E-07	1.95E-07	n/a	1.95E-07	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-29
EPCs at AOC C-15-004 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Copper	2	2	17.7	21.1	n/a*	21.1	Maximum detected concentration
Zinc	2	2	97.7	184	n/a	184	Maximum detected concentration
Organic Chemicals (mg/kg)							
TCDD[2,3,7,8-] equivalent	1	1	5.69E-06	5.69E-06	n/a	5.69E-06	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	2	2	2.29	6.08	n/a	6.08	Maximum detected concentration
Uranium-235/236	2	2	0.197	0.311	n/a	0.31	Maximum detected concentration
Uranium-238	2	2	10.4	13.9	n/a	13.9	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.
*n/a = Not applicable.

Table I-3.3-30
EPCs at AOC C-15-004 for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Copper	4	4	10.3	52.6	n/a*	52.6	Maximum detected concentration
Zinc	4	4	48.5	184	n/a	184	Maximum detected concentration
Organic Chemicals (mg/kg)							
TCDD[2,3,7,8-] equivalent	1	1	5.69E-06	5.69E-06	n/a	5.69E-06	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	4	4	0.821	6.08	n/a	6.08	Maximum detected concentration
Uranium-235/236	4	4	0.067	0.311	n/a	0.31	Maximum detected concentration
Uranium-238	4	4	1.4	13.9	n/a	13.9	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.
*n/a = Not applicable.

Table I-3.3-31
EPCs at AOC C-15-004 for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Copper	4	4	10.3	52.6	n/a*	52.6	Maximum detected concentration
Zinc	4	4	48.5	184	n/a	184	Maximum detected concentration
Organic Chemicals (mg/kg)							
TCDD[2,3,7,8-] equivalent	1	1	5.69E-06	5.69E-06	n/a	5.69E-06	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	4	4	0.821	6.08	n/a	6.08	Maximum detected concentration
Uranium-235/236	4	4	0.067	0.311	n/a	0.31	Maximum detected concentration
Uranium-238	4	4	1.4	13.9	n/a	13.9	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-32
EPCs at AOC C-15-005 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	6	6	10500	14000	n/a*	14000	Maximum detected concentration
Antimony	6	1	0.27 (U)	2.6	n/a	2.6	Maximum detected concentration
Barium	6	6	111	151	n/a	151	Maximum detected concentration
Lead	6	6	17.6	33.8	n/a	33.8	Maximum detected concentration
Mercury	6	4	0.039 (U)	2.97	n/a	2.97	Maximum detected concentration
Nickel	6	6	7.3	9.5	n/a	9.5	Maximum detected concentration
Perchlorate	5	1	0.0051	0.023 (U)	n/a	0.0051	Maximum detected concentration
Selenium	6	6	1.2	1.9	n/a	1.9	Maximum detected concentration
Zinc	6	6	31.5	90.8	n/a	90.8	Maximum detected concentration
Organic Chemicals (mg/kg)							
Acetone	6	2	0.0092 (U)	0.023 (U)	n/a	0.01	Maximum detected concentration
Butylbenzylphthalate	6	1	0.038	0.38 (U)	n/a	0.038	Maximum detected concentration
Diethylphthalate	6	1	0.35 (U)	13	n/a	13	Maximum detected concentration
Di-n-butylphthalate	6	1	0.093	0.38 (U)	n/a	0.093	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	4.85E-08	4.85E-08	n/a	4.85E-08	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-33
EPCs at AOC C-15-005 for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	12	1	0.16 (U)	2.6	n/a*	2.6	Maximum detected concentration
Barium	12	12	45.1	151	Normal	124	95% Student's-t
Lead	12	12	7.3	45.4	Normal	30.1	95% Student's-t
Mercury	12	4	0.0168 (U)	2.97	n/a	2.97	Maximum detected concentration
Nickel	12	12	4.2	9.5	Normal	8.28	95% Student's-t
Selenium	12	12	1.2	1.9	Normal	1.59	95% Student's-t
Zinc	12	12	28.3	138	Nonparametric	67.2	95% Student's-t
Organic Chemicals (mg/kg)							
Acetone	12	4	0.0092 (U)	0.023 (U)	n/a	0.012	Maximum detected concentration
Benzyl alcohol	12	1	0.044	0.38 (U)	n/a	0.044	Maximum detected concentration
Butylbenzylphthalate	12	1	0.038	0.38 (U)	n/a	0.038	Maximum detected concentration
Diethylphthalate	12	1	0.35 (U)	13	n/a	13	Maximum detected concentration
Di-n-butylphthalate	12	1	0.093	0.38 (U)	n/a	0.093	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	4.85E-08	4.85E-08	n/a	4.85E-08	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-34
EPCs at AOC C-15-005 for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	12	12	4430	15300	Nonparametric	13069	95% Modified-t
Antimony	12	1	0.16 (U)	2.6	n/a*	2.6	Maximum detected concentration
Barium	12	12	45.1	151	Normal	124	95% Student's-t
Lead	12	12	7.3	45.4	Normal	30.1	95% Student's-t
Mercury	12	4	0.0168 (U)	2.97	n/a	2.97	Maximum detected concentration
Nickel	12	12	4.2	9.5	Normal	8.28	95% Student's-t
Perchlorate	11	3	0.0027	0.023	n/a	0.023	Maximum detected concentration
Selenium	12	12	1.2	1.9	Normal	1.59	95% Student's-t
Zinc	12	12	28.3	138	Nonparametric	67.2	95% Student's-t
Organic Chemicals (mg/kg)							
Acetone	12	4	0.0092 (U)	0.023 (U)	n/a	0.012	Maximum detected concentration
Benzyl alcohol	12	1	0.044	0.38 (U)	n/a	0.044	Maximum detected concentration
Butylbenzylphthalate	12	1	0.038	0.38 (U)	n/a	0.038	Maximum detected concentration
Diethylphthalate	12	1	0.35 (U)	13	n/a	13	Maximum detected concentration
Di-n-butylphthalate	12	1	0.093	0.38 (U)	n/a	0.093	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	4.85E-08	4.85E-08	n/a	4.85E-08	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-35
EPCs at AOC 15-005(b) for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	4	4	10300	12400	n/a*	12400	Maximum detected concentration
Barium	4	4	156	171	n/a	171	Maximum detected concentration
Cobalt	4	4	4.9	6.5	n/a	6.5	Maximum detected concentration
Nickel	4	4	7	8.2	n/a	8.2	Maximum detected concentration
Selenium	4	4	0.96	1.1	n/a	1.1	Maximum detected concentration
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	4	1	0.11	0.37 (U)	n/a	0.11	Maximum detected concentration
Dibenzofuran	4	1	0.17	0.38 (U)	n/a	0.17	Maximum detected concentration
Methylene chloride	4	4	0.0046	0.0056	n/a	0.0056	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	3.06E-08	3.06E-08	n/a	3.06E-08	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-36
EPCs at AOC 15-005(b) for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Barium	8	8	52	310	Normal	214	95% Student's-t
Cobalt	8	8	1.5	11.9	Normal	7.22	95% Student's-t
Nickel	8	8	5.3	9.9	Normal	8.42	95% Student's-t
Selenium	8	8	0.65	1.3	Normal	1.18	95% Student's-t
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	8	2	0.11	0.41 (U)	n/a*	0.21	Maximum detected concentration
Dibenzofuran	8	1	0.17	0.41 (U)	n/a	0.17	Maximum detected concentration
Methylene chloride	8	8	0.0041	0.0065	Normal	0.0055	95% Student's-t
TCDD[2,3,7,8-] equivalent	1	1	3.06E-08	3.06E-08	n/a	3.06E-08	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-37
EPCs at AOC 15-005(b) for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	8	8	3490	14100	Normal	12286	95% Student's-t
Barium	8	8	52	310	Normal	214	95% Student's-t
Cobalt	8	8	1.5	11.9	Normal	7.22	95% Student's-t
Nickel	8	8	5.3	9.9	Normal	8.42	95% Student’s-t
Perchlorate	8	1	0.0033	0.0062 (U)	n/a*	0.0033	Maximum detected concentration
Selenium	8	8	0.65	1.3	Normal	1.18	95% Student's-t
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	8	2	0.11	0.41 (U)	n/a	0.21	Maximum detected concentration
Dibenzofuran	8	1	0.17	0.41 (U)	n/a	0.17	Maximum detected concentration
Methylene chloride	8	8	0.0041	0.0065	Normal	0.0055	95% Student's-t
TCDD[2,3,7,8-] equivalent	1	1	3.06E-08	3.06E-08	n/a	3.06E-08	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-38
EPCs at AOC C-15-006 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	6	3	0.23 (U)	4.9	n/a*	4.9	Maximum detected concentration
Cobalt	6	6	4	9.7	n/a	9.7	Maximum detected concentration
Copper	6	6	7.9	13.2	n/a	13.2	Maximum detected concentration
Iron	6	6	11100	35800	n/a	35800	Maximum detected concentration
Lead	6	6	11	27.8	n/a	27.8	Maximum detected concentration
Manganese	6	6	294	636	n/a	636	Maximum detected concentration
Mercury	6	6	0.0789	14.4	n/a	14.4	Maximum detected concentration
Perchlorate	5	4	0.0038	0.0055 (UJ)	n/a	0.0044	Maximum detected concentration
Zinc	6	6	28.3	85.5	n/a	85.5	Maximum detected concentration
Organic Chemicals (mg/kg)							
Aroclor-1254	1	1	0.032	0.032	n/a	0.032	Maximum detected concentration
Aroclor-1260	1	1	0.018	0.018	n/a	0.018	Maximum detected concentration
Di-n-butylphthalate	6	1	0.052	0.39 (U)	n/a	0.052	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	7.19E-07	7.19E-07	n/a	7.19E-07	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-39
EPCs at AOC C-15-006 for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	12	7	0.23 (U)	10	Normal	4.27	95% KM (Percentile Bootstrap)
Cobalt	12	12	4	15.3	Normal	9.33	95% Student's-t
Copper	12	12	6.4	16.2	Normal	11.7	95% Student's-t
Lead	12	12	11	43.6	Normal	28.8	95% Student's-t
Manganese	12	12	294	1120	Gamma	726	95% Adjusted Gamma KM
Mercury	12	12	0.0219	14.4	Nonparametric	7.09	95% Chebyshev (Mean, Sd)
Zinc	12	12	26.9	85.5	Normal	58.4	95% Student's-t
Organic Chemicals (mg/kg)							
Aroclor-1254	1	1	0.032	0.032	n/a*	0.032	Maximum detected concentration
Aroclor-1260	1	1	0.018	0.018	n/a	0.018	Maximum detected concentration
Benzoic acid	12	1	0.55	3.5 (UJ)	n/a	0.55	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	12	1	0.14	0.39 (U)	n/a	0.14	Maximum detected concentration
Butylbenzylphthalate	12	1	0.042	0.73 (U)	n/a	0.042	Maximum detected concentration
Di-n-butylphthalate	12	1	0.052	0.73 (U)	n/a	0.052	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	7.19E-07	7.19E-07	n/a	7.19E-07	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-40
EPCs at AOC C-15-006 for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	12	7	0.23 (U)	10	Normal	4.27	95% KM (Percentile Bootstrap)
Cobalt	12	12	4	15.3	Normal	9.33	95% Student's-t
Copper	12	12	6.4	16.2	Normal	11.7	95% Student's-t
Iron	12	12	11100	35800	Nonparametric	20391	95% Student's-t
Lead	12	12	11	43.6	Normal	28.8	95% Student's-t
Manganese	12	12	294	1120	Gamma	726	95% Adjusted Gamma KM
Mercury	12	12	0.0219	14.4	Nonparametric	7.09	95% Chebyshev (Mean, Sd)
Perchlorate	11	7	0.0038	0.021 (U)	Normal	0.0042	95% KM (Percentile Bootstrap)
Zinc	12	12	26.9	85.5	Normal	58.4	95% Student's-t
Organic Chemicals (mg/kg)							
Aroclor-1254	1	1	0.032	0.032	n/a*	0.032	Maximum detected concentration
Aroclor-1260	1	1	0.018	0.018	n/a	0.018	Maximum detected concentration
Benzoic acid	12	1	0.55	3.5 (UJ)	n/a	0.55	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	12	1	0.14	0.39 (U)	n/a	0.14	Maximum detected concentration
Butylbenzylphthalate	12	1	0.042	0.73 (U)	n/a	0.042	Maximum detected concentration
Di-n-butylphthalate	12	1	0.052	0.73 (U)	n/a	0.052	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	7.19E-07	7.19E-07	n/a	7.19E-07	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-41
EPCs at SWMU 36-001 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Copper	6	6	4.3	8.1	n/a*	8.1	Maximum detected concentration
Lead	6	6	8	11.3	n/a	11.3	Maximum detected concentration
Nickel	6	6	4.2	9.5	n/a	9.5	Maximum detected concentration
Nitrate	6	6	0.24	5.2	n/a	5.2	Maximum detected concentration
Silver	6	6	0.023	0.039	n/a	0.039	Maximum detected concentration
Uranium	6	6	0.83	2.7	n/a	2.7	Maximum detected concentration
Zinc	6	6	29.4	37	n/a	37	Maximum detected concentration
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	6	1	0.31	0.35 (U)	n/a	0.31	Maximum detected concentration
Methylphenol[2-]	6	1	0.047	0.35 (U)	n/a	0.047	Maximum detected concentration
Methylphenol[4-]	6	1	0.12	0.71 (U)	n/a	0.12	Maximum detected concentration
Phenol	6	1	0.35 (U)	0.64	n/a	0.64	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	6	6	5.52E-10	3.75E-06	n/a	3.75E-06	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	6	6	0.418	1.8	n/a	1.8	Maximum detected concentration
Uranium-235/236	6	1	0.019 (U)	0.111	n/a	0.11	Maximum detected concentration
Uranium-238	6	6	0.514	2.1	n/a	2.1	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.
*n/a = Not applicable.

Table I-3.3-42
EPCs at SWMU 36-001 for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	7	1	0.21 (U)	5	n/a*	5	Maximum detected concentration
Copper	7	7	4.3	1160	n/a	1160	Maximum detected concentration
Lead	7	7	8	79.7	n/a	79.7	Maximum detected concentration
Nickel	7	7	4.2	9.5	n/a	9.5	Maximum detected concentration
Silver	7	7	0.023	0.35	n/a	0.35	Maximum detected concentration
Uranium	7	7	0.83	107	n/a	107	Maximum detected concentration
Zinc	7	7	29.4	260	n/a	260	Maximum detected concentration
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	7	2	0.15	0.35 (U)	n/a	0.31	Maximum detected concentration
Di-n-butylphthalate	7	1	0.076	0.37 (U)	n/a	0.076	Maximum detected concentration
Methylphenol[2-]	7	1	0.047	0.35 (U)	n/a	0.047	Maximum detected concentration
Phenol	7	1	0.35 (U)	0.64	n/a	0.64	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	7	7	5.52E-10	1.06E-05	n/a	1.06E-05	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	7	7	0.418	4.42	n/a	4.42	Maximum detected concentration
Uranium-235/236	7	2	0.019 (U)	0.606	n/a	0.606	Maximum detected concentration
Uranium-238	7	7	0.514	26.7	n/a	26.7	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-43
EPCs at SWMU 36-001 for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	16	4	0.21(U)	22.6	n/a*	22.6	Maximum detected concentration
Copper	16	16	4.3	1890	Nonparametric	832	95% Chebyshev (Mean, Sd)
Lead	16	16	8	668	Nonparametric	237	95% Chebyshev (Mean, Sd)
Nickel	16	16	4.1	132	Nonparametric	49.6	95% Chebyshev (Mean, Sd)
Nitrate	14	14	0.24	20	Gamma	8.15	95% Adjusted Gamma KM
Perchlorate	11	1	0.0035	0.0059 (U)	n/a	0.0035	Maximum detected concentration
Silver	16	14	0.023	4.4	Nonparametric	1.53	95% KM (Chebyshev)
Uranium	14	14	0.66	274	Nonparametric	127	95% Chebyshev (Mean, Sd)
Zinc	16	16	29.4	397	Nonparametric	195	95% Chebyshev (Mean, Sd)
Organic Chemicals (mg/kg)							
Acetone	16	1	0.0094 (U)	0.059 (U)	n/a	0.041	Maximum detected concentration
Benzyl alcohol	16	1	0.073	1.6 (U)	n/a	0.073	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	16	4	0.062	0.39 (U)	n/a	0.31	Maximum detected concentration
Di-n-butylphthalate	16	1	0.076	0.39 (U)	n/a	0.076	Maximum detected concentration
Dinitroaniline[3,5-]	14	1	0.004	0.059 (U)	n/a	0.004	Maximum detected concentration
Methylphenol[2-]	16	1	0.047	0.39 (U)	n/a	0.047	Maximum detected concentration
Methylphenol[4-]	16	1	0.12	0.78 (U)	n/a	0.12	Maximum detected concentration
Phenol	16	1	0.34 (U)	0.64	n/a	0.64	Maximum detected concentration

Table I-3.3-43 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
TCDD[2,3,7,8-] equivalent	14	14	5.52E-10	5.64E-05	Gamma	3.38E-05	95% Adjusted Gamma KM
Trichlorofluoromethane	16	1	0.00071	0.012 (U)	n/a	0.00071	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	16	16	0.418	61.3	Nonparametric	22.1	95% Chebyshev (Mean, Sd)
Uranium-235/236	16	8	0.019 (U)	6.7	Approx. lognormal	2.51	95% KM (Chebyshev)
Uranium-238	16	16	0.514	464	Nonparametric	164	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-44
EPCs at SWMU 36-003(b) for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Selenium	3	3	1.1	1.4	n/a*	1.4	Maximum detected concentration
Organic Chemicals (mg/kg)							
TCDD[2,3,7,8-] equivalent	1	1	1.71E-07	1.71E-07	n/a	1.71E-07	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-45
EPCs at SWMU 36-003(b) for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Selenium	6	6	1.1	1.4	n/a*	1.4	Maximum detected concentration
Organic Chemicals (mg/kg)							
TCDD[2,3,7,8-] equivalent	1	1	1.71E-07	1.71E-07	n/a	1.71E-07	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-46
EPCs at SWMU 36-003(b) for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Selenium	6	6	1.1	1.4	n/a*	1.4	Maximum detected concentration
Organic Chemicals (mg/kg)							
TCDD[2,3,7,8-] equivalent	1	1	1.71E-07	1.71E-07	n/a	1.71E-07	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-47
EPCs at SWMU 36-005 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Chromium (Total)	11	11	4.9	9.6	Normal	8.26	95% Student's-t
Nickel	11	11	4.5	9.1	Normal	7.79	95% Student's-t
Perchlorate	11	1	0.0048	0.022 (U)	n/a*	0.0048	Maximum detected concentration
Selenium	11	11	0.86	1.6	Normal	1.38	95% Student's-t
Organic Chemicals (mg/kg)							
Acetone	11	2	0.021 (U)	0.31	n/a	0.31	Maximum detected concentration
Benzoic acid	11	1	0.61	1.8 (UJ)	n/a	0.61	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	11	1	0.052	0.37 (U)	n/a	0.052	Maximum detected concentration
Butylbenzylphthalate	11	1	0.043	0.37 (U)	n/a	0.043	Maximum detected concentration
Di-n-butylphthalate	11	1	0.2	0.37 (U)	n/a	0.2	Maximum detected concentration
Methylene chloride	11	4	0.0029	0.0063	n/a	0.0063	Maximum detected concentration
Pentachlorophenol	11	1	0.37	1.8 (U)	n/a	0.37	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	1.44E-08	1.44E-08	n/a	1.44E-08	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-48
EPCs at SWMU 36-005 for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Chromium (Total)	28	28	4.2	27.2	Approx. lognormal	9.66	95% Student's-t
Nickel	28	28	2.8	12.4	Normal	7.26	95% Student's-t
Selenium	28	28	0.86	3.2	Approx. lognormal	1.7	95% Student's-t
Organic Chemicals (mg/kg)							
Acetone	28	4	0.0096 (U)	0.31	n/a*	0.31	Maximum detected concentration
Benzoic acid	28	1	0.61	1.9 (UJ)	n/a	0.61	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	28	5	0.047	0.39 (U)	Approx. normal	0.065	95% KM (t)
Butylbenzylphthalate	28	1	0.043	0.39 (U)	n/a	0.043	Maximum detected concentration
Di-n-butylphthalate	28	1	0.2	0.39 (U)	n/a	0.2	Maximum detected concentration
Methylene chloride	28	16	0.0018	0.0063	Nonparametric	0.0031	95% KM (t)
Pentachlorophenol	28	1	0.37	1.9 (U)	n/a	0.37	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	1.44E-08	1.44E-08	n/a	1.44E-08	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-49
EPCs at SWMU 36-005 for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Chromium (Total)	28	28	4.2	27.2	Approx. lognormal	9.66	95% Student's-t
Nickel	28	28	2.8	12.4	Normal	7.26	95% Student's-t
Perchlorate	28	5	0.0033	0.024 (U)	Normal	0.0045	95% KM (t)
Selenium	28	28	0.86	3.2	Approx. lognormal	1.7	95% Student's-t
Organic Chemicals (mg/kg)							
Acetone	28	4	0.0096 (U)	0.31	n/a*	0.31	Maximum detected concentration
Benzoic acid	28	1	0.61	1.9 (UJ)	n/a	0.61	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	28	5	0.047	0.39 (U)	Approx. normal	0.065	95% KM (t)
Butylbenzylphthalate	28	1	0.043	0.39 (U)	n/a	0.043	Maximum detected concentration
Di-n-butylphthalate	28	1	0.2	0.39 (U)	n/a	0.2	Maximum detected concentration
Methylene chloride	28	16	0.0018	0.0063	Nonparametric	0.0031	95% KM (t)
Pentachlorophenol	28	1	0.37	1.9 (U)	n/a	0.37	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	1	1	1.44E-08	1.44E-08	n/a	1.44E-08	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-50
EPCs at SWMU 36-006 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	15	1	0.075 (U)	11 (UJ)	n/a*	1.6	Maximum detected concentration
Copper	15	15	4.2	3140	Nonparametric	1135	95% Chebyshev (Mean, Sd)
Mercury	15	10	0.0174	1.48	Approx. lognormal	0.57	95% KM (Chebyshev)
Selenium	15	11	0.56 (U)	2.3	Normal	1.57	95% KM (Percentile Bootstrap)
Zinc	15	15	23	168	Nonparametric	64.4	95% Student's-t
Organic Chemicals (mg/kg)							
Acenaphthene	15	2	0.079	1.4	n/a	1.4	Maximum detected concentration
Acetone	15	2	0.0087	0.023 (U)	n/a	0.016	Maximum detected concentration
Amino-2,6-dinitrotoluene[4-]	15	1	0.053 (U)	0.25 (U)	n/a	0.084	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	15	1	0.053 (U)	0.25 (U)	n/a	0.055	Maximum detected concentration
Anthracene	15	2	0.17 (U)	1.3	n/a	1.3	Maximum detected concentration
Benzo(a)anthracene	15	2	0.17 (U)	4.8	n/a	4.8	Maximum detected concentration
Benzo(a)pyrene	15	2	0.17 (U)	3.6	n/a	3.6	Maximum detected concentration
Benzo(b)fluoranthene	15	3	0.04 (U)	5.1	n/a	5.1	Maximum detected concentration
Benzo(g,h,i)perylene	15	2	0.17 (U)	1.2	n/a	1.2	Maximum detected concentration
Benzo(k)fluoranthene	15	2	0.17 (U)	2.2	n/a	2.2	Maximum detected concentration
Chrysene	15	2	0.17 (U)	4.6	n/a	4.6	Maximum detected concentration

Table I-3.3-50 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Dibenz(a,h)anthracene	15	1	0.061	0.36 (U)	n/a	0.061	Maximum detected concentration
Dibenzofuran	15	1	0.17 (U)	0.58	n/a	0.58	Maximum detected concentration
Dinitroaniline[3,5-]	11	1	0.036	0.055 (U)	n/a	0.036	Maximum detected concentration
Fluoranthene	15	3	0.054	9.9	n/a	9.9	Maximum detected concentration
Fluorene	15	2	0.074	0.94	n/a	0.94	Maximum detected concentration
Indeno(1,2,3-cd)pyrene	15	2	0.17 (U)	1.5	n/a	1.5	Maximum detected concentration
Methylnaphthalene[2-]	15	1	0.17 (U)	0.36 (U)	n/a	0.22	Maximum detected concentration
Naphthalene	15	1	0.17 (U)	0.95	n/a	0.95	Maximum detected concentration
Phenanthrene	15	2	0.17 (U)	7.2	n/a	7.2	Maximum detected concentration
Pyrene	15	3	0.042	6.9	n/a	6.9	Maximum detected concentration
RDX	15	1	0.11 (U)	1 (U)	n/a	0.49	Maximum detected concentration
TATB	11	1	0.42 (U)	2.7	n/a	2.7	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	2	2	7.46E-08	1.82E-07	n/a	1.82E-07	Maximum detected concentration
Trichlorofluoromethane	15	1	0.00045	0.011 (U)	n/a	0.00045	Maximum detected concentration
Trinitrobenzene[1,3,5-]	15	1	0.037	0.25 (U)	n/a	0.037	Maximum detected concentration
Trinitrotoluene[2,4,6-]	15	1	0.047	0.25 (U)	n/a	0.047	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-238	11	11	0.476	5.26	Normal	2.48	95% Student's-t

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-51
EPCs at SWMU 36-006 for Ecological Receptors

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	28	1	0.07 (U)	11 (UJ)	n/a*	1.6	Maximum detected concentration
Copper	28	28	3.1	3140	Nonparametric	615	95% Chebyshev (Mean, Sd)
Mercury	28	12	0.0174	1.48	Approx. lognormal	0.19	95% KM (BCA)
Selenium	28	21	0.56 (U)	2.5	Normal	1.56	95% KM (t)
Zinc	28	28	21	168	Nonparametric	56.7	95% Student's-t
Organic Chemicals (mg/kg)							
Acenaphthene	28	2	0.079	1.4	n/a	1.4	Maximum detected concentration
Acetone	28	6	0.007	0.023 (U)	Normal	0.015	95% KM (t)
Amino-2,6-dinitrotoluene[4-]	28	1	0.052 (U)	0.25 (U)	n/a	0.084	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	28	1	0.052 (U)	0.25 (U)	n/a	0.055	Maximum detected concentration
Anthracene	28	2	0.17 (U)	1.3	n/a	1.3	Maximum detected concentration
Benzo(a)anthracene	28	3	0.084	4.8	n/a	4.8	Maximum detected concentration
Benzo(a)pyrene	28	3	0.079	3.6	n/a	3.6	Maximum detected concentration
Benzo(b)fluoranthene	28	4	0.04	5.1	n/a	5.1	Maximum detected concentration
Benzo(g,h,i)perylene	28	2	0.17 (U)	1.2	n/a	1.2	Maximum detected concentration
Benzo(k) fluoranthene	28	3	0.048	2.2	n/a	2.2	Maximum detected concentration
Benzoic acid	28	1	0.64	1.8 (U)	n/a	0.64	Maximum detected concentration

Table I-3.3-51 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Chrysene	28	3	0.087	4.6	n/a	4.6	Maximum detected concentration
Dibenz(a,h)anthracene	28	1	0.061	0.36 (U)	n/a	0.061	Maximum detected concentration
Dibenzofuran	28	1	0.17 (U)	0.58	n/a	0.58	Maximum detected concentration
Fluoranthene	28	4	0.054	9.9	n/a	9.9	Maximum detected concentration
Fluorene	28	2	0.074	0.94	n/a	0.94	Maximum detected concentration
Indeno(1,2,3-cd)pyrene	28	2	0.17 (U)	1.5	n/a	1.5	Maximum detected concentration
Methylene chloride	28	1	0.0037 (U)	0.011 (U)	n/a	0.0086	Maximum detected concentration
Methylnaphthalene[2-]	28	1	0.17 (U)	0.36 (U)	n/a	0.22	Maximum detected concentration
Naphthalene	28	1	0.17 (U)	0.95	n/a	0.95	Maximum detected concentration
Phenanthrene	28	3	0.12	7.2	n/a	7.2	Maximum detected concentration
Pyrene	28	4	0.042	6.9	n/a	6.9	Maximum detected concentration
RDX	28	1	0.1 (U)	1 (U)	n/a	0.49	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	2	2	7.46E-08	1.82E-07	n/a	1.82E-07	Maximum detected concentration
Trichlorofluoromethane	28	1	0.00045	0.011 (U)	n/a	0.00045	Maximum detected concentration
Trinitrotoluene[2,4,6-]	28	1	0.047	0.25 (U)	n/a	0.047	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-238	22	22	0.19	5.26	Gamma	1.57	95% Adjusted Gamma KM

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-52
EPCs at SWMU 36-006 for the Residential and Construction Worker Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	28	1	0.07 (U)	11 (UJ)	n/a*	1.6	Maximum detected concentration
Copper	28	28	3.1	3140	Nonparametric	615	95% Chebyshev (Mean, Sd)
Mercury	28	12	0.0174	1.48	Approx. normal	0.19	95% KM (BCA)
Selenium	28	21	0.56 (U)	2.5	Normal	1.56	95% KM (t)
Zinc	28	28	21	168	Nonparametric	56.7	95% Student's-t
Organic Chemicals (mg/kg)							
Acenaphthene	28	2	0.079	1.4	n/a	1.4	Maximum detected concentration
Acetone	28	6	0.007	0.023 (U)	Nonparametric	0.015	95% KM (t)
Amino-2,6-dinitrotoluene[4-]	28	1	0.052 (U)	0.25 (U)	n/a	0.084	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	28	1	0.052 (U)	0.25 (U)	n/a	0.055	Maximum detected concentration
Anthracene	28	2	0.17 (U)	1.3	n/a	1.3	Maximum detected concentration
Benzo(a)anthracene	28	3	0.084	4.8	n/a	4.8	Maximum detected concentration
Benzo(a)pyrene	28	3	0.079	3.6	n/a	3.6	Maximum detected concentration
Benzo(b)fluoranthene	28	4	0.04	5.1	n/a	5.1	Maximum detected concentration
Benzo(g,h,i)perylene	28	2	0.17 (U)	1.2	n/a	1.2	Maximum detected concentration
Benzo(k)fluoranthene	28	3	0.048	2.2	n/a	2.2	Maximum detected concentration
Benzoic acid	28	1	0.64	1.8 (U)	n/a	0.64	Maximum detected concentration

Table I-3.3-52 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Chrysene	28	3	0.087	4.6	n/a	4.6	Maximum detected concentration
Dibenz(a,h)anthracene	28	1	0.061	0.36 (U)	n/a	0.061	Maximum detected concentration
Dibenzofuran	28	1	0.17 (U)	0.58	n/a	0.58	Maximum detected concentration
Dinitroaniline[3,5-]	22	1	0.036	0.055 (U)	n/a	0.036	Maximum detected concentration
Fluoranthene	28	4	0.054	9.9	n/a	9.9	Maximum detected concentration
Fluorene	28	2	0.074	0.94	n/a	0.94	Maximum detected concentration
Indeno(1,2,3-cd)pyrene	28	2	0.17 (U)	1.5	n/a	1.5	Maximum detected concentration
Isopropyltoluene[4-]	28	1	0.0037	0.0057 (U)	n/a	0.0037	Maximum detected concentration
Methylene chloride	28	1	0.0037 (U)	0.011 (U)	n/a	0.0086	Maximum detected concentration
Methylnaphthalene[2-]	28	1	0.17 (U)	0.36 (U)	n/a	0.22	Maximum detected concentration
Naphthalene	28	1	0.17 (U)	0.95	n/a	0.95	Maximum detected concentration
Phenanthrene	28	3	0.12	7.2	n/a	7.2	Maximum detected concentration
Pyrene	28	4	0.042	6.9	n/a	6.9	Maximum detected concentration
RDX	28	1	0.1 (U)	1 (U)	n/a	0.49	Maximum detected concentration
TATB	22	1	0.42 (U)	2.7	n/a	2.7	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	2	2	7.46E-08	1.82E-07	n/a	1.82E-07	Maximum detected concentration
Trichlorofluoromethane	28	1	0.00045	0.011 (U)	n/a	0.00045	Maximum detected concentration
Trinitrobenzene[1,3,5-]	28	1	0.037	0.25 (U)	n/a	0.037	Maximum detected concentration
Trinitrotoluene[2,4,6-]	28	1	0.047	0.25 (U)	n/a	0.047	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-238	22	22	0.19	5.26	Gamma	1.57	95% Adjusted Gamma KM

Note: Data qualifiers are defined in Appendix A.

*n/a = Not applicable.

Table I-3.3-53
TEFs Used for Calculating TCDD-Equivalent Concentrations

Dioxin and Furan Congeners	TEFs*
Tetrachlorodibenzodioxin[2,3,7,8-]	1
Pentachlorodibenzodioxin[1,2,3,7,8-]	1
Hexachlorodibenzodioxin[1,2,3,4,7,8-]	0.1
Hexachlorodibenzodioxin[1,2,3,6,7,8-]	0.1
Hexachlorodibenzodioxin[1,2,3,7,8,9-]	0.1
Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]	0.01
Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]	0.0003
Tetrachlorodibenzofuran[2,3,7,8-]	0.1
Pentachlorodibenzofuran[1,2,3,7,8-]	0.03
Pentachlorodibenzofuran[2,3,4,7,8-]	0.3
Hexachlorodibenzofuran[1,2,3,4,7,8-]	0.1
Hexachlorodibenzofuran[1,2,3,6,7,8-]	0.1
Hexachlorodibenzofuran[1,2,3,7,8,9-]	0.1
Hexachlorodibenzofuran[2,3,4,6,7,8-]	0.1
Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	0.01
Heptachlorodibenzofuran[1,2,3,4,7,8,9-]	0.01
Octachlorodibenzofuran[1,2,3,4,6,7,8,9-]	0.0003

*TEFs from NMED (2015, 600575).

Table I-4.1-1
Exposure Parameter Values Used to Calculate
Chemical SSLs for the Residential, Industrial, and Construction Worker Scenarios

Parameters	Residential	Industrial	Construction Worker
Target HQ	1	1	1
Target cancer risk	10^{-5}	10^{-5}	10^{-5}
Averaging time (carcinogen/mutagen)	70 yr × 365 d	70 yr × 365 d	70 yr × 365 d
Averaging time (noncarcinogen)	Exposure duration × 365 d	Exposure duration × 365 d	Exposure duration × 365 d
Skin absorption factor	Chemical-specific	Chemical-specific	Chemical-specific
Adherence factor–child	0.2 mg/cm^2	n/a[a]	n/a
Body weight–child	15 kg (0–6 yr of age)	n/a	n/a
Cancer slope factor–oral (chemical-specific)	(mg/kg-d)$^{-1}$	(mg/kg-d)$^{-1}$	(mg/kg-d)$^{-1}$
Inhalation unit risk (chemical-specific)	(µg/m^3)	(µg/m^3)	(µg/m^3)
Exposure frequency	350 d/yr	225 d/yr	250 d/yr
Exposure time	24 h/d	8 h/day	8 h/d
Exposure duration–child	6 yr[b]	n/a	n/a
Age-adjusted ingestion factor for carcinogens	36,750 mg/kg	n/a	n/a
Age-adjusted ingestion factor for mutagens	166,833 mg/kg	n/a	n/a
Soil ingestion rate–child	200 mg/d	n/a	n/a
Particulate emission factor	6.61 × 10^9 m^3/kg	6.61 × 10^9 m^3/kg	2.1 ×10^6 m^3/kg
Reference dose–oral (chemical-specific)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)
Reference dose–inhalation (chemical-specific)	(mg/kg-d)	(mg/kg-d)	(mg/kg-d)
Exposed surface area–child	2690 cm^2/d	n/a	n/a
Age-adjusted skin contact factor f carcinogens	112266 mg/kg	n/a	n/a
Age-adjusted skin contact factor for mutagens	475,599 mg/kg	n/a	n/a
Volatilization factor for soil (chemical-specific)	(m^3/kg)	(m^3/kg)	(m^3/kg)
Body weight–adult	80 kg	80 kg	80 kg
Exposure duration[c]	30 yr[d]	25 yr	1 yr
Adherence factor–adult	0.07 mg/cm^2	0.12 mg/cm^2	0.3 mg/cm^2
Soil ingestion rate–adult	100 mg/d	100 mg/d	330 mg/d
Exposed surface area–adult	6032 cm^2/d	3470 cm^2/d	3300 cm^2/d

Note: Parameter values from NMED (2015, 600575).

[a] n/a = Not applicable.

[b] The child exposure duration for mutagens is subdivided into 0–2 yr and 2–6 yr.

[c] Exposure duration for lifetime resident is 26 yr. For carcinogens, the exposures are combined for child (6 yr) and adult (20 yr).

[d] The adult exposure duration for mutagens is subdivided into 6–16 yr and 16–30 yr.

Table I-4.1-2
Parameters Used in the SAL Calculations for Radionuclides, Residential

Parameters	Residential, Child	Residential, Adult
Inhalation rate (m^3/yr)	4712[a]	7780[b]
Mass loading (g/m^3)	1.5E-07[c]	1.5E-07[c]
Outdoor time fraction	0.0926[d]	0.0934[e]
Indoor time fraction	0.8656[f]	0.8648[g]
Soil ingestion (g/yr)	73[h]	36.5[i]

[a] Calculated as 12.9 m^3/d × 365.25 d/yr, where 12.9 m^3/d is the mean upper percentile daily inhalation rate of a child (EPA 2011, 208374, Table 6-1).

[b] Calculated as 21.3 m^3/d × 365.25 d/yr, where 21.3 m^3/d is the mean upper percentile daily inhalation rate of an adult from 21 to less than 61 yr old (EPA 2011, 208374, Table 6-1).

[c] Calculated as (1/6.6 × 10^9 m^3/kg) × 1000 g/kg, where 6.6 × 10^9 m^3/kg is the particulate emission factor (NMED 2015, 600575).

[d] Calculated as (2.32 h/d × 350 d/yr)/8766 h/yr, where 2.32 h/d (139 min) is the largest amount of time spent outdoors for child age groups between 1 to less than 3 mo and 3 to less than 6 yr (EPA 2011, 208374, Table 16-1) and is comparable with the adult time spent outdoors at a residence.

[e] Calculated as (2.34 h/d × 350 d/yr)/8766 h/yr, where 4.68 h/d is the average total time spent outdoors for adults age 18 to less than 65 yr in all environments (EPA 2011, 208374, Table 16-1); 50% of this value (2.34 h/d) was applied to time spent outdoors at a residence and is similar to mean time outdoors at a residence for this age group (EPA 2011, 208374, Table 16-22).

[f] Calculated as [(24 h/d–2.32 h/d) × 350 d/yr]/8766 h/yr.

[g] Calculated as [(24 h/d–2.34 h/d) × 350 d/yr]/8766 h/yr.

[h] The soil ingestion rate compensates for the time-based occupancy factor applied by RESRAD in calculating exposure from the soil ingestion pathway. Calculated as [0.2 g/d × 350 d/yr]/[indoor + outdoor time fractions], where 0.2 g/d is the upper percentile site-related daily child soil ingestion rate (NMED 2015, 600575; EPA 2011, 208374, Table 5-1).

[i] The soil ingestion rate compensates for the time-based occupancy factor applied by RESRAD in calculating exposure from the soil ingestion pathway. Calculated as [0.1 g/d × 350 d/yr]/[indoor + outdoor time fractions], where 0.1 g/d is the site-related daily adult soil ingestion rate (NMED 2015, 600575).

Table I-4.1-3
Parameter Values Used to Calculate Radionuclide SALs for the Industrial and Construction Worker Scenarios

Parameters	Industrial, Adult	Construction Worker, Adult
Inhalation rate (m^3/yr)	7780[a]	7780[a]
Mass loading (g/m^3)	1.5×10^{-7} [b]	0.0004[c]
Outdoor time fraction	0.2053[d]	0.2282[e]
Indoor time fraction	0[f]	0
Soil ingestion (g/yr)	109.6[g]	362[h]

[a] Calculated as [21.3 m^3/d × 365.25 d/yr], where 21.3 m^3/d is the upper percentile daily inhalation rate of an adult from 21 to less than 61 yr old (EPA 2011, 208374, Table 6-1).

[b] Calculated as (1/6.6 × 10^9 m^3/kg) x 1000 g/kg, where 6.6 × 10^9 m^3/kg is the particulate emission factor (NMED 2015, 600575).

[c] Calculated as (1/2.1 × 10^6 m^3/kg) × 1000 g/kg, where 2.1 × 10^6 m^3/kg is the particulate emission factor (NMED 2015, 600575).

[d] Calculated as (8 h/d × 225 d/yr)/8766 h/yr, where 8 h/d is an estimate of the average length of the work day and 225 d/yr is the exposure frequency (NMED 2015, 600575).

[e] Calculated as (8 h/d × 250 d/yr)/8766 h/yr, where 8 h/d is an estimate of the average length of the work day and 250 d/yr is the exposure frequency (NMED 2015, 600575).

[f] The commercial/industrial worker is defined as someone who "spends most of the work day conducting maintenance or manual labor activities outdoors" (NMED 2015, 600575, p. 13).

[g] The soil-ingestion rate compensates for the time-based occupancy factor applied by RESRAD in calculating exposure from the soil-ingestion pathway. Calculated as [0.1 g/d × 225 d/yr]/[indoor + outdoor time fractions], where 0.1 g/d is the site-related daily adult soil-ingestion rate (NMED 2015, 600575).

[h] The soil-ingestion rate compensates for the time-based occupancy factor applied by RESRAD in calculating exposure from the soil ingestion pathway. Calculated as [0.33 g/d × 250 d/yr]/ [indoor + outdoor time fractions], where 0.33 g/d is the site-related daily soil ingestion rate for a construction worker (NMED 2015, 600575).

Table I-4.2-1
Essential Nutrient Screening for SWMU 15-002, Former North Burn Pit

Essential Nutrient	Maximum Detected Concentration (mg/kg)	Industrial SSL* (mg/kg)	Industrial Ratio	Construction Worker SSL* (mg/kg)	Construction Worker Ratio	Residential SSL* (mg/kg)	Residential Ratio
Calcium	9850	32400000	0.0003	8850000	0.0011	13000000	0.00076
Magnesium	2470	5680000	0.000043	1550000	0.0016	339000	0.0073
Potassium	2030	73000000	0.000028	19900000	0.0001	15600000	0.0013

* SSLs from NMED (2015, 600575).

Table I-4.2-2
Industrial Carcinogenic Screening for SWMU 15-002, Former North Burn Pit

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Bis(2-ethylhexyl)phthalate	0.14	1830	7.65E-10
TCDD[2,3,7,8-] equivalent	1.26E-07	2.48E-04	5.08E-09
Total Excess Cancer Risk			**6E-09**

* SSLs from NMED (2015, 600575).

Table I-4.2-3
Industrial Noncarcinogenic Screening
for SWMU 15-002, Former North Burn Pit

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	HQ
Aluminum	12700	1290000	9.84E-03
Barium	271	255000	1.06E-03
Copper	9.1	51900	1.75E-04
Lead	21.9	800	2.74E-02
Manganese	2400	160000	1.50E-02
Mercury	1.29	389	3.32E-03
Selenium	1.5	6490	2.31E-04
Di-n-butylphthalate	0.69	91600	7.53E-06
		HI	**0.06**

* SSLs from NMED (2015, 600575).

Table I-4.2-4
Construction Worker Noncarcinogenic Screening
for SWMU 15-002, Former North Burn Pit

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	HQ
Aluminum	10887	41400	2.63E-01
Barium	148	4390	3.37E-02
Copper	8.69	14200	6.12E-04
Lead	25.8	800	3.23E-02
Manganese	1094	464	2.36E+00
Mercury	0.52	77.1	6.74E-03
Perchlorate	0.0032	248	1.29E-05
Selenium	1.69	1750	9.66E-04
Acetone	0.083	242000	3.43E-07
Bis(2-ethylhexyl)phthalate	0.15	5380	2.79E-05
Di-n-butylphthalate	0.69	26900	2.57E-05
Diethylphthalate	0.18	215000	8.37E-07
TCDD[2,3,7,8-] equivalent	8.01E-08	2.26E-04	3.54E-04
		HI	**3**

* SSLs from NMED (2015, 600575).

Table I-4.2-5
Residential Carcinogenic Screening
for SWMU 15-002, Former North Burn Pit

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Bis(2-ethylhexyl)phthalate	0.15	380	3.95E-09
TCDD[2,3,7,8-] equivalent	8.01E-08	4.90E-05	1.63E-08
		Total Excess Cancer Risk	**2E-08**

* SSLs from NMED (2015, 600575).

Table I-4.2-6
Residential Noncarcinogenic Screening
for SWMU 15-002, Former North Burn Pit

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	HQ
Aluminum	10887	78000	1.40E-01
Barium	148	15600	9.49E-03
Copper	8.69	3130	2.78E-03
Lead	25.8	400	6.45E-02
Manganese	1094	10500	1.04E-01
Mercury	0.52	23.5	2.21E-02
Perchlorate	0.0032	54.8	5.84E-05
Selenium	1.69	391	4.32E-03
Acetone	0.083	66300	1.25E-06
Di-n-butylphthalate	0.69	6160	1.12E-04
Diethylphthalate	0.18	49300	3.65E-06
		HI	**0.3**

* SSLs from NMED (2015, 600575).

Table I-4.2-7
Industrial TPH Screening Evaluation
for SWMU 15-002, Former North Burn Pit

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	HQ
TPH-DRO	8.1	3000	0.003
		HI	**0.003**

* Screening guideline for diesel No. 2 from NMED (2015, 600575).

Table I-4.2-8
Construction Worker TPH Screening Evaluation
for SWMU 15-002, Former North Burn Pit

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	HQ
TPH-DRO	8.1	3000	0.0027
		HI	**0.003**

* Industrial screening guideline for diesel No. 2 from NMED (2015, 600575).

Table I-4.2-9
Residential TPH Screening Evaluation
for SWMU 15-002, Former North Burn Pit

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	HQ
TPH-DRO	8.1	1000	0.0081
		HI	**0.008**

* Screening guideline for diesel No. 2 from NMED (2015, 600575).

Table I-4.2-10
Essential Nutrient Screening for SWMU 15-002, Former South Burn Pit

Essential Nutrient	Maximum Detected Concentration (mg/kg)	Industrial SSL* (mg/kg)	Industrial Ratio	Construction Worker SSL* (mg/kg)	Construction Worker Ratio	Residential SSL* (mg/kg)	Residential Ratio
Calcium	3180	32400000	0.000098	8850000	0.00036	13000000	0.00024
Magnesium	3200	5680000	0.00056	1550000	0.021	339000	0.0094
Potassium	4440	73000000	0.0000061	19900000	0.00022	15600000	0.00028

* SSLs from NMED (2015, 600575).

Table I-4.2-11
Industrial Carcinogenic Screening
for SWMU 15-002, Former South Burn Pit

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Arsenic	3.6	21.5	1.67E-06
Chromium (total)	12.7	505	2.51E-07
Bis(2-ethylhexyl)phthalate	0.13	1830	7.10E-10
Dinitrotoluene[2,4-]	0.012	82.3	1.46E-09
RDX	2.6	311	8.36E-08
TCDD[2,3,7,8-] equivalent	2.15E-06	2.48E-04	8.67E-08
		Total Excess Cancer Risk	**2E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-12
Industrial Noncarcinogenic Screening
for SWMU 15-002, Former South Burn Pit

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Aluminum	14300	1290000	1.11E-02
Antimony	12.5	519	2.41E-02
Barium	18200	255000	7.14E-02
Beryllium	1.1	2580	4.26E-04
Copper	146	51900	2.81E-03
Cyanide	1.9	63.3	3.00E-02
Lead	170	800	2.13E-01
Mercury	1120	389	2.88E+00
Nickel	11.8	25700	4.59E-04
Perchlorate	0.0022	908	2.42E-06
Selenium	1.6	6490	2.47E-04
Zinc	112	389000	2.88E-04
Amino-2,6-dinitrotoluene[4-]	0.15	2300[b]	6.52E-05
Amino-4,6-dinitrotoluene[2-]	0.12	2300[b]	5.22E-05
Dinitroaniline[3,5-]	0.037	32000[b,c]	1.16E-06
HMX	0.44	63300	6.95E-06
Trinitrobenzene[1,3,5-]	0.0097	32000[b]	3.03E-07
Trinitrotoluene[2,4,6-]	0.11	573	1.92E-04
		HI	**3**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table I-4.2-13
Construction Worker Noncarcinogenic Screening
for SWMU 15-002, Former South Burn Pit

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	14954	41400	3.61E-01
Antimony	12.5	142	8.80E-02
Arsenic	3.4	57.4	5.92E-02
Barium	6981	4390	1.59E+00
Beryllium	1.13	148	7.64E-03
Chromium (Total)	14.6	134	1.09E-01
Copper	298	14200	2.10E-02
Cyanide	1.9	12.1	1.57E-01
Lead	44.6	800	5.58E-02
Mercury	402	77.1	5.21E+00
Nickel	11.3	753	1.50E-02
Perchlorate	0.0029	248	1.17E-05
Selenium	2.03	1750	1.16E-03
Zinc	51.3	106000	4.84E-04
Amino-2,6-dinitrotoluene[4-]	0.15	688[b]	2.18E-04
Amino-4,6-dinitrotoluene[2-]	0.12	695[b]	1.73E-04
Bis(2-ethylhexyl)phthalate	0.13	5380	2.42E-05
Dinitroaniline[3,5-]	0.037	10000[b,c]	3.70E-06
Dinitrotoluene[2,4-]	0.012	536	2.24E-05
HMX	0.6	17400	3.45E-05
RDX	2.6	1010	2.57E-03
TCDD[2,3,7,8-] equivalent	8.15E-07	2.26E-04	3.61E-03
Trinitrobenzene[1,3,5-]	0.0097	10000[b]	9.70E-07
Trinitrotoluene[2,4,6-]	0.11	161	6.83E-04
		HI	**8**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table I-4.2-14
Residential Carcinogenic Screening
for SWMU 15-002, Former South Burn Pit

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Arsenic	3.4	4.25	8.00E-06
Chromium (total)	14.6	96.6	1.51E-06
Bis(2-ethylhexyl)phthalate	0.13	380	3.42E-09
Dinitrotoluene[2,4-]	0.012	17.1	7.02E-09
RDX	2.6	60.4	4.30E-07
TCDD[2,3,7,8-] equivalent	8.15E-07	4.90E-05	1.66E-07
		Total Excess Cancer Risk	**1E-05**

* SSLs from NMED (2015, 600575).

Table I-4.2-15
Residential Noncarcinogenic Screening
for SWMU 15-002, Former South Burn Pit

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	14954	78000	1.92E-01
Antimony	12.5	31.3	3.99E-01
Barium	6981	15600	4.48E-01
Beryllium	1.13	156	7.24E-03
Copper	298	3130	9.52E-02
Cyanide	1.9	11.2	1.70E-01
Lead	44.6	400	1.12E-01
Mercury	402	23.5	1.71E+01
Nickel	11.3	1560	7.24E-03
Perchlorate	0.0029	54.8	5.29E-05
Selenium	2.03	391	5.19E-03
Zinc	51.3	23500	2.18E-03
Amino-2,6-dinitrotoluene[4-]	0.15	150[b]	1.00E-03
Amino-4,6-dinitrotoluene[2-]	0.12	150[b]	8.00E-04
Dinitroaniline[3,5-]	0.037	2200[b,c]	1.68E-05
HMX	0.6	3850	1.56E-04
Trinitrobenzene[1,3,5-]	0.0097	2200[b]	4.41E-06
Trinitrotoluene[2,4,6-]	0.11	36	3.06E-03
		HI	**19**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

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Table I-4.2-16
Industrial TPH Screening Evaluation
for SWMU 15-002, Former South Burn Pit

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	HQ
TPH-DRO	18	3000	0.006
		HI	**0.006**

* Screening guideline for diesel No. 2 from NMED (2015, 600575).

Table I-4.2-17
Construction Worker TPH Screening Evaluation
for SWMU 15-002, Former South Burn Pit

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	HQ
TPH-DRO	4.3	3000	0.0014
		HI	**0.001**

* Industrial screening guideline for diesel No. 2 from NMED (2015, 600575).

Table I-4.2-18
Residential TPH Screening Evaluation
for SWMU 15-002, Former South Burn Pit

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	HQ
TPH-DRO	4.3	1000	0.0043
		HI	**0.004**

* Screening guideline for diesel No. 2 from NMED (2015, 600575).

Table I-4.2-19
Essential Nutrient Screening for SWMUs 15-004(b) and 15-004(c)

COPC	Maximum Detected Concentration (mg/kg)	Industrial SSL* (mg/kg)	Industrial Ratio	Construction Worker SSL* (mg/kg)	Construction Worker Ratio	Residential SSL* (mg/kg)	Residential Ratio
Calcium	8140	32400000	0.00025	8850000	0.00092	13000000	0.00063

* SSLs from NMED (2015, 600575).

Table I-4.2-20
Industrial Noncarcinogenic Screening for SWMUs 15-004(b) and 15-004(c)

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Aluminum	12578	1290000	9.75E-03
Barium	512	255000	2.01E-03
Beryllium	1.06	2580	4.11E-04
Cadmium	20.1	1110	1.81E-02
Cobalt	8.27	350[b]	2.36E-02
Copper	171	51900	3.29E-03
Lead	439	800	5.49E-01
Manganese	498	160000	3.11E-03
Mercury	0.19	389	4.88E-04
Nickel	9.69	25700	3.77E-04
Selenium	1.5	6490	2.31E-04
Thallium	1.7	13	1.31E-01
Amino-2,6-dinitrotoluene[4-]	0.0074	2300[b]	3.22E-06
Amino-4,6-dinitrotoluene[2-]	0.0076	2300[b]	3.30E-06
Benzyl alcohol	0.063	82000[b]	7.68E-07
Di-n-butylphthalate	0.99	91600	1.08E-05
Isopropyltoluene[4-]	5.80E-04	14200[c]	4.08E-08
Trimethylbenzene[1,2,4-]	1.00E-03	240[b]	4.17E-06
Trimethylbenzene[1,3,5-]	6.10E-04	12000[b]	5.08E-08
Trinitrotoluene[2,4,6-]	0.0072	573	1.26E-05
		HI	**0.7**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-21
Industrial Carcinogenic Screening for SWMUs 15-004(b) and 15-004(c)

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Arsenic	3.61	21.5	1.68E-06
Chromium (Total)	11.1	505	2.20E-07
Bis(2-ethylhexyl)phthalate	0.47	1830	2.57E-09
TCDD[2,3,7,8-] equivalent	8.16E-10	2.50E-04	3.26E-11
		Total Excess Cancer Risk	**2E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-22
Industrial Radionuclide Screening for SWMUs 15-004(b) and 15-004(c)

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	1.4	3000	0.012
Uranium-238	1.5	750	0.05
		Total Dose	**0.06**

* SALs from LANL (2014, 600064).

Table I-4.2-23
Construction Worker Noncarcinogenic Screening for SWMUs 15-004(b) and 15-004(c)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	13256	41400	3.20E-01
Arsenic	3.71	57.4	6.46E-02
Barium	404	4390	9.20E-02
Beryllium	1.07	148	7.23E-03
Cadmium	10.5	72.1	1.46E-01
Chromium (total)	12.5	134	9.33E-02
Cobalt	8.12	36.6[b]	2.22E-01
Copper	97.1	14200	6.84E-03
Lead	251	800	3.14E-01
Manganese	415	464	8.94E-01
Mercury	0.11	77.1	1.43E-03
Nickel	10.2	753	1.35E-02
Selenium	1.72	1750	9.83E-04
Thallium	0.54	3.54	1.53E-01
Acetone	0.012	242000	4.96E-08
Amino-2,6-dinitrotoluene[4-]	0.0074	688[b]	1.08E-05
Amino-4,6-dinitrotoluene[2-]	0.0076	695[b]	1.09E-05
Benzyl alcohol	0.079	26900[b]	2.94E-06
Bis(2-ethylhexyl)phthalate	0.13	5380	2.42E-05
Di-n-butylphthalate	0.99	26900	3.68E-05
HMX	0.086	17400	4.94E-06
Isopropyltoluene[4-]	0.00058	2740[c]	2.12E-07
RDX	0.31	1010	3.07E-04
TCDD[2,3,7,8-] equivalent	8.16E-10	2.26E-04	3.61E-06
Trimethylbenzene[1,2,4-]	0.0011	245[b]	4.49E-06
Trimethylbenzene[1,3,5-]	0.00061	3540[b]	1.72E-07
Trinitrotoluene[2,4,6-]	0.0098	161	6.09E-05
Xylene (total)	0.00095	798	1.19E-06
		HI	**2**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-24
Construction Worker Radionuclide Screening for SWMUs 15-004(b) and 15-004(c)

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	1.28	770	0.042
Uranium-238	1.38	410	0.084
		Total Dose	**0.1**

* SALs from LANL (2014, 600064).

Table I-4.2-25
Residential Noncarcinogenic Screening for SWMUs 15-004(b) and 15-004(c)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	13256	78000	1.70E-01
Barium	404	15600	2.59E-02
Beryllium	1.07	156	6.86E-03
Cadmium	10.5	70.5	1.49E-01
Cobalt	8.12	23[b]	3.53E-01
Copper	97.1	3130	3.10E-02
Lead	251	400	6.28E-01
Manganese	415	10500	3.95E-02
Mercury	0.11	23.5	4.68E-03
Nickel	10.2	1560	6.54E-03
Selenium	1.72	391	4.40E-03
Thallium	0.54	0.782	6.91E-01
Acetone	0.012	66300	1.81E-07
Amino-2,6-dinitrotoluene[4-]	0.0074	150[b]	4.93E-05
Amino-4,6-dinitrotoluene[2-]	0.0076	150[b]	5.07E-05
Benzyl alcohol	0.079	6300[b]	1.25E-05
Di-n-butylphthalate	0.99	6160	1.61E-04
HMX	0.086	3850	2.23E-05
Isopropyltoluene[4-]	0.00058	2360[c]	2.46E-07
Trimethylbenzene[1,2,4-]	0.0011	58[b]	1.90E-05
Trimethylbenzene[1,3,5-]	0.00061	780[b]	7.82E-07
Trinitrotoluene[2,4,6-]	0.0098	36	2.72E-04
Xylene (total)	0.00095	871	1.09E-06
		HI	**2**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-26
Residential Carcinogenic Screening for SWMUs 15-004(b) and 15-004(c)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Arsenic	3.71	4.25	8.73E-06
Chromium (Total)	12.5	96.6	1.29E-06
Bis(2-ethylhexyl)phthalate	0.13	380	3.42E-09
RDX	0.31	60.4	5.13E-08
TCDD[2,3,7,8-] equivalent	8.16E-10	4.90E-05	1.67E-10
Total Excess Cancer Risk			**1E-05**

* SSLs from NMED (2015, 600575).

Table I-4.2-27
Residential Radionuclide Screening for SWMUs 15-004(b) and 15-004(c)

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	1.28	270	0.12
Uranium-238	1.38	150	0.23
Total Dose			**0.4**

*SALs from LANL (2014, 600064).

Table I-4.2-28
Essential Nutrient Screening for SWMU 15-004(f)

COPC	Maximum Detected Concentration (mg/kg)	Industrial SSL[a] (mg/kg)	Industrial Ratio	Construction Worker SSL* (mg/kg)	Construction Worker Ratio	Residential SSL* (mg/kg)	Residential Ratio
Calcium	13300	32400000	0.00025	8850000	0.00092	13000000	0.00063
Magnesium	4240	5680000	0.00071	1550000	0.0026	339000	0.012

* SSLs from NMED (2015, 600575).

Table I-4.2-29
Industrial Noncarcinogenic Screening for SWMU 15-004(f)

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Aluminum	11835	1290000	9.17E-03
Antimony	2.17	519	4.18E-03
Barium	243	255000	9.53E-04
Beryllium	6.7	2580	2.60E-03
Cadmium	1.8	1110	1.62E-03
Cobalt	5.92	350[b]	1.69E-02
Copper	1329	51900	2.56E-02
Iron	13835	908000	1.52E-02
Lead	63.1	800	7.89E-02
Manganese	425	160000	2.66E-03
Mercury	0.3	389	7.71E-04
Nickel	11.5	25700	4.47E-04
Selenium	1.31	6490	2.02E-04
Silver	3.11	6490	4.79E-04
Uranium	1375	3880	3.54E-01
Zinc	131	389000	3.37E-04
Amino-4,6-dinitrotoluene[2-]	0.0072	2300[b]	3.13E-06
Dinitroaniline[3,5-]	0.0048	32000[b,c]	1.50E-07
Tris(o-cresyl)phosphate	0.064	16000[b,d]	4.00E-06
		HI	**0.5**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[d] Tricresyl phosphate used as a surrogate based on structural similarity.

Table I-4.2-30
Industrial Carcinogenic Screening for SWMU 15-004(f)

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Arsenic	3.88	21.5	1.80E-06
Chromium (Total)	12.5	505	2.48E-07
Dinitrotoluene[2,4-]	0.004	82.3	4.86E-10
Dinitrotoluene[2,6-]	0.0064	17.2	3.72E-09
TCDD[2,3,7,8-]	1.31E-07	2.48E-04	5.28E-09
		Total Excess Cancer Risk	**2E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-31
Industrial Radionuclide Screening for SWMU 15-004(f)

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.4	39	0.26
Uranium-234	85.8	3000	0.72
Uranium-235/236	10.2	150	1.7
Uranium-238	477	750	15.9
		Total Dose	**19**

* SALs from LANL (2014, 600064).

Table I-4.2-32
Construction Worker Noncarcinogenic Screening for SWMU 15-004(f)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	11941	41400	2.88E-01
Antimony	0.7	142	4.93E-03
Arsenic	3.05	57.4	5.31E-02
Barium	204	4390	4.65E-02
Beryllium	2.3	148	1.55E-02
Cadmium	2.09	72.1	2.90E-02
Chromium (Total)	12.5	134	9.33E-02
Cobalt	4.65	36.6[b]	1.27E-01
Copper	4014	14200	2.83E-01
Iron	12756	248000	5.14E-02
Lead	33.6	800	4.20E-02
Manganese	361	464	7.78E-01
Mercury	0.17	77.1	2.20E-03
Nickel	9.34	753	1.24E-02
Selenium	1.55	1750	8.86E-04
Silver	1.39	1770	7.85E-04
Uranium	849	277	3.06E+00
Zinc	73.8	106000	6.96E-04
Amino-4,6-dinitrotoluene[2-]	0.0072	695[b]	1.04E-05
Dinitroaniline[3,5-]	0.0048	10000[b,c]	4.80E-07
Dinitrotoluene[2,4-]	0.004	536	7.46E-06
Dinitrotoluene[2,6-]	0.0064	80.9	7.91E-05
TCDD[2,3,7,8-] equivalent	1.31E-07	2.26E-04	5.80E-04
Tris(o-cresyl)phosphate	0.064	5380[b,d]	1.19E-05
		HI	**5**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[d] Tricresyl phosphate used as a surrogate based on structural similarity.

Table I-4.2-33
Construction Worker Radionuclide Screening for SWMU 15-004(f)

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.28	31	0.23
Uranium-234	58.4	770	1.9
Uranium-235/236	4.9	100	1.23
Uranium-238	191	410	11.6
		Total Dose	**15**

* SALs from LANL (2014, 600064).

Table I-4.2-34
Residential Noncarcinogenic Screening for SWMU 15-004(f)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	11941	78000	1.53E-01
Antimony	0.7	31.3	2.24E-02
Barium	204	15600	1.31E-02
Beryllium	2.3	156	1.47E-02
Cadmium	2.09	70.5	2.96E-02
Cobalt	4.65	23[b]	2.02E-01
Copper	4014	3130	1.28E+00
Iron	12756	54800	2.33E-01
Lead	33.6	400	8.40E-02
Manganese	361	10500	3.44E-02
Mercury	0.17	23.5	7.23E-03
Nickel	9.34	1560	5.99E-03
Selenium	1.55	391	3.96E-03
Silver	1.39	391	3.55E-03
Uranium	849	234	3.63E+00
Zinc	73.8	23500	3.14E-03
Amino-4,6-dinitrotoluene[2-]	0.0072	150[b]	4.80E-05
Dinitroaniline[3,5-]	0.0048	2200[b,c]	2.18E-06
Tris(o-cresyl)phosphate	0.064	1300[b,d]	4.92E-05
		HI	**6**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[d] Tricresyl phosphate used as a surrogate based on structural similarity.

Table I-4.2-35
Residential Carcinogenic Screening for SWMU 15-004(f)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Arsenic	3.05	4.25	7.18E-06
Chromium (Total)	12.5	96.6	1.29E-06
Dinitrotoluene[2,4-]	0.004	17.1	2.34E-09
Dinitrotoluene[2,6-]	0.0064	3.56	1.80E-08
TCDD[2,3,7,8-] equivalent	1.31E-07	4.90E-05	2.67E-08
Total Excess Cancer Risk			**9E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-36
Residential Radionuclide Screening for SWMU 15-004(f)

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.28	11	0.64
Uranium-234	58.4	270	5.41
Uranium-235/236	4.9	39	3.14
Uranium-238	191	150	32
Total Dose			**41**

* SALs from LANL (2014, 600064).

Table I-4.2-37
Industrial Noncarcinogenic Screening
for SWMU 15-004(f), Excluding Firing Point E

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	11219	1290000	8.70E-03
Antimony	0.55	519	1.06E-03
Barium	166	255000	6.51E-04
Beryllium	0.98	2580	3.80E-04
Cadmium	0.73	1110	6.58E-04
Cobalt	5	350[b]	1.43E-02
Copper	113	51900	2.18E-03
Iron	12947	908000	1.43E-02
Lead	28.7	800	3.59E-02
Manganese	413	160000	2.58E-03
Mercury	0.45	389	1.16E-03
Nickel	7.59	25700	2.95E-04

Table I-4.2-37 (continued)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Selenium	1.1	6490	1.69E-04
Silver	0.69	6490	1.06E-04
Uranium	86.7	3880	2.23E-02
Zinc	36.6	389000	9.41E-05
Amino-4,6-dinitrotoluene[2-]	0.0072	2300[b]	3.13E-06
Dinitroaniline[3,5]	0.0048	32000[b,c]	1.50E-07
		HI	**0.1**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table I-4.2-38
Industrial Carcinogenic Screening
for SWMU 15-004(f), Excluding Firing Point E

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	Cancer Risk
Arsenic	3.2	21.5	1.49E-06
Chromium (Total)	10.3	505	2.04E-07
Dinitrotoluene[2,4-]	0.004	82.3[b]	4.86E-10
Dinitrotoluene[2,6-]	0.0064	17.2[b]	3.72E-09
TCDD[2,3,7,8-] equivalent	1.61E-08	2.48E-04	6.49E-10
		Total Excess Cancer Risk	**2E-06**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-39
Industrial Radionuclide Screening
for SWMU 15-004(f), Excluding Firing Point E

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.402	39	0.26
Uranium-234	44.7	3000	0.37
Uranium-235/236	2.72	150	0.45
Uranium-238	76.6	750	2.55
		Total Dose	**4**

* SALs from LANL (2014, 600064).

Table I-4.2-40
Construction Worker Noncarcinogenic Screening
for SWMU 15-004(f), Excluding Firing Point E

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	11034	41400	2.67E-01
Antimony	0.12	142	8.45E-04
Arsenic	2.65	57.4	4.62E-02
Barium	140	4390	3.19E-02
Beryllium	0.89	148	6.01E-03
Cadmium	0.303	72.1	4.20E-03
Chromium (Total)	11.6	134	8.66E-02
Cobalt	3.46	36.6[b]	9.45E-02
Copper	43.4	14200	3.06E-03
Iron	11741	248000	4.73E-02
Lead	12.3	800	1.54E-02
Manganese	322	464	6.94E-01
Mercury	0.166	77.1	2.15E-03
Nickel	7.94	753	1.05E-02
Selenium	1.43	1750	8.17E-04
Silver	0.166	1770	9.38E-05
Uranium	59.7	277	2.16E-01
Zinc	33.4	106000	3.15E-04
Amino-4,6-dinitrotoluene[2-]	0.0072	695[b]	1.04E-05
Dinitroaniline[3,5-]	0.0048	10000[b,c]	4.80E-07
Dinitrotoluene[2,4-]	0.004	536	7.46E-06
Dinitrotoluene[2,6-]	0.0064	80.9	7.91E-05
TCDD[2,3,7,8-] equivalent	1.61E-08	2.26E-04	7.12E-05
		HI	**2**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table I-4.2-41
Construction Worker Radionuclide Screening
for SWMU 15-004(f), Excluding Firing Point E

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.3	31	0.24
Uranium-234	15.6	770	0.51
Uranium-235/236	0.61	100	0.15
Uranium-238	25.9	410	1.58
		Total Dose	**2**

* SALs from LANL (2014, 600064).

Table I-4.2-42
Residential Noncarcinogenic Screening
for SWMU 15-004(f), Excluding Firing Point E

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	11034	78000	1.41E-01
Antimony	0.12	31.3	3.83E-03
Barium	140	15600	8.97E-03
Beryllium	0.89	156	5.71E-03
Cadmium	0.303	70.5	4.30E-03
Cobalt	3.46	23[b]	1.50E-01
Copper	43.4	3130	1.39E-02
Iron	11741	54800	2.14E-01
Lead	12.3	400	3.08E-02
Manganese	322	10500	3.07E-02
Mercury	0.166	23.5	7.06E-03
Nickel	7.94	1560	5.09E-03
Selenium	1.43	391	3.66E-03
Silver	0.166	391	4.25E-04
Uranium	59.7	234	2.55E-01
Zinc	33.4	23500	1.42E-03
Amino-4,6-dinitrotoluene[2-]	0.0072	150[b]	4.80E-05
Dinitroaniline[3,5-]	0.0048	2200[b,c]	2.18E-06
		HI	**0.9**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table I-4.2-43
Residential Carcinogenic Screening
for SWMU 15-004(f), Excluding Firing Point E

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Arsenic	2.65	4.25	6.24E-06
Chromium (Total)	11.6	96.6	1.20E-06
Dinitrotoluene[2,4-]	0.004	17.1	2.34E-09
Dinitrotoluene[2,6-]	0.0064	3.56	1.80E-08
TCDD[2,3,7,8-] equivalent	1.61E-08	4.90E-05	3.29E-09
Total Excess Cancer Risk			**7E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-44
Residential Radionuclide Screening
for SWMU 15-004(f), Excluding Firing Point E

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.3	11	0.68
Uranium-234	15.6	270	1.44
Uranium-235/236	0.61	39	0.39
Uranium-238	25.9	150	4.32
Total Dose			**7**

* SALs from LANL (2014, 600064).

Table I-4.2-45
Industrial Noncarcinogenic Screening
for SWMU 15-004(f), Firing Point E Only

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Aluminum	14222	1290000	1.10E-02
Antimony	4.28	519	8.25E-03
Barium	395	255000	1.55E-03
Beryllium	16.5	2580	6.40E-03
Cadmium	4.28	1110	3.86E-03
Cobalt	7.64	350[b]	2.18E-02
Copper	3553	51900	6.85E-02
Iron	16272	908000	1.79E-02
Lead	139	800	1.74E-01

Table I-4.2-45 (continued)

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Manganese	476	160000	2.98E-03
Mercury	0.034	389	8.74E-05
Nickel	14.3	25700	5.56E-04
Selenium	1.68	6490	2.59E-04
Silver	8.13	6490	1.25E-03
Uranium	2763	3880	7.12E-01
Zinc	295	389000	7.58E-04
Tris(o-cresyl)phosphate	0.064	16000[b,c]	4.00E-06
		HI	**1**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Tricresyl phosphate used as a surrogate based on structural similarity.

Table I-4.2-46
Industrial Carcinogenic Screening
for SWMU 15-004(f), Firing Point E Only

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Arsenic	4.15	21.5	1.93E-06
Chromium (Total)	15.2	505	3.01E-07
Dinitrotoluene[2,4-]	0.0038	82.3	4.62E-10
TCDD[2,3,7,8-] equivalent	1.31E-07	2.48E-04	5.28E-09
		Total Excess Cancer Risk	**2E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-47
Industrial Radionuclide Screening
for SWMU 15-004(f), Firing Point E Only

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	176	3000	1.47
Uranium-235/236	26.1	150	4.35
Uranium-238	1050	750	35
		Total Dose	**41**

* SALs from LANL (2014, 600064).

Table I-4.2-48
Construction Worker Noncarcinogenic Screening
for SWMU 15-004(f), Firing Point E Only

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	15484	41400	3.74E-01
Antimony	1.87	142	1.32E-02
Arsenic	3.94	57.4	6.86E-02
Barium	406	4390	9.25E-02
Beryllium	7.55	148	5.10E-02
Cadmium	5.78	72.1	8.02E-02
Chromium (Total)	14.3	134	1.07E-01
Cobalt	7.07	36.6[b]	1.93E-01
Copper	11739	14200	8.27E-01
Iron	15482	248000	6.24E-02
Lead	74.5	800	9.31E-02
Manganese	451	464	9.72E-01
Mercury	0.047	77.1	6.10E-04
Nickel	12.4	753	1.65E-02
Selenium	2.06	1750	1.18E-03
Silver	3.84	1770	2.17E-03
Uranium	2763	277	9.97E+00
Zinc	152	106000	1.43E-03
Dinitrotoluene[2,4-]	0.0038	536	7.09E-06
TCDD[2,3,7,8-] equivalent	1.31E-07	2.26E-04	5.80E-04
Tris(o-cresyl)phosphate	0.064	5380[b,c]	1.19E-05
		HI	**13**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Tricresyl phosphate used as a surrogate based on structural similarity.

Table I-4.2-49
Construction Worker Radionuclide Screening
for SWMU 15-004(f), Firing Point E Only

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	98.4	770	3.19
Uranium-235/236	12	100	3
Uranium-238	375	410	22.9
		Total Dose	**29**

* SALs from LANL (2014, 600064).

Table I-4.2-50
Residential Noncarcinogenic Screening
for SWMU 15-004(f), Firing Point E Only

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	15484	78000	1.99E-01
Antimony	1.87	31.3	5.97E-02
Barium	406	15600	2.60E-02
Beryllium	7.55	156	4.84E-02
Cadmium	5.78	70.5	8.20E-02
Cobalt	7.07	23[b]	3.07E-01
Copper	11739	3130	3.75E+00
Iron	15482	54800	2.83E-01
Lead	74.5	400	1.86E-01
Manganese	451	10500	4.30E-02
Mercury	0.047	23.5	2.00E-03
Nickel	12.4	1560	7.95E-03
Selenium	2.06	391	5.27E-03
Silver	3.84	391	9.82E-03
Uranium	2763	234	1.18E+01
Zinc	152	23500	6.47E-03
Tris(o-cresyl)phosphate	0.064	1300[b,c]	4.92E-05
		HI	**17**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Tricresyl phosphate used as a surrogate based on structural similarity.

Table I-4.2-51
Residential Carcinogenic Screening
for SWMU 15-004(f), Firing Point E Only

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Arsenic	3.94	4.25	9.27E-06
Chromium (Total)	14.3	96.6	1.48E-06
Dinitrotoluene[2,4-]	0.0038	17.1	2.22E-09
TCDD[2,3,7,8-] equivalent	1.31E-07	4.90E-05	2.67E-08
		Total Excess Cancer Risk	**1E-05**

* SSLs from NMED (2015, 600575).

Table I-4.2-52
Residential Radionuclide Screening
for SWMU 15-004(f), Firing Point E Only

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	98.4	270	9.11
Uranium-235/236	12	39	7.69
Uranium-238	375	150	62.5
		Total Dose	**79**

* SALs from LANL (2014, 600064).

Table I-4.2-53
Essential Nutrient Screening for SWMU 15-007(a)

COPC	Maximum Detected Concentration (mg/kg)	Industrial SSL* (mg/kg)	Industrial Ratio	Construction Worker SSL* (mg/kg)	Construction Worker Ratio	Residential SSL* (mg/kg)	Residential Ratio
Calcium	5130	32400000	0.00016	8850000	0.00058	13000000	0.00039
Magnesium	3340	5680000	0.00059	1550000	0.0022	339000	0.01

* SSLs from NMED (2015, 600575).

Table I-4.2-54
Construction Worker Noncarcinogenic Screening for SWMU 15-007(a)

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	HQ
Aluminum	11601	41400	2.80E-01
Arsenic	2.9	57.4	5.05E-02
Barium	147	4390	3.35E-02
Chromium (Total)	9.65	134	7.20E-02
Copper	5.8	14200	4.08E-04
Lead	58.7	800	7.34E-02
Nickel	8.74	753	1.16E-02
Perchlorate	0.003	248	1.21E-05
Selenium	1.55	1750	8.86E-04
Acetone	0.029	242000	1.20E-07
Bis(2-ethylhexyl)phthalate	0.14	5380	2.60E-05
TCDD[2,3,7,8-] equivalent	1.18E-08	2.26E-04	5.22E-05
		HI	**0.5**

* SSLs from NMED (2015, 600575).

Table I-4.2-55
Residential Noncarcinogenic Screening for SWMU 15-007(a)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	HQ
Aluminum	11601	78000	1.49E-01
Barium	147	15600	9.42E-03
Copper	5.8	3130	1.85E-03
Lead	58.7	400	1.47E-01
Nickel	8.74	1560	5.60E-03
Perchlorate	0.003	54.8	5.47E-05
Selenium	1.55	391	3.96E-03
Acetone	0.029	66300	4.37E-07
		HI	**0.3**

* SSLs from NMED (2015, 600575).

Table I-4.2-56
Residential Carcinogenic Screening for SWMU 15-007(a)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Arsenic	2.9	4.25	6.82E-06
Chromium (Total)	9.65	96.6	9.99E-07
Bis(2-ethylhexyl)phthalate	0.14	380	3.68E-09
TCDD[2,3,7,8-] equivalent	1.18E-08	4.90E-05	2.41E-09
		Total Excess Cancer Risk	**8E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-57
Essential Nutrient Screening for SWMU 15-008(a)

COPC	Maximum Detected Concentration (mg/kg)	Industrial SSL* (mg/kg)	Industrial Ratio	Construction Worker SSL* (mg/kg)	Construction Worker Ratio	Residential SSL* (mg/kg)	Residential Ratio
Calcium	3090	32400000	0.0001	8850000	0.00035	13000000	0.00024
Magnesium	2140	5680000	0.00038	1550000	0.0014	339000	0.0063

* SSLs from NMED (2015, 600575).

Table I-4.2-58
Industrial Noncarcinogenic Screening for SWMU 15-008(a)

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Aluminum	11770	1290000	9.12E-03
Antimony	2.5	519	4.82E-03
Barium	387	255000	1.52E-03
Copper	3278	51900	6.32E-02
Iron	12677	908000	1.40E-02
Lead	32.7	800	4.09E-02
Mercury	0.67	389	1.72E-03
Nickel	28.2	25700	1.10E-03
Perchlorate	0.0044	908	4.85E-06
Selenium	1.52	6490	2.34E-04
Silver	0.34	6490	5.24E-05
Uranium	2820	3880	7.27E-01
Vanadium	19.4	6530	2.97E-03
Zinc	173	389000	4.45E-04
Acenaphthene	0.21	50500	4.16E-06
Acetone	0.059	960000	6.15E-08
Di-n-butylphthalate	0.21	91600	2.29E-06
Di-n-octylphthalate	0.069	8200[b]	8.41E-06
Isopropyltoluene[4-]	0.013	14200[c]	9.15E-07
		HI	**0.9**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-59
Industrial Carcinogenic Screening for SWMU 15-008(a)

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Arsenic	2.91	21.5	1.35E-06
Chromium (Total)	8.76	505	1.73E-07
Bis(2-ethylhexyl)phthalate	0.17	1830	9.29E-10
TCDD[2,3,7,8-] equivalent	1.34E-06	2.48E-04	5.40E-08
		Total Excess Cancer Risk	**2E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-60
Industrial Radionuclide Screening for SWMU 15-008(a)

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	227	3000	1.89
Uranium-235/236	13.5	150	2.25
Uranium-238	321	750	10.7
		Total Dose	**15**

* SALs from LANL (2014, 600064).

Table I-4.2-61
Construction Worker Noncarcinogenic Screening for SWMU 15-008(a)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	9243	41400	2.23E-01
Antimony	0.71	142	5.00E-03
Arsenic	2.53	57.4	4.41E-02
Barium	233	4390	5.31E-02
Chromium (Total)	8.7	134	6.49E-02
Copper	1734	14200	1.22E-01
Iron	11728	248000	4.73E-02
Lead	22	800	2.75E-02
Mercury	0.42	77.1	5.45E-03
Nickel	17.7	753	2.35E-02
Perchlorate	0.0036	248	1.45E-05
Selenium	1.61	1750	9.20E-04
Silver	0.81	1770	4.58E-04
Uranium	2820	277	1.02E+01
Vanadium	15.4	614	2.51E-02
Zinc	112	106000	1.06E-03
Acenaphthene	0.152	15100	1.01E-06
Acetone	0.047	242000	1.95E-07
Benzoic acid	0.8	1080000[b]	7.41E-07
Bis(2-ethylhexyl)phthalate	0.306	5380	5.69E-05
Di-n-butylphthalate	0.21	26900	7.81E-06
Di-n-octylphthalate	0.069	3540[b]	1.95E-05
Diethylphthalate	0.05	215000	2.33E-07
Isopropyltoluene[4-]	0.013	2740[c]	4.74E-06
Methylene chloride	0.0031	1210	2.56E-06
TCDD[2,3,7,8-] equivalent	1.34E-06	2.26E-04	5.93E-03
		HI	**11**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-62
Construction Worker Radionuclide Screening for SWMU 15-008(a)

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	145	770	4.71
Uranium-235/236	7.07	100	1.77
Uranium-238	147	410	8.96
		Total Dose	**15**

* SALs from LANL (2014, 600064).

Table I-4.2-63
Residential Noncarcinogenic Screening for SWMU 15-008(a)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	9243	78000	1.19E-01
Antimony	0.71	31.3	2.23E-02
Barium	233	15600	1.49E-02
Copper	1734	3130	5.54E-01
Iron	11728	54800	2.14E-01
Lead	22	400	5.50E-02
Mercury	0.42	23.5	1.79E-02
Nickel	17.7	1560	1.13E-02
Perchlorate	0.0036	54.8	6.57E-05
Selenium	1.61	391	4.12E-03
Silver	0.81	391	2.07E-03
Uranium	2820	234	1.21E+01
Vanadium	15.4	394	3.91E-02
Zinc	112	23500	4.77E-03
Acenaphthene	0.21	3480	6.03E-05
Acetone	0.047	66300	7.09E-07
Benzoic acid	0.8	250000[b]	3.20E-06
Di-n-butylphthalate	0.21	6160	3.41E-05
Di-n-octylphthalate	0.069	630[b]	1.10E-04
Diethylphthalate	0.05	49300	1.01E-06
Isopropyltoluene[4-]	0.013	2360[c]	5.51E-06
Methylene chloride	0.0031	409	7.58E-06
		HI	**13**

[a] SSLs from NMED (2015, 600575).

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-64
Residential Carcinogenic Screening for SWMU 15-008(a)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Arsenic	2.53	4.25	5.95E-06
Chromium (Total)	8.7	96.6	9.01E-07
Bis(2-ethylhexyl)phthalate	0.306	380	8.05E-09
TCDD[2,3,7,8-] equivalent	1.34E-06	4.90E-05	2.73E-07
Total Excess Cancer Risk			**7E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-65
Residential Radionuclide Screening for SWMU 15-008(a)

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	145	270	13.4
Uranium-235/236	7.07	39	4.53
Uranium-238	147	150	24.5
Total Dose			**42**

* SALs from LANL (2014, 600064).

Table I-4.2-66
Industrial Noncarcinogenic Screening for SWMU 15-009(e)

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Antimony	8.6	519	1.66E-02
Selenium	1.18	6490	1.82E-04
Silver	1.63	6490	2.51E-04
Fluoranthene	0.089	33700	2.64E-06
Isopropyltoluene[4-]	0.003	14200[b]	2.11E-07
Pyrene	0.073	25300	2.89E-06
Toluene	0.0021	61300	3.43E-08
HI			**0.02**

[a] SSLs from NMED (2015, 600575).

[b] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-67
Industrial Carcinogenic Screening for SWMU 15-009(e)

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Benzo(a)anthracene	0.067	32.3	2.07E-08
Benzo(a)pyrene	0.048	3.23	1.49E-07
Benzo(b)fluoranthene	0.05	32.3	1.55E-08
Benzo(k)fluoranthene	0.045	323	1.39E-09
Chromium (Total)	6.27	505	1.24E-07
Chrysene	0.066	3230	2.01E-10
TCDD[2,3,7,8-] equivalent	8.19E-08	2.48E-04	3.30E-09
Total Excess Cancer Risk			**3E-07**

* SSLs from NMED (2015, 600575).

Table I-4.2-68
Industrial Radionuclide Screening for SWMU 15-009(e)

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	8.85	3000	0.074
Uranium-235/236	0.488	150	0.081
Uranium-238	16.1	750	0.54
Total Dose			**0.7**

* SALs from LANL (2014, 600064).

Table I-4.2-69
Construction Worker Noncarcinogenic Screening for SWMU 15-009(e)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Antimony	8.6	142	6.06E-02
Chromium (Total)	7.23	134	5.40E-02
Selenium	0.93	1750	5.31E-04
Silver	1.61	1770	9.10E-04
Uranium	10.5	277	3.79E-02
Acetone	0.0093	242000	3.84E-08
Fluoranthene	0.089	10000	8.90E-06
Isopropyltoluene[4-]	0.003	2740[b]	1.09E-06
Pyrene	0.073	7530	9.69E-06
TCDD[2,3,7,8-] equivalent	8.19E-08	2.26E-04	3.62E-04
Toluene	0.0021	14000	1.50E-07
HI			**0.2**

[a] SSLs from NMED (2015, 600575).

[b] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-70
Construction Worker Carcinogenic Screening for SWMU 15-009(e)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Benzo(a)anthracene	0.067	240	2.79E-09
Benzo(a)pyrene	0.048	2.4	2.00E-07
Benzo(b)fluoranthene	0.058	240	2.42E-09
Benzo(k)fluoranthene	0.045	2310	1.95E-10
Chrysene	0.066	23100	2.86E-11
		Total Excess Cancer Risk	**2E-07**

* SSLs from NMED (2015, 600575).

Table I-4.2-71
Construction Worker Radionuclide Screening for SWMU 15-009(e)

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	8.85	770	0.29
Uranium-235/236	0.488	100	0.12
Uranium-238	16.1	410	0.98
		Total Dose	**1**

* SALs from LANL (2014, 600064).

Table I-4.2-72
Residential Noncarcinogenic Screening for SWMU 15-009(e)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Antimony	8.6	31.3	2.75E-01
Selenium	0.93	391	2.38E-03
Silver	1.61	391	4.12E-03
Uranium	10.5	234	4.49E-02
Acetone	0.0093	66300	1.40E-07
Fluoranthene	0.089	2320	3.84E-05
Isopropyltoluene[4-]	0.003	2360[b]	1.27E-06
Pyrene	0.073	1740	4.20E-05
Toluene	0.0021	5230	4.02E-07
		HI	**0.3**

[a] SSLs from NMED (2015, 600575).

[b] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-73
Residential Carcinogenic Screening for SWMU 15-009(e)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Benzo(a)anthracene	0.067	1.53	4.38E-07
Benzo(a)pyrene	0.048	0.53	3.14E-06
Benzo(b)fluoranthene	0.058	1.53	3.79E-07
Benzo(k)fluoranthene	0.045	15.3	2.94E-08
Chromium (Total)	7.23	96.6	7.48E-07
Chrysene	0.066	153	4.31E-09
TCDD[2,3,7,8-] equivalent	8.19E-08	4.90E-05	1.67E-08
		Total Excess Cancer Risk	**5E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-74
Residential Radionuclide Screening for SWMU 15-009(e)

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	8.85	270	0.82
Uranium-235/236	0.488	39	0.31
Uranium-238	16.1	150	2.68
		Total Dose	**4**

* SALs from LANL (2014, 600064).

Table I-4.2-75
Essential Nutrient Screening for SWMU 15-010(a)

COPC	Maximum Detected Concentration (mg/kg)	Industrial SSL* (mg/kg)	Industrial Ratio	Construction Worker SSL* (mg/kg)	Construction Worker Ratio	Residential SSL* (mg/kg)	Residential Ratio
Calcium	4070	32400000	0.00013	8850000	0.00046	13000000	0.00031

* SSL from NMED (2015, 600575).

Table I-4.2-76
Construction Worker Noncarcinogenic Screening for SWMU 15-010(a)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Antimony	0.97	142	6.83E-03
Barium	326	4390	7.43E-02
Chromium (Total)	11.4	134	8.51E-02
Cobalt	4.53	36.6[b]	1.24E-01
Copper	9	14200	6.34E-04
Lead	83.9	800	1.05E-01
Mercury	5.45	77.1	7.07E-02
Nitrate	50.3	566000	8.89E-05
Perchlorate	0.0028	248	1.13E-05
Selenium	2.74	1750	1.57E-03
Silver	2.31	1770	1.31E-03
Zinc	44.1	106000	4.16E-04
Acenaphthene	0.096	15100	6.36E-06
Bis(2-ethylhexyl)phthalate	0.076	5380	1.41E-05
Di-n-butylphthalate	0.13	26900	4.83E-06
Diethylphthalate	1.5	215000	6.98E-06
Isopropyltoluene[4-]	0.0017	2740c	6.20E-07
TCDD[2,3,7,8-] equivalent	1.95E-07	2.26E-04	8.63E-04
		HI	**0.5**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-77
Residential Noncarcinogenic Screening for SWMU 15-010(a)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Antimony	0.97	31.3	3.10E-02
Barium	326	15600	2.09E-02
Cobalt	4.53	23[b]	1.97E-01
Copper	9	3130	2.88E-03
Lead	83.9	400	2.10E-01
Mercury	5.45	23.5	2.32E-01
Nitrate	50.3	125000	4.02E-04
Perchlorate	0.0028	54.8	5.11E-05
Selenium	2.74	391	7.01E-03
Silver	2.31	391	5.91E-03
Zinc	44.1	23500	1.88E-03
Acenaphthene	0.096	3480	2.76E-05
Di-n-butylphthalate	0.13	6160	2.11E-05
Diethylphthalate	1.5	49300	3.04E-05
Isopropyltoluene[4-]	0.0017	2360[c]	7.20E-07
		HI	**0.7**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-78
Residential Carcinogenic Screening for SWMU 15-010(a)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Chromium (Total)	11.4	96.6	1.18E-06
Bis(2-ethylhexyl)phthalate	0.076	380	2.00E-09
TCDD[2,3,7,8-] equivalent	1.95E-07	4.90E-05	3.98E-08
		Total Excess Cancer Risk	**1E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-79
Industrial Noncarcinogenic Screening for AOC C-15-004

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	HQ
Copper	21.1	51900	4.07E-04
Zinc	184	389000	4.73E-04
		HI	**0.0009**

* SSLs from NMED (2015, 600575).

Table I-4.2-80
Industrial Carcinogenic Screening for AOC C-15-004

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
TCDD[2,3,7,8-]	5.69E-06	2.48E-04	2.29E-07
		Total Excess Cancer Risk	**2E-07**

* SSLs from NMED (2015, 600575).

Table I-4.2-81
Industrial Radionuclide Screening for AOC C-15-004

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	6.08	3000	0.051
Uranium-235/236	0.31	150	0.052
Uranium-238	13.9	750	0.46
		Total Dose	**0.6**

* SALs from LANL (2014, 600064).

Table I-4.2-82
Construction Worker Noncarcinogenic Screening for AOC C-15-004

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	HQ
Copper	52.6	14200	3.70E-03
Zinc	184	106000	1.74E-03
TCDD[2,3,7,8-] equivalent	5.69E-06	2.26E-04	2.52E-02
		HI	**0.03**

* SSLs from NMED (2015, 600575).

Table I-4.2-83
Construction Worker Radionuclide Screening for AOC C-15-004

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	6.08	770	0.2
Uranium-235/236	0.31	100	0.078
Uranium-238	13.9	410	0.85
		Total Dose	**1**

* SALs from LANL (2014, 600064).

Table I-4.2-84
Residential Noncarcinogenic Screening for AOC C-15-004

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	HQ
Copper	52.6	3130	1.68E-02
Zinc	184	23500	7.83E-03
		HI	**0.02**

* SSLs from NMED (2015, 600575).

Table I-4.2-85
Residential Carcinogenic Screening for AOC C-15-004

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
TCDD[2,3,7,8-] equivalent	5.69E-06	4.90E-05	1.16E-06
		Total Excess Cancer Risk	**1E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-86
Residential Radionuclide Screening for AOC C-15-004

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	6.08	270	0.56
Uranium-235/236	0.31	39	0.2
Uranium-238	13.9	150	2.32
		Total Dose	**3**

* SALs from LANL (2014, 600064).

Table I-4.2-87
Essential Nutrient Screening for AOC C-15-005

COPC	Maximum Detected Concentration (mg/kg)	Industrial SSL* (mg/kg)	Industrial Ratio	Construction Worker SSL* (mg/kg)	Construction Worker Ratio	Residential SSL* (mg/kg)	Residential Ratio
Calcium	4790	32400000	0.00015	8850000	0.00054	13000000	0.00037

* SSLs from NMED (2015, 600575).

Table I-4.2-88
Industrial Noncarcinogenic Screening for AOC C-15-005

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	HQ
Aluminum	14000	1290000	1.09E-02
Antimony	2.6	519	5.01E-03
Barium	151	255000	5.92E-04
Lead	33.8	800	4.23E-02
Mercury	2.97	389	7.63E-03
Nickel	9.5	25700	3.70E-04
Perchlorate	0.0051	908	5.62E-06
Selenium	1.9	6490	2.93E-04
Zinc	90.8	389000	2.33E-04
Acetone	0.01	960000	1.04E-08
Di-n-butylphthalate	0.093	91600	1.02E-06
Diethylphthalate	13	733000	1.77E-05
		HI	**0.07**

* SSLs from NMED (2015, 600575).

Table I-4.2-89
Industrial Carcinogenic Screening for AOC C-15-005

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	Cancer Risk
Butylbenzylphthalate	0.038	12000[b]	3.17E-11
TCDD[2,3,7,8-] equivalent	4.85E-08	2.48E-04	1.96E-09
		Total Excess Cancer Risk	**2E-09**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-90
Construction Worker Noncarcinogenic Screening for AOC C-15-005

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	13069	41400	3.16E-01
Antimony	2.6	142	1.83E-02
Barium	124	4390	2.82E-02
Lead	30.1	800	3.76E-02
Mercury	2.97	77.1	3.85E-02
Nickel	8.28	753	1.10E-02
Perchlorate	0.023	248	9.27E-05
Selenium	1.59	1750	9.09E-04
Zinc	67.2	106000	6.34E-04
Acetone	0.012	242000	4.96E-08
Benzyl alcohol	0.044	26900[b]	1.64E-06
Butylbenzylphthalate	0.038	53800[b]	7.06E-07
Di-n-butylphthalate	0.093	26900	3.46E-06
Diethylphthalate	13	215000	6.05E-05
TCDD[2,3,7,8-] equivalent	4.85E-08	2.26E-04	2.15E-04
		HI	**0.5**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

Table I-4.2-91
Residential Noncarcinogenic Screening for AOC C-15-005

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	13069	78000	1.68E-01
Antimony	2.6	31.3	8.31E-02
Barium	124	15600	7.95E-03
Lead	30.1	400	7.53E-02
Mercury	2.97	23.5	1.26E-01
Nickel	8.28	1560	5.31E-03
Perchlorate	0.023	54.8	4.20E-04
Selenium	1.59	391	4.07E-03
Zinc	67.2	23500	2.86E-03
Acetone	0.012	66300	1.81E-07
Benzyl alcohol	0.044	6300[b]	6.98E-06
Di-n-butylphthalate	0.093	6160	1.51E-05
Diethylphthalate	13	49300	2.64E-04
		HI	**0.5**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-92
Residential Carcinogenic Screening for AOC C-15-005

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Butylbenzylphthalate	0.038	2900[b]	1.31E-10
TCDD[2,3,7,8-] equivalent	4.85E-08	4.90E-05	9.90E-09
		Total Excess Cancer Risk	**1E-08**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-93
Essential Nutrient Screening for AOC C-15-005(b)

COPC	Maximum Detected Concentration (mg/kg)	Industrial SSL* (mg/kg)	Industrial Ratio	Construction Worker SSL* (mg/kg)	Construction Worker Ratio	Residential SSL* (mg/kg)	Residential Ratio
Calcium	4490	32400000	0.00014	8850000	0.00051	13000000	0.00035

*SSLs from NMED (2015, 600575).

Table I-4.2-94
Industrial Noncarcinogenic Screening for AOC 15-005(b)

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Aluminum	12400	1290000	9.61E-03
Barium	171	255000	6.71E-04
Cobalt	6.5	350[b]	1.86E-02
Nickel	8.2	25700	3.19E-04
Selenium	1.1	6490	1.69E-04
Dibenzofuran	0.17	1000[b]	1.70E-04
Methylene chloride	0.0056	5130	1.09E-06
		HI	**0.03**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-95
Industrial Carcinogenic Screening for AOC 15-005(b)

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Bis(2-ethylhexyl)phthalate	0.11	1830	6.01E-10
TCDD[2,3,7,8-] equivalent	3.06E-08	2.48E-04	1.23E-09
		Total Excess Cancer Risk	**2E-09**

* SSLs from NMED (2015, 600575).

Table I-4.2-96
Construction Worker Noncarcinogenic Screening for AOC 15-005(b)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	12286	41400	2.97E-01
Barium	214	4390	4.87E-02
Cobalt	7.22	36.6[b]	1.97E-01
Nickel	8.42	753	1.12E-02
Perchlorate	0.0033	248	1.33E-05
Selenium	1.18	1750	6.74E-04
Bis(2-ethylhexyl)phthalate	0.21	5380	3.90E-05
Dibenzofuran	0.17	354[b]	4.80E-04
Methylene chloride	0.0055	1210	4.55E-06
TCDD[2,3,7,8-] equivalent	3.06E-08	2.26E-04	1.35E-04
		HI	**0.6**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

Table I-4.2-97
Residential Noncarcinogenic Screening for AOC 15-005(b)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	12286	78000	1.58E-01
Barium	214	15600	1.37E-02
Cobalt	7.22	23[b]	3.14E-01
Nickel	8.42	1560	5.40E-03
Perchlorate	0.0033	54.8	6.02E-05
Selenium	1.18	391	3.02E-03
Dibenzofuran	0.17	73[b]	2.33E-03
Methylene chloride	0.0055	409	1.34E-05
		HI	**0.5**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-98
Residential Carcinogenic Screening for AOC 15-005(b)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Bis(2-ethylhexyl)phthalate	0.21	380	5.53E-09
TCDD[2,3,7,8-] equivalent	3.06E-08	4.90E-05	6.24E-09
		Total Excess Cancer Risk	**1E-08**

* SSLs from NMED (2015, 600575).

Table I-4.2-99
Industrial Noncarcinogenic Screening for AOC C-15-006

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Antimony	4.9	519	9.44E-03
Cobalt	9.7	350[b]	2.77E-02
Copper	13.2	51900	2.54E-04
Iron	35800	908000	3.94E-02
Lead	27.8	800	3.48E-02
Manganese	636	160000	3.98E-03
Mercury	14.4	389	3.70E-02
Perchlorate	0.0044	908	4.85E-06
Zinc	85.5	389000	2.20E-04
Di-n-butylphthalate	0.052	91600	5.68E-07
		HI	**0.2**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-100
Industrial Carcinogenic Screening for AOC C-15-006

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Aroclor-1254	0.032	11.5	2.78E-08
Aroclor-1260	0.018	11.5	1.57E-08
TCDD[2,3,7,8-] equivalent	7.19E-07	2.48E-04	2.90E-08
		Total Excess Cancer Risk	**7E-08**

* SSLs from NMED (2015, 600575).

Table I-4.2-101
Construction Worker Noncarcinogenic Screening for AOC C-15-006

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Antimony	4.27	142	3.01E-02
Cobalt	9.33	36.6[b]	2.55E-01
Copper	11.7	14200	8.24E-04
Iron	20391	248000	8.22E-02
Lead	28.8	800	3.60E-02
Manganese	726	464	1.56E+00
Mercury	7.09	77.1	9.20E-02
Perchlorate	0.0042	248	1.69E-05
Zinc	58.4	106000	5.51E-04
Aroclor-1254	0.032	4.91	6.52E-03
Benzoic acid	0.55	1080000[b]	5.09E-07
Bis(2-ethylhexyl)phthalate	0.14	5380	2.60E-05
Butylbenzylphthalate	0.042	53800[b]	7.81E-07
Di-n-butylphthalate	0.052	26900	1.93E-06
TCDD[2,3,7,8-] equivalent	7.19E-07	2.26E-04	3.18E-03
		HI	**2**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

Table I-4.2-102
Construction Worker Carcinogenic Screening for AOC C-15-006

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	Cancer Risk
Aroclor-1260	0.018	85.3	2.11E-09
		Total Excess Cancer Risk	**2E-09**

* SSL from NMED (2015, 600575).

Table I-4.2-103
Residential Noncarcinogenic Screening for AOC C-15-006

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Antimony	4.27	31.3	1.36E-01
Cobalt	9.33	23[b]	4.06E-01
Copper	11.7	3130	3.74E-03
Iron	20391	54800	3.72E-01
Lead	28.8	400	7.20E-02
Manganese	726	10500	6.91E-02
Mercury	7.09	23.5	3.02E-01
Perchlorate	0.0042	54.8	7.66E-05
Zinc	58.4	23500	2.49E-03
Aroclor-1254	0.032	1.14	2.81E-02
Benzoic acid	0.55	250000[b]	2.20E-06
Di-n-butylphthalate	0.052	6160	8.44E-06
		HI	**1**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-104
Residential Carcinogenic Screening for AOC C-15-006

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Aroclor-1260	0.018	2.43	7.41E-08
Bis(2-ethylhexyl)phthalate	0.14	380	3.68E-09
Butylbenzylphthalate	0.042	2900[b]	1.45E-10
TCDD[2,3,7,8-] equivalent	7.19E-07	4.90E-05	1.47E-07
		Total Excess Cancer Risk	**2E-07**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-105
Industrial Noncarcinogenic Screening for SWMU 36-001

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Copper	8.1	51900	1.56E-04
Lead	11.3	800	1.41E-02
Nickel	9.5	25700	3.70E-04
Nitrate	5.2	2080000	2.50E-06
Silver	0.039	6490	6.01E-06
Uranium	2.7	3880	6.96E-04
Zinc	37	389000	9.51E-05
Methylphenol[2-]	0.047	41000[b]	1.15E-06
Methylphenol[4-]	0.12	82000[b]	1.46E-06
Phenol	0.64	275000	2.33E-06
		HI	**0.02**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-106
Industrial Carcinogenic Screening for SWMU 36-001

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Bis(2-ethylhexyl)phthalate	0.31	1830	1.69E-09
TCDD[2,3,7,8-] equivalent	3.75E-06	2.48E-04	1.51E-07
		Total Excess Cancer Risk	**2E-07**

* SSLs from NMED (2015, 600575).

Table I-4.2-107
Industrial Radionuclide Screening for SWMU 36-001

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	1.8	3000	0.015
Uranium-235/236	0.11	150	0.018
Uranium-238	2.1	750	0.07
		Total Dose	**0.1**

* SALs from LANL (2014, 600064).

Table I-4.2-108
Construction Worker Noncarcinogenic Screening for SWMU 36-001

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Antimony	22.6	142	1.59E-01
Copper	832	14200	5.86E-02
Lead	237	800	2.96E-01
Nickel	49.6	753	6.59E-02
Nitrate	8.15	566000	1.44E-05
Perchlorate	0.0035	248	1.41E-05
Silver	1.53	1770	8.64E-04
Uranium	127	277	4.58E-01
Zinc	195	106000	1.84E-03
Acetone	0.041	242000	1.69E-07
Benzyl alcohol	0.073	26900[b]	2.71E-06
Bis(2-ethylhexyl)phthalate	0.31	5380	5.76E-05
Dinitroaniline[3,5-]	0.004	10000[b,c]	4.00E-07
Di-n-butylphthalate	0.076	26900	2.83E-06
Methylphenol[2-]	0.047	13400[b]	3.51E-06
Methylphenol[4-]	0.12	26800[b]	4.48E-06
Phenol	0.64	77400	8.27E-06
TCDD[2,3,7,8-] equivalent	3.38E-05	2.26E-04	1.50E-01
Trichlorofluoromethane	0.00071	1130	6.28E-07
		HI	**1**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table I-4.2-109
Construction Worker Radionuclide Screening for SWMU 36-001

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	22.1	770	0.72
Uranium-235/236	2.51	100	0.63
Uranium-238	164	410	10
		Total Dose	**11**

* SALs from LANL (2014, 600064).

Table I-4.2-110
Residential Noncarcinogenic Screening for SWMU 36-001

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Antimony	22.6	31.3	7.22E-01
Copper	832	3130	2.66E-01
Lead	237	400	5.93E-01
Nickel	49.6	1560	3.18E-02
Nitrate	8.15	125000	6.52E-05
Perchlorate	0.0035	54.8	6.39E-05
Silver	1.53	391	3.91E-03
Uranium	127	234	5.43E-01
Zinc	195	23500	8.30E-03
Acetone	0.041	66300	6.18E-07
Benzyl alcohol	0.073	6300[b]	1.16E-05
Dinitroaniline[3,5-]	0.004	2200[b,c]	1.82E-06
Di-n-butylphthalate	0.076	6160	1.23E-05
Methylphenol[2-]	0.047	3200[b]	1.47E-05
Methylphenol[4-]	0.12	6300[b]	1.90E-05
Phenol	0.64	18500	3.46E-05
Trichlorofluoromethane	0.00071	1230	5.77E-07
		HI	**2**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table I-4.2-111
Residential Carcinogenic Screening for SWMU 36-001

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Bis(2-ethylhexyl)phthalate	0.31	380	8.16E-09
TCDD[2,3,7,8-] equivalent	3.38E-05	4.90E-05	6.90E-06
		Total Excess Cancer Risk	**7E-06**

* SSLs from NMED (2015, 600575).

Table I-4.2-112
Residential Radionuclide Screening for SWMU 36-001

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	22.1	270	2.05
Uranium-235/236	2.51	39	1.61
Uranium-238	164	150	27.3
		Total Dose	**31**

* SALs from LANL (2014, 600064).

Table I-4.2-113
Industrial Noncarcinogenic Screening for SWMU 36-003(b)

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	HQ
Selenium	1.4	6490	2.16E-04
		HI	**0.0002**

* SSLs from NMED (2015, 600575).

Table I-4.2-114
Industrial Carcinogenic Screening for SWMU 36-003(b)

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
TCDD[2,3,7,8-] equivalent	1.71E-07	2.48E-04	6.9E-09
		Total Excess Cancer Risk	**7E-09**

* SSLs from NMED (2015, 600575).

Table I-4.2-115
Construction Worker Noncarcinogenic Screening for SWMU 36-003(b)

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	HQ
Selenium	1.4	1750	8.00E-04
TCDD[2,3,7,8-] equivalent	1.71E-07	2.26E-04	7.57E-04
		HI	**0.002**

* SSLs from NMED (2015, 600575).

Table I-4.2-116
Residential Noncarcinogenic Screening for SWMU 36-003(b)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	HQ
Selenium	1.4	391	3.58E-03
		HI	**0.004**

* SSLs from NMED (2015, 600575).

Table I-4.2-117
Residential Carcinogenic Screening for SWMU 36-003(b)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
TCDD[2,3,7,8-] equivalent	1.71E-07	4.90E-05	3.49E-08
		Total Excess Cancer Risk	**3E-08**

* SSL from NMED (2015, 600575).

Table I-4.2-118
Industrial Noncarcinogenic Screening for SWMU 36-005

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Nickel	7.79	25700	3.03E-04
Perchlorate	0.0048	908	5.29E-06
Selenium	1.38	6490	2.13E-04
Acetone	0.31	960000	3.23E-07
Benzoic acid	0.61	3300000[b]	1.85E-07
Di-n-butylphthalate	0.2	91600	2.18E-06
Methylene chloride	0.0063	5130	1.23E-06
		HI	**0.0005**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-119
Industrial Carcinogenic Screening for SWMU 36-005

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	Cancer Risk
Chromium (Total)	8.26	505	1.64E-07
Bis(2-ethylhexyl)phthalate	0.052	1830	2.84E-10
Butylbenzylphthalate	0.043	12000[b]	3.58E-11
Pentachlorophenol	0.37	44.5	8.31E-08
TCDD[2,3,7,8-] equivalent	1.44E-08	2.48E-04	5.81E-10
		Total Excess Cancer Risk	**2E-07**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-120
Construction Worker Noncarcinogenic Screening for SWMU 36-005

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Chromium (Total)	9.66	134	7.21E-02
Nickel	7.26	753	9.64E-03
Perchlorate	0.0045	248	1.81E-05
Selenium	1.7	1750	9.71E-04
Acetone	0.31	242000	1.28E-06
Benzoic acid	0.61	1080000[b]	5.65E-07
Bis(2-ethylhexyl)phthalate	0.065	5380	1.21E-05
Butylbenzylphthalate	0.043	53800[b]	7.99E-07
Di-n-butylphthalate	0.2	26900	7.43E-06
Methylene chloride	0.0031	1210	2.56E-06
TCDD[2,3,7,8-] equivalent	1.44E-08	2.26E-04	6.37E-05
		HI	**0.08**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

Table I-4.2-121
Construction Worker Carcinogenic Screening for SWMU 36-005

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	Cancer Risk
Pentachlorophenol	0.37	346	1.07E-08
		Total Excess Cancer Risk	**1E-08**

* SSL from NMED (2015, 600575).

Table I-4.2-122
Residential Noncarcinogenic Screening for SWMU 36-005

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Nickel	7.26	1560	4.65E-03
Perchlorate	0.0045	54.8	8.21E-05
Selenium	1.7	391	4.35E-03
Acetone	0.31	66300	4.68E-06
Benzoic acid	0.61	250000[b]	2.44E-06
Di-n-butylphthalate	0.2	6160	3.25E-05
Methylene chloride	0.0031	409	7.58E-06
		HI	**0.009**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-123
Residential Carcinogenic Screening for SWMU 36-005

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Chromium (Total)	9.66	96.6	1.00E-06
Bis(2-ethylhexyl)phthalate	0.065	380	1.71E-09
Butylbenzylphthalate	0.043	2900[b]	1.48E-10
Pentachlorophenol	0.37	9.85	3.76E-07
TCDD[2,3,7,8-] equivalent	1.44E-08	4.90E-05	2.94E-09
		Total Excess Cancer Risk	**1E-06**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table I-4.2-124
Industrial Noncarcinogenic Screening for SWMU 36-006

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Antimony	1.6	519	3.08E-03
Copper	1135	51900	2.19E-02
Mercury	0.57	389	1.47E-03
Selenium	1.57	6490	2.42E-04
Zinc	64.4	389000	1.66E-04
Acenaphthene	1.4	50500	2.77E-05
Acetone	0.016	960000	1.67E-08
Amino-2,6-dinitrotoluene[4-]	0.084	2300[b]	3.65E-05
Amino-4,6-dinitrotoluene[2-]	0.055	2300[b]	2.39E-05
Anthracene	1.3	253000	5.14E-06
Benzo(g,h,i)perylene	1.2	25300[c]	4.74E-05
Dibenzofuran	0.58	1000[b]	5.80E-04
Dinitroaniline[3,5-]	0.036	32000[b,d]	1.13E-06
Fluoranthene	9.9	33700	2.94E-04
Fluorene	0.94	33700	2.79E-05
Methylnaphthalene[2-]	0.22	3000[b]	7.33E-05
Phenanthrene	7.2	25300	2.85E-04
Pyrene	6.9	25300	2.73E-04
TATB	2.7	32000[b,d]	8.44E-05
Trichlorofluoromethane	0.00045	6030	7.46E-08
Trinitrobenzene[1,3,5-]	0.037	32000[b]	1.16E-06
Trinitrotoluene[2,4,6-]	0.047	573	8.20E-05
		HI	**0.03**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Pyrene used as a surrogate based on structural similarity.

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table I-4.2-125
Industrial Carcinogenic Screening for SWMU 36-006

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Benzo(a)anthracene	4.8	32.3	1.49E-06
Benzo(a)pyrene	3.6	3.23	1.11E-05
Benzo(b)fluoranthene	5.1	32.3	1.58E-06
Benzo(k)fluoranthene	2.2	323	6.81E-08
Chrysene	4.6	3230	1.42E-08
Dibenz(a,h)anthracene	0.061	3.23	1.89E-07
Indeno(1,2,3-cd)pyrene	1.5	32.3	4.64E-07
Naphthalene	0.95	241	3.94E-08
RDX	0.49	311	1.58E-08
TCDD[2,3,7,8-] equivalent	1.82E-07	2.48E-04	7.34E-09
Total Excess Cancer Risk			**1E-05**

* SSLs from NMED (2015, 600575) unless otherwise noted.

Table I-4.2-126
Industrial Radionuclide Screening for SWMU 36-006

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Uranium-238	2.48	750	0.083
Total Dose			**0.08**

* SALs from LANL (2014, 600064).

Table I-4.2-127
Construction Worker Noncarcinogenic Screening for SWMU 36-006

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Antimony	1.6	142	1.13E-02
Copper	615	14200	4.33E-02
Mercury	0.19	77.1	2.46E-03
Selenium	1.56	1750	8.91E-04
Zinc	56.7	106000	5.35E-04
Acenaphthene	1.4	15100	9.27E-05
Acetone	0.015	242000	6.20E-08
Amino-2,6-dinitrotoluene[4-]	0.084	688[b]	1.22E-04
Amino-4,6-dinitrotoluene[2-]	0.055	695[b]	7.91E-05
Anthracene	1.3	75300	1.73E-05

Table I-4.2-127 (continued)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Benzo(g,h,i)perylene	1.2	7530[c]	1.59E-04
Benzoic acid	0.64	1080000[b]	5.93E-07
Dibenzofuran	0.58	354[b]	1.64E-03
Dinitroaniline[3,5-]	0.036	10000[b,d]	3.60E-06
Fluoranthene	9.9	10000	9.90E-04
Fluorene	0.94	10000	9.40E-05
Isopropyltoluene[4-]	0.0037	2740[e]	1.35E-06
Methylene chloride	0.0086	1210	7.11E-06
Methylnaphthalene[2-]	0.22	1420[b]	1.55E-04
Naphthalene	0.95	159	5.97E-03
Phenanthrene	7.2	7530	9.56E-04
Pyrene	6.9	7530	9.16E-04
RDX	0.49	1010	4.85E-04
TATB	2.7	10000[b,d]	2.70E-04
TCDD[2,3,7,8-] equivalent	1.82E-07	2.26E-04	8.05E-04
Trichlorofluoromethane	0.00045	1130[b]	3.98E-07
Trinitrobenzene[1,3,5-]	0.037	10000[b]	3.70E-06
Trinitrotoluene[2,4,6-]	0.047	161	2.92E-04
		HI	**0.07**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2015, 600575).

[c] Pyrene used as a surrogate based on structural similarity.

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[e] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-128
Construction Worker Carcinogenic Screening for SWMU 36-006

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	Cancer Risk
Benzo(a)anthracene	4.8	240	2.00E-07
Benzo(a)pyrene	3.6	24	1.50E-06
Benzo(b)fluoranthene	5.1	240	2.13E-07
Benzo(k)fluoranthene	2.2	2310	9.52E-09
Chrysene	4.6	23100	1.99E-09
Dibenz(a,h)anthracene	0.061	24	2.54E-08
Indeno(1,2,3-cd)pyrene	1.5	240	6.25E-08
		Total Excess Cancer Risk	**2E-06**

* SSLs from (NMED 2015, 600575).

Table I-4.2-129
Construction Worker Radionuclide Screening for SWMU 36-006

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Uranium-238	1.57	410	0.096
		Total Dose	**0.1**

* SAL from LANL (2014, 600064).

Table I-4.2-130
Residential Noncarcinogenic Screening for SWMU 36-006

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Antimony	1.6	31.3	5.11E-02
Copper	615	3130	1.96E-01
Mercury	0.19	23.5	8.09E-03
Selenium	1.56	391	3.99E-03
Zinc	56.7	23500	2.41E-03
Acenaphthene	1.4	3480	4.02E-04
Acetone	0.015	66300	2.26E-07
Amino-2,6-dinitrotoluene[4-]	0.084	150[b]	5.60E-04
Amino-4,6-dinitrotoluene[2-]	0.055	150[b]	3.67E-04
Anthracene	1.3	17400	7.47E-05
Benzo(g,h,i)perylene	1.2	1740[c]	6.90E-04
Benzoic acid	0.64	250000[b]	2.56E-06
Dinitroaniline[3,5-]	0.036	2200[b,d]	1.64E-05
Dibenzofuran	0.58	73[b]	7.95E-03
Fluoranthene	9.9	2320	4.27E-03
Fluorene	0.94	2320	4.05E-04
Isopropyltoluene[4-]	0.0037	2360[e]	1.57E-06
Methylene chloride	0.0086	409	2.10E-05
Methylnaphthalene[2-]	0.22	240[b]	9.17E-04
Phenanthrene	7.2	1740	4.14E-03
Pyrene	6.9	1740	3.97E-03
TATB	2.7	2200[b,d]	1.23E-03
Trichlorofluoromethane	0.00045	1230	3.66E-07
Trinitrobenzene[1,3,5-]	0.037	2200[b]	1.68E-05
Trinitrotoluene[2,4,6-]	0.047	36	1.31E-03
		HI	**0.3**

[a] SSLs from NMED (2015, 600575) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Pyrene used as a surrogate based on structural similarity.

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[e] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.2-131
Residential Carcinogenic Screening for SWMU 36-006

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Benzo(a)anthracene	4.8	1.53	3.14E-05
Benzo(a)pyrene	3.6	0.153	2.35E-04
Benzo(b)fluoranthene	5.1	1.53	3.33E-05
Benzo(k)fluoranthene	2.2	15.3	1.44E-06
Chrysene	4.6	153	3.01E-07
Dibenz(a,h)anthracene	0.061	0.153	3.99E-06
Indeno(1,2,3-cd)pyrene	1.5	1.53	9.80E-06
Naphthalene	0.95	49.7	1.91E-07
RDX	0.49	60.4	8.11E-08
TCDD[2,3,7,8-] equivalent	1.82E-07	4.90E-05	3.71E-08
		Total Excess Cancer Risk	**3E-04**

* SSLs from NMED (2015, 600575).

Table I-4.2-132
Residential Radionuclide Screening for SWMU 36-006

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Uranium-238	1.57	150	0.26
		Total Dose	**0.3**

* SAL from LANL (2014, 600064).

Table I-4.3-1
Residential Noncarcinogenic Screening
of Vapor Intrusion for SWMU 15-002, Former North Burn Pit

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Acetone	0.083	9720	0.0000085
		HI	**0.000009**

[a] Maximum detected concentration.

[b] Vapor-intrusion risk values generated by the Johnson and Ettinger soil model.

Table I-4.3-2
Residential Noncarcinogenic Screening
of Vapor Intrusion for SWMUs 15-004(b) and 15-004(c)

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Acetone	0.012	9720	0.0000012
Isopropyltoluene[4-]	0.00058	140[c]	0.0000041
Trimethylbenzene[1,2,4-]	0.0011	0.587	0.0019
Trimethylbenzene[1,3,5-]	0.00061	2.45	0.00025
Xylene (Total)	0.00095	30.8[d]	0.000031
		HI	**0.002**

[a] Maximum detected concentration.

[b] Vapor-intrusion risk values generated by the Johnson and Ettinger soil model.

[c] Isopropylbenzene used as a surrogate based on structural similarity.

[d] Xylene[p-] used as a surrogate based on structural similarity.

Table I-4.3-3
Residential Noncarcinogenic Screening of Vapor Intrusion for SWMU 15-007(a)

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Acetone	0.14	1950	0.000072
		HI	**0.00007**

[a] Maximum detected concentration.

[b] Vapor-intrusion risk values generated by the Johnson and Ettinger soil model.

Table I-4.3-4
Residential Noncarcinogenic Screening of Vapor Intrusion for SWMU 15-010(a)

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Isopropyltoluene[4-]	0.0017	125[c]	0.000014
		HI	**0.00001**

[a] Maximum detected concentration.

[b] Vapor-intrusion risk values generated by the Johnson and Ettinger soil model.

[c] Isopropylbenzene used as a surrogate based on structural similarity.

Table I-4.3-5
Residential Noncarcinogenic Screening of Vapor Intrusion for AOC C-15-005

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Acetone	0.012	2970	0.000004
		HI	**0.000004**

[a] Maximum detected concentration.

[b] Vapor-intrusion risk values generated by the Johnson and Ettinger soil model.

Table I-4.3-6
Residential Noncarcinogenic Screening of Vapor Intrusion for AOC 15-005(b)

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Methylene chloride	0.0065	40.2	0.00016
Methylnaphthalene[2-][c]	0.043	3.04	0.014
		HI	**0.01**

[a] Maximum detected concentration.

[b] Vapor-intrusion risk values generated by the Johnson and Ettinger soil model.

[c] The toxicity value used is the reference concentration (RfC) for naphthalene.

Table I-4.3-7
Residential Carcinogenic Screening of Vapor Intrusion for AOC 15-005(b)

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration [b] (mg/kg)	Cancer Risk
Naphthalene	0.075	0.396	1.89E-06
		Total Excess Cancer Risk	**2E-06**

[a] Maximum detected concentration.

[b] Vapor-intrusion risk values generated by the Johnson and Ettinger soil model.

Table I-4.3-8
Residential Noncarcinogenic Screening of Vapor Intrusion for SWMU 36-001

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Acetone	0.041	3890	0.000011
Methylene Chloride	0.006	32.2	0.00019
Trichlorofluoromethane	0.00071	146	0.0000049
		HI	**0.0002**

[a] Maximum detected concentration.

[b] Vapor-intrusion risk values generated by the Johnson and Ettinger soil model.

Table I-4.3-9
Residential Noncarcinogenic Screening of Vapor Intrusion for SWMU 36-005

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Acetone	0.31	2070	0.00015
Methylene chloride	0.0063	40.2	0.00016
		HI	**0.0003**

[a] Maximum detected concentration.

[b] Vapor-intrusion risk values generated by the Johnson and Ettinger soil model.

Table I-5.3-1
ESLs for Terrestrial Receptors

COPEC	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Inorganic Chemicals (mg/kg)											
Antimony	na*	na	na	na	na	2.4	2.6	2.6	46	78	11
Arsenic	120	850	42	18	26	32	140	15	820	6.8	18
Barium	8600	28000	820	1000	930	1800	2900	1300	41000	330	110
Beryllium	na	na	na	na	na	56	150	18	420	40	2.5
Cadmium	1.5	470	4.4	0.29	0.54	0.51	8.8	0.27	530	140	32
Chromium (Total)	200	1000	68	28	40	110	750	45	1800	na	na
Cobalt	720	2700	170	96	120	400	1600	160	5500	na	13
Copper	92	1300	38	15	22	64	240	38	4000	80	70
Cyanide (Total)	0.4	0.59	0.1	0.1	0.1	340	660	310	2800	na	na
Lead	95	630	21	14	16	120	330	72	3700	1700	120
Manganese	27000	69000	1400	3100	1900	1400	1800	1500	41000	450	220
Mercury	0.066	0.29	0.07	0.013	0.022	3	20	1.7	61	0.05	34
Nickel	120	2300	160	21	38	20	440	9.7	1200	280	38
Selenium	4.3	81	1	0.75	0.87	0.83	1.9	0.66	90	4.1	0.52
Silver	14	670	11	2.6	4.3	24	140	14	4300	na	560
Thallium	56	120	9.2	6.3	7.5	0.73	2.5	0.22	5.3	na	0.05
Uranium	16000	30000	1900	1600	1700	750	1800	220	4800	na	25

Table I-5.3-1 (continued)

COPEC	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Vanadium	64	130	8.9	6.7	7.6	480	1300	140	3300	na	60
Zinc	250	2400	350	48	85	170	1600	98	7800	120	160
Organic Chemicals (mg/kg)											
Acenaphthene	na	na	na	na	na	160	440	120	25000	na	0.25
Acetone	970	76000	7.5	170	14	1.2	1.3	15	7800	na	na
Amino-2,6-dinitrotoluene[4-]	na	na	na	na	na	23	290	12	6400	18	33
Amino-4,6-dinitrotoluene[2-]	na	na	na	na	na	24	92	15	9400	43	14
Anthracene	na	na	na	na	na	310	1000	210	34000	na	6.8
Aroclor-1254	0.22	7.1	1.3	0.041	0.08	0.88	46	0.44	5.9	na	160
Aroclor-1260	4.8	400	46	0.88	1.7	20	2600	10	14	na	na
Benzo(a)anthracene	7.4	34	0.8	1	0.91	3.4	5.5	3	110	na	18
Benzo(a)pyrene	na	na	na	na	na	85	240	53	3400	na	na
Benzo(b)fluoranthene	na	na	na	na	na	52	110	38	2400	na	18
Benzo(g,h,i)perylene	na	na	na	na	na	47	480	24	3300	na	na
Benzo(k)fluoranthene	na	na	na	na	na	100	310	62	4300	na	na
Benzoic acid	na	na	na	na	na	1.3	3.7	1	1800	na	na
Benzyl alcohol	na	na	na	na	na	120	150	260	110000	na	na
Bis(2-ethylhexyl)phthalate	0.1	8.1	20	0.02	0.04	1.1	2400	0.59	380	na	na
Butylbenzylphthalate	na	na	na	na	na	160	2000	90	18000	na	na

Table I-5.3-1 (continued)

COPEC	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Organic Chemicals (mg/kg)											
Chrysene	na	na	na	na	na	3.1	5.8	2.4	110	na	na
Di-n-butylphthalate	0.059	1.7	0.39	0.011	0.021	370	14000	180	48000	na	160
Di-n-octylphthalate	na	na	na	na	na	1.8	11000	0.91	1000	na	na
Dibenz(a,h)anthracene	na	na	na	na	na	22	85	12	850	na	na
Dibenzofuran	na	na	na	na	na	na	na	na	na	na	6.1
Diethylphthalate	na	na	na	na	na	3600	7200	3600	2200000	na	100
Dinitrotoluene[2,4-]	na	na	na	na	na	20	66	13	2000	18	6
Dinitrotoluene[2,6-]	780	21000	52	130	76	4.1	5.5	7.1	1300	30	na
Fluoranthene	na	na	na	na	na	38	230	22	3300	10	na
Fluorene	na	na	na	na	na	340	990	250	44000	3.7	na
HMX	na	na	na	na	na	300	340	900	59000	16	2700
Indeno(1,2,3-cd)pyrene	na	na	na	na	na	110	530	62	4600	na	na
Methylene chloride	na	na	na	na	na	2.6	3	9	4200	na	1600
Methylnaphthalene[2-]	na	na	na	na	na	24	95	16	4200	na	na
Methylphenol[2-]	na	na	na	na	na	590	720	1300	160000	na	0.67
Naphthalene	89	2100	3.4	16	5.7	9.7	11	27	5100	na	1
Pentachlorophenol	1.9	49	31	0.36	0.72	1.6	150	0.81	170	31	5
Phenanthrene	na	na	na	na	na	15	52	10	1700	5.5	na
Phenol	na	na	na	na	na	38	38	550	42000	1.8	0.79

Table I-5.3-1 (continued)

COPEC	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Organic Chemicals (mg/kg)											
Pyrene	190	3100	71	34	46	32	99	22	2800	10	na
RDX	13	890	2.3	2.4	2.4	16	31	16	7000	8.4	na
TCDD[2,3,7,8-]	na	na	na	na	na	5.80E-07	4.30E-05	2.9E-07	8.30E-05	5	na
Toluene	na	na	na	na	na	25	54	23	11000	na	200
Trichlorofluoromethane	na	na	na	na	na	98	1500	52	52000	na	na
Trinitrobenzene[1,3,5-]	na	na	na	na	na	120	120	400	10000	10	na
Trinitrotoluene[2,4,6-]	1500	3500	7.6	170	14	96	96	1000	26000	32	62
Xylene (Total)	220	12000	90	41	56	2	6.2	1.4	640	na	100
Radionuclides (pCi/g)											
Cesium-137	4300	3900	1400	4600	2600	2300	1200	2400	1500	2300	1500
Uranium-234	260000	260000	15000	92000	31000	120000	18000	140000	110000	2200	440
Uranium-235/236	10000	10000	6500	9800	8200	5200	4200	5200	5200	1600	440
Uranium-238	4200	4200	3400	4100	3800	2100	1900	2100	2100	1100	400

Note: ESLs from ECORISK Database, Version 3.2 (LANL 2014, 262559).

*na = Not available.

Table I-5.3-2
Minimum ESL Comparison for SWMU 15-002, Former North Burn Pit

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Barium	187	110	Plant (terrestrial autotroph–producer)	**1.7**
Copper	8.17	15	American robin (avian insectivore)	**0.5**
Lead	29.9	14	American robin (avian insectivore)	**2.1**
Manganese	1104	220	Plant (terrestrial autotroph–producer)	**5**
Mercury	0.63	0.013	American robin (avian insectivore)	**49**
Selenium	1.51	0.52	Plant (terrestrial autotroph–producer)	**2.9**
Organic Chemicals (mg/kg)				
Acetone	0.083	1.2	Deer mouse (mammalian omnivore)	0.07
Bis(2-ethylhexyl)phthalate	0.14	0.02	American robin (avian insectivore)	**7**
Di-n-butylphthalate	0.69	0.011	American robin (avian insectivore)	**63**
Diethylphthalate	0.18	100	Plant (terrestrial autotroph–producer)	0.002
TCDD[2,3,7,8-] equivalent	8.85E-08	2.90E-07	Montane shrew (mammalian insectivore)	**0.31**

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-3
HI Analysis for SWMU 15-002, Former North Burn Pit

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Barium	187	0.022	0.0067	0.23	0.19	0.2	0.1	0.064	0.14	0.0046	**0.57**	**1.7**
Copper	8.17	0.089	0.0063	0.22	**0.54**	**0.37**	0.13	0.03	0.22	0.002	0.1	0.12
Lead	29.9	**0.31**	0.047	**1.42**	**2.14**	**1.87**	0.25	0.091	**0.42**	0.0081	0.018	0.25
Manganese	1104	0.041	0.016	**0.79**	**0.36**	**0.58**	**0.79**	**0.61**	**0.74**	0.027	**2.45**	**5.02**
Mercury	0.63	**9.55**	**2.17**	**9**	**48.5**	**28.6**	0.21	0.032	**0.37**	0.01	**12.6**	0.019
Selenium	1.51	**0.35**	0.019	**1.51**	**2.01**	**1.73**	**1.81**	**0.79**	**2.28**	0.02	**0.37**	**2.9**
Bis(2-ethylhexyl)phthalate	0.14	**1.4**	0.017	0.007	**7**	**3.5**	0.13	0.000058	0.24	0.00037	na*	na
Di-n-butylphthalate	0.69	**11.7**	**0.41**	**1.77**	**62.7**	**32.9**	0.0019	0.000049	0.0038	0.000014	na	0.0043
TCDD[2,3,7,8-] equivalent	8.85E-08	0.041	na	na	na	na	0.15	0.0021	**0.31**	0.0011	0.000000018	na
HI		**24**	**3**	**15**	**123**	**70**	**4**	**2**	**5**	0.07	**16**	**10**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-4
Minimum ESL Comparison for SWMU 15-002, Former South Burn Pit

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	12.5	2.4	Deer mouse (mammalian omnivore)	**5.2**
Arsenic	3.84	6.8	Earthworm (soil-dwelling invertebrate)	**0.6**
Barium	10283	110	Plant (terrestrial autotroph–producer)	**93**
Beryllium	1.03	2.5	Plant (terrestrial autotroph–producer)	**0.4**
Chromium (total)	11.7	28	American robin (avian insectivore)	**0.4**
Copper	81.9	15	American robin (avian insectivore)	**5.5**
Cyanide	1.9	0.1	American robin (all feeding guilds)	**19**
Lead	61.6	14	American robin (avian insectivore)	**4.4**
Mercury	604	0.013	American robin (avian insectivore)	**46462**
Nickel	9.93	9.7	Montane shrew (mammalian insectivore)	**1**
Selenium	1.7	0.52	Plant (terrestrial autotroph–producer)	**3.3**
Zinc	57.3	48	American robin (avian insectivore)	**1.2**
Organic Chemicals (mg/kg)				
Amino-2,6-dinitrotoluene[4-]	0.15	12	Montane shrew (mammalian insectivore)	0.013
Amino-4,6-dinitrotoluene[2-]	0.12	14	Plant (terrestrial autotroph–producer)	0.0086
Bis(2-ethylhexyl)phthalate	0.13	0.02	American robin (avian insectivore)	**6.5**
Dinitrotoluene[2,4-]	0.012	6	Plant (terrestrial autotroph–producer)	0.002
HMX	0.6	16	Earthworm (soil-dwelling invertebrate)	0.038
RDX	2.6	2.3	American robin (avian herbivore)	**1.1**
TCDD[2,3,7,8-] equivalent	1.20E-06	2.90E-07	Montane shrew (mammalian insectivore)	**4.1**
Trinitrotoluene[2,4,6-]	0.11	7.6	American robin (avian herbivore)	0.014

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-5
HI Analysis for SWMU 15-002, Former South Burn Pit

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	12.5	na*	na	na	na	na	**5.21**	**4.81**	**4.81**	0.27	0.16	**1.14**
Arsenic	3.84	0.032	0.0045	0.091	0.21	0.15	0.12	0.027	0.26	0.0047	**0.57**	0.21
Barium	10283	**1.2**	**0.37**	**12.5**	**10.3**	**11.1**	**5.71**	**3.55**	**7.91**	**0.25**	**31.2**	**93.5**
Beryllium	1.03	na	na	na	na	na	0.018	0.0069	0.057	0.0025	0.026	**0.41**
Chromium (total)	11.7	0.059	0.012	0.17	**0.42**	0.29	0.11	0.016	0.26	0.0065	na	na
Copper	81.9	**0.89**	0.063	**2.16**	**5.46**	**3.72**	**1.28**	**0.34**	**2.16**	0.02	**1.02**	**1.17**
Cyanide	1.9	**4.75**	**3.22**	**19**	**19**	**19**	0.0056	0.0029	0.0061	0.00068	na	na
Lead	61.6	**0.65**	0.098	**2.93**	**4.4**	**3.85**	**0.51**	0.19	**0.86**	0.017	0.036	**0.51**
Mercury	604	**9152**	**2083**	**8629**	**46462**	**27455**	**201**	**30.2**	**355**	**9.9**	**12080**	**17.8**
Nickel	9.93	0.083	0.0043	0.062	**0.47**	0.26	**0.5**	0.022	**1.02**	0.0083	0.035	0.26
Selenium	1.7	**0.4**	0.021	**1.7**	**2.27**	**1.95**	**2.05**	**0.89**	**2.58**	0.019	**0.41**	**3.27**
Zinc	57.3	0.23	0.024	0.16	**1.19**	**0.67**	**0.34**	0.036	**0.58**	0.0073	**0.48**	**0.36**
Bis(2-ethylhexyl)phthalate	0.13	**1.3**	0.016	0.0065	**6.5**	**3.25**	0.12	0.000054	0.22	0.00034	na	na
RDX	2.6	0.2	0.0029	**1.13**	**1.08**	**1.08**	0.16	0.084	0.16	0.00037	**0.31**	na
TCDD[2,3,7,8-] equivalent	1.20E-06	na	na	na	na	na	**2.07**	0.028	**4.14**	0.014	0.00000024	na
HI		**9162**	**2087**	**8669**	**46513**	**27500**	**219**	**40**	**380**	**11**	**12114**	**119**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-6
Minimum ESL Comparison for SWMU 15-004(b) and 15-004(c)

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Arsenic	3.71	6.8	Plant (terrestrial autotroph–producer)	**0.55**
Barium	404	110	Plant (terrestrial autotroph–producer)	**3.7**
Beryllium	1.07	2.5	Plant (terrestrial autotroph–producer)	**0.43**
Cadmium	10.5	0.27	Montane shrew (mammalian insectivore)	**39**
Chromium (Total)	12.5	28	American robin (avian insectivore)	**0.45**
Cobalt	8.12	13	Plant (terrestrial autotroph–producer)	**0.62**
Copper	97.1	15	American robin (avian insectivore)	**6.47**
Lead	251	14	American robin (avian insectivore)	**18**
Manganese	415	220	Plant (terrestrial autotroph–producer)	**1.89**
Mercury	0.11	0.013	American robin (avian insectivore)	**8.5**
Nickel	10.2	9.7	Montane shrew (mammalian insectivore)	**1.05**
Selenium	1.72	0.52	Plant (terrestrial autotroph–producer)	**3.3**
Thallium	0.543	0.05	Plant (terrestrial autotroph–producer)	**11**
Organic Chemicals (mg/kg)				
Acetone	0.012	1.2	Deer mouse (mammalian omnivore)	0.01
Amino-2,6-dinitrotoluene[4-]	0.0074	12	Montane shrew (mammalian insectivore)	0.00062
Amino-4,6-dinitrotoluene[2-]	0.0076	14	Plant (terrestrial autotroph–producer)	0.00054
Benzyl alcohol	0.079	120	Deer mouse (mammalian omnivore)	0.00066
Bis(2-ethylhexyl)phthalate	0.13	0.02	American robin (avian insectivore)	**6.5**
Di-n-butylphthalate	0.99	0.011	American robin (avian insectivore)	**90**
HMX	0.086	16	Earthworm (soil-dwelling invertebrate)	0.0054
RDX	0.31	2.3	American robin (avian herbivore)	0.13
TCDD[2,3,7,8-] equivalent	8.16E-10	2.9E-07	Montane shrew (mammalian insectivore)	0.0028
Trinitrotoluene[2,4,6-]	0.0098	7.6	American robin (avian herbivore)	0.0013
Xylene (Total)	0.00095	1.4	Montane shrew (mammalian insectivore)	0.00068
Radionuclides (pCi/g)				
Uranium-234	1.28	440	Plant (terrestrial autotroph–producer)	0.0029
Uranium-238	1.38	400	Plant (terrestrial autotroph–producer)	0.0035

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-7
HI Analysis for SWMUs 15-004(b) and 15-004(c)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Arsenic	3.71	0.031	0.0044	0.088	0.21	0.14	0.12	0.027	0.25	0.0045	**0.55**	0.21
Barium	404	0.047	0.014	**0.49**	**0.4**	**0.43**	0.22	0.14	**0.31**	0.0099	**1.22**	**3.67**
Beryllium	1.07	na*	na	na	na	na	0.019	0.0072	0.059	0.0026	0.027	**0.43**
Cadmium	10.5	**7**	0.022	**2.39**	**36.2**	**19.4**	**20.6**	**1.19**	**38.9**	0.02	0.075	**0.33**
Chromium (Total)	12.5	0.062	0.012	0.18	**0.45**	**0.31**	0.11	0.017	0.28	0.0069	na	na
Cobalt	8.12	0.011	0.003	0.048	0.085	0.068	0.02	0.0051	0.051	0.0015	na	**0.62**
Copper	97.1	**1.06**	0.075	**2.55**	**6.47**	**4.41**	**1.52**	**0.4**	**2.55**	0.024	**1.21**	**1.39**
Lead	251	**2.65**	**0.4**	**12**	**17.9**	**15.7**	**2.09**	**0.76**	**3.49**	0.068	0.15	**2.09**
Manganese	415	0.015	0.006	0.296	0.13	0.22	0.295	0.23	0.28	0.01	**0.92**	**1.89**
Mercury	0.11	**1.68**	**0.38**	**1.59**	**8.54**	**5.05**	0.037	0.0055	0.065	0.0018	**2.2**	0.0032
Nickel	10.2	0.085	0.0044	0.064	**0.49**	0.27	**0.51**	0.023	**1.05**	0.0085	0.036	0.27
Selenium	1.72	**0.4**	0.021	**1.72**	**2.29**	**1.98**	**2.07**	**0.91**	**2.61**	0.019	**0.42**	**3.31**
Thallium	0.543	0.0097	0.0045	0.059	0.086	0.072	**0.74**	0.22	**2.47**	0.1	na	**10.9**
Bis(2-ethylhexyl)phthalate	0.13	**1.3**	0.016	0.0065	**6.5**	**3.25**	0.12	0.000054	0.22	0.00034	na	na
Di-n-butylphthalate	0.99	**16.8**	**0.58**	**2.54**	**90**	**47.1**	0.0027	0.000071	0.0055	0.000021	na	0.0062
HI		**31**	**2**	**24**	**170**	**98**	**28**	**4**	**53**	0.3	**7**	**25**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-8
Minimum ESL Comparison for SWMU 15-004(f)

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	0.81	2.4	Deer mouse (mammalian omnivore)	**0.34**
Arsenic	2.88	6.8	Earthworm (soil-dwelling invertebrate)	**0.42**
Barium	180	110	Plant (terrestrial autotroph–producer)	**1.6**
Beryllium	2.5	2.5	Plant (terrestrial autotroph–producer)	**1**
Cadmium	1.02	0.27	Montane shrew (mammalian insectivore)	**3.8**
Chromium (Total)	12.3	28	American robin (avian insectivore)	**0.44**
Cobalt	4.19	13	Plant (terrestrial autotroph–producer)	**0.32**
Copper	598	15	American robin (avian insectivore)	**40**
Lead	34.2	14	American robin (avian insectivore)	**2.4**
Manganese	345	220	Plant (terrestrial autotroph–producer)	**1.6**
Mercury	0.2	0.013	American robin (avian insectivore)	**15.4**
Nickel	8.94	9.7	Montane shrew (mammalian insectivore)	**0.92**
Selenium	1.45	0.52	Plant (terrestrial autotroph–producer)	**2.8**
Silver	1.61	2.6	American robin (avian insectivore)	**0.62**
Uranium	849	25	Plant (terrestrial autotroph–producer)	**34**
Zinc	76.4	48	American robin (avian insectivore)	**1.6**
Organic Chemicals (mg/kg)				
Amino-4,6-dinitrotoluene[2-]	0.0072	14	Plant (terrestrial autotroph–producer)	0.00051
Dinitrotoluene[2,4-]	0.004	6	Plant (terrestrial autotroph–producer)	0.00067
Dinitrotoluene[2,6-]	0.0064	4.1	Deer mouse (mammalian omnivore)	0.0016
TCDD[2,3,7,8-] equivalent	1.31E-07	2.90E-07	Montane shrew (mammalian insectivore)	**0.45**
Radionuclides (pCi/g)				
Cesium-137	0.28	1200	Desert cottontail (mammalian herbivore)	0.00023
Uranium-234	59.5	440	Plant (terrestrial autotroph–producer)	0.14
Uranium-235/236	5.7	440	Plant (terrestrial autotroph–producer)	0.013
Uranium-238	235	400	Plant (terrestrial autotroph–producer)	**0.59**

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-9
HI Analysis for SWMU 15-004(f)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	0.81	na*	na	na	na	na	**0.34**	**0.31**	**0.31**	0.018	0.01	0.074
Arsenic	2.88	0.024	0.0034	0.069	0.16	0.11	0.09	0.021	0.19	0.0035	**0.42**	0.16
Barium	180	0.021	0.0064	0.22	0.18	0.19	0.1	0.062	0.14	0.0044	**0.55**	**1.64**
Beryllium	2.5	na	na	na	na	na	0.045	0.017	0.14	0.006	0.063	**1.04**
Cadmium	1.02	**0.68**	0.0022	0.23	**3.52**	**1.89**	**2**	0.12	**3.78**	0.0019	0.0073	0.032
Chromium (Total)	12.3	0.062	0.012	0.18	**0.44**	**0.31**	0.11	0.016	0.27	0.0068	na	na
Cobalt	4.19	0.0058	0.0015	0.025	0.044	0.035	0.01	0.0026	0.026	0.0008	na	**0.32**
Copper	598	**6.5**	**0.46**	**15.7**	**39.9**	**27.2**	**9.34**	**2.49**	**15.7**	0.15	**7.48**	**8.54**
Lead	34.2	**0.36**	0.054	**1.63**	**2.45**	**2.14**	0.29	0.1	**0.48**	0.0093	0.02	0.29
Manganese	345	0.013	0.005	0.25	0.11	0.18	0.25	0.19	0.23	0.0084	**0.77**	**1.57**
Mercury	0.2	**3.09**	**0.7**	**2.91**	**15.7**	**9.27**	0.068	0.01	0.12	0.0033	**4.08**	0.006
Nickel	8.94	0.075	0.0039	0.056	**0.43**	0.24	**0.45**	0.02	**0.92**	0.0075	0.032	0.24
Selenium	1.45	**0.34**	0.018	**1.45**	**1.94**	**1.67**	**1.75**	**0.76**	**2.2**	0.016	**0.35**	**2.79**
Silver	1.61	0.11	0.0024	0.15	**0.62**	**0.37**	0.067	0.011	0.11	0.00037	na	0.0029
Uranium	849	0.053	0.28	**0.45**	**0.53**	**0.5**	**1.13**	**0.47**	**3.86**	0.18	na	**34**
Zinc	76.4	**0.31**	0.032	0.22	**1.59**	**0.9**	**0.45**	0.048	**0.78**	0.0098	**0.64**	**0.48**
TCDD[2,3,7,8-] equivalent	1.31E-07	na	na	na	na	na	0.23	0.003	**0.45**	0.0016	0.000000026	na
Uranium-238	235	0.056	0.056	0.069	0.057	0.062	0.11	0.12	0.11	0.11	0.21	**0.59**
HI		**12**	**2**	**24**	**68**	**45**	**17**	**5**	**30**	0.5	**15**	**52**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-10
Minimum ESL Comparison for SWMU 15-004(f) Excluding Firing Point E

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	0.118	2.4	Deer mouse (mammalian omnivore)	0.049
Arsenic	2.65	6.8	Earthworm (soil-dwelling invertebrate)	**0.39**
Barium	140	110	Plant (terrestrial autotroph–producer)	**1.3**
Beryllium	0.89	2.5	Plant (terrestrial autotroph–producer)	**0.36**
Cadmium	0.303	0.27	Montane shrew (mammalian insectivore)	**1.1**
Chromium (Total)	11.6	28	American robin (avian insectivore)	**0.41**
Cobalt	3.46	13	Plant (terrestrial autotroph–producer)	0.27
Copper	43.4	15	American robin (avian insectivore)	**2.9**
Lead	12.3	14	American robin (avian insectivore)	**0.88**
Manganese	322	220	Plant (terrestrial autotroph–producer)	**1.5**
Mercury	0.166	0.013	American robin (avian insectivore)	**12.8**
Nickel	7.94	9.7	Montane shrew (mammalian insectivore)	**0.82**
Selenium	1.43	0.52	Plant (terrestrial autotroph–producer)	**2.75**
Silver	0.166	2.6	American robin (avian insectivore)	0.064
Uranium	59.7	25	Plant (terrestrial autotroph–producer)	**2.39**
Zinc	33.4	48	American robin (avian insectivore)	**0.7**
Organic Chemicals (mg/kg)				
Amino-4,6-dinitrotoluene[2-]	0.0072	14	Plant (terrestrial autotroph–producer)	0.00051
Dinitrotoluene[2,4-]	0.004	6	Plant (terrestrial autotroph–producer)	0.00067
Dinitrotoluene[2,6-]	0.0064	4.1	Deer mouse (mammalian omnivore)	0.0016
TCDD[2,3,7,8-] equivalent	1.61E-08	2.90E-07	Montane shrew (mammalian insectivore)	0.056
Radionuclides (pCi/g)				
Cesium-137	0.3	1200	Desert cottontail (mammalian herbivore)	0.00025
Uranium-234	15.6	440	Plant (terrestrial autotroph–producer)	0.035
Uranium-235/236	0.61	440	Plant (terrestrial autotroph–producer)	0.0014
Uranium-238	25.9	400	Plant (terrestrial autotroph–producer)	0.065

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-11
HI Analysis for SWMU 15-004(f) Excluding Firing Point E

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Arsenic	2.65	0.022	0.0031	0.063	0.15	0.1	0.083	0.019	0.18	0.0032	**0.39**	0.15
Barium	140	0.016	0.005	0.17	0.14	0.15	0.078	0.048	0.11	0.0034	**0.42**	**1.27**
Beryllium	0.89	na*	na	na	na	na	0.016	0.0059	0.049	0.0021	0.022	**0.36**
Cadmium	0.303	0.2	0.00065	0.069	**1.04**	**0.56**	**0.59**	0.034	**1.12**	0.00057	0.0022	0.0095
Chromium (Total)	11.6	0.058	0.012	0.17	**0.41**	0.29	0.11	0.015	0.26	0.0064	na	na
Copper	43.4	**0.47**	0.033	**1.14**	**2.89**	**1.97**	**0.68**	0.18	**1.14**	0.011	**0.54**	**0.62**
Lead	12.3	0.13	0.019	**0.59**	**0.88**	**0.77**	0.1	0.037	0.17	0.0033	0.0072	0.1
Manganese	322	0.012	0.0047	0.23	0.1	0.17	0.23	0.18	0.21	0.0079	**0.72**	**1.46**
Mercury	0.166	**2.5**	**0.57**	**2.36**	**12.7**	**7.55**	0.055	0.0083	0.097	0.0027	**3.32**	0.0049
Nickel	7.94	0.066	0.0035	0.05	**0.38**	0.21	**0.4**	0.018	**0.82**	0.0066	0.028	0.21
Selenium	1.43	**0.33**	0.018	**1.44**	**1.92**	**1.65**	**1.73**	**0.76**	**2.18**	0.016	**0.35**	**2.77**
Uranium	59.7	0.0037	0.002	0.031	0.037	0.035	0.08	0.033	0.27	0.012	na	**2.39**
Zinc	33.4	0.13	0.014	0.095	**0.7**	**0.39**	0.2	0.021	**0.34**	0.0043	0.28	0.21
HI		**4**	0.7	**6**	**21**	**14**	**4**	1	**7**	0.08	**6**	**10**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-12
Minimum ESL Comparison for SWMU 15-004(f) Firing Point E Only

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	4.05	2.4	Deer mouse (mammalian omnivore)	**1.7**
Arsenic	4.08	6.8	Earthworm (soil-dwelling invertebrate)	**0.6**
Barium	386	110	Plant (terrestrial autotroph–producer)	**3.5**
Beryllium	16.3	2.5	Plant (terrestrial autotroph–producer)	**6.5**
Cadmium	4.91	0.27	Montane shrew (mammalian insectivore)	**18**
Chromium (Total)	16.2	28	American robin (avian insectivore)	**0.58**
Cobalt	7.65	13	Plant (terrestrial autotroph–producer)	**0.59**
Copper	3282	15	American robin (avian insectivore)	**219**
Lead	136	14	American robin (avian insectivore)	**9.7**
Manganese	482	220	Plant (terrestrial autotroph–producer)	**2.2**
Mercury	0.033	0.013	American robin (avian insectivore)	**2.5**
Nickel	14.6	9.7	Montane shrew (mammalian insectivore)	**1.5**
Selenium	1.65	0.52	Plant (terrestrial autotroph–producer)	**3.2**
Silver	8.57	2.6	American robin (avian insectivore)	**3.3**
Uranium	2763	25	Plant (terrestrial autotroph–producer)	**111**
Zinc	278	48	American robin (avian insectivore)	**5.8**
Organic Chemicals (mg/kg)				
Dinitrotoluene[2,4-]	0.0038	6	Plant (terrestrial autotroph–producer)	0.00063
TCDD[2,3,7,8-] equivalent	1.31E-07	2.90E-07	Montane shrew (mammalian insectivore)	**0.45**
Radionuclides (pCi/g)				
Uranium-234	184	440	Plant (terrestrial autotroph–producer)	**0.42**
Uranium-235/236	26.2	440	Plant (terrestrial autotroph–producer)	0.06
Uranium-238	1122	400	Plant (terrestrial autotroph–producer)	**2.8**

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-13
HI Analysis for SWMU 15-004(f) Firing Point E only

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	4.05	na*	na	na	na	na	**1.69**	**1.56**	**1.56**	0.088	0.052	**0.37**
Arsenic	4.08	0.034	0.0048	0.097	0.23	0.16	0.13	0.029	0.27	0.005	**0.6**	0.23
Barium	386	0.045	0.014	**0.47**	**0.39**	**0.41**	0.21	0.13	0.3	0.0094	**1.17**	**3.51**
Beryllium	16.3	na	na	na	na	na	0.29	0.11	**0.91**	0.039	**0.41**	**6.51**
Cadmium	4.91	**3.27**	0.01	**1.12**	**16.9**	**9.1**	**9.63**	**0.56**	**18.2**	0.0093	0.035	0.15
Chromium (Total)	16.2	0.081	0.016	0.24	**0.58**	**0.41**	0.15	0.022	**0.36**	0.009	na	na
Cobalt	7.65	0.011	0.0028	0.045	0.08	0.064	0.019	0.0048	0.048	0.0014	na	**0.59**
Copper	3282	**35.7**	**2.52**	**86.4**	**219**	**149**	**51.3**	**13.7**	**86.4**	**0.82**	**41**	**46.9**
Lead	136	**1.43**	0.22	**6.49**	**9.74**	**8.52**	**1.14**	**0.41**	**1.89**	0.037	0.08	**1.14**
Manganese	482	0.018	0.007	**0.34**	0.16	0.25	**0.34**	0.27	**0.32**	0.012	**1.07**	**2.19**
Mercury	0.033	**0.5**	0.11	**0.47**	**2.54**	**1.5**	0.011	0.0017	0.019	0.00054	**0.66**	0.001
Nickel	14.6	0.12	0.0063	0.091	**0.69**	**0.38**	**0.73**	0.033	**1.5**	0.012	0.052	**0.38**
Selenium	1.65	**0.38**	0.02	**1.65**	**2.2**	**1.90**	**1.99**	**0.87**	**2.5**	0.018	**0.4**	**3.17**
Silver	8.57	**0.61**	0.013	**0.78**	**3.3**	**1.99**	**0.36**	0.061	**0.61**	0.002	na	0.015
Uranium	2763	0.17	0.092	**1.45**	**1.73**	**1.63**	**3.68**	**1.54**	**12.6**	**0.58**	na	**111**
Zinc	278	**1.11**	0.12	**0.79**	**5.79**	**3.27**	**1.63**	0.17	**2.83**	0.036	**2.31**	**1.74**
TCDD[2,3,7,8-] equivalent	1.31E-07	na	na	na	na	na	0.23	0.03	**0.45**	0.0016	0.000000026	na
Uranium-234	184	0.00071	0.00071	0.012	0.002	0.0059	0.0015	0.01	0.0013	0.0017	0.084	**0.42**
Uranium-238	1122	0.27	0.27	**0.33**	0.27	0.3	**0.53**	**0.59**	**0.53**	**0.53**	**1.02**	**2.81**
HI		**44**	**3**	**101**	**264**	**179**	**74**	**20**	**131**	**2**	**49**	**181**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1

*na = Not available.

Table I-5.3-14
Minimum ESL Comparison for SWMU 15-007(a)

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Arsenic	3.8	6.8	Earthworm (soil-dwelling invertebrate)	**0.56**
Barium	217	110	Plant (terrestrial autotroph–producer)	**2**
Chromium (Total)	13.5	28	American robin (avian insectivore)	**0.48**
Copper	8.5	15	American robin (avian insectivore)	**0.57**
Lead	23.9	14	American robin (avian insectivore)	**1.7**
Nickel	10.7	9.7	Montane shrew (mammalian insectivore)	**1.1**
Selenium	1.5	0.52	Plant (terrestrial autotroph–producer)	**2.9**
Organic Chemicals (mg/kg)				
Acetone	0.0073	1.2	Deer mouse (mammalian omnivore)	0.0061
TCDD[2,3,7,8-] equivalent	5.25E-10	2.90E-07	Montane shrew (mammalian insectivore)	0.0018

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-15
HI Analysis for SWMU 15-007(a)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph - producer)
Arsenic	3.8	0.032	0.0045	0.09	0.21	0.15	0.12	0.027	0.25	0.0046	**0.56**	0.21
Barium	217	0.025	0.0078	0.26	0.22	0.23	0.12	0.075	0.17	0.0053	**0.66**	**1.97**
Chromium (Total)	13.5	0.068	0.014	0.2	**0.48**	**0.34**	0.12	0.018	0.3	0.0075	na*	na
Copper	8.5	0.092	0.0065	0.22	**0.57**	**0.39**	0.13	0.035	0.22	0.0021	0.11	0.12
Lead	23.9	0.25	0.038	**1.14**	**1.71**	**1.49**	0.2	0.072	**0.33**	0.0065	0.014	0.2
Nickel	10.7	0.089	0.0047	0.067	**0.51**	0.28	**0.54**	0.024	**1.1**	0.0089	0.038	0.28
Selenium	1.5	**0.35**	0.019	**1.5**	**2**	**1.72**	**1.81**	**0.79**	**2.27**	0.017	**0.37**	**2.88**
HI		0.9	0.1	**3**	**6**	**5**	**3**	1	**5**	0.05	**2**	**6**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-16
Minimum ESL Comparison for SWMU 15-008(a)

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	0.71	2.4	Deer mouse (mammalian omnivore)	0.3
Arsenic	2.53	6.8	Earthworm (soil-dwelling invertebrate)	**0.37**
Barium	233	110	Plant (terrestrial autotroph–producer)	**2.1**
Chromium (Total)	8.7	28	American robin (avian insectivore)	**0.31**
Copper	1734	15	American robin (avian insectivore)	**116**
Lead	22	14	American robin (avian insectivore)	**1.6**
Mercury	0.42	0.013	American robin (avian insectivore)	**32**
Nickel	17.7	9.7	Montane shrew (mammalian insectivore)	**1.8**
Selenium	1.61	0.52	Plant (terrestrial autotroph–producer)	**3.1**
Silver	0.81	2.6	American robin (avian insectivore)	**0.31**
Uranium	2820	25	Plant (terrestrial autotroph–producer)	**113**
Vanadium	15.4	6.7	American robin (avian insectivore)	**2.3**
Zinc	112	48	American robin (avian insectivore)	**2.3**
Organic Chemicals (mg/kg)				
Acenaphthene	0.152	0.25	Plant (terrestrial autotroph–producer)	**0.61**
Acetone	0.047	1.2	Deer mouse (mammalian omnivore)	0.039
Benzoic acid	0.8	1	Montane shrew (mammalian insectivore)	**0.8**
Bis(2-ethylhexyl)phthalate	0.31	0.02	American robin (avian insectivore)	**15**
Di-n-butylphthalate	0.21	0.011	American robin (avian insectivore)	**19**
Di-n-octylphthalate	0.069	0.91	Montane shrew (mammalian insectivore)	0.076
Diethylphthalate	0.05	100	Plant (terrestrial autotroph–producer)	0.0005
Methylene chloride	0.0031	2.6	Deer mouse (mammalian omnivore)	0.0012
TCDD[2,3,7,8-] equivalent	1.34E-06	2.90E-07	Montane shrew (mammalian insectivore)	**4.6**
Radionuclides (pCi/g)				
Uranium-234	145	440	Plant (terrestrial autotroph–producer)	**0.33**
Uranium-235/236	7.07	440	Plant (terrestrial autotroph–producer)	0.016
Uranium-238	147	400	Plant (terrestrial autotroph–producer)	**0.37**

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-17
HI Analysis for SWMU 15-008(a)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Arsenic	2.53	0.021	0.003	0.06	0.14	0.097	0.079	0.018	0.17	0.0031	**0.37**	0.14
Barium	233	0.027	0.0083	0.28	0.23	0.25	0.13	0.08	0.18	0.0057	**0.71**	**2.11**
Chromium (Total)	8.7	0.044	0.0087	0.13	**0.31**	0.22	0.079	0.012	0.19	0.0048	na*	na
Copper	1734	**18.8**	**1.33**	**45.6**	**116**	**78.8**	**27.1**	**7.23**	**45.6**	**0.43**	**21.7**	**24.8**
Lead	22	0.23	0.035	**1.05**	**1.57**	**1.37**	0.18	0.067	**0.31**	0.0059	0.013	0.18
Mercury	0.42	**6.39**	**1.46**	**6.03**	**32.3**	**19.2**	0.14	0.021	0.25	0.0069	**8.44**	0.012
Nickel	17.7	0.15	0.0077	0.11	**0.84**	**0.47**	**0.89**	0.04	**1.83**	0.015	0.063	**0.47**
Selenium	1.61	**0.37**	0.02	**1.61**	**2.14**	**1.85**	**1.94**	**0.85**	**2.43**	0.018	**0.39**	**3.09**
Silver	0.81	0.058	0.0012	0.074	**0.31**	0.19	0.034	0.0058	0.058	0.00019	na	0.0014
Uranium	2820	0.18	0.094	**1.48**	**1.76**	**1.66**	**3.76**	**1.57**	**12.8**	**0.59**	na	**113**
Vanadium	15.4	0.24	0.12	**1.73**	**2.3**	**2.03**	0.032	0.012	0.11	0.0047	na	0.26
Zinc	112	**0.45**	0.047	**0.32**	**2.34**	**1.32**	**0.66**	0.07	**1.14**	0.014	**0.94**	**0.7**
Acenaphthene	0.152	na	na	na	na	na	0.00095	0.00035	0.0013	0.0000061	na	**0.61**
Benzoic acid	0.8	na	na	na	na	na	**0.62**	0.22	**0.8**	0.00044	na	na
Bis(2-ethylhexyl)phthalate	0.31	**3.06**	0.038	0.015	**15.3**	**7.65**	0.28	0.00013	**0.52**	0.0011	na	na
Di-n-butylphthalate	0.21	**3.56**	0.12	**0.54**	**19.1**	**10**	0.00057	0.000015	0.0012	0.0000044	na	0.0013
TCDD[2,3,7,8-] equivalent	1.34E-06	na	na	na	na	na	**2.31**	0.03	**4.62**	0.016	0.00000027	na
Uranium-234	145	0.00056	0.00056	0.0097	0.0016	0.0047	0.0012	0.0081	0.0010	0.0013	0.066	**0.33**
Uranium-238	147	0.035	0.035	0.043	0.036	0.039	0.07	0.077	0.07	0.07	0.13	**0.37**
HI		**34**	**3**	**59**	**195**	**125**	**38**	**10**	**71**	1	**33**	**146**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-18
Minimum ESL Comparison for SWMU 15-009(e)

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	8.6	2.4	Deer mouse (mammalian omnivore)	**3.6**
Chromium (Total)	7.45	28	American robin (avian insectivore)	0.27
Selenium	1.11	0.52	Plant (terrestrial autotroph–producer)	**2.1**
Silver	2.04	2.6	American robin (avian insectivore)	**0.78**
Uranium	18.9	25	Plant (terrestrial autotroph–producer)	**0.76**
Organic Chemicals (mg/kg)				
Benzo(a)anthracene	0.067	0.8	American robin (avian herbivore)	0.084
Benzo(a)pyrene	0.048	53	Montane shrew (mammalian insectivore)	0.00091
Benzo(b)fluoranthene	0.058	18	Plant (terrestrial autotroph–producer)	0.0032
Benzo(k)flouranthene	0.045	62	Montane shrew (mammalian insectivore)	0.00073
Chrysene	0.066	2.4	Montane shrew (mammalian insectivore)	0.028
Fluoranthene	0.089	10	Earthworm (soil-dwelling invertebrate)	0.0089
Pyrene	0.073	10	Earthworm (soil-dwelling invertebrate)	0.0073
TCDD[2,3,7,8-] equivalent	8.19E-08	2.90E-07	Montane shrew (mammalian insectivore)	0.28
Toluene	0.0021	23	Montane shrew (mammalian insectivore)	0.000091
Radionuclides (pCi/g)				
Uranium-234	8.85	440	Plant (terrestrial autotroph–producer)	0.020
Uranium-235/236	0.49	440	Plant (terrestrial autotroph–producer)	0.0011
Uranium-238	16.1	400	Plant (terrestrial autotroph–producer)	0.04

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-19
HI Analysis for SWMU 15-009(e)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph - producer)
Antimony	8.6	na*	na	na	na	na	**3.58**	**3.31**	**3.31**	0.19	0.11	**0.78**
Selenium	1.11	0.26	0.012	**1.11**	**1.48**	**1.28**	**1.34**	**0.58**	**1.68**	0.012	0.27	**2.13**
Silver	2.04	0.15	0.003	0.19	**0.78**	**0.47**	0.085	0.015	0.15	0.00047	na	0.0036
Uranium	18.9	0.0012	0.00063	0.01	0.012	0.011	0.025	0.011	0.086	0.0039	na	**0.76**
HI		0.4	0.02	1	**2**	**2**	**5**	**4**	**5**	0.2	0.4	**4**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-20
Minimum ESL Comparison for SWMU 15-010(a)

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	0.97	2.4	Deer mouse (mammalian omnivore)	**0.4**
Barium	551	110	Plant (terrestrial autotroph–producer)	**5**
Chromium (Total)	13.7	28	American robin (avian insectivore)	**0.49**
Cobalt	5.9	13	Plant (terrestrial autotroph–producer)	**0.45**
Copper	15.4	15	American robin (avian insectivore)	**1**
Lead	25.1	14	American robin (avian insectivore)	**1.8**
Mercury	11.5	0.013	American robin (avian insectivore)	**885**
Selenium	2.5	0.52	Plant (terrestrial autotroph–producer)	**4.8**
Silver	0.6	2.6	American robin (avian insectivore)	0.23
Zinc	64.3	48	American robin (avian insectivore)	**1.3**
Organic Chemicals (mg/kg)				
Acenaphthene	0.096	0.25	Plant (terrestrial autotroph–producer)	**0.38**
Di-n-butylphthalate	0.077	0.011	American robin (avian insectivore)	**7**
TCDD[2,3,7,8-] equivalent	1.95E-07	2.90E-07	Montane shrew (mammalian insectivore)	**0.67**

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-21
HI Analysis for SWMU 15-010(a)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	0.97	na*	na	na	na	na	**0.4**	**0.37**	**0.37**	0.021	0.012	0.088
Barium	551	0.064	0.02	**0.67**	**0.55**	**0.59**	**0.31**	0.19	**0.42**	0.013	**1.67**	**5.01**
Chromium (Total)	13.7	0.069	0.014	0.2	**0.49**	**0.34**	0.12	0.018	**0.3**	0.0076	na	na
Cobalt	5.9	0.0082	0.0022	0.035	0.061	0.049	0.015	0.0037	0.037	0.0011	na	**0.45**
Copper	15.4	0.17	0.01	**0.41**	**1.03**	**0.7**	0.24	0.06	**0.41**	0.0039	0.19	0.22
Lead	25.1	0.26	0.04	**1.2**	**1.79**	**1.57**	0.21	0.08	**0.35**	0.0068	0.015	0.21
Mercury	11.5	**174**	**39.7**	**164**	**885**	**523**	**3.83**	**0.58**	**6.76**	0.19	**230**	**0.34**
Selenium	2.5	**0.58**	0.03	**2.5**	**3.33**	**2.87**	**3.01**	**1.32**	**3.79**	0.03	**0.61**	**4.81**
Zinc	64.3	0.26	0.027	0.18	**1.34**	**0.76**	**0.38**	0.04	**0.66**	0.0082	**0.54**	**0.4**
Acenaphthene	0.096	na	na	na	na	na	0.0006	0.00022	0.0008	0.0000038	na	**0.38**
Di-n-butylphthalate	0.077	**1.31**	0.045	0.2	**7**	**3.67**	0.00021	0.0000055	0.00043	0.0000016	na	0.00048
TCDD[2,3,7,8-] equivalent	1.95E-07	na	na	na	na	na	**0.34**	0.0045	**0.67**	0.0023	0.000000039	na
HI		**177**	**40**	**169**	**901**	**534**	**9**	**3**	**14**	0.3	**233**	**12**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-22
Minimum ESL Comparison for AOC C-15-004

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Copper	52.6	15	American robin (avian insectivore)	**3.5**
Zinc	184	48	American robin (avian insectivore)	**3.8**
Organic Chemicals (mg/kg)				
TCDD[2,3,7,8-] equivalent	5.69E-06	2.90E-07	Montane shrew (mammalian insectivore)	**20**
Radionuclides (pCi/g)				
Uranium-234	6.08	440	Plant (terrestrial autotroph - producer)	0.014
Uranium-235/236	0.31	440	Plant (terrestrial autotroph–producer)	0.00071
Uranium-238	13.9	400	Plant (terrestrial autotroph–producer)	0.035

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-23
HI Analysis for AOC C-15-004

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Copper	52.6	**0.57**	0.04	**1.38**	**3.51**	**2.39**	**0.82**	0.22	**1.38**	0.013	**0.66**	**0.75**
Zinc	184	**0.74**	0.077	**0.53**	**3.83**	**2.16**	**1.08**	0.12	**1.88**	0.024	**1.53**	**1.15**
TCDD[2,3,7,8-] equivalent	5.69E-06	na*	na	na	na	na	**9.81**	1.13	**19.6**	0.069	0.0000011	na
HI		1	0.1	**2**	**7**	**5**	**12**	1	**23**	0.1	**2**	**2**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-24
Minimum ESL Comparison for AOC C-15-005

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	2.6	2.4	Deer mouse (mammalian omnivore)	**1.1**
Barium	124	110	Plant (terrestrial autotroph–producer)	**1.1**
Lead	30.1	14	American robin (avian insectivore)	**2.2**
Mercury	2.97	0.013	American robin (avian insectivore)	**228**
Nickel	8.28	9.7	Montane shrew (mammalian insectivore)	**0.85**
Selenium	1.59	0.52	Plant (terrestrial autotroph–producer)	**3.1**
Zinc	67.2	48	American robin (avian insectivore)	**1.4**
Organic Chemicals (mg/kg)				
Acetone	0.012	1.2	Deer mouse (mammalian omnivore)	0.01
Benzyl alcohol	0.044	120	Deer mouse (mammalian omnivore)	0.00037
Butylbenzylphthalate	0.038	90	Montane shrew (mammalian insectivore)	0.00042
Di-n-butylphthalate	0.093	0.011	American robin (avian insectivore)	**8.5**
Diethylphthalate	13	100	Plant (terrestrial autotroph–producer)	0.13
TCDD[2,3,7,8-] equivalent	4.85E-08	2.90E-07	Montane shrew (mammalian insectivore)	0.17

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-25
HI Analysis for AOC C-15-005

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	2.6	na*	na	na	na	na	**1.08**	**1**	**1**	0.057	0.033	0.24
Barium	124	0.014	0.0044	0.15	0.12	0.13	0.069	0.043	0.095	0.003	**0.37**	**1.12**
Lead	30.1	**0.32**	0.048	**1.43**	**2.15**	**1.88**	0.25	0.091	**0.42**	0.0081	0.018	0.25
Mercury	2.97	**45**	**10.2**	**42.4**	**228**	**135**	**0.99**	0.15	**1.75**	0.049	**59.4**	0.087
Nickel	8.28	0.069	0.0036	0.052	**0.39**	0.22	**0.41**	0.019	**0.85**	0.0069	0.03	0.22
Selenium	1.59	**0.37**	0.02	**1.59**	**2.12**	**1.83**	**1.91**	**0.84**	**2.41**	0.018	**0.39**	**3.06**
Zinc	67.2	0.27	0.028	0.19	**1.40**	**0.79**	**0.4**	0.042	**0.69**	0.0086	**0.56**	**0.42**
Di-n-butylphthalate	0.093	**1.58**	0.055	0.24	**8.45**	**4.43**	0.00025	0.0000066	0.00052	0.0000019	na	0.00058
HI		**48**	**10**	**46**	**243**	**144**	**5**	**2**	**7**	0.2	**61**	**5**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-26
Minimum ESL Comparison for AOC 15-005(b)

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Barium	214	110	Plant (terrestrial autotroph–producer)	**1.9**
Cobalt	7.22	13	Plant (terrestrial autotroph–producer)	**0.56**
Nickel	8.42	9.7	Montane shrew (mammalian insectivore)	**0.87**
Selenium	1.18	0.52	Plant (terrestrial autotroph–producer)	**2.3**
Organic Chemicals (mg/kg)				
Bis(2-ethylhexyl)phthalate	0.21	0.02	American robin (avian insectivore)	**10.5**
Dibenzofuran	0.17	6.1	Plant (terrestrial autotroph–producer)	0.028
Methylene chloride	0.0055	2.6	Deer mouse (mammalian omnivore)	0.0021
TCDD[2,3,7,8-] equivalent	3.06E-08	2.90E-07	Montane shrew (mammalian insectivore)	0.11

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-27
HI Analysis for AOC 15-005(b)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Barium	214	0.025	0.0077	0.26	0.21	0.23	0.12	0.074	0.16	0.0052	**0.65**	**1.95**
Cobalt	7.22	0.01	0.0027	0.042	0.075	0.06	0.018	0.0045	0.045	0.0013	na*	**0.56**
Nickel	8.42	0.07	0.0037	0.051	**0.4**	0.22	**0.42**	0.019	**0.87**	0.007	0.03	0.22
Selenium	1.18	0.27	0.015	**1.18**	**1.57**	**1.35**	**1.42**	**0.62**	**1.78**	0.013	0.29	**2.27**
Bis(2-ethylhexyl)phthalate	0.21	**2.1**	0.026	0.011	**10.5**	**5.25**	0.19	0.000088	**0.36**	0.00055	na	na
HI		**2**	0.06	**2**	**13**	**7**	**2**	0.7	**3**	0.03	1	**5**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-28
Minimum ESL Comparison for AOC C-15-006

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	4.27	2.4	Deer mouse (mammalian omnivore)	**1.8**
Cobalt	9.33	13	Plant (terrestrial autotroph–producer)	**0.72**
Copper	11.7	15	American robin (avian insectivore)	**0.78**
Lead	28.8	14	American robin (avian insectivore)	**2.1**
Manganese	726	220	Plant (terrestrial autotroph–producer)	**3.3**
Mercury	7.09	0.013	American robin (avian insectivore)	**545**
Zinc	58.4	48	American robin (avian insectivore)	**1.2**
Organic Chemicals (mg/kg)				
Aroclor-1254	0.032	0.041	American robin (avian insectivore)	**0.78**
Aroclor-1260	0.018	0.88	American robin (avian insectivore)	0.02
Benzoic acid	0.55	1	Montane shrew (mammalian insectivore)	**0.55**
Bis(2-ethylhexyl)phthalate	0.14	0.02	American robin (avian insectivore)	**7**
Butylbenzylphthalate	0.042	90	Montane shrew (mammalian insectivore)	0.00046
Di-n-butylphthalate	0.052	0.011	American robin (avian insectivore)	**4.7**
TCDD[2,3,7,8-] equivalent	7.19E-07	2.90E-07	Montane shrew (mammalian insectivore)	**2.5**

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-29
HI Analysis for AOC C-15-006

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	4.27	na*	na	na	na	na	**1.8**	**1.64**	**1.64**	0.093	0.055	**0.39**
Cobalt	9.33	0.013	0.0035	0.055	0.097	0.078	0.023	0.0058	0.058	0.0017	na	**0.72**
Copper	11.7	0.13	0.009	**0.31**	**0.78**	**0.53**	0.18	0.049	**0.31**	0.0029	0.15	0.17
Lead	28.8	**0.3**	0.046	**1.37**	**2.06**	**1.8**	0.24	0.087	**0.4**	0.0078	0.017	0.24
Manganese	726	0.027	0.011	**0.52**	0.23	**0.38**	**0.52**	**0.35**	**0.48**	0.018	**1.61**	**3.3**
Mercury	7.09	**107**	**24.5**	**101**	**545**	**322**	**2.36**	**0.35**	**4.17**	0.12	**142**	0.21
Zinc	58.4	0.23	0.024	0.17	**1.22**	**0.69**	**0.34**	0.037	**0.6**	0.0075	**0.49**	**0.37**
Aroclor-1254	0.032	0.15	0.0045	0.025	**0.78**	**0.4**	0.036	0.0007	0.073	0.0054	na	0.0002
Benzoic acid	0.55	na	na	na	na	na	**0.42**	0.15	**0.55**	0.00031	na	na
Bis(2-ethylhexyl)phthalate	0.14	**1.4**	0.017	0.007	**7**	**3.5**	0.13	0.000058	0.24	0.00037	na	na
Di-n-butylphthalate	0.052	**0.88**	0.031	0.13	**4.73**	**2.48**	0.00014	0.0000037	0.00029	0.0000011	na	0.000325
TCDD[2,3,7,8-] equivalent	7.19E-07	na	na	na	na	na	**1.24**	0.017	**2.48**	0.0087	0.00000014	na
	HI	**110**	**25**	**104**	**562**	**332**	**7**	**3**	**11**	0.3	**144**	**5**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-30
Minimum ESL Comparison for SWMU 36-001

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	5	2.4	Deer mouse (mammalian omnivore)	**2.1**
Copper	1160	15	American robin (avian insectivore)	**77**
Lead	79.7	14	American robin (avian insectivore)	**5.7**
Nickel	9.5	9.7	Montane shrew (mammalian insectivore)	**1**
Silver	0.35	2.6	American robin (avian insectivore)	0.13
Uranium	107	25	Plant (terrestrial autotroph–producer)	**4.3**
Zinc	260	48	American robin (avian insectivore)	**5.4**
Organic Chemicals (mg/kg)				
Bis(2-ethylhexyl)phthalate	0.31	0.02	American robin (avian insectivore)	**15.5**
Di-n-butylphthalate	0.076	0.011	American robin (avian insectivore)	**6.9**
Methylphenol[2-]	0.047	0.67	Plant (terrestrial autotroph–producer)	0.07
Phenol	0.64	0.79	Plant (terrestrial autotroph–producer)	**0.81**
TCDD[2,3,7,8-] equivalent	1.06E-05	2.90E-07	Montane shrew (mammalian insectivore)	**36.6**
Radionuclides (pCi/g)				
Uranium-234	4.42	440	Plant (terrestrial autotroph–producer)	0.01
Uranium-235/236	0.606	440	Plant (terrestrial autotroph–producer)	0.0014
Uranium-238	26.7	400	Plant (terrestrial autotroph–producer)	0.067

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-31
HI Analysis for SWMU 36-001

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	5	na*	na	na	na	na	**2.08**	**1.92**	**1.92**	0.11	0.064	**0.45**
Copper	1160	**12.6**	**0.89**	**30.5**	**77.3**	**52.7**	**18.1**	**4.83**	**30.5**	0.29	**14.5**	**16.6**
Lead	79.7	**0.84**	0.13	**3.8**	**5.69**	**4.98**	**0.66**	0.242	**1.11**	0.022	0.047	**0.66**
Nickel	9.5	0.079	0.0041	0.059	**0.45**	0.25	**0.48**	0.022	**0.98**	0.0079	0.034	0.25
Uranium	107	0.0067	0.0036	0.056	0.069	0.063	0.14	0.059	**0.49**	0.022	na	**4.28**
Zinc	260	**1.04**	0.11	**0.74**	**5.42**	**3.06**	**1.53**	0.163	**2.65**	0.033	**2.17**	**1.63**
Bis(2-ethylhexyl)phthalate	0.31	**3.1**	0.038	0.016	**15.5**	**7.75**	0.28	0.00013	**0.53**	0.00082	na	na
Di-n-butylphthalate	0.076	**1.29**	0.045	0.19	**6.9**	**3.6**	0.00021	0.0000054	0.00042	0.0000016	na	0.0005
Phenol	0.64	na	na	na	na	na	0.017	0.017	0.00116	0.000015	**0.36**	**0.81**
TCDD[2,3,7,8-] equivalent	1.06E-05	na	na	na	na	na	**18.3**	0.25	**36.6**	0.13	0.0000021	na
HI		**19**	1	**35**	**111**	**72**	**42**	**8**	**75**	0.6	**17**	**25**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-32
Minimum ESL Comparison for SWMU 36-003(b)

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Selenium	1.4	0.52	Plant (terrestrial autotroph–producer)	**2.7**
Organic Chemicals (mg/kg)				
TCDD[2,3,7,8-] equivalent	1.71E-07	2.9E-07	Montane shrew (mammalian insectivore)	**0.59**

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-33
HI Analysis for SWMU 36-003(b)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph - producer)
Selenium	1.4	**0.33**	0.017	**1.4**	**1.87**	**1.61**	**1.69**	**0.74**	**2.12**	0.016	**0.34**	**2.69**
TCDD[2,3,7,8-] equivalent	1.71E-07	na*	na	na	na	na	0.29	0.004	**0.59**	0.0021	0.000000034	na
HI		0.3	0.02	1	**2**	**2**	**2**	0.7	**3**	0.02	0.3	**3**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-34
Minimum ESL Comparison for SWMU 36-005

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Chromium (Total)	9.66	28	American robin (avian insectivore)	**0.35**
Nickel	7.26	9.7	Montane shrew (mammalian insectivore)	**0.75**
Selenium	1.7	0.52	Plant (terrestrial autotroph–producer)	**3.3**
Organic Chemicals (mg/kg)				
Acetone	0.31	1.2	Deer mouse (mammalian omnivore)	0.26
Benzoic acid	0.61	1	Montane shrew (mammalian insectivore)	**0.61**
Bis(2-ethylhexyl)phthalate	0.065	0.02	American robin (avian insectivore)	**3.3**
Butylbenzylphthalate	0.043	90	Montane shrew (mammalian insectivore)	0.00048
Di-n-butylphthalate	0.2	0.011	American robin (avian insectivore)	**18**
Methylene chloride	0.0031	2.6	Deer mouse (mammalian omnivore)	0.0012
Pentachlorophenol	0.37	0.36	American robin (avian insectivore)	**1**
TCDD[2,3,7,8-] equivalent	1.44E-08	2.90E-07	Montane shrew (mammalian insectivore)	0.05

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-35
HI Analysis for SWMU 36-005

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph - producer)
Chromium (Total)	9.66	0.048	0.0097	0.14	**0.35**	0.24	0.088	0.013	0.21	0.0054	na*	na
Nickel	7.26	0.061	0.0032	0.045	**0.35**	0.19	**0.36**	0.016	**0.75**	0.006	0.026	0.19
Selenium	1.7	**0.4**	0.021	**1.7**	**2.27**	**1.96**	**2.05**	**0.89**	**2.58**	0.019	**0.42**	**3.27**
Benzoic acid	0.61	na	na	na	na	na	**0.47**	0.16	**0.61**	0.00034	na	na
Bis(2-ethylhexyl)phthalate	0.065	**0.65**	0.008	0.0033	**3.26**	**1.63**	0.059	0.000027	0.11	0.00017	na	na
Di-n-butylphthalate	0.2	**3.39**	0.12	**0.51**	**18.2**	**9.52**	0.00054	0.000014	0.0011	0.0000042	na	0.0013
Pentachlorophenol	0.37	0.19	0.0076	0.012	**1.03**	**0.51**	0.23	0.0025	**0.46**	0.0022	0.012	0.074
HI		**5**	0.2	**2**	**25**	**14**	**3**	1	**5**	0.03	0.5	**4**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.3-36
Minimum ESL Comparison for SWMU 36-006

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	1.6	2.4	Deer mouse (mammalian omnivore)	**0.67**
Copper	615	15	American robin (avian insectivore)	**41**
Mercury	0.19	0.013	American robin (avian insectivore)	**15**
Selenium	1.56	0.52	Plant (terrestrial autotroph–producer)	**3**
Zinc	56.7	48	American robin (avian insectivore)	**1.2**
Organic Chemicals (mg/kg)				
Acenaphthene	1.4	0.25	Plant (terrestrial autotroph–producer)	**5.6**
Acetone	0.015	1.2	Deer mouse (mammalian omnivore)	0.013
Amino-2,6-dinitrotoluene[4-]	0.084	12	Montane shrew (mammalian insectivore)	0.007
Amino-4,6-dinitrotoluene[2-]	0.055	14	Plant (terrestrial autotroph–producer)	0.0039
Anthracene	1.3	6.8	Plant (terrestrial autotroph–producer)	0.19
Benzo(a)anthracene	4.8	0.8	American robin (avian herbivore)	**6**
Benzo(a)pyrene	3.6	53	Montane shrew (mammalian insectivore)	0.068
Benzo(b)fluoranthene	5.1	18	Plant (terrestrial autotroph–producer)	0.28
Benzo(g,h,i)perylene	1.2	24	Montane shrew (mammalian insectivore)	0.05
Benzo(k)fluoranthene	2.2	62	Montane shrew (mammalian insectivore)	0.035
Benzoic acid	0.64	1	Montane shrew (mammalian insectivore)	**0.64**
Chrysene	4.6	2.4	Montane shrew (mammalian insectivore)	**1.9**
Dibenz(a,h)anthracene	0.061	12	Montane shrew (mammalian insectivore)	0.0051
Dibenzofuran	0.58	6.1	Plant (terrestrial autotroph–producer)	0.095
Fluoranthene	9.9	10	Earthworm (soil-dwelling invertebrate)	**0.99**
Fluorene	0.94	3.7	Earthworm (soil-dwelling invertebrate)	0.25
Indeno(1,2,3-cd)pyrene	1.5	62	Montane shrew (mammalian insectivore)	0.024
Methylene chloride	0.0086	2.6	Deer mouse (mammalian omnivore)	0.0033
Methylnaphthalene[2-]	0.22	16	Montane shrew (mammalian insectivore)	0.014
Naphthalene	0.95	1	Plant (terrestrial autotroph–producer)	**0.95**
Phenanthrene	7.2	5.5	Earthworm (soil-dwelling invertebrate)	**1.3**
Pyrene	6.9	10	Earthworm (soil-dwelling invertebrate)	**0.69**
RDX	0.49	2.3	American robin (avian herbivore)	0.21
TCDD[2,3,7,8-] equivalent	1.82E-07	2.90E-07	Montane shrew (mammalian insectivore)	**0.63**
Trichlorofluoromethane	0.00045	52	Montane shrew (mammalian insectivore)	0.0000087
Trinitrobenzene[1,3,5-]	0.037	10	Earthworm (soil-dwelling invertebrate)	0.0037
Trinitrotoluene[2,4,6-]	0.047	7.6	American robin (avian herbivore)	0.0062
Radionuclides (pCi/g)				
Uranium-238	1.57	400	Plant (terrestrial autotroph–producer)	0.0039

Note: Bolded values indicate HQ greater than 0.3.

Table I-5.3-37
HI Analysis for SWMU 36-006

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	1.6	na*	na	na	na	na	**0.67**	**0.62**	**0.62**	0.035	0.021	0.15
Copper	615	**6.68**	**0.47**	**16.2**	**41**	**28**	**9.61**	**2.56**	**16.2**	0.15	**7.69**	**8.78**
Mercury	0.19	**2.88**	**0.66**	**2.71**	**14.6**	**8.64**	0.063	0.0095	0.11	0.0031	**3.8**	0.0056
Selenium	1.56	**0.36**	0.019	**1.56**	**2.08**	**1.79**	**1.88**	**0.82**	**2.36**	0.017	**0.38**	**3**
Zinc	56.7	0.23	0.024	0.16	**1.18**	**0.67**	**0.33**	0.04	**0.58**	0.0073	**0.47**	**0.35**
Acenaphthene	1.4	na	na	na	na	na	0.0088	0.0032	0.012	0.000056	na	**5.6**
Benzo(a)anthracene	4.8	**0.65**	0.14	**6**	**4.8**	**5.27**	**1.41**	**0.87**	**1.6**	0.044	na	0.27
Benzoic acid	0.64	na	na	na	na	na	**0.49**	0.17	**0.64**	0.00036	na	na
Chrysene	4.6	na	na	na	na	na	**1.48**	**0.79**	**1.92**	0.042	na	na
Fluoranthene	9.9	na	na	na	na	na	0.26	0.043	**0.45**	0.003	**0.99**	na
Naphthalene	0.95	0.011	0.00045	0.28	0.059	0.17	0.098	0.086	0.035	0.00019	na	**0.95**
Phenanthrene	7.2	na	na	na	na	na	**0.48**	0.14	**0.72**	0.0042	**1.31**	na
Pyrene	6.9	0.036	0.0022	0.097	0.2	0.15	0.22	0.07	**0.31**	0.0025	**0.69**	na
TCDD[2,3,7,8-] equivalent	1.82E-07	na	na	na	na	na	**0.31**	0.0042	**0.63**	0.0022	0.000000036	na
HI		**11**	1	**27**	**64**	**45**	**17**	**6**	**26**	0.3	**15**	**19**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*na = Not available.

Table I-5.4-1
Mexican Spotted Owl AUFs for
Sites within the Potrillo and Fence Canyons Aggregate Area

Site	Site Area (ha)	AUF*
SWMU 15-002, Former North Burn Pit	0.023	0.000063
SWMU 15-002, Former South Burn Pit	0.101	0.00028
SWMUs 15-004(b) and 15-004(c)	5.85	0.016
SWMU 15-004(f)	26.6	0.073
SWMU 15-007(a)	0.15	0.00041
SWMU 15-008(a)	0.04	0.00011
SWMU 15-009(e)	0.014	0.000037
SWMU 15-010(a)	0.0023	0.0000063
AOC C-15-004	0.00074	0.000002
AOC C-15-005	0.033	0.000091
AOC 15-005(b)	0.014	0.000038
AOC C-15-006	0.0098	0.000027
SWMU 36-001	0.083	0.00023
SWMU 36-003(b)	0.0047	0.000013
SWMU 36-005	0.27	0.00074
SWMU 36-006	0.22	0.00059

*AUF is calculated as the area of the site divided by the owl HR of 366 ha.

Table I-5.4-2
PAUFs for Ecological Receptors at SWMU 15-002, Former North Burn Pit

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.0000054
American Robin	0.42	16.8	0.0014
Deer Mouse	0.077	3	0.0077
Desert Cottontail	3.1	124	0.00019
Montane Shrew	0.39	15.6	0.0015
Red Fox	1038	41520	0.00000055

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.023 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-3
Adjusted HIs for SWMU 15-002, Former North Burn Pit

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Barium	187	1.19E-07	4.23E-07	3.15E-04	2.58E-04	2.78E-04	8.03E-04	1.21E-05	2.14E-04	2.55E-09	**0.57**	**1.7**
Copper	8.17	4.86E-07	3.98E-07	2.97E-04	7.52E-04	5.13E-04	9.87E-04	6.37E-06	3.20E-04	1.14E-09	1.02E-01	1.17E-01
Lead	29.9	1.72E-06	3.01E-06	1.97E-03	2.95E-03	2.58E-03	1.93E-03	1.69E-05	6.17E-04	4.51E-09	1.76E-02	2.49E-01
Manganese	1104	2.24E-07	1.01E-06	1.09E-03	4.92E-04	8.02E-04	6.10E-03	1.15E-04	1.09E-03	1.50E-08	**2.45**	**5.02**
Mercury	0.63	5.31E-05	1.40E-04	1.26E-02	6.81E-02	4.02E-02	1.65E-03	6.00E-06	5.61E-04	5.87E-09	**12.6**	1.89E-02
Selenium	1.51	1.92E-06	1.18E-06	2.08E-03	2.77E-03	2.39E-03	1.40E-02	1.48E-04	3.39E-03	9.35E-09	**0.37**	**2.9**
Bis(2-ethylhexyl)phthalate	0.14	7.66E-06	1.1E-06	9.67E-06	9.67E-03	4.83E-03	9.84E-04	1.09E-08	3.53E-04	2.06E-10	na*	na
Di-n-butylphthalate	0.69	6.40E-05	2.57E-05	2.44E-03	8.66E-02	4.54E-02	1.44E-05	9.22E-09	5.70E-06	8.03E-12	na	4.31E-03
TCDD[2,3,7,8-] equivalent	8.85E-08	na	na	na	na	na	1.17E-03	3.82E-07	4.50E-04	5.91E-10	1.77E-08	na
Adjusted HI		0.0001	0.0002	0.02	0.2	0.1	0.03	0.0003	0.007	4E-08	**16**	**10**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-4
PAUFs for Ecological Receptors at SWMU 15-002, Former South Burn Pit

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.000024
American Robin	0.42	16.8	0.006
Deer Mouse	0.077	3	0.034
Desert Cottontail	3.1	124	0.00081
Montane Shrew	0.39	15.6	0.0064
Red Fox	1038	41520	0.0000024

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.1 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-5
Adjusted HIs for SWMU 15-002, Former South Burn Pit

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	12.5	na*	na	na	na	na	1.75E-01	3.92E-03	3.11E-02	6.61E-07	1.60E-01	**1.14**
Arsenic	3.84	7.63E-07	1.25E-06	5.5E-04	1.28E-03	8.89E-04	4.04E-03	2.24E-05	1.66E-03	1.14E-08	**0.57**	2.14E-01
Barium	10283	2.82E-05	1.00E-03	7.46E-02	6.12E-02	6.58E-02	1.90E-01	2.86E-03	5.07E-02	6.04E-07	**31.2**	**93.5**
Beryllium	1.03	na	na	na	na	na	6.22E-04	5.61E-06	3.72E-04	5.99E-09	2.59E-02	**0.41**
Chromium (Total)	11.7	1.40E-06	3.24E-06	1.04E-03	2.52E-03	1.76E-03	3.59E-03	1.27E-05	1.69E-03	1.59E-08	na	na
Copper	81.9	2.12E-05	1.74E-05	1.29E-02	3.28E-02	2.24E-02	4.31E-02	2.78E-04	1.39E-02	4.98E-08	**1.02**	**1.17**
Cyanide	1.9	1.12E-04	8.80E-04	4.48E-04	4.48E-04	4.48E-04	1.32E-07	6.79E-08	1.45E-07	1.63E-09	na	na
Lead	61.6	1.53E-05	2.67E-05	1.75E-02	2.62E-02	2.29E-02	1.71E-02	1.51E-04	5.48E-03	4.01E-08	3.62E-02	**0.51**
Mercury	604	2.16E-01	**0.57**	**51.4**	**277**	**163**	**6.71**	2.44E-02	**2.28**	2.38E-05	**12080**	**17.8**
Nickel	9.93	1.97E-06	1.19E-06	3.73E-04	2.84E-03	1.57E-03	1.67E-02	1.84E-05	6.63E-03	2.01E-08	3.55E-02	2.61E-01
Selenium	1.7	9.42E-06	5.79E-06	1.02E-02	1.36E-02	1.17E-02	6.90E-02	7.29E-04	1.67E-02	4.59E-08	**0.41**	**3.27**
Zinc	57.3	5.46E-06	6.59E-06	9.85E-04	7.18E-03	4.05E-03	1.14E-02	2.92E-05	3.79E-03	1.79E-08	**0.48**	**0.36**
Bis(2-ethylhexyl)phthalate	0.13	3.1E-05	4.43E-06	3.91E-05	3.91E-02	1.95E-02	3.98E-03	4.41E-08	1.43E-03	8.32E-10	na	na
RDX	2.6	4.76E-06	8.06E-07	6.80E-03	6.51E-03	6.51E-03	5.47E-03	6.83E-05	1.05E-03	9.04E-10	**0.31**	na
TCDD[2,3,7,8-] equivalent	1.20E-06	na	na	na	na	na	6.90E-02	2.25E-05	2.65E-02	3.48E-08	2.40E-07	na
Adjusted HI		0.2	0.6	**52**	**277**	**163**	**7**	0.03	**2**	0.00003	**12114**	**119**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-6
PAUFs for Ecological Receptors at SWMUs 15-004(b) and 15-004(c)

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.0014
American Robin	0.42	16.8	0.35
Deer Mouse	0.077	3	n/a[c]
Desert Cottontail	3.1	124	0.047
Montane Shrew	0.39	15.6	0.38
Red Fox	1038	41520	0.00014

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (5.85 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

[c] n/a = Not applicable.

Table I-5.4-7
Adjusted HIs for SWMU 15-004(b) and 15-004(c)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Arsenic	3.71	4.27E-05	6.98E-05	3.08E-02	7.18E-02	4.97E-02	1.16E-01	1.25E-03	9.28E-02	6.38E-07	**0.54**	2.06E-01
Barium	404	6.48E-05	2.31E-04	1.72E-01	1.41E-01	1.51E-01	2.24E-01	6.57E-03	1.17E-01	1.39E-06	**1.22**	**3.67**
Beryllium	1.07	na*	na	na	na	na	1.91E-02	3.37E-04	2.24E-02	3.60E-07	2.68E-02	**0.43**
Cadmium	10.5	9.66E-03	3.57E-04	**0.83**	**12.6**	**6.77**	**20.6**	5.63E-02	**14.6**	2.79E-06	7.50E-02	**0.33**
Chromium (Total)	12.5	8.61E-05	2.00E-04	6.39E-02	1.55E-01	1.09E-01	1.13E-01	7.85E-04	1.04E-01	9.77E-07	na	na
Cobalt	8.12	1.56E-05	4.81E-05	1.66E-02	2.94E-02	2.36E-02	2.03E-02	2.39E-04	1.90E-02	2.08E-07	na	**0.62**
Copper	97.1	1.46E-03	1.19E-03	**0.89**	**2.25**	**1.54**	**1.52**	1.91E-02	**0.96**	3.42E-06	**1.21**	**1.39**
Lead	251	3.65E-03	6.38E-03	**4.17**	**6.25**	**5.47**	**2.09**	3.59E-02	**1.31**	9.57E-06	1.48E-01	**2.09**
Manganese	415	2.12E-05	9.62E-05	1.03E-01	4.66E-02	7.61E-02	2.97E-01	1.09E-02	1.04E-01	1.43E-06	**0.92**	**1.89**
Mercury	0.11	2.32E-03	6.12E-03	**0.55**	**2.95**	**1.74**	3.70E-02	2.62E-04	0.02	2.57E-07	**2.2**	3.26E-03
Nickel	10.2	1.17E-04	7.09E-05	2.22E-02	1.69E-01	9.35E-02	**0.51**	1.09E-03	**0.39**	1.20E-06	3.64E-02	2.68E-01
Selenium	1.72	5.53E-04	3.40E-04	**0.6**	**0.8**	**0.69**	**2.07**	4.28E-02	**0.98**	2.70E-06	**0.42**	**3.31**
Thallium	0.543	1.34E-05	7.23E-05	2.06E-02	3.00E-02	2.52E-02	**0.74**	1.02E-02	**0.93**	1.44E-05	na	**10.9**
Bis(2-ethylhexyl)phthalate	0.13	1.75E-03	9.31E-03	2.21E-03	**2.21**	**1.11**	2.68E-03	2.50E-06	8.07E-02	2.91E-09	na	na
Di-n-butylphthalate	0.99	2.32E-02	2.31E-04	**0.88**	**31.3**	**16.4**	2.24E-01	3.34E-06	2.06E-03	1.39E-06	na	6.19E-03
Adjusted HI		0.04	0.02	**8**	**59**	**34**	**29**	0.2	**20**	0.00004	**7**	**25**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-8
PAUFs for Ecological Receptors at SWMU 15-004(f)

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.0063
American Robin	0.42	16.8	n/a[c]
Deer Mouse	0.077	3	n/a
Desert Cottontail	3.1	124	0.21
Montane Shrew	0.39	15.6	n/a
Red Fox	1038	41520	0.00064

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (26.6 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

[c] n/a = Not applicable.

Table I-5.4-9
Adjusted HIs for SWMU 15-004(f)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	0.81	na*	na	na	na	na	**0.34**	6.68E-02	**0.31**	1.13E-05	1.04E-02	7.36E-02
Arsenic	2.88	1.50E-04	2.45E-04	6.83E-02	1.59E-01	1.10E-01	8.96E-02	4.39E-03	1.91E-01	2.24E-06	**0.42**	1.59E-01
Barium	180	1.32E-04	4.71E-04	2.21E-01	1.82E-01	1.95E-01	1.01E-01	1.34E-02	1.40E-01	2.84E-06	**0.55**	**1.65**
Beryllium	2.5	na	na	na	na	na	4.64E-02	3.72E-03	1.44E-01	3.96E-06	6.50E-02	**1.04**
Cadmium	1.02	4.27E-03	1.58E-04	2.32E-01	**3.52**	**1.89**	**2**	2.49E-02	**3.78**	1.23E-06	7.29E-04	3.18E-03
Chromium (Total)	12.3	3.86E-04	8.95E-04	1.81E-01	**0.44**	**0.31**	1.12E-01	3.52E-03	2.74E-01	4.38E-06	na	na
Cobalt	4.19	3.68E-05	1.14E-04	2.49E-02	4.41E-02	3.52E-02	1.06E-02	5.67E-04	2.64E-02	4.92E-07	na	**0.32**
Copper	598	4.08E-02	3.34E-02	**15.7**	**39.9**	**27.2**	**9.34**	**0.53**	**15.7**	9.57E-05	**7.48**	**8.54**
Lead	34.2	2.26E-03	3.95E-03	**1.63**	**2.45**	**2.14**	2.85E-01	2.22E-02	**0.48**	5.92E-06	2.01E-02	2.85E-01
Manganese	345	8.02E-05	3.64E-04	2.47E-01	1.11E-01	1.82E-01	2.47E-01	4.11E-02	2.30E-01	5.40E-06	**0.77**	**1.57**
Mercury	0.2	1.94E-02	5.11E-02	**2.91**	**15.7**	**9.3**	6.80E-02	2.19E-03	1.20E-01	2.14E-06	**4.08**	5.88E-03
Nickel	8.94	4.68E-04	2.83E-04	5.6E-02	**0.43**	2.36E-01	**0.45**	4.37E-03	**0.92**	4.78E-06	3.20E-02	2.36E-01
Selenium	1.45	2.12E-03	1.30E-03	**1.45**	**1.94**	**1.67**	**1.75**	1.64E-01	**2.2**	1.03E-05	**0.35**	**2.79**
Silver	1.61	7.19E-04	1.74E-04	1.46E-01	**0.62**	**0.37**	6.69E-02	2.46E-03	1.15E-01	2.39E-07	na	2.87E-03
Uranium	849	3.33E-04	2.06E-03	**0.45**	**0.53**	**0.50**	**1.13**	1.01E-01	**3.86**	1.13E-04	na	**34**
Zinc	76.4	1.92E-03	2.31E-03	2.18E-01	**1.59**	**0.9**	**0.45**	1.02E-02	**0.78**	6.27E-06	**0.64**	**0.48**
TCDD[2,3,7,8-] equivalent	1.31E-07	na	na	na	na	na	2.30E-01	6.54E-04	**0.45**	1.01E-06	2.62E-08	na
Uranium-238	235	3.50E-04	4.06E-03	6.90E-02	5.72E-02	6.17E-02	1.12E-01	2.65E-02	1.12E-01	7.15E-05	2.13E-01	**0.59**
Adjusted HI		0.07	0.1	**24**	**68**	**45**	**17**	1	**30**	0.0003	**15**	**52**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-10
PAUFs for Ecological Receptors at SWMU 15-007(a)

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.000035
American Robin	0.42	16.8	0.0089
Deer Mouse	0.077	3	0.05
Desert Cottontail	3.1	124	0.0012
Montane Shrew	0.39	15.6	0.0096
Red Fox	1038	41520	0.0000036

[a] Values from EPA 1993, 059384.

[b] PAUF is calculated as the area of the site (0.15 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-11
Adjusted HIs for SWMU 15-007(a)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Arsenic	3.8	1.11E-06	1.82E-06	8.02E-04	1.87E-03	1.3E-03	5.90E-03	3.26E-05	2.42E-03	1.66E-08	**0.56**	2.11E-01
Barium	217	8.87E-07	3.16E-06	2.35E-03	1.92E-03	2.07E-03	5.99E-03	8.99E-05	1.59E-03	1.90E-08	**0.66**	**1.97**
Chromium (Total)	13.5	2.37E-06	5.50E-06	1.76E-03	4.28E-03	2.99E-03	6.10E-03	2.16E-05	2.87E-03	2.69E-08	na*	na
Copper	8.5	3.25E-06	2.66E-06	1.98E-03	5.03E-03	3.43E-03	6.60E-03	4.26E-05	2.14E-03	7.63E-09	1.06E-01	1.21E-01
Lead	23.9	8.84E-06	1.54E-05	1.01E-02	1.51E-02	1.32E-02	9.89E-03	8.70E-05	3.17E-03	2.32E-08	1.41E-02	1.99E-01
Nickel	10.7	3.13E-06	1.89E-06	5.93E-04	4.52E-03	2.50E-03	2.66E-02	2.92E-05	1.05E-02	3.20E-08	3.82E-02	2.82E-01
Selenium	1.5	1.23E-05	7.54E-06	1.33E-02	1.77E-02	1.53E-02	8.98E-02	9.49E-04	2.17E-02	5.98E-08	**0.37**	**2.88**
Adjusted HI		0.00003	0.00004	0.03	0.05	0.04	0.2	0.001	0.04	2E-07	**2**	**6**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-12
PAUFs for Ecological Receptors at SWMU 15-008(a)

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.0000094
American Robin	0.42	16.8	0.0024
Deer Mouse	0.077	3	0.013
Desert Cottontail	3.1	124	0.00032
Montane Shrew	0.39	15.6	0.0026
Red Fox	1038	41520	0.000001

[a] Values from EPA 1993, 059384.

[b] PAUF is calculated as the area of the site (0.04 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-13
Adjusted HIs for SWMU 15-008(a)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Arsenic	2.53	1.97E-07	3.22E-07	1.42E-04	3.32E-04	2.30E-04	1.05E-03	5.78E-06	4.29E-04	2.95E-09	**0.37**	1.40E-01
Barium	233	2.53E-07	9.01E-07	6.70E-04	5.49E-04	5.91E-04	1.71E-03	2.57E-05	4.55E-04	5.42E-09	**0.71**	**2.11**
Chromium (Total)	8.7	4.07E-07	9.44E-07	3.02E-04	7.34E-04	5.14E-04	1.05E-03	3.71E-06	4.92E-04	4.62E-09	na*	na
Copper	1734	1.78E-04	1.46E-04	1.09E-01	2.75E-01	1.88E-01	**0.36**	2.33E-03	1.17E-01	4.18E-07	**21.7**	**24.8**
Lead	22	2.18E-06	3.82E-06	2.49E-03	3.74E-03	3.27E-03	2.44E-03	2.15E-05	7.83E-04	5.73E-09	1.29E-02	1.83E-01
Mercury	0.42	5.99E-05	1.58E-04	1.42E-02	7.67E-02	4.53E-02	1.86E-03	6.76E-06	6.32E-04	6.61E-09	**8.44**	1.24E-02
Nickel	17.7	1.38E-06	8.36E-07	2.62E-04	1.99E-03	1.10E-03	1.17E-02	1.29E-05	4.65E-03	1.41E-08	6.33E-02	**0.47**
Selenium	1.61	3.50E-06	2.15E-06	3.80E-03	5.06E-03	4.36E-03	2.56E-02	2.71E-04	6.20E-03	1.71E-08	**0.39**	**3.09**
Silver	0.81	5.47E-07	1.32E-07	1.76E-04	7.43E-04	4.49E-04	4.51E-04	1.87E-06	1.49E-04	1.82E-10	na	1.45E-03
Uranium	2820	1.65E-06	1.02E-05	3.51E-03	4.16E-03	3.92E-03	4.98E-02	5.02E-04	3.26E-02	5.62E-07	na	**113**
Vanadium	15.4	2.25E-06	1.29E-05	4.09E-03	5.44E-03	4.79E-03	4.25E-04	3.80E-06	2.80E-04	4.47E-09	na	2.57E-01
Zinc	112	4.20E-06	5.07E-06	7.58E-04	5.52E-03	3.12E-03	8.73E-03	2.25E-05	2.91E-03	1.38E-08	**0.94**	**0.7**
Acenaphthene	0.152	na	na	na	na	na	1.27E-05	1.11E-07	3.25E-06	5.86E-12	na	**0.61**
Benzoic acid	0.8	na	na	na	na	na	8.14E-03	6.92E-05	2.04E-03	4.25E-10	na	na
Bis(2-ethylhexyl)phthalate	0.31	2.89E-05	4.13E-06	3.64E-05	3.64E-02	1.82E-02	3.71E-03	4.11E-08	1.33E-03	1.05E-09	na	na
Di-n-butylphthalate	0.21	3.33E-05	1.34E-05	1.27E-03	4.51E-02	2.36E-02	7.51E-06	4.80E-09	2.97E-06	4.18E-12	na	1.31E-03
TCDD[2,3,7,8-] equivalent	1.34E-06	na	na	na	na	na	3.08E-02	1.01E-05	1.18E-02	1.56E-08	2.68E-07	na
Uranium-234	145	5.26E-09	6.09E-08	2.30E-05	3.75E-06	1.11E-05	1.61E-05	2.60E-06	2.66E-06	1.27E-09	6.59E-02	**0.33**
Uranium-238	147	3.28E-07	3.80E-06	1.02E-04	8.48E-05	9.15E-05	9.27E-04	2.48E-05	1.78E-04	6.70E-08	1.34E-01	**0.37**
Adjusted HI		0.0003	0.0004	0.1	0.5	0.3	0.5	0.003	0.2	1E-06	**33**	**146**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-14
PAUFs for Ecological Receptors at SWMU 15-009(e)

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.0000033
American Robin	0.42	16.8	0.00083
Deer Mouse	0.077	3	0.0047
Desert Cottontail	3.1	124	0.00011
Montane Shrew	0.39	15.6	0.0009
Red Fox	1038	41520	0.00000034

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.014 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-15
Adjusted HIs for SWMU 15-009(e)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	8.6	na*	na	na	na	na	1.61E-02	3.60E-04	2.86E-03	6.08E-08	1.10E-01	**0.78**
Selenium	1.11	8.52E-07	5.24E-07	9.25E-04	1.23E-03	1.06E-03	6.24E-03	6.60E-05	1.51E-03	4.16E-09	2.71E-01	**2.13**
Silver	2.04	4.81E-07	1.16E-07	1.55E-04	6.54E-04	3.95E-04	3.97E-04	1.65E-06	1.31E-04	1.60E-10	na	3.64E-03
Uranium	18.9	3.76E-09	2.32E-08	7.99E-06	9.49E-06	8.93E-06	1.13E-04	1.14E-06	7.43E-05	1.28E-09	na	**0.76**
Adjusted HI		1E-06	7E-07	0.001	0.002	0.001	0.02	0.0004	0.005	7E-08	0.4	**4**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-16
PAUFs for Ecological Receptors at SWMU 15-010(a)

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.0000054
American Robin	0.42	16.8	0.000137
Deer Mouse	0.077	3	0.00077
Desert Cottontail	3.1	124	0.000019
Montane Shrew	0.39	15.6	0.00015
Red Fox	1038	41520	0.000000055

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0023 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-17
Adjusted HIs for SWMU 15-010(a)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	0.97	na*	na	na	na	na	3.10E-04	6.92E-06	5.50E-05	1.17E-09	1.24E-02	8.82E-02
Barium	551	3.48E-08	1.24E-07	9.02E-05	7.54E-05	8.11E-05	2.35E-04	3.52E-06	6.25E-05	7.44E-10	**1.67**	**5.01**
Chromium (Total)	13.7	3.72E-08	8.61E-08	2.76E-05	6.70E-05	4.69E-05	9.55E-05	3.39E-07	4.49E-05	4.22E-10	na	na
Cobalt	5.9	4.45E-09	1.37E-08	4.75E-06	8.41E-06	6.73E-06	1.13E-05	6.84E-08	5.44E-06	5.94E-11	na	**0.45**
Copper	15.4	9.08E-08	7.44E-08	5.55E-05	1.41E-04	9.58E-05	1.84E-04	1.19E-06	5.98E-05	2.13E-10	1.93E-01	2.20E-01
Lead	25.1	1.43E-07	2.50E-07	1.64E-04	2.45E-04	2.15E-04	1.60E-04	1.41E-06	5.14E-05	3.76E-10	1.48E-02	2.09E-01
Mercury	11.5	9.45E-05	2.49E-04	2.25E-02	1.21E-01	7.16E-02	2.94E-03	1.07E-05	9.97E-04	1.04E-08	**230**	**0.34**
Selenium	2.5	3.15E-07	1.94E-07	3.42E-04	4.56E-04	3.93E-04	2.31E-03	2.44E-05	5.58E-04	1.54E-09	**0.61**	**4.81**
Zinc	64.3	1.40E-07	1.68E-07	2.52E-05	1.83E-04	1.04E-04	2.90E-04	7.45E-07	9.67E-05	4.57E-10	**0.54**	**0.4**
Acenapththene	0.096	na	na	na	na	na	4.60E-07	4.05E-09	1.18E-07	2.13E-13	na	**0.38**
Di-n-butylphthalate	0.077	7.08E-07	2.85E-07	2.7E-05	9.58E-04	5.02E-04	1.60E-07	1.02E-10	6.31E-08	8.89E-14	na	4.81E-04
TCDD[2,3,7,8-] equivalent	1.95E-07	na	na	na	na	na	2.58E-04	8.41E-08	9.91E-05	1.30E-10	3.90E-08	na
Adjusted HI		0.0001	0.0003	0.02	0.1	0.07	0.007	0.00005	0.002	2E-08	**233**	**12**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-18
PAUFs for Ecological Receptors at AOC C-15-004

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.00000018
American Robin	0.42	16.8	0.000044
Deer Mouse	0.077	3	0.00025
Desert Cottontail	3.1	124	0.0000060
Montane Shrew	0.39	15.6	0.000048
Red Fox	1038	41520	0.000000018

[a] Values from EPA 1993, 059384.

[b] PAUF is calculated as the area of the site (0.000743 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-19
Adjusted HIs for AOC C-15-004

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Copper	52.6	1.00E-07	8.21E-08	6.12E-05	1.55E-04	1.06E-04	2.04E-04	1.31E-06	6.59E-05	2.35E-10	**0.66**	**0.75**
Zinc	184	1.29E-07	1.56E-07	2.33E-05	1.70E-04	9.57E-05	2.68E-04	6.89E-07	8.94E-05	4.22E-10	**1.53**	**1.15**
TCDD[2,3,7,8-] equivalent	5.69E-06	na*	na	na	na	na	2.43E-03	7.97E-07	9.34E-04	1.23E-09	1.14E-06	na
Adjusted HI		2E-07	2E-07	0.00008	0.0003	0.0002	0.003	3E-06	0.001	2E-09	**2**	**2**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-20
PAUFs for Ecological Receptors at AOC C-15-005

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.0000079
American Robin	0.42	16.8	0.0020
Deer Mouse	0.077	3	0.011
Desert Cottontail	3.1	124	0.00027
Montane Shrew	0.39	15.6	0.0021
Red Fox	1038	41520	0.0000008

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0334 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-21
Adjusted HIs for AOC C-15-005

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	2.6	na*	na	na	na	na	1.21E-02	2.69E-04	2.14E-03	4.55E-08	3.33E-02	2.36E-01
Barium	124	1.13E-07	4.03E-07	3.00E-04	2.46E-04	2.64E-04	7.64E-04	1.15E-05	2.04E-04	2.43E-09	**0.37**	**1.12**
Lead	30.1	2.49E-06	4.36E-06	2.85E-03	4.27E-03	3.74E-03	2.79E-03	2.46E-05	8.94E-04	6.54E-09	1.77E-02	2.51E-01
Mercury	2.97	3.54E-04	9.35E-04	8.44E-02	**0.45**	2.68E-01	1.10E-02	4.00E-05	3.74E-03	3.92E-08	**59.4**	8.74E-02
Nickel	8.28	5.43E-07	3.28E-07	1.03E-04	7.83E-04	4.33E-04	4.61E-03	5.07E-06	1.83E-03	5.55E-09	2.96E-02	2.18E-01
Selenium	1.59	2.91E-06	1.79E-06	3.16E-03	4.21E-03	3.63E-03	2.13E-02	2.25E-04	5.15E-03	1.42E-08	**0.39**	**3.06**
Zinc	67.2	2.12E-06	2.55E-06	3.81E-04	2.78E-03	1.57E-03	4.40E-03	1.13E-05	1.47E-03	6.93E-09	**0.56**	**0.42**
Di-n-butylphthalate	0.093	1.24E-05	4.99E-06	4.74E-04	1.68E-02	8.80E-03	2.80E-06	1.79E-09	1.11E-06	1.56E-12	na	5.81E-04
Adjusted HI		0.0004	0.0009	0.09	0.5	0.3	0.06	0.0006	0.02	1E-07	**61**	**5**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-22
PAUFs for Ecological Receptors at AOC 15-005(b)

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.0000033
American Robin	0.42	16.8	0.00083
Deer Mouse	0.077	3	0.0046
Desert Cottontail	3.1	124	0.00011
Montane Shrew	0.39	15.6	0.00089
Red Fox	1038	41520	0.00000033

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0139 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-23
Adjusted HIs for AOC 15-005(b)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Barium	214	8.17E-08	2.91E-07	2.16E-04	1.77E-04	1.91E-04	5.52E-04	8.28E-06	1.47E-04	1.75E-09	**0.65**	**1.95**
Cobalt	7.22	3.29E-08	1.02E-07	3.51E-05	6.22E-05	4.98E-05	8.36E-05	5.06E-07	4.02E-05	4.39E-10	na*	**0.56**
Nickel	8.42	2.30E-07	1.39E-07	4.35E-05	3.32E-04	1.83E-04	1.95E-03	2.15E-06	7.73E-04	2.35E-09	3.01E-02	2.22E-01
Selenium	1.18	8.97E-07	5.52E-07	9.74E-04	1.30E-03	1.12E-03	6.57E-03	6.94E-05	1.59E-03	4.38E-09	2.87E-01	**2.26**
Bis(2-ethylhexyl)phthalate	0.21	6.88E-06	9.85E-07	8.69E-06	8.69E-03	4.34E-03	8.85E-04	9.81E-09	3.17E-04	1.85E-10	na	na
Adjusted HI		8E-06	2E-06	0.001	0.01	0.006	0.010	0.00008	0.003	9E-09	1	**5**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-24
PAUFs for Ecological Receptors at AOC C-15-006

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.0000022
American Robin	0.42	16.8	0.00056
Deer Mouse	0.077	3	0.0032
Desert Cottontail	3.1	124	0.000076
Montane Shrew	0.39	15.6	0.00061
Red Fox	1038	41520	0.00000023

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.00945 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-25
Adjusted HIs for AOC C-15-006

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	4.27	na*	na	na	na	na	5.60E-03	1.25E-04	9.95E-04	2.11E-08	5.47E-02	**0.39**
Cobalt	9.33	2.98E-08	9.20E-08	3.18E-05	5.64E-05	4.51E-05	7.58E-05	4.58E-07	3.64E-05	3.98E-10	na	**0.72**
Copper	11.7	2.93E-07	2.41E-07	1.79E-04	4.54E-04	3.10E-04	5.96E-04	3.85E-06	1.93E-04	6.89E-10	1.47E-01	1.68E-01
Lead	28.8	6.97E-07	1.22E-06	7.96E-04	1.19E-03	1.05E-03	7.80E-04	6.86E-06	2.50E-04	1.83E-09	1.69E-02	2.40E-01
Manganese	726	6.18E-08	2.80E-07	3.01E-04	1.36E-04	2.22E-04	1.69E-03	3.17E-05	3.03E-04	4.16E-09	**1.61**	**3.3**
Mercury	7.09	2.39E-04	6.30E-04	5.70E-02	**0.31**	1.81E-01	7.44E-03	2.70E-05	2.53E-03	2.65E-08	**142**	2.09E-01
Zinc	58.4	5.38E-07	6.49E-07	9.69E-05	7.07E-04	3.99E-04	1.12E-03	2.87E-06	3.73E-04	1.76E-09	**0.49**	**0.37**
Aroclor-1254	0.032	3.34E-07	1.20E-07	1.43E-05	4.53E-04	2.32E-04	1.18E-04	5.47E-08	4.55E-05	1.27E-09	na	2.00E-04
Benzoic acid	0.55	na	na	na	na	na	1.38E-03	1.17E-05	3.44E-04	7.18E-11	na	na
Bis(2-ethylhexyl)phthalate	0.14	3.22E-06	4.60E-07	4.06E-06	4.06E-03	2.03E-03	4.14E-04	4.59E-09	1.48E-04	8.65E-11	na	na
Di-n-butylphthalate	0.052	2.03E-06	8.15E-07	7.74E-05	2.74E-03	1.44E-03	4.57E-07	2.92E-10	1.81E-07	2.54E-13	na	3.25E-04
TCDD[2,3,7,8-] equivalent	7.19E-07	na	na	na	na	na	3.90E-03	1.27E-06	1.50E-03	1.97E-09	1.44E-07	na
Adjusted HI		0.0002	0.0006	0.06	0.3	0.2	0.02	0.0002	0.007	6E-08	**144**	**5**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-26
PAUFs for Ecological Receptors at SWMU 36-001

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.00002
American Robin	0.42	16.8	0.0049
Deer Mouse	0.077	3	0.028
Desert Cottontail	3.1	124	0.00067
Montane Shrew	0.39	15.6	0.0053
Red Fox	1038	41520	0.000002

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0829 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-27
Adjusted HIs for SWMU 36-001

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	5	na*	na	na	na	na	5.76E-02	1.29E-03	1.02E-02	2.17E-07	6.41E-02	**0.45**
Copper	1160	2.47E-04	2.02E-04	1.51E-01	**0.38**	2.60E-01	**0.5**	3.23E-03	1.62E-01	5.79E-07	**14.5**	**16.6**
Lead	79.7	1.64E-05	2.87E-05	1.87E-02	2.81E-02	2.46E-02	1.84E-02	1.61E-04	5.88E-03	4.30E-08	4.69E-02	**0.66**
Nickel	9.5	1.55E-06	9.36E-07	2.93E-04	2.23E-03	1.23E-03	1.31E-02	1.44E-05	5.20E-03	1.58E-08	3.39E-02	2.50E-01
Uranium	107	1.31E-07	8.08E-07	2.78E-04	3.30E-04	3.11E-04	3.94E-03	3.97E-05	2.58E-03	4.45E-08	na	**4.28**
Zinc	260	2.03E-05	2.45E-05	3.67E-03	2.67E-02	1.51E-02	4.23E-02	1.09E-04	1.41E-02	6.66E-08	**2.17**	**1.63**
Bis(2-ethylhexyl)phthalate	0.31	6.06E-05	8.67E-06	7.65E-05	7.65E-02	3.82E-02	7.79E-03	8.64E-08	2.79E-03	1.63E-09	na	na
Di-n-butylphthalate	0.076	2.52E-05	1.01E-05	9.62E-04	3.41E-02	1.79E-02	5.68E-06	3.63E-09	2.24E-06	3.16E-12	na	4.75E-04
Phenol	0.64	na	na	na	na	na	4.65E-04	1.13E-05	6.18E-06	3.04E-11	**0.36**	**0.81**
TCDD[2,3,7,8-] equivalent	1.06E-05	na	na	na	na	na	**0.51**	1.65E-04	0.19	2.55E-07	2.12E-06	na
Adjusted HI		0.0004	0.0003	0.2	0.5	0.4	1	0.005	0.4	1E-06	**17**	**25**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-28
PAUFs for Ecological Receptors at SWMU 36-003(b)

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.0000011
American Robin	0.42	16.8	0.00027
Deer Mouse	0.077	3	0.0015
Desert Cottontail	3.1	124	0.000037
Montane Shrew	0.39	15.6	0.00029
Red Fox	1038	41520	0.00000011

[a] Values from EPA 1993, 059384.

[b] PAUF is calculated as the area of the site (0.0046 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-29
Adjusted HIs for SWMU 36-003(b)

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Selenium	1.4	3.57E-07	2.20E-07	3.88E-04	5.17E-04	4.45E-04	2.61E-03	2.76E-05	6.32E-04	1.74E-09	**0.34**	**2.69**
TCDD[2,3,7,8-] equivalent	1.71E-07	na*	na	na	na	na	4.52E-04	1.48E-07	1.74E-04	2.28E-10	3.42E-09	na
Adjusted HI		4E-07	2E-07	0.0004	0.0005	0.0004	0.003	0.00003	0.0008	2E-09	0.3	**3**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-30
PAUFs for Ecological Receptors at SWMU 36-005

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.000064
American Robin	0.42	16.8	0.016
Deer Mouse	0.077	3	0.09
Desert Cottontail	3.1	124	0.0022
Montane Shrew	0.39	15.6	0.017
Red Fox	1038	41520	0.0000065

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0. 271 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-31
Adjusted HIs for SWMU 36-005

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Chromium (Total)	9.66	3.09E-06	7.15E-06	2.29E-03	5.56E-03	3.89E-03	7.93E-03	2.81E-05	3.73E-03	3.50E-08	na*	na
Nickel	7.26	3.86E-06	2.34E-06	7.32E-04	5.57E-03	3.08E-03	3.28E-02	3.60E-05	1.30E-02	3.95E-08	2.59E-02	1.91E-01
Selenium	1.7	2.53E-05	1.56E-05	2.75E-02	3.66E-02	3.16E-02	1.85E-01	1.96E-03	4.48E-02	1.23E-07	**0.42**	**3.27**
Benzoic acid	0.61	na	na	na	na	na	4.24E-02	3.60E-04	1.06E-02	2.21E-09	na	na
Bis(2-ethylhexyl)phthalate	0.065	4.17E-05	5.96E-06	5.26E-05	5.26E-02	2.63E-02	5.35E-03	5.94E-08	1.92E-03	1.12E-09	na	na
Di-n-butylphthalate	0.2	2.17E-04	8.71E-05	8.27E-03	2.93E-01	1.54E-01	4.88E-05	3.12E-08	1.93E-05	2.72E-11	na	1.25E-03
Pentachlorophenol	0.37	1.24E-05	5.59E-06	1.93E-04	1.66E-02	8.29E-03	2.09E-02	5.39E-06	7.94E-03	1.42E-08	1.19E-02	7.40E-02
Adjusted HI		0.0003	0.0001	0.04	0.4	0.2	0.3	0.002	0.08	2E-07	0.5	**4**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.; *na = Not available.

Table I-5.4-32
PAUFs for Ecological Receptors at SWMU 36-006

Receptor	HR (ha)	Population Area (ha)[a]	PAUF[b]
American Kestrel	106	4240	0.000051
American Robin	0.42	16.8	0.013
Deer Mouse	0.077	3	0.072
Desert Cottontail	3.1	124	0.0017
Montane Shrew	0.39	15.6	0.014
Red Fox	1038	41520	0.0000052

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0. 216 ha) divided by the population area. If a PAUF is greater than 1, no adjustment is made.

Table I-5.4-33
Adjusted HIs for SWMU 36-006

COPEC	EPC (mg/kg)	American Kestrel (avian intermediate carnivore)	American Kestrel (avian top carnivore)	American Robin (avian herbivore)	American Robin (avian insectivore)	American Robin (avian omnivore)	Deer Mouse (mammalian omnivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Red Fox (mammalian top carnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph–producer)
Antimony	1.6	na*	na	na	na	na	4.8E-02	1.07E-03	8.52E-03	1.81E-07	2.05E-02	1.45E-01
Copper	615	3.40E-04	2.79E-04	2.08E-01	**0.53**	**0.36**	**0.69**	4.46E-03	2.24E-01	8.00E-07	**7.69**	**8.78**
Mercury	0.19	1.47E-04	3.87E-04	3.49E-02	1.88E-01	1.11E-01	4.56E-03	1.65E-05	1.55E-03	1.62E-08	**3.8**	5.59E-03
Selenium	1.56	1.85E-05	1.14E-05	2.01E-02	2.67E-02	2.31E-02	1.35E-01	1.43E-03	3.27E-02	9.02E-08	**0.38**	**3**
Zinc	56.7	1.15E-05	1.39E-05	2.08E-03	1.52E-02	8.57E-03	2.40E-02	6.17E-05	8.01E-03	3.78E-08	**0.47**	**0.35**
Acenaphthene	1.4	na	na	na	na	na	6.30E-04	5.54E-06	1.62E-04	2.91E-10	na	**5.6**
Benzo(a)anthracene	4.8	3.30E-05	8.33E-05	7.71E-02	6.17E-02	6.78E-02	1.02E-01	1.52E-03	2.22E-02	2.27E-07	na	2.67E-01
Benzoic acid	0.64	na	na	na	na	na	3.54E-02	3.01E-04	8.86E-03	1.85E-09	na	na
Chrysene	4.6	na	na	na	na	na	1.07E-01	1.38E-03	2.65E-02	2.18E-07	na	na
Fluoranthene	9.9	na	na	na	na	na	1.88E-02	7.50E-05	6.23E-03	1.56E-08	**0.99**	na
Naphthalene	0.95	5.44E-07	2.67E-07	3.59E-03	7.63E-04	2.14E-03	7.05E-03	1.50E-04	4.87E-04	9.69E-10	na	**0.95**
Phenanthrene	7.2	na	na	na	na	na	3.46E-02	2.41E-04	9.97E-03	2.20E-08	**1.31**	na
Pyrene	6.9	1.85E-06	1.31E-06	1.25E-03	2.61E-03	1.93E-03	1.55E-02	1.21E-04	4.34E-03	1.28E-08	**0.69**	na
TCDD[2,3,4,7-] equivalent	1.82E-07	na	na	na	na	na	0.023	7.37E-06	0.009	1.14E-08	3.64E-08	na
Adjusted HI		0.0006	0.0008	0.3	0.8	0.6	1	0.01	0.4	2E-06	**15**	**19**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.0.

*na = Not available.

Table I-5.4-34
LOAEL-Based ESLs for Terrestrial Receptors

COPEC	Receptor	LOAEL-Based ESLs* (mg/kg)
Antimony	Deer mouse	24
	Montane shrew	26
	Earthworm	780
	Plant	58
Arsenic	Earthworm	68
Barium	Earthworm	3200
	Plant	260
Beryllium	Plant	25
Cadmium	Robin (herbivore)	44
	Robin (insectivore)	2.9
	Robin (omnivore)	5.4
	Deer mouse	5.1
	Montane shrew	2.7
	Plant	160
Chromium (total)	Robin (insectivore)	280
	Robin (omnivore)	400
Cobalt	Plant	130
Copper	Robin (herbivore)	110
	Robin (insectivore)	46
	Robin (omnivore)	66
	Deer mouse	100
	Desert cottontail	410
	Montane shrew	63
	Earthworm	530
	Plant	490
Lead	Robin (herbivore)	42
	Robin (insectivore)	28
	Robin (omnivore)	33
	Deer mouse	230
	Montane shrew	130
	Earthworm	8400
	Plant	570

Table I-5.4-34 (continued)

COPEC	Receptor	LOAEL-Based ESLs* (mg/kg)
Manganese	Earthworm	4500
	Plant	1100
Mercury	Robin (herbivore)	0.7
	Robin (insectivore)	0.13
	Robin (omnivore)	0.22
	Deer mouse	30
	Montane shrew	17
	Earthworm	0.5
	Plant	64
Nickel	Robin (herbivore)	1600
	Robin (insectivore)	210
	Robin (omnivore)	380
	Deer mouse	41
	Montane shrew	19
	Plant	270
Selenium	Robin (herbivore)	2
	Robin (insectivore)	1.5
	Robin (omnivore)	1.7
	Deer mouse	1.2
	Montane shrew	0.99
	Earthworm	41
	Plant	3
Silver	Robin (insectivore)	26
	Robin (omnivore)	43
Thallium	Deer mouse	7.3
	Montane shrew	2.2
	Plant	0.5
Uranium	Robin (herbivore)	19000
	Robin (insectivore)	16000
	Robin (omnivore)	17000
	Deer mouse	1800
	Montane shrew	560
	Plant	250

Table I-5.4-34 (continued)

COPEC	Receptor	LOAEL-Based ESLs* (mg/kg)
Zinc	Robin (insectivore)	480
	Robin (omnivore)	850
	Deer mouse	1700
	Montane shrew	980
	Earthworm	930
	Plant	810
Acenaphthene	Plant	2
Bis(2-ethylhexyl)phthalate	Robin (insectivore)	0.2
	Robin (omnivore)	0.4
Di-n-butylphthalate	Robin (herbivore)	3.9
	Robin (insectivore)	0.11
	Robin (omnivore)	0.21
	Deer mouse	870
	Montane shrew	440
	Plant	380
Fluoranthene	Earthworm	23
Naphthalene	Plant	10
Phenanthrene	Earthworm	12
Phenol	Earthworm	18
	Plant	8
Pyrene	Earthworm	20
RDX	Earthworm	15
TCDD[2,3,7,8-]	Deer mouse	3.90E-06
	Montane shrew	1.90E-06
Uranium-234	Plant	4400
Uranium-238	Plant	4000

* LOAEL-based ESLs from ECORISK Database, Version 3.2 (LANL 2014, 262559).

Table I-5.4-35
HI Analysis Using LOAEL-Based ESLs
for SWMU 15-002, Former North Burn Pit

COPEC	EPC (mg/kg)	Earthworm	Plant
Barium	187	0.058	**0.72**
Manganese	1104	0.25	**1**
Mercury	0.63	**1.3**	n/a*
Selenium	1.51	0.037	**0.5**
	HI	**2**	**2**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

*n/a = Not applicable.

Table I-5.4-36
HI Analysis Using LOAEL-Based ESLs
for SWMU 15-002, Former South Burn Pit

COPEC	EPC (mg/kg)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Montane Shrew	Earthworm	Plant
Antimony	12.5	na[a]	na	na	n/a[b]	n/a	n/a	0.22
Arsenic	3.84	na	na	na	na	na	0.06	n/a
Barium	10283	na	na	na	na	na	**3.21**	**39.6**
Beryllium	1.03	na	na	na	n/a	n/a	n/a	0.04
Copper	81.9	n/a	n/a	n/a	n/a	n/a	0.15	0.17
Lead	61.6	n/a	n/a	n/a	n/a	n/a	n/a	0.11
Mercury	604	**863**	**4646**	**2745**	**20.1**	**35.5**	**1208**	**9.44**
Selenium	1.7	n/a	n/a	n/a	n/a	n/a	0.041	**0.57**
Zinc	57.3	n/a	n/a	n/a	n/a	n/a	0.062	0.071
RDX	2.6	n/a	n/a	n/a	n/a	n/a	0.17	na
HI		**863**	**4646**	**2745**	**20**	**36**	**1212**	**50**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] na = Not available.

[b] n/a = Not applicable.

Table I-5.4-37
Adjusted HI Analysis Using LOAEL-Based ESLs for SWMU 15-002, Former South Burn Pit

COPEC	EPC (mg/kg)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Montane Shrew	Earthworm	Plant
Arsenic	3.84	na[a]	na	na	na	na	0.06	n/a[b]
Barium	10283	na	na	na	na	na	**3.21**	**39.6**
Beryllium	1.03	na	na	na	n/a	n/a	n/a	0.04
Copper	81.9	n/a	n/a	n/a	n/a	n/a	0.15	0.17
Lead	61.6	n/a	n/a	n/a	n/a	n/a	n/a	0.11
Mercury	604	**5.13**	**27.7**	**16.3**	**0.67**	0.23	**1208**	**9.44**
Selenium	1.7	n/a	n/a	n/a	n/a	n/a	0.041	**0.57**
Zinc	57.3	n/a	n/a	n/a	n/a	n/a	0.062	0.071
RDX	2.6	n/a	n/a	n/a	n/a	n/a	0.17	na
HI		**5**	**28**	**16**	0.7	0.2	**1212**	**50**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] na = Not available.

[b] n/a = Not applicable.

Table I-5.4-38
HI Analysis Using LOAEL-Based ESLs for SWMUs 15-004(b) and 15-004(c)

COPEC	EPC (mg/kg)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Montane Shrew	Earthworm	Plant
Arsenic	3.71	n/a[a]	n/a	n/a	n/a	n/a	0.055	n/a
Barium	404	n/a	n/a	n/a	n/a	n/a	0.13	**1.6**
Beryllium	1.07	na[b]	na	na	n/a	n/a	n/a	0.043
Cadmium	10.5	0.24	**3.62**	**1.94**	**2.06**	**3.89**	n/a	0.074
Cobalt	8.12	n/a	n/a	n/a	n/a	n/a	na	0.062
Copper	97.1	**0.88**	**2.11**	**1.47**	**0.97**	**1.54**	0.18	0.2
Lead	251	**5.98**	**8.96**	**7.61**	**1.09**	**1.93**	n/a	**0.44**
Manganese	415	n/a	n/a	n/a	n/a	n/a	0.092	**0.38**
Mercury	0.11	0.16	**0.85**	**0.5**	n/a	n/a	0.22	n/a
Nickel	10.2	n/a	n/a	n/a	0.25	**0.54**	n/a	n/a
Selenium	1.72	**0.86**	**1.15**	**1.01**	**1.43**	**1.74**	0.042	**0.57**
Thallium	0.543	n/a	n/a	n/a	0.25	**0.54**	na	**1.1**
Bis(2-ethylhexyl)phthalate	0.13	n/a	**0.65**	**0.33**	n/a	n/a	na	na
Di-n-butylphthalate	0.99	0.25	**9**	**4.71**	n/a	n/a	na	0.002
HI		**8**	**26**	**18**	**6**	**10**	0.7	**4**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Table I-5.4-39
Adjusted HI Analysis Using LOAEL-Based ESLs for SWMUs 15-004(b) and 15-004(c)

COPEC	EPC (mg/kg)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Montane Shrew	Earthworm	Plant
Arsenic	3.71	n/a[a]	n/a	n/a	n/a	n/a	0.055	n/a
Barium	404	n/a	n/a	n/a	n/a	n/a	0.13	**1.6**
Beryllium	1.07	na[b]	na	na	n/a	n/a	n/a	0.043
Cadmium	10.5	0.083	**1.26**	**0.68**	**2.06**	**1.46**	n/a	0.074
Cobalt	8.12	n/a	n/a	n/a	n/a	n/a	na	0.062
Copper	97.1	**0.31**	**0.74**	**0.51**	**0.97**	**0.58**	0.18	0.2
Lead	251	**2.08**	**3.12**	**2.65**	**1.09**	**0.72**	n/a	**0.44**
Manganese	415	n/a	n/a	n/a	n/a	n/a	0.092	**0.38**
Mercury	0.11	0.055	0.29	0.17	n/a	n/a	0.22	n/a
Nickel	10.2	n/a	n/a	n/a	0.25	0.02	n/a	n/a
Selenium	1.72	**0.3**	**0.4**	**0.35**	**1.43**	**0.65**	0.042	**0.57**
Thallium	0.543	n/a	n/a	n/a	0.25	0.2	na	**1.1**
Bis(2-ethylhexyl)phthalate	0.13	n/a	0.23	0.11	n/a	n/a	na	na
Di-n-butylphthalate	0.99	0.09	**3.13**	**1.64**	n/a	n/a	na	0.002
HI		**3**	**9**	**6**	**6**	**4**	0.7	**4**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Table I-5.4-40
HI Analysis Using LOAEL-Based ESLs for SWMUs 15-004(b) and 15-004(c), Northern Area

COPEC	EPC (mg/kg)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Montane Shrew
Cadmium	32.4	**0.74**	**11.2**	**6**	**6.35**	**12**
Copper	281.5	**2.6**	**6.21**	**4.33**	**2.86**	**4.53**
Lead	524.5	**12.5**	**18.7**	**15.9**	**2.28**	**4.03**
Mercury	0.145	**0.21**	**1.11**	**0.66**	n/a*	n/a
Nickel	12.4	n/a	n/a	n/a	0.3	**0.65**
Selenium	1.56	**0.78**	**1.04**	**0.92**	**1.3**	**1.58**
Thallium	1.3(U)	n/a	n/a	n/a	0.18	**0.59**
Bis(2-ethylhexyl)phthalate	0.118	n/a	**0.59**	0.3	n/a	n/a
Di-n-butylphthalate	0.547	0.14	**4.97**	**2.6**	n/a	n/a
HI		**17**	**44**	**31**	**13**	**23**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

* n/a = Not applicable.

Table I-5.4-41
Adjusted HI Analysis Using LOAEL-Based ESLs
for SWMUs 15-004(b) and 15-004(c), Northern Area

COPEC	EPC (mg/kg)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Montane Shrew
Cadmium	32.4	0.018	**0.27**	0.14	**0.83**	**0.31**
Copper	281.5	0.067	0.15	0.11	**0.37**	0.12
Lead	524.5	0.3	**0.45**	**0.38**	0.3	0.105
Mercury	0.145	0.005	0.027	0.016	n/a*	n/a
Nickel	12.4	n/a	n/a	n/a	0.039	0.017
Selenium	1.56	0.019	0.025	0.022	0.17	0.041
Thallium	1.3(U)	n/a	n/a	n/a	0.023	0.015
Bis(2-ethylhexyl)phthalate	0.118	n/a	0.014	0.0072	n/a	n/a
Di-n-butylphthalate	0.547	0.0034	0.12	0.062	n/a	n/a
HI		0.4	1	0.7	**2**	0.6

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

* n/a = Not applicable.

Table I-5.4-42
HI Analysis Using LOAEL-Based ESLs for SWMU 15-004(f)

COPEC	EPC (mg/kg)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Montane Shrew	Desert Cottontail	Earthworm	Plant
Antimony	0.81	na[a]	na	na	0.034	0.031	n/a[b]	n/a	n/a
Arsenic	2.88	n/a	n/a	n/a	n/a	n/a	n/a	0.04	n/a
Barium	180	n/a	n/a	n/a	n/a	n/a	n/a	0.06	**0.69**
Beryllium	2.5	na	na	na	n/a	n/a	n/a	n/a	0.1
Cadmium	1.02	n/a	**0.35**	0.19	0.2	**0.38**	n/a	n/a	n/a
Chromium (Total)	12.3	n/a	0.044	0.031	n/a	n/a	n/a	na	na
Cobalt	4.19	n/a	n/a	n/a	n/a	n/a	n/a	na	0.03
Copper	598	**5.44**	**13**	**9.06**	**5.98**	**9.49**	**1.46**	**1.13**	**1.22**
Lead	34.2	**0.82**	**1.22**	**1.04**	n/a	0.26	n/a	n/a	n/a
Manganese	345	n/a	n/a	n/a	n/a	n/a	n/a	0.08	**0.31**
Mercury	0.2	0.29	**1.54**	**0.91**	n/a	n/a	n/a	**0.41**	n/a
Nickel	8.94	n/a	0.043	n/a	0.22	**0.47**	n/a	n/a	n/a
Selenium	1.45	**0.73**	**0.97**	**0.85**	**1.21**	**1.47**	n/a	0.035	**0.48**
Silver	1.61	n/a	0.062	0.037	n/a	n/a	n/a	na	n/a
Uranium	849	0.045	0.053	0.05	**0.47**	**1.51**	n/a	na	**3.4**
Zinc	76.4	n/a	0.16	0.09	0.05	0.08	n/a	0.082	0.094
TCDD[2,3,7,8-] equivalent	1.31E-07	na	na	na	na	0.069	n/a	n/a	na
Uranium-238	235	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.06
HI		**7**	**17**	**12**	**8**	**14**	1	**2**	**6**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] na = Not available.

[b] n/a = Not applicable.

Table I-5.4-43
Adjusted HI Analysis using LOAEL-Based ESLs for SWMU 15-004(f)

COPEC	EPC (mg/kg)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Montane Shrew	Desert Cottontail	Earthworm	Plant
Antimony	0.81	na[a]	na	na	0.034	0.031	n/a[b]	n/a	n/a
Arsenic	2.88	n/a	n/a	n/a	n/a	n/a	n/a	0.04	n/a
Barium	180	n/a	n/a	n/a	n/a	n/a	n/a	0.06	**0.69**
Beryllium	2.5	na	na	na	n/a	n/a	n/a	n/a	0.1
Cadmium	1.1	n/a	**0.35**	0.19	0.2	**0.38**	n/a	n/a	n/a
Chromium (Total)	12.3	n/a	0.044	0.031	n/a	n/a	n/a	na	na
Cobalt	4.19	n/a	n/a	n/a	n/a	n/a	n/a	na	0.03
Copper	598	**5.44**	**13**	**9.06**	**5.98**	**9.49**	**0.31**	**1.13**	**1.22**
Lead	34.2	**0.82**	**1.22**	**1.04**	n/a	0.26	n/a	n/a	n/a
Manganese	345	n/a	n/a	n/a	n/a	n/a	n/a	0.08	**0.31**
Mercury	0.2	0.29	**1.54**	**0.91**	n/a	n/a	n/a	**0.41**	n/a
Nickel	8.94	n/a	0.043	n/a	0.22	**0.47**	n/a	n/a	n/a
Selenium	1.45	**0.73**	**0.97**	**0.85**	**1.21**	**1.47**	n/a	0.035	**0.48**
Silver	1.61	n/a	0.062	0.037	n/a	n/a	n/a	na	n/a
Uranium	849	0.045	0.053	0.05	**0.47**	**1.51**	n/a	na	**3.4**
Zinc	76.4	n/a	0.16	0.09	0.05	0.08	n/a	0.082	0.094
TCDD[2,3,7,8-] equivalent	1.31E-07	na	na	na	na	0.069	n/a	n/a	na
Uranium-238	235	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.06
HI		**7**	**17**	**12**	**8**	**14**	0.3	**2**	**6**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] na = Not available.

[b] n/a = Not applicable.

Table I-5.4-44
HI Analysis Using LOAEL-Based ESLs for SWMU 15-007(a)

COPEC	EPC (mg/kg)	Earthworm	Plant
Arsenic	3.8	0.056	n/a*
Barium	217	0.068	**0.83**
Selenium	1.5	0.037	**0.5**
	HI	0.2	1

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.
* n/a = Not applicable.

Table I-5.4-45
HI Analysis Using LOAEL-Based ESLs for SWMU 15-008(a)

COPEC	EPC (mg/kg)	Earthworm	Plant
Arsenic	2.53	0.037	n/a[a]
Barium	233	0.073	**0.89**
Copper	1734	**3.27**	**3.54**
Mercury	0.42	**0.84**	n/a
Nickel	17.7	n/a	0.07
Selenium	1.61	0.039	**0.54**
Uranium	2820	na[b]	**11.3**
Zinc	112	0.12	0.14
Acenaphthene	0.152	na	0.076
Uranium-234	145	n/a	0.033
Uranium-238	147	n/a	0.037
	HI	**4**	**17**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.
[a] n/a = Not applicable.
[b] na = Not available.

Table I-5.4-46
HI Analysis Using LOAEL-Based ESLs for SWMU 15-009(e)

COPEC	EPC (mg/kg)	Plant
Antimony	8.6	0.15
Selenium	1.1	**0.37**
Uranium	18.9	0.077
	HI	0.6

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

Table I-5.4-47
HI Analysis Using LOAEL-Based ESLs for SWMU 15-010(a)

COPEC	EPC (mg/kg)	Earthworm	Plant
Barium	551	0.17	**2.12**
Cobalt	5.9	na*	0.045
Mercury	11.5	**23**	0.18
Selenium	2.5	0.061	**0.83**
Zinc	64.3	0.069	0.079
Acenaphthene	0.096	na	0.048
HI		**23**	**3**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.
*na = Not available.

Table I-5.4-48
HI Analysis Using LOAEL-Based ESLs for AOC C-15-004

COPEC	EPC (mg/kg)	Earthworm	Plant
Copper	52.6	0.099	0.11
Zinc	184	0.2	0.23
HI		0.3	0.3

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

Table I-5.4-49
HI Analysis Using LOAEL-Based ESLs for AOC C-15-005

COPEC	EPC (mg/kg)	Earthworm	Plant
Barium	124	0.039	**0.48**
Mercury	2.97	**5.94**	n/a*
Selenium	1.59	0.039	**0.53**
Zinc	67.2	0.072	0.083
HI		**6**	1

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.
*n/a = Not applicable.

Table I-5.4-50
HI Analysis Using LOAEL-Based ESLs for AOC 15-005(b)

COPEC	EPC (mg/kg)	Earthworm	Plant
Barium	214	0.07	**0.82**
Cobalt	7.22	n/a*	0.056
Selenium	1.18	n/a	**0.39**
HI		0.07	1

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.
*n/a = Not applicable.

Table I-5.4-51
HI Analysis Using LOAEL-Based ESLs for AOC C-15-006

COPEC	EPC (mg/kg)	Earthworm	Plant
Antimony	4.27	n/a[a]	0.07
Cobalt	9.33	na[b]	0.07
Manganese	726	0.16	**0.66**
Mercury	7.09	**14.2**	n/a
Zinc	58.4	0.006	0.07
	HI	**14**	0.9

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Table I-5.4-52
HI Analysis Using LOAEL-Based ESLs for SWMU 36-001

COPEC	EPC (mg/kg)	Deer Mouse	Earthworm	Plant
Antimony	5	n/a[a]	n/a	0.086
Copper	1160	**11.6**	**2.19**	**2.37**
Lead	79.7	n/a	n/a	0.14
Uranium	107	n/a	na[b]	**0.43**
Zinc	260	n/a	0.28	**0.32**
Phenol	0.64	n/a	0.036	0.08
TCDD[2,3,7,8-] equivalent	1.06E-05	**2.72**	n/a	n/a
	HI	**14**	**3**	**3**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Table I-5.4-53
Adjusted HI Analysis Using LOAEL-Based ESLs for SWMU 36-001

COPEC	EPC (mg/kg)	Deer Mouse	Earthworm	Plant
Antimony	5	n/a[a]	n/a	0.086
Copper	1160	**0.32**	**2.19**	**2.37**
Lead	79.7	n/a	n/a	0.14
Uranium	107	n/a	na[b]	**0.43**
Zinc	260	n/a	0.28	**0.32**
Phenol	0.64	n/a	0.036	0.08
TCDD[2,3,7,8-] equivalent	1.06E-05	0.075	n/a	n/a
	HI	0.4	**3**	**3**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Table I-5.4-54
HI Analysis Using LOAEL-Based ESLs for SWMU 36-003(b)

COPEC	EPC (mg/kg)	Plant
Selenium	1.4	**0.47**
	HI	0.5

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

Table I-5.4-55
HI Analysis Using LOAEL-Based ESLs for SWMU 36-005

COPEC	EPC (mg/kg)	Plant
Selenium	1.7	**0.57**
	HI	0.6

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

Table I-5.4-56
HI Analysis Using LOAEL-Based ESLs for SWMU 36-006

COPEC	EPC (mg/kg)	Deer Mouse	Earthworm	Plant
Copper	615	**6.15**	**1.16**	**1.26**
Mercury	0.19	n/a[a]	**0.38**	n/a
Selenium	1.56	n/a	0.038	**0.52**
Zinc	56.7	n/a	0.06	0.07
Acenaphthene	1.4	n/a	na[b]	**0.7**
Fluoranthene	9.9	n/a	**0.43**	na
Naphthalene	0.95	n/a	na	0.095
Phenanthrene	7.2	n/a	**0.6**	na
Pyrene	6.9	n/a	**0.35**	na
HI		**6**	**3**	**3**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Table I-5.4-57
Adjusted HI Analysis Using LOAEL-Based ESLs for SWMU 36-006

COPEC	EPC (mg/kg)	Deer Mouse	Earthworm	Plant
Copper	615	**0.44**	**1.16**	**1.26**
Mercury	0.19	n/a[a]	**0.38**	n/a
Selenium	1.56	n/a	0.038	**0.52**
Zinc	56.7	n/a	0.06	0.07
Acenaphthene	1.4	n/a	na[b]	**0.7**
Fluoranthene	9.9	n/a	**0.43**	na
Naphthalene	0.95	n/a	na	0.095
Phenanthrene	7.2	n/a	**0.6**	na
Pyrene	6.9	n/a	**0.35**	na
HI		0.4	**3**	**3**

Note: Bolded values indicate an HQ greater than 0.3 or an HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Attachment I-1

Dioxin and Furan Toxicity Equivalency Factor Calculations
(on CD included with this document)

Attachment I-2

ProUCL Files
(on CD included with this document)

Attachment I-3

Vapor-Intrusion Model Spreadsheets
(on CD included with this document)

Attachment I-4

Ecological Scoping Checklists

I4-1.0 SWMU 15-010(a); AOC C-15-005; AOC C-15-006; SWMU 15-007(a); SWMU 15-002

I4-1.1 Part A—Scoping Meeting Documentation

Site ID	Solid Waste Management Unit (SWMU) 15-010(a); Area of Concern (AOC) C-15-005; AOC C-15-006; SWMU 15-007(a); SWMU 15-002 at Los Alamos National Laboratory (LANL or the Laboratory)
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.**	AOC C-15-005 within Technical Area 15 (TA-15) is an area of potential soil contamination associated with the footprint of a former laboratory and shop (former building 15-0001). AOC C-15-006 is an area of potential soil contamination associated with the footprint of a former control building and darkroom (former building 15-0007). Hazardous materials known to be present in these buildings included thorium in former building 15-0001 and mercury and photographic chemicals in former building 15-0007. SWMU 15-007(a) is the location of a former inactive landfill known as Material Disposal Area (MDA) N, used between 1962 and 1965 to dispose of debris from the demolition of former buildings 15-0001 and 15-0007 (LANL 1993, 020946, p. 9-2). MDA N was excavated and removed during the 2010 investigation. SWMU 15-002 is described as an inactive burn pit west of E-F Firing Site (LANL 1990, 007512, p. 88). A recent review of engineering drawings and aerial photographs demonstrates that SWMU 15-002 actually consists of two former burn pits. The burn pit originally identified is located south of building 15-0534, referred to in this report as the former south burn pit. The second burn pit is an approximate 5-ft to 10-ft rectangular area located east of former buildings 15-0001 and 15-0023, referred to in this report as the former north burn pit. SWMU 15-010(a) is the location of a former decommissioned septic tank (structure 15-0080) east of former buildings 15-0001 and 15-0023 at R-Site. Potential release mechanisms from historical activities include spills, dumping, material disposal, and material incineration.
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/Vegetated –** **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine –** X **Piñon juniper/juniper savannah –** X **Grassland/shrubland –** X **Developed –** X **Burned –**
Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	Potrillo and Fence Canyons are not documented Areas of Environmental Interest (AEI) or AEI buffer areas as documented in the Threatened and Endangered Species Habitat Management Plan, Rev. 1, published March 25, 2014. The following federally threatened and endangered species are known to reside in local canyon habitats: Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow Flycatcher (*Empidonax traillii extimus*), and the Jemez Mountains salamander (*Plethodon neomexicanus*) (ENV Division Resources Management Team 2014, 600084). The Mexican spotted owl is likely to nest, roost, and forage at varying levels in some of the reaches in the Potrillo and Fence watershed (Nisengard 2010, 111141).
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.)**	Contiguous sites: SWMU 15-010(a), AOC C-15-005, AOC C-15-006, SWMU 15-007(a), SWMU 15-002 (see Plate 2).
Surface Water Erosion Potential Information **Summarize information including the terminal point of surface water transport, slope, and surface water run-on sources.**	The sites are within a relatively flat vegetated field. There is little evidence of runoff. Sources of run-on include drainage from roads, parking lots, and buildings.

I4-1.2 Part B—Site Visit Documentation

Site ID	SWMU 15-010(a); AOC C-15-005; AOC C-15-006; SWMU 15-007(a); SWMU 15-002
Date of Site Visit	1/19/2015
Site Visit Conducted by	Tony Fristachi

Receptor Information:

Estimate cover	**Relative vegetative cover (high, medium, low, none)** = medium **Relative wetland cover (high, medium, low, none)** = none **Relative structures/asphalt, etc., cover (high, medium, low, none)** = high
Field notes on the GIS vegetation class to assist in verifying the ArcView information	The site consists of grasses, forbs, and shrubs. Ponderosa pine and juniper are present at the edge of the historically developed area.
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.**	Terrestrial receptors including mammals and birds could use this site for both foraging and nesting. Several species of birds were heard and observed in the vicinity. Rabbit, mule deer, and elk scat was observed in the immediate area. The area contains numerous burrows (1–5 in. in diameter). Buildings in the immediate area are still occupied decreasing the attractiveness of the habitat to larger mammals.

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).**	The site lies within a relatively flat vegetated field. There is no evidence of runoff. Sources of run-on include drainage from roads, parking lots, and buildings. The potential for surface water transport off-site and erosion is low.
Are there any off-site transport pathways (surface water, air, or groundwater)? **(yes/no/uncertain)** **Provide explanation**	Off-site transport pathways include surface water during large storm events.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	This is a historically developed area including former building footprints. There are currently no structures in the immediate area of these sites.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Present vegetation is indicative of the historical physical disturbance. The area is primarily small forbs and grasses with some larger shrubs.

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. Not Applicable

Adequacy of the 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.)**	The data indicate that the nature and extent of contamination is known.
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.)**	Samples were collected from the surface and at varying depths surrounding the sites to address the potential migration of contamination.
Provide additional field notes on the site setting and potential ecological receptors. All relevant field notes are included in the previous sections.	

I4-1.3 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-m3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Volatile organic compounds (VOCs) were infrequently detected and at concentrations below or near the EQLs.

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

Provide explanation: The area is vegetated minimizing dust however chemicals of potential concern (COPCs) were detected in the surface samples.

Question C:

Can contaminated soil be transported to aquatic ecological communities?

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 is no aquatic habitat present at the sites.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: The sites are located in a large flat vegetated area and not near the mesa edge.

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 were infrequently detected and at very low concentrations.

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: 3

Terrestrial Animals: 3

Provide explanation: COPCs are present in the surface soil.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soil?

- **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: COPCs are present in the surface soil.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soil?

- **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: COPCs are present in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soil?

- **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: COPCs are present in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soil?

- **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: 3

Provide explanation: Lipophilic COPCs were detected in surface soil.

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: 0

Terrestrial Animals: 0

Provide explanation: Radionuclides were not detected above background values (BVs).

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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediment?

- **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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

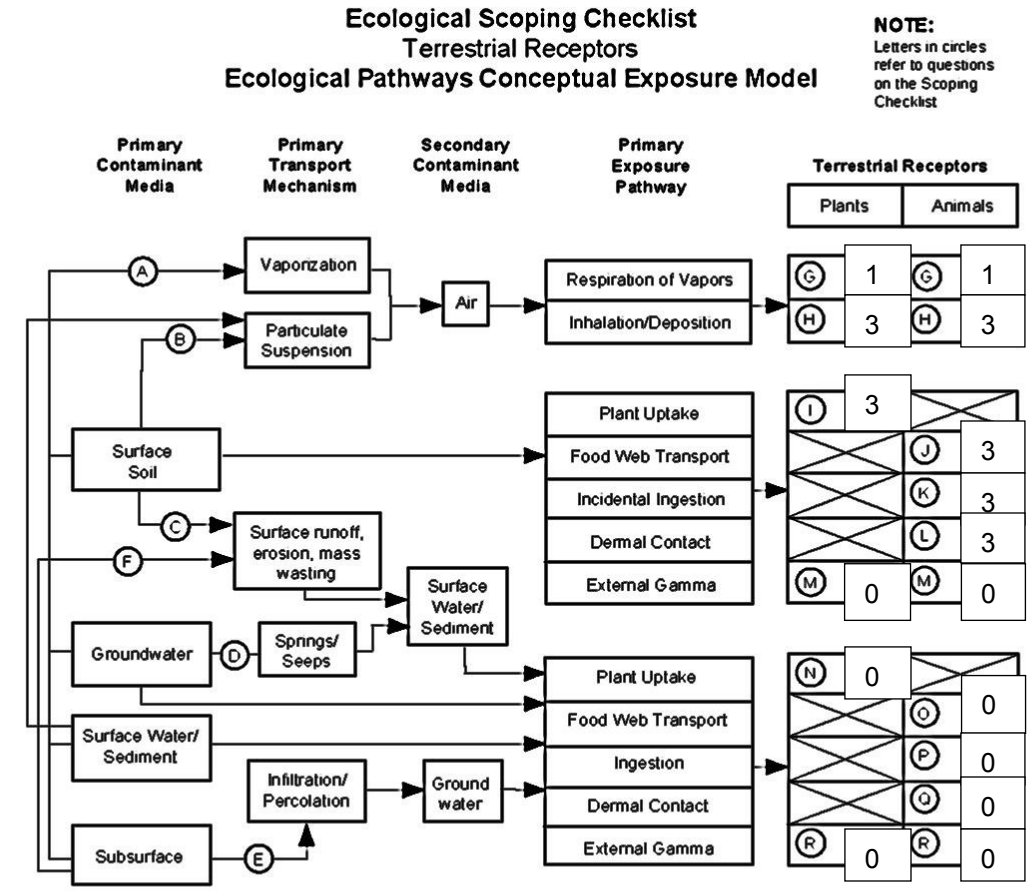
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

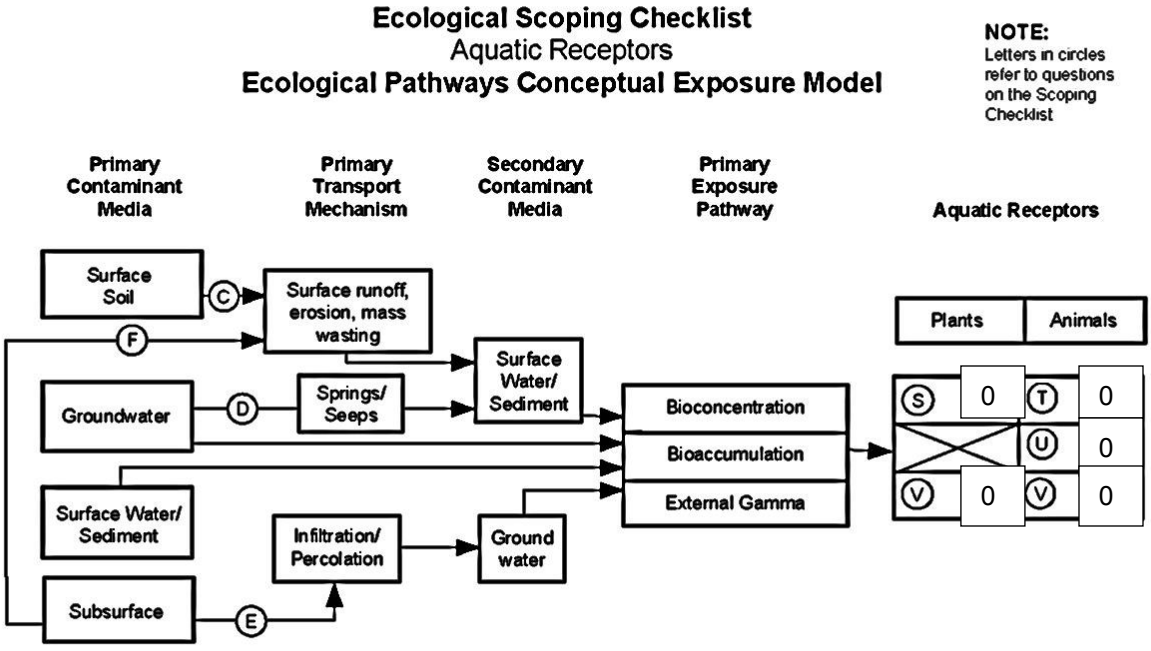
Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No water or sediment is present at the sites.


Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Terrestrial Receptors
Plants
Animals
Vaporization
Particulate Suspension
Air
Respiration of Vapors
Inhalation/Deposition
Surface Soil
Surface runoff, erosion, mass wasting
Surface Water/ Sediment
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Plant Uptake
Food Web Transport
Incidental Ingestion
Dermal Contact
External Gamma
Plant Uptake
Food Web Transport
Ingestion
Dermal Contact
External Gamma
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
1
3
3
3
3
0
0
0
0
0
0
1
3


Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Aquatic Receptors
Plants
Animals
Surface Soil
Surface runoff, erosion, mass wasting
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Bioconcentration
Bioaccumulation
External Gamma
C
D
E
F
S
T
U
V
0
0
0
0
0
0

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Linsey Hurst

Name (signature): [signature]

Organization: Fristachi Scientific Consulting

Phone number: 505-470-4007

Date completed: 6/26/2015

Verification by another party (provide name, organization and phone number):

Name (printed): ANTHONY FRISTACHI

Name (signature): [signature]

Organization: FRISTACHI SCIENTIFIC CONSULTING, LLC

Phone number: 505-709-0692

I4-2.0 SWMUS 15-004(b) AND 15-004(c)

I4-2.1 Part A—Scoping Meeting Documentation

Site ID	SWMUs 15-004(b) and 15-004(c)
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.**	SWMU 15-004(b) is inactive Firing Site A, located approximately 450 ft southeast of building 15-0183, and SWMU 15-004(c) is inactive Firing Site B, located approximately 525 ft southeast of building 15-0183, at TA-15. Firing Sites A and B are located approximately 75 ft apart. Firing Site A was among the first firing sites to be used at the Laboratory and operated from 1945 to 1953. Both firing sites and associated structures were removed and the ground surface was regraded in 1967. Most of the experiments conducted at SWMU 15-004(b) involved small amounts of HE (i.e., up to 50 lb.). Tests involving larger quantities of HE were conducted at Firing Site B, SWMU 15-004(c) (LANL 1993, 020946, p. 4-3). Other materials used as Firing Sites A and B included natural uranium, beryllium, lead, mercury, and high explosives (HE). The amount of uranium used in any one test was a few kilograms (LANL 1993, 020946, p. 8-5). Potential mechanisms of release include explosives testing.
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/Vegetated –** X **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine –** **Piñon juniper/juniper savannah –** **Grassland/shrubland –** X **Developed –**X **Burned –**
Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	Potrillo and Fence Canyons are not documented AEI or AEI buffer areas as documented in the Threatened and Endangered Species Habitat Management Plan, Rev. 1. The following federally threatened and endangered species are known to reside in local canyon habitats; Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow Flycatcher (*Empidonax trailii extimus*), and the Jemez Mountains salamander (*Plethodon neomexicanus*) (ENV Division Resources Management Team 2014, 600084). The Mexican spotted owl is likely to nest, roost, and forage at varying levels in some of the reaches in the Potrillo and Fence Canyons watershed (Nisengard 2010, 111141).

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.)	There are no upgradient SWMUs/AOCs. The area to the north is developed and Phermex Road to the east runs parallel to the firing sites. There is no indication of contaminant migration between sites.
Surface Water Erosion Potential Information Summarize information including the terminal point of surface water transport, slope, and surface water run-on sources.	The area surrounding SWMUs 15-004(b) and 15-004(c) drains into Potrillo Canyon.

I4-2.2 Part B—Site Visit Documentation

Site ID	SWMUs 15-004(b) and 15-004(c)
Date of Site Visit	2/19/2015
Site Visit Conducted by	Tony Fristachi

Receptor Information:

Estimate cover	**Relative vegetative cover (high, medium, low, none) = high** **Relative wetland cover (high, medium, low, none)** = none **Relative structures/asphalt, etc., cover (high, medium, low, none)** = low
Field notes on the GIS vegetation class to assist in verifying the ArcView information	Vegetation consists of grasses and forbs.
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.	Terrestrial receptors including mammals and birds could use the surrounding area for both foraging and nesting. Several species of birds were heard and observed in the vicinity. Rabbit, mule deer, and elk scat was observed in the immediate area. The area contains numerous burrows (1–5 in. in diameter). The SWMUs are located in a remote, no longer operational area, increasing attractiveness to ecological receptors.

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).	The area surrounding SWMUs 15-004(b) and 15-004(c) is a relatively flat vegetated field that drains into Potrillo Canyon. No significant erosion was observed in the immediate area.
Are there any off-site transport pathways (surface water, air, or groundwater)? (yes/no/uncertain) Provide explanation	Off-site transport pathways include surface water runoff into Potrillo Canyon.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	The firing sites are in a developed area that is no longer in operation.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Present vegetation at the firing sites is indicative of the historical physical disturbance to the area. The area is primarily small forbs, grasses, and shrubs, with bare areas of exposed soil.

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.

Not Applicable

Adequacy of the 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.)**	The nature and extent of contamination are defined and/or additional sampling is not warranted, except for vertical extent of thallium.
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.)**	Samples were collected from the surface and at varying depths surrounding the sites to address the potential migration of contamination.
Provide additional field notes on the site setting and potential ecological receptors. All relevant field notes are included in the previous sections.	

I4-2.3 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-m3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: VOCs were infrequently detected and at concentrations below the estimated quantitation limits (EQLs).

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

Provide explanation: COPCs are present in the surface soil.

Question C:

Can contaminated soil be transported to aquatic ecological communities?

- **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 is no aquatic habitat present at or nearby the sites.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: The firing site areas are located away from the mesa edge. Erosion could potentially transport contaminants during a large storm event.

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 were infrequently detected and at concentrations below the EQLs.

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: 3

Terrestrial Animals: 3

Provide explanation: COPCs are present in the surface soil.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soil?

- **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: COPCs are present in the surface soil.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soil?

- **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: COPCs are present in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soil?

- **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: COPCs are present in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soil?

- **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: 3

Provide explanation: Lipophilic COPCs were detected in surface soil.

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: 3

Terrestrial Animals: 3

Provide explanation: Radionuclides were detected above BVs.

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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediment?

- **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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

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 water or sediment is present at the sites.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

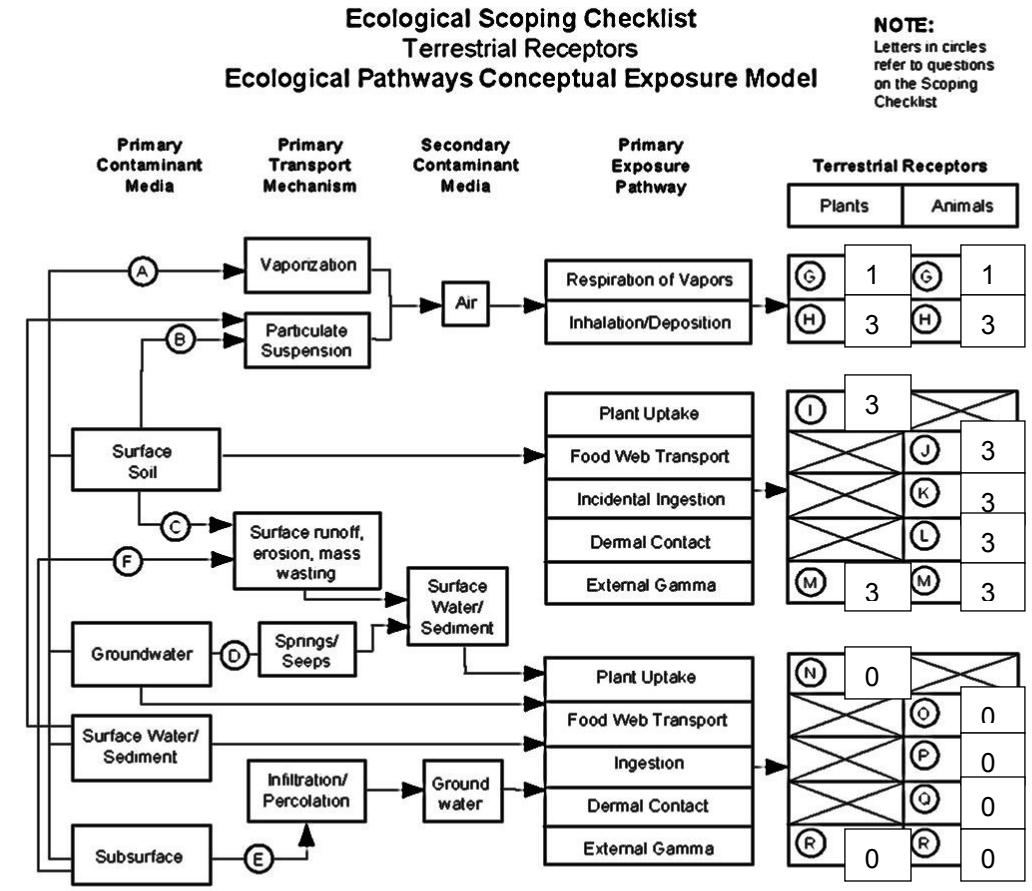
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

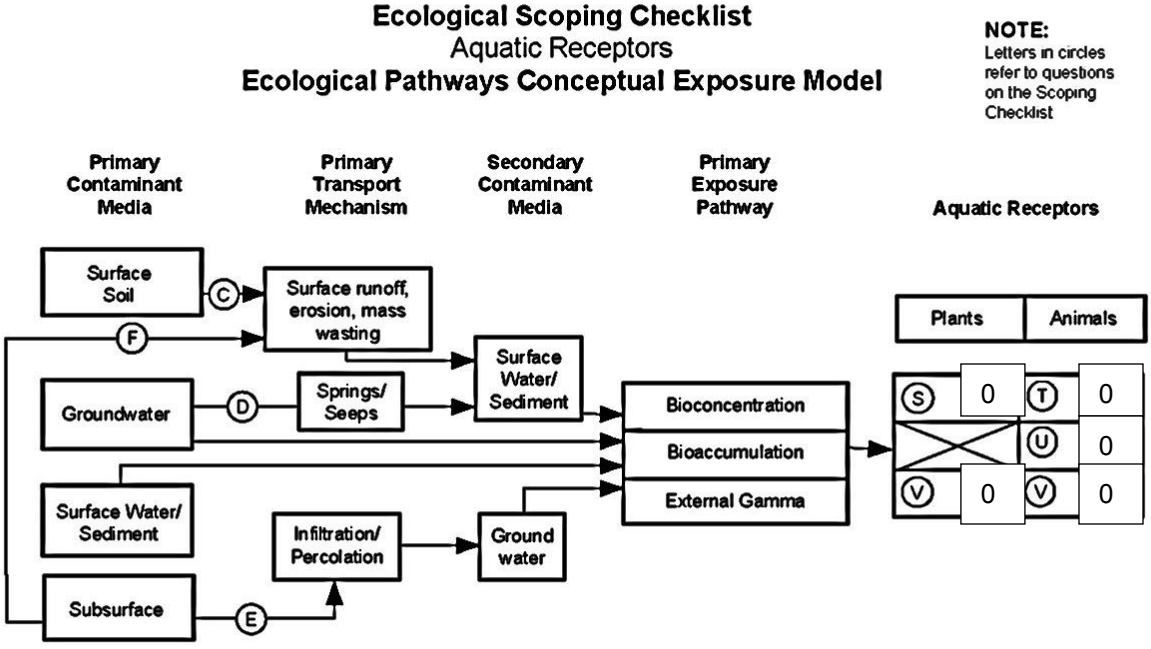
Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No water or sediment is present at the sites.


Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Terrestrial Receptors
Plants
Animals
Vaporization
Particulate Suspension
Air
Respiration of Vapors
Inhalation/Deposition
Surface Soil
Surface runoff, erosion, mass wasting
Surface Water/ Sediment
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Plant Uptake
Food Web Transport
Incidental Ingestion
Dermal Contact
External Gamma
Plant Uptake
Food Web Transport
Ingestion
Dermal Contact
External Gamma


Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Aquatic Receptors
Plants
Animals
Surface Soil
Surface runoff, erosion, mass wasting
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Bioconcentration
Bioaccumulation
External Gamma

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Linsey Hurst

Name (signature): [signature]

Organization: Fristachi Scientific Consulting

Phone number: 505-470-4007

Date completed: 6/26/2015

Verification by another party (provide name, organization and phone number):

Name (printed): ANTHONY FRISTACHI

Name (signature): [signature]

Organization: FRISTACHI SCIENTIFIC CONSULTING, LLC

Phone number: 505 - 709 - 0692

I4-3.0 AOC C-15-004

I4-3.1 Part A—Scoping Meeting Documentation

Site ID	AOC C-15-004
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.**	AOC C-15-004 is a former transformer station (former structure 15-0056) that was located approximately 30 ft southwest of the former E-F Firing Site control room (building 15-0027). Two transformers (18-gal. and 30-gal. capacity) were located on a 5-ft-long wooden platform 10 ft above the ground (LANL 1993, 020946, p. 7-21). Each transformer contained mineral oil with PCBs of unknown concentration. The date of installation is not known, but the transformers were removed from the site in 1989 (Francis 1992, 057736, p. 2). No evidence was found of a release on the wooden platform or on the soil beneath the platform (LANL 1993, 020946, p. 7-21). The potential release mechanisms from the former transformer station include leaks and spills.
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/Vegetated –** X **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine – X** **Piñon juniper/juniper savannah –** **Grassland/shrubland –** **Developed –** **Burned –**
Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	Potrillo and Fence Canyons are not documented AEI or AEI buffer areas as documented in the Threatened and Endangered Species Habitat Management Plan, Rev. 1 published March 25, 2014. The following federally threatened and endangered species are known to reside in local canyon habitats; Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow Flycatcher (*Empidonax trailii extimus*), and the Jemez Mountains salamander (*Plethodon neomexicanus*) (ENV Division Resources Management Team 2014, 600084). The Mexican spotted owl is likely to nest, roost, and forage at varying levels in some of the reaches in the Potrillo and Fence Canyons watershed (Nisengard 2010, 111141).

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.)	The AOC is 30 ft southwest of the former E-F Firing Site control room and approximately 200 ft from E-F Firing Site [SWMU 15-004(f)]. Run-on originates from the mesa top and from the roadway. The AOC is located on the steep edge of the canyon and there has been erosion below the site.
Surface Water Erosion Potential Information Summarize information including the terminal point of surface water transport, slope, and surface water run-on sources.	AOC C-15-004 is located on the edge of the canyon. The site shows evidence of significant erosion. Berms to mitigate erosion were installed below the site. Run-on originates from the mesa top and from the roadway to building 15-0027.

I4-3.2 Part B—Site Visit Documentation

Site ID	AOC C-15-004
Date of Site Visit	2/19/2015
Site Visit Conducted by	Tony Fristachi

Receptor Information:

Estimate cover	**Relative vegetative cover (high, medium, low, none)** = medium **Relative wetland cover (high, medium, low, none)** = none **Relative structures/asphalt, etc., cover (high, medium, low, none)** = low
Field notes on the GIS vegetation class to assist in verifying the ArcView information	The site consists of grasses, forbs, and shrubs. Ponderosa pine and juniper are present at the edge of the area.
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.	Terrestrial receptors including mammals and birds could use this site for both foraging and nesting. Several species of birds were heard and observed in the vicinity. The AOC is located in a remote, no longer operational area, increasing attractiveness to ecological receptors.

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).	AOC C-15-004 is located on the steep edge of the canyon. The site shows evidence of significant erosion. Berms to mitigate erosion are installed below the site. Run-on originates from the mesa top and from the roadway to building 15-0027.
Are there any off-site transport pathways (surface water, air, or groundwater)? (yes/no/uncertain) Provide explanation	Off-site transport pathways include surface water runoff into Potrillo Canyon.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	Parts of former structure 15-0056 remain on-site. Other major disturbances to the site include significant erosion and an earthen berm with a straw waddle to mitigate erosion.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Present vegetation is indicative of the historical physical disturbance to the area. The area is primarily small forbs and grasses with bare areas of exposed soil where the grade is steepest.

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. Not Applicable

Adequacy of the 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.)**	Nature and extend are defined and/or additional sampling is not warranted.
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.)**	Samples collected address the potential migration of contaminants.
Provide additional field notes on the site setting and potential ecological receptors. All relevant field notes are included in the previous sections.	

I4-3.3 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-m3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: No VOCs were detected.

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

Provide explanation: Bare soil is exposed below the site due to erosion. COPCs are present in the surface soil.

Question C:

Can contaminated soil be transported to aquatic ecological communities?

- **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 is no aquatic habitat present at the site. Significant erosion is currently mitigated by the installed berm. Unmitigated erosion at this site will terminate in Potrillo Canyon.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Likely

Provide explanation: The site is located at the edge of Potrillo Canyon in an area affected by 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: 0

Terrestrial Animals: 0

Provide explanation: No VOCs were detected.

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: 3

Terrestrial Animals: 3

Provide explanation: COPCs are present in the surface soil.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soil?

- **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: COPCs are present in the surface soil.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soil?

- **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: COPCs are present in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soil?

- **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: COPCs are present in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soil?

- **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: 3

Provide explanation: Lipophilic COPCs were detected in surface soil.

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: 3

Terrestrial Animals: 3

Provide explanation: Radionuclides were detected above BVs.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediment?

- **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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

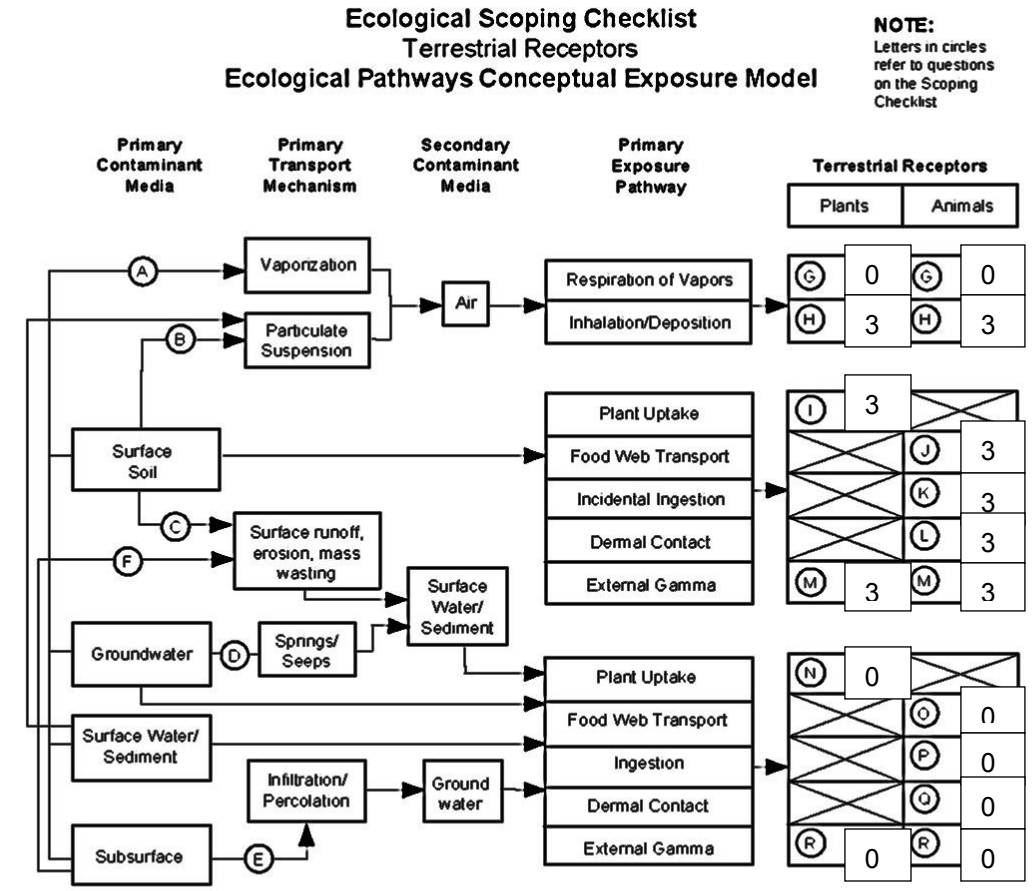
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

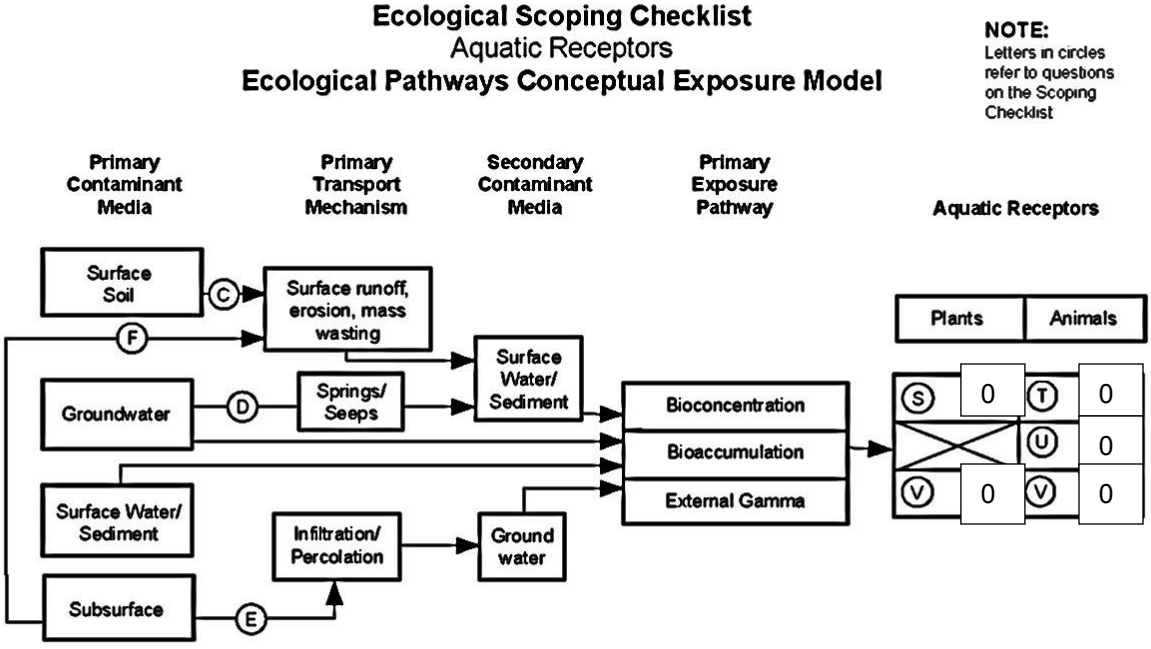
Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No water or sediment is present at the site.


Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Terrestrial Receptors
Plants
Animals
Vaporization
Particulate Suspension
Air
Respiration of Vapors
Inhalation/Deposition
Surface Soil
Surface runoff, erosion, mass wasting
Surface Water/ Sediment
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Plant Uptake
Food Web Transport
Incidental Ingestion
Dermal Contact
External Gamma
Plant Uptake
Food Web Transport
Ingestion
Dermal Contact
External Gamma


Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Aquatic Receptors
Plants
Animals
Surface Soil
Surface runoff, erosion, mass wasting
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Bioconcentration
Bioaccumulation
External Gamma

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Linsey Hurst

Name (signature):

Organization: Fristachi Scientific Consulting

Phone number: 505-470-4007

Date completed: 6/26/2015

Verification by another party (provide name, organization and phone number):

Name (printed): ANTHONY FRISTACHI

Name (signature):

Organization: FRISTACHI SCIENTIFIC CONSULTING, LLC

Phone number: 505 - 709 - 0692

I4-4.0 SWMU 15-004(f)

I4-4.1 Part A—Scoping Meeting Documentation

Site ID	SWMU 15-004(f)
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.**	SWMU 15-004(f) is inactive E-F Firing Site, that consists of three inactive firing points (D, E, and F) covering a total area of approximately 60 acres at TA-15. E-F Firing Site began operating in 1946 and was last used in 1981. Eventually, nearby soil was mounded on the north and south sides of Firing Point E to protect TA-15 structures from shrapnel (LANL 1993, 020946, pp. 7-3–7-5). Tests at E-F Firing Site involved HE, uranium, beryllium, lead, and mercury (LANL 1993, 020946, p. 7-8). Potential mechanisms of release include explosives testing.
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/Vegetated –** X **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine –** **Piñon juniper/juniper savannah –** **Grassland/shrubland –** X **Developed –** **Burned –**
Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	Potrillo and Fence Canyons are not documented AEI or AEI buffer areas as documented in the Threatened and Endangered Species Habitat Management Plan, Rev. 1. The following federally threatened and endangered species are known to reside in local canyon habitats; Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow Flycatcher (*Empidonax trailii extimus*), and the Jemez Mountains salamander (*Plethodon neomexicanus*) (ENV Division Resource Management Team 2014, 600084). The Mexican spotted owl is likely to nest, roost, and forage at varying levels in some of the reaches in the Potrillo and Fence Canyons watershed (Nisengard 2010, 111141).

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.)	The SWMU is an inactive firing site, E-F Firing Site, that consists of three inactive firing points (D, E, and F) covering a total area of approximately 60 acres at TA-15. Except for the firing mound the site is relatively flat and there are no erosion issues.
Surface Water Erosion Potential Information Summarize information including the terminal point of surface water transport, slope, and surface water run-on sources.	The area surrounding SWMU 15-004 (f) drains into Potrillo Canyon.

I4-4.2 Part B—Site Visit Documentation

Site ID	SWMU 15-004(f)
Date of Site Visit	2/19/2015
Site Visit Conducted by	Tony Fristachi

Receptor Information:

Estimate cover	**Relative vegetative cover (high, medium, low, none)** = high **Relative wetland cover (high, medium, low, none)** = none **Relative structures/asphalt, etc., cover (high, medium, low, none)** = low
Field notes on the GIS vegetation class to assist in verifying the ArcView information	Vegetation consists of grasses and forbs.
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.	Terrestrial receptors including mammals and birds could use the surrounding area for both foraging and nesting. Several species of birds were heard and observed in the vicinity. Rabbit, mule deer, and elk scat was observed in the immediate area. The area contains numerous burrows (1–5 in. in diameter). The SWMUs are located in a remote, no longer operational site, increasing attractiveness to ecological receptors.

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).	The area surrounding SWMU 15-004(f) is a relatively flat vegetated field that drains into Potrillo Canyon. No significant erosion was observed in the immediate area.
Are there any off-site transport pathways (surface water, air, or groundwater)? (yes/no/uncertain) Provide explanation	Off-site transport pathways include surface water runoff into Potrillo Canyon.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	The firing sites were in an area that is no longer in operation. Relatively little physical disturbance (except for the mounds) is evident after over 30 years of inactivity.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Present vegetation at the firing sites is indicative of the historical physical disturbance to the area. The area is primarily small forbs, grasses, and shrubs, with bare areas of exposed soil.

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. Not Applicable

Adequacy of the 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.)**	The nature and extent of contamination at the SWMU 15-004(f) is defined and/or additional sampling is not warranted, except for the vertical extent of copper at locations 15-613366 and 15-613374; the vertical extent of uranium-234/235 and -236 at locations 15-613370, 15-613374, 15-613380, and 15-613386; and the vertical extent of uranium-238 at locations 15-613370, 15-613374, 15-613380, and 15-613386.
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.)**	Samples were collected to characterize the site. Samples were also collected from sediment catchment areas in the drainages downgradient of the site to determine if contaminants are migrating from the site.
Provide additional field notes on the site setting and potential ecological receptors. All relevant field notes are included in the previous sections.	

I4-4.3 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-m3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: No VOCs were detected.

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

Provide explanation: COPCs are present in the surface soil.

Question C:

Can contaminated soil be transported to aquatic ecological communities?

- **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 is no aquatic habitat present at 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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: The firing site areas are located well away from the mesa edge.

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: 0

Terrestrial Animals: 0

Provide explanation: No VOCs were detected.

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: 3

Terrestrial Animals: 3

Provide explanation: COPCs are present in the surface soil.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soil?

- **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: COPCs are present in the surface soil.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soil?

- **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: COPCs are present in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soil?

- **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: COPCs are present in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soil?

- **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: 3

Provide explanation: Lipophilic COPCs were detected in surface soil.

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: 3

Terrestrial Animals: 3

Provide explanation: Radionuclides were detected above BVs.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediment?

- **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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

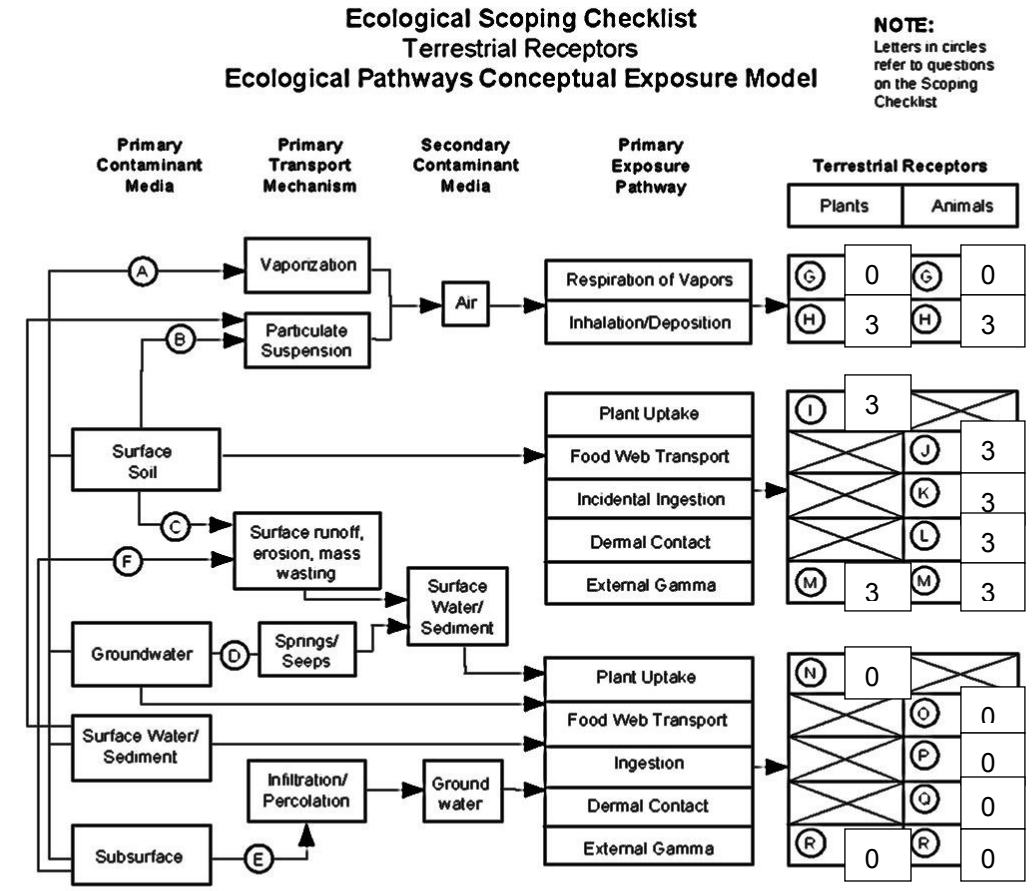
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

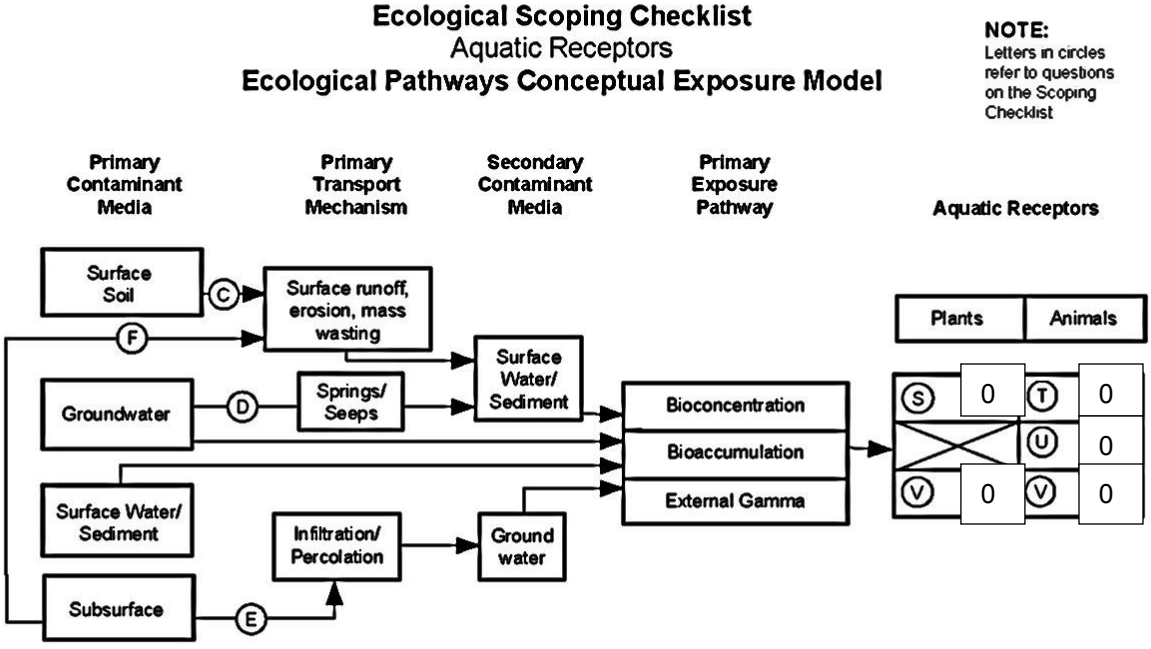
Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No water or sediment is present at the site.


Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Terrestrial Receptors
Plants
Animals
Vaporization
Particulate Suspension
Air
Respiration of Vapors
Inhalation/Deposition
Surface Soil
Surface runoff, erosion, mass wasting
Surface Water/ Sediment
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Plant Uptake
Food Web Transport
Incidental Ingestion
Dermal Contact
External Gamma
Plant Uptake
Food Web Transport
Ingestion
Dermal Contact
External Gamma


Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Aquatic Receptors
Plants
Animals
Surface Soil
Surface runoff, erosion, mass wasting
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Bioconcentration
Bioaccumulation
External Gamma

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Linsey Hurst

Name (signature): [signature]

Organization: Fristachi Scientific Consulting

Phone number: 505-470-4007

Date completed: 6/26/2015

Verification by another party (provide name, organization and phone number):

Name (printed): ANTHONY FRISTACHI

Name (signature): [signature]

Organization: FRISTACHI SCIENTIFIC CONSULTING, LLC

Phone number: 505-709-0692

I4-5.0 SWMU 15-008(a)

I4-5.1 Part A—Scoping Meeting Documentation

Site ID	SWMU 15-008(a)
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.**	SWMU 15 008(a) consists of two small surface disposal areas located on the edge of Potrillo Canyon, one south and one east of E-F Firing Site [SWMU 15 004(f)], at TA-15. The disposal areas are located within approximately 350 ft of each other, with each disposal area having dimensions of approximately 8 ft in diameter × 2 ft high. Both areas were used to dispose of debris from tests conducted at the E F Firing Site, including soil, rock, pebbles, metal fragments, plastic, electrical cable, and electrical accessories. All debris was removed from both surface disposal areas during the 2010 investigation.
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/Vegetated –** X **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine –** **Piñon juniper/juniper savannah –** **Grassland/shrubland –** X **Developed –** **Burned –**
Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	Potrillo and Fence Canyons are not documented AEI or AEI buffer areas as documented in the Threatened and Endangered Species Habitat Management Plan, Rev. 1. The following federally threatened and endangered species are known to reside in local canyon habitats; Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow Flycatcher (*Empidonax trailii extimus*), and the Jemez Mountains salamander (*Plethodon neomexicanus*) (ENV Division Resource Management Team 2014, 600084). The Mexican spotted owl is likely to nest, roost, and forage at varying levels in some of the reaches in the Potrillo and Fence watershed (Nisengard 2010, 111141).

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.)	E-F Firing Site [SWMU 15-004(f)] is upgradient of the surface disposal areas.
Surface Water Erosion Potential Information Summarize information including the terminal point of surface water transport, slope, and surface water run-on sources.	SWMU 15-008 (a) drains into Potrillo Canyon.

I4-5.2 Part B—Site Visit Documentation

Site ID	SWMU 15-008(a)
Date of Site Visit	2/20/2015
Site Visit Conducted by	Tony Fristachi

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)** = none
Field notes on the GIS vegetation class to assist in verifying the ArcView information	The two surface disposal sites are bare with limited vegetation consisting of grasses and forbs at the edge of the sites.
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.	Terrestrial receptors including mammals and birds could use the surrounding area for both foraging and nesting. Several species of birds were heard and observed in the vicinity. The SWMU is located in a remote, no longer operational site, increasing attractiveness to ecological receptors. Anthills were observed at the surface disposal area.

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).	SWMU 15-008(a) drains into Potrillo Canyon. No significant erosion was observed in the immediate area.
Are there any off-site transport pathways (surface water, air, or groundwater)? (yes/no/uncertain) Provide explanation	Off-site transport pathways include surface water runoff into Potrillo Canyon.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	The surface disposal areas are in an area that is no longer in operation. Debris was removed from both surface disposal areas during the 2010 investigation. The area is minimally disturbed.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Present lack of vegetation at the disposal sites is indicative of the historical physical disturbance to the area. The area is primarily small forbs, grasses, and shrubs, with bare areas of exposed soil.

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. Not Applicable

Adequacy of the 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.)**	The nature and extent of contamination at the SWMU 15-008(a) is defined and/or additional sampling is not warranted.
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.)**	Samples were collected from around the surface debris removal boundaries to determine the extent of contamination.
Provide additional field notes on the site setting and potential ecological receptors. All relevant field notes are included in the previous sections.	

I4-5.3 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-m3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: VOCs were infrequently detected and were generally below the EQLs.

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

Provide explanation: Bare soil is exposed at the site. COPCs are present in the surface soil.

Question C:

Can contaminated soil be transported to aquatic ecological communities?

- **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 is no aquatic habitat present at 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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Uncertain

Provide explanation: The surface waste disposal areas are located near the mesa edge and could potentially be affected by 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 were infrequently detected and were generally below the EQLs.

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: 3

Terrestrial Animals: 3

Provide explanation: COPCs are present in the surface soil.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soil?

- **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: COPCs are present in the surface soil.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soil?

- **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: COPCs are present in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soil?

- **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: COPCs are present in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soil?

- **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: 3

Provide explanation: Lipophilic COPCs were detected in surface soil.

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: 3

Terrestrial Animals: 3

Provide explanation: Radionuclides were detected above BVs.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediment?

- **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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

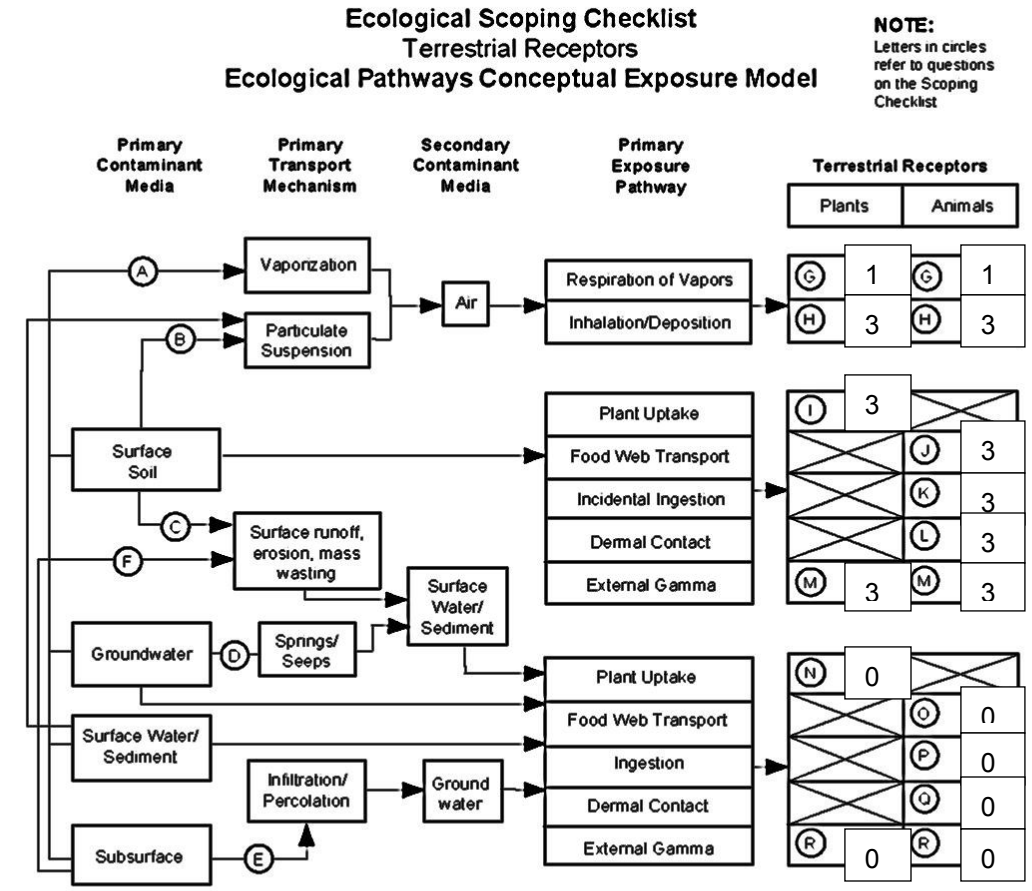
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

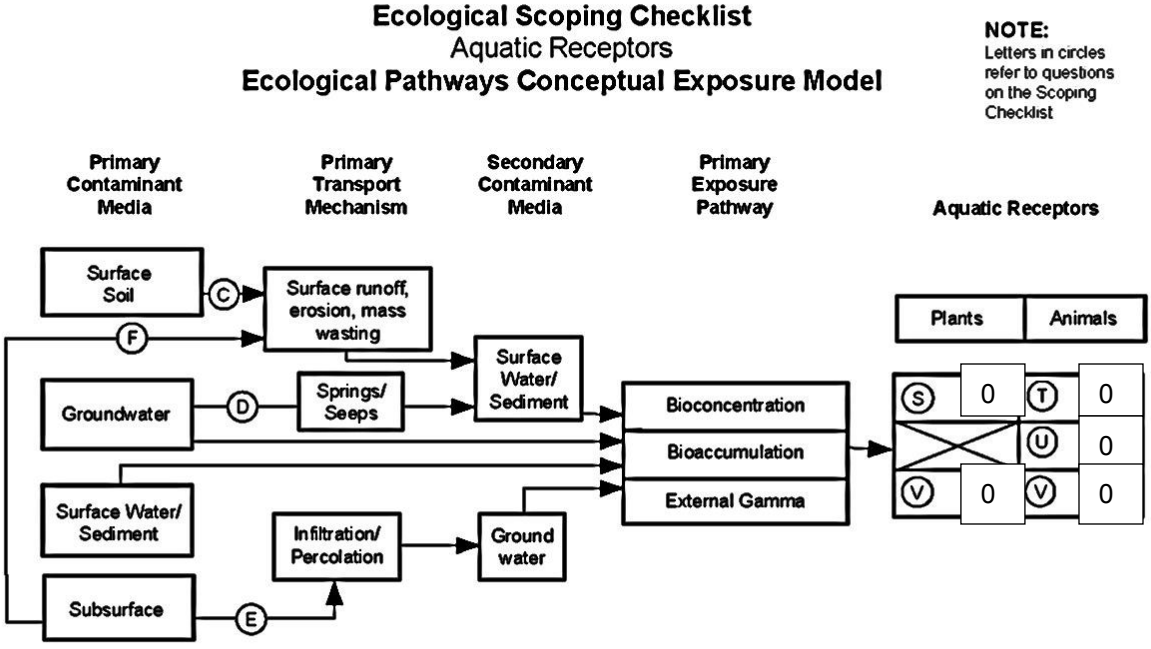
Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No water or sediment is present at the site.


Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
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Plants
Animals
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Particulate Suspension
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Dermal Contact
External Gamma
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NOTE:
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Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Bioconcentration
Bioaccumulation
External Gamma

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Linsey Hurst

Name (signature): [signature]

Organization: Fristachi Scientific Consulting

Phone number: 505-470-4007

Date completed: 6/26/2015

Verification by another party (provide name, organization and phone number):

Name (printed): ANTHONY FRISTACHI

Name (signature): [signature]

Organization: FRISTACHI SCIENTIFIC CONSULTING, LLC

Phone number: 505-709-0692

I4-6.0 SWMU 15-009(e)

I4-6.1 Part A—Scoping Meeting Documentation

Site ID	SWMU 15-009(e)
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.**	SWMU 15-009(e) is a decommissioned 1500-gal. septic tank (structure 15-0072) at E-F Firing Site [SWMU 15-004(f)]. The septic tank was constructed in 1947 and received sanitary waste from the E-F Firing Site control building (15-0027). Discharges from the septic tank flowed through a vitrified clay pipe to an outfall located approximately 30 ft from the tank at the edge of Potrillo Canyon (LANL 1997, 074091, p. 1).
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/Vegetated –** X **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine – X** **Piñon juniper/juniper savannah –** **Grassland/shrubland – X** **Developed –** **Burned –**
Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	Potrillo and Fence Canyons are not documented AEI or AEI buffer areas as documented in the Threatened and Endangered Species Habitat Management Plan, Rev. 1. The following federally threatened and endangered species are known to reside in local canyon habitats; Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow Flycatcher (*Empidonax trailii extimus*), and the Jemez Mountains salamander (*Plethodon neomexicanus*) (ENV Division Resource Management Team 2014, 600084). The Mexican spotted owl is likely to nest, roost, and forage at varying levels in some of the reaches in the Potrillo and Fence watershed (Nisengard 2010, 111141).

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.)	No SWMUs/AOCs are located upgradient. There is no indication of contaminant migration.
Surface Water Erosion Potential Information Summarize information including the terminal point of surface water transport, slope, and surface water run-on sources.	The area surrounding SWMU 15-009(e) drains into Potrillo Canyon.

I4-6.2 Part B—Site Visit Documentation

Site ID	SWMU 15-009(e)
Date of Site Visit	2/19/2015
Site Visit Conducted by	Tony Fristachi

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)** = none
Field notes on the GIS vegetation class to assist in verifying the ArcView information	The site consists of grasses, forbs, and shrubs. Scrub oaks are present at the edge of the site.
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.	Terrestrial receptors including mammals and birds could use this site for both foraging and nesting. Several species of birds were heard and observed in the vicinity. The SWMU is located in a remote, no longer operational site, increasing attractiveness to ecological receptors.

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).	The area surrounding SWMU 15-009(e) drains into Potrillo Canyon. No significant erosion was observed. Vegetation consisting of thick scrub oaks contribute to the stabilization of the soil at the edge of the SWMU.
Are there any off-site transport pathways (surface water, air, or groundwater)? (yes/no/uncertain) Provide explanation	Off-site transport pathways include surface water runoff into Potrillo Canyon.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	This site is in an area that is no longer in operation.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Present vegetation is indicative of the historical physical disturbance to the area. The area is primarily small forbs, grasses, and scrub oak, with bare areas of exposed soil.

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. Not Applicable

Adequacy of the 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.)**	The nature and extent of inorganic, organic, and radionuclide COPCs at the outfall area and around the septic tank are not defined. Samples were inadvertently not collected from soil underlying former structures. Sampling is necessary below the structures to define the nature and extent.
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.)**	Samples were not collected from soil underlying former structures.
Provide additional field notes on the site setting and potential ecological receptors. All relevant field notes are included in the previous sections.	

I4-6.3 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-m3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: VOCs were infrequently detected and below or near the EQLs.

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

Provide explanation: Bare soil is exposed at the site. COPCs were minimally detected in the surface soil.

Question C:

Can contaminated soil be transported to aquatic ecological communities?

- **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 is no aquatic habitat present at 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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Uncertain

Provide explanation: The outfall for SWMU 15-009(e) is located at the mesa edge and could potentially be affected by erosion caused by a large storm event.

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 were infrequently detected and below or near the EQLs.

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: COPCs were minimally detected in the surface soil.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soil?

- **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: 2

Provide explanation: Lipophilic COPCs were minimally detected in surface soil.

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: Radionuclides were minimally detected above BVs.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediment?

- **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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

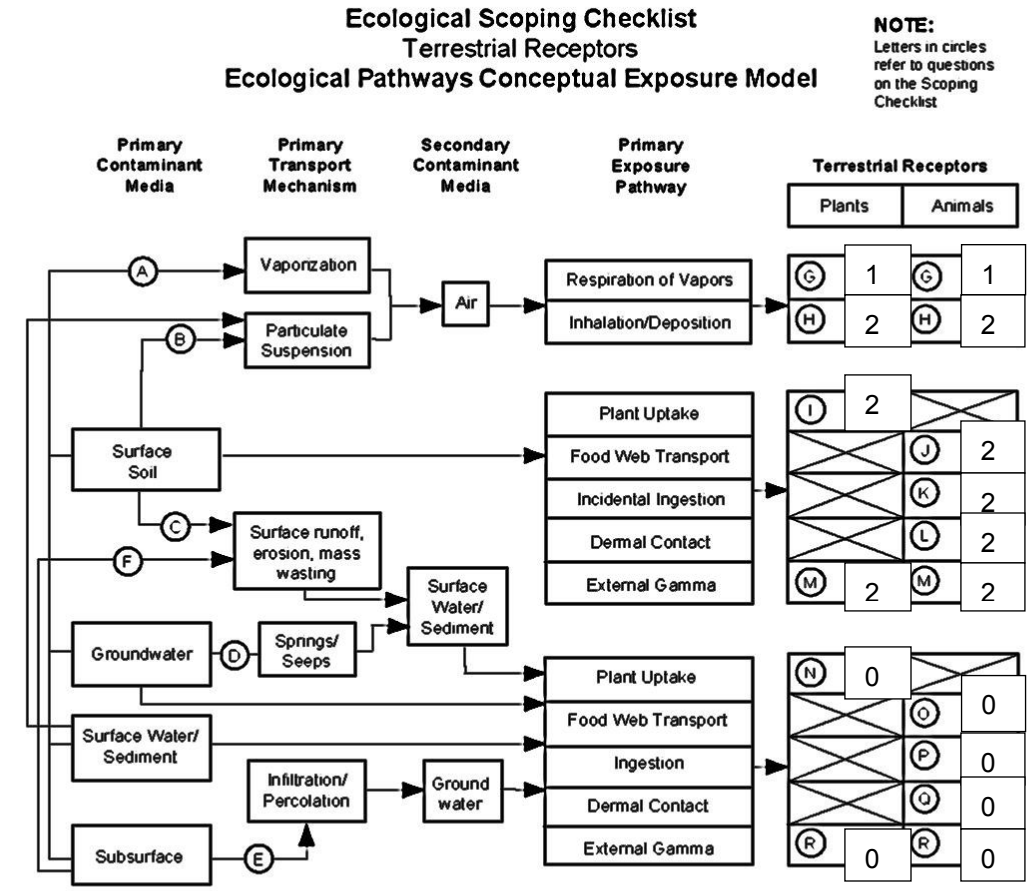
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

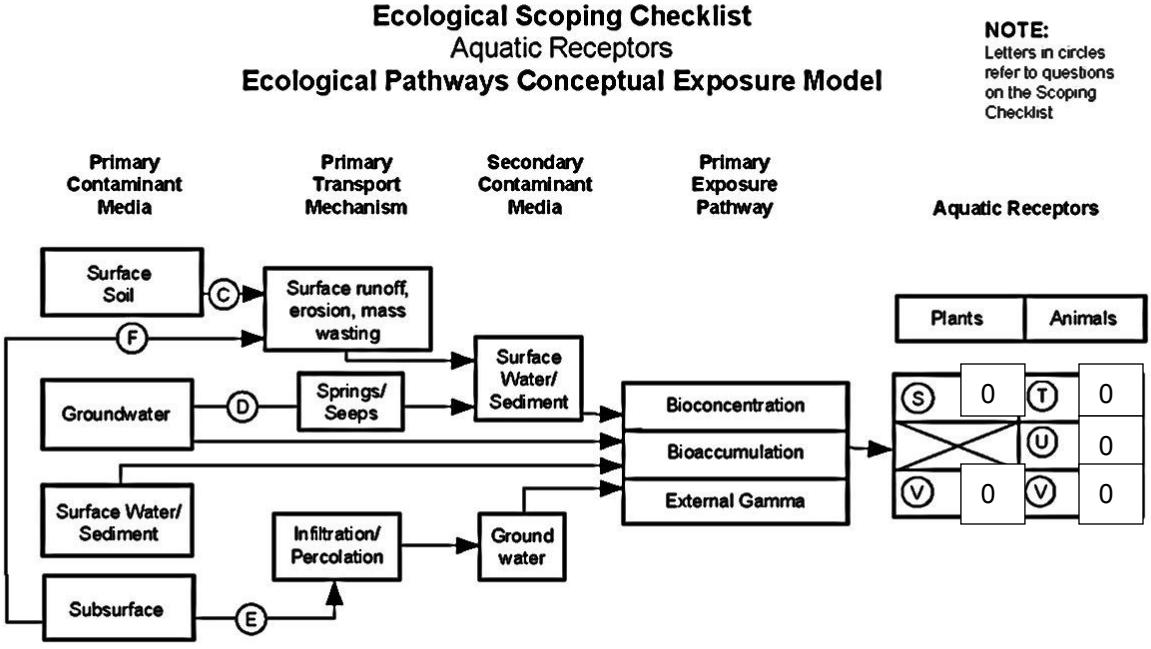
Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No water or sediment is present at the site.


Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Terrestrial Receptors
Plants
Animals
Vaporization
Particulate Suspension
Air
Respiration of Vapors
Inhalation/Deposition
Surface Soil
Surface runoff, erosion, mass wasting
Surface Water/ Sediment
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Plant Uptake
Food Web Transport
Incidental Ingestion
Dermal Contact
External Gamma
Plant Uptake
Food Web Transport
Ingestion
Dermal Contact
External Gamma


Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Aquatic Receptors
Plants
Animals
Surface Soil
Surface runoff, erosion, mass wasting
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Bioconcentration
Bioaccumulation
External Gamma

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Linsey Hurst

Name (signature): [signature]

Organization: Fristachi Scientific Consulting

Phone number: 505-470-4007

Date completed: 6/26/2015

Verification by another party (provide name, organization and phone number):

Name (printed): ANTHONY FRISTACHI

Name (signature): [signature]

Organization: FRISTACHI SCIENTIFIC CONSULTING, LLC

Phone number: 505-709-0692

I4-7.0 SWMU 36-001

I4-7.1 Part A—Scoping Meeting Documentation

Site ID	SWMU 36-001
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.**	SWMU 36-001 consists of MDA AA, an inactive landfill located approximately 240 ft southwest of a control bunker (building 36-0120) and 100 ft southwest of the x-ray device building (building 36-0086). MDA AA consists of two disposal trenches containing burned debris from test shots conducted at the Lower Slobbovia Firing Site (LANL 1993, 015313, p. 5-1). The debris included wood and sand contaminated with barium, uranium, other inorganic chemicals, plastics, and HE (LANL 1989, 105232). The disposal trenches were originally constructed in the mid-1960s; the site was closed in 1989 (LANL 1993, 015313, pp. 5-1–5 9). Potential mechanisms of release include material disposal, material incineration, and spills.
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/Vegetated –** X **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine –** X **Piñon juniper/juniper savannah –** X **Grassland/shrubland –** X **Developed –**X **Burned –**
Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	Potrillo and Fence Canyons are not documented AEI or AEI buffer areas as documented in the Threatened and Endangered Species Habitat Management Plan, Rev. 1. The following federally threatened and endangered species are known to reside in local canyon habitats; Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow Flycatcher (*Empidonax trailii extimus*), and the Jemez Mountains salamander (*Plethodon neomexicanus*) (ENV Division Resource Management Team 2014, 600084). The Mexican spotted owl is likely to nest, roost, and forage at varying levels in some of the reaches in the Potrillo and Fence watershed (Nisengard 2010, 111141).

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.)**	The Lower Slobbovia Firing Site is upgradient of MDA AA. Debris from explosive testing at Lower Slobbovia was transported to MDA AA for incineration and disposal.
Surface Water Erosion Potential Information **Summarize information including the terminal point of surface water transport, slope, and surface water run-on sources.**	The area containing the Lower Slobbovia Firing Site and MDA AA drains into Potrillo Canyon.

I4-7.2 Part B—Site Visit Documentation

Site ID	SWMU 36-001
Date of Site Visit	2/20/2015
Site Visit Conducted by	Tony Fristachi

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
Field notes on the GIS vegetation class to assist in verifying the ArcView information	Vegetation consists of grasses and forbs with Ponderosa Pine outside of the disturbed area.
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.**	Terrestrial receptors including mammals and birds could use the surrounding area for both foraging and nesting. Several species of birds were heard and observed in the vicinity. The SWMU is located in a remote, no longer operational site, increasing attractiveness to ecological receptors.

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).**	The area surrounding SWMU 36-001 is a relatively flat vegetated field that drains into Potrillo Canyon. Erosion was observed near site access roads. There is a culvert installed (see photo). Small sloped areas show rills from past surface water run-off.
Are there any off-site transport pathways (surface water, air, or groundwater)? **(yes/no/uncertain)** **Provide explanation**	Off-site transport pathways include surface water runoff into Potrillo Canyon.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	The area was physically disturbed by past firing site and material disposal operations. Erosion of bare ground was observed. Interim action activities were conducted in 1996 to implement erosion-control measures around SWMU 36-001 (LANL 1996, 054449, pp. 1–7). Additional storm water controls have been implemented under the Individual Permit.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Present vegetation at the material disposal site is indicative of the historical physical disturbance to the area. The area is primarily small forbs, grasses, and shrubs, with bare areas of exposed soil.

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. Not Applicable

Adequacy of the 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.)**	Planned work activities were modified to include additional characterization of buried waste at the site. The extent of contamination is not defined.
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.)**	Characterization samples were collected where 2010 geophysical data indicated the presence of buried metal debris. The samples were collected to determine the levels of beryllium and radioactivity present in the buried waste. The extent of contamination is not defined for MDA AA.
Provide additional field notes on the site setting and potential ecological receptors. All relevant field notes are included in the previous sections.	

I4-7.3 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-m3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: VOCs were infrequently detected and were below EQLs.

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

Provide explanation: COPCs were minimally detected in the surface soil.

Question C:

Can contaminated soil be transported to aquatic ecological communities?

- **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 is no aquatic habitat present at 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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: MDA AA is not located near the mesa edge. The area is gently sloped and could potentially be affected by 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 were infrequently detected and were below EQLs.

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: COPCs were minimally detected in the surface soil.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soil?

- **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: 2

Provide explanation: Lipophilic COPCs were minimally detected in surface soil.

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: Radionuclides were minimally detected above BVs.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediment?

- **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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

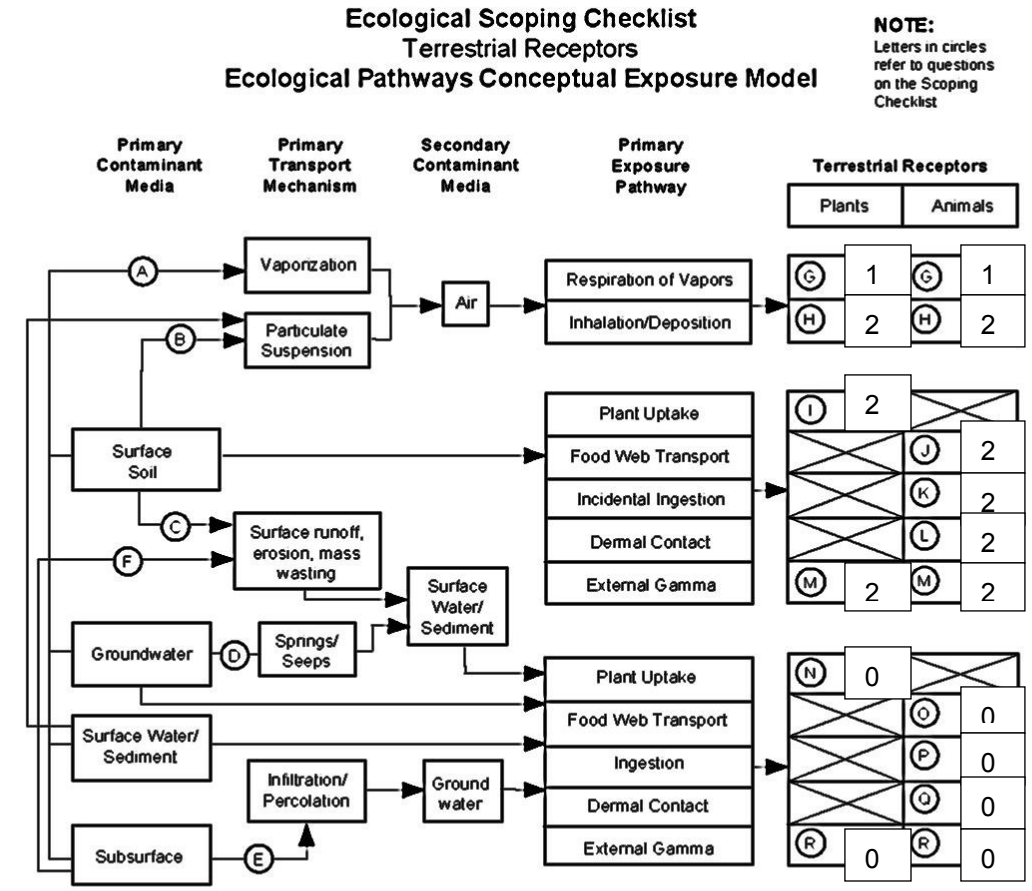
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

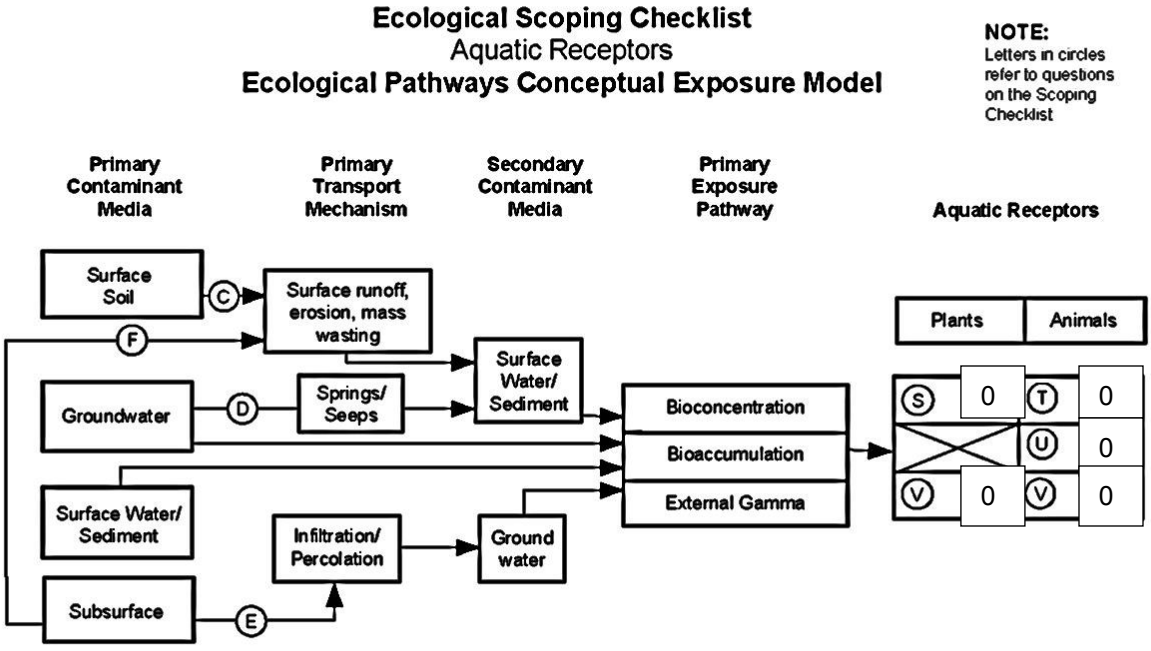
Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No water or sediment is present at the site.


Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Terrestrial Receptors
Plants
Animals
Vaporization
Particulate Suspension
Air
Respiration of Vapors
Inhalation/Deposition
Surface Soil
Surface runoff, erosion, mass wasting
Surface Water/ Sediment
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Plant Uptake
Food Web Transport
Incidental Ingestion
Dermal Contact
External Gamma
Plant Uptake
Food Web Transport
Ingestion
Dermal Contact
External Gamma


Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
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Surface Water/ Sediment
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Bioconcentration
Bioaccumulation
External Gamma

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Linsey Hurst

Name (signature): [signature]

Organization: Fristachi Scientific Consulting

Phone number: 505-470-4007

Date completed: 6/26/2015

Verification by another party (provide name, organization and phone number):

Name (printed): ANTHONY FRISTACHI

Name (signature): [signature]

Organization: FRISTACHI SCIENTIFIC CONSULTING, LLC

Phone number: 505-709-0692

I4-8.0 SWMU 36-003(b)

I4-8.1 Part A—Scoping Meeting Documentation

Site ID	SWMU 36-003(b)
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.**	SWMU 36-003(b) is a decommissioned septic system located at the west end of TA-36. The septic system served building 36-0055, the control bunker for the I-J Firing Site, and consists of a septic tank (structure 36-0061) and its associated drain lines and outfall. The septic tank sits near the edge of Mesita del Potrillo, approximately 100 ft southwest of building 36 0055, (LANL 1993, 015313, p. 5-24). The tank has a buried overflow pipe that previously discharged near the north rim of Potrillo Canyon. The overflow pipe was capped in 1989. After the overflow pipe was capped, the septic tank continued to be used and its contents were periodically removed and taken to a sanitary wastewater treatment plant for treatment and disposal (LANL 1993, 015313, p. 5-24). The septic system was taken out of service in the early 1990s. A 1996 voluntary corrective action included removing the septic tank contents, pressure washing the tank, and filling the tank with expanding cement. The mechanism of release includes effluent discharge.
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/Vegetated –** X **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine –** **Piñon juniper/juniper savannah –** X **Grassland/shrubland –** X **Developed –** **Burned –**

Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	Potrillo and Fence Canyons are not documented AEI or AEI buffer areas as documented in the Threatened and Endangered Species Habitat Management Plan, Rev. 1. The following federally threatened and endangered species are known to reside in local canyon habitats; Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow Flycatcher (*Empidonax traillii extimus*), and the Jemez Mountains salamander (*Plethodon neomexicanus*) (ENV Division Resource Management Team 2014, 600084). The Mexican spotted owl is likely to nest, roost, and forage at varying levels in some of the reaches in the Potrillo and Fence watershed (Nisengard 2010, 111141).
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.)**	I and J Firing Sites are upgradient of SWMU 36-003(b). Debris from explosive testing at I and J Firing Sites could impact sampling results surrounding SWMU 36-003(b).
Surface Water Erosion Potential Information **Summarize information including the terminal point of surface water transport, slope, and surface water run-on sources.**	The outfall from SWMU 36-003(b) drains into Potrillo Canyon. Erosion is likely because of surface water run-off, the slope of the site, and the proximity of the site to the canyon.

I4-8.2 Part B—Site Visit Documentation

Site ID	SWMU 36-003(b)
Date of Site Visit	2/20/2015
Site Visit Conducted by	Tony Fristachi

Receptor Information:

Estimate cover	**Relative vegetative cover (high, medium, low, none)** = medium **Relative wetland cover (high, medium, low, none)** = none **Relative structures/asphalt, etc., cover (high, medium, low, none) = low**
Field notes on the GIS vegetation class to assist in verifying the ArcView information	Vegetation consists of grasses, forbs, and shrubs.
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.**	Terrestrial receptors including mammals and birds could use the surrounding area for both foraging and nesting. Several species of birds were heard and observed in the vicinity. The SWMU is located in a remote, no longer operational site, increasing attractiveness to ecological receptors.

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).**	The outfall from SWMU 36-003(b) previously discharged near the north rim of Potrillo Canyon. Surface water flow from the area terminates in Potrillo Canyon.
Are there any off-site transport pathways (surface water, air, or groundwater)? **(yes/no/uncertain)** **Provide explanation**	Off-site transport pathways include surface water runoff into Potrillo Canyon.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	The area is developed. SWMU 36-003(b) has been decommissioned in place. Asphalt, debris, shrapnel, and depleted uranium were observed in the area of SWMU 36-003(b).
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Present vegetation at the site is indicative of the historical physical disturbance to the area. The area is primarily small forbs, grasses, and shrubs, with bare areas of exposed soil.

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. Not Applicable

Adequacy of the 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.)**	The nature and extent of inorganic, organic, and radionuclide COPCs at the SWMU 36-003(b) outfall area and around the septic tank are not defined. Samples were inadvertently not collected from soil underlying site structures.
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.)**	Sampling at and below the outfall has been completed but not below structures.
Provide additional field notes on the site setting and potential ecological receptors. All relevant field notes are included in the previous sections.	

I4-8.3 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-m3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: No VOCs were detected.

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

Provide explanation: COPCs were minimally detected in the surface soil.

Question C:

Can contaminated soil be transported to aquatic ecological communities?

- **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 is no aquatic habitat present at 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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Likely

Provide explanation: The outfall is located at the edge of the mesa.

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: 0

Terrestrial Animals: 0

Provide explanation: No VOCs were detected.

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: COPCs were minimally detected in the surface soil.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soil?

- **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: 2

Provide explanation: Lipophilic COPCs were minimally detected in surface soil.

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: 0

Terrestrial Animals: 0

Provide explanation: Radionuclides were not detected above BVs.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediment?

- **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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

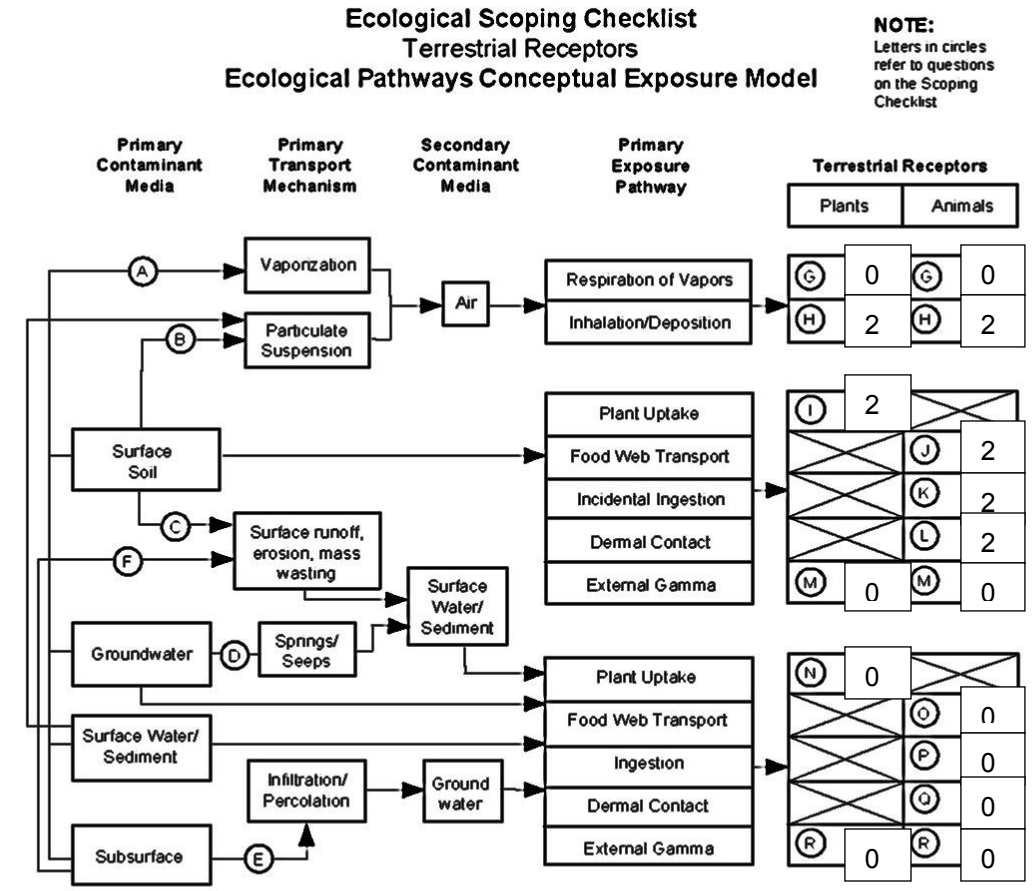
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

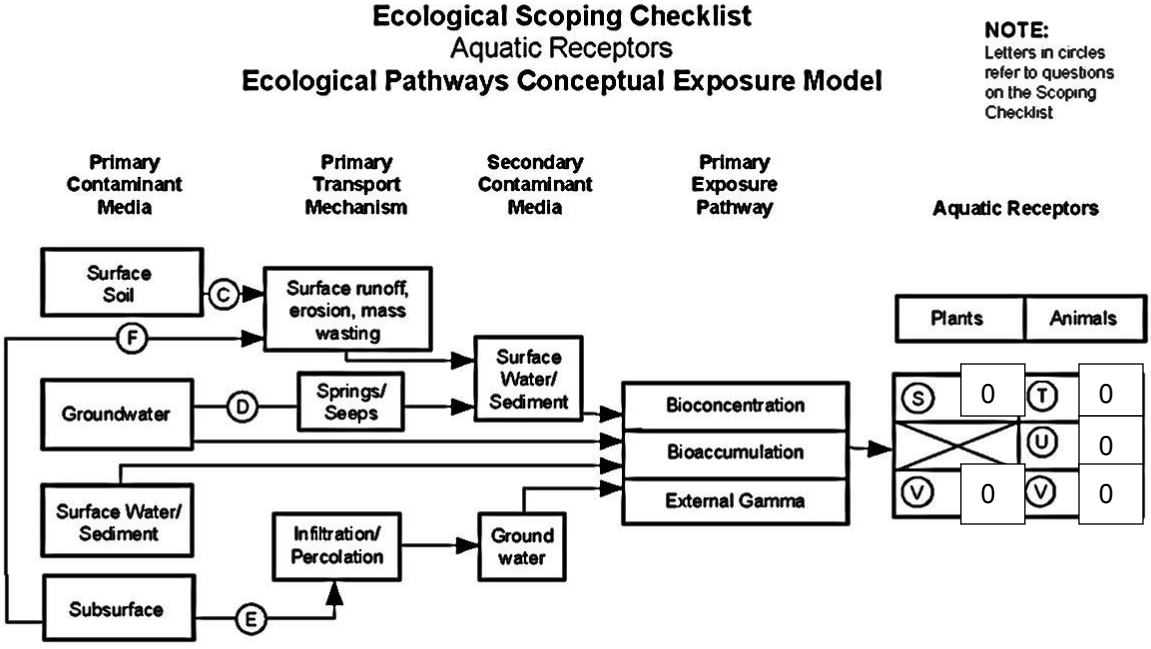
Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No water or sediment is present at the site.


Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Terrestrial Receptors
Plants
Animals
Vaporization
Particulate Suspension
Air
Respiration of Vapors
Inhalation/Deposition
Surface Soil
Surface runoff, erosion, mass wasting
Surface Water/ Sediment
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Plant Uptake
Food Web Transport
Incidental Ingestion
Dermal Contact
External Gamma
Plant Uptake
Food Web Transport
Ingestion
Dermal Contact
External Gamma


Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Aquatic Receptors
Plants
Animals
Surface Soil
Surface runoff, erosion, mass wasting
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Bioconcentration
Bioaccumulation
External Gamma

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Linsey Hurst

Name (signature): [signature]

Organization: Fristachi Scientific Consulting

Phone number: 505-470-4007

Date completed: 6/26/2015

Verification by another party (provide name, organization and phone number):

Name (printed): ANTHONY FRISTACHI

Name (signature): [signature]

Organization: FRISTACHI SCIENTIFIC CONSULTING, LLC

Phone number: 505-709-0692

I4-9.0 SWMU 36-005

I4-9.1 Part A—Scoping Meeting Documentation

Site ID	SWMU 36-005
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.**	SWMU 36-005 is an inactive storage area (known as the "Boneyard") located at TA-36 near the head of Fence Canyon between the Meenie and Minie Firing Sites [AOCs 36-004(b) and 36-004(c), respectively]. This approximately 260 ft × 300 ft storage area is an undeveloped area, largely covered with grass and ponderosa pine. From the 1950s to the late 1970s, the Boneyard was used as a parking lot for trailers and a storage area for large non-waste items. From the late 1970s to the late 1980s, the site was used to store large waste items exposed to explosives tests (Kelkar 1992, 012470), including metal drums, cans, cylinders, and scrap metals such as lead sheets, copper, uranium-contaminated steel, and iron (LANL 1993, 020946, p. 5-53). In the late 1980s, a major cleanup was conducted at the site. Cans labeled isopentane, uranium-contaminated iron and steel, drums, and cylinders were removed during this cleanup effort (LANL 1993, 020946, p. 5-53). Mechanisms of release include spills and dumping.
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/Vegetated –** X **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine –** X **Piñon juniper/juniper savannah –** X **Grassland/shrubland –** X **Developed –** **Burned –**

Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	Potrillo and Fence Canyons are not documented AEI or AEI buffer areas as documented in the Threatened and Endangered Species Habitat Management Plan, Rev. 1. The following federally threatened and endangered species are known to reside in local canyon habitats; Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow Flycatcher (*Empidonax trailii extimus*), and the Jemez Mountains salamander (*Plethodon neomexicanus*) (ENV Division Resource Management Team 2014, 600084). The Mexican spotted owl is likely to nest, roost, and forage at varying levels in some of the reaches in the Potrillo and Fence watershed (Nisengard 2010, 111141).
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.)**	SWMU 36-005 is located near the head of Fence Canyon between the Meenie and Minie Firing Sites [AOCs 36-004(b) and 36-004(c), respectively].
Surface Water Erosion Potential Information **Summarize information including the terminal point of surface water transport, slope, and surface water run-on sources.**	The "Boneyard" is a relatively flat open vegetated field with a gentle slope to the southeast. Surface water run-off from the site terminates in Fence Canyon.

I4-9.2 Part B—Site Visit Documentation

Site ID	SWMU 36-005
Date of Site Visit	1/20/2015
Site Visit Conducted by	Tony Fristachi

Receptor Information:

Estimate cover	**Relative vegetative cover (high, medium, low, none)** = medium **Relative wetland cover (high, medium, low, none)** = none **Relative structures/asphalt, etc., cover (high, medium, low, none)** = low
Field notes on the GIS vegetation class to assist in verifying the ArcView information	Vegetation consists of grasses, forbs, and shrubs. Larger flora at the edge of the site includes scrub oak, Ponderosa Pine, Juniper, and Pinon Pine.
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.**	Terrestrial receptors including mammals and birds could use the surrounding area for both foraging and nesting. Several species of birds were heard and observed in the vicinity. The SWMU is located in a remote, no longer operational site, increasing attractiveness to ecological receptors.

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).**	The Boneyard is a relatively flat open vegetated field with a gentle slope to the southeast. Surface water run-off from the site terminates in Fence Canyon.
Are there any off-site transport pathways (surface water, air, or groundwater)? **(yes/no/uncertain)** **Provide explanation**	Off-site transport pathways include surface water runoff into Fence Canyon.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	The Boneyard storage area was active from the 1950s through the late 1980s when a major cleanup was completed at the site.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Present vegetation at the site is indicative of the historical physical disturbance to the area. The area is primarily small forbs, grasses, and shrubs, with bare areas of exposed soil.

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. Not Applicable

Adequacy of the 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.)**	During the 2010 implementation of the approved work plan, cultural resource issues were raised by Laboratory archaeologists, causing work activities to be suspended. Additional archaeological sites were discovered during a site visit by Laboratory archaeologists (English 2010, 111797). It was determined that full clearance by the State Historical Preservation Office to collect samples (and remove debris) may not be possible, and the review process to reach this determination would extend beyond due date of the investigation report. An alternate sampling approach was proposed that included three transects across the slope downgradient of the site. This alternative sampling approach was successfully implemented (see section 7.4.4-1 and deviations in Appendix B).

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.)**	Samples were collected along three transects across the slope downgradient of the site.
Provide additional field notes on the site setting and potential ecological receptors. All relevant field notes are included in the previous sections.	

I4-9.3 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-m3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Few VOCs were detected at low concentrations.

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

Provide explanation: COPCs were minimally detected in the surface soil.

Question C:

Can contaminated soil be transported to aquatic ecological communities?

- **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 is no aquatic habitat present at 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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: The Boneyard is located on the mesa top in a relatively flat area.

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: Few VOCs were detected at low concentrations.

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: COPCs were minimally detected in the surface soil.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soil?

- **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: 2

Provide explanation: COPCs were minimally detected in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soil?

- **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: 2

Provide explanation: Lipophilic COPCs were minimally detected in surface soil.

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: 0

Terrestrial Animals: 0

Provide explanation: Radionuclides were not detected above BVs.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediment?

- **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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

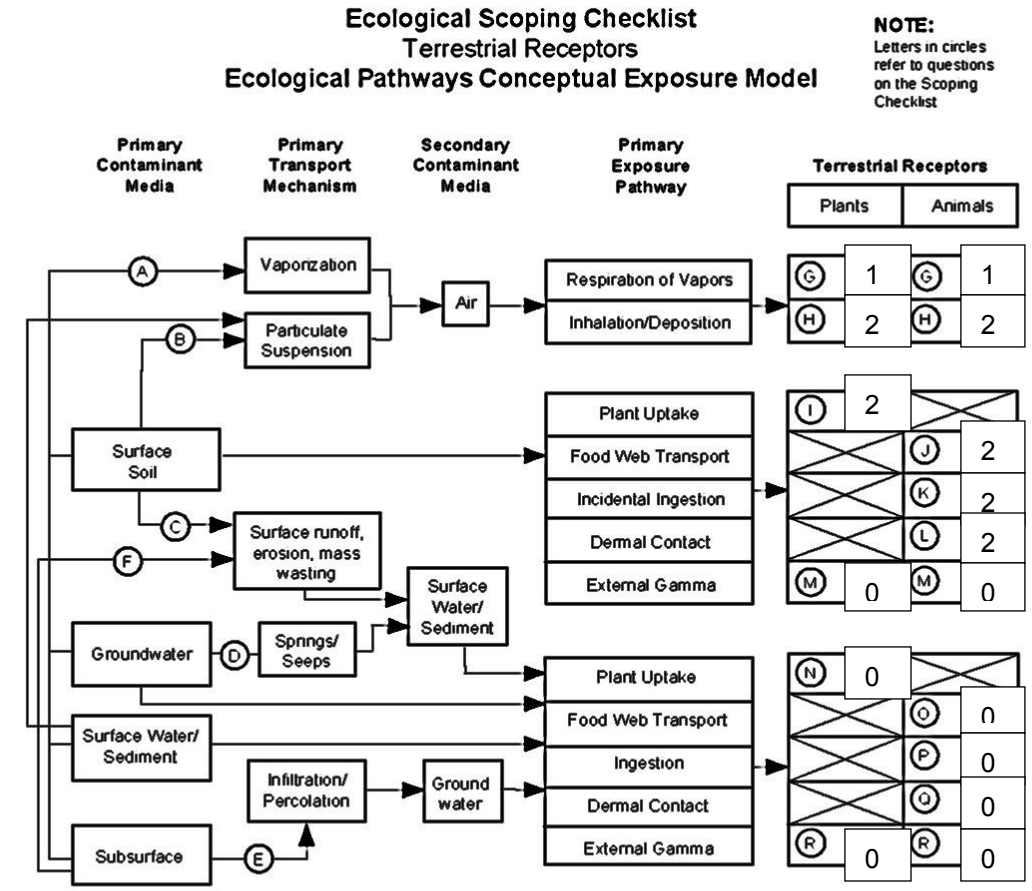
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

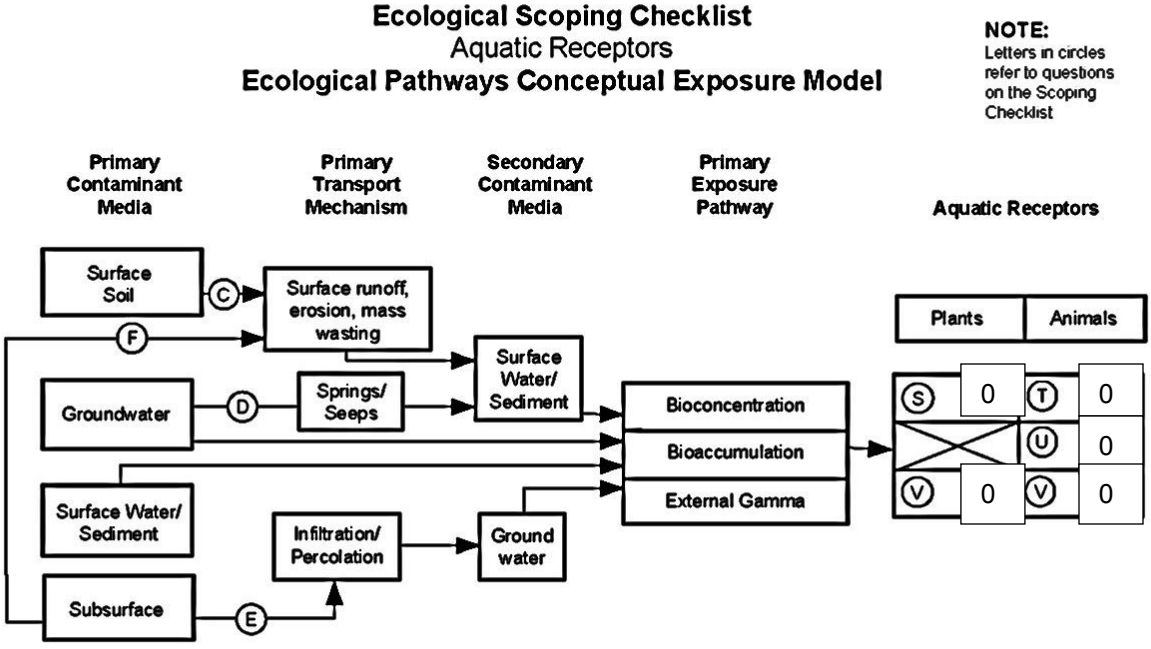
Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No water or sediment is present at the site.


Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Terrestrial Receptors
Plants
Animals
Vaporization
Particulate Suspension
Air
Respiration of Vapors
Inhalation/Deposition
Surface Soil
Surface runoff, erosion, mass wasting
Surface Water/ Sediment
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Plant Uptake
Food Web Transport
Incidental Ingestion
Dermal Contact
External Gamma
Plant Uptake
Food Web Transport
Ingestion
Dermal Contact
External Gamma


Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model
NOTE:
Letters in circles refer to questions on the Scoping Checklist
Primary Contaminant Media
Primary Transport Mechanism
Secondary Contaminant Media
Primary Exposure Pathway
Aquatic Receptors
Plants
Animals
Surface Soil
Surface runoff, erosion, mass wasting
Groundwater
Springs/ Seeps
Surface Water/ Sediment
Surface Water/ Sediment
Infiltration/ Percolation
Ground water
Subsurface
Bioconcentration
Bioaccumulation
External Gamma

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Linsey Hurst

Name (signature):

Organization: Fristachi Scientific Consulting

Phone number: 505-470-4007

Date completed: 6/26/2015

Verification by another party (provide name, organization and phone number):

Name (printed): ANTHONY FRISTACHI

Name (signature):

Organization: FRISTACHI SCIENTIFIC CONSULTING, LLC

Phone number: 505-709-0692

I4-10.0 SWMU 36-006

I4-10.1 Part A—Scoping Meeting Documentation

Site ID	SWMU 36-006
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.**	SWMU 36-006 consists of an inactive surface disposal area located on the southern slope of Potrillo Canyon, approximately 600 ft north of the Eenie Firing Site [AOC 36-004(a)] at TA-36. SWMU 36-006 was used to dispose of cables, metal, concrete, and other similar debris from the TA-36 firing sites (LANL 1993, 015313, p. 5-63). Most of the debris covers an area approximately 75 ft wide that extends approximately 100 ft down the south canyon slope. The remainder of the debris was scattered laterally 300 ft along the south canyon slope. SWMU 36-006 was used from 1955 to 1970. All remaining debris was removed from the SWMU 36-006 surface disposal area during the 2010 investigation. Mechanisms of release include spills and dumping.
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/Vegetated –** X **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine –** X **Piñon juniper/juniper savannah –** **Grassland/shrubland –** **Developed –**X **Burned –**
Is T&E Habitat Present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	Potrillo and Fence Canyons are not documented AEI or AEI buffer areas as documented in the Threatened and Endangered Species Habitat Management Plan, Rev. 1. The following federally threatened and endangered species are known to reside in local canyon habitats; Mexican spotted owl (*Strix occidentalis lucida*), Southwestern Willow Flycatcher (*Empidonax trailii extimus*), and the Jemez Mountains salamander (*Plethodon neomexicanus*) (ENV Division Resource Management Team 2014, 600084). The Mexican spotted owl is likely to nest, roost, and forage at varying levels in some of the reaches in the Potrillo and Fence watershed (Nisengard 2010, 111141).

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.)**	SWMU 36-006 is located directly north of AOC 36-004(a); debris from AOC 36-004(a) was disposed of at SWMU 36-006.
Surface Water Erosion Potential Information **Summarize information including the terminal point of surface water transport, slope, and surface water run-on sources.**	Surface disposal area 36-006 is located at the edge and on the southern slope of Potrillo Canyon. Erosion potential for this site with materials removed is consistent with erosion typically observed in local canyons. Straw waddles are installed downgradient of the dumping area.

I4-10.1 Part B—Site Visit Documentation

Site ID	SWMU 36-006
Date of Site Visit	2/20/2015
Site Visit Conducted by	Tony Fristachi

Receptor Information:

Estimate cover	**Relative vegetative cover (high, medium, low, none)** = medium **Relative wetland cover (high, medium, low, none)** = none **Relative structures/asphalt, etc., cover (high, medium, low, none)** = none
Field notes on the GIS vegetation class to assist in verifying the ArcView information	Vegetation consists of grasses, forbs, shrubs and larger flora including scrub oak and Ponderosa Pine.
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.**	Terrestrial receptors including mammals and birds could use the area for both foraging and nesting. Several species of birds were heard and observed in the vicinity. Canyons provide additional shelter and variety of habitat increasing the diversity of species attracted to the area. Larger predators, such as bear and mountain lion, have been observed in adjacent canyons.

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 disposal area is located at the edge and on the southern slope of Potrillo Canyon. Erosion potential for this site with materials removed is consistent with erosion typically observed in local canyons. Straw waddles are installed down gradient of the dumping area.
Are there any off-site transport pathways (surface water, air, or groundwater)? **(yes/no/uncertain)** **Provide explanation**	Off-site transport of COPCs from SWMU 36-006 via surface water and windblown dust down gradient into Potrillo Canyon.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	Surface disposal area was active from 1955 to 1970. All remaining debris was removed during the 2010 investigation.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Obvious ecological effects are limited to small areas of bare exposed soil caused by physical disturbances at the site

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. Not Applicable

Adequacy of the 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.)**	The nature and extent of contamination at SWMU 36-006 is defined and/or additional sampling is not warranted.
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.)**	Samples were collected downgradient and lateral to the surface disposal area.
Provide additional field notes on the site setting and potential ecological receptors. All relevant field notes are included in the previous sections.	

I4-10.3 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-m3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Few VOCs were infrequently detected and were detected below EQLs.

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

Provide explanation: COPCs are present in the surface soil.

Question C:

Can contaminated soil be transported to aquatic ecological communities?

- **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 is no aquatic habitat present at 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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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: The depth to regional groundwater is approximately 1300 ft. There are no seeps, springs, or shallow groundwater in the area.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Likely

Provide explanation: The surface disposal area is located on the mesa edge and down onto the southern slope of Potrillo Canyon.

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: Few VOCs were infrequently detected and were detected below EQLs.

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: 3

Terrestrial Animals: 3

Provide explanation: COPCs are present in the surface soil.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soil?

- **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: COPCs are present in the surface soil.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soil?

- **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: COPCs are present in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soil?

- **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: COPCs are present in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soil?

- **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: 3

Provide explanation: Lipophilic COPCs were detected in surface soil.

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: 3

Terrestrial Animals: 3

Provide explanation: Uranium-238 was detected above the soil BV in three soil samples with a maximum activity of 5.26 pCi/g.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediment?

- **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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

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 water or sediment is present at the site.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

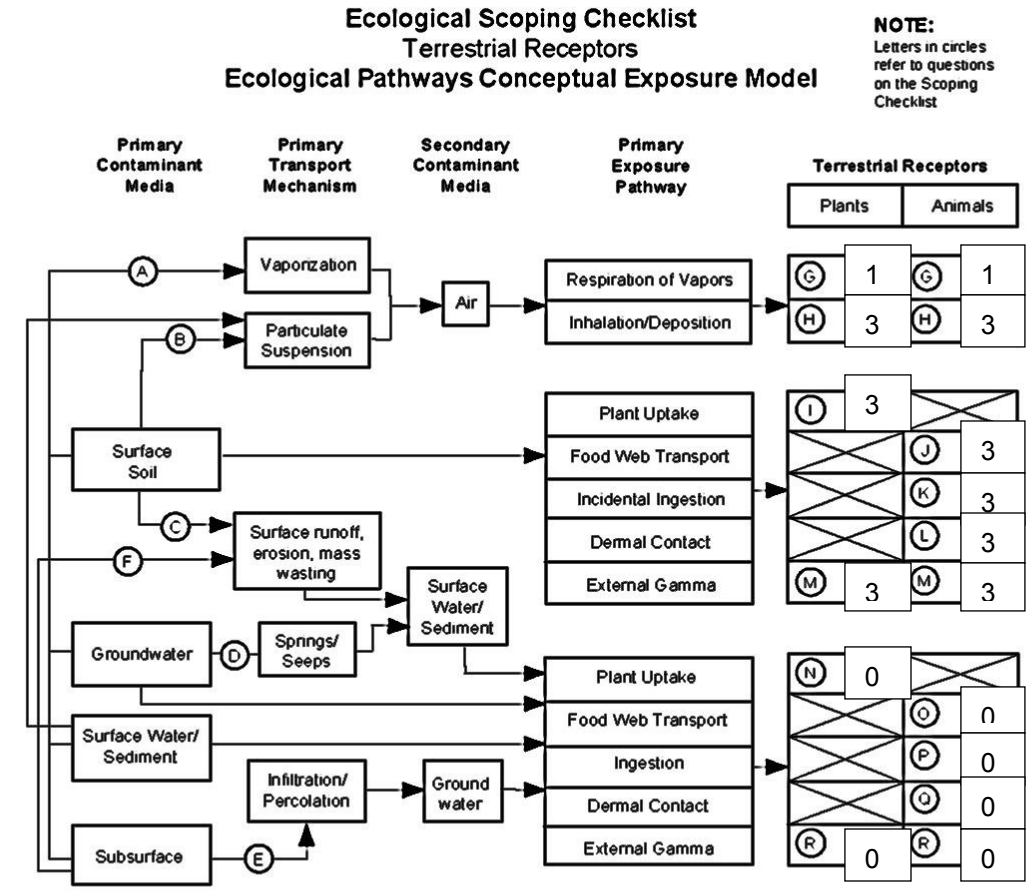
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment dwelling organisms.**

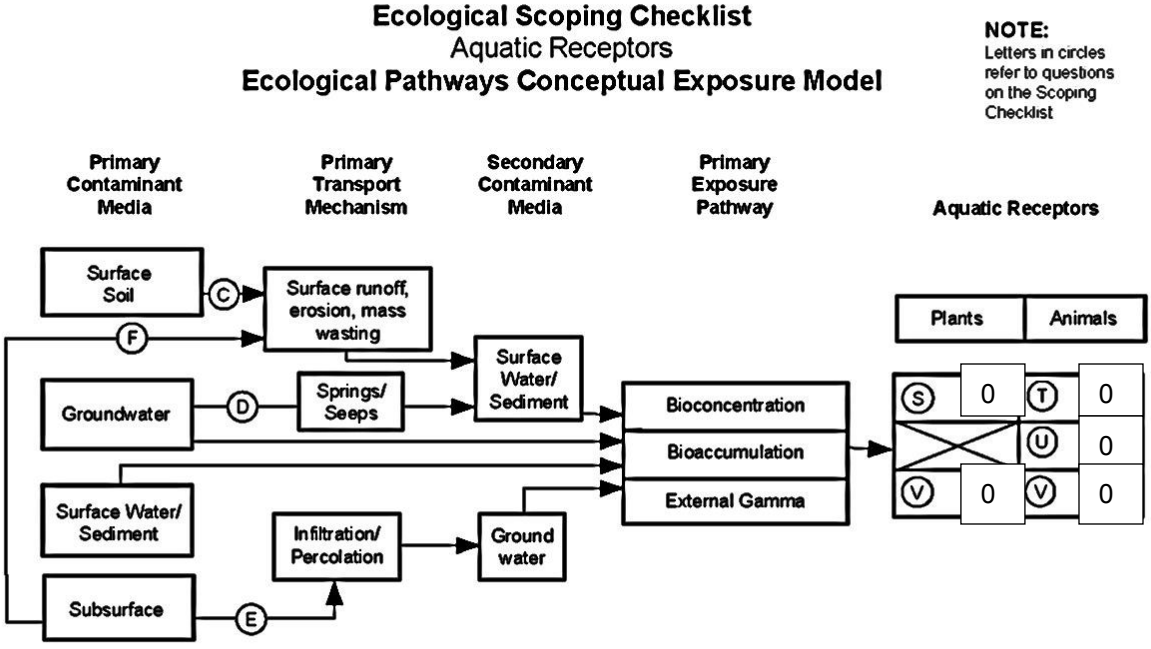
Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No water or sediment is present at the site.


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NOTE:
Letters in circles refer to questions on the Scoping Checklist
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Secondary Contaminant Media
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Plants
Animals
Vaporization
Particulate Suspension
Air
Respiration of Vapors
Inhalation/Deposition
Surface Soil
Surface runoff, erosion, mass wasting
Surface Water/ Sediment
Springs/ Seeps
Groundwater
Surface Water/ Sediment
Subsurface
Infiltration/ Percolation
Ground water
Plant Uptake
Food Web Transport
Incidental Ingestion
Dermal Contact
External Gamma
Ingestion
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
1
3
0


Ecological Scoping Checklist
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NOTE:
Letters in circles refer to questions on the Scoping Checklist
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Subsurface
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Ground water
Bioconcentration
Bioaccumulation
External Gamma
C
D
E
F
S
T
U
V
0

Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Linsey Hurst

Name (signature):

Organization: Fristachi Scientific Consulting

Phone number: 505-470-4007

Date completed: 6/26/2015

Verification by another party (provide name, organization and phone number):

Name (printed): ANTHONY FRISTACHI

Name (signature):

Organization: FRISTACHI SCIENTIFIC CONSULTING, LLC

Phone number: 505 - 709 - 0692

I4-11.0 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 or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH 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.

English, J., December 14, 2010. Communication Record Form. Personal communication between J. English (LANL), and D. Cobrain (NMED-HWB), Los Alamos, New Mexico. (LANL 2010, 111797)

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Appendix J

Site Photographs



Figure J-1 **Weathered asphalt roadway and parking area located adjacent to Area of Concern (AOC) 15-005(b) (building 15-0242)**



Figure J-2 **R-Site Road located north of AOC C-15-006**



Figure J-3 R-Site Road located west of AOC C-15-005



Figure J-4 Weathered asphalt upgradient of Solid Waste Management Unit (SWMU) 36-003(b) septic tank looking southeast



Figure J-5 **Area near SWMU 36-003(b) septic tank north of drainage area (close-up of asphalt)**