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Supplemental Investigation Report for Cañon de Valle Aggregate Area, Technical Area 14

Los Alamos
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Prepared by the Associate Directorate for Environmental Management

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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 18 solid waste management units (SWMUs) and areas of concern (AOCs) within Technical Area 14 (TA-14) in the Cañon de Valle Aggregate Area at Los Alamos National Laboratory (LANL or the Laboratory). Eighteen SWMUs/AOCs at TA-14 within the Cañon de Valle Aggregate Area were investigated in 2011, and the investigation results were documented in the investigation report for Cañon de Valle Aggregate Area, TA-14, submitted to the New Mexico Environment Department (NMED) in January 2012. The investigation report concluded that additional sampling to define the extent of contamination was needed for 10 SWMUs and AOCs. Seven other SWMUs and AOCs were recommended for corrective action complete, and 1 AOC was recommended for delayed investigation because it is an active firing site.

After the investigation report was submitted, 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 Compliance Order on Consent (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 this process could be revised to more efficiently complete site characterization, 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 revised process was used to reevaluate the decision-level investigation data for 18 sites. The revised process does not affect the status of 3 sites within the aggregate area approved for completion of corrective action, 1 site subject to Resource Conservation and Recovery Act closure, 5 sites with investigation deferred per Appendix A of the 2016 Consent Order, and 4 sites recommended for delayed investigation and not sampled during 2011. AOC 14-001(g) is also recommended for delayed investigation but was sampled in 2011 to determine if contaminants were migrating off-site. Based on the evaluation of investigation results using the revised process, the extent of contamination has been defined (or a determination has been made that no further sampling for extent is warranted) at 17 sites. Human health and ecological risk assessments were performed for all sites.

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 17 sites for which extent is defined or no further sampling is warranted and which pose no potential unacceptable human health risk under the industrial, construction worker, and residential scenarios and no unacceptable ecological risk.
- Delayed investigation is recommended for one active firing site for which no further sampling is currently warranted and which poses no potential unacceptable human health risk under the industrial, construction worker, and residential scenarios and no unacceptable ecological risk. Delayed investigation is also recommended for four sites within or adjacent to active facilities.
- Five sites are deferred from investigation pursuant to Appendix A of the 2016 Consent Order.

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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 approximately 39 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 (amsl).

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 effort 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 Technical Area 14 (TA-14) in the Cañon de Valle Aggregate Area at the Laboratory (Figure 1.0-1 and Plate 1). These sites are potentially contaminated with both hazardous and radioactive components. Corrective actions at the Laboratory are subject to a Compliance Order on Consent (the Consent Order). 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 435.1, Radioactive Waste Management; and DOE Order 458.1, Administrative Change 2, Radiation Protection of the Public and the Environment. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with DOE policy.

1.1 General Site Information

The Cañon de Valle Aggregate Area investigation work plan identified and described the activities needed to complete the investigations of TA-14 sites within the aggregate area (LANL 2006, 091698, section 9.0). Since the work plan was approved in 2007 (NMED 2007, 095478), the Laboratory's Associate Directorate for Environmental Management (ADEM), in cooperation with and with the consent of NMED, has revised and improved investigation sampling for sites regulated under the Consent Order. Sampling activities implemented during the investigation described in this report deviated substantially from the approved work plan, which were described in detail in the 2011 field implementation plan (FIP) (LANL 2011, 207481). This FIP also incorporated the modifications NMED requested in its approval with modifications letter for the work plan, issued on February 9, 2007 (NMED 2007, 095478), and is consistent with the current strategy employed at the Laboratory to collect field samples.

Thirty-one SWMUs and AOCs are located within TA-14 of the Cañon de Valle Aggregate Area (Plate 1). Table 1.1-1 lists the 31 sites and provides a brief description, investigation activities conducted in 2011, and status for each site.

Of the 31 sites, 2 sites have been previously approved for no further action (NFA) by the U.S. Environmental Protection Agency (EPA), 1 site was removed from Module VIII of the Laboratory's Hazardous Waste Facility Permit by NMED, and 1 site is subject to Resource Conservation and Recovery Act (RCRA) closure requirements. Therefore, these four sites are not addressed in this report.

Of the 27 remaining sites addressed in this supplemental investigation report, 5 sites are deferred from investigation pursuant to Appendix A of the 2016 Consent Order, 5 sites are recommended for delayed investigation, and 17 sites were sampled during the 2011 investigation. This supplemental investigation report describes the investigation status and results of sampling activities conducted to date for the 27 sites (Plate 2).

1.2 Purpose of Investigation

During the 2011 investigation (LANL 2012, 210350), 18 SWMUs and AOCs in TA-14 within the Cañon de Valle Aggregate Area were sampled in August and September of 2011 in accordance with the FIP (LANL 2011, 207481). For each site sampled, the objectives of the 2011 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 and the environment, and (3) assess whether any additional sampling and/or corrective actions are required.

All analytical data collected during the 2011 investigation activities are presented and evaluated in this report in conjunction with decision-level data from previous investigations, where available.

1.3 Document Organization

This report is organized into nine sections, including this introduction, with multiple supporting appendixes. Section 2 provides a discussion of the site conditions of the aggregate area. Section 3 provides an overview of the scope of the activities performed during the implementation of the work plan and the FIP. Section 4 describes the regulatory criteria used to evaluate potential risks to human and ecological receptors. Section 5 describes the data review methods. Section 6 presents an overview of the operational history of each site and historical releases, summaries of previous investigations, results of the field activities performed during the 2011 investigation, a discussion of site contamination, evaluation of the nature and extent of contamination, and summaries of human health risk-screening and ecological risk-screening assessment results. Section 7 presents the conclusions of the nature and extent determinations and risk assessments. Section 8 discusses recommendations based on applicable data and the risk-screening assessments. Section 9 includes a list of references cited and the map data sources used in all figures and plates.

Appendixes include acronyms, a metric conversion table, and definitions of data qualifiers (Appendix A); field methods (Appendix B); analytical program descriptions and summaries of data quality (Appendix C); analytical suites and results and analytical reports (Appendix D, on DVD included with this document); investigation-derived waste (IDW) management (Appendix E); box plots and statistical results (Appendix F); risk-screening assessments (Appendix G); and site photographs (Appendix H).

2.0 AGGREGATE AREA SITE CONDITIONS

2.1 Surface Conditions

The Cañon de Valle watershed consists of roughly east- to southeast-trending, flat-topped mesas that drain predominantly into Cañon de Valle (Plate 1). Fishladder Canyon, located in the eastern portion of the watershed, is a small tributary canyon that drains in a southeasterly direction into Cañon de Valle. At the southeastern end of the watershed, the Cañon de Valle watershed terminates at the confluence with Water Canyon. Source waters are predominantly from storm and snowmelt runoff that flows from the Sierra de los Valles mountains (i.e., the eastern front of the Jemez Mountains), located west of the Laboratory (Collins et al. 2005, 092028, pp. 2-104–2-107) and flow from perennial springs.

The mesa tops range from 7700 ft amsl at the western Laboratory boundary to 7200 ft amsl at the southern tip of the watershed and overlook the confluence with Water Canyon. Cañon de Valle is fairly narrow and steep near its headwaters in the Sierra de los Valles headlands, located west of the Laboratory boundary. The headlands transition into the mesa top at the western Laboratory boundary, and Cañon de Valle becomes broader with a gentler gradient for approximately 0.5 mi east of the western Laboratory boundary. At this point, the canyon steepens and narrows with up to 300-ft-tall cliffs at its terminus with Water Canyon (Plate 1).

2.1.1 Soil

Soil on the Pajarito Plateau was initially mapped and described by Nyhan et al. (1978, 005702). The canyon slopes between the mesa tops and canyon floors are mostly steep rock outcrops consisting of approximately 90% bedrock with patches of shallow, weakly developed colluvial soil. South-facing canyon walls generally are 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).

A variety of soil types occur at TA-14, including Carjo loam, Frijoles very fine sandy loam, and Pogna fine sandy loam (LANL 1994, 034755, pp. 3-8–3-9). These soil units transition into outcrops of Bandelier Tuff along the margins of the mesa tops.

The eastern and central portions of the TA-14 sites were moderately burned in the 2000 Cerro Grande fire with damage to groundcover. The western portion was moderately to severely burned in the 2000 Cerro Grande fire, with substantial damage to the canopy and groundcover (LANL 2000, 067370, pp. 11–14). The entire south-facing slope located south of the TA-14 structures was moderately burned, with damage to the groundcover (LANL 2001, 071342, p. 19).

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.

Cañon de Valle has a drainage area of 4 mi^2, and surface water is perennial from Burning Ground Spring to stream gage E256 (Plate 1). Intermittent surface water occurs from natural and anthropogenic sources to stream gage E262 (Cañon de Valle confluence with Water Canyon) (Collins et al. 2005, 092028, p. 3-A-36). Permanent gaging stations located in the Cañon de Valle watershed consist of E253, located outside the western Laboratory boundary; E256, in the central portion of the watershed; E257, in the headwaters of Fishladder Canyon; and E262, located at the confluence of Cañon de Valle and Water Canyon (Plate 1).

Several springs issue from the Bandelier Tuff in the upper reaches of Cañon de Valle (Plate 1). Peter Seep, SWSC (Sanitary Wastewater Systems Consolidation) Spring, and Burning Ground Spring are located in Cañon de Valle. Fishladder Seep is located in Fishladder Canyon, a tributary to Cañon de Valle. Martin Spring is located in S-Site Canyon (Plate 1) but actually flows into Water Canyon

(Collins et al. 2005, 092028, p. 3-A-37). Hollow Spring is a seep located at TA-15, near storm water runoff monitoring sampling location CDV-SMA-8 (Plate 1).

2.1.3 Land Use

Currently, land use at TA-14 is industrial and is not expected to change. TA-14 sites consist of decommissioned pull boxes, an active firing site, former firing sites, a decommissioned bullet test facility (now used for test shots), former buildings and structures, a former burn area, decommissioned sumps, a decommissioned septic system, magazines, a surface disposal area, and a storage area. TA-14 is not accessible to the public.

2.2 Subsurface Conditions

2.2.1 Stratigraphic Units of the Bandelier Tuff

The stratigraphy of the Cañon de Valle 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 Laboratory's hydrogeological synthesis report (Collins et al. 2005, 092028).

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 following descriptions of the stratigraphic units begin with the oldest (deepest) and proceed to the youngest (topmost). Stratigraphic units composing the Bandelier Tuff are shown in Figure 2.2-1. The only stratigraphic unit encountered during the TA-14 investigation was unit 4 of the Tshirege Member of the Bandelier Tuff (Qbt 4).

2.2.1.1 Otowi Member of the Bandelier Tuff

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. The basal part of the Otowi Member includes the Guaje Pumice Bed, which is a sequence of well-stratified pumice-fall and ash-fall deposits.

2.2.1.2 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 and 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).

2.2.1.3 Tshirege Member of the Bandelier Tuff

The Tshirege Member is the upper member of the Bandelier Tuff 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 surge deposits and vertical fractures within the Bandelier Tuff have been identified as likely fast pathways for infiltration of surface water and contaminants from ponds and drainages into the vadose zone (LANL 2011, 207069). 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 display 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 within the Cañon de Valle Aggregate Area.

The Tsankawi Pumice Bed forms the base of the Tshirege Member. Where exposed, it is commonly 20–30 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 (Broxton and Vaniman 2005, 090038).

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 (4–10 in.) pumice-poor surge deposit commonly occurs at the base of this unit (Broxton and Vaniman 2005, 090038).

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 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, is 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.

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 marks its base. It typically has low porosity and permeability relative to the other units of the Tshirege Member (Broxton and Vaniman 2005, 090038).

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 (Broxton and Vaniman 2005, 090038).

Qbt 4 is a complex unit consisting of nonwelded to densely welded ash-flow tuffs and thin intercalated surge deposits. Devitrification and vapor-phase alteration are typical in this unit, but thin zones of vitric ash-flow tuff occur locally. The occurrence of Qbt 4 is limited to the western part of the Pajarito Plateau. Welded portions of Qbt 4 are typically denser and more highly fractured than nonwelded portions. Fractures originating in welded zones commonly die out in the underlying nonwelded zones or in less welded units beneath (Broxton and Vaniman 2005, 090038).

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 with the wettest canyons containing continuous streams and perennial groundwater in the canyon-bottom alluvium. Dry canyons have only occasional stream flow and may lack alluvial groundwater. Perched-intermediate groundwater has been found at certain locations on the plateau at depths ranging between 100 and 850 ft below ground surface (bgs). The regional aquifer is found at depths of about 600–1200 ft bgs (Collins et al. 2005, 092028), and groundwater has been encountered in the Tschicoma Formation at depths greater than 1500 ft bgs (LANL 2011, 204541).

The hydrogeological conceptual site model for the Laboratory (LANL 2016, 601506) 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) perched-intermediate 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 annual Interim Facility-Wide Groundwater Monitoring Plan (LANL 2016, 601506) details the implementation of extensive groundwater characterization across the Pajarito Plateau within an area potentially affected by past and present Laboratory operations.

The locations of the existing wells within the Cañon de Valle Aggregate Area are shown on Plate 1.

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, resulting 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).

A thin (typically less than 10 ft thick) alluvial system in Cañon de Valle near Peter Seep, SWSC Spring, and Burning Ground Spring has perennial saturation. However, the alluvial saturation does not extend to the confluence with Water Canyon. The downcanyon extent of saturation is highly variable and fluctuates depending on weather conditions. Saturation is also restricted by the limited extent of alluvium in the canyon. The alluvial monitoring wells within the Cañon de Valle Aggregate Area are shown on Plate 1.

Six alluvial wells (designated CdV-16-02655, CdV-16-02656, CdV-16-02657, CdV-16-02658, CdV-16-02659, and CdV-16-02660) were installed in conjunction with the Phase II RCRA facility investigation (RFI) for Consolidated Unit 16-021(c)-99 in the fall of 1997. Two of the alluvial wells, CdV-16-02657 and CdV-16-02658, were destroyed on August 21, 2011, by severe flooding in Cañon de Valle caused by a thunderstorm centered over the Las Conchas wildfire burn area west of NM 501 (LANL 2011, 207069).

Perched-Intermediate Waters

Perched groundwater systems beneath the Pajarito Plateau are identified primarily from direct observation of saturation in boreholes, wells, and piezometers, or from borehole geophysics (Collins et al. 2005, 092028, p. 2-96). Perched water has been identified in the following Cañon de Valle wells: R-25, R-25b, R-26, R-63, CdV-16-1(i), CdV-16-2(i), CdV-16-3(i), CdV-16-4ip, and CdV-R-15-3 (Plate 1). In intermediate well R-47i, located in TA-14, perched water was encountered at a depth of 840 ft bgs (LANL 2011, 207069). There are also shallow perched waters at depths less than 200 ft bgs, as evidenced by perennial perched waters in intermediate well 16-26664 (LANL 2011, 207069).

A deep-sounding surface-based magnetotelluric survey was conducted in the Cañon de Valle/Water Canyon area. The survey results indicate perched groundwater is discontinuous laterally, occurring instead as vertical, fingerlike groundwater bodies (Collins et al. 2005, 092028, pp. 2-96–2-97).

Regional Groundwater

The regional aquifer is the only aquifer capable of large-scale municipal water supply in the Los Alamos area (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 the regional aquifer below the mesa tops range between about 1200 ft bgs along the western margin of the plateau and about 600 ft bgs at the eastern margin. The location of wells and generalized water-level contours on top of the regional aquifer are described in the annual Interim Facility-Wide Groundwater Monitoring Plan (LANL 2016, 601506). The regional aquifer is typically separated from the alluvial groundwater and perched- intermediate groundwater by 350–620 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 20–250 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). Figure 2.2-2 shows depths to the top of the regional aquifer across the Laboratory.

The depths to the regional aquifer near TA-14 have been determined by drilling to be at 1245 ft bgs at well CdV-R-15-3 (LANL 2002, 073211, p. 22); 1197 ft bgs at well CdV-R-37-2 (LANL 2002, 073707, p. 16); 1286 ft bgs at well R-25 (Broxton et al. 2002, 072640, p. 45); 1242 ft bgs at well R-47i (LANL 2010, 109188); 563 ft bgs at well CdV-16-1(i) (located in Cañon de Valle) (Kleinfelder 2004, 087844, p. 14); 957 ft bgs at well CdV-16-2(i) (Kleinfelder 2004, 087843, p. 13); and 1350 ft bgs at well CdV-16-3(i) (Kleinfelder 2004, 087845, p. 14). A poorly transmissive groundwater zone was found in the Tschicoma Formation in regional well R-48, with the highest transmissivity at a depth of 1500–1520 ft bgs. Regional well R-63 was completed with a single well screen in groundwater between 1325 and 1345.3 ft bgs within the Puye Formation (LANL 2011, 204541).

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 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).The Bandelier Tuff is very dry and does not readily transmit moisture in much of its extent on the Pajarito Plateau. However, in the southwestern portion of the Laboratory and possibly in the vicinity of TA-14, there is evidence that infiltration of surface water and alluvial groundwater has resulted in the vertical transport of contaminants through the vadose zone, impacting both shallow (<200 ft) and deep (>700 ft) perched groundwater as well as the regional aquifer (LANL 2011, 207069). Surge deposits and interconnected fractures have been identified as likely fast pathways for infiltration and vadose zone transport of surface water and contaminants (LANL 2011, 207069).

2.2.2.3 Hydrologic Conceptual Model

Hydrogeologic elements potentially affected by contaminant releases in the aggregate area include surface water, sediment, alluvial groundwater, perched-intermediate groundwater, and regional groundwater. The mobility of contaminants is controlled by the geochemical characteristics of each contaminant and the geochemical properties of the medium along transport pathways. Water infiltration into bedrock is greater beneath the canyon floors than on the mesa tops because surface flow and alluvial groundwater provide hydrologic drivers for infiltration. However, the mesas have local areas of increased infiltration where sufficient hydrologic drivers may exist to transport contaminants from the near-surface vadose zone to greater depths. The hydrologic conceptual model for the portion of the Laboratory encompassing the Cañon de Valle Aggregate Area is discussed in detail in the investigation report for Water Canyon/Cañon de Valle (LANL 2011, 207069).

3.0 SCOPE OF ACTIVITIES

After the Cañon de Valle Aggregate Area investigation work plan (LANL 2006, 091698) was approved in 2007 (NMED 2007, 095478), ADEM, in cooperation with and with the approval of NMED, revised and improved investigation sampling for sites regulated by the Consent Order. A FIP for the TA-14 sites (LANL 2011, 207481) was developed in 2011 to incorporate current strategies of collecting field samples and also to incorporate the modifications NMED requested in its approval with modifications letter for the work plan, issued on February 9, 2007 (NMED 2007, 095478). Table 3.0-1 is a crosswalk of the sampling activities implemented by the FIP compared with the sampling activities proposed in the approved work plan (LANL 2006, 091698).

This section presents an overview of the field activities performed during the implementation of the FIP for the TA-14 sites (LANL 2011, 207481). The scope of activities for the 2011 investigation included site access and premobilization activities, geodetic and radiological surveys, surface and shallow subsurface sampling, health and safety monitoring, and waste management activities. Deviations from the FIP are discussed in section 3.3 and in Appendix B, section B-8.0.

3.1 Site Access and Premobilization Activities

The area encompassing the TA-14 sites within the Cañon de Valle Aggregate Area is currently used for Laboratory operations. Before field mobilization, the issue of Laboratory worker access (e.g., traffic control plan and 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 2011 investigation. Additional 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 TA-14 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 R8 Global Navigation

Satellite System (GNSS). The surveyed coordinates for all 2011 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 Field Screening

Field screening for organic vapors and radioactivity was conducted to ensure health and safety 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 2006, 091698; NMED 2007, 095478) and the FIP (LANL 2011, 207481) to guide sample collection. The field-screening results are discussed below.

3.2.2.1 Organic Vapors

Environmental samples were field screened for headspace organic vapors with a MiniRAE 2000 photoionization detector (PID) 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 Photo Ionization Detector, and recorded in the field logbook. After it was collected, each sample was placed in a sealed plastic bag for approximately 5 min. Screening measurements were recorded on the field sample collection logs (SCLs)/chain-of-custody (COC) forms (Appendix D on DVD). The organic vapor screening results are presented in Table 3.2-2. No elevated organic vapor screening results required the collection of additional samples.

3.2.2.2 Radioactivity

All samples collected were field screened for radioactivity before they were submitted to the Sample Management Office (SMO). A Laboratory radiological control technician 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 gross-alpha and gross-beta/gamma radioactivity were recorded in disintegrations per minute (dpm) on the field SCLs/ COC forms. The SCLs/COC forms are provided on DVD in Appendix D. The radioactivity screening results are presented in Table 3.2-2. If elevated radioactivity was encountered during field screening, to ensure compliance with U.S. Department of Transportation requirements, samples were submitted to American Radiation Services, Inc., in White Rock, New Mexico, for gross-alpha, -beta, and -gamma analyses before shipment by the SMO.

3.2.2.3 Explosive Compounds

All samples collected during the 2011 were field screened quantitatively for RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) and TNT (2,4,6-trinitrotoluene) using Laboratory-developed spot-test kits. Field screening for explosive compounds is described in detail in Appendix B, section B-3.3, and the screening results for explosive compounds are presented in Table 3.2-2. All high-explosives (HE) spot-test results were negative; therefore, no additional samples were collected based on field screening for explosive compounds.

3.2.3 Surface, Shallow Subsurface, and Sediment Sampling

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. Shallow-subsurface samples were collected using the hand-auger method in accordance with SOP-06.10. Samples for volatile organic compound (VOC) analysis were collected immediately to minimize the loss of subsurface VOCs during the sample collection process. 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.

Sediment samples were collected from areas of sediment accumulation that include sediment determined as representative of the historical period of Laboratory operations. The locations were selected by the field geologist based on geomorphic relationships in areas likely to have been affected by discharges from Laboratory operations. Because sediment systems are dynamic and subject to redistribution by runoff events, some sediment sampling locations were adjusted appropriately by the field geologist and the adjusted locations were surveyed using GNSS.

Standard quality assurance (QA)/quality control (QC) samples (field duplicates, field trip blanks, and rinsate blanks) were collected in accordance with SOP-5059, Field Quality Control Samples.

All sample collection activities were coordinated with the SMO. All surface, shallow subsurface, sediment, and QA/QC samples were placed in appropriate sample containers. Samples 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 for the analyses specified in the FIP.

3.2.4 Borehole Abandonment

No boreholes requiring the use of a drill rig were drilled during the 2011 investigation. Hand-auger sampling locations were backfilled with cuttings. A power auger was used where necessary. The cuttings from the power-auger sampling locations were managed as IDW as described in Appendix E. All locations where a power auger was used were abandoned in accordance with SOP-5034, Monitoring Well and Borehole Abandonment, by filling the boreholes with bentonite chips up to 2–3 ft from the ground surface. The chips were hydrated and clean soil was placed on top of the hydrated chips.

3.2.5 Equipment Decontamination

All field equipment with the potential to contact sample material (e.g., hand augers, sampling scoops, and bowls) was decontaminated between sample collections 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 decontamination methods used are described in Appendix B.

3.2.6 Sample Analyses

All samples were shipped by the SMO to off-site contract analytical laboratories for the requested analyses specified in the FIP (LANL 2011, 207481). The samples were analyzed for all or a subset of the following: target analyte list (TAL) metals, total cyanide, nitrate, perchlorate, dioxins and furans, explosive compounds, polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), VOCs, gamma-emitting radionuclides, isotopic uranium, and strontium-90.

Field duplicates of investigation samples were analyzed for the same analytical suites as the corresponding investigation samples. Equipment rinsate blanks were analyzed for the same inorganic chemical suites as the related investigation samples. Field trip blanks were analyzed only for VOCs. The analytical methods and summaries of data quality are presented in Appendix C. The analytical results and analytical reports are included on DVD in Appendix D.

3.2.7 Health and Safety Measures

All activities for the 2011 investigation were conducted in accordance with an approved site-specific health and safety plan and integrated work document that detailed work steps, potential hazards, hazard controls, and required training to conduct work. These health and safety measures included the use of modified Level-D personal protective equipment and field monitoring for organic vapors and for gross-alpha and -beta radioactivity using portable air monitoring systems. HE spot-test kits were used to screen common explosive compounds before sample collection.

3.2.8 IDW Storage and Disposal

All IDW generated during the 2011 investigation was managed in accordance with SOP-5238, Characterization and Management of Environmental Programs Waste. This procedure incorporates the requirements of all applicable EPA and NMED regulations, DOE orders, and Laboratory implementation requirements, policies, and procedures. The waste streams associated with the 2011 investigation included contact waste and drill cuttings. Each waste stream was containerized and managed in accordance with the approved waste characterization strategy form (WCSF). Details of IDW management are presented in Appendix E. All available waste documentation, including WCSFs and land application packages are provided in Appendix E (Attachment E-1 on CD).

3.3 Deviations

Investigation activities described in the FIP deviated from the approved work plan to incorporate investigation approaches that had been implemented since the work plan was approved. In addition, deviations occurred while field activities were conducted as defined in the FIP (LANL 2011, 207481). The deviations did not adversely affect the completion or results of the investigation. Specific deviations are summarized in section 6 and are described in Appendix B, section B-8.0.

4.0 REGULATORY CRITERIA

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

Human health risk-screening evaluations were conducted for the Cañon de Valle Aggregate Area sites at TA-14 using NMED guidance (NMED 2015, 600915). Ecological risk-screening assessments were performed using Laboratory guidance (LANL 2015, 600982).

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 land use of TA-14 is currently industrial and is expected to remain industrial for the reasonably foreseeable future. The 18 sites sampled in TA-14 consist of sites that have undergone decontamination and decommissioning and an active site. The industrial and construction worker scenarios were evaluated for the sites investigated. Because part of TA-14 is actively used for explosives testing, recreational activities such as walking or jogging are not allowed for Laboratory employees, and TA-14 is not accessible to the general public. Therefore, the recreational scenario is not applicable for the sites investigated. The residential scenario is not applicable given the current and foreseeable future land use but was evaluated for comparison purposes and to determine if a site was suitable for corrective action complete without controls.

4.2 Screening Levels

Human health risk-screening evaluations were conducted for the solid media at sites within the Cañon de Valle Aggregate Area at TA-14. The human health risk-screening assessments (Appendix G) were performed for inorganic and organic chemicals of potential concern (COPCs) using NMED soil screening levels (SSLs) for the industrial, construction worker, and residential scenarios (NMED 2015, 600915). Radionuclides were assessed using the Laboratory screening action levels (SALs) (LANL 2015, 600929). When an NMED SSL was not available for a COPC, SSLs were obtained from EPA's May 2016 regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) (adjusted to a risk level of 1×10^{-5} for carcinogens). Surrogate SSLs were used for some COPCs based on structural similarity or breakdown products.

NMED guidance includes total chromium SSLs for the residential, industrial, and construction worker scenarios (NMED 2015, 600915). 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, 600915; http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

The SWMUs and AOCs included in this supplemental investigation report are not known or suspected to be sources of hexavalent chromium. Samples from all sites were analyzed for total chromium and screened using the NMED total chromium SSLs.

4.3 Ecological Screening Levels

The ecological risk-screening assessments (Appendix G) were conducted using ecological screening levels (ESLs) obtained from the Laboratory's ECORISK Database, Version 3.3 (LANL 2015, 600921). The ESLs are based on similar species and are derived from experimentally determined no observed adverse effect levels, lowest observed adverse effect levels (LOAELs), or doses determined lethal to 50% of the test population. Information relevant to the calculation of ESLs, including concentration equations, dose equations, bioconcentration factors, transfer factors, and toxicity reference values, are presented in the ECORISK Database, Version 3.3 (LANL 2015, 600921).

4.4 Cleanup Standards

As specified in the Consent Order, screening levels are used as soil cleanup levels unless they are determined to be impracticable or values do not exist for current and reasonably foreseeable future land use. Screening assessments compare COPC concentrations for each site with industrial, residential, and construction worker SSLs/SALs.

The cleanup goals specified in Section IX of the 2016 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 in the risk-screening assessments in Appendix G 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 within TA-14 in the Cañon de Valle 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 may 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 may 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 background values (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 available 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 assessing the nature of contamination, 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 present from sources other than releases from a SWMU or AOC 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 maximum concentrations in a background data set 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, and hexavalent chromium) 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 and the maximum background concentration for the appropriate media. If at least one sampling result is above the BV and the maximum background concentration, the inorganic chemical is identified as a COPC. 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 with BVs for naturally occurring radionuclides or with 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, cobalt-60, 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 a soil sample collected below 1.0 ft or in tuff samples, the radionuclide is identified as a COPC. For soil samples from 1.0 ft 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. The radionuclide is eliminated as a COPC if activities are determined to be similar to fallout activities based on statistical comparisons or comparisons to the maximum fallout concentration. Sediment and fill 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 TA-14 in the Cañon de Valle 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 Qbt 2, Qbt 3, and Qbt 4). 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 along with soil samples in sample counts and comparisons with background. Fill samples are not discussed separately from soil. The units of the upper Bandelier Tuff (Qbt 2, Qbt 3, and Qbt 4) 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 F. The approach presented and used to analyze the data from the Cañon de Valle, TA-14, sites has been accepted by NMED since 2010.

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 a UTL estimated from the background data (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 from that 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 prespecified 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 is elevated.

Occasionally, if the differences between two distributions appear to occur far into the tails, the slippage test may 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 different from background (Appendix F).

5.1.2.2 Graphical Presentation

Box plots are provided for a visual representation of the data and to help illustrate the presence of outliers or other anomalous data that may 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 produced in Appendix F 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 no release has occurred or there are other sources of contamination.

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 may 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 TA-14 within the Cañon de Valle Aggregate Area 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 needing 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, 600915). 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-14 BACKGROUND AND FIELD INVESTIGATION RESULTS

6.1 Background of TA-14

TA-14 sites within the Cañon de Valle Aggregate Area are located in the southeastern portion of TA-14, next to the north side of Cañon de Valle (Plate 1). All the TA-14 sites within the Cañon de Valle Aggregate Area drain into Cañon de Valle. Elevations range from 7410 to 7280 ft amsl, and the site topography slopes south toward Cañon de Valle.

6.1.1 Operational History

Also known as Q-Site, TA-14 has been used since 1944 for explosives development and testing, including testing that involves radioactive materials. In 1952, the main firing site was renovated, the structures were removed, and a new firing site was constructed.

6.1.2 Summary of Releases

Potential contaminant sources at the TA-14 sites within the Cañon de Valle Aggregate Area include former and active firing sites, facilities associated with firing sites, a surface disposal area, a former burning area, removed buildings and structures, former HE magazines, electrical pull boxes, HE sumps and drainlines, and a septic system. Details on historical releases from the TA-14 sites can be found in the historical investigation report (HIR) (LANL 2006, 091697, section 9).

6.1.3 Current Site Usage and Status

HE operations continue at TA-14; most are remotely controlled and involve HE detonation, certain types of HE machining, and permitted burning. Tests are conducted on explosives charges to investigate fragmentation impact, explosives sensitivity, and thermal responses of new HE. No offices are located at this site, and personnel are present only during testing.

6.2 AOC 14-001(a), Pull Box

6.2.1 Site Description and Operational History

AOC 14-001(a) is a small steel pull box (structure 14-25) located at TA-14 (Figure 6.2-1). The pull box measures 26 in. long × 32 in. wide × 32 in. high and is covered with a metal lid. Most of the box is belowground with only the lid and top 2 to 3 in. of the box exposed. Pull boxes were used to contain detonator and diagnostic electrical hookups. Historically, the AOC 14-001(a) pull box contained capacitor discharge units. The pull box has been decommissioned and the top is welded shut.

6.2.2 Relationship to Other SWMUs and AOCs

AOCs 14-001(a,b,c,d,e) are a series of pull boxes located south of control building 14-23. These pull boxes are approximately 80 to 100 ft apart, lined up in a north-south direction, and are not associated with other SWMUs or AOCs at TA-14.

6.2.3 Summary of Previous Investigations

AOC 14-001(a) was visually inspected during the 1995 RFI and found to be clean and well-sealed by the protective lid, with no evidence of contaminant releases within or outside the pull box (LANL 1996, 054086, pp. 5-35–5-36).

No previous sampling has been performed at AOC 14-001(a).

6.2.4 Site Contamination

6.2.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC 14-001(a):

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Two samples were collected from location 14-614493 at the base of the pull box at 3.0–4.0 ft and 6.0–7.0 ft bgs.
- All samples were analyzed for PCBs only based on the operational history of the site (LANL 2011, 207481, p. 2).

The sampling locations for the 2011 investigation at AOC 14-001(a) are shown in Figure 6.2-1. Table 6.2-1 presents the samples collected and the analyses requested for AOC 14-001(a). The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.2.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological -screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.2.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC 14-001(a) consist of the results from two soil samples collected from one location.

Inorganic Chemicals

Samples were not analyzed for inorganic chemicals at AOC 14-001(a).

Organic Chemicals

Two soil samples were analyzed for PCBs. PCBs were not detected at AOC 14-001(a). No organic COPCs are identified at the site.

Radionuclides

Samples were not analyzed for radionuclides at AOC 14-001(a).

6.2.4.4 Nature and Extent of Contamination

Inorganic Chemicals

Samples were not analyzed for inorganic chemicals at AOC 14-001(a).

Organic Chemicals

PCBs were not detected at AOC 14-001(a). The extent of PCBs is defined at AOC 14-001(a).

Radionuclides

Samples were not analyzed for radionuclides at AOC 14-001(a).

Summary of Nature and Extent

The extent of PCBs is defined at AOC 14-001(a).

6.2.5 Summary of Human Health Risk Screening

Because no COPCs are identified at the site, risk-screening assessments were not performed for the industrial, construction worker, and residential scenarios at AOC 14-001(a).

6.2.6 Summary of Ecological Risk Screening

Because no COPCs are identified at the site, an ecological risk-screening assessment was not performed for ecological receptors at AOC 14-001(a).

6.3 AOC 14-001(b), Pull Box

6.3.1 Site Description and Operational History

AOC 14-001(b) is a small steel pull box (structure 14-26) located at TA-14 (Figure 6.2-1). The pull box measures 26 in. long × 32 in. wide × 32 in. high and is covered with a metal lid. Most of the box was belowground with only the lid and top 2 to 3 in. of the box exposed. Pull boxes were used to contain detonator and diagnostic electrical hookups. Historically, the AOC 14-001(b) pull box contained capacitor discharge units. The pull box has been decommissioned and the top is welded shut. During a 2011 site visit, this pull box was not visible because it had been completely covered over with sand.

6.3.2 Relationship to Other SWMUs and AOCs

AOCs 14-001(a,b,c,d,e) are a series of pull boxes located south of control building 14-23. These pull boxes are approximately 80 to 100 ft apart, lined up in a north-south direction, and are not associated with other SWMUs or AOCs at TA-14.

6.3.3 Summary of Previous Investigations

AOC 14-001(b) was visually inspected during the 1995 RFI and found to be clean and well-sealed by the protective lid, with no evidence of contaminant releases within or outside the pull box (LANL 1996, 054086, pp. 5-35–5-36).

No previous sampling has been performed at AOC 14-001(b).

6.3.4 Site Contamination

6.3.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC 14-001(b):

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Two samples were collected from location 14-614494 at the base of the pull box at 3.0–4.0 ft and 6.0–7.0 ft bgs.
- All samples were analyzed for PCBs only based on the operational history of the site (LANL 2011, 207481, p. 2).

The sampling locations for the 2011 investigation at AOC 14-001(b) are shown in Figure 6.2-1. Table 6.2-1 presents the samples collected and the analyses requested for AOC 14-001(b). The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.3.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.3.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC 14-001(b) consist of the results from two soil samples collected from one location.

Inorganic Chemicals

Samples were not analyzed for inorganic chemicals at AOC 14-001(b).

Organic Chemicals

Two soil samples were analyzed for PCBs. PCBs were not detected at AOC 14-001(b). No organic COPCs are identified at the site.

Radionuclides

Samples were not analyzed for radionuclides at AOC 14-001(b).

6.3.4.4 Nature and Extent of Contamination

Inorganic Chemicals

Samples were not analyzed for inorganic chemicals at AOC 14-001(b).

Organic Chemicals

PCBs were not detected at AOC 14-001(b). The extent of PCBs is defined at AOC 14-001(b).

Radionuclides

Samples were not analyzed for radionuclides at AOC 14-001(b).

Summary of Nature and Extent

The extent of PCBs is defined at AOC 14-001(b).

6.3.5 Summary of Human Health Risk Screening

Because no COPCs are identified at the site, risk-screening assessments were not performed for the industrial, construction worker, and residential scenarios at AOC 14-001(b).

6.3.6 Summary of Ecological Risk Screening

Because no COPCs are identified at the site, an ecological risk-screening assessment was not performed for ecological receptors at AOC 14-001(b).

6.4 AOC 14-001(c), Pull Box

6.4.1 Site Description and Operational History

AOC 14-001(c) is a small steel pull box (structure 14-27) located at TA-14 (Figure 6.2-1). The pull box measures 26 in. long × 32 in. wide × 32 in. high and is covered with a metal lid. Most of the box is belowground with only the lid and top 2 to 3 in. of the box exposed. Pull boxes were used to contain detonator and diagnostic electrical hookups. Historically, the AOC 14-001(c) pull box contained capacitor discharge units. The pull box has been decommissioned and the top is welded shut.

6.4.2 Relationship to Other SWMUs and AOCs

AOCs 14-001(a,b,c,d,e) are a series of pull boxes located south of control building 14-23. These pull boxes are approximately 80 to 100 ft apart, lined up in a north-south direction, and are not associated with other SWMUs or AOCs at TA-14.

6.4.3 Summary of Previous Investigations

AOC 14-001(c) was visually inspected during the 1995 RFI and found to be clean and well-sealed by the protective lid, with no evidence of contaminant releases within or outside the pull box (LANL 1996, 054086, pp. 5-35–5-36).

No previous sampling has been performed at AOC 14-001(c).

6.4.4 Site Contamination

6.4.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC 14-001(c):

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Two samples were collected from location 14-614495 at the base of the pull box at 3.0–4.0 ft and 6.0–7.0 ft bgs.
- All samples were analyzed for PCBs only based on the operational history of the site (LANL 2011, 207481, p. 2).

The sampling locations for the 2011 investigation at AOC 14-001(c) are shown in Figure 6.2-1. Table 6.2-1 presents the samples collected and the analyses requested for AOC 14-001(c). The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.4.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.4.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC 14-001(c) consist of the results from two tuff samples collected from one location.

Inorganic Chemicals

Samples were not analyzed for inorganic chemicals at AOC 14-001(c).

Organic Chemicals

Two tuff samples were analyzed for PCBs. PCBs were not detected at AOC 14-001(c). No organic COPCs are identified at the site.

Radionuclides

Samples were not analyzed for radionuclides at AOC 14-001(c).

6.4.4.4 Nature and Extent of Contamination

Inorganic Chemicals

Samples were not analyzed for inorganic chemicals at AOC 14-001(c).

Organic Chemicals

PCBs were not detected at AOC 14-001(c). The extent of PCBs is defined at AOC 14-001(c).

Radionuclides

Samples were not analyzed for radionuclides at AOC 14-001(c).

Summary of Nature and Extent

The extent of PCBs is defined at AOC 14-001(c).

6.4.5 Summary of Human Health Risk Screening

Because no COPCs are identified at the site, risk-screening assessments were not performed for the industrial, construction worker, and residential scenarios at AOC 14-001(c).

6.4.6 Summary of Ecological Risk Screening

Because no COPCs are identified at the site, an ecological risk-screening assessment was not performed for ecological receptors at AOC 14-001(c).

6.5 AOC 14-001(d), Pull Box

6.5.1 Site Description and Operational History

AOC 14-001(d) is a small steel pull box (structure 14-28) located at TA-14 (Figure 6.2-1). The pull box measures 26 in. long × 32 in. wide × 32 in. high and is covered with a metal lid. Most of the box is belowground with only the lid and top 2 to 3 in. of the box exposed. Pull boxes were used to contain detonator and diagnostic electrical hookups. Historically, the AOC 14-001(d) pull box contained capacitor discharge units. The pull box has been decommissioned and the top is welded shut.

6.5.2 Relationship to Other SWMUs and AOCs

AOCs 14-001(a,b,c,d,e) are a series of pull boxes located south of control building 14-23. These pull boxes are approximately 80 to 100 ft apart, lined up in a north-south direction, and are not associated with other SWMUs or AOCs at TA-14.

6.5.3 Summary of Previous Investigations

AOC 14-001(d) was visually inspected during the 1995 RFI and found to be clean and well-sealed by the protective lid, with no evidence of contaminant releases within or outside the pull box (LANL 1996, 054086, pp. 5-35–5-36).

No previous sampling has been performed at AOC 14-001(d).

6.5.4 Site Contamination

6.5.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC 14-001(d):

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Two samples were collected from location 14-614496 at the base of the pull box at 3.0–4.0 ft and 6.0–7.0 ft bgs.
- All samples were analyzed for PCBs only based on the operational history of the site (LANL 2011, 207481, p. 2).

The sampling locations for the 2011 investigation at AOC 14-001(d) are shown in Figure 6.2-1. Table 6.2-1 presents the samples collected and the analyses requested for AOC 14-001(d). The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.5.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.5.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC 14-001(d) consist of the results from two tuff samples collected from one location.

Inorganic Chemicals

Samples were not analyzed for inorganic chemicals at AOC 14-001(d).

Organic Chemicals

Two tuff samples were analyzed for PCBs. PCBs were not detected at AOC 14-001(d). No organic COPCs are identified at the site.

Radionuclides

Samples were not analyzed for radionuclides at AOC 14-001(d).

6.5.4.4 Nature and Extent of Contamination

Inorganic Chemicals

Samples were not analyzed for inorganic chemicals at AOC 14-001(d).

Organic Chemicals

PCBs were not detected at AOC 14-001(d). The extent of PCBs is defined at AOC 14-001(d).

Radionuclides

Samples were not analyzed for radionuclides at AOC 14-001(d).

Summary of Nature and Extent

The extent of PCBs is defined at AOC 14-001(d).

6.5.5 Summary of Human Health Risk Screening

Because no COPCs are identified at the site, risk-screening assessments were not performed for the industrial, construction worker, and residential scenarios at AOC 14-001(d).

6.5.6 Summary of Ecological Risk Screening

Because no COPCs are identified at the site, an ecological risk-screening assessment was not performed for ecological receptors at AOC 14-001(d).

6.6 AOC 14-001(e), Pull Box

6.6.1 Site Description and Operational History

AOC 14-001(e) is a small steel pull box (structure 14-29) located at TA-14 (Figure 6.2-1). The pull box measures 26 in. long × 32 in. wide × 32 in. high and is covered with a metal lid. Most of the box is belowground with only the lid and top 2 to 3 in. of the box exposed. Pull boxes were used to contain detonator and diagnostic electrical hookups. Historically, the AOC 14-001(e) pull box contained capacitor discharge units. The pull box has been decommissioned and the top is welded shut.

6.6.2 Relationship to Other SWMUs and AOCs

AOCs 14-001(a,b,c,d,e) are a series of pull boxes located south of control building 14-23. These pull boxes are approximately 80 to 100 ft apart, lined up in a north-south direction, and are not associated with other SWMUs or AOCs at TA-14.

6.6.3 Summary of Previous Investigations

AOC 14-001(e) was visually inspected during the 1995 RFI and found to be clean and well-sealed by the protective lid, with no evidence of contaminant releases within or outside the pull box (LANL 1996, 054086, pp. 5-35–5-36).

No previous sampling has been performed at AOC 14-001(e).

6.6.4 Site Contamination

6.6.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC 14-001(e):

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Two samples were collected from location 14-614497 at the base of the pull box at 3.0–4.0 ft and 6.0–7.0 ft bgs.
- All samples were analyzed for PCBs only based on the operational history of the site (LANL 2011, 207481, p. 2).

The sampling locations for the 2011 investigation at AOC 14-001(e) are shown in Figure 6.2-1. Table 6.2-1 presents the samples collected and the analyses requested for AOC 14-001(e). The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.6.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.6.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC 14-001(e) consist of the results from two tuff samples collected from one location.

Inorganic Chemicals

Samples were not analyzed for inorganic chemicals at AOC 14-001(e).

Organic Chemicals

Two tuff samples were analyzed for PCBs. PCBs were not detected at AOC 14-001(e). No organic COPCs are identified at the site.

Radionuclides

Samples were not analyzed for radionuclides at AOC 14-001(e).

6.6.4.4 Nature and Extent of Contamination

Inorganic Chemicals

Samples were not analyzed for inorganic chemicals at AOC 14-001(e).

Organic Chemicals

PCBs were not detected at AOC 14-001(e). The extent of PCBs is defined at AOC 14-001(e).

Radionuclides

Samples were not analyzed for radionuclides at AOC 14-001(e).

Summary of Nature and Extent

The extent of PCBs is defined at AOC 14-001(e).

6.6.5 Summary of Human Health Risk Screening

Because no COPCs are identified at the site, risk-screening assessments were not performed for the industrial, construction worker, and residential scenarios at AOC 14-001(e).

6.6.6 Summary of Ecological Risk Screening

Because no COPCs are identified at the site, an ecological risk-screening assessment was not performed for ecological receptors at AOC 14-001(e).

6.7 AOC 14-001(f), Bullet Test Facility

6.7.1 Site Description and Operational History

AOC 14-001(f) is the decommissioned bullet test facility located in the center of the western portion of Q-Site at TA-14 (Figure 6.7-1). AOC 14-001(f) is deferred for investigation per Appendix A of the 2016 Consent Order. The bullet test facility consisted of a control building (structure 14-34) constructed in 1957 and a target building (structure 14-39) constructed in 1973. A gun stand was located on a pad immediately outside the southeastern end of structure 14-34 and oriented towards the target tube (structure 14-39) to the southeast. A 13-ft-square × 4.5-ft-deep reinforced concrete sump lies under the target tube. Firing was conducted from within building 14-34 or from the gun-stand mounted outside building 14-34 into targets consisting of explosives or explosives devices that were placed within a 10-ft-diameter steel tube partially filled with sand inside structure 14-39. Depleted uranium was used as a projectile and as a target. During the 1970s, small hand guns were fired from within building 14-34. After the late 1970s, all tests were conducted from the exterior gun stand. Guns ranged from a 0.22-caliber pellet gun to a 30-mm smooth-bore gun. Both the control building (structure 14-34) and the target building (structure 14-39), including the steel tube, remain in place. Currently, shot tests are conducted in both buildings.

It should be noted that the 1990 SWMU report associates only control building 14-34 with the bullet test facility (LANL 1990, 007512). In actuality, the facility consisted of structure 14-34 (in and near where guns were fired) and structure 14-39 (which housed the targets into which the guns were fired).

6.7.2 Relationship to Other SWMUs and AOCs

AOC 14-001(f) is the decommissioned bullet test facility. SWMU 14-002(b), a former HE-firing pedestal, and SWMU 14-002(f), a former junction box shelter, are located south of AOC 14-001(f). However, these two structures were installed in 1945 and removed in 1952, before the bullet test facility was constructed in 1957.

6.7.3 Summary of Previous Investigations

An RFI was conducted at AOC 14-001(f) in 1995 (LANL 1996, 054086, p. 5-29; LANL 1996, 055049, p. 1). Three samples were collected from three locations, two from within the bullet test facility and one from the underlying sump. These samples were field screened for lead, uranium, and radioactivity. They were submitted for off-site analyses, but the analytical results were screening-level data. The results were presented and discussed in the investigation work plan (LANL 2006, 091698, p. 117) and are not included in this report.

A voluntary corrective action (VCA) was conducted at AOC 14-001(f) in 1996 based on the presence of pieces of HE visible in the sand at the site and contamination determined during the Phase I investigation (LANL 1996, 055049, p. 1). During the VCA, all sand in the bullet test facility and beneath the sump was removed. Following the excavation, a radiological survey revealed readings above background on the interior surfaces of the steel tube and the sump. Pieces of depleted uranium were found and removed from the surfaces of the sump and some areas of the steel tube; however, uranium had not been completely removed from the steel tube interior (LANL 1996, 055049, p. 4). The radioactivity in the steel tube was determined to be fixed radioactivity, and those areas were painted and a sign was posted in the bullet test facility in accordance with the Laboratory’s Environment, Safety, and Health Division requirements in effect at the time (LANL 1996, 055049, pp. 4–5). The sump drain was plugged using quick-dry cement. Confirmatory sampling was not conducted because all the sand had been removed and sealing the drain eliminated any potential for environmental release (LANL 1996, 055049, p. 5).

The investigation work plan mistakenly identified three 1997 samples as being collected at AOC 14-001(f) (LANL 2006, 091698, pp. 117, 457). Further evaluation indicated these three samples belong to the 1997 investigation at SWMU 14-003. No historical decision-level data exist for AOC 14-001(f).

6.7.4 Rationale for Deferred Investigation

Investigation of AOC 14-001(f) is deferred per Appendix A of the 2016 Consent Order. The NMED-approved investigation work plan proposed no investigation activities for this site (LANL 2006, 091698; NMED 2007, 095478).

6.8 AOC 14-001(g), Firing Site

6.8.1 Site Description and Operational History

AOC 14-001(g) is an active firing pad (structure 14-35) located south of control building 14-23 at TA-14 (Figure 6.8-1). Installed in 1964, the reinforced concrete pad is 5 ft square × 2 ft thick and surrounded on three sides with a blast shield. At the base, the shield is a 6-ft-square × 2-ft-thick concrete pad overlain by a neoprene shock pad, a 4.5-in.-thick steel plate, and several inches of sand. The shield directs the force of detonations away from nearby control building 14-23. The AOC 14-001(g) firing pad is used to conduct test-shot experiments.

6.8.2 Relationship to Other SWMUs and AOCs

AOC 14-001(g) is located approximately 10 ft west of AOC 14-001(a). However, there is no current association between these two sites.

6.8.3 Summary of Previous Investigations

AOC 14-001(g) was not sampled during the 1995 RFI, and the RFI report stated that any corrective action at this AOC will be delayed until the site is decommissioned (LANL 1996, 054086, p. 5-37). No historical analytical data exist for this site.

6.8.4 Site Contamination

6.8.4.1 Soil, Rock, and Sediment Sampling

The approved investigation work plan indicated AOC 14-001(g) would not be investigated until testing operations had ceased (LANL 2006, 091698). The NMED approval with modifications letter required that the proposed investigation activities in the work plan be implemented because this site was not deferred under the 2005 Consent Order (NMED 2007, 095478). Since that time, the Laboratory has implemented an alternate approach for investigating active firing sites that are not on the list of deferred sites in the 2005 Consent Order. These sites include AOC 36-004(c) in the approved work plan for Potrillo and Fence Canyons Aggregate Area (LANL 2009, 106657.8; NMED 2009, 106677) and SWMU 39-004(d) in the approved work plan for North Ancho Canyon Aggregate Area (LANL 2007, 101894; NMED 2007, 098948). This approach involves sampling in drainages downgradient of the sites to characterize contaminant migration from the sites but does not include sampling to define nature and extent within the active firing site. This approach was implemented at AOC 14-001(g) (LANL 2011, 207481).

As part of the 2011 investigation, the following activities were conducted at AOC 14-001(g):

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Thirty samples were collected from 15 locations at 0.0–1.0 ft and 2.0–3.0 ft bgs in the four drainages downgradient of the site.
- All samples were analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, SVOCs, gamma-emitting radionuclides, isotopic uranium, and strontium-90. Fifteen subsurface samples were analyzed for VOCs and six samples were analyzed for PCBs.

The sampling locations for the 2011 investigation at AOC 14-001(g) are shown in Figure 6.8-1. Table 6.8-1 presents the samples collected and the analyses requested for AOC 14-001(g). The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.8.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.8.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC 14-001(g) consist of the results from 30 samples (17 soil and 13 tuff) collected from 15 locations.

Inorganic Chemicals

Thirty samples (17 soil and 13 tuff) were analyzed for TAL metals, 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.

Aluminum was detected above the Qbt 2,3,4 BV (7340 mg/kg) in one sample at a concentration of 7810 mg/kg. The Gehan test indicated site concentrations of aluminum in tuff are statistically different from background (Table F-1). However, the quantile and slippage tests indicated site concentrations of aluminum in tuff are not statistically different from background (Figure F-1 and Table F-1). Aluminum is not a COPC.

Antimony was not detected above the Qbt 2,3,4 BV (0.5 mg/kg) but had a DL (0.51 mg/kg) above the BV for one sample. The DL was only 0.01 mg/kg above BV. Antimony was not detected in the other 29 samples. Antimony is not a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in two samples with a maximum concentration of 49.4 mg/kg. The Gehan test indicated site concentrations of barium in tuff are statistically different from background (Table F-1). However, the quantile and slippage tests indicated site concentrations of barium in tuff are not statistically different from background (Figure F-2 and Table F-1). 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 indicated site concentrations of beryllium in tuff are not statistically different from background (Figure F-3 and Table F-1). Beryllium is not a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in one sample at a concentration of 2460 mg/kg. The Gehan test indicated site concentrations of calcium in tuff are statistically different from background (Table F-1). However, the quantile and slippage tests indicated site concentrations of calcium in tuff are not statistically different from background (Figure F-4 and Table F-1). Calcium is not a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in one sample at a concentration of 7.5 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in tuff are statistically different from background (Figure F-5 and Table F-1). Chromium 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 two tuff samples with a maximum concentration of 29.9 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in soil are not statistically different from background (Figure F-6 and Table F-2). The Gehan and quantile tests indicated site concentrations of copper in tuff are statistically different from background (Figure F-7 and Table F-1). Copper is retained as a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg for both) but had DLs (0.52 mg/kg to 0.73 mg/kg) in 16 soil samples and 13 tuff samples above the BVs. The DLs were similar for all samples. The DLs were only 0.02 mg/kg to 0.23 mg/kg above the BVs. Cyanide was detected below BV in the one sample. Cyanide is not a COPC.

Lead was detected above the soil BV (22.3 mg/kg) in two samples with a maximum concentration of 57.6 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are not statistically different from background (Figure F-8 and Table F-2). Lead is not a COPC.

Mercury was detected above the soil BV (0.1 mg/kg) in one sample at a concentration of 0.409 mg/kg. Mercury is retained as a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in one sample at a concentration of 6.7 mg/kg. The quantile and slippage tests indicated site concentrations of nickel in tuff are not statistically different from background (Figure F-9 and Table F-1). Nickel is not a COPC.

Nitrate was detected in 30 samples with a maximum concentration of 8 mg/kg. Nitrate is naturally occurring and the concentrations likely reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Perchlorate was detected in two samples with a maximum concentration of 0.026 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 13 soil samples and 13 tuff samples with a maximum concentration of 3.3 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure F-10 and Table F-2). Selenium is retained as a COPC.

Organic Chemicals

A total of 30 samples (17 soil and 13 tuff) were analyzed for explosive compounds and SVOCs, 6 samples (2 soil and 4 tuff) were analyzed for PCBs, and 15 samples (4 soil and 11 tuff) were analyzed for VOCs. Table 6.8-3 presents the detected organic chemicals. Figure 6.8-3 shows the spatial distribution of detected organic chemicals.

Organic chemicals detected at AOC 14-001(g) include acenaphthene; benzene; bis(2-ethylhexyl)phthalate; 1,3-dichlorobenzene; diethylphthalate; di-n-butylphthalate; HMX (1,3,5,7-tetranitro-1,3,5,7-tetrazocine); 4-isopropyltoluene; RDX; TATB (triaminotrinitrobenzene); toluene; and trichloroethene. The detected organic chemicals are retained as COPCs.

Radionuclides

Thirty samples (17 soil and 13 tuff) were analyzed for gamma-emitting radionuclides, isotopic uranium, and strontium-90. 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.

Cesium-134 was detected in one soil sample at an activity of 0.051 pCi/g. Cesium-134 is retained as a COPC.

Cesium-137 was detected in one subsurface soil sample and four tuff samples with a maximum activity of 0.473 pCi/g. Cesium-137 is retained as a COPC.

Strontium-90 was detected in one subsurface soil sample at an activity of 0.302 pCi/g. Strontium-90 is retained as a COPC.

6.8.4.4 Nature and Extent of Contamination

AOC 14-001(g) is an active firing site. Because the distribution of contamination is affected by continuing operations, limited characterization sampling was performed to determine whether off-site migration is occurring but not to determine the nature and extent of contamination. Contaminant distributions were evaluated primarily to determine what contaminants are being dispersed, whether they are migrating off-site, and what the general spatial distribution is. Because samples were collected in drainage areas where vertical mixing may occur, vertical distribution was not evaluated.

Inorganic Chemicals

Inorganic COPCs at AOC 14-001(g) include chromium, copper, mercury, perchlorate, and selenium.

Chromium was detected above the Qbt 2,3,4 BV in one sample at a concentration of 7.5 mg/kg. The concentration was below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Further sampling for chromium is not warranted.

Copper was detected above the soil and Qbt 2,3,4 BVs in one soil sample and two tuff samples with a maximum concentration of 29.9 mg/kg. Copper concentrations in soil are not statistically different from background. Concentrations decreased downgradient in three of four drainages and did not change substantially downgradient (1.3 mg/kg) at location 14-614465 (the concentration at location 14-614464 was 8.6 mg/kg). The residential SSL was approximately 364 times the maximum concentration in this drainage. Further sampling for copper is not warranted.

Mercury was detected above the soil BV in one sample at a concentration of 0.409 mg/kg. Concentrations decreased downgradient.

Perchlorate was detected in two samples with a maximum concentration of 0.026 mg/kg. Concentrations decreased downgradient.

Selenium was detected above the soil and Qbt 2,3,4 BVs in 13 soil samples and 13 tuff samples with a maximum concentration of 3.3 mg/kg. Concentrations did not change substantially (0.1 mg/kg to 1.7 mg/kg) in the drainages. The residential SSL was approximately 118 times the maximum concentration. Further sampling for selenium is not warranted.

Organic Chemicals

Organic COPCs at AOC 14-001(g) include acenaphthene; benzene; bis(2-ethylhexyl)phthalate; 1,3-dichlorobenzene; diethylphthalate; di-n-butylphthalate; HMX; 4-isopropyltoluene; RDX; TATB; toluene; and trichloroethene.

Acenaphthene was detected in one sample at a concentration of 0.061 mg/kg. Concentrations increased downgradient at location 14-614477, but the concentration was below the EQL. The residential SSL was approximately 57,000 times the concentration. Further sampling for acenaphthene is not warranted.

Benzene was detected in five samples with a maximum concentration of 0.00072 mg/kg. Concentrations decreased downgradient in two of the drainages and did not change substantially (0.00005 mg/kg) downgradient in one drainage. Concentrations were below the EQLs. The residential SSL was approximately 24,700 times the maximum concentration. Further sampling for benzene is not warranted.

Bis(2-ethylhexyl)phthalate was detected in three samples with a maximum concentration of 0.093 mg/kg. Concentrations decreased downgradient in two of the drainages and did not change substantially (0.037 mg/kg) downgradient in one drainage. Concentrations were below the EQLs. The residential SSL was approximately 4090 times the maximum concentration. Further sampling for bis(2-ethylhexyl)phthalate is not warranted.

Dichlorobenzene[1,3-] was detected in one sample at a concentration of 0.00038 mg/kg. The concentration was below the EQL and decreased downgradient.

Diethylphthalate was detected in one sample at a concentration of 0.059 mg/kg. The concentration was below the EQL and decreased downgradient.

Di-n-butylphthalate was detected in one sample at a concentration of 0.14 mg/kg. The concentration was below the EQL and decreased downgradient.

HMX was detected in 11 samples with a maximum concentration of 7.5 mg/kg. Concentrations decreased downgradient.

Isopropyltoluene[4-] was detected in two samples with a maximum concentration of 0.0052 mg/kg. Concentrations increased downgradient in two drainages, but the concentrations were below the EQLs. The residential SSL was approximately 454,000 times the maximum concentration. Further sampling for 4-isopropyltoluene is not warranted.

RDX was detected in one sample at a concentration of 0.25 mg/kg. The concentration was below the EQL and decreased downgradient.

TATB was detected in 12 samples with a maximum concentration of 3.6 mg/kg. Concentrations decreased downgradient in two drainages and did not change substantially (0.6 mg/kg and 1.3 mg/kg) downgradient in 2 drainages. The residential SSL was approximately 611 times the maximum concentration. Further sampling for TATB is not warranted.

Toluene was detected in five samples with a maximum concentration of 0.0027 mg/kg. Concentrations decreased downgradient in two drainages and did not change substantially (0.0007 mg/kg) downgradient in one drainage. All detected results were below the EQL. The residential SSL was approximately 1,940,000 times the maximum concentration. Further sampling for toluene is not warranted.

Trichloroethene was detected in two samples with a maximum concentration of 0.00091 mg/kg. Concentrations decreased downgradient.

Radionuclides

Radionuclide COPCs at AOC 14-001(g) include cesium-134, cesium-137, and strontium-90.

Cesium-134 was detected in one soil sample at an activity of 0.051 pCi/g. Activities decreased downgradient.

Cesium-137 was detected in one subsurface soil sample and four tuff samples with a maximum activity of 0.473 pCi/g. Activities increased or did not change substantially (0.097 pCi/g) downgradient. The residential and industrial SALs were approximately 25 times and 87 times the maximum activity. Further sampling for cesium-137 is not warranted.

Strontium-90 was detected in one sample at an activity of 0.302 pCi/g. Activities decreased downgradient.

Summary of Nature and Extent

Concentrations of inorganic, organic, and radionuclide COPCs decreased downgradient or no further sampling is warranted at AOC 14-001(g).

6.8.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 5 × 10^{-10}, which is less than the NMED target risk level of 1 × 10^{-5} (NMED 2015, 600915). The industrial HI is 0.0009, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.3 mrem/yr, which is less than 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 0.04, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.2 mrem/yr, which is less than 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 6 × 10^{-7}, which is less than the NMED target risk level of 1 × 10^{-5} (NMED 2015, 600915). The residential HI is 0.01, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 2 mrem/yr, which is less than 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 in the drainages at AOC 14-001(g).

6.8.6 Summary of Ecological Risk Screening

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for threatened and endangered [T&E] species), LOAEL analyses, the relationship of detected concentrations and screening levels to background concentrations, and chemicals of potential ecological concern (COPECs) without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist in the drainages at AOC 14-001(g).

6.9 SWMU 14-002(a), Former Firing Site

6.9.1 Site Description and Operational History

SWMU 14-002(a) is a former HE firing chamber (structure 14-2) that was located at TA-14 (Figure 6.7-1). SWMU 14-002(a) is deferred for investigation per Appendix A of the 2016 Consent Order. Installed in 1944, the firing chamber was constructed of steel-lined reinforced concrete and measured 21.5 ft long × 16 ft wide × 13 ft high. HE tests containing uranium, as well as bullet-impact firing tests, were conducted in the firing chamber. The SWMU 14-002(a) firing chamber was removed in 1973 to prepare for the construction of the target building [structure 14-39, AOC 14-001(f)].

6.9.2 Relationship to Other SWMUs and AOCs

SWMU 14-002(a) is the location of a former HE firing chamber that was installed in 1944, before structure 14-39 [AOC 14-001(f)] was constructed near the location of the former firing chamber.

6.9.3 Summary of Previous Investigations

In 1995, an RFI was conducted at SWMU 14-002(a) (LANL 1996, 054086, p. 5-30; LANL 1997, 055678). One ruptured sandbag southeast of building 14-38, presumably associated with the firing chamber, was sampled. Two additional surface soil samples were collected during the 1995 RFI activities. These samples were submitted for off-site analyses, but the analytical results are screening-level data. The results were presented and discussed in the investigation work plan (LANL 2006, 091698, p. 118) and are not included in this report.

Based on the recommendations of the RFI report, a VCA was conducted at SWMU 14-002(a) in 1997 to remove the deteriorated sandbags and contaminated sand and asphalt (LANL 1997, 056611). Asphalt in the immediate vicinity of the sandbags had visible depleted uranium as well as high radioactivity screening results. The asphalt was vacuumed to remove loose contaminated soil and the asphalt was then removed. Four confirmation samples were collected and analyzed for HE and isotopic uranium. The 2006 investigation work plan mistakenly included sample 0214-97-0008 and location 14-01031 at this site (LANL 2006, 091698, pp. 118, 457), which are associated with SWMU 14-003 (location 14-01031 has been designated as location 14-614910 at SWMU 14-003). HMX was detected and isotopic uranium was detected above BVs in the four confirmation samples collected at SWMU 14-002(a). These analytical results are decision-level data and were presented and discussed in the investigation work plan (LANL 2006, 091698, p. 118).

6.9.4 Rationale for Deferred Investigation

Investigation of SWMU 14-002(a) is deferred per Appendix A of the 2016 Consent Order. The NMED-approved investigation work plan proposed no investigation activities for this site (LANL 2006, 091698; NMED 2007, 095478).

6.10 SWMU 14-002(b), Former Firing Site

6.10.1 Site Description and Operational History

SWMU 14-002(b) is a former HE-firing pedestal (structure 14-17) that was located at TA-14 (Figure 6.7-1). SWMU 14-002(b) is deferred for investigation per Appendix A of the Consent Order. Installed in 1945, the reinforced concrete pedestal measured 4 ft square × 2 ft thick. The pedestal was topped with a steel plate and surrounded on three sides by an 8-ft-high earthen berm. Small-caliber and up to 150-caliber guns were fired from the pedestal into HE targets that occasionally contained natural or depleted uranium. The SWMU 14-002(b) firing pedestal was removed in 1952. Currently, structures 14-34 (the control building associated with the bullet test facility) and 14-43 (an equipment storage building) partially cover the former location of the firing pedestal.

6.10.2 Relationship to Other SWMUs and AOCs

SWMU 14-002(b) is the location of a former HE-firing pedestal that was installed in 1945 and removed in 1952. The bullet test facility [AOC 14-001(f)] was constructed in the vicinity in 1957.

6.10.3 Summary of Previous Investigations

SWMU 14-002(b) was not sampled during the 1995 RFI but was field screened for radioactivity, and HE spot tests were performed (LANL 1996, 054086, p. 5-30). No radioactivity was detected above background, and HE spot-test results were negative. No historical analytical data exist for this site.

6.10.4 Rationale for Deferred Investigation

Investigation of SWMU 14-002(b) is deferred per Appendix A of the 2016 Consent Order. The NMED-approved investigation work plan proposed no investigation activities for this site (LANL 2006, 091698; NMED 2007, 095478).

6.11 SWMU 14-002(c), Decommissioned Firing Site

6.11.1 Site Description and Operational History

SWMU 14-002(c) is a decommissioned firing site (structure 14-5) located in the southeastern portion of TA-14 (Figure 6.11-1). Structure 14-5 consisted of a control building and firing pad. Constructed in 1944, the wood-framed control building measured 11 ft wide × 18 ft long × 10 ft high and was surrounded on three sides by an earthen berm. A 10-ft-square × 8-ft-high concrete firing pad faced with a 0.5-in. steel plate was attached to the exterior south wall of the control building. The firing site was used to conduct small-scale explosive tests until the mid-1950s. The control building was converted to a storage site in 1961 and used to store cyanogen gas from 1965 to the 1970s. In 1980, a 5-ft-diameter metal sphere was installed on the firing pad at the south side of structure 14-5. The sphere was used to conduct slow-combustion experiments, which continued until 1985, when building operations ceased. The firing pad was removed at an unknown date. The control building was partially destroyed by the Cerro Grande fire in 2000; only the concrete portions of the roof and walls remain.

6.11.2 Relationship to Other SWMUs and AOCs

SWMUs 14-002(d) and 14-002(e), located approximately 7 ft southwest and southeast of SWMU 14-002(c), respectively, are two x-unit chambers that were used to remotely detonate the explosive tests at SWMU 14-002(c) from 1944 to the mid-1950s, when explosive operations ceased.

6.11.3 Summary of Previous Investigations

SWMU 14-002(c) was not sampled during the 1995 RFI because no environmental media were present inside the building (LANL 1996, 054086, p. 5-82). The site was field screened for radioactivity, and HE spot tests were performed. No radioactivity was detected above background and HE spot-test results were negative. No historical decision-level data exist for SWMU 14-002(c).

6.11.4 Site Contamination

6.11.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at SWMU 14-002(c):

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Four samples were collected from two locations (14-614486 and 14-614487) within the building footprint at 0.0–1.0 ft and 2.0–3.0 ft bgs. Eight samples were collected from four historical locations [sampled for SWMUs 14-002(d and e) in the 1995 RFI, section 6.12.3] at 1.0–2.0 ft and 5.0–6.0 ft bgs from locations 14-01089 and 14-01090 (west of building footprint) and 1.0–2.0 ft and 6.0–7.0 ft bgs from locations 14-01091 and 14-01092 (east of building footprint).

- All samples were analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, SVOCs, gamma-emitting radionuclides, isotopic uranium, and strontium-90. Ten subsurface samples were analyzed for VOCs and six samples were analyzed for PCBs.

The sampling locations for the 2011 investigation at SWMU 14-002(c) are shown in Figure 6.11-1. Table 6.11-1 presents the samples collected and the analyses requested for SWMU 14-002(c). The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.11.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.11.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 14-002(c) consist of the results from 12 samples (8 soil and 4 tuff) collected from six locations.

Inorganic Chemicals

Twelve samples (eight soil and four tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.11-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.11.2 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 13,100 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (8370 mg/kg). Aluminum is retained as a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in three samples with a maximum concentration of 3.7 mg/kg. The concentrations were only 0.31 mg/kg to 0.91 mg/kg above the BV and were less than the two highest Qbt 2,3,4 background concentrations (4 mg/kg and 5 mg/kg). Arsenic was detected below BVs in the other nine samples. Arsenic is not a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in four samples with a maximum concentration of 142 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (51.6 mg/kg). Barium is retained as a COPC.

Cadmium was detected above the soil BV (0.4 mg/kg) in 1 sample at a concentration of 0.43 mg/kg. The concentration was only 0.03 mg/kg above the BV and was less than the 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). Cadmium was not detected or not detected above BVs in 11 other samples (detected below BVs in 8 samples). Cadmium is not a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in one sample at a concentration of 2480 mg/kg. The 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 Qbt 2,3,4 BV (7.14 mg/kg) in 2 samples with a maximum concentration of 7.9 mg/kg. The concentrations were 5.1 mg/kg and 5.3 mg/kg below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium was detected below BVs in the other 10 samples including similar or higher concentrations in soil (7.6 mg/kg to 12.4 mg/kg at all 6 locations). Chromium is not a COPC.

Cobalt was detected above the Qbt 2,3,4 BV (3.14 mg/kg) in two samples with a maximum concentration of 8.5 mg/kg. Cobalt is retained as a COPC.

Copper was detected above the Qbt 2,3,4 BV (4.66 mg/kg) in two samples with a maximum concentration of 6.6 mg/kg. The maximum 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 or Qbt 2,3,4 BVs (0.5 mg/kg for both) but had DLs (0.52 mg/kg to 0.56 mg/kg) above BVs in eight soil samples and four tuff samples. The DLs were only 0.02 mg/kg to 0.06 mg/kg above the BVs. Cyanide was not detected in any samples. 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 15,900 mg/kg. The concentration was 3600 mg/kg below the maximum Qbt 2,3,4 background concentration (19,500 mg/kg). Iron was detected below BVs in the other 11 samples including similar or higher concentrations in soil (15,900 mg/kg to 16,900 mg/kg at four locations). 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 three soil samples and four tuff samples with a maximum concentration of 80.6 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil are statistically different from background (Figure F-11 and Table F-3). The tuff concentrations were above the maximum Qbt 2,3,4 background concentration (15.5 mg/kg). 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 2770 mg/kg. The concentrations were 50 mg/kg and 820 mg/kg below the maximum Qbt 2,3,4 background concentration (2820 mg/kg) and below or similar to the next highest Qbt 2,3,4 background concentration (2720 mg/kg). Magnesium was detected below BVs in the other 10 samples. Magnesium is not a COPC.

Manganese was detected above the Qbt 2,3,4 BV (492 mg/kg) in 1 sample at a concentration of 744 mg/kg. The concentration was below the maximum Qbt 2,3,4 background concentration (752 mg/kg) and manganese was detected below BVs in the other 11 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 10.4 mg/kg. The concentration was above the maximum Qbt 2,3,4 background concentration (7 mg/kg). Nickel is retained as a COPC.

Nitrate was detected in 12 samples with a maximum concentration of 71.8 mg/kg. Nitrate is retained as a COPC.

Perchlorate was detected in six samples with a maximum concentration of 0.0097 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 one soil sample and four 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 F-12 and Table F-3). 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 only 0.2 mg/kg above the BV and was less than or equivalent to the 2 highest tuff background concentrations (1.3 mg/kg and 1.7 mg/kg). Thallium was not detected or not detected above BVs in the other 11 samples (detected below BV in 2 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 mg/kg. The concentration was only 1 mg/kg above the BV and was below the maximum Qbt 2,3,4 background concentration (21 mg/kg). Vanadium was not detected above BVs in the other 11 samples including higher concentrations in soil (22.8 mg/kg to 28 mg/kg at all 6 locations). Vanadium is not a COPC.

Zinc was detected above the soil and Qbt 2,3,4 BVs (48.8 mg/kg and 63.5 mg/kg) in three soil samples and three tuff samples with a maximum concentration of 516 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are not statistically different from background (Figure F-13 and Table F-3). However, the maximum concentration was substantially above the soil BV and the tuff concentrations were above the maximum Qbt 2,3,4 background concentration (65.6 mg/kg). Zinc is retained as a COPC.

Organic Chemicals

A total of 12 samples (8 soil and 4 tuff) were analyzed for explosive compounds and SVOCs, 6 samples (5 soil and 1 tuff) were analyzed for PCBs, and 10 samples (6 soil and 4 tuff) were analyzed for VOCs. Table 6.11-3 presents the detected organic chemicals. Figure 6.11-3 shows the spatial distribution of detected organic chemicals.

Organic chemicals detected at SWMU 14-002(c) include acetone; chloroform; 1,4-dichlorobenzene; 1,1-dichloroethene; diethylphthalate; di-n-butylphthalate; ethylbenzene; HMX; methylene chloride; RDX; toluene; trichlorofluoromethane; and total xylene. The detected organic chemicals are retained as COPCs.

Radionuclides

Twelve samples (eight soil and four tuff) were analyzed for gamma-emitting radionuclides, isotopic uranium, and strontium-90.

Radionuclides were not detected or detected above BVs/FVs at SWMU 14-002(c).

6.11.4.4 Nature and Extent of Contamination

The nature and extent of inorganic and organic COPCs at SWMU 14-002(c) are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMU 14-002(c) include aluminum, barium, calcium, cobalt, copper, lead, nickel, nitrate, perchlorate, selenium, and zinc.

Aluminum was detected above the Qbt 2,3,4 BV in three samples with a maximum concentration of 13,100 mg/kg. Concentrations decreased with depth at locations 14-01089 and 14-01090 and increased with depth at location 14-01091 (the concentrations in the shallower samples at locations 14-01089 and 14-01090 were 19,300 mg/kg and 17,800 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations increased laterally at location 14-01090 and decreased laterally at location 14-01092. The residential and industrial SSLs were approximately 6 times and 98 times the maximum concentration, respectively. Further sampling for extent of aluminum is not warranted.

Barium was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 142 mg/kg. Concentrations decreased with depth at all locations (the concentrations in the shallower samples at locations 14-01089, 14-01090, 14-01091, and 14-01092 were 247 mg/kg, 218 mg/kg, 240 mg/kg, and 182 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased laterally at location 14-01090 and decreased laterally at location 14-01092. The residential SSL was approximately 110 times the maximum concentration. 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 one sample at a concentration of 2480 mg/kg. Concentrations increased with depth and increased laterally at location 14-01090. The NMED residential essential nutrient screening level was approximately 524 times the maximum concentration. Further sampling for extent of calcium is not warranted.

Cobalt was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 8.5 mg/kg. Concentrations did not change substantially with depth (1.5 mg/kg and 1.3 mg/kg) at locations 14-01090 and 14-01091 (the concentrations in the shallower samples at locations 14-01090 and 14-01091 were 7 mg/kg and 4.4 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables].) Concentrations did not change substantially laterally (2 mg/kg) at location 14-01090 and decreased laterally at location 14-01092. The residential and industrial SSLs were approximately 2.7 times and 41 times the maximum concentration, respectively. Further sampling for extent of cobalt is not warranted.

Copper was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 6.6 mg/kg. Concentrations decreased with depth at location 14-01091 and did not change substantially with depth (1 mg/kg) at location 14-01090 (the concentrations in the shallower samples at locations 14-01090 and 14-01091 were 7.6 mg/kg and 7.3 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially laterally (1.3 mg/kg) at locations 14-01090 and 14-01092. The residential SSL was approximately 474 times the maximum concentration. Further sampling for extent of copper 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 80.6 mg/kg. Concentrations increased with depth at locations 14-01090, 14-01092, and 14-614487, decreased with depth at locations 14-01089 and 14-01091, increased laterally at location 14-01090, and decreased laterally at location 14-01092. The residential and industrial SSLs were approximately 6.6 times and 13 times the maximum concentration, respectively. Further sampling for extent of lead is not warranted.

Nickel was detected above the Qbt 2,3,4 BV in one sample at a concentration of 10.4 mg/kg. Concentrations did not change substantially with depth (0.5 mg/kg) and increased laterally at location 14-01090 (the concentration in the shallower sample at location 14-01090 was 9.9 mg/kg and below the soil BV [Appendix D, Pivot Tables]). The residential SSL was approximately 150 times the maximum concentration. Further sampling for extent of nickel is not warranted.

Nitrate was detected in 12 samples with a maximum concentration of 71.8 mg/kg. Concentrations decreased with depth at locations 14-01089 and 14-614486; increased with depth at locations 14-01090, 14-01091, and 14-01092; did not change substantially with depth (0.1 mg/kg) at location 14-614487; did not change substantially laterally (0.6 mg/kg) at location 14-01090, and decreased laterally at location 14-01092. The residential SSL was approximately 1740 times the maximum concentration. The lateral extent of nitrate is defined, and further sampling for vertical extent is not warranted.

Perchlorate was detected in six samples with a maximum concentration of 0.0097 mg/kg. Concentrations increased with depth at all locations and were equivalent to or were below the estimated DLs at locations 14-01089, 14-01090, 14-01091, and 14-614486. Concentrations decreased laterally at location 14-01092 and did not change substantially laterally (0.0062 mg/kg) at location 14-01090. The residential SSL was approximately 5650 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 one soil sample and four tuff samples with a maximum concentration of 3.2 mg/kg. Concentrations increased with depth at locations 14-01090 and 14-01091, did not change substantially with depth (0.4 mg/kg) at locations 14-01089 and 14-01092, and increased laterally at locations 14-01090 and 14-01092 (the concentration in the shallower sample at location 14-01090 was 1.4 mg/kg and below the soil BV [Appendix D, Pivot Tables]). The residential SSL was approximately 122 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 three soil samples and three tuff samples with a maximum concentration of 516 mg/kg. Concentrations increased with depth at locations 14-01090, 14-01092, 14-614486, and 14-614487; decreased with depth at location 14-01089; and increased laterally at locations 14-01090 and 14-01092. The residential and industrial SSLs were approximately 46 times and 739 times the maximum concentration, respectively. The lateral extent of zinc is defined, and further sampling for vertical extent is not warranted.

Organic Chemicals

Organic COPCs at SWMU 14-002(c) include acetone, chloroform; 1,4-dichlorobenzene; 1,1-dichloroethene; diethylphthalate; di-n-butylphthalate; ethylbenzene; HMX; methylene chloride; RDX; toluene; trichlorofluoromethane; and total xylene.

Acetone and 1,4-dichlorobenzene were each detected in one sample at location 14-614487 at concentrations of 0.082 mg/kg and 0.0072 mg/kg, respectively. Only one depth was sampled at this location. Concentrations decreased laterally at locations 14-01090 and 14-01092. The residential SSLs for acetone and 1,4-dichlorobenzene were approximately 808,000 times and 4560 times the maximum concentrations, respectively. The lateral extent of acetone and 1,4-dichlorobenzene are defined, and further sampling for vertical extent is not warranted.

Chloroform; 1,1-dichloroethene; ethylbenzene; toluene; trichlorofluoromethane; and total xylene were each detected in one sample at location 14-614487 at concentrations of 0.0016 mg/kg, 0.0021 mg/kg, 0.0011 mg/kg, 0.00217 mg/kg, 0.0023 mg/kg, and 0.0023 mg/kg, respectively. Only one depth was sampled at this location. Concentrations decreased laterally and all detected concentrations were below EQLs. The residential SSLs for chloroform; 1,1-dichloroethene; ethylbenzene; toluene; trichlorofluoromethane; and total xylene were approximately 3690; 210,000; 68,300; 3,080,000; 535,000; and 379,000 times the detected concentrations, respectively. The lateral extents of chloroform; 1,1-dichloroethene; ethylbenzene; toluene; trichlorofluoromethane; and total xylene are defined, and further sampling for vertical extent is not warranted.

Diethylphthalate was detected in one sample at a concentration of 0.092 mg/kg. Concentrations increased with depth and decreased laterally, and the detected concentration was below the EQL. The residential SSL was approximately 536,000 times the maximum concentration. The lateral extent of diethylphthalate is defined, and further sampling for vertical extent is not warranted.

Di-n-butylphthalate was detected in two samples with a maximum concentration of 0.14 mg/kg. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of di-n-butylphthalate are defined.

HMX was detected in one sample at a concentration of 0.097 mg/kg. Concentrations decreased with depth and decreased laterally, and the detected concentration was below the EQL. The lateral and vertical extent of HMX are defined.

Methylene chloride was detected in three samples with a maximum concentration of 0.0029 mg/kg. Concentrations did not change substantially with depth (0.0006 mg/kg) and were below EQLs at location 14-01092, and only one depth was sampled at location 14-614487. Concentrations decreased laterally. The residential SSL was approximately 21,500 times the maximum concentration. The lateral extent of methylene chloride is defined, and further sampling for vertical extent is not warranted.

RDX was detected in one sample at a concentration of 1.2 mg/kg. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of RDX are defined.

Radionuclides

Radionuclides were not detected or detected above BVs/FVs at SWMU 14-002(c).

Summary of Nature and Extent

The extent of inorganic and organic COPCs is defined or no further sampling for extent is warranted at SWMU 14-002(c). No radionuclide COPCs were identified at SWMU 14-002(c).

6.11.5 Summary of Human Health Risk Screening

Industrial Scenario

No carcinogenic COPCs were identified in the 0.0−1.0 ft depth interval. The industrial HI is 0.000006, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 2×10^{-10}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.7, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified.

Residential Scenario

The total excess cancer risk for the residential scenario is 2×10^{-7}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.6, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified.

Based on the risk-screening assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios at SWMU 14-002(c).

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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at SWMU 14-002(c).

6.12 SWMU 14-002(d), X-unit Chamber

6.12.1 Site Description and Operational History

SWMU 14-002(d) is an x-unit chamber (structure 14-14) located at TA-14 approximately 7 ft southwest of structure 14-5 (Figure 6.11-1). SWMU 14-002(d) is deferred for investigation per Appendix A of the Consent Order. Constructed in 1944, the x-unit chamber was one of two voltage distribution systems installed at the SWMU 14-002(c) firing site. The x-unit chamber was constructed of reinforced concrete and measured approximately 3 ft wide × 4 ft long × 3 ft high. The x-unit housed the firing voltage distribution system used for the remote detonation of small-scale explosives tests at structure 14-5. The x-unit was used from 1944 to the mid-1950s when explosives operations ceased. Whether the chamber is still in place is not known.

The 1994 RFI work plan for Operable Unit 1085 (LANL 1994, 034755) incorrectly identified SWMU 14-002(d) as a firing pad. Engineering drawings confirm it is an x-unit chamber (LASL 1949, 207439).

6.12.2 Relationship to Other SWMUs and AOCs

SWMU 14-002(d), located approximately 7 ft southwest of SWMU 14-002(c), is one of two x-unit chambers used to remotely detonate the explosives tests at the SWMU 14-002(c) firing site from 1944 to the mid-1950s when explosive operations ceased.

6.12.3 Summary of Previous Investigations

During the 1995 RFI conducted at SWMUs 14-002(d and e), samples were field screened for lead, uranium, and gross radioactivity, and HE spot tests were performed. Based on field-screening results, four surface samples (0.0–0.5 ft bgs) were collected from locations around the sides of control building 14-5, and four surface samples (0.0–0.5 ft bgs) were collected on the drainage immediately south of structure 14-5 (LANL 1996, 054086, pp. 5-88–5-93). All eight samples were submitted for off-site analysis of TAL metals, gamma-emitting radionuclides, and HE. The data showed lead, thallium, and uranium detected above BVs; uranium-235 and uranium-238 detected above BVs; and no detected HE. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

6.12.4 Rationale for Deferred Investigation

Investigation of SWMU 14-002(d) is deferred per Appendix A of the Consent Order. The NMED-approved investigation work plan proposed no investigation activities for this site (LANL 2006, 091698; NMED 2007, 095478).

6.13 SWMU 14-002(e), X-unit Chamber

6.13.1 Site Description and Operational History

SWMU 14-002(e) is an x-unit chamber (structure 14-15) located at TA-14 approximately 7 ft southeast of structure 14-5 (Figure 6.11-1). SWMU 14-002(e) is deferred for investigation per Appendix A of the 2016 Consent Order. Constructed in 1944, the x-unit chamber was one of two voltage distribution systems installed at the SWMU 14-002(c) firing site. The x-unit chamber was constructed of reinforced concrete and measured approximately 3 ft wide × 4 ft long × 3 ft high. The x-unit housed the firing voltage distribution system used for the remote detonation of small-scale explosives tests at structure 14-5. The x-unit was used from 1944 to the mid-1950s when explosives operations ceased. Whether the chamber is still in place is not known.

The 1994 RFI work plan for Operable Unit 1085 (LANL 1994, 034755) incorrectly identified SWMU 14-002(e) as a firing pad. Engineering drawings confirm that it is an x-unit chamber (LASL 1949, 207439).

6.13.2 Relationship to Other SWMUs and AOCs

SWMU 14-002(e), located approximately 7 ft southeast of SWMU 14-002(c), is one of two x-unit chambers used to remotely detonate the explosives tests at the SWMU 14-002(c) firing site from 1944 to the mid-1950s when explosive operations ceased.

6.13.3 Summary of Previous Investigations

Previous investigations are summarized in section 6.12.3. No historical decision-level data exist for SWMU 14-002(e).

6.13.4 Rationale for Deferred Investigation

Investigation of SWMU 14-002(e) is deferred per Appendix A of the Consent Order. The NMED-approved investigation work plan proposed no investigation activities for this site (LANL 2006, 091698; NMED 2007, 095478).

6.14 SWMU 14-002(f), Former Structure

6.14.1 Site Description and Operational History

SWMU 14-002(f) is the location of a former junction box shelter (structure 14-12) that was located at TA-14 (Figure 6.7-1). Built in 1945, the wood-framed shelter measured 6 ft square × 6 ft tall and was surrounded on three sides with an earthen berm. The SWMU 14-002(f) shelter was removed in 1952 (LANL 1994, 034755, p. 5-3-4).

6.14.2 Relationship to Other SWMUs and AOCs

SWMU 14-002(f) is the location of a former junction box shelter that was installed in 1945 and removed in 1952. The bullet test facility [AOC 14-001(f)] was constructed in the vicinity in 1957.

6.14.3 Summary of Previous Investigations

SWMU 14-002(f) was not sampled during the 1995 RFI but was field screened for radioactivity and HE spot tests were performed (LANL 1996, 054086, p. 5-31). No radioactivity was detected above background and HE spot-test results were negative. No historical analytical data exist for this site.

6.14.4 Rationale for Delayed Investigation

The RFI work plan for Operable Unit 1085 does not identify any releases from SWMU 14-002(f) but notes that the site may be contaminated because of its close proximity to other sites (LANL 1994, 034755, p. 5-3-4). Therefore, the source of potential contamination at this site appears to be the adjacent deferred firing sites, including SWMU 14-002(b). As a result, site characterization and investigation at

SWMU 14-002(f) have been proposed to be delayed until the adjacent deferred sites [AOC 14-001(f) and SWMUs 14-002(a) and 14-002(b)] are investigated (LANL 2011, 207481, pp. 3–4).

6.15 SWMU 14-003, Former Burning Area

6.15.1 Site Description and Operational History

SWMU 14-003 is a former burning area located approximately 300 ft northeast of structure 14-5 in the southeastern portion of TA-14 (Figure 6.15-1). The burning area measured approximately 30 ft wide × 40 ft long and was surrounded on three sides by a U-shaped, 3-ft-high soil berm. The area was used for burning combustible HE-contaminated debris and for flash-burning noncombustible HE-contaminated debris from test shots. Burning operations began in 1951 and ceased in the 1960s. In 1997, soil was excavated and removed, and the site, including the berms, was regraded during a VCA performed at the site.

6.15.2 Relationship to Other SWMUs and AOCs

SWMU 14-003 is the location of a former burning area that operated from 1951 to the 1960s. It is located east of the other SWMUs and AOCs at TA-14 and is not associated with the other sites.

6.15.3 Summary of Previous Investigations

During the 1995 RFI conducted at SWMU 14-003, samples were field screened for radioactivity and HE spot tests were performed. Based on field-screening results, two surface samples (0.0–0.5 ft bgs) were collected and submitted for off-site analysis of TAL metals (LANL 1996, 054086, p. 5-93). The data showed 12 metals detected above BVs, detected HE, and uranium-235 and uranium-238 detected above BVs. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

Based on the results of the RFI, a VCA was conducted at SWMU 14-003 in 1997 to determine the extent of contamination, remove contaminated soil, and collect confirmation samples to verify that cleanup goals were met (LANL 2001, 071096). Extensive field screening for metals, HE, and radioactivity was conducted using a 34- × 28-ft grid with 2-ft-square intervals. Based on the screening results, excavation was conducted in two areas to remove lead- and HE-contaminated soil, respectively. After soil removal, 12 confirmation samples were collected from 12 locations and were submitted for off-site analyses of TAL metals, uranium, and HE. Barium and silver were detected above BVs. Amino-4,6-dinitrotoluene[2-] and TNT were detected. After sampling was complete, 2 ft of soil was removed from the berm and used to fill in the areas excavated within the burn area. The site was regraded and a mixture of native grass seed was applied. A best management practice in the form of straw bales was put in place to prevent runoff from the site (LANL 2001, 071096, p. 7-8). Decision-level data from the 1997 VCA are included in this supplemental investigation report. The decision level data from the 1997 VCA does not include the total uranium results. The total uranium analysis was done using kinetic phosphorescence analysis (KPA), which is now considered to be a screening method, and the data by KPA are not reliable for decision-making purposes. Therefore, the total uranium results from the VCA are screening level data and are not included in the site characterization data set for this SWMU. These data have been replaced by isotopic uranium results obtained in subsequent samples. All decision-level analytical data collected during previous investigations are presented and evaluated in section 6.15.4.3.

Although the VCA report was completed in September 1997, it was not submitted to NMED because of a reprioritization of sites during a reorganization of the former Environmental Restoration Project.

6.15.4 Site Contamination

6.15.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at SWMU 14-003:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Fourteen samples were collected from seven locations within the former burning area (locations 14-614501 through 14-614506 and 14-614511) from the surface (0.0–1.0 ft bgs) and from the first 1 ft of native material beneath the burning area (second depths ranging from 3.5–6.0 ft bgs). Twelve samples were collected from six locations surrounding and east of the burning area (locations 14-614507 through 14-614510, 14-614512, and 14-614513) at 0.0–1.0 ft and 3.0–4.0 ft bgs.
- All samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, dioxins and furans, explosive compounds, SVOCs, VOCs (excluding surface samples), gamma-emitting radionuclides, isotopic uranium, and strontium-90. Thirteen subsurface samples were analyzed for VOCs and six samples were analyzed for PCBs.

Sampling locations at SWMU 14-003, from the VCA and 2011 investigations, are shown in Figure 6.15-1. Table 6.15-1 presents the samples collected and the analyses requested for SWMU 14-003, for the VCA and 2011 investigations. The geodetic coordinates of the sampling locations for the 2011 investigation are presented in Table 3.2-1.

6.15.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples from the 2011 investigation are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.15.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 14-003 consist of the results from 38 samples (26 soil, 11 tuff, and 1 sediment) collected from 25 locations.

Inorganic Chemicals

All 38 samples (26 soil, 11 tuff, and 1 sediment) were analyzed for TAL metals. In addition, 26 samples (15 soil and 11 tuff) were analyzed for cyanide, nitrate, and perchlorate. Table 6.15-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Plate 3 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 3 soil samples and 11 tuff samples with a maximum concentration of 42,000 mg/kg. The Gehan test indicated site concentrations of aluminum in soil are statistically different from background (Table F-4). However, the quantile and slippage tests indicated site concentrations of aluminum in soil are not statistically different from background (Figure F-14 and Table F-4). The Gehan and quantile tests indicated site concentrations of aluminum in tuff are statistically different from background (Figure F-15 and Table F-5). Aluminum is retained as a COPC.

Antimony was not detected above the soil and sediment BVs (0.83 mg/kg for both) but had DLs (4.46 mg/kg to 13 mg/kg) above BVs for 11 soil samples and 1 sediment sample. Antimony is retained as a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in five samples with a maximum concentration of 3.5 mg/kg. The Gehan test and quantile tests indicated site concentrations of arsenic in tuff are statistically different from background (Figure F-16 and Table F-5). 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 8 soil samples, 11 tuff samples, and 1 sediment sample with a maximum concentration of 1800 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in soil and tuff are statistically different from background (Figure F-17 and Table F-4 and Figure F-18 and Table F-5, respectively). Barium is retained as a COPC.

Beryllium was detected above the soil BV (1.83 mg/kg) in one sample at a concentration of 2.1 mg/kg. The Gehan and quantile tests indicated site concentrations of beryllium in soil are statistically different from background (Figure F-19 and Table F-4). Beryllium is retained as a COPC.

Cadmium was not detected above the soil and sediment BVs (0.4 mg/kg for both) but had DLs (0.446 mg/kg to 0.64 mg/kg) in 11 soil samples and 1 sediment sample. The DLs were only 0.046 mg/kg to 0.24 mg/kg above the BVs. The maximum soil DL (0.64 mg/kg) was below the highest background DLs (2 mg/kg) and the 2 highest soil background concentrations (1.4 mg/kg and 2.6 mg/kg). Cadmium was detected below BVs in the other 26 samples. Cadmium is not a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in seven samples with a maximum concentration of 5030 mg/kg. The Gehan and quantile tests indicated site concentrations of calcium in tuff are statistically different from background (Figure F-20 and Table F-5). 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 1 soil sample and 11 tuff samples with a maximum concentration of 21 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in soil are not statistically different from background (Figure F-21 and Table F-4). The Gehan and quantile tests indicated site concentrations of chromium in tuff are statistically different from background (Figure F-22 and Table F-5). 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 1 soil sample, 11 tuff samples, and 1 sediment sample with a maximum concentration of 9.4 mg/kg. The Gehan test indicated site concentrations of cobalt in soil are statistically different from background (Table F-4). However, the quantile and slippage tests indicated site concentrations of cobalt in soil are not statistically different from background (Figure F-23 and Table F-4). The Gehan and quantile tests indicated site concentrations of cobalt in tuff are statistically different from background (Figure F-24 and Table F-5). Cobalt is retained as a COPC.

Copper was detected above the Qbt 2,3,4 BV (4.66 mg/kg) in 11 samples with a maximum concentration of 7.9 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in tuff are statistically different from background (Figure F-25 and Table F-5). Copper is retained as a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg for both) but had DLs (0.52 mg/kg to 0.57 mg/kg) above BVs for 15 soil samples and 11 tuff samples. The DLs were only 0.02 mg/kg to 0.07 mg/kg above the BVs and cyanide was not detected in any samples. Cyanide is not 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 one tuff sample with a maximum concentration of 22,000 mg/kg. The Gehan test indicated site concentrations of iron in soil are statistically different from background (Table F-4). However, the quantile and slippage tests indicated site concentrations of iron in soil are not statistically different from background (Figure F-26 and Table F-4). The Gehan and quantile tests indicated site concentrations of iron in tuff are statistically different from background (Figure F-27 and Table F-5). Iron is retained as a COPC.

Lead was detected above the Qbt 2,3,4 BV (11.2 mg/kg) in seven samples with a maximum concentration of 13.8 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in tuff are statistically different from background (Figure F-28 and Table F-5). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in 10 samples with a maximum concentration of 2360 mg/kg. The Gehan and quantile tests indicated site concentrations of magnesium in tuff are statistically different from background (Figure F-29 and Table F-5). Magnesium is retained as a COPC.

Manganese was detected above the Qbt 2,3,4 BV (482 mg/kg) in one sample at a concentration of 486 mg/kg. The Gehan and quantile tests indicated site concentrations of manganese in tuff are statistically different from background (Figure F-30 and Table F-5). Manganese is retained as a COPC.

Mercury was not detected above the soil and sediment BVs (0.1 mg/kg for both) but had DLs (0.12 mg/kg to 0.13 mg/kg) above BVs in five soil samples and one sediment sample. The DLs were only 0.02 mg/kg to 0.03 mg/kg above the BVs, and mercury was not detected in the other 32 samples (DLs less than BVs). Mercury is not 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 nine tuff samples with a maximum concentration of 17 mg/kg. The Gehan test indicated site concentrations of nickel in soil are statistically different from background (Table F-4). However, the quantile and slippage tests indicated site concentrations of nickel in soil are not statistically different from background (Figure F-31 and Table F-4). The quantile and slippage tests indicated site concentrations of nickel in tuff are statistically different from background (Figure F-32 and Table F-5). Nickel is retained as a COPC.

Nitrate was detected in 24 samples with a maximum concentration of 2.7 mg/kg. Nitrate is naturally occurring and the concentrations likely reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Perchlorate was detected in four samples with a maximum concentration of 0.029 mg/kg. Perchlorate is retained as a COPC.

Potassium was detected above the soil BV (3460 mg/kg) in one sample at a concentration of 3500 mg/kg. The Gehan test indicated site concentrations of potassium in soil are statistically different from background (Table F-4). However, the quantile and slippage tests indicated site concentrations of potassium in soil are not statistically different from background (Figure F-33 and Table F-4). Potassium is not a COPC.

Selenium was detected above the Qbt 2,3,4 BV (0.3 mg/kg) in 4 samples with a maximum concentration of 1.1 mg/kg and had DLs (1 mg/kg to 2.1 mg/kg) above BVs in 10 samples. Selenium is retained as a COPC.

Silver was detected above the soil BV (1 mg/kg) in two samples with a maximum concentration of 1.97 mg/kg and had DLs (2.3 mg/kg to 2.6 mg/kg) above the soil and sediment BVs (1 mg/kg for both) in five soil samples and one sediment sample. Silver is retained as a COPC.

Thallium was detected above the soil BV (0.73 mg/kg) in four samples with a maximum concentration of 1.2 mg/kg. The Gehan and slippage tests indicated site concentrations of thallium in soil are not statistically different from background (Figure F-34 and Table F-4). Thallium is not a COPC.

Vanadium was detected above the Qbt 2,3,4 and sediment BVs (17 mg/kg and 19.7 mg/kg) in 10 tuff samples and 1 sediment sample with a maximum concentration of 22.7 mg/kg. The Gehan and quantile tests indicated site concentrations of vanadium in tuff are statistically different from background (Figure F-35 and Table F-5). Vanadium is retained as a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in three samples with a maximum concentration of 71 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are not statistically different from background (Figure F-36 and Table F-4). Zinc is not a COPC.

Organic Chemicals

A total of 38 samples (26 soil, 11 tuff, and 1 sediment) were analyzed for explosive compounds, 26 samples (15 soil and 11 tuff) were analyzed for dioxins/furans and SVOCs, 6 samples (3 soil and 3 tuff) were analyzed for PCBs, and 13 samples (2 soil and 11 tuff) were analyzed for VOCs. Table 6.15-3 presents the detected organic chemicals. Plate 4 shows the spatial distribution of detected organic chemicals.

Organic chemicals detected at SWMU 14-003 include 2-amino-4,6-dinitrotoluene; bis(2-ethylhexyl)phthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzofuran; HMX, methylene chloride; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 2,3,4,7,8-pentachlorodibenzofuran; pentaerythritol tetranitrate (PETN), TATB, 2,3,7,8-tetrachlorodibenzofuran; and TNT. The detected organic chemicals are retained as COPCs.

Radionuclides

A total of 26 samples (15 soil and 11 tuff) were analyzed for gamma-emitting radionuclides, isotopic uranium, and strontium-90. Table 6.15-4 presents the radionuclides detected or detected above BVs/FVs. Figure 6.15-2 shows the spatial distribution of radionuclides detected or detected above BVs/FVs.

Cesium-134 was detected in one tuff sample at an activity of 0.052 pCi/g. Cesium-134 is retained as a COPC.

Cesium-137 was detected in one tuff sample at an activity of 0.141 pCi/g. Cesium-137 is retained as a COPC.

6.15.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 14-003 are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMU 14-003 include aluminum, antimony, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, perchlorate, selenium, silver, and vanadium.

Aluminum was detected above the soil and Qbt 2,3,4 BVs in 3 soil samples and 11 tuff samples with a maximum concentration of 42,000 mg/kg. Concentrations increased with depth at locations 14-614504, 14-614505, 14-614507, 14-614511, 14-614512, and 14-614513; did not change substantially with depth (1000 mg/kg) at location 14-614506; and decreased with depth at locations 14-614501, 14-614502, 14-614503, and 14-614510 (the concentrations in the shallower samples at locations 14-614501, 14-614502, 14-614503, 14-614506, and 14-614510 were 10,200 mg/kg, 11,900 mg/kg, 14,500 mg/kg, 14,500 mg/kg, and 14,600 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Only 1 depth was sampled at locations 14-614910, 14-614911, and 14-614912, but concentrations decreased with depth in deeper samples collected at locations 14-614502 and 14-614511, located within 10 ft of locations 14-614910, 14-614911, and 14-614912 (Plate 3). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 1.9 times and 31 times the maximum concentration, respectively (36,000 mg/kg and 1,248,000 mg/kg below the respective SSLs). The lateral extent of aluminum is defined, and further sampling for vertical extent is not warranted.

Antimony was not detected above the soil and sediment BVs but had DLs (4.46 mg/kg to 13 mg/kg) above BVs in 11 soil samples and 1 sediment sample. Because antimony was not detected above BVs and the residential and industrial SSLs were approximately 2.4 times and 40 times the maximum DL, respectively, further sampling for extent of antimony is not warranted.

Arsenic was detected above the Qbt 2,3,4 BV in five samples with a maximum concentration of 3.5 mg/kg. Concentrations decreased with depth at location 14-614513 (concentration in the shallower sample was 4.7 mg/kg and below the soil BV [Appendix D, Pivot Tables]) and did not change or did not change substantially with depth (0.0 mg/kg to 0.2 mg/kg) at locations 14-614502, 14-614503, 14-614507, and 14-614511 (the concentrations in the shallower samples at locations 14-614502, 14-614503, 14-614507, and 14-614511 were 3.1 mg/kg, 3.6 mg/kg, 3.4 mg/kg, and 3.3 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially downgradient (0.5 mg/kg). 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, Qbt 2,3,4, and sediment BVs in 8 soil samples, 11 tuff samples, and 1 sediment sample with a maximum concentration of 1800 mg/kg. Concentrations increased with depth at locations 14-604503 and 14-604511; did not change substantially with depth (2 mg/kg to 23 mg/kg) at locations 14-604504, 14-604505, 14-604507, 14-604510, and 14-604513; and decreased with depth at locations 14-604501, 14-604502, 14-604506, and 14-604512 (the concentrations in the shallower samples at locations 14-614501, 14-614504, 14-614505, 14-614506, 14-614507, 14-614510, and 14-604513 were 183 mg/kg, 183 mg/kg, 173 mg/kg, 211 mg/kg, 207 mg/kg, 186 mg/kg, and 181 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Only one depth was sampled at locations 14-01035, 14-614909, 14-614910, 14-614911, 14-614912, 14-614914, and 14-614916. Concentrations at locations 14-614909 and 14-614914 were below the maximum soil background concentration (410 mg/kg), and concentrations decreased with depth in deeper samples at locations 14-614504 and 14-614511, located within 10 ft of locations 14-614910, 14-614911, 14-614912, and 14-614916 (Plate 3). Concentrations at location 14-01035 increased with depth in a deeper sample at location 14-614513, adjacent to location 14-01035 (Plate 3). Concentrations decreased downgradient. The residential SSL was approximately 59 times the maximum concentration where vertical extent is not defined (265 mg/kg at location 14-614511). 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 2.1 mg/kg. Only one depth was sampled at location 14-614910, but concentrations were below BV in a deeper sample at location 14-614511, which is less than 10 ft from location 14-614910 (Plate 3). Concentrations decreased downgradient, and the maximum concentration was below the maximum soil background concentration (3.95 mg/kg). The lateral and vertical extent of beryllium are defined.

Calcium was detected above the Qbt 2,3,4 BV in seven samples with a maximum concentration of 5030 mg/kg. Concentrations increased with depth at locations 14-614503, 14-614504, 14-614505, 14-614506, 14-614511, and 14-614512 and were equivalent to the maximum Qbt 2,3,4 background concentration (2230 mg/kg) at location 14-614507. Concentrations decreased downgradient. The NMED residential essential nutrient screening level was approximately 258 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 1 soil sample and 11 tuff samples with a maximum concentration of 21 mg/kg. Concentrations increased with depth at location 14-614513; did not change substantially with depth (0.2 mg/kg to 1.6 mg/kg) at locations 14-614501, 14-614502, 14-614503, 14-614504, 14-614505, 14-614507, 14-614510, 14-614511, and 14-614512; and decreased with depth at location 14-614506 (the concentrations in the shallower samples at locations 14-614501, 14-614502, 14-614503, 14-614504, 14-614505, 14-614506, 14-614507, 14-614510, 14-614511, and 14-614512 were 9.2 mg/kg, 9.7 mg/kg, 11.1 mg/kg, 9.4 mg/kg, 9.1 mg/kg, 10.7 mg/kg, 9.8 mg/kg, 9.7 mg/kg, 9.0 mg/kg, and 7.9 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Only one depth was sampled at location 14-614910, but chromium concentrations decreased with depth in a deeper sample at location 14-614511, which is less than 10 ft from location 14-614910 (Plate 3). The soil concentrations were not different from background, and the tuff concentrations were below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Concentrations decreased downgradient. As discussed in section 4.2, because there was no known use of hexavalent chromium at this site, the results were compared with the residential SSL for trivalent chromium (117,000 mg/kg). The residential trivalent chromium SSL was approximately 5570 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, Qbt 2,3,4, and sediment BVs in 1 soil sample, 11 tuff samples, and 1 sediment sample with a maximum concentration of 9.4 mg/kg. Concentrations did not change substantially with depth (0.6 mg/kg to 1.3 mg/kg) at locations 14-614502, 14-614507, 14-614510, 14-614511, 14-614512, and 14-614513, and decreased with depth at locations 14-614501, 14-614503, 14-614504, 14-614505, and 14-614506 (the concentrations in the shallower samples at locations 14-614501, 14-614502, 14-614503, 14-614504, 14-614505, 14-614506, 14-614507, 14-614510, 14-614511, 14-614512, and 14-614513 were 6.9 mg/kg, 6.6 mg/kg, 8.1 mg/kg, 6.0 mg/kg, 5.7 mg/kg, 7.7 mg/kg, 6.4 mg/kg, 5.6 mg/kg, 6.5 mg/kg, 5.8 mg/kg, and 5.7 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Only one depth was sampled at locations 14-01035 and 14-614911, but concentrations decreased with depth in deeper samples at location 14-614513, which is adjacent to location 14-01035, and at location 14-614502, which is within 10 ft of location 14-614911 (Plate 3). The soil concentrations were not different from background. Concentrations decreased downgradient. The residential and industrial SSLs were approximately 2.5 times and 37 times the maximum concentration, respectively. The lateral extent of cobalt is defined, and further sampling for vertical extent is not warranted.

Copper was detected above the Qbt 2,3,4 BV in 11 samples with a maximum concentration of 7.9 mg/kg. Concentrations did not change or did not change substantially with depth (0.0 mg/kg to 1.8 mg/kg) at locations 14-614503, 14-614504, 14-614505, 14-614506, 14-614507, 14-614510, 14-614511, 14-614512, and 14-614513 and decreased with depth at locations 14-614501 and 14-614502 (the concentrations in the shallower samples at locations 14-614501, 14-614502, 14-614503, 14-614504, 14-614505, 14-614506, 14-614507, 14-614510, 14-614511, 14-614512, and 14-614513 were 7.6 mg/kg, 10.6 mg/kg, 7.7 mg/kg, 5.6 mg/kg, 5.4 mg/kg, 6.8 mg/kg, 7.1 mg/kg, 5.7 mg/kg, 7.1 mg/kg, 5.8 mg/kg, and 5.9 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially downgradient (0.6 mg/kg). Tuff concentrations at locations 14-614501, 14-614502, 14-614504, 14-614505, and 14-614506 were below the maximum Qbt 2,3,4 background concentration (6.2 mg/kg). The residential SSL was approximately 396 times the maximum concentration. Further sampling for extent of copper is not warranted.

Iron was detected above the soil and Qbt 2,3,4 BVs in one soil sample and one tuff sample with a maximum concentration of 22,000 mg/kg. Concentrations did not change substantially with depth (300 mg/kg) at location 14-614513 (the concentration in the shallower sample at location 14-614513 was 15,500 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Only one depth was sampled at location 14-614910, but iron concentrations decreased with depth in a deeper sample at location 14-614511, which is less than 10 ft from location 14-614910 (Plate 3). The soil concentrations were not different from background, and the tuff concentration was below the maximum Qbt 2,3,4 background concentration (19,500 mg/kg). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 2.5 times and 41 times the maximum concentration, respectively. The lateral extent of iron is defined, and further sampling for vertical extent is not warranted.

Lead was detected above the Qbt 2,3,4 BV in seven samples with a maximum concentration of 13.8 mg/kg. Concentrations did not change substantially with depth (0.9 mg/kg to 2.1 mg/kg) at locations 14-614511, 14-614512, and 14-614513 and decreased with depth at locations 14-614501, 14-614502, 14-614506, and 14-614507 (the concentrations in the shallower samples at locations 14-614501, 14-614502, 14-614506, 14-614507, 14-614511, 14-614512, and 14-614513 were 14.4 mg/kg, 15.9 mg/kg, 17.3 mg/kg, 16.0 mg/kg, 14.8 mg/kg, 12.4 mg/kg, and 14.2 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations were below the maximum Qbt 2,3,4 background concentration (15.5 mg/kg). Concentrations did not change substantially downgradient (1.6 mg/kg). The residential and industrial SSLs were approximately 29 times and 58 times the maximum concentration, respectively. Further sampling for extent of lead is not warranted.

Magnesium was detected above the Qbt 2,3,4 BV in 10 samples with a maximum concentration of 2360 mg/kg. Concentrations increased with depth at locations 14-614511, 14-614512, and 14-614513; did not change substantially with depth (60 mg/kg to 180 mg/kg) at locations 14-614502, 14-614507, and 14-614510; and decreased with depth at locations 14-614503 and 14-614506 (the concentrations in the shallower samples at locations 14-614502, 14-614503, 14-614506, 14-614507, and 14-614510 were 1910 mg/kg, 2330 mg/kg, 2280 mg/kg, 2140 mg/kg, and 1870 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations were below the maximum Qbt 2,3,4 background concentration (2820 mg/kg). Concentrations increased downgradient. The NMED residential essential nutrient screening level was approximately 144 times the maximum concentration. Further sampling for extent of magnesium is not warranted.

Manganese was detected above the Qbt 2,3,4 BV in one sample at a concentration of 486 mg/kg. Concentrations did not change substantially with depth (52 mg/kg) (the concentration in the shallower sample at location 14-614511 was 434 mg/kg and below the soil BV [Appendix D, Pivot Tables]) and decreased downgradient. The tuff concentration was below the maximum Qbt 2,3,4 background concentration (752 mg/kg). The residential and industrial SSLs were approximately 22 times and 329 times the maximum concentration, respectively. The lateral extent of manganese 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 nine tuff samples with a maximum concentration of 17 mg/kg. Concentrations did not change substantially with depth (0.1 mg/kg to 1.5 mg/kg) at locations 14-614502, 14-614503, 14-614504, 14-614505, 14-614507, 14-614510, 14-614511, 14-614512, and 14-614513 (the concentrations in the shallower samples at locations 14-614502, 14-614503, 14-614504, 14-614505, 14-614507, 14-614510, 14-614511, 14-614512, and 14-614513 were 8.0 mg/kg, 9.4 mg/kg, 7.5 mg/kg, 7.4 mg/kg, 8.1 mg/kg, 8.2 mg/kg, 7.8 mg/kg, 7.6 mg/kg, and 6.9 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Only one depth was sampled at location 14-614910, but concentrations decreased with depth in a deeper sample at location 14-614511, which is less than 10 ft from location 14-614910 (Plate 3). The soil concentrations were not different from background, and the tuff concentrations at locations 14-614502, 14-614504, and 14-614505 were below the maximum Qbt 2,3,4 background concentration (7 mg/kg). Concentrations decreased downgradient. The residential SSL was approximately 92 times the maximum concentration. The lateral extent of nickel is defined, and further sampling for vertical extent is not warranted.

Perchlorate was detected in four samples with a maximum concentration of 0.029 mg/kg. Concentrations increased with depth at locations 14-614506, 14-614510, and 14-614511 and decreased with depth at location 14-614507. Concentrations at locations 14-614506, 14-614507, and 14-614510 were below estimated DLs. Concentrations decreased downgradient. The residential SSL was approximately 1890 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 Qbt 2,3,4 BV in four samples with a maximum concentration of 1.1 mg/kg and had DLs (1 mg/kg to 2.1 mg/kg) above the soil, Qbt 2,3,4, and sediment BVs in 10 samples. Concentrations increased with depth at locations 14-614502 and 14-614511 and did not change substantially with depth (0.09 mg/kg and 0.1 mg/kg) at locations 14-614501 and 14-614503 (the concentrations in the shallower samples at locations 14-614501 and 14-614503 were 0.69 mg/kg and 1.2 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The residential SSL was approximately 355 times the maximum concentration and 186 times the maximum DL. The lateral extent of selenium is defined, and further sampling for vertical extent is not warranted.

Silver was detected above the soil BV in two samples with a maximum concentration of 1.97 mg/kg and had DLs (2.3 mg/kg to 2.6 mg/kg) above the soil and sediment BVs in five soil samples and one sediment sample. Only one depth was sampled at locations 14-614915 and 14-614916, but silver was not detected above BV in deeper samples at location 14-614506, which is approximately 10 ft from locations 14-614915 and 14-614916 (Plate 3). Concentrations decreased downgradient. The residential SSL was approximately 198 times the maximum concentration and 150 times the maximum DL. Further sampling for extent of silver is not warranted.

Vanadium was detected above the Qbt 2,3,4 and sediment BVs in 10 tuff samples and 1 sediment sample with a maximum concentration of 22.7 mg/kg. Concentrations did not change substantially with depth (0.3 mg/kg) at location 14-614513 and decreased with depth at locations 14-614501, 14-614502, 14-614503, 14-614504, 14-614505, 14-614507, 14-614510, 14-614511, and 14-614512 (the concentrations in the shallower samples at locations 14-614501, 14-614502, 14-614503, 14-614504, 14-614505, 14-614507, 14-614510, 14-614511, 14-614512, and 14-614513 were 23.8 mg/kg, 24.6 mg/kg, 29.5 mg/kg, 23.0 mg/kg, 23.1 mg/kg, 24.7 mg/kg, 23.2 mg/kg, 24.3 mg/kg, 22.4 mg/kg, and 22 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Only one depth was sampled at location 14-01035, but vanadium concentrations did not change substantially with depth (0.7 mg/kg) in a deep sample at adjacent location 14-614513. Concentrations did not change substantially downgradient (1 mg/kg). Concentrations at locations 14-614501, 14-614504, 14-614505, 14-614510, and 14-614512 were below the maximum Qbt 2,3,4 background concentration (21 mg/kg). The residential and industrial SSLs were approximately 17 times and 287 times the maximum concentration, respectively. Further sampling for extent of vanadium is not warranted.

Organic Chemicals

Organic COPCs at SWMU 14-003 include 2-amino-4,6-dinitrotoluene; bis(2-ethylhexyl)phthalate; 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8-heptachlorodibenzofuran; 1,2,3,4,7,8-hexachlorodibenzofuran; HMX, methylene chloride; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzofuran; 2,3,4,7,8-pentachlorodibenzofuran; PETN; TATB; 2,3,7,8-tetrachlorodibenzofuran; and TNT.

Amino-4,6-dinitrotoluene[2-] was detected in two samples with a maximum concentration of 0.107 mg/kg. Concentrations decreased with depth at location 14-614511 and were below the EQL. Only one depth was sampled at location 14-614916, but 2-amino-4,6-dinitrotoluene was not detected in a deeper sample at location 14-614504, which is within 5 ft of location 14-614916 (Plate 4). Concentrations decreased downgradient. The lateral and vertical extent of 2-amino-4,6-dinitrotoluene are defined.

Bis(2-ethylhexyl)phthalate was detected in two samples with a maximum concentration of 0.079 mg/kg. Concentrations deceased with depth at locations 14-614502 and 14-614511 and were below EQLs. Concentrations decreased downgradient. The lateral and vertical extent of bis(2-ethylhexyl)phthalate are defined.

HMX was detected in two samples with a maximum concentration of 0.13 mg/kg. Concentrations did not change substantially with depth (0.078 mg/kg) at location 14-614511 and decreased downgradient. The residential SSL was approximately 29,600 times the maximum concentration. The lateral extent of HMX is defined, and further sampling for vertical extent is not warranted.

Methylene chloride was detected in four samples with a maximum concentration of 0.0033 mg/kg. Only the deeper sample was analyzed for methylene chloride at all locations. Concentrations decreased downgradient, and concentrations were below EQLs. The residential SSL was approximately 124,000 times the maximum concentration. The lateral extent of methylene chloride is defined, and further sampling for vertical extent is not warranted.

PETN was detected in one sample at a concentration of 0.13 mg/kg. Concentrations decreased with depth, decreased downgradient, and were below the EQL. The lateral and vertical extent of PETN are defined.

TATB was detected in three samples with a maximum concentration of 0.16 mg/kg. Concentrations decreased with depth at locations 14-614501, 14-614511, and 14-614513 and did not change substantially (0.05 mg/kg) downgradient. Concentrations were below EQLs. The residential SSL was approximately 13,800 times the maximum concentration. The vertical extent of TATB is defined, and further sampling for lateral extent is not warranted.

TNT was detected in one sample at a concentration of 0.131 mg/kg. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of TNT are defined.

Seven dioxin/furan congeners were detected in 1 to 19 samples. Concentrations decreased with depth for all except 2 congeners at locations 14-614503, 14-614506, 14-614508, 14-614510, and 14-614511. Concentrations at depth at these locations were below the EQLs. Concentrations did not change substantially laterally. Congener concentrations were more than an order of magnitude below the residential SSL for 2,3,7,8-tetrachlorodibenzodioxin following application of the respective toxicity equivalency factors. Further sampling for extent of dioxins/furans is not warranted.

Radionuclides

Radionuclide COPCs at SWMU 14-003 include cesium-134 and cesium-137.

Cesium-134 was detected in one tuff sample at an activity of 0.052 pCi/g. The activity increased with depth at location 14-614502 and decreased downgradient. The residential SAL was approximately 96 times the maximum activity. The lateral extent of cesium-134 is defined, and further sampling for vertical extent is not warranted.

Cesium-137 was detected in one tuff sample at an activity of 0.141 pCi/g. The activity increased with depth at location 14-614512 and decreased downgradient. The residential SAL was approximately 85 times the maximum activity. The lateral extent of cesium-137 is defined, and further sampling for vertical extent is not warranted.

Summary of Nature and Extent

The extent of inorganic, organic, and radionuclide COPCs is defined or no further sampling for extent is warranted at SWMU 14-003.

6.15.5 Summary of Human Health Risk Screening

The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified in the 0.0−1.0-ft depth interval.

Construction Worker Scenario

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, 600915). The total dose is 0.1 mrem/yr, which is less than 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 6×10^{-6} (based on the EPA regional screening value for arsenic), which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.9, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.4 mrem/yr, which is less than 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 SWMU 14-003.

6.15.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at SWMU 14-003.

6.16 AOC 14-004(a), Storage Area

6.16.1 Site Description and Operational History

AOC 14-004(a) is a storage area located inside an HE magazine (structure 14-22) in the southeastern portion of TA-14 (Figure 6.16-1). The magazine (structure 14-22) housed a storage area for small quantities of HE (less than 5-gal. amounts) that were removed for disposal at frequent intervals. The dates when the magazine was used as an HE storage area are not known.

6.16.2 Relationship to Other SWMUs and AOCs

AOC 14-004(a) is a storage area located inside an HE magazine (structure 14-22). The magazine is currently in use. The nearby sites under investigation include the location of a former HE-preparation building (AOC C-14-003); the location of a former electronics shop (AOC C-14-004); and the location of a former storage building (AOC C-14-007). AOC C-14-003 is located approximately 70 ft to the northeast of AOC 14-004(a), AOC C-14-004 is approximately 120 ft south, and AOC C-14-007 is approximately 150 ft southwest.

6.16.3 Summary of Previous Investigations

No previous investigations have been conducted at AOC 14-004(a).

6.16.4 Rationale for Delayed Investigation

Sampling was proposed at AOC 14-004(a) in the FIP (LANL 2011, 207481, p. 5). However, during field activities, the magazine (structure 14-22) was found to be in use, and the floor is concrete instead of earthen, as originally believed. Site characterization and investigation of AOC 14-004(a) are therefore proposed to be delayed until the decommissioning of the magazine (structure 14-22).

6.17 SWMU 14-006, Decommissioned Sump and Outfall

6.17.1 Site Description and Operational History

SWMU 14-006 is a decommissioned HE sump (structure 14-31), associated drainline, and outfall that are located at TA-14 approximately 45 ft east of control building 14-23 (Figure 6.17-1). Installed in 1952, the steel-lined sump is constructed of reinforced concrete and measures approximately 4.5 ft wide × 8 ft long × 5 ft deep. The sump received discharges from sink and floor drains in building 14-23 and discharged to an outfall approximately 55 ft southeast of the sump. The sump has been filled with concrete and its outlet is plugged (date not known). Currently the outfall receives only storm water.

6.17.2 Relationship to Other SWMUs and AOCs

The decommissioned HE sump of SWMU 14-006 was installed in 1952 and served control building 14-23. This SWMU is not associated with other SWMUs or AOCs at TA-14.

6.17.3 Summary of Previous Investigations

During the 1995 RFI conducted at SWMU 14-006, samples were field screened for metals and gross radioactivity, and HE spot tests were performed. Based on field-screening results, 3 surface samples (0.0–0.5 ft bgs) and 3 subsurface samples (1.5–2.0 ft bgs and 4.0 ft bgs) were collected and submitted for off-site analysis of TAL metals, gamma spectroscopy, and HE (LANL 1996, 054086, pp. 5-42–5-50). The data showed 12 metals detected above BVs, detected HE and polycyclic aromatic hydrocarbons (PAHs), and uranium-235 and uranium-238 detected above BVs. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

6.17.4 Site Contamination

6.17.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at SWMU 14-006:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Fourteen samples were collected from seven locations along the inlet drainline (locations 14-614539 and 14-614532); below the sump inlet, the sump, and the sump outlet (locations 14-614533, 14-614531, and 14-614534, respectively); and along the outlet drainline (locations 14-614540 and 14-614535). These samples were collected at two depth intervals—the first at the bottom of the drainline or sump and the second at least 3 ft below the first depth.
- Eight samples were collected from four locations at and downgradient of the outfall (locations 14-614536 through 14-614538 and 14-614541) at 0.0–1.0 ft and 3.0–4.0 ft bgs.
- All samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, explosive compounds, SVOCs, gamma-emitting radionuclides, isotopic uranium, and strontium-90. Eighteen subsurface samples were analyzed for VOCs and four samples were analyzed for PCBs.

The sampling locations for the 2011 investigation at SWMU 14-006 are shown in Figure 6.17-1. Table 6.17-1 presents the samples collected and the analyses requested for SWMU 14-006. The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.17.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.17.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 14-006 consist of the results from 22 samples (7 soil and 15 tuff) collected from 11 locations.

Inorganic Chemicals

A total of 22 samples (7 soil and 15 tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.17-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.17-2 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 seven samples with a maximum concentration of 15,500 mg/kg. The Gehan and quantile tests indicated site concentrations of aluminum in tuff are statistically different from background (Figure F-37 and Table F-6). Aluminum 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 7.7 mg/kg. The Gehan and quantile tests indicated site concentrations of arsenic in tuff are statistically different from background (Figure F-38 and Table F-6). Arsenic is retained as a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in seven samples with a maximum concentration of 223 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in tuff are statistically different from background (Figure F-39 and Table F-6). 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 1.5 mg/kg. The Gehan and quantile tests indicated site concentrations of beryllium in tuff are statistically different from background (Figure F-40 and Table F-6). Beryllium is retained as a COPC.

Cadmium was detected above the soil BV (0.4 mg/kg) in 2 samples with a maximum concentration of 0.45 mg/kg. The concentrations were only 0.02 mg/kg and 0.05 mg/kg above the BV and were less than the 3 highest soil background concentrations (0.6 mg/kg, 1.4 mg/kg, and 2.6 mg/kg). Cadmium was not detected or not detected above BV in the other 20 samples (detected below BV in 17 samples). Cadmium is not a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in seven samples with a maximum concentration of 5610 mg/kg. The Gehan and quantile tests indicated site concentrations of calcium in tuff are statistically different from background (Figure F-41 and Table F-6). 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 10.8 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in tuff are statistically different from background (Figure F-42 and Table F-6). 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 6.1 mg/kg. The Gehan test indicated site concentrations of cobalt in tuff are statistically different from background (Table F-6). However, the quantile and slippage tests indicated site concentrations of cobalt in tuff are not statistically different from background (Figure F-43 and Table F-6). 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 3 soil samples and 11 tuff samples with a maximum concentration of 82.5 mg/kg. The maximum concentration in soil (82.5 mg/kg) is substantially above the BV, and the Gehan and quantile tests indicated site concentrations of copper in tuff are statistically different from background (Figure F-44 and Table F-6). Copper is retained as a COPC.

Cyanide was detected above the soil BV (0.5 mg/kg) in 1 sample at a concentration of 0.57 mg/kg and had DLs (0.52 mg/kg to 0.65 mg/kg) in 5 soil samples and 15 tuff samples above the soil and Qbt 2,3,4 BVs (0.5 mg/kg for both). The detected concentration was only 0.07 mg/kg above BV, and the DLs were only 0.02 mg/kg to 0.15 mg/kg above BVs. Cyanide was detected below 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 one sample at a concentration of 16,300 mg/kg. The Gehan test indicated site concentrations of iron in tuff are statistically different from background (Table F-6). However, the quantile and slippage tests indicated site concentrations of iron in tuff are not statistically different from background (Figure F-45 and Table F-6). 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 three soil samples and three tuff samples with a maximum concentration of 154 mg/kg. The maximum concentration in soil (154 mg/kg) is substantially above BV, and the Gehan and quantile tests indicated site concentrations of lead in tuff are statistically different from background (Figure F-46 and Table F-6). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in five samples with a maximum concentration of 3140 mg/kg. The Gehan and quantile tests indicated site concentrations of magnesium in tuff are statistically different from background (Figure F-47 and Table F-6). Magnesium is retained as a COPC.

Mercury was detected above the soil BV (0.1 mg/kg) in one sample at a concentration of 0.234 mg/kg. Mercury is retained as a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in five samples with a maximum concentration of 11.4 mg/kg. The quantile and slippage tests indicated site concentrations of nickel in tuff are statistically different from background (Figure F-48 and Table F-6). Nickel is retained as a COPC.

Nitrate was detected in 22 samples with a maximum concentration of 8.1 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 13 samples with a maximum concentration of 0.066 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 4 soil samples and 15 tuff samples with a maximum concentration of 5.5 mg/kg. Selenium 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 22.7 mg/kg. The Gehan and quantile tests indicated site concentrations of vanadium in tuff are statistically different from background (Figure F-49 and Table F-6). Vanadium is retained as a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in three samples with a maximum concentration of 151 mg/kg. Two concentrations were above the maximum soil background concentration (75.5 mg/kg). Zinc is retained as a COPC.

Organic Chemicals

A total of 22 samples (7 soil and 15 tuff) were analyzed for explosive compounds and SVOCs, 4 samples (1 soil and 3 tuff) were analyzed for PCBs, and 18 samples (3 soil and 15 tuff) were analyzed for VOCs. Table 6.17-3 presents the detected organic chemicals. Figure 6.17-3 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 being 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, 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, 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 parking lots.

Site Activities

SWMU 14-006 was identified as a SWMU because of possible soil contamination resulting from releases of HE in wastewater discharged from building 14-23, which is the control building for the firing sites in the central area of TA-14. The sump was connected to floor drains and sinks in building 14-23 and received wash water from cleanup after HE had been handled. PAHs were not used in the firing site control building.

SWMU 14-006 is located adjacent to a paved parking/storage area and paved road providing access to the control building (Appendix H, Figures H-1 and H-2). The asphalt in these areas is weathered, and runoff from the asphalt flows to the area where samples were collected. Although PAHs were detected in samples collected from depth at this site, the highest concentrations were in surface samples and detections in deeper samples may have resulted from cross-contamination from augering through surface contamination. Based on the fact that PAHs were not used in the building associated with the sump, and the sampled area receives storm water runoff from the weathered asphalt, 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 site operations and are not COPCs.

Organic COPCs

Other organic chemicals detected at SWMU 14-006 include 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; bis(2-ethylhexyl)phthalate; dibenzofuran; HMX; PETN; RDX; TATB; and TNT. The detected organic chemicals listed are retained as COPCs.

Radionuclides

A total of 22 samples (7 soil and 15 tuff) were analyzed for gamma-emitting radionuclides, isotopic uranium, and strontium-90. Table 6.17-4 presents the radionuclides detected or detected above BVs/FVs. Figure 6.17-4 shows the spatial distribution of radionuclides detected or detected above BVs/FVs.

Strontium-90 was detected in one subsurface soil sample and one tuff sample with a maximum activity of 0.38 pCi/g. Strontium-90 is retained as a COPC.

6.17.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 14-006 are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMU 14-006 include aluminum, arsenic, barium, beryllium, calcium, chromium, copper, lead, magnesium, mercury, nickel, perchlorate, selenium, vanadium, and zinc.

Aluminum was detected above the Qbt 2,3,4 BV in seven samples with a maximum concentration of 15,500 mg/kg. Concentrations increased with depth at location 14-614537; did not change substantially with depth (1000 mg/kg) at location 14-614539; and decreased with depth at locations 14-614531, 14-614532, 14-614533, 14-614534, and 14-614535 (the concentrations in the shallower samples at locations 14-614534, 14-614535, and 14-614539 were 15,600 mg/kg, 15,700 mg/kg, and 14,500 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 5 times (62,500 mg/kg below the SSL) and 83 times the maximum concentration, respectively. 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 seven samples with a maximum concentration of 7.7 mg/kg. Concentrations increased with depth at location 14-614535; did not change or did not change substantially with depth (0.0 mg/kg to 0.7 mg/kg) at locations 14-614534, 14-614536, and 14-614539; and decreased with depth at locations 14-614532, 14-614533, and 14-614537 (the concentrations in the shallower samples at locations 14-614534, 14-614536, 14-614537, and 14-614539 were 3.4 mg/kg, 3.4 mg/kg, 4.7 mg/kg, and 3.4 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). The tuff concentrations at locations 14-614532, 14-614533, 14-614534, 14-614537, and 14-614539 were below the maximum Qbt 2,3,4 background concentration (5 mg/kg). Concentrations decreased downgradient. The residential excess cancer risk for arsenic was 9×10^{-6} with a total excess cancer risk of 1×10^{-5} (the excess cancer risk for arsenic was 6×10^{-6} with a total excess cancer risk of 7×10^{-6} using the EPA residential regional screening value), which are less than or equivalent to the target risk level of 1×10^{-5} (Appendix G). The lateral extent of arsenic is defined, and further sampling for vertical extent is not warranted.

Barium was detected above the Qbt 2,3,4 BV in seven samples with a maximum concentration of 223 mg/kg. Concentrations did not change substantially with depth (0.8 mg/kg) at location 14-614537 and decreased with depth at the other locations (the concentrations in the shallower samples at locations 14-614534, 14-614537, and 14-614539 were 175 mg/kg, 48.2 mg/kg, and 280 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). The tuff concentration at location 14-614537 was below the maximum Qbt 2,3,4 background concentration (51.6 mg/kg). Concentrations decreased downgradient. The residential SSL was approximately 70 times the maximum concentration. The lateral extent of barium is defined, and further sampling for vertical extent is not warranted.

Beryllium was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 1.5 mg/kg. Concentrations did not change substantially with depth (0.2 mg/kg and 0.4 mg/kg) at locations 14-614535 and 14-614539 (the concentrations in the shallower samples at locations 14-614535 and 14-614539 were 1.5 mg/kg and 1.1 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). The tuff concentrations were below the maximum Qbt 2,3,4 background concentration (1.8 mg/kg). Concentrations decreased downgradient. The residential SSL was approximately 104 times the maximum concentration. 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 seven samples with a maximum concentration of 5610 mg/kg. Concentrations did not change substantially with depth (50 mg/kg) at location 14-614535 and decreased with depth at the other locations (the concentrations in the shallower samples at locations 14-614534, 14-614535, and 14-614539 were 2920 mg/kg, 2950 mg/kg, and 3040 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The NMED residential essential nutrient screening level was approximately 232 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 four samples with a maximum concentration of 10.8 mg/kg. Concentrations increased with depth at locations 14-614537 and 14-614539 and decreased with depth at locations 14-614532 and 14-614535 (the concentration in the shallower sample at location 14-614535 was 10.1 mg/kg and below the soil BV [Appendix D, Pivot Tables]). The tuff concentrations were all below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Concentrations decreased downgradient. As discussed in section 4.2, because there was no known use of hexavalent chromium at this site, the results were compared with the residential SSL for trivalent chromium (117,000 mg/kg). The residential trivalent chromium SSL was approximately 10,800 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 Qbt 2,3,4 BV in one sample at a concentration of 6.1 mg/kg. The concentration did not change substantially with depth (0.8 mg/kg) at location 14-614539 (the concentration in the shallower sample at location 14-614539 was 5.3 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 3.8 times and 57 times the maximum concentration, respectively. 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 3 soil samples and 11 tuff samples with a maximum concentration of 82.5 mg/kg. Concentrations did not change substantially with depth (1.4 mg/kg and 0.2 mg/kg) at locations 14-614533 and 14-614540 and decreased with depth at the other locations (the concentrations in the shallower samples at locations 14-614534, 14-614535, and 14-614537 were 8.1 mg/kg, 10.4 mg/kg, and 11.6 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). The tuff concentrations at locations 14-614531, 14-614534, 14-614537, and 14-614540 were below the maximum Qbt 2,3,4 background concentration (6.2 mg/kg). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 38 times and 629 times the maximum concentration, respectively. 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 three tuff samples with a maximum concentration of 154 mg/kg. Concentrations decreased with depth at all locations and decreased downgradient (the concentration in the shallower sample at location 14-614535 was 22.3 mg/kg and below the soil BV [Appendix D, Pivot Tables]). The lateral and vertical extent of lead are defined.

Magnesium was detected above the Qbt 2,3,4 BV in five samples with a maximum concentration of 3140 mg/kg. Concentrations increased with depth at location 14-614539, did not change substantially with depth (200 mg/kg) at location 14-614534, and decreased with depth at locations 14-614532, 14-614534, and 14-614535 (the concentrations in the shallower samples at locations 14-614534 and 14-614535 were 2280 mg/kg and 2740 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). The tuff concentrations at locations 14-614532, 14-614533, 14-614534, and 14-614535 were below the maximum Qbt 2,3,4 background concentration (2820 mg/kg). Concentrations decreased downgradient. The NMED residential essential nutrient screening level was approximately 108 times the maximum concentration. The lateral extent of magnesium is defined, and further sampling for vertical extent is not warranted.

Mercury was detected above the soil BV in one sample at a concentration of 0.234 mg/kg. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of mercury are defined.

Nickel was detected above the Qbt 2,3,4 BV in five samples with a maximum concentration of 11.4 mg/kg. Concentrations increased with depth at location 14-614539, did not change substantially with depth (1.9 mg/kg and 2.0 mg/kg) at locations 14-614534 and 14-614535 (the concentrations in the shallower samples at locations 14-614534 and 14-614535 were 7.9 mg/kg and 9.6 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]), and decreased with depth at locations 14-614532 and 14-614540. Concentrations decreased downgradient. The residential SSL was approximately 137 times the maximum concentration. The lateral extent of nickel is defined, and further sampling for vertical extent is not warranted.

Perchlorate was detected in 13 samples with a maximum concentration of 0.066 mg/kg. Concentrations increased with depth at locations 14-614531, 14-614533, and 14-614536; did not change substantially with depth (0.001 mg/kg to 0.02 mg/kg) at locations 14-614535, 14-614537, 14-614538, and 14-614541; and decreased with depth at locations 14-614539 and 14-614540. Concentrations at locations 14-614531, 14-614533, and 14-614539 were below estimated DLs. Concentrations decreased downgradient. The residential SSL was approximately 830 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 4 soil samples and 15 tuff samples with a maximum concentration of 5.5 mg/kg. Concentrations increased with depth at locations 14-614531, 14-614534, 14-614535, and 14-614536 and did not change substantially with depth (0.1 mg/kg to 0.9 mg/kg) at locations 14-614532, 14-614533, 14-614537, 14-614538, 14-614539, 14-614540, and 14-614541 (the concentration in the shallower sample at location 14-614541 was 1.5 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The residential SSL was approximately 71 times the maximum concentration. The lateral extent of selenium is defined, and further sampling for vertical extent is not warranted.

Vanadium was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 22.7 mg/kg. Concentrations did not change substantially with depth (0.3 mg/kg) at location 14-614539 (the concentration in the shallower sample at location 14-614539 was 22.4 mg/kg and below the soil BV [Appendix D, Pivot Tables]) and decreased with depth at location 14-614532. The tuff concentration at location 14-614532 was below the maximum Qbt 2,3,4 background concentration (21 mg/kg). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 17 times and 288 times the maximum concentration, respectively. The lateral extent of vanadium 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 151 mg/kg. Concentrations decreased with depth at all locations and decreased downgradient. The lateral and vertical extent of zinc are defined.

Organic Chemicals

Organic COPCs detected at SWMU 14-006 include 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; bis(2-ethylhexyl)phthalate; dibenzofuran; HMX; PETN; RDX; TATB; and TNT.

Amino-2,6-dinitrotoluene[4-] and 2-amino-4,6-dinitrotoluene were each detected in two samples with maximum concentrations of 0.16 mg/kg and 0.17 mg/kg, respectively. Concentrations decreased with depth at both locations and decreased downgradient. 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 four samples with a maximum concentration of 1.5 mg/kg. Concentrations increased with depth at locations 14-614532, 14-614537, and 14-614540; decreased with depth at location 14-614538; and decreased downgradient. Concentrations of bis(2-ethylhexyl)phthalate were below or equivalent to EQLs at locations 14-614532, 14-614538, and 14-614540. The residential SSL was approximately 253 times the maximum concentration. The lateral extent of bis(2-ethylhexyl)phthalate is defined, and further sampling for vertical extent is not warranted.

Dibenzofuran was detected in three samples with a maximum concentration of 1.1 mg/kg. Concentrations decreased with depth at all locations and decreased downgradient. The lateral and vertical extent of dibenzofuran are defined.

HMX was detected in 20 samples at 11 locations with a maximum concentration of 1.8 mg/kg. Concentrations increased with depth at location 14-614532; did not change substantially with depth (0.074 mg/kg to 0.59 mg/kg) at locations 14-614531, 14-614534, 14-614535, 14-614537, 14-614539, and 14-614540; and decreased with depth at locations 14-614533, 14-614536, 14-614538, and 14-614541. Concentrations did not change substantially downgradient (0.1 mg/kg). The residential SSL was approximately 2140 times the maximum concentration. Further sampling for extent of HMX is not warranted.

PETN was detected in one sample at a concentration of 1.7 mg/kg. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of PETN are defined.

RDX was detected in two samples with a maximum concentration of 2.6 mg/kg. Concentrations decreased with depth at both locations and decreased downgradient. The lateral and vertical extent of RDX are defined.

TATB was detected in 16 samples with a maximum concentration of 13 mg/kg. Concentrations increased with depth at location 14-614532; did not change substantially with depth (0.21 mg/kg to 0.64 mg/kg) at locations 14-614531, 14-614534, and 14-614535; and decreased with depth at locations 14-614533, 14-614536, 14-614537, 14-614538, 14-614540, and 14-614541. Concentrations decreased downgradient. The residential SSL was approximately 169 times the maximum concentration. The lateral extent of TATB is defined, and further sampling for vertical extent is not warranted.

TNT was detected in six samples with a maximum concentration of 0.83 mg/kg. Concentrations increased with depth at location 14-614532; decreased with depth at locations 14-614534, 14-614536, 14-614538, and 14-614541; and decreased downgradient. Concentrations were below the EQLs. The residential SSL was approximately 43 times the maximum concentration. The lateral extent of TNT is defined, and further sampling for vertical extent is not warranted.

Radionuclides

Radionuclide COPCs at SWMU 14-006 include strontium-90.

Strontium-90 was detected in one subsurface soil sample and one tuff sample with a maximum activity of 0.38 pCi/g. Activities increased with depth at location 14-614532, decreased with depth at location 14-614535, and decreased downgradient. The residential SAL was approximately 39 times the maximum activity. The lateral extent of strontium-90 is defined, and further sampling for vertical extent is not warranted.

Summary of Nature and Extent

The extent of inorganic, organic, and radionuclide COPCs is defined or no further sampling for extent is warranted at SWMU 14-006.

6.17.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 8×10^{-8}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified in the 0.0−1.0-ft depth interval.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.007 mrem/yr, which is less than 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} (based on the EPA regional screening value for arsenic), which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.3, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.6 mrem/yr, which is less than 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 SWMU 14-006.

6.17.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at SWMU 14-006.

6.18 SWMU 14-007, Decommissioned Septic System

6.18.1 Site Description and Operational History

SWMU 14-007 is a decommissioned septic system located at TA-14, approximately 70 ft northeast of building 14-6 (Figure 6.18-1). The septic system consists of an inactive septic tank (structure 14-19) installed in 1944 and an inactive drain field installed in 1988. The reinforced concrete tank measures 4 ft wide × 7 ft long × 6 ft deep and has a capacity of 640 gal. The drain field is approximately 9 ft wide × 18 ft long. The septic system received effluent from a photoprocessing sink, a restroom, a shop, and dark room. Originally, the tank discharged to an outfall located 130 ft northeast of the septic tank. In 1988, a drain field and a new drainline (from the septic tank to the drain field) were installed and the portion of the original drainline that discharged to the outfall was decommissioned in place. The septic tank and drain field were disconnected in 1992 when building 14-6 was connected to the SWSC.

6.18.2 Relationship to Other SWMUs and AOCs

The decommissioned septic system of SWMU 14-007 was installed in 1944 and served building 14-6. This SWMU is not associated with other SWMUs or AOCs at TA-14.

6.18.3 Summary of Previous Investigations

During the 1995 RFI conducted at SWMU 14-007, samples were field screened for metals and gross radioactivity, and HE spot tests were performed. Based on field-screening results, three surface samples (0.0–0.5 ft bgs) and three subsurface samples (1.5–2.0 ft bgs and 5.0 ft bgs) were collected and submitted for off-site analysis of TAL metals, total cyanide, HE, and SVOCs and by gamma spectroscopy (LANL 1996, 054086, pp. 5-75–5-81). The data showed five metals detected above BVs and uranium-235 and uranium-238 detected above BVs. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

6.18.4 Site Contamination

6.18.4.1 Soil, Rock, and Sediment Sampling

During sampling for the 2011 investigation, the inlet drainline to the septic tank was located and samples were collected next to the drainline. The FIP proposed to remove the septic tank and collect samples at the septic tank inlet and outlet and beneath the tank. However, because of safety concerns associated with removing the septic tank, it was not removed but instead was filled with cement during field activities. Samples were collected next to the septic tank. The outlet drainline was not located; consequently, samples were collected at the sampling locations proposed in the FIP. The drain field was located and sampled as proposed in the FIP. As part of the 2011 investigation, the following activities were conducted at SWMU 14-007:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Twenty-seven samples were collected from nine locations along the inlet drainline (locations 14-614551 and 14-614552); at the tank inlet, the tank, and the tank outlet (locations 14-614542, 14-614544, and 14-614543, respectively); and along the outlet drainline (locations 14-614553, 14-614545, 14-614549, and 14-614550). Samples at location 14-614551 were collected at 2.5–3.5 ft and 5.5–6.5 ft bgs; samples at location 14-614544 were collected at 0.0–1.0 ft, 3.0–4.0 ft, 6.0–7.0 ft, and 9.0–10.0 ft bgs; samples at the other locations were collected at 0.0–1.0 ft, 3.0–4.0 ft, and 6.0–7.0 ft bgs.
- Eight samples were collected from four locations (14-614546, 14-614547, 14-614548, and 14-614554) at and downgradient of the outfall at 0.0–1.0 ft and 3.0–4.0 ft bgs.
- Twenty-four samples were collected from eight locations (14-614555 through 14-614562) within and around the drain field at 0.0–1.0 ft, 3.0–4.0 ft, and 6.0–7.0 ft bgs.
- All samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, explosive compounds, SVOCs, gamma-emitting radionuclides, isotopic uranium, and strontium-90. Thirty-nine subsurface samples were analyzed for VOCs and thirteen samples were analyzed for PCBs.

Locations 14-614542, 14-614543, 14-614544, 14-614545, 14-614549, 14-614552, and 14-614553 are along or adjacent to drainlines. The shallower samples were incorrectly collected at 0.0–1.0 ft bgs instead of 0.0–1.0 ft below the drainlines. Samples from 0.0–1.0 ft bgs at these locations are not representative of potential releases from the drainlines, and results from these samples were not evaluated.

The sampling locations for the 2011 investigation at SWMU 14-007 are shown in Figure 6.18-1. Table 6.18-1 presents the samples collected and the analyses requested for SWMU 14-007. The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.18.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.18.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 14-007 consist of the results from 52 samples (36 soil and 16 Qbt 4) collected from 21 locations.

Inorganic Chemicals

A total of 52 samples (36 soil and 16 tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.18-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.18-2 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 14 samples with a maximum concentration of 20,800 mg/kg. The Gehan and quantile tests indicated site concentrations of aluminum in tuff are statistically different from background (Figure F-50 and Table F-7). Aluminum is retained as a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in eight samples with a maximum concentration of 3.5 mg/kg. The Gehan and quantile tests indicated site concentrations of arsenic in tuff are statistically different from background (Figure F-51 and Table F-7). Arsenic is retained as a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in 15 samples with a maximum concentration of 257 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in tuff are statistically different from background (Figure F-52 and Table F-7). 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 1.7 mg/kg. The Gehan and quantile tests indicated site concentrations of beryllium in tuff are statistically different from background (Figure F-53 and Table F-7). Beryllium is retained as a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in 10 samples with a maximum concentration of 6870 mg/kg. The Gehan and quantile tests indicated site concentrations of calcium in tuff are statistically different from background (Figure F-54 and Table F-7). Calcium is retained as a COPC.

Chromium was detected above the Qbt 2,3,4 BV (7.14 mg/kg) in 10 samples with a maximum concentration of 10.2 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in tuff are statistically different from background (Figure F-55 and Table F-7). 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 eight tuff samples with a maximum concentration of 15.8 mg/kg. The quantile and slippage tests indicated site concentrations of cobalt in soil are not statistically different from background (Figure F-56 and Table F-8). The Gehan and slippage tests indicated site concentrations of cobalt in tuff are statistically different from background (Figure F-57 and Table F-7). Cobalt is retained as a COPC.

Copper was detected above the Qbt 2,3,4 BV (4.66 mg/kg) in 13 samples with a maximum concentration of 8.1 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in tuff are statistically different from background (Figure F-58 and Table F-7). Copper is retained as a COPC.

Cyanide was not detected above the soil or Qbt 2,3,4 BVs (0.5 mg/kg for both) but had DLs (0.52 mg/kg to 0.61 mg/kg) in 32 soil samples and 16 tuff samples above BVs. The DLs were only 0.02 mg/kg to 0.11 mg/kg above the BVs. Cyanide was not detected or not detected above BV in 4 other samples (detected below BV in 3 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 16,800 mg/kg. The Gehan and quantile tests indicated site concentrations of iron in tuff are statistically different from background (Figure F-59 and Table F-7). Iron is retained as a COPC.

Lead was detected above the Qbt 2,3,4 BV (11.2 mg/kg) in five samples with a maximum concentration of 15.9 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in tuff are statistically different from background (Figure F-60 and Table F-7). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in 12 samples with a maximum concentration of 3530 mg/kg. The Gehan and quantile tests indicated site concentrations of magnesium in tuff are statistically different from background (Figure F-61 and Table F-7). Magnesium is retained as a COPC.

Manganese was detected above the soil and Qbt 2,3,4 BVs (671 mg/kg and 482 mg/kg) in one soil sample and three tuff samples with a maximum concentration of 739 mg/kg. The Gehan test indicated site concentrations of manganese in soil are statistically different from background (Table F-8). However, the quantile and slippage tests indicated site concentrations of manganese in soil are not statistically different from background (Figure F-62 and Table F-8). The Gehan test indicated site concentrations of manganese in tuff are statistically different from background (Table F-7). However, the quantile and slippage tests indicated site concentrations of manganese in tuff are not statistically different from background (Figure F-63 and Table F-7). Manganese is not a COPC.

Mercury was detected above the soil BV (0.1 mg/kg) in three samples with a maximum concentration of 0.259 mg/kg. Mercury is retained as a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in 12 samples with a maximum concentration of 11.9 mg/kg. The quantile and slippage tests indicated site concentrations of nickel in tuff are statistically different from background (Figure F-64 and Table F-7). Nickel is retained as a COPC.

Nitrate was detected in 42 samples with a maximum concentration of 9.3 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 16 samples with a maximum concentration of 0.0071 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 6 soil samples and 16 tuff samples with a maximum concentration of 2.2 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure F-65 and Table F-8). The maximum concentration in tuff (2.2 mg/kg) was substantially above the Qbt 2,3,4 BV. Selenium is retained as a COPC.

Silver was detected above the soil and Qbt 2,3,4 BVs (1 mg/kg for both) in nine soil samples and two tuff samples with a maximum concentration of 24.2 mg/kg. Silver is retained as a COPC.

Vanadium was detected above the Qbt 2,3,4 BV (17 mg/kg) in five samples with a maximum concentration of 23 mg/kg. The Gehan and quantile tests indicated site concentrations of vanadium in tuff are statistically different from background (Figure F-66 and Table F-7). Vanadium is retained as a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in three samples with a maximum concentration of 97.6 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are not statistically different from background (Figure F-67 and Table F-8). Zinc is not a COPC.

Organic Chemicals

A total of 52 samples (36 soil and 16 tuff) were analyzed for explosive compounds and SVOCs, 11 samples (7 soil and 4 tuff) were analyzed for PCBs, and 39 samples (23 soil and 16 tuff) were analyzed for VOCs. Table 6.18-3 presents the detected organic chemicals. Figure 6.18-3 shows the spatial distribution of detected organic chemicals.

Organic chemicals detected at SWMU 14-007 include acenaphthene; acetone; bis(2-ethylhexyl)phthalate; 1,3-dichlorobenzene; HMX; 4-isopropyltoluene; methylene chloride; TATB; and trichloroethene. The detected organic chemicals are retained as COPCs.

Radionuclides

A total of 52 samples (36 soil and 16 Qbt 4) were analyzed for gamma-emitting radionuclides, isotopic uranium, and strontium-90. Table 6.18-4 presents the radionuclides detected or detected above BVs/FVs. Figure 6.18-4 shows the spatial distribution of radionuclides detected or detected above BVs/FVs.

Cesium-137 was detected in one subsurface soil sample at an activity of 0.146 pCi/g. Cesium-137 is retained as a COPC.

Strontium-90 was detected in one subsurface soil sample at an activity of 0.46 pCi/g. Strontium-90 is retained as a COPC.

6.18.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 14-007 are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMU 14-007 include aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, mercury, nickel, perchlorate, selenium, silver, and vanadium.

Aluminum was detected above the Qbt 2,3,4 BV in 14 samples with a maximum concentration of 20,800 mg/kg. Concentrations did not change substantially with depth (300 mg/kg) at location 14-614560; and decreased with depth at locations 14-614542, 14-614543, 14-614545, 14-614550, 14-614553, 14-614555, 14-614556, 14-614558, 14-614559, 14-614561, and 14-614562 (the concentrations in the shallower samples at locations 14-614542, 14-614543, 14-614545, 14-614550, 14-614555, 14-614556, 14-614558, 14-614559, 14-614561, and 14-614562 were 20,300 mg/kg, 16,000 mg/kg, 17,900 mg/kg, 17,500 mg/kg, 19,300 mg/kg, 15,400 mg/kg, 14,600 mg/kg, 28,200 mg/kg, 19,000 mg/kg, and 18,200 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 3.8 times (57,200 mg/kg below the SSL) and 62 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 eight samples with a maximum concentration of 3.5 mg/kg. Concentrations did not change substantially with depth (0.1 mg/kg to 0.6 mg/kg) at locations 14-614542, 14-614543, 14-614553, 14-614555, 14-614558, 14-614560, and 14-614562 (the concentrations in the shallower samples at locations 14-614542, 14-614543, 14-614560, 14-614562, 14-614555, and 14-614558 were 3.7 mg/kg, 3.6 mg/kg, 2.8 mg/kg, 2.9 mg/kg, 3.6 mg/kg, and 2.9 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). The concentration in the deepest sample at location 14-614553 was 2.4 mg/kg and below the Qbt 2,3,4 BV (Appendix D, Pivot Tables). Tuff concentrations were below the maximum Qbt 2,3,4 background concentration (5 mg/kg). Concentrations did not change substantially downgradient (0.7 mg/kg). Further sampling for extent of arsenic is not warranted.

Barium was detected above the Qbt 2,3,4 BV in 15 samples with a maximum concentration of 257 mg/kg. Concentrations did not change substantially with depth (14 mg/kg to 33 mg/kg) at locations 14-614543, 14-614555, and 14-614558 and decreased with depth at locations 14-614542, 14-614545, 14-614550, 14-614553, 14-614556, 14-614557, 14-614559, 14-614560, 14-614561, and 14-614562 (concentrations in the shallower samples at locations 14-614542, 14-614543, 14-614545, 14-614550, 14-614555, 14-614556, 14-614557, 14-614558, 14-614561, and 14-614562 were 216 mg/kg, 223 mg/kg, 170 mg/kg, 189 mg/kg, 189 mg/kg, 195 mg/kg, 199 mg/kg, 184 mg/kg, 183 mg/kg, and 190 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially downgradient (13 mg/kg). The residential SSL was approximately 61 times the maximum concentration. Further sampling for extent of barium is not warranted.

Beryllium was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 1.7 mg/kg. Concentrations decreased with depth at location 14-614553 and did not change substantially with depth (0.5 mg/kg) at location 14-614562 (the concentration in the shallower sample at location 14-614562 was 1.2 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations were below the maximum Qbt 2,3,4 background concentration (1.8 mg/kg). Concentrations did not change substantially downgradient (0.4 mg/kg). The residential SSL was approximately 92 times the maximum concentration. Further sampling for extent of beryllium is not warranted.

Calcium was detected above the Qbt 2,3,4 BV in 10 samples with a maximum concentration of 6870 mg/kg. Concentrations increased with depth at locations 14-614545, 14-614550, 14-614555, 14-614556, 14-614557, 14-614560, 14-614561, and 14-614562 and decreased with depth at location 14-614553. Concentrations decreased downgradient. The NMED residential essential nutrient screening level was approximately 189 times the maximum concentration. Further sampling for extent of calcium is not warranted.

Chromium was detected above the Qbt 2,3,4 BV in 10 samples with a maximum concentration of 10.2 mg/kg. Concentrations did not change or did not change substantially (0.0 mg/kg to 0.9 mg/kg) with depth at locations 14-614542, 14-614543, 14-614545, 14-614550, 14-614553, 14-614559, 14-614560, and 14-614562 and decreased with depth at location 14-614555 (concentrations in the shallower samples at locations 14-614542, 14-614543, 14-614545, 14-614550, 14-614553, 14-614555, 14-614559, and 14-614562 were 11.1 mg/kg, 10.5 mg/kg, 9.8 mg/kg, 9.4 mg/kg, 9.3 mg/kg, 8.5 mg/kg, 9.3 mg/kg, and 10.1 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). The tuff concentrations were all below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Concentrations did not change substantially downgradient (0.1 mg/kg). As discussed in section 4.2, because there was no known use of hexavalent chromium at this site, the results were compared with the residential SSL for trivalent chromium (117,000 mg/kg). The residential trivalent chromium SSL was approximately 11,500 times the maximum concentration. Further sampling for extent of chromium is not warranted.

Cobalt was detected above the soil and Qbt 2,3,4 BVs in one soil sample and eight tuff samples with a maximum concentration of 15.8 mg/kg. Concentrations did not change substantially (0.1 mg/kg to 1.1 mg/kg) with depth at locations 14-614542, 14-614553, 14-614555, and 14-614558 and decreased with depth at locations 14-614543, 14-614545, and 14-614560 (concentrations in the shallower samples at locations 14-614542, 14-614545, 14-614555, and 14-614558 were 6.5 mg/kg, 6.1 mg/kg, 6.0 mg/kg, and 5.8 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 1.5 times and 22 times the maximum concentration, respectively. The lateral extent of cobalt is defined, and further sampling for vertical extent is not warranted.

Copper was detected above the Qbt 2,3,4 BV in 13 samples with a maximum concentration of 8.1 mg/kg. Concentrations increased with depth at location 14-614555; did not change substantially with depth (0.2 mg/kg to 1.2 mg/kg) at locations 14-614542, 14-614543, 14-614553, and 14-614562; and decreased with depth at locations 14-614545, 14-614550, 14-614556, 14-614558, 14-614560, and 14-614561 (concentrations in the shallower samples at locations 14-614542, 14-614543, 14-614545, 14-614550, 14-614556, 14-614558, 14-614561, and 14-614562 were 8.7 mg/kg, 8.7 mg/kg, 7.9 mg/kg, 7.9 mg/kg, 6.9 mg/kg, 7 mg/kg, 7 mg/kg, and 6.1 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations at locations 14-614545, 14-614550, 14-614553, 14-614556, and 14-614558 were below the maximum Qbt 2,3,4 background concentration (6.2 mg/kg). Concentrations did not change substantially downgradient (1.1 mg/kg). The residential SSL was approximately 386 times the maximum concentration. Further sampling for extent of copper is not warranted.

Iron was detected above the Qbt 2,3,4 BV in one sample at a concentration of 16,800 mg/kg. Concentrations increased with depth and increased downgradient. The concentration was below the maximum Qbt 2,3,4 background concentration (19,500 mg/kg). The residential and industrial SSLs were approximately 3.3 times and 54 times the concentration, respectively. Further sampling for extent of iron is not warranted.

Lead was detected above the Qbt 2,3,4 BV in five samples with a maximum concentration of 15.9 mg/kg. Concentrations did not change substantially with depth (1.1 mg/kg and 1.9 mg/kg) at locations 14-614555 and 14-614558 and decreased with depth at locations 14-614543, 14-614553, and 14-614560 (the concentration in the shallower sample at location 14-614543 was 18.2 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations at locations 14-614543, 14-614553, 14-614555, and 14-614558 were below the maximum Qbt 2,3,4 background concentration (15.5 mg/kg). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 25 times and 50 times the maximum concentration, respectively. 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 12 samples with a maximum concentration of 3530 mg/kg. Concentrations increased with depth at locations 14-614555, 14-614560, and 14-614562; did not change substantially with depth (20 mg/kg to 80 mg/kg) at locations 14-614545, 14-614550, 14-614556, and 14-614561; and decreased with depth at locations 14-614542, 14-614543, and 14-614553 (concentrations in the shallower samples at locations 14-614542, 14-614543, 14-614545, 14-614556, and 14-614561 were 2680 mg/kg, 2260 mg/kg, 2080 mg/kg, 1830 mg/kg, and 1810 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations at locations 14-614542, 14-614543, 14-614545, 14-614550, 14-614553, 14-614555, 14-614556, and 14-614561 were all below the Qbt 2,3,4 maximum background concentration (2820 mg/kg). Concentrations increased downgradient. The NMED residential essential nutrient screening level was approximately 96 times the maximum concentration. Further sampling for extent of magnesium is not warranted.

Mercury was detected above the soil BV in three samples with a maximum concentration of 0.259 mg/kg. Concentrations increased with depth at locations 14-614546 and 14-614548, decreased with depth at location 14-614547, and decreased downgradient. The residential SSL was approximately 91 times the maximum concentration. The lateral extent of mercury is defined, and further sampling for vertical extent is not warranted.

Nickel was detected above the Qbt 2,3,4 BV in 12 samples with a maximum concentration of 11.9 mg/kg. Concentrations increased with depth at locations 14-614558 and 14-614562; did not change substantially with depth (0.4 mg/kg to 0.7 mg/kg) at locations 14-614543, 14-614555, and 14-614560; and decreased with depth at locations 14-614542, 14-614545, 14-614553, 14-614556, and 14-614559 (concentrations in the shallower samples at locations 14-614542, 14-614543, 14-614545, 14-614555, 14-614556, 14-614559, and 14-614560 were 10.4 mg/kg, 9.3 mg/kg, 9.5 mg/kg, 7.1 mg/kg, 8.5 mg/kg, 10.5 mg/kg, and 8 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations at locations 14-614545, 14-614553, 14-614556, and 14-614559 were equivalent to or below the Qbt 2,3,4 maximum background concentration (7 mg/kg). Concentrations did not change substantially downgradient (0.7 mg/kg). The residential SSL was approximately 131 times the maximum concentration. Further sampling for extent of nickel is not warranted.

Perchlorate was detected in 16 samples with a maximum concentration of 0.0071 mg/kg. Concentrations increased with depth at locations 14-614554, 14-614556, 14-614557, 14-614558, 14-614560, and 14-614562; did not change substantially with depth (0.0014 mg/kg to 0.0026 mg/kg) at locations 14-614549, 14-614555, and 14-614561; and decreased with depth at locations 14-614550, 14-614551, and 14-614553. Concentrations did not change substantially downgradient (0.0009 mg/kg). All concentrations, except at locations 14-614560 and 14-614562, were below the estimated DLs. The residential SSL was approximately 7720 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 6 soil samples and 16 tuff samples with a maximum concentration of 2.2 mg/kg. Concentrations increased with depth at locations 14-614544 and 14-614558; did not change or did not change substantially with depth (0.0 mg/kg to 0.8 mg/kg) at locations 14-614542, 14-614543, 14-614545, 14-614549, 14-614550, 14-614553, 14-614555, 14-614556, 14-614557, 14-614559, 14-614560, 14-614561, and14-614562; and decreased with depth at location 14-614552 (concentrations in the shallower samples at locations 14-614543, 14-614545, 14-614549, 14-614555, 14-614556, 14-614557, 14-614559, 14-614560, 14-614561, and 14-614562 were 1.3 mg/kg, 1.2 mg/kg, 1.1 mg/kg, 1.3 mg/kg, 1.4 mg/kg, 1.2 mg/kg, 1.2 mg/kg, 1.4 mg/kg, 1.3 mg/kg, and 1.1 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially downgradient (0.4 mg/kg). The residential SSL was approximately 178 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Silver was detected above the soil and Qbt 2,3,4 BVs in nine soil samples and two tuff samples with a maximum concentration of 24.2 mg/kg. Concentrations did not change substantially with depth (2.2 mg/kg) at location 14-614546, decreased with depth at all other locations, and decreased downgradient. The residential and industrial SSLs were approximately 16 times and 268 times the maximum concentration, respectively. The lateral extent of silver is defined, and further sampling for vertical extent is not warranted.

Vanadium was detected above the Qbt 2,3,4 BV in five samples with a maximum concentration of 23 mg/kg. Concentrations did not change substantially with depth (1.8 mg/kg) at location 14-614555 and decreased with depth at locations 14-614542, 14-614543, 14-614553, and 14-614560 (concentrations in the shallower samples at locations 14-614542, 14-614543, and 14-614555 were 26 mg/kg, 26.1 mg/kg, and 21.3 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations at locations 14-614542, 14-614553, and 14-614555 were equivalent to or below the Qbt 2,3,4 maximum background concentration (21 mg/kg). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 17 times and 284 times the maximum concentration, respectively. The lateral extent of vanadium is defined, and further sampling for vertical extent is not warranted.

Organic Chemicals

Organic COPCs at SWMU 14-007 include acenaphthene; acetone; bis(2-ethylhexyl)phthalate; 1,3-dichlorobenzene; HMX; 4-isopropyltoluene; methylene chloride; TATB; and trichloroethene.

Acenaphthene was detected in one sample at a concentration of 0.074 mg/kg. Concentrations increased with depth at location 14-614548 but the concentration was below the EQL. Concentrations decreased downgradient. The residential SSL was approximately 47,000 times the maximum concentration. The lateral extent of acenaphthene is defined, and further sampling for vertical extent is not warranted.

Acetone was detected in 10 samples with a maximum concentration of 0.012 mg/kg. Concentrations did not change substantially with depth (0.0018 mg/kg) at location 14-614551 and decreased with depth at locations 14-614543, 14-614544, 14-614545, and 14-614553. Only the deepest sample was analyzed for VOCs at locations 14-614546, 14-614547, and 14-614548. Concentrations decreased downgradient and were below EQLs. The residential SSL was approximately 5,520,000 times the maximum concentration. The lateral extent of acetone is defined, and further sampling for vertical extent is not warranted.

Bis(2-ethylhexyl)phthalate was detected in five samples with a maximum concentration of 0.71 mg/kg. Concentrations increased with depth at locations 14-614551 and 14-614556, did not change substantially with depth (0.29 mg/kg) at location 14-614555, and decreased with depth at location 14-614554. Concentrations decreased downgradient. The residential SSL was approximately 535 times the maximum concentration. The lateral extent of bis(2-ethylhexyl)phthalate is defined, and further sampling for vertical extent is not warranted.

Dichlorobenzene[1,3-] was detected in one sample at a concentration of 0.00034 mg/kg. Concentrations increased with depth at location 14-614545 but the concentration was below the EQL. Concentrations decreased downgradient. The residential SSL was approximately 6,320,000 times the maximum concentration. The lateral extent of 1,3-dichlorobenzene is defined, and further sampling for vertical extent is not warranted.

HMX was detected in one sample at a concentration of 0.054 mg/kg. Concentrations decreased with depth at location 14-614552 and decreased downgradient, and the concentration was below the EQL. The lateral and vertical extent of HMX are defined.

Isopropyltoluene[4-] was detected in one sample at a concentration of 0.0006 mg/kg. Only the deepest sample at location 14-614548 was analyzed for VOCs. Concentrations decreased downgradient, and the concentration was below the EQL. The residential SSL was approximately 3,930,000 times the maximum concentration. The lateral extent of 4-isopropyltoluene is defined, and further sampling for vertical extent is not warranted.

Methylene chloride was detected in nine samples with a maximum concentration of 0.0041 mg/kg. Concentrations decreased with depth at locations 14-614542, 14-614543, 14-614544, 14-614545, 14-614552, and 14-614553. Only the deepest sample was analyzed for VOCs at locations 14-614546, 14-614547, and 14-614548. Concentrations decreased downgradient, and concentrations were below EQLs. The residential SSL was approximately 99,800 times the maximum concentration. The lateral extent of methylene chloride is defined, and further sampling for vertical extent is not warranted.

TATB was detected in 12 samples with a maximum concentration of 3.6 mg/kg. Concentrations increased with depth at locations 14-614549 and 14-614552 and decreased with depth at locations 14-614543, 14-614546, 14-614547, 14-614548, 14-614551, 14-614554, 14-614555, and 14-614559. Concentrations at locations 14-614547, 14-614548, 14-614549, 14-614552, and 14-614559 were below EQLs. Concentrations decreased downgradient. The residential SSL was approximately 611 times the maximum concentration. The lateral extent of TATB is defined, and further sampling for vertical extent is not warranted.

Trichloroethene was detected in two samples with a maximum concentration of 0.001 mg/kg. Concentrations increased with depth at locations 14-614543 and 14-614549, but concentrations were below EQLs. Concentrations decreased downgradient. The residential SSL was approximately 6780 times the maximum concentration. The lateral extent of trichloroethene is defined, and further sampling for vertical extent is not warranted.

Radionuclides

Radionuclide COPCs at SWMU 14-007 include cesium-137 and strontium-90.

Cesium-137 was detected in one subsurface soil sample at an activity of 0.146 pCi/g. Activities decreased with depth and decreased downgradient. The lateral and vertical extent of cesium-137 are defined.

Strontium-90 was detected in one subsurface soil sample at an activity of 0.46 pCi/g. Activities decreased with depth and decreased downgradient. The lateral and vertical extent of strontium-90 are defined.

Summary of Nature and Extent

The extent of inorganic, organic, and radionuclide COPCs is defined or no further sampling for extent is warranted at SWMU 14-007.

6.18.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-9}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.003, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified in the 0.0−1.0-ft depth interval.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.8, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.02 mrem/yr, which is less than 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 6×10^{-6} (based on the EPA regional screening value for arsenic), which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.8, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.9 mrem/yr, which is less than 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 SWMU 14-007.

6.18.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at SWMU 14-007.

6.19 SWMU 14-009, Surface Disposal Area

6.19.1 Site Description and Operational History

SWMU 14-009 is a surface disposal area located south and west of building 14-43 at TA-14 (Figure 6.7-1). The disposal area measures approximately 30 ft × 140 ft and consists of sand and ruptured sandbags used during explosives tests performed at nearby firing sites [SWMUs 14-002(a) and 14-002(b)].

6.19.2 Relationship to Other SWMUs and AOCs

SWMU 14-009 is located on the canyon slope to the southwest of the other SWMUs and AOCs of Consolidated Unit 14-002(a)-99 and consists of sand and ruptured sandbags used during explosives tests performed at SWMUs 14-002(a and b).

6.19.3 Summary of Previous Investigations

During the 1995 RFI conducted at SWMU 14-009, samples were field screened for lead, uranium, and gross radioactivity, and HE spot tests were performed. Based on field-screening results showing the presence of depleted uranium and positive HE spot-test results, seven surface samples (0.0–0.5 ft bgs) and two subsurface samples (1.0–1.5 ft bgs) were collected and submitted for off-site analysis of total lead and total uranium (LANL 1996, 054086, p. 5-31). The data showed inorganic chemicals detected above BVs. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

6.19.4 Site Contamination

6.19.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at SWMU 14-009:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Twenty samples were collected from 10 locations within the disposal area (locations 14-614514 through 14-614521, 14-614527, and 14-614528) from the surface interval (0.0-1.0 ft bgs) and from 2 depth intervals beneath the disposal area: the first 1 ft of native material beneath the disposal area, and a second depth interval ranging from 1.5–6.0 ft bgs. Eight samples were collected from 4 locations on the bench at the bottom of the slope below the disposal area (locations 14-614522 through 14-614524 and 14-614529), and 6 samples were collected from 3 locations in the drainage downgradient of the site (locations 14-614525, 14-614526, and 14-614530). Samples from these locations were collected at 0.0–1.0 ft and 1.0–2.0 ft bgs.
- All samples were analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, SVOCs, gamma-emitting radionuclides, isotopic uranium, and strontium-90. Seventeen subsurface samples were analyzed for VOCs and eight samples were analyzed for PCBs.

The sampling locations for the 2011 investigation at SWMU 14-009 are shown in Figure 6.7-1. Table 6.19-1 presents the samples collected and the analyses requested for SWMU 14-009. The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.19.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.19.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 14-009 consist of the results from 34 samples (13 soil, 17 tuff, and 4 sediment) collected from 17 locations.

Inorganic Chemicals

A total of 34 samples (13 soil, 17 tuff, and 4 sediment) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.19-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.19-1 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 16,200 mg/kg. The Gehan and quantile tests indicated site concentrations of aluminum in tuff are statistically different from background (Figure F-68 and Table F-9). Aluminum is retained as a COPC.

Antimony was detected above the Qbt 2,3,4 BV (0.5 mg/kg) in two samples with a maximum concentration of 23.8 mg/kg and had DLs (0.51 mg/kg to 0.59 mg/kg) above the BV in six samples. The quantile and slippage tests indicated site concentrations of antimony in tuff are statistically different from background (Figure F-69 and Table F-9). Antimony is retained as a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in four samples with a maximum concentration of 4.5 mg/kg. The Gehan and quantile tests indicated site concentrations of arsenic in tuff are statistically different from background (Figure F-70 and Table F-9). Arsenic is retained as a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in eight samples with a maximum concentration of 183 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in tuff are statistically different from background (Figure F-71 and Table F-9). 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 3920 mg/kg. The Gehan and quantile tests indicated site concentrations of calcium in tuff are statistically different from background (Figure F-72 and Table F-9). 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 49.6 mg/kg. The Gehan and quantile tests indicated site concentrations of chromium in tuff are statistically different from background (Figure F-73 and Table F-9). Chromium is retained as a COPC.

Cobalt was detected above the soil and Qbt 2,3,4 BVs (8.64 mg/kg and 9.5 mg/kg) in one soil sample and five tuff samples with a maximum concentration of 9.5 mg/kg. The Gehan and quantile tests indicated site concentrations of cobalt in soil are not statistically different from background (Figure F-74 and Table F-10). The Gehan test indicated site concentrations of cobalt in tuff are statistically different from background (Table F-9). However, the quantile and slippage tests indicated site concentrations of cobalt in tuff are not statistically different from background (Figure F-75 and Table F-9). Cobalt is not 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 three soil samples, seven tuff samples, and two sediment samples with a maximum concentration of 77.8 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in soil and tuff are statistically different from background (Figure F-76 and Table F-10, and Figure F-77 and Table F-9, respectively). Copper is retained as a COPC.

Cyanide was not detected above the soil or Qbt 2,3,4 BVs (0.5 mg/kg for both) but had DLs (0.51 mg/kg to 0.62 mg/kg) in 11 soil samples and 17 tuff samples above BVs. The DLs were only 0.01 mg/kg to 0.12 mg/kg above the BVs. Cyanide was not detected or detected above BVs in 6 other samples (detected below BV 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 14,700 mg/kg. The Gehan test indicated site concentrations of iron in tuff are statistically different from background (Table F-9). However, the quantile and slippage tests indicated site concentrations of iron in tuff are not statistically different from background (Figure F-78 and Table F-9). Iron is not a COPC.

Lead was detected above the soil, Qbt 2,3,4, and sediment BVs (22.3 mg/kg, 11.2 mg/kg, and 19.7 mg/kg) in 4 soil samples, 12 tuff samples, and 4 sediment samples with a maximum concentration of 60.2 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in soil and tuff are statistically different from background (Figure F-79 and Table F-10, and Figure F-80 and Table F-9, respectively). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in one sample at a concentration of 2100 mg/kg. The Gehan and quantile tests indicated site concentrations of magnesium in tuff are statistically different from background (Figure F-81 and Table F-9). Magnesium is retained as a COPC.

Mercury was detected above the soil, Qbt 2,3,4, and sediment BVs (0.1 mg/kg for all) in three soil samples, one tuff sample, and one sediment sample with a maximum concentration of 0.629 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 two tuff samples with a maximum concentration of 50.6 mg/kg. The Gehan and quantile tests indicated site concentrations of nickel in soil are not statistically different from background (Figure F-82 and Table F-10). The quantile and slippage tests indicated site concentrations of nickel in tuff are statistically different from background (Figure F-83 and Table F-9). Nickel is retained as a COPC.

Nitrate was detected in 34 samples with a maximum concentration of 14.3 mg/kg. Nitrate is naturally occurring, and the concentrations detected likely reflect naturally occurring levels of nitrate. Nitrate 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 4 soil samples, 17 tuff samples, and 4 sediment 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 F-84 and Table F-10). Selenium is retained as a COPC.

Thallium was detected above the soil BV (0.73 mg/kg) in one sample at a concentration of 0.82 mg/kg. The Gehan and quantile tests indicated site concentrations of thallium in soil are not statistically different from background (Figure F-85 and Table F-10). Thallium is not a COPC.

Vanadium was detected above the Qbt 2,3,4 BV (17 mg/kg) in four samples with a maximum concentration of 24.7 mg/kg. The Gehan and quantile tests indicated site concentrations of vanadium in tuff are statistically different from background (Figure F-86 and Table F-9). Vanadium is retained as a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in one sample at a concentration of 51.8 mg/kg. The Gehan and quantile tests indicated site concentrations of zinc in soil are not statistically different from background (Figure F-87 and Table F-10). Zinc is not a COPC.

Organic Chemicals

A total of 34 samples (13 soil, 17 tuff, and 4 sediment) were analyzed for explosive compounds and SVOCs; 8 samples (2 soil, 4 tuff, and 2 sediment) were analyzed for PCBs; and 17 tuff samples were analyzed for VOCs. Table 6.19-3 presents the detected organic chemicals. Figure 6.19-2 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 being 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, 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, 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 parking lots.

Site Activities

SWMU 14-009 was identified as a SWMU because of possible soil contamination resulting from disposal of debris from tests at nearby firing sites [SWMUs 14-002(a) and 14-002(b)]. The tests at these firing sites used HE and uranium, but did not use or produce PAHs.

SWMU 14-009 is located on a hillside adjacent to and below a paved parking/storage area and paved road providing access to building 14-43 (Appendix H, Figures H-3 to H-5). The asphalt in these areas is weathered, and runoff from the asphalt flows to the area where samples were collected. Although PAHs were detected in samples collected from depth at this site, the highest concentrations were in surface samples and detections in deeper samples may have resulted from cross-contamination from augering through surface contamination. Based on the fact that PAHs were not used or produced in the firing tests generating the wastes disposed of at this site, and the sampled area receives storm water runoff from weathered asphalt, the PAHs detected in samples used to characterize this site [anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; chrysene; fluoranthene; indeno(1,2,3-cd)pyrene; phenanthrene; and pyrene] are not related to historical Laboratory site operations and are not COPCs.

Organic COPCs

Other organic chemicals detected at SWMU 14-009 include acetone, bis[2-ethylhexyl]phthalate; di-n-butylphthalate; 2,4-dinitrotoluene; 2-hexanone; HMX; N-nitrosodiphenylamine; PETN; RDX; and TATB. The detected organic chemicals listed are retained as COPCs.

Radionuclides

A total of 34 samples (13 soil, 17 tuff 4, and 4 sediment) were analyzed for gamma-emitting radionuclides, isotopic uranium, and strontium-90. Table 6.19-4 presents the radionuclides detected or detected above BVs/FVs. Figure 6.19-3 shows the spatial distribution of radionuclides detected or detected above BVs/FVs.

Cesium-137 was detected in two tuff samples with a maximum activity of 0.243 pCi/g. Cesium-137 is retained as a COPC.

Strontium-90 was detected in three tuff samples with a maximum activity of 1.3 pCi/g. Strontium-90 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 one soil sample, two tuff samples, and one sediment sample with a maximum activity of 21 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 four soil samples, two tuff samples, and two sediment samples with a maximum activity of 2.79 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 five soil samples, four tuff samples, and two sediment samples with a maximum activity of 162 pCi/g. Uranium-238 is retained as a COPC.

6.19.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 14-009 are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMU 14-009 include aluminum, antimony, arsenic, barium, calcium, chromium, copper, lead, magnesium, mercury, nickel, selenium, and vanadium.

Aluminum was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 16,200 mg/kg. Concentrations increased with depth at locations 14-614514, 14-614527, and 14-614528, and decreased with depth at location 14-614515 (the concentration in the shallower sample at location14-614515 was 14,400 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 4.8 times (61,800 mg/kg below the SSL) and 80 times the maximum concentration, respectively. The lateral extent of aluminum is defined, and further sampling for vertical extent is not warranted.

Antimony was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 23.8 mg/kg and had DLs (0.51 mg/kg to 0.59 mg/kg) in six samples above the BV. Concentrations increased with depth at location 14-614527 and did not change substantially with depth (0.05 mg/kg) at location 14-614519. Concentrations decreased downgradient. The residential and industrial SSLs were approximately 1.3 times and 22 times the maximum concentration, respectively. The residential SSL was approximately 53 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 four samples with a maximum concentration of 4.5 mg/kg. Concentrations did not change substantially with depth (0.1 mg/kg to 0.9 mg/kg) at locations 14-614514, 14-614515, and 14-614519 and decreased with depth at location 14-614525 (concentrations in the shallower samples at locations 14-614514, 14-614515, and 14-614519 were 3.4 mg/kg, 2.7 mg/kg, and 2.0 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations were below the Qbt 2,3,4 maximum background concentration (5 mg/kg). Concentrations decreased downgradient. The lateral extent of arsenic is defined, and further sampling for vertical extent is not warranted.

Barium was detected above the Qbt 2,3,4 BV in eight samples with a maximum concentration of 183 mg/kg. Concentrations increased with depth at locations 14-614527 and 14-614528, did not change substantially with depth (2 mg/kg) at location 14-614514, and decreased with depth at locations 14-614515, 14-614516, 14-614517, 14-614518, and 14-614519 (concentrations in the shallower samples at locations 14-614514, 14-614515, 14-614516, 14-614517, 14-614518, and 14-614519 were 185 mg/kg, 174 mg/kg, 139 mg/kg, 142 mg/kg, 158 mg/kg, and 102 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The residential SSL was approximately 85 times the maximum concentration. 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 five samples with a maximum concentration of 3920 mg/kg. Concentrations increased with depth at locations 14-614514 and 14-614518, did not change substantially with depth (110 mg/kg and 130 mg/kg) at locations 14-614519 and 14-614528, and decreased with depth at location 14-614527 (concentrations in the shallower samples at locations 14-614519, 14-614527, and 14-614528 were 3200 mg/kg, 2810 mg/kg, and 2610 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The NMED residential essential nutrient screening level was approximately 332 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 four samples with a maximum concentration of 49.6 mg/kg. Concentrations increased with depth at location 14-614519 and did not change substantially with depth (0.3 mg/kg to 1.6 mg/kg) at locations 14-614514, 14-614515, and 14-614528 (concentrations in the shallower samples at locations 14-614514, 14-614515, and 14-614528 were 10.5 mg/kg, 9.2 mg/kg, and 7.4 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). The tuff concentrations at locations 14-614514, 14-614515, and 14-614528 were below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Concentrations decreased downgradient. As discussed in section 4.2, because there was no known use of hexavalent chromium at this site, the results were compared with the residential SSL for trivalent chromium (117,000 mg/kg). The residential trivalent chromium SSL was approximately 2360 times the maximum concentration. The lateral extent of chromium 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 three soil samples, seven tuff samples, and two sediment samples with a maximum concentration of 77.8 mg/kg. Concentrations did not change substantially with depth (0.1 mg/kg and 0.7 mg/kg) at locations 14-614515 and 14-614527 and decreased with depth at locations 14-614514, 14-614519, 14-614520, 14-614526, 14-614528, and 14-614529 (concentrations in the shallower samples at locations 14-614514, 14-614515, and 14-614527 were 10 mg/kg, 6.9 mg/kg, and 6.6 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The residential SSL was approximately 40 times the maximum concentration. The lateral extent of copper is defined, and further sampling for vertical extent is not warranted.

Lead was detected above the soil, Qbt 2,3,4, and sediment BVs in 4 soil samples, 12 tuff samples, and 4 sediment samples with a maximum concentration of 60.2 mg/kg. Concentrations increased with depth at locations 14-614515 and 14-614520; did not change substantially with depth (0.4 mg/kg to 2.1 mg/kg) at locations 14-614514, 14-614522, and 14-614527; and decreased with depth at locations 14-614516, 14-614519, 14-614521, 14-614523, 14-614525, 14-614526, 14-614528, and 14-614529 (concentrations in the shallower samples at locations 14-614514, 14-614516, 14-614522, and 14-614528 were 17.8 mg/kg, 20.9 mg/kg, 11.5 mg/kg, and 22.1 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations at locations 14-614514, 14-614516, 14-614517, 14-614522, 14-614526, 14-614527, and 14-614528 were equivalent to or below the Qbt 2,3,4 maximum background concentration (15.5 mg/kg). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 6.6 times and 13 times the maximum concentration, respectively. 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 one sample at a concentration of 2100 mg/kg. Concentrations decreased with depth and decreased downgradient (the concentration in the shallower sample at location 14-614514 was 2590 mg/kg and below the soil BV [Appendix D, Pivot Tables]). The tuff concentration at location 14-614514 was below the Qbt 2,3,4 maximum background concentration (2820 mg/kg). The lateral and vertical extent of magnesium are defined.

Mercury was detected above the soil, Qbt 2,3,4, and sediment BVs in three soil samples, one tuff sample, and one sediment sample with a maximum concentration of 0.629 mg/kg. Concentrations decreased with depth at locations 14-614519, 14-614520, 14-614526, and 14-614528 and decreased downgradient. The lateral and vertical extent of mercury are defined.

Nickel was detected above the soil and Qbt 2,3,4 BVs in one soil sample and two tuff samples with a maximum concentration of 50.6 mg/kg. Concentrations increased with depth at location 14-614519 and did not change substantially with depth (1.9 mg/kg) at location 14-614514. Concentrations decreased downgradient. The residential and industrial SSLs were approximately 31 times and 508 times the maximum concentration, respectively. 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 4 soil samples, 17 tuff samples, and 4 sediment samples with a maximum concentration of 2.8 mg/kg. Concentrations increased with depth at locations 14-614520 and 14-614526 and did not change or did not change substantially with depth (0.0 mg/kg to 0.7 mg/kg) at locations 14-614514, 14-614515, 14-614516, 14-614517, 14-614518, 14-614519, 14-614521, 14-614522, 14-614523, 14-614524, 14-614525, 14-614527, 14-614528, 14-614529, and 14-614530 (concentrations in the shallower samples at locations 14-614514, 14-614515, 14-614516, 14-614517, 14-614518, 14-614519, 14-614527, and 14-614528 were 1 mg/kg, 1.4 mg/kg, 0.96 mg/kg, 1.2 mg/kg, 0.97 mg/kg, 1.3 mg/kg, 1.4 mg/kg, and 0.9 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially downgradient (0.6 mg/kg). The residential SSL was approximately 140 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Vanadium was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 24.7 mg/kg. Concentrations increased with depth at location 14-614527, did not change substantially with depth (0.5 mg/kg and 1.5 mg/kg) at locations 14-614514 and 14-614528, and decreased with depth at location 14-614518 (concentrations in the shallower samples at locations 14-614514, 14-614518, and 14-614528 were 25.2 mg/kg, 23 mg/kg, and 16.6 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations at locations 14-614518, 14-614527, and 14-614528 were below the Qbt 2,3,4 maximum background concentration (21 mg/kg). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 16 times and 264 times the maximum concentration, respectively. The lateral extent of vanadium is defined, and further sampling for vertical extent is not warranted.

Organic Chemicals

Organic COPCs at SWMU 14-009 include acetone; bis[2-ethylhexyl]phthalate; di-n-butylphthalate; 2,4-dinitrotoluene; 2-hexanone; HMX; N-nitrosodiphenylamine, PETN; RDX; and TATB.

Acetone was detected in six samples with a maximum concentration of 0.0099 mg/kg. VOCs were analyzed only in the deeper samples at locations 14-614515, 14-614520, 14-614521, 14-614523, 14-614526, and 14-614530. Concentrations did not change substantially downgradient (0.0032 mg/kg) and were below EQLs. The residential SSL was approximately 6,700,000 times the maximum concentration. Further sampling for extent of acetone is not warranted.

Bis(2-ethylhexyl)phthalate; 2,4-dinitrotoluene; and N-nitrosodiphenylamine were each detected in one sample at concentrations of 0.057 mg/kg, 0.16 mg/kg, and 0.096 mg/kg, respectively. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of bis(2-ethylhexyl)phthalate; 2,4-dinitrotoluene; and N-nitrosodiphenylamine are defined.

Di-n-butylphthalate was detected in five samples with a maximum concentration of 0.16 mg/kg. Concentrations increased with depth at location 14-614515 and decreased with depth at locations 14-614521, 14-614523, 14-614525, and 14-614529. Concentrations were below EQLs and decreased downgradient. The residential SSL was approximately 38,500 times the maximum concentration. The lateral extent of di-n-butylphthalate is defined, and further sampling for vertical extent is not warranted.

Hexanone[2-] was detected in one sample at a concentration of 0.011 mg/kg. Only the deeper sample from location 14-614517 was analyzed for VOCs. Concentrations decreased downgradient, and the concentration was below the EQL. The residential SSL was approximately 18,200 times the maximum concentration. The lateral extent of 2-hexanone is defined, and further sampling for vertical extent is not warranted.

HMX was detected in 16 samples with a maximum concentration of 370 mg/kg. Concentrations increased with depth at locations 14-614517, 14-614519, 14-614520; and 14-614526; did not change substantially with depth (0.54 mg/kg) at location 14-614528; and decreased with depth at locations 14-614521, 14-614524, 14-614525, and 14-614529. Concentrations decreased downgradient. The residential and industrial SSLs were approximately 10 times and 171 times the maximum concentration, respectively. The lateral extent of HMX is defined, and further sampling for vertical extent is not warranted.

PETN was detected in one sample at a concentration of 0.43 mg/kg. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of PETN are defined.

RDX was detected in five samples with a maximum concentration of 0.94 mg/kg. Concentrations increased with depth at location 14-614526; did not change substantially with depth (0.79 mg/kg) at location 14-614519; decreased with depth at locations 14-614520 and 14-614529; and decreased downgradient. The residential SSL was approximately 64 times the maximum concentration. The lateral extent of RDX is defined, and further sampling for vertical extent is not warranted.

TATB was detected in eight samples with a maximum concentration of 20 mg/kg. Concentrations increased with depth at location 14-614527 and decreased with depth at locations 14-614516, 14-614519, 14-614520, and 14-614528. Concentrations at locations 14-614516 and 14-614527 were below EQLs. Concentrations decreased downgradient. The residential SSL was approximately 110 times the maximum concentration. The lateral extent of TATB is defined, and further sampling for vertical extent is not warranted.

Radionuclides

Radionuclide COPCs at SWMU 14-009 include cesium-137, strontium-90, uranium-234, uranium-235/236, and uranium-238.

Cesium-137 was detected in two tuff samples with a maximum activity of 0.243 pCi/g. Activities decreased with depth at locations 14-614516 and 14-614521 (activities in the shallower samples at locations 14-614516 and 14-614521 were 0.177 pCi/g and 0.964 pCi/g, respectively, and below the soil FV [Appendix D, Pivot Tables]). Activities decreased downgradient. The lateral and vertical extent of cesium-137 are defined.

Strontium-90 was detected in three tuff samples with a maximum activity of 1.3 pCi/g. Activities increased with depth at locations 14-614514 and 14-614526 and did not change substantially with depth (0.02 pCi/g) at location 14-614520 (the activity in the shallower sample at location 14-614520 was 0.39 pCi/g and below the soil FV [Appendix D, Pivot Tables]). Activities decreased downgradient. The residential and industrial SALs were approximately 12 times and 1850 times the maximum activity, respectively. The lateral extent of strontium-90 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 one soil sample, two tuff samples, and one sediment sample with a maximum activity of 21 pCi/g. Activities increased with depth at location 14-614519 and decreased with depth at locations 14-614528 and 14-614529. Activities decreased downgradient. The residential and industrial SALs were approximately 14 times and 148 times the maximum activity, respectively. 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, Qbt 2,3,4, and sediment BVs in four soil samples, two tuff samples, and two sediment samples with a maximum activity of 2.79 pCi/g. Activities did not change substantially with depth (0.5 pCi/g) at location 14-614519 and decreased with depth at locations 14-614520, 14-614526, 14-614527, 14-614528, and 14-614529. Activities decreased downgradient. The residential and industrial SALs were approximately 15 times and 57 times the maximum activity, respectively. 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, Qbt 2,3,4, and sediment BVs in five soil samples, four tuff samples, and two sediment samples with a maximum activity of 162 pCi/g. Activities increased with depth at location 14-614519 and decreased with depth at locations 14-614520, 14-614521, 14-614526, 14-614527, 14-614528, and 14-614529. Activities decreased downgradient. The residential and industrial SALs were approximately 3.2 times and 15 times the maximum activity, respectively, at location 14-614519. The lateral extent of uranium-238 is defined, and further sampling for vertical extent is not warranted.

Summary of Nature and Extent

The extent of inorganic, organic, and radionuclide COPCs is defined or no further sampling for extent is warranted at SWMU 14-009.

6.19.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 1×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.05, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 2 mrem/yr, which is less than 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 3×10^{-11}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.4, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 2 mrem/yr, which is less than 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} (based on the EPA regional screening value for arsenic), which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.4, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 7 mrem/yr, which is less than 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 SWMU 14-009.

6.19.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at SWMU 14-009.

6.20 SWMU 14-010, Former Sump

6.20.1 Site Description and Operational History

SWMU 14-010 is a former HE sump located on the exterior south wall of a former firing chamber [structure 14-2, SWMU 14-002(a)] (Figure 6.7-1). The sump received waste from firing chamber 14-2 and discharged to an outfall located approximately 24 ft southeast of the sump. The SWMU 14-010 sump was removed in 1973. The drainline remains in place.

6.20.2 Relationship to Other SWMUs and AOCs

SWMU 14-010 is the location of a former HE sump that served the former firing chamber SWMU 14-002(a). The sump was removed in 1973 before structure 14-39 [AOC 14-001(f)] was constructed in the vicinity.

6.20.3 Summary of Previous Investigations

During the 1995 RFI conducted at SWMU 14-010, samples were field screened for lead, uranium, and gross radioactivity, and HE spot tests were performed. Based on field-screening results, three surface samples (0.0–0.5 ft bgs) and one subsurface sample (1.0–1.5 ft bgs) were collected and submitted for off-site analysis of lead and total uranium (LANL 1996, 054086, p. 5-29). The data showed inorganic chemicals detected above BVs. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

Based on the recommendations of the RFI report, a VCA was conducted at SWMU 14-010 in 1997 to excavate and remove contaminated surface soil and sediment in the drainage area (LANL 1997, 056611). Twelve confirmation sediment samples were collected following the removal of contaminated soil and sediment. All the samples were submitted for off-site analysis; six samples were submitted for HE analysis, and six samples were submitted for isotopic uranium analysis. HMX was detected in all 12 confirmation samples, and TNT was detected in 3 confirmation samples. Uranium-234, uranium-235, and uranium-238 were each detected above their respective sediment BVs in 1, 2, and 4 of the confirmation samples, respectively. Decision-level data from the 1997 VCA are included in this report.

6.20.4 Site Contamination

6.20.4.1 Soil, Rock, and Sediment Sampling

The locations of the sump and drainline were substantially regraded during construction of the current buildings. Therefore, the locations of the former sump and drainline could not be sampled, and samples were collected at the location of the former outfall and in the drainage downgradient of the outfall. As part of the 2011 investigation, the following activities were conducted at SWMU 14-010:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Ten samples were collected from five locations downgradient of the outfall at 0.0–1.0 ft and 3.0–4.0 ft bgs, except the first depth sampled at location 14-614595 was collected from 0.3–1.3 ft bgs to avoid a piece of asphalt at the surface.
- All samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, explosive compounds, SVOCs, gamma-emitting radionuclides, isotopic uranium, and strontium-90. Five subsurface samples were analyzed for VOCs and two samples were analyzed for PCBs.

Sampling locations at SWMU 14-010, both historical and from the 2011 investigation, are shown in Figure 6.7-1. Table 6.20-1 presents the samples collected and the analyses requested for SWMU 14-010, both for the historical and 2011 investigations. The geodetic coordinates of the sampling locations for the 2011 investigation are presented in Table 3.2-1.

6.20.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples from the 2011 investigation are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.20.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at SWMU 14-010 consist of the results from 22 samples (5 soil, 5 tuff, and 12 sediment) collected from 11 locations.

Inorganic Chemicals

Ten samples (five soil and five tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Because fewer than eight soil or tuff samples were analyzed for TAL metals, statistical tests could not be performed on results for these media. Table 6.20-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.20-1 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Antimony was detected above the Qbt 2,3,4 BV (0.5 mg/kg) in one sample at a concentration of 0.7 mg/kg. The detected concentration was only 0.2 mg/kg above the Qbt 2,3,4 BV. Antimony was detected below BVs in the other nine samples. Antimony is not a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in three samples with a maximum concentration of 5.4 mg/kg. The maximum concentration was above the maximum Qbt 2,3,4 background concentration (5 mg/kg). Arsenic 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 two soil samples and one tuff sample with a maximum concentration of 53.4 mg/kg. The soil concentrations were above the maximum soil background concentration (16 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 for both) but had DLs (0.53 mg/kg to 0.62 mg/kg) in 10 samples above BVs. The DLs were similar for all samples and were only 0.03 mg/kg to 0.12 mg/kg above the BVs. Cyanide was not detected in any of the 10 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 and two tuff samples with a maximum concentration of 64.8 mg/kg. The 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.

Nitrate was detected in five soil and five tuff samples with a maximum concentration of 5.7 mg/kg. Nitrate is naturally occurring and the concentrations likely 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 five samples with a maximum concentration of 2.4 mg/kg. Selenium is retained as a COPC.

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

Zinc was detected above the Qbt 2,3,4 BV (63.5 mg/kg) in one sample at a concentration of 88.2 mg/kg. The concentration was above the maximum Qbt 2,3,4 background concentration (65.6 mg/kg). Zinc is retained as a COPC.

Organic Chemicals

A total of 16 samples (5 soil, 5 tuff, and 6 sediment) were analyzed for explosive compounds, 10 samples (5 soil and 5 tuff) were analyzed for SVOCs, 2 samples (1 soil and 1 tuff) were analyzed for PCBs, and 5 tuff samples were analyzed for VOCs. Table 6.20-3 presents the detected organic chemicals. Figure 6.20-2 shows the spatial distribution of detected organic chemicals.

Organic chemicals detected at SWMU 14-010 include bis(2-ethylhexyl)phthalate, di-n-butylphthalate, HMX, RDX, TATB, and TNT. The detected organic chemicals are retained as COPCs.

Radionuclides

A total of 10 samples (5 soil and 5 tuff) were analyzed for gamma-emitting radionuclides and strontium-90. A total of 16 samples (5 soil, 5 tuff, and 6 sediment) were analyzed for isotopic uranium. Table 6.20-4 presents the radionuclides detected or detected above BVs/FVs. Figure 6.20-3 shows the spatial distribution of radionuclides detected or detected above BVs/FVs.

Cesium-137 was detected in one tuff sample at an activity of 0.142 pCi/g. Cesium-137 is retained as a COPC.

Uranium-234 was detected above the soil and sediment BVs (2.59 pCi/g for both) in one soil sample and one sediment sample with a maximum activity of 3.44 pCi/g. Uranium-234 is retained as a COPC.

Uranium-235 and uranium-235/236 were detected above the soil and sediment BVs (0.2 pCi/g for both) in one soil sample and two sediment samples with a maximum activity of 0.322 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 two soil, one tuff, and four sediment samples with a maximum activity of 24 pCi/g. Uranium-238 is retained as a COPC.

6.20.4.4 Nature and Extent of Contamination

The nature and extent of inorganic, organic, and radionuclide COPCs at SWMU 14-010 are discussed below.

Inorganic Chemicals

Inorganic COPCs at SWMU 14-010 include arsenic, copper, lead, selenium, silver, and zinc.

Arsenic was detected above the Qbt 2,3,4 BV in three samples with a maximum concentration of 5.4 mg/kg. Concentrations increased with depth at locations 14-614595, 14-614596, and 14-614597. Concentrations decreased downgradient. Tuff concentrations were similar to or below the Qbt 2,3,4 maximum background concentration (5 mg/kg). The lateral extent of arsenic is defined, and further sampling for vertical extent is not warranted.

Copper was detected above the soil and Qbt 2,3,4 BVs in two soil samples and one tuff sample with a maximum concentration of 53.4 mg/kg. Concentrations decreased with depth at locations 14-614596 and 14-614599 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 two soil and two tuff samples with a maximum concentration of 64.8 mg/kg. Concentrations increased with depth at location 14-614599, did not change substantially with depth (0.3 mg/kg) at location 14-614598, and decreased with depth at location 14-614596 (the concentration in the shallower sample at location 14-614598 was 17.8 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased downgradient. The residential and industrial SSLs were approximately 6.2 times and 12 times the maximum concentration, respectively. The lateral extent of lead is defined, and further sampling for vertical extent is not warranted.

Selenium was detected above the Qbt 2,3,4 BV in five samples with a maximum concentration of 2.4 mg/kg. Concentrations increased with depth at locations 14-614596 and 14-614597 and did not change substantially with depth (0.3 mg/kg to 0.6 mg/kg) at locations 14-614595, 14-614598, and 14-614599. Concentrations did not change substantially downgradient (0.8 mg/kg). The residential SSL was approximately 163 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Silver was detected above the soil BV in one sample at a concentration of 2 mg/kg. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of silver are defined.

Zinc was detected above the Qbt 2,3,4 BV in one sample at a concentration of 88.2 mg/kg. Concentrations increased with depth at location 14-614599 and decreased downgradient. The residential SSL was approximately 266 times the maximum concentration. The lateral extent of zinc is defined, and further sampling for vertical extent is not warranted.

Organic Chemicals

Organic COPCs at SWMU 14-010 include bis(2-ethylhexyl)phthalate, di-n-butylphthalate, HMX, RDX, TATB, and TNT.

Bis(2-ethylhexyl)phthalate was detected in three samples with a maximum concentration of 0.15 mg/kg. Concentrations increased with depth at locations 14-614595 and 14-614596 and decreased with depth at location 14-614598. Concentrations did not change substantially downgradient (0.04 mg/kg). Concentrations were below EQLs. The residential SSL was approximately 2530 times the maximum concentration. Further sampling for extent of bis(2-ethylhexyl)phthalate is not warranted.

Di-n-butylphthalate was detected in one sample at a concentration of 0.46 mg/kg. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of di-n-butylphthalate are defined.

HMX was detected in 15 samples with a maximum concentration of 94.3 mg/kg. Concentrations did not change substantially with depth (0.032 mg/kg) at locations 14-614595 and 14-614598 and decreased with depth at locations 14-614596, 14-614597, and 14-614599. Only one depth was sampled at locations 14-01038, 14-01039, 14-01040, 14-01041, 14-01042, and 14-01043. The vertical extent at these locations was evaluated by adjacent locations with deeper samples: locations 14-01038 and 14-01039 were evaluated by location 14-614596 (approximately 5 ft distant), and locations 14-01040 through 14-01043 were evaluated by location 14-614599 (approximately 5 ft to 20 ft distant) (Figure 6.20-2). The concentration in the deeper sample at location 14-614596 was less than the concentrations in the surface samples at locations 14-01038 and 14-01039. The concentration in the deeper sample at location 14-614599 was greater than the concentrations in the surface samples at locations 14-01040 through 14-01043. Concentrations decreased downgradient. The residential SSL was approximately 28 times the maximum concentration at these four locations. The lateral extent of HMX is defined, and further sampling for vertical extent is not warranted.

RDX was detected in one sample at a concentration of 0.38 mg/kg. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of RDX are defined.

TATB was detected in four samples with a maximum concentration of 14 mg/kg. Concentrations decreased with depth at locations 14-614596 and 14-614599 and decreased downgradient. The lateral and vertical extent of TATB are defined.

TNT was detected in three samples with a maximum concentration of 0.162 mg/kg. Only one depth was sampled at locations 14-01038, 14-01041, and 14-01043. The vertical extent at these locations was evaluated by adjacent locations with deeper samples: location 14-01038 was evaluated by location 14-614596 (approximately 5 ft distant), and locations 14-01041 and 14-01043 were evaluated by location 14-614599 (approximately 10 ft to 20 ft distant) (Figure 6.20-2). TNT was not detected in deeper samples at locations 14-614596 and 14-614599. Concentrations decreased downgradient. The lateral and vertical extent of TNT are defined.

Radionuclides

Radionuclide COPCs at SWMU 14-010 include cesium-137, uranium-234, uranium-235/236, and uranium-238.

Cesium-137 was detected in one tuff sample at an activity of 0.142 pCi/g. Activities increased with depth at location 14-614597 and decreased downgradient. The residential SAL was approximately 85 times the maximum activity. The lateral extent of cesium-137 is defined, and further sampling for vertical extent is not warranted.

Uranium-234 was detected above the soil and sediment BVs in one soil sample and one sediment sample with a maximum activity of 3.44 pCi/g. Activities decreased with depth at location 14-614596. Only one depth was sampled at location 14-01038. The vertical extent at this location was evaluated by adjacent location 14-614596 (approximately 5 ft distant) (Figure 6.20-3). Uranium-234 was not detected above BV in the deeper sample at location 14-614596. Activities decreased downgradient. The lateral and vertical extent of uranium-234 are defined.

Uranium-235 and uranium-235/236 were detected above the soil and sediment BVs in one soil sample and two sediment samples with a maximum activity of 0.322 pCi/g. Activities decreased with depth at location 14-614596. Only one depth was sampled at locations 14-01038 and 14-01039. The vertical extent at these locations was evaluated by adjacent location 14-614596 (approximately 5 ft distant) (Figure 6.20-3). Uranium-235/236 was not detected above BV in the deeper sample at location 14-614596. Activities decreased downgradient. The lateral and vertical extent of uranium-235/236 are defined.

Uranium-238 was detected above the soil, Qbt 2,3,4, and sediment BVs in two soil, one tuff, and four sediment samples with a maximum activity of 24 pCi/g. Activities decreased with depth at locations 14-614596 and 14-614599. Only one depth was sampled at locations 14-01038, 14-01039, 14-01041, and 14-01042. The vertical extent at these locations was evaluated by adjacent locations with deeper samples: locations 14-01038 and 14-01039 were evaluated by location 14-614596 (approximately 5 ft distant), and locations 14-01041 and 14-01042 were evaluated by location 14-614599 (approximately 10 ft to 15 ft distant) (Figure 6.20-3). The uranium-238 activity in the deeper sample at location 14-614596 was less than the activities detected in surface samples at locations 14-01038 and 14-01039. Uranium-238 was not detected above BV in the deeper sample at location 14-614599. Activities decreased downgradient. The lateral and vertical extent of uranium-238 are defined.

Summary of Nature and Extent

The extent of inorganic, organic, and radionuclide COPCs is defined or no further sampling for extent is warranted at SWMU 14-010.

6.20.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 1×10^{-8}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.6 mrem/yr, which is less than 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 0.1, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 1 mrem/yr, which is less than 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} (based on the EPA regional screening value for arsenic), which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.1, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 3 mrem/yr, which is less than 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 SWMU 14-010.

6.20.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at SWMU 14-010.

6.21 AOC C-14-001, Former Magazine

6.21.1 Site Description and Operational History

AOC C-14-001 is the location of a former HE magazine (structure 14-1) in the south-central portion of TA-14 (Figure 6.21-1). Constructed in 1944, the wood-framed magazine measured 9 ft wide × 11 ft long × 8 ft high and was covered with an earthen berm on three sides and the top. The magazine was destroyed by burning in 1963.

6.21.2 Relationship to Other SWMUs and AOCs

AOC C-14-001 is a former HE magazine located at least 450 ft west of the other SWMUs and AOCs at TA-14. It is not associated with other SWMUs or AOCs at TA-14.

6.21.3 Summary of Previous Investigations

During the 1995 RFI conducted at AOC C-14-001, samples were field screened for metals and gross radioactivity, and HE spot tests were performed. Based on field-screening results, three near-surface samples (0.5–1.0 ft bgs) were collected and submitted for off-site analysis of TAL metals and HE (LANL 1996, 054086, pp. 5-93–5-94). The data showed three metals detected above BVs and HE was detected. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

6.21.4 Site Contamination

6.21.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC C-14-001:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Ten samples were collected from five locations within and around the structure footprint at 0.0–1.0 ft and 3.0–4.0 ft bgs.
- All samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, explosive compounds, and SVOCs. Five subsurface samples were analyzed for VOCs, and two samples were analyzed for PCBs.

The sampling locations for the 2011 investigation at AOC C-14-001 are shown in Figure 6.21-1. Table 6.21-1 presents the samples collected and the analyses requested for AOC C-14-001. The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.21.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.21.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC C-14-001 consist of the results from 10 samples (6 soil and 4 tuff) collected from 5 locations.

Inorganic Chemicals

Ten samples (six soil and four tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.21-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.21-2 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 10,200 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 Qbt 2,3,4 BV (0.5 mg/kg) but had DLs (0.53 mg/kg to 0.54 mg/kg) above BV in four samples. The DLs were similar regardless of the medium. The DLs were only 0.03 mg/kg to 0.04 mg/kg above BV. Antimony was not detected in the other six samples (DLs below the soil BV). Antimony is not a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in four samples with a maximum concentration of 104 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 one sample at a concentration of 5300 mg/kg. The 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 one tuff sample with a maximum concentration of 75.5 mg/kg. The concentrations were above the maximum soil and Qbt 2,3,4 background concentration (36.5 mg/kg and 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 4.3 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 for both) but had DLs (0.53 mg/kg to 0.57 mg/kg) above BVs in five soil samples and four tuff samples. The DLs were similar regardless of the medium and were only 0.03 mg/kg to 0.07 mg/kg above the BVs. Cyanide was detected below BV in the remaining sample. Cyanide 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 12.2 mg/kg. The concentration was above the maximum Qbt 2,3,4 background concentration (7 mg/kg). Nickel is retained as a COPC.

Nitrate was detected in six soil samples and four tuff samples with a maximum concentration of 0.77 mg/kg. Nitrate is naturally occurring, and the concentrations detected likely 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 four samples with a maximum concentration of 1.4 mg/kg. Selenium is retained as a COPC.

Organic Chemicals

Ten samples (six soil and four tuff) were analyzed for explosive compounds and SVOCs. Two samples (one soil and one tuff) were analyzed for PCBs. Five samples (one soil and four tuff) were analyzed for VOCs. Table 6.21-3 presents the detected organic chemicals. Figure 6.21-3 shows the spatial distribution of detected organic chemicals.

Organic chemicals detected at AOC C-14-001 include benzoic acid. The detected organic chemical is retained as a COPC.

Radionuclides

Samples at AOC C-14-001 were not analyzed for radionuclides.

6.21.4.4 Nature and Extent of Contamination

The nature and extent of inorganic and organic COPCs at AOC C-14-001 are discussed below.

Inorganic Chemicals

Inorganic COPCs at AOC C-14-001 include aluminum, barium, calcium, chromium, cobalt, nickel, and selenium.

Aluminum was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 10,200 mg/kg. Concentrations increased with depth at location 14-614608 and decreased with depth at locations 14-614606, 14-614607, and 14-614609 (the concentrations in the shallower samples at locations 14-614606, 14-614607, and 14-614609 were 11,200 mg/kg, 10,800 mg/kg, and 15,500 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations increased laterally at location 14-614608. The residential and industrial SSLs were approximately 7.6 times (67,800 mg/kg below the SSL) and 126 times the concentration at location 14-614608, respectively. Further sampling for extent of aluminum is not warranted.

Barium was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 104 mg/kg. Concentrations did not change substantially with depth (2.2 mg/kg) at location 14-614608 and decreased with depth at locations 14-614606, 14-614607, and 14-614609 (concentrations in the shallower samples at locations 14-614606, 14-614607, 14-614608, and 14-614609 were 111 mg/kg, 116 mg/kg, 90.9 mg/kg, and 118 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations increased laterally at location 14-614607. The residential SSL was approximately 150 times the maximum concentration. Further sampling for extent of barium is not warranted.

Calcium was detected above the Qbt 2,3,4 BV in one sample at a concentration of 5300 mg/kg. Concentrations increased with depth and increased laterally at location 14-614606. The NMED residential essential nutrient screening level was approximately 25 times the maximum concentration. Further sampling for extent of calcium is not warranted.

Chromium was detected above the soil and Qbt 2,3,4 BVs in one soil sample and one tuff sample with a maximum concentration of 75.5 mg/kg. Concentrations increased with depth at location 14-614606, decreased with depth at location 14-614605, and decreased laterally at all locations. As discussed in section 4.2, because there was no known use of hexavalent chromium at this site, the results were compared with the residential SSL for trivalent chromium (117,000 mg/kg). The residential trivalent chromium SSL was approximately 1550 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 Qbt 2,3,4 BV in four samples, with a maximum concentration of 4.3 mg/kg. Concentrations decreased with depth at locations 14-614606, 14-614607, 14-614608, and 14-614609 (concentrations in the shallower samples at locations 14-614606, 14-614607, 14-614608, and 14-614609 were 5.4 mg/kg, 6 mg/kg, 5.1 mg/kg, and 5.4 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially laterally (0.9 mg/kg). The residential and industrial SSLs were approximately 5.4 times and 81 times the maximum concentration above BV, respectively. The vertical extent of cobalt is defined, and further sampling for lateral extent is not warranted.

Nickel was detected above the Qbt 2,3,4 BV in one sample at a concentration of 12.2 mg/kg. Concentrations increased with depth and increased laterally at location 14-614606. The residential SSL was approximately 128 times the maximum concentration. Further sampling for extent of nickel is not warranted.

Selenium was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 1.4 mg/kg. Concentrations did not change or did not change substantially with depth (0.0 mg/kg to 0.3 mg/kg) at locations 14-614606, 14-614607, 14-614608, and 14-614609 (concentrations in the shallower samples at locations 14-614606, 14-614607, 14-614608, and 14-614609 were 1.2 mg/kg, 1.3 mg/kg, 1.1 mg/kg, and 1.2 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially laterally (0.5 mg/kg). The residential SSL was approximately 279 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Organic Chemicals

Organic COPCs at AOC C-14-001 include benzoic acid.

Benzoic acid was detected in one sample at a concentration of 0.36 mg/kg. Concentrations increased with depth and increased laterally at location 14-614609. The concentration was below the EQL. The residential SSL was approximately 694,000 times the concentration. Further sampling for extent of benzoic acid is not warranted.

Radionuclides

Samples were not analyzed for radionuclides at AOC C-14-001.

Summary of Nature and Extent

The extent of inorganic and organic COPCs is defined or no further sampling for extent is warranted at AOC C-14-001.

6.21.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). No noncarcinogenic COPCs were identified in the 0.0−1.0-ft depth interval.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.8, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

The total excess cancer risk for the residential scenario is 5×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.4, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Based on the risk-screening assessment results, no potential unacceptable risks exist for the industrial, construction worker, and residential scenarios at AOC C-14-001.

6.21.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at AOC C-14-001.

6.22 AOC C-14-002, Former Building

6.22.1 Site Description and Operational History

AOC C-14-002 is the location of a former control building (structure 14-3) in the southeastern portion of TA-14 (Figure 6.22-1). Constructed in 1944, the wood-framed building measured 8 ft wide × 14 ft long × 8 ft high with a 6-ft-square × 8-ft-high addition. The building was removed in 1952. The location of the former building is currently beneath the paved access road to the bullet test facility.

6.22.2 Relationship to Other SWMUs and AOCs

The location of AOC C-14-002 is currently paved over. Former firing sites SWMUs 14-002(a and b) are the likely sources of any potential contamination at AOC C-14-002.

6.22.3 Summary of Previous Investigations

No previous investigations have been conducted at AOC C-14-002.

6.22.4 Rationale for Delayed Investigation

The RFI work plan for Operable Unit 1085 did not identify any releases from AOC C-14-002 itself but noted the area may have residual contamination because of its location (LANL 1994, 034755, p. 5-3-5). Therefore, the source of potential contamination at this site appears to be the adjacent deferred active firing sites, including SWMUs 14-002(a and b). Site characterization and investigation at AOC C-14-002 were proposed to be delayed until the adjacent deferred sites [SWMUs 14-002(a and b)] undergo investigation in the FIP (LANL 2011, 207481, p. 6).

6.23 AOC C-14-003, Former Building

6.23.1 Site Description and Operational History

AOC C-14-003 is the location of a former HE-preparation building (structure 14-4) in the southeastern portion of TA-14 (Figure 6.23-1). Constructed in 1944, the wood-framed building measured 12 ft wide × 25 ft long × 8 ft high. The building was removed in 1952.

6.23.2 Relationship to Other SWMUs and AOCs

AOC C-14-003 is not associated with other SWMUs and AOCs at TA-14. The nearby sites under investigation include AOC 14-004(a), a storage area housed in an HE magazine; and AOC C-14-005, the location of a former storage building. AOC 14-004(a) is located approximately 30 ft southwest, and AOC C-14-005 is approximately 100 ft northeast.

6.23.3 Summary of Previous Investigations

During the 1995 RFI conducted at AOC C-14-003, samples were field screened for metals and gross radioactivity, and HE spot tests were performed. Based on field-screening results, two surface samples (0.0–0.25 ft and 0.0–0.5 ft bgs) were collected and submitted for off-site analysis of TAL metals, gamma emitting radionuclides, and HE (LANL 1996, 054086, p. 5-53). The data showed uranium-238 detected above BVs and HE was detected. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

The 1995 RFI was conducted based on the former site boundary that was modified following the 2011 investigation (section 6.23.4).

6.23.4 Rationale for Delayed Investigation

Sampling was conducted at AOC C-14-003 as proposed in the FIP (LANL 2011, 207481, pp. 6–7). However, a 1946 aerial photo (SNL 1946, 015397) was found during the investigation, and the site boundary was subsequently modified based on this new information (Figure 6.23-1). The revised site boundary is approximately 30 ft to the west of the site boundary presented in the FIP. Therefore, the locations sampled during the 2011 investigation are not applicable to the site. The revised site boundary is partially covered by the berm area north of an active HE magazine (structure 14-22), which housed the AOC 14-004(a) storage area. Further site characterization and investigation are proposed to be delayed until the decommissioning of the HE magazine.

6.24 AOC C-14-004, Former Building

6.24.1 Site Description and Operational History

AOC C-14-004 is the location of a former electronics shop (structure 14-7) that was approximately 75 ft west of building 14-23 in the southeastern portion of TA-14 (Figure 6.24-1). Constructed in 1945, the wood-framed building with concrete foundation measured 15 ft wide × 24 ft long × 9 ft high. The building, including the concrete foundation, was removed in 1952.

6.24.2 Relationship to Other SWMUs and AOCs

AOC C-14-004 is not associated with other SWMUs and AOCs at TA-14. The nearby sites under investigation include AOC 14-004(a), a storage area housed in an HE magazine, and the location of a former storage building, AOC C-14-007. AOC 14-004(a) is located approximately 120 ft north and AOC C-14-007 is approximately 100 ft west.

6.24.3 Summary of Previous Investigations

During the 1995 RFI conducted at AOC C-14-004, samples were field screened for metals and gross radioactivity, and HE spot tests were performed. Based on field-screening results, two surface samples (0.0–0.25 ft bgs) were collected and submitted for off-site analysis of SVOCs (LANL 1996, 054086, pp. 5-53–5-57). The data showed 4-chloro-3-methyl phenol was detected. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

6.24.4 Site Contamination

6.24.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC C-14-004:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Twelve samples were collected from six locations within and around the structure footprint at 0.0–1.0 ft and 3.0–4.0 ft bgs.
- All samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, explosive compounds, and SVOCs. Six subsurface samples were analyzed for VOCs, and four samples were analyzed for PCBs.

The sampling locations for the 2011 investigation at AOC C-14-004 are shown in Figure 6.24-1. Table 6.24-1 presents the samples collected and the analyses requested for AOC C-14-004. The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.24.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.24.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC C-14-004 consist of the results from 12 samples (6 soil and 6 tuff) collected from six locations.

Inorganic Chemicals

Twelve samples (six soil and six tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.24-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.24-2 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 15,800 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 Qbt 2,3,4 BV (0.5 mg/kg) but had DLs (0.52 mg/kg to 0.56 mg/kg) above BV in three samples. The DLs were only 0.02 mg/kg to 0.06 mg/kg above the BV and antimony was not detected or detected above BVs in the other nine samples (detected below BVs in five samples). Antimony is not a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in three samples with a maximum concentration of 3.4 mg/kg. The concentrations were only 0.41 mg/kg and 0.61 mg/kg above the BV and were below the two highest Qbt 2,3,4 background concentrations (4 mg/kg and 5 mg/kg). Arsenic was detected below BV in the other nine 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 295 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 three samples with a maximum concentration of 4320 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 Qbt 2,3,4 BV (7.14 mg/kg) in 2 samples with a maximum concentration of 9.2 mg/kg. The concentrations were below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium was detected below BVs in the other 10 samples including a higher concentration in soil (10.9 mg/kg at location 14-614626). Chromium is not a COPC.

Cobalt was detected above the Qbt 2,3,4 BV (3.14 mg/kg) in three samples, with a maximum concentration of 4.1 mg/kg. Cobalt is retained as a COPC.

Copper was detected above the Qbt 2,3,4 BV (4.66 mg/kg) in four samples with a maximum concentration of 7.8 mg/kg. Two 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 for both) but had DLs (0.52 mg/kg to 0.57 mg/kg) above BVs in six soil samples and six tuff samples. The DLs were similar regardless of the medium and were only 0.02 mg/kg to 0.07 mg/kg above the BVs. 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 15,800 mg/kg. The concentration was only 1300 mg/kg above the BV and was below the maximum Qbt 2,3,4 background concentration (19,500 mg/kg). Iron was detected below BVs in the other 11 samples including a similar concentration in soil (14,900 mg/kg at location 14-614626). 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 one soil sample and three tuff samples with a maximum concentration of 26.5 mg/kg. The maximum concentration in tuff (17.6 mg/kg) was above the maximum Qbt 2,3,4 background concentration (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 2460 mg/kg. The concentrations were below the two 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.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in three samples with a maximum concentration of 7.8 mg/kg. The maximum concentration was above the maximum Qbt 2,3,4 background concentration (7 mg/kg). Nickel is retained as a COPC.

Nitrate was detected in six soil samples and six tuff samples with a maximum concentration of 3.9 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 three soil samples and four tuff samples with a maximum concentration of 0.02 mg/kg. Perchlorate is retained as a COPC.

Selenium was detected above the Qbt 2,3,4 BV (0.3 mg/kg) in six samples with a maximum concentration of 1.6 mg/kg. Selenium is retained as a COPC.

Vanadium was detected above the Qbt 2,3,4 BV (17 mg/kg) in 2 samples with a maximum concentration of 17.5 mg/kg. The concentrations were only 0.5 mg/kg above the BV and were below the maximum Qbt 2,3,4 background concentration (21 mg/kg). Vanadium was detected below BVs in the other 10 samples including similar or higher concentrations in soil (17.5 mg/kg, 17.7 mg/kg, 20.1 mg/kg, 20.4 mg/kg, and 21.8 mg/kg at 4 locations). Vanadium is not a COPC.

Organic Chemicals

Twelve samples (six soil and six tuff) were analyzed for explosive compounds and SVOCs, four samples (two soil and two tuff) were analyzed for PCBs, and six samples (one soil and five tuff) were analyzed for VOCs. Table 6.24-3 presents the detected organic chemicals. Figure 6.24-3 shows the spatial distribution of detected organic chemicals.

Organic chemicals detected at AOC C-14-004 include acetone, HMX, and TATB. The detected organic chemicals are retained as COPCs.

Radionuclides

Samples at AOC C-14-004 were not analyzed for radionuclides.

6.24.4.4 Nature and Extent of Contamination

The nature and extent of inorganic and organic COPCs at AOC C-14-004 are discussed below.

Inorganic Chemicals

Inorganic COPCs at AOC C-14-004 include aluminum, barium, calcium, cobalt, copper, lead, nickel, perchlorate, and selenium.

Aluminum was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 15,800 mg/kg. Concentrations increased with depth at locations 14-614622, 14-614623, and 14-614624 and decreased with depth at location 14-614642. Concentrations decreased laterally at all locations. The residential and industrial SSLs were approximately 4.9 times (62,200 mg/kg below the SSL) and 82 times the maximum concentration, respectively. The lateral extent of aluminum is defined, and further sampling for vertical extent is not warranted.

Barium was detected above the Qbt 2,3,4 BV in five samples, with a maximum concentration of 295 mg/kg. Concentrations increased with depth at locations 14-614622, 14-614623, and 14-614624 and decreased with depth at location 14-614642. Concentrations decreased laterally at all locations. The residential SSL was approximately 53 times the maximum concentration. 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 4320 mg/kg. Concentrations increased with depth at locations 14-614622, 14-614623, and 14-614624, increased laterally at location 14-614624, and decreased laterally at the other locations. The NMED residential essential nutrient screening level was approximately 301 times maximum concentration. The lateral extent of calcium is defined, and further sampling for vertical extent is not warranted.

Cobalt was detected above the Qbt 2,3,4 BV in three samples with a maximum concentration of 4.1 mg/kg. Concentrations did not change substantially with depth (0.2 mg/kg) at location 14-614623 and decreased with depth at locations 14-614622 and 14-614642 (concentrations in the shallower samples at locations 14-614622 and 14-614623 were 6.1 mg/kg and 4.3 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially laterally (0.6 mg/kg) at location 14-614642 and decreased laterally at the other locations. The residential and industrial SSLs were approximately 5.6 times and 85 times the maximum concentration, respectively. Further sampling for extent of cobalt is not warranted.

Copper was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 7.8 mg/kg. Concentrations increased with depth at location 14-614624, did not change substantially with depth (0.7 mg/kg and 1.1 mg/kg) at locations 14-614622 and 14-614623 (concentrations in the shallower samples at locations 14-614622 and 14-614623 were 5.8 mg/kg and 5.1 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]), and decreased with depth at location 14-614642. Concentrations did not change substantially laterally at locations 14-614642 and 14-614624 (1.6 mg/kg and 1.1 mg/kg). The residential SSL was approximately 401 times the maximum concentration above BV. Further sampling for extent of copper is not warranted.

Lead was detected above the soil and Qbt 2,3,4 BVs in one soil sample and three tuff samples with a maximum concentration of 26.5 mg/kg. Concentrations did not change substantially with depth (0.4 mg/kg and 1.8 mg/kg) at locations 14-614622 and 14-614623 (concentrations in the shallower samples at locations 14-614622 and 14-614623 were 16.3 mg/kg and 13.5 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]) and decreased with depth at locations 14-614625 and 14-614642. Concentrations increased laterally at locations 14-614625 and 14-614642 and decreased laterally at the other locations. The residential and industrial SSLs were approximately 15 times and 30 times the maximum concentration, respectively. Further sampling for extent of lead is not warranted.

Nickel was detected above the Qbt 2,3,4 BV in three samples with a maximum concentration of 7.8 mg/kg. Concentrations increased with depth at locations 14-614623 and 14-614624 and did not change substantially with depth (1.6 mg/kg) at location 14-614622 (concentration in the shallower samples at location 14-614622 was 6.2 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially laterally (0.9 mg/kg) at location 14-614624 and decreased laterally at the other locations. The residential SSL was approximately 200 times the maximum concentration above BV. Further sampling for extent of nickel is not warranted.

Perchlorate was detected in three soil samples and four tuff samples with a maximum concentration of 0.02 mg/kg. Concentrations did not change substantially with depth (0.005 mg/kg to 0.0176 mg/kg) at locations 14-614622, 14-614623, and 14-614624, and increased with depth at location 14-614642. Concentrations decreased laterally at locations 14-614625 and 14-614626 and did not change substantially laterally (0.005 mg/kg and 0.0135 mg/kg) at locations 14-614624 and 14-614642. The residential SSL was approximately 2740 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 Qbt 2,3,4 BV in six samples with a maximum concentration of 1.6 mg/kg. Concentrations did not change substantially with depth (0.2 mg/kg to 0.78 mg/kg) at locations 14-614622, 14-614623, 14-614624, 14-614625, and 14-614642 (concentrations in the shallower samples at locations 14-614622, 14-614623, 14-614624, and 14-614625 were 1.1 mg/kg, 0.97 mg/kg, 0.82 mg/kg, and 1.2 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially laterally (0.3 mg/kg). The residential SSL was approximately 244 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Organic Chemicals

Organic COPCs at AOC C-14-004 include acetone, HMX, and TATB.

Acetone was detected in three samples with a maximum concentration of 0.014 mg/kg. VOCs were analyzed for in only the deeper samples at locations 14-614622, 14-614623, and 14-614625. Concentrations did not change substantially laterally (0.0067 mg/kg) at location 14-614625 and decreased laterally at the other locations. Concentrations were below EQLs. The residential SSL was approximately 4,740,000 times the maximum concentration. Further sampling for extent of acetone is not warranted.

HMX was detected in two samples with a maximum concentration of 0.059 mg/kg. Concentrations decreased with depth at locations 14-614623 and 14-614642 and did not change substantially laterally (0.013 mg/kg) at location 14-614642 and decreased laterally at the other locations. Concentrations were below EQLs. The residential SSL was approximately 65,200 times the maximum concentration. The vertical extent of HMX is defined, and further sampling for lateral extent is not warranted.

TATB was detected in 10 samples with a maximum concentration of 1.9 mg/kg. Concentrations decreased with depth at locations 14-614624 and 14-614625 and did not change substantially with depth (0.43 mg/kg to 1.7 mg/kg) at location 14-614622, 14-614623, and 14-614642. Concentrations did not change substantially laterally (less than 1 mg/kg). The residential SSL was approximately 1160 times the maximum concentration. Further sampling for extent of TATB is not warranted.

Radionuclides

Samples were not analyzed for radionuclides at AOC C-14-004.

Summary of Nature and Extent

The extent of inorganic and organic COPCs is defined or no further sampling for extent is warranted at AOC C-14-004.

6.24.5 Summary of Human Health Risk Screening

Industrial Scenario

No carcinogenic COPCs were identified in the 0.0−1.0-ft depth interval. The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.6, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

The total excess cancer risk for the residential scenario is 8×10^{-7}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.5, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Based on the risk-screening assessment results, no potential unacceptable risks exist for the industrial, construction worker, and residential scenarios at AOC C-14-004.

6.24.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at AOC C-14-004.

6.25 AOC C-14-005, Former Building

6.25.1 Site Description and Operational History

AOC C-14-005 is the location of a former storage building (structure 14-8) that was approximately 75 ft north of building 14-6 at TA-14 (Figure 6.25-1). Constructed in 1944, the wood-framed building measured 6 ft wide × 16 ft long × 9 ft high. The building was removed in 1952.

6.25.2 Relationship to Other SWMUs and AOCs

AOC C-14-005 is not associated with other SWMUs and AOCs at TA-14. The nearby sites under investigation include AOC C-14-003, the location of a former HE-preparation building, and SWMU 14-007, the decommissioned septic system that served building 14-6. AOC C-14-003 is located approximately 100 ft southwest, and SWMU 14-007 is approximately 75 ft south-southeast.

6.25.3 Summary of Previous Investigations

During the 1995 RFI conducted at AOC C-14-005, samples were field screened for metals and gross radioactivity, and HE spot tests were performed. Based on field-screening results, two surface samples (0.0–0.5 ft bgs) were collected and submitted for off-site analysis of TAL metals, HE, and total uranium (LANL 1996, 054086, pp. 5-57–5-61). The data showed lead, thallium, and mercury detected above BVs.

Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

6.25.4 Site Contamination

6.25.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC C-14-005:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Ten samples were collected from five locations within and around the structure footprint at 0.0–1.0 ft and 3.0–4.0 ft bgs.
- All samples were analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, and SVOCs. Five subsurface samples were analyzed for VOCs, and two samples were analyzed for PCBs.

The sampling locations for the 2011 investigation at AOC C-14-005 are shown in Figure 6.25-1. Table 6.25-1 presents the samples collected and the analyses requested for AOC C-14-005. The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.25.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.25.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC C-14-005 consist of the results from 10 soil samples collected from 5 locations.

Inorganic Chemicals

Ten soil samples were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.25-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.25-2 shows the spatial distribution of inorganic chemicals detected or detected above BVs.

Cyanide was not detected above the soil BV (0.5 mg/kg) but had DLs (0.53 mg/kg to 0.56 mg/kg) above the BV in 10 samples. The DLs were only 0.03 mg/kg to 0.06 mg/kg above the BV and cyanide was not detected in any samples. Cyanide is not a COPC.

Lead was detected above the soil BV (22.3 mg/kg) in one sample at a concentration of 24 mg/kg. The Gehan test indicated site concentrations of lead in soil are statistically different from background (Table F-11). However, the quantile and slippage tests indicated site concentrations of lead in soil are not statistically different from background (Figure F-88 and Table F-11). Lead is not a COPC.

Mercury was detected above the soil BV (0.1 mg/kg) in five samples with a maximum concentration of 1.37 mg/kg. Mercury is retained as a COPC.

Nitrate was detected in 10 samples with a maximum concentration of 3.6 mg/kg. Nitrate is naturally occurring, and the concentrations detected at the site likely reflect naturally occurring levels of nitrate. Nitrate is not a COPC.

Perchlorate was detected in four soil samples with a maximum concentration of 0.012 mg/kg. Perchlorate is retained as a COPC.

Selenium was detected above the soil BV (1.52 mg/kg) in one sample at a concentration of 1.8 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure F-89 and Table F-11). Selenium is retained as a COPC.

Organic Chemicals

Ten soil samples were analyzed for explosive compounds and SVOCs, two soil samples were analyzed for PCBs, and five soil samples were analyzed for VOCs. Table 6.25-3 presents the detected organic chemicals. Figure 6.25-3 shows the spatial distribution of detected organic chemicals.

Organic chemicals detected at AOC C-14-005 include acetone, fluoranthene, 4-isopropyltoluene, and TATB. The detected organic chemicals are retained as COPCs.

Radionuclides

Samples at AOC C-14-005 were not analyzed for radionuclides.

6.25.4.4 Nature and Extent of Contamination

The nature and extent of inorganic and organic COPCs at AOC C-14-005 are discussed below.

Inorganic Chemicals

Inorganic COPCs at AOC C-14-005 include mercury, perchlorate, and selenium.

Mercury was detected above the soil BV in five samples with a maximum concentration of 1.37 mg/kg. Concentrations decreased with depth at all locations and did not change substantially laterally (0.65 mg/kg or less). The residential and industrial SSLs were approximately 17 times and 284 times the maximum concentration, respectively. The vertical extent of mercury is defined, and further sampling for lateral extent is not warranted.

Perchlorate was detected in four soil samples with a maximum concentration of 0.012 mg/kg. Concentrations increased with depth at locations 14-614627, 14-614628, 14-614630, and 14-614631; decreased laterally at location 14-614629; and did not change substantially laterally (0.0007 mg/kg to 0.0089 mg/kg) at the other locations. Concentrations at locations 14-614627, 14-614628, and 14-614631 were below the estimated DLs. The residential SSL was approximately 4570 times the maximum concentration. Further sampling for extent of perchlorate is not warranted.

Selenium was detected above the soil BV in one sample at a concentration of 1.8 mg/kg. Concentrations did not change substantially with depth (0.6 mg/kg) at location 14-614628 (the concentration in the shallower sample at location 14-614628 was 1.2 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially laterally (0.7 mg/kg) at location 14-614628. The residential SSL was approximately 217 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Organic Chemicals

Organic COPCs at AOC C-14-005 include acetone, fluoranthene, 4-isopropyltoluene, and TATB.

Acetone was detected in one sample at a concentration of 0.076 mg/kg. VOCs were analyzed for in only the deeper sample at location 14-614631. Concentrations increased laterally at location 14-614631. The concentration was below the EQL. The residential SSL was approximately 872,000 times the maximum concentration. Further sampling for extent of acetone is not warranted.

Fluoranthene was detected in one sample at a concentration of 0.041 mg/kg. Concentrations decreased with depth and increased laterally at location 14-614631. The concentration was below the EQL. The residential SSL was approximately 56,600 times the maximum concentration. The vertical extent of fluoranthene is defined, and further sampling for lateral extent is not warranted.

Isopropyltoluene[4-] was detected in one sample at a concentration of 0.019 mg/kg. VOCs were analyzed for in only the deeper sample at location 14-614631. Concentrations increased laterally at location 14-614631. The residential SSL was approximately 124,000 times the maximum concentration. Further sampling for extent of 4-isopropyltoluene is not warranted.

TATB was detected in four samples with a maximum concentration of 0.77 mg/kg. Concentrations decreased with depth and did not change substantially laterally (0.25 mg/kg to 0.52 mg/kg) at all locations. The vertical extent of TATB is defined, and further sampling for lateral extent is not warranted.

Radionuclides

Samples were not analyzed for radionuclides at AOC C-14-005.

Summary of Nature and Extent

The extent of inorganic and organic COPCs is defined or no further sampling for extent is warranted at AOC C-14-005.

6.25.5 Summary of Human Health Risk Screening

Industrial Scenario

No carcinogenic COPCs were identified in the 0.0−1.0-ft depth interval. The industrial HI is 0.004, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Construction Worker Scenario

No carcinogenic COPCs were identified in the 0.0−10.0-ft depth interval. The construction worker HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

No carcinogenic COPCs were identified in the 0.0−10.0-ft depth interval. The residential HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Based on the risk-screening assessment results, no potential unacceptable risks exist for the industrial, construction worker, and residential scenarios at AOC C-14-005.

6.25.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at AOC C-14-005.

6.26 AOC C-14-007, Former Storage Building

6.26.1 Site Description and Operational History

AOC C-14-007 is the location of a former storage building (structure 14-10) that was located approximately 130 ft west of building 14-24 in the southeastern portion of TA-14 (Figure 6.26-1). Constructed in 1945, the wood-framed building measured 10 ft square × 8 ft high. The building was removed in 1952.

6.26.2 Relationship to Other SWMUs and AOCs

AOC C-14-007 is not associated with other SWMUs and AOCs at TA-14.

6.26.3 Summary of Previous Investigations

During the 1995 RFI conducted at AOC C-14-007, samples were field screened for metals and gross radioactivity, and HE spot tests were performed. Based on field-screening results, two surface samples (0.0–0.5 ft bgs) were collected and submitted for off-site analysis of TAL metals, HE, SVOCs, and total uranium (LANL 1996, 054086, pp. 5-64–5-69). The data showed lead, thallium, and total uranium detected above BVs and TNT detected in one sample. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

6.26.4 Site Contamination

6.26.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC C-14-007:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Ten samples were collected from five locations within and around the structure footprint at 0.0–1.0 ft and 3.0–4.0 ft bgs.
- All samples were analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, and SVOCs. Five subsurface samples were analyzed for VOCs, and two samples were analyzed for PCBs.

The sampling locations for the 2011 investigation at AOC C-14-007 are shown in Figure 6.26-1. Table 6.26-1 presents the samples collected and the analyses requested for AOC C-14-007. The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.26.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological-screening results exceeded twice the daily site background levels. All HE spot test results were negative. Field-screening results for the 2011 samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.26.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC C-14-007 consist of the results from 10 samples (4 soil and 6 tuff) collected from 5 locations.

Inorganic Chemicals

Ten samples (four soil and six tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.26-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.26-2 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 4.9 mg/kg. The concentration was above the maximum soil background concentration (1 mg/kg). Antimony is retained as a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.79 mg/kg) in four samples with a maximum concentration of 6.3 mg/kg. Two 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 Qbt 2,3,4 BV (46 mg/kg) in two samples with a maximum concentration of 58.1 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 one sample at a concentration of 4800 mg/kg. The 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 Qbt 2,3,4 BV (7.14 mg/kg) in five samples with a maximum concentration of 49.3 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium is retained as a COPC.

Copper was detected above the Qbt 2,3,4 BV (4.66 mg/kg) in three samples with a maximum concentration of 9.7 mg/kg. The maximum 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 for both) but had DLs (0.51 mg/kg to 0.63 mg/kg) above BVs in three soil samples and six tuff samples. The DLs were similar regardless of the medium and were only 0.01 mg/kg to 0.13 mg/kg above the BVs. Cyanide was detected below BV in the other sample. Cyanide is not a COPC.

Lead was detected above the Qbt 2,3,4 BV (11.2 mg/kg) in two samples with a maximum concentration of 17.7 mg/kg. The concentrations were above the maximum Qbt 2,3,4 background concentration (15.5 mg/kg). Lead is retained as a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in one sample at a concentration of 1770 mg/kg. The concentration was only 80 mg/kg above the BV and was below or similar to the three highest Qbt 2,3,4 background concentrations (1700 mg/kg, 2720 mg/kg, and 2820 mg/kg). Magnesium was detected below BVs in the other nine samples. Magnesium is not a COPC.

Nickel was detected above the Qbt 2,3,4 BV (6.58 mg/kg) in three samples with a maximum concentration of 16.4 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 four soil samples and five tuff samples with a maximum concentration of 4.7 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 tuff sample at a concentration of 0.0052 mg/kg. Perchlorate is retained as a COPC.

Selenium was detected above the Qbt 2,3,4 BV (0.3 mg/kg) in six samples with a maximum concentration of 2.6 mg/kg. Selenium is retained as a COPC.

Organic Chemicals

Ten samples (four soil and six tuff) were analyzed for explosive compounds and SVOCs, two samples (one soil and one tuff) were analyzed for PCBs, and five tuff samples were analyzed for VOCs. Table 6.26-3 presents the detected organic chemicals. Figure 6.26-3 shows the spatial distribution of detected organic chemicals.

Organic chemicals detected at AOC C-14-007 include benzene, benzo(b)fluoranthene, 2-butanone, chrysene, fluoranthene, 4-isopropyltoluene, pyrene, TATB, and toluene. The detected organic chemicals are retained as COPCs.

Radionuclides

Samples at AOC C-14-007 were not analyzed for radionuclides.

6.26.4.4 Nature and Extent of Contamination

The nature and extent of inorganic and organic COPCs at AOC C-14-007 are discussed below.

Inorganic Chemicals

Inorganic COPCs at AOC C-14-007 include antimony, arsenic, barium, calcium, chromium, copper, lead, nickel, perchlorate, and selenium.

Antimony was detected above the soil BV in one sample at a concentration of 4.9 mg/kg. Concentrations decreased with depth at location 14-614636 and decreased laterally. The lateral and vertical extent of antimony are defined.

Arsenic was detected above the Qbt 2,3,4 BV in four samples with a maximum concentration of 6.3 mg/kg. Concentrations increased with depth at location 14-614635, did not change substantially with depth (0.7 mg/kg and 1.2 mg/kg) at locations 14-614632 and 14-614634, and decreased with depth at location 14-614636 (concentrations in the shallower samples at locations 14-614632, 14-614634, and 14-614636 were 2.7 mg/kg, 3.9 mg/kg, and 5.6 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations at locations 14-614632, 14-614634, and 14-614636 were equivalent to or below the maximum Qbt 2,3,4 background concentration (5 mg/kg). Concentrations increased laterally at locations 14-614634 and 14-614635 by 2.2 mg/kg and 3.4 mg/kg, respectively, decreased laterally at location 14-614633, and did not change substantially laterally (0.5 mg/kg) at location 14-614632. The residential excess cancer risk for arsenic was 7×10^{-6} with a total excess cancer risk of 1×10^{-5} using the EPA residential regional screening value, which is equivalent to the target risk level of 1×10^{-5} (Appendix G). Further sampling for extent of arsenic is not warranted.

Barium was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 58.1 mg/kg. Concentrations did not change substantially with depth (5.2 mg/kg) and increased laterally at location 14-614632. The residential SSL was approximately 268 times the maximum concentration. 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 one sample at a concentration of 4800 mg/kg. Concentrations increased with depth and increased laterally at location 14-614632. The NMED residential essential nutrient screening level was approximately 271 times the maximum concentration. Further sampling for extent of calcium is not warranted.

Chromium was detected above the Qbt 2,3,4 BV in five samples with a maximum concentration of 49.3 mg/kg. Concentrations increased with depth at all locations, increased laterally at locations 14-614632, 14-614633, and 14-614635, and decreased laterally at location 14-614634. As discussed in section 4.2, because there was no known use of hexavalent chromium at this site, the results were compared with the residential SSL for trivalent chromium (117,000 mg/kg). The residential trivalent chromium SSL was approximately 2370 times the maximum concentration. Further sampling for extent of chromium is not warranted.

Copper was detected above the Qbt 2,3,4 BV in three samples with a maximum concentration of 9.7 mg/kg. Concentrations increased with depth at location 14-614632, did not change substantially with depth (1 mg/kg) at location 14-614635, and decreased with depth at location 14-614633 (concentrations in the shallower samples at locations 14-614633 and 14-614635 were 8.6 mg/kg and 6.9 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Tuff concentrations at locations 14-614633 and 14-614635 were below the maximum Qbt 2,3,4 background concentration (6.2 mg/kg). Concentrations increased laterally at location 14-614632, 14-614633, and 14-614635. The residential SSL was approximately 323 times the maximum concentration. Further sampling for extent of copper is not warranted.

Lead was detected above the Qbt 2,3,4 BV in two samples with a maximum concentration of 17.7 mg/kg. Concentrations decreased with depth at locations 14-614632 and 14-614635 (the concentration in the shallower sample at location 14-614635 was 21.9 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Concentrations increased laterally at location 14-614632 and14-614635. The residential and industrial SSLs were approximately 23 times and 45 times the maximum concentration, respectively. The vertical extent of lead 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 16.4 mg/kg. Concentrations increased with depth at locations 14-614632 and 14-614635 and did not change substantially with depth (1.7 mg/kg) at location 14-614636 (the concentration in the shallower sample at location 14-614636 was 6.1 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Concentrations increased laterally at locations 14-614632 and 14-614635 and decreased laterally at location 14-614633 and 14-614634. The residential SSL was approximately 95 times the maximum concentration. Further sampling for extent of nickel is not warranted.

Perchlorate was detected in one tuff sample at a concentration of 0.0052 mg/kg. Concentrations increased with depth and increased laterally at location 14-614632. The concentration was below the estimated DL. The residential SSL was approximately 10,500 times the maximum concentration. Further sampling for extent of perchlorate is not warranted.

Selenium was detected above the Qbt 2,3,4 BV in six samples with a maximum concentration of 2.6 mg/kg. Concentrations did not change substantially with depth (0.6 mg/kg to 1.3 mg/kg) at all locations (concentrations in the shallower samples at locations 14-614533, 14-614634, 14-614535, and 14-614636 were 1.5 mg/kg, 1.4 mg/kg, 1.4 mg/kg, and 1.2 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially laterally (0.5 mg/kg or less). The residential SSL was approximately 150 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Organic Chemicals

Organic COPCs at AOC C-14-007 include benzene, benzo(b)fluoranthene, 2-butanone, chrysene, fluoranthene, 4-isopropyltoluene, pyrene, TATB, and toluene.

Benzene and 2-butanone were each detected in one sample at concentrations of 0.0003 mg/kg and 0.0058 mg/kg, respectively. VOCs were analyzed for in only the deeper sample at location 14-614635. Concentrations increased laterally at location 14-614635. Concentrations were below EQLs. The residential SSLs for benzene and 2-butanone were approximately 59,300 and 6,450,000 times the maximum concentrations, respectively. Further sampling for extent of benzene and 2-butanone is not warranted.

Benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene were each detected in one sample at concentrations of 0.074 mg/kg, 0.048 mg/kg, 0.055 mg/kg, and 0.048 mg/kg, respectively. Concentrations decreased with depth and increased laterally at location 14-614635. Concentrations were below EQLs. The residential SSLs for benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene were approximately 21 times; 3190 times; 42,200 times; and 36,200 times the concentrations, respectively. The vertical extent of benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene are defined, and further sampling for lateral extent is not warranted.

Isopropyltoluene[4-] was detected in two samples with a maximum concentration of 0.0014 mg/kg. VOCs were analyzed for in only the deeper sample at locations 14-614632 and 14-614635. Concentrations increased laterally at locations 14-614632 and 14-614635. Concentrations were below EQLs. The residential SSL was approximately 1,690,000 times the maximum concentration. Further sampling for extent of 4-isopropyltoluene is not warranted.

TATB was detected in four samples with a maximum concentration of 2.8 mg/kg. Concentrations decreased with depth at all locations. Concentrations increased laterally at locations 14-614534 and 14-614635, did not change substantially laterally (0.11 mg/kg) at location 14-614633, and decreased laterally at location 14-614632. The residential SSL was approximately 786 times the maximum concentration. The vertical extent of TATB is defined, and further sampling for lateral extent is not warranted.

Toluene was detected in one sample at a concentration of 0.0015 mg/kg. VOCs were analyzed for in only the deeper sample at location 14-614633. Concentrations increased laterally at location 14-614633. The concentration was below the EQL. The residential SSL was approximately 3,490,000 times the maximum concentration. Further sampling for extent of toluene is not warranted.

Radionuclides

Samples were not analyzed for radionuclides at AOC C-14-007.

Summary of Nature and Extent

The extent of inorganic and organic COPCs is defined or no further sampling for extent is warranted at AOC C-14-007.

6.26.5 Summary of Human Health Risk Screening

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-8}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.04, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 3×10^{-9}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.3, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-5} (based on the EPA regional screening value for arsenic), which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.2, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Based on the risk-screening assessment results, no potential unacceptable risks exist for the industrial, construction worker, and residential scenarios at AOC C-14-007.

6.26.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at AOC C-14-007.

6.27 AOC C-14-008, Former Magazine

6.27.1 Site Description and Operational History

AOC C-14-008 is a former HE magazine (structure 14-11) located at TA-14 (Figure 6.7-1). Constructed in 1945, the wood-framed magazine measured 5 ft square × 5 ft high, with an earthen berm on three sides and on top. The magazine was removed in 1952.

6.27.2 Relationship to Other SWMUs and AOCs

AOC C-14-008 is the location of a former HE magazine, approximately 100 ft northeast of the other SWMUs and AOCs in Consolidated Unit 14-002(a)-99.

6.27.3 Summary of Previous Investigations

During the 1995 RFI conducted at AOC C-14-008, samples were field screened for lead, uranium, and gross radioactivity, and HE spot tests were performed. Based on field-screening results, two surface samples (0.0–0.5 ft bgs) were collected and submitted for off-site analysis of TAL metals, gamma-emitting radionuclides, and HE (LANL 1996, 054086, pp. 5-32–5-33). The data showed no inorganic chemicals detected above BVs, no radionuclides detected above BVs/FVs, and no detected HE. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

6.27.4 Site Contamination

6.27.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC C-14-008:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Ten samples were collected from five locations within and around the structure footprint at 0.0–1.0 ft and 3.0–4.0 ft bgs.
- All samples were analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, PCBs, and SVOCs. Five subsurface samples were analyzed for VOCs.

The sampling locations for the 2011 investigation at AOC C-14-008 are shown in Figure 6.7-1. Table 6.27-1 presents the samples collected and the analyses requested for AOC C-14-008. The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.27.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.27.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC C-14-008 consist of the results from 10 samples (9 soil and 1 tuff) collected from 5 locations in 2011.

Inorganic Chemicals

Ten samples (nine soil and one tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.27-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.27-1 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 two soil samples and one tuff sample with a maximum concentration of 33,100 mg/kg. The Gehan and quantile tests indicated site concentrations of aluminum in soil are not statistically different from background (Figure F-90 and Table F-12). The tuff concentration was above the maximum Qbt 2,3,4 background concentration (8340 mg/kg). Aluminum is retained as a COPC.

Arsenic was detected above the Qbt 2,3,4 BV (2.8 mg/kg) in one sample at a concentration of 3.5 mg/kg. The concentration was only 0.7 mg/kg above the BV and was below the two highest Qbt 2,3,4 background concentrations (4 mg/kg and 5 mg/kg). Arsenic was detected below BVs in the other nine 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 three soil samples and one tuff sample with a maximum concentration of 356 mg/kg. The Gehan test indicated site concentrations of barium in soil are statistically different from background (Table F-12). However, the quantile and slippage tests indicated site concentrations of barium in soil are not statistically different from background (Figure F-91 and Table F-12). The tuff concentration was above the maximum Qbt 2,3,4 background concentration (51.6 mg/kg). 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 one soil sample and one tuff sample with a maximum concentration of 2 mg/kg. The Gehan and quantile tests indicated site concentrations of beryllium in soil are not statistically different from background (Figure F-92 and Table F-12). The tuff concentration was less than the maximum Qbt 2,3,4 background concentration (1.8 mg/kg). Beryllium was detected below BVs in the other eight samples including similar or higher concentrations in soil (1.6 mg/kg and 1.8 mg/kg at two locations). Beryllium is not a COPC.

Calcium was detected above the Qbt 2,3,4 BV (2200 mg/kg) in one sample at a concentration of 3830 mg/kg. The 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 Qbt 2,3,4 BV (7.14 mg/kg) in one sample at a concentration of 10.8 mg/kg. The concentration was only 3.7 mg/kg above the BV and was below the maximum Qbt 2,3,4 background concentration (13 mg/kg). Chromium was detected below BVs in the other nine samples including higher concentrations in soil (12.8 mg/kg, 12.9 mg/kg, and 13.2 mg/kg) at three locations. Chromium is not a COPC.

Cobalt was detected above the Qbt 2,3,4 BV (3.14 mg/kg) in one sample at a concentration of 5.6 mg/kg. Cobalt is retained as a COPC.

Copper was detected above the Qbt 2,3,4 BV (4.66 mg/kg) in one sample at a concentration of 8 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 for both) but had DLs (0.54 mg/kg to 0.61 mg/kg) above BVs in nine soil samples and one tuff sample. The DLs were similar regardless of the medium and were only 0.04 mg/kg to 0.11 mg/kg above the BVs. Cyanide was not detected in any 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 15,500 mg/kg. The concentration was only 1000 mg/kg above the BV and was below the maximum Qbt 2,3,4 background concentration (19,500 mg/kg). Iron was detected below BVs in the other nine samples including higher concentrations in soil (18,300 mg/kg, 18,400 mg/kg, and 19,100 mg/kg) at three locations. Iron is not a COPC.

Lead was detected above the Qbt 2,3,4 BV (11.2 mg/kg) in one sample at a concentration of 14.3 mg/kg. The concentration was only 3.1 mg/kg above BV and was below or similar to the two highest Qbt 2,3,4 background concentrations (14.5 mg/kg and 15.5 mg/kg). Lead was detected below BVs in the other nine samples including similar or higher concentrations in soil (14.2 mg/kg to 18.1 mg/kg) at five locations. Lead is not a COPC.

Magnesium was detected above the Qbt 2,3,4 BV (1690 mg/kg) in one sample at a concentration of 2730 mg/kg. The concentration was below or similar to the two highest Qbt 2,3,4 background concentrations (2720 mg/kg and 2820 mg/kg). Magnesium was detected below BVs in the other nine samples including higher concentrations in soil (2830 mg/kg, 2940 mg/kg, and 3010 mg/kg) at three locations. Magnesium 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 10 mg/kg. The concentration was above the maximum Qbt 2,3,4 background concentration (7 mg/kg). Nickel is retained as a COPC.

Nitrate was detected in nine soil samples and one tuff sample with a maximum concentration of 1.2 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 soil sample at a concentration of 0.0024 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 four soil samples and one tuff sample with a maximum concentration of 2.4 mg/kg. The Gehan and quantile tests indicated site concentrations of selenium in soil are statistically different from background (Figure F-93 and Table F-12). Selenium 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 23.2 mg/kg. The concentration was above the maximum Qbt 2,3,4 background concentration (21 mg/kg). Vanadium is retained as a COPC.

Organic Chemicals

Ten samples (nine soil and one tuff) were analyzed for explosive compounds, PCBs, and SVOCs, and five samples (four soil and one tuff) were analyzed for VOCs.

Organic chemicals were not detected at AOC C-14-008.

Radionuclides

Samples at AOC C-14-008 were not analyzed for radionuclides.

6.27.4.4 Nature and Extent of Contamination

The nature and extent of inorganic COPCs at AOC C-14-008 are discussed below.

Inorganic Chemicals

Inorganic COPCs at AOC C-14-008 include aluminum, barium, calcium, cobalt, copper, nickel, perchlorate, selenium, and vanadium.

Aluminum was detected above the soil and Qbt 2,3,4 BVs in two soil samples and one tuff sample with a maximum concentration of 33,100 mg/kg. Concentrations increased with depth at locations 14-614637, 14-614639, and 14-614640 and decreased laterally at these locations. The residential and industrial SSLs were approximately 2.4 times (44,900 mg/kg below the SSL) and 39 times the maximum concentration, respectively. Further sampling for extent of aluminum is not warranted.

Barium was detected above the soil and Qbt 2,3,4 BVs in three soil samples and one tuff sample with a maximum concentration of 356 mg/kg. Concentrations increased with depth at locations 14-614637, 14-614639, 14-614640, and 14-614641 and decreased laterally at these locations. The residential and industrial SSLs were approximately 44 times and 716 times the maximum concentration, respectively. Further sampling for extent of barium is not warranted.

Calcium was detected above the Qbt 2,3,4 BV in one sample at a concentration of 3830 mg/kg. Concentrations increased with depth and increased laterally at location 14-614640. The NMED residential essential nutrient screening level was approximately 339 times the maximum concentration. Further sampling for extent of calcium is not warranted.

Cobalt was detected above the Qbt 2,3,4 BV in one sample at a concentration of 5.6 mg/kg. Concentrations did not change substantially with depth (0.4 mg/kg) and laterally (0.1 mg/kg) at location 14-614640 (the concentration in the shallower sample at location 14-614640 was 5.2 mg/kg and below the soil BV [Appendix D, Pivot Tables]). The residential and industrial SSLs were approximately 4.1 times and 62 times the maximum concentration, respectively. Further sampling for extent of cobalt is not warranted.

Copper was detected above the Qbt 2,3,4 BV in one sample at a concentration of 8 mg/kg. Concentrations did not change substantially with depth (0.7 mg/kg) and laterally (1.1 mg/kg) at location 14-614640 (the concentration in the shallower sample at location 14-614640 was 7.3 mg/kg and below the soil BV [Appendix D, Pivot Tables]). The residential SSL was approximately 391 times the maximum concentration. Further sampling for extent of copper is not warranted.

Nickel was detected above the Qbt 2,3,4 BV in one sample at a concentration of 10 mg/kg. Concentrations increased with depth and decreased laterally at location 14-614640. The residential SSL was approximately 156 times the maximum concentration. Further sampling for extent of nickel is not warranted.

Perchlorate was detected in one soil sample at a concentration of 0.0024 mg/kg. Concentrations increased with depth and increased laterally at location 14-614639. The concentration was below the estimated DL. The residential SSL was approximately 22,800 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 one tuff sample with a maximum concentration of 2.4 mg/kg. Concentrations did not change substantially with depth (0.4 mg/kg to 1.1 mg/kg) at locations 14-614637, 14-614638, 14-614639, 14-614640, and 14-614641 (concentrations in the shallower samples at locations 14-614637, 14-614638, 14-614639, and 14-614640 and in the deeper sample at location 14-614641 were 1.4 mg/kg, 1.3 mg/kg, 1.4 mg/kg, 1.3 mg/kg, and 1.2 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially laterally (0.1 mg/kg to 0.6 mg/kg). The residential SSL was approximately 163 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Vanadium was detected above the Qbt 2,3,4 BV in one sample at a concentration of 23.2 mg/kg. Concentrations did not change substantially with depth (2.9 mg/kg) (the concentration in the shallower sample at location 14-614640 was 20.3 mg/kg and below the soil BV [Appendix D, Pivot Tables]) and decreased laterally at location 14-614640. The residential and industrial SSLs were approximately 17 times and 281 times the maximum concentration, respectively. Further sampling for extent of vanadium is not warranted.

Organic Chemicals

Organic chemicals were not detected at AOC C-14-008.

Radionuclides

Samples were not analyzed for radionuclides at AOC C-14-008.

Summary of Nature and Extent

No further sampling for extent of inorganic COPCs is warranted at AOC C-14-008.

6.27.5 Summary of Human Health Risk Screening

Industrial Scenario

No carcinogenic COPCs were identified in the 0.0−1.0-ft depth interval. The industrial HI is 0.0002, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Construction Worker Scenario

No carcinogenic COPCs were identified in the 0.0−10.0-ft depth interval. The construction worker HI is 0.9, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

No carcinogenic COPCs were identified in the 0.0−10.0-ft depth interval. The residential HI is 0.7, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Based on the risk-screening assessment results, no potential unacceptable risks exist for the industrial, construction worker, and residential scenarios at AOC C-14-008.

6.27.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at AOC C-14-008.

6.28 AOC C-14-009, Former Magazine

6.28.1 Site Description and Operational History

AOC C-14-009 is a former HE magazine (structure 14-13) located approximately 125 ft northeast of structure 14-5 (Figure 6.28-1). Constructed in 1945, the wood-framed magazine measured 3 ft wide × 4 ft long × 3 ft high and was covered with an earthen berm on three sides and the top. The magazine was destroyed by burning in 1960.

6.28.2 Relationship to Other SWMUs and AOCs

AOC C-14-009 is not associated with other SWMUs and AOCs at TA-14.

6.28.3 Summary of Previous Investigations

During the 1995 RFI conducted at AOC C-14-009, samples were field screened for metals and gross radioactivity, and HE spot tests were performed. Based on field-screening results, two near-surface samples (0.5–1.2 ft bgs) were collected and submitted for off-site analysis of TAL metals and HE (LANL 1996, 054086, pp. 5-97–5-100). The data showed lead detected above BVs. Data from the Phase I RFI are screening-level data and are presented in Appendix B of the HIR (LANL 2006, 091697).

6.28.4 Site Contamination

6.28.4.1 Soil, Rock, and Sediment Sampling

As part of the 2011 investigation, the following activities were conducted at AOC C-14-009:

- All samples were field screened for organic vapors and gross-alpha, -beta, and -gamma radioactivity. Field-screening results were recorded on the SCLs/COC forms (Appendix D) and are presented in Table 3.2-2.
- Ten samples were collected from five locations within and around the structure footprint at 0.0–1.0 ft and 3.0–4.0 ft bgs.
- All samples were analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, and SVOCs. Five subsurface samples were analyzed for VOCs, and two samples were analyzed for PCBs.

The sampling locations for the 2011 investigation at AOC C-14-009 are shown in Figure 6.28-1. Table 6.28-1 presents the samples collected and the analyses requested for AOC C-14-009. The geodetic coordinates of the sampling locations are presented in Table 3.2-1.

6.28.4.2 Soil, Rock, and Sediment Field-Screening Results

No organic vapors were detected at more than 5 ppm above ambient-air levels during PID screening of the samples during the 2011 investigation. No radiological field-screening results exceeded twice the daily site background levels. All HE spot-test results were negative. Field-screening results for the samples are presented in Table 3.2-2. No changes to sampling or other activities occurred because of the results of field screening.

6.28.4.3 Soil, Rock, and Sediment Sampling Analytical Results

Decision-level data at AOC C-14-009 consist of the results from 10 samples (2 soil and 8 tuff) collected from 5 locations.

Inorganic Chemicals

Ten samples (two soil and eight tuff) were analyzed for TAL metals, cyanide, nitrate, and perchlorate. Table 6.28-2 presents the inorganic chemicals above BVs and detected inorganic chemicals with no BVs. Figure 6.28-2 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 one sample at a concentration of 7550 mg/kg. The Gehan and quantile tests indicated site concentrations of aluminum in tuff are statistically different from background (Figure F-94 and Table F-13). Aluminum is retained as a COPC.

Antimony was not detected above the Qbt 2,3,4 BV (0.5 mg/kg) but had DLs (0.51 mg/kg and 0.53 mg/kg) above the BV in two samples. The DLs were only 0.01 mg/kg and 0.03 mg/kg above the BV and antimony was detected below BVs in the other eight samples. Antimony is not a COPC.

Barium was detected above the Qbt 2,3,4 BV (46 mg/kg) in six samples with a maximum concentration of 99.6 mg/kg. The Gehan and quantile tests indicated site concentrations of barium in tuff are statistically different from background (Figure F-95 and Table F-13). Barium 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 3.8 mg/kg. The Gehan test indicated site concentrations of cobalt in tuff are statistically different from background (Table F-13). However, the quantile and slippage tests indicated site concentrations of cobalt in tuff are not statistically different from background (Figure F-96 and Table F-13). 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 5.5 mg/kg. The Gehan and quantile tests indicated site concentrations of copper in tuff are statistically different from background (Figure F-97 and Table F-13). Copper is retained as a COPC.

Cyanide was not detected above the soil and Qbt 2,3,4 BVs (0.5 mg/kg for both) but had DLs (0.51 mg/kg to 0.57 mg/kg) above the BVs in two soil samples and eight tuff samples. The DLs were similar regardless of the medium and were only 0.01 mg/kg to 0.07 mg/kg above the BVs. Cyanide was not detected in any 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 one soil sample and three tuff samples with a maximum concentration of 66.7 mg/kg. The Gehan and quantile tests indicated site concentrations of lead in tuff are statistically different from background (Figure F-98 and Table F-13). Lead is retained as a COPC.

Manganese was detected above the Qbt 2,3,4 BV (482 mg/kg) in one sample at a concentration of 598 mg/kg. The Gehan and quantile tests indicated site concentrations of manganese in tuff are not statistically different from background (Figure F-99 and Table F-13). Manganese is not a COPC.

Nitrate was detected in two soil samples and eight tuff samples with a maximum concentration of 3.8 mg/kg. Nitrate is naturally occurring, and the concentrations detected likely 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 eight samples with a maximum concentration of 1.3 mg/kg. Selenium is retained as a COPC.

Organic Chemicals

Ten samples (two soil and eight tuff) were analyzed for explosive compounds and SVOCs, two tuff samples were analyzed for PCBs, and five tuff samples were analyzed for VOCs. Table 6.28-3 presents the detected organic chemicals. Figure 6.28-3 shows the spatial distribution of detected organic chemicals.

Organic chemicals detected at AOC C-14-009 include acetone, chloroform, methylene chloride, and TATB. The detected organic chemicals are retained as COPCs.

Radionuclides

Samples at AOC C-14-009 were not analyzed for radionuclides.

6.28.4.4 Nature and Extent of Contamination

The nature and extent of inorganic and organic COPCs at AOC C-14-009 are discussed below.

Inorganic Chemicals

Inorganic COPCs at AOC C-14-009 include aluminum, barium, copper, lead, and selenium.

Aluminum was detected above the Qbt 2,3,4 BV in one sample at a concentration of 7550 mg/kg. Concentrations decreased with depth and increased laterally at location 14-614619. The concentration was below the maximum Qbt 2,3,4 background concentration (8370 mg/kg). The residential and industrial SSLs were approximately 10 times (70,450 mg/kg below the SSL) and 171 times the maximum concentration, respectively. The vertical extent of aluminum is defined, and further sampling for lateral extent is not warranted.

Barium was detected above the Qbt 2,3,4 BV in six samples with a maximum concentration of 99.6 mg/kg. Concentrations did not change substantially with depth (0.7 mg/kg) at location 14-614616 and decreased with depth at locations 14-614615, 14-614617, and 14-614619 (the concentration in the shallower sample at location 14-614615 was 135 mg/kg and below the soil BV [Appendix D, Pivot Tables]). Concentrations decreased laterally at location 14-619616 and increased laterally at locations 14-619617, 14-619618, and 14-614619. The residential SSL was approximately 157 times the maximum concentration. The lateral extent of barium is defined, and further sampling for vertical extent is not warranted.

Copper was detected above the Qbt 2,3,4 BV in one sample at a concentration of 5.5 mg/kg. Concentrations decreased with depth and did not change substantially laterally (1.5 mg/kg) at location 14-614616. The concentration was below the maximum Qbt 2,3,4 background concentration (6.2 mg/kg). The residential SSL was approximately 569 times the maximum concentration. The vertical extent of copper is defined, and further sampling for lateral extent is not warranted.

Lead was detected above the soil and Qbt 2,3,4 BVs in one soil sample and three tuff samples with a maximum concentration of 66.7 mg/kg. Concentrations increased with depth at location 14-614616 and decreased with depth at locations 14-614615 and 14-614619. Concentrations increased laterally at location 14-614616 and decreased laterally at the other locations. The residential and industrial SSLs were approximately 6 times and 12 times (333 mg/kg and 733 mg/kg below the SSLs) the maximum concentration, respectively. Further sampling for extent of lead is not warranted.

Selenium was detected above the Qbt 2,3,4 BV in eight samples with a maximum concentration of 1.3 mg/kg. Concentrations did not change substantially with depth (0.41 mg/kg to 0.52 mg/kg) at locations 14-614615, 14-614616, 14-614617, 14-614618, and 14-614619 (concentrations in the shallower samples at locations 14-614615 and 14-614618 were 0.66 mg/kg and 0.36 mg/kg, respectively, and below the soil BV [Appendix D, Pivot Tables]). Concentrations did not change substantially laterally (0.2 mg/kg) at all locations. The residential SSL was approximately 301 times the maximum concentration. Further sampling for extent of selenium is not warranted.

Organic Chemicals

Organic COPCs at AOC C-14-009 include acetone, chloroform, methylene chloride, and TATB.

Acetone was detected in one sample at a concentration of 0.0088 mg/kg. VOCs were analyzed for in only the deeper sample at location 14-614615. Concentrations decreased laterally. The concentration was below the EQL. The residential SSL was approximately 7,530,000 times the maximum concentration. The lateral extent of acetone is defined, and further sampling for vertical extent is not warranted.

Chloroform was detected in one sample at a concentration of 0.00045 mg/kg. VOCs were analyzed for in only the deeper sample at location 14-614617. Concentrations increased laterally at location 14-614617. The concentration was below the EQL. The residential SSL was approximately 13,100 times the maximum concentration. Further sampling for extent of chloroform is not warranted.

Methylene chloride was detected in four samples with a maximum concentration of 0.0043 mg/kg. VOCs were analyzed for in only the deeper sample at locations 14-614616, 14-614617, 14-614618, and 14-614619. Concentrations increased laterally. The concentrations were below the EQLs. The residential SSL was approximately 95,100 times the maximum concentration. Further sampling for extent of methylene chloride is not warranted.

TATB was detected in one sample at a concentration of 0.57 mg/kg. Concentrations decreased with depth and increased laterally at location 14-614616. The residential SSL was approximately 3860 times the maximum concentration. The vertical extent of TATB is defined, and further sampling for lateral extent is not warranted.

Radionuclides

Samples were not analyzed for radionuclides at AOC C-14-009.

Summary of Nature and Extent

The extent of inorganic and organic COPCs is defined or no further sampling for extent is warranted at AOC C-14-009.

6.28.5 Summary of Human Health Risk Screening

Industrial Scenario

No carcinogenic COPCs were identified in the 0.0−1.0-ft depth interval. The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 3×10^{-11}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.2, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

The total excess cancer risk for the residential scenario is 8×10^{-10}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.2, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Based on the risk-screening assessment results, no potential unacceptable risks exist for the industrial, construction worker, and residential scenarios at AOC C-14-009.

6.28.6 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, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at AOC C-14-009.

7.0 CONCLUSIONS

7.1 Nature and Extent of Contamination

Of the 27 sites located at TA-14 in the Cañon de Valle Aggregate Area addressed during the 2011 investigation, 5 sites are deferred from investigation pursuant to Appendix A of the 2016 Consent Order and 5 sites are proposed for delayed investigation because they are an active firing site or are located next to active firing sites. Eight sites were not sampled during the 2011 investigation, and nature and extent of contamination have not been evaluated. Sampling at AOC 14-001(g) was in the drainages downgradient of the site to characterize contaminant migration from the site. Sampling was not performed to define nature and extent within the active firing site. Sampling was also conducted at AOC C-14-003 (a former HE-preparation building), but the site boundary was subsequently modified based on new information. Therefore, the locations sampled during the 2011 investigation are not applicable, and the revised site boundary is partially covered by the berm area north of an active HE magazine (structure 14-22). Site characterization of this AOC is proposed to be delayed until the decommissioning of the magazine. Sampling to determine nature and extent of contamination was performed at the remaining 17 sites.

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 17 sites investigated during the 2011 TA-14 investigation. The downgradient distribution of COPCs at AOC 14-001(g) was evaluated, and no further sampling is warranted for this site at this time. Summaries of the nature and extent of contamination are presented below.

The nature and extent of contamination have been defined, and/or no further sampling for extent is warranted, for the following sites:

- AOC 14-001(a), Pull Box
- AOC 14-001(b), Pull Box
- AOC 14-001(c), Pull Box
- AOC 14-001(d), Pull Box
- AOC 14-001(e), Pull Box
- SWMU 14-002(c), Decommissioned Firing Site,
- SWMU 14-003, Former Burning Area,
- SWMU 14-006, Decommissioned Sump and Outfall
- SWMU 14-007, Decommissioned Septic System
- SWMU 14-009, Surface Disposal Area
- SWMU 14-010, Former Sump
- AOC C-14-001, Former Magazine
- AOC C-14-004, Former Building
- AOC C-14-005, Former Building
- AOC C-14-007, Former Storage Building
- AOC C-14-008, Former Magazine
- AOC C-14-009, Former Magazine

The distribution of contaminants in drainages downgradient of the following site has been characterized, and no further sampling is currently warranted:

- AOC 14-001(g), Firing Site

7.2 Summary of Risk-Screening Assessments

Thirteen SWMUs/AOCs were evaluated for potential risk by human health and ecological risk screening assessments. AOCs 14-001(a,b,c,d,e) were not evaluated for potential human health and ecological risks because no COPCs were identified at these sites.

7.2.1 Human Health Risk Screening Assessments

For the industrial scenario, the total excess cancer risks were less than the 1×10^{-5} target risk level, the HIs were less than the target level of 1, and the doses were less than the target dose of 25 mrem/yr at all SWMUs and AOCs evaluated.

For the construction worker scenario, the total excess cancer risks were less than the 1×10^{-5} target risk level, the HIs were less than or equivalent to the target level of 1, and the doses were less than the target level of 25 mrem/yr at all SWMUs and AOCs evaluated.

For the residential scenario, the total excess cancer risks were less than or equivalent to the 1×10^{-5} target risk level, the HIs were less than the target level of 1, and the doses were less than the target dose of 25 mrem/yr at all SWMUs and AOCs evaluated.

Sites at TA-14 are not accessible by 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. 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.

7.2.2 Ecological Risk Screening Assessments

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at any SWMUs and AOCs located within TA-14 in the Cañon de Valle Aggregate Area.

8.0 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 or that exposure controls are implemented during construction activities. The current and reasonably foreseeable future land use for the Cañon de Valle Aggregate Area is industrial.

8.1 Recommendations for Deferred/Delayed Characterization

Ten sites are recommended for deferred or delayed characterization and investigation. Five of these sites are deferred per Appendix A of the 2016 Consent Order, and five of these sites are delayed because they are located within an active firing site or next to active firing sites. These sites were not investigated or not investigated in their entirety during the 2011 investigation (Table 8.1-1). They include the following:

Deferred per the Consent Order

- AOC 14-001(f), Bullet Test Facility
- SWMU 14-002(a), Former Firing Site,
- SWMU 14-002(b), Former Firing Site
- SWMU 14-002(d), X-unit Chamber
- SWMU 14-002(e), X-unit Chamber

Proposed for Delayed Characterization/Investigation

- SWMU 14-002(f), Former Structure
- AOC 14-001(g), Active Firing Site
- AOC 14-004(a), Storage Area
- AOC C-14-002 , Former Building
- AOC C-14-003, Former Building

AOC 14-001(g) was sampled during the 2011 investigation to describe the migration of contaminants in the drainages but was not completely characterized.

8.2 Recommendations for Corrective Actions Complete

Seventeen sites do not pose a potential unacceptable risk or dose under the industrial, construction worker, and residential scenarios; have no potential ecological risks for any receptor; and have the nature and extent of contamination defined and/or warrant no further sampling for extent. At these sites, the Laboratory recommends corrective action complete without controls (Table 8.1-1). They include the following:

- AOC 14-001(a), Pull Box
- AOC 14-001(b), Pull Box
- AOC 14-001(c), Pull Box
- AOC 14-001(d), Pull Box
- AOC 14-001(e), Pull Box
- SWMU 14-002(c), Decommissioned Firing Site
- SWMU 14-003, Former Burning Area
- SWMU 14-006, Decommissioned Sump and Outfall
- SWMU 14-007, Decommissioned Septic System
- SWMU 14-009, Surface Disposal Area

- SWMU 14-010, Former Sump
- AOC C-14-001, Former Magazine
- AOC C-14-004, Former Building
- AOC C-14-005, Former Building
- AOC C-14-007, Former Storage Building
- AOC C-14-008, Former Magazine
- AOC C-14-009, Former Magazine

8.3 Additional Field Characterization Activities

The nature and extent of contamination has been defined and/or no further sampling is warranted for 17 SWMUs and AOCs investigated during 2011 based on evaluation of the investigation data. The NMED disapproval of the investigation report (NMED 2012, 520805) required additional investigation sampling for dioxins/furans for AOC 14-001(g), SWMU 14-002(c), AOC C-14-001, and AOC C-14-009. AOC 14-001(g) is an active firing site, which NMED indicated could be a potential source of dioxins/furans. SWMU 14-002(c) and AOCs C-14-001 and C-14-009 are sites where wooden buildings were destroyed by burning, which NMED indicated could be a source of dioxins/furans.

During the 2011 investigation, samples collected at SMWU 14-003 were analyzed for dioxins/furans. This site is the most likely source of dioxins/furans of the SWMUs/AOCs at TA-14 within the Cañon de Valle Aggregate Area. SWMU 14-003 was used for open burning of debris and wastes over a period of at least 10 yr. Open burning is more likely to produce dioxins/furans than detonations at firing sites, such as AOC 14-001(g), because of the higher reaction temperatures and pressures associated with detonations. The more frequent operation of SWMU 14-003 is also more likely to result in dioxins/furans in soil than the one-time burning events associated with the buildings at SWMU 14-002(c) and AOCs C-14-001 and C-14-009. The sampling results at SWMU 14-003 showed low concentrations of several dioxin and furan congeners (section 6.15-4). The human health risk-screening assessments for SWMU 14-003 resulted in risks associated with dioxin and furan congeners to be 6×10^{-9} total excess cancer risk for the industrial scenario, an HI of 0.004 for the construction worker scenario, and 2×10^{-8} total excess cancer risk for the residential scenario (Tables G-4.2-14, G-4.2-16, and G-4.2-18, respectively). Because SWMU 14-003 is more likely to be a source of dioxins/furans than SWMUs 14-002(c) and AOCs C-14-001 and C-14-009 and the risks associated with dioxins/furans at SWMU 14-003 are well below the target risk levels of 1×10^{-5} total excess cancer risk and an HI of 1, sampling for dioxins/furans at SWMU 14-002(c) and AOCs C-14-001 and C-14-009 is not warranted.

No additional field characterization activities are recommended.

8.4 Schedule for Recommended Activities

Further characterization will be performed at sites recommended for deferred/delayed investigation. In accordance with Section XI of the 2016 Consent Order, investigation of these sites will occur when active facility operations cease. No schedule currently exists for cessation of facility operations at these sites.

9.0 REFERENCES AND MAP DATA SOURCES

9.1 References

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID 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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9.2 Map Data Sources

Sampling location- er_location_ids_pnt; Point Feature Locations of the Environmental Restoration Project Database; Los Alamos National Laboratory, Waste and Environmental Services Division, EP2010-0035; 21 January 2010.

SWMU or AOC: er_prs_all_reg, Potential Release Sites; Los Alamos National Laboratory, Waste and Environmental Services Division, Environmental Data and Analysis Group, EP2009-0633; 1:2,500 Scale Data; 25 January 2010.

Structure or Building: ksl_structures_ply; Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Fence: ksl_fences_arc; Security and Industrial Fences and Gates; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Paved road: ksl_paved_rds_arc; Paved Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Dirt road: ksl_dirt_rds_arc; Dirt Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Storm drain: ksl_stormdrn_arc; Storm Drain Line Distribution System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Contours: lanl_contour1991_; Hypsography, 2, 10, 20, 100 Foot Contour Interval; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; 1991.

Communication: ksl_comm_arc; Communication Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 08 August 2002; as published 28 May 2009.

Electric: ksl_electric_arc; Primary Electric Grid; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Gas: ksl_gas_arc; Primary Gas Distribution Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Industrial waste: wfm_indstrl_waste_arc; Primary Industrial Waste Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 January 2009.

Sewer: ksl_sewer_arc; Sewer Line System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Steam: ksl_steam_arc; Steam Line Distribution System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Water: ksl_water_arc; Water Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Inset, LANL Boundary: plan_ownerclip_reg; Ownership Boundaries Around LANL Area; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; 19 September 2007; as published 04 December 2008.

Inset, ROADS: lac_streets_arc; Streets; County of Los Alamos, Information Services; as published 16 May 2006.

Landscape: ksl_landscape_arc; Primary Landscape Features; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.

Former structures: frmr_structures_ply; Former Structures of the Los Alamos Site; Los Alamos National Laboratory, Waste and Environmental Services Division, EP2008-0441; 1:2,500 Scale Data; 08 August 2008.

Technical area boundary: plan_tecareas_ply; Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published 04 December 2008.

Inactive Outfall: wqh_inact_outfalls_pnt; WQH Inactive Outfalls; Los Alamos National Laboratory, ENV Water Quality and Hydrology Group; Edition 2002.01; 01 September 2003.

NPDES Outfalls: wqh_npdes_outfalls_pnt: WQH NPDES Outfalls; Los Alamos National Laboratory, ENV Water Quality and Hydrology Group; Edition 2002.01; 01 September 2003.

Outfalls: er_outfalls_pnt: Outfalls; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; Unknown publication date.

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Supply Wells: Locations of Monitoring and Supply Wells at Los Alamos National Laboratory, Table A-2, 2009 General Facility Information; LANL Report LA-UR-09-1341; March 2009.

Drainage: wqh_drainage_arc: WQH Drainage_arc; Los Alamos National Laboratory, ENV Water Quality and Hydrology Group; 1:24,000 Scale Data; 03 June 2003.

Aggregate Area: er_agg_areas_ply: Aggregate Areas; Los Alamos National Laboratory, ENV Environmental Remediation & Surveillance Program, ER2005-0496; 1:2,500 Scale Data; 22 September 2005.

Canyon Reaches: er_reaches_ply: Canyon Reaches; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program, ER2002-0592; 1:24,000 Scale Data; Unknown publication date.

Springs: er_springs_pnt: Locations of Springs; Los Alamos National Laboratory, Waste and Environmental Services Division in cooperation with the New Mexico Environment Department, Department of Energy Oversight Bureau, EP2008-0138; 1:2,500 Scale Data; 17 March 2008.

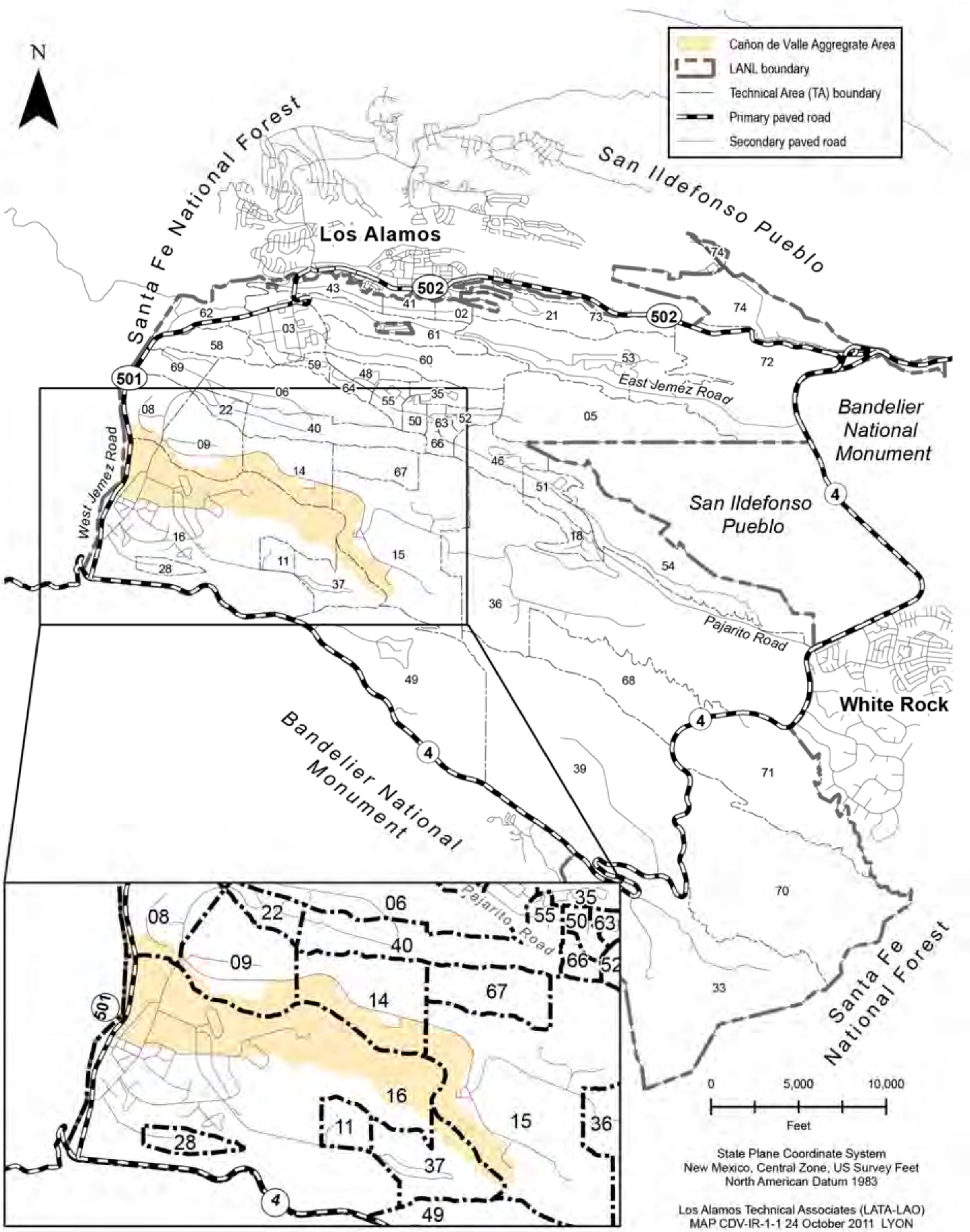
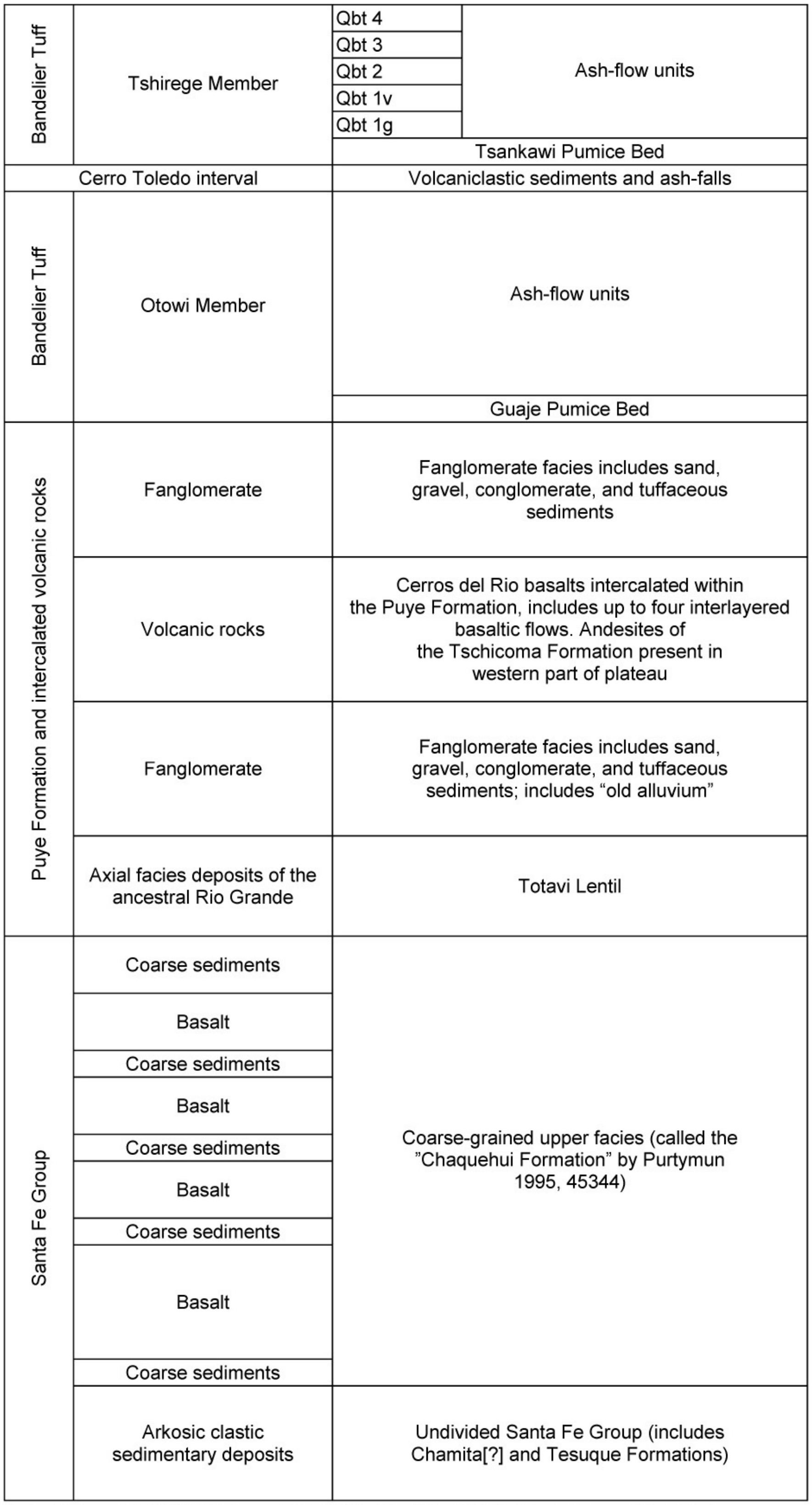


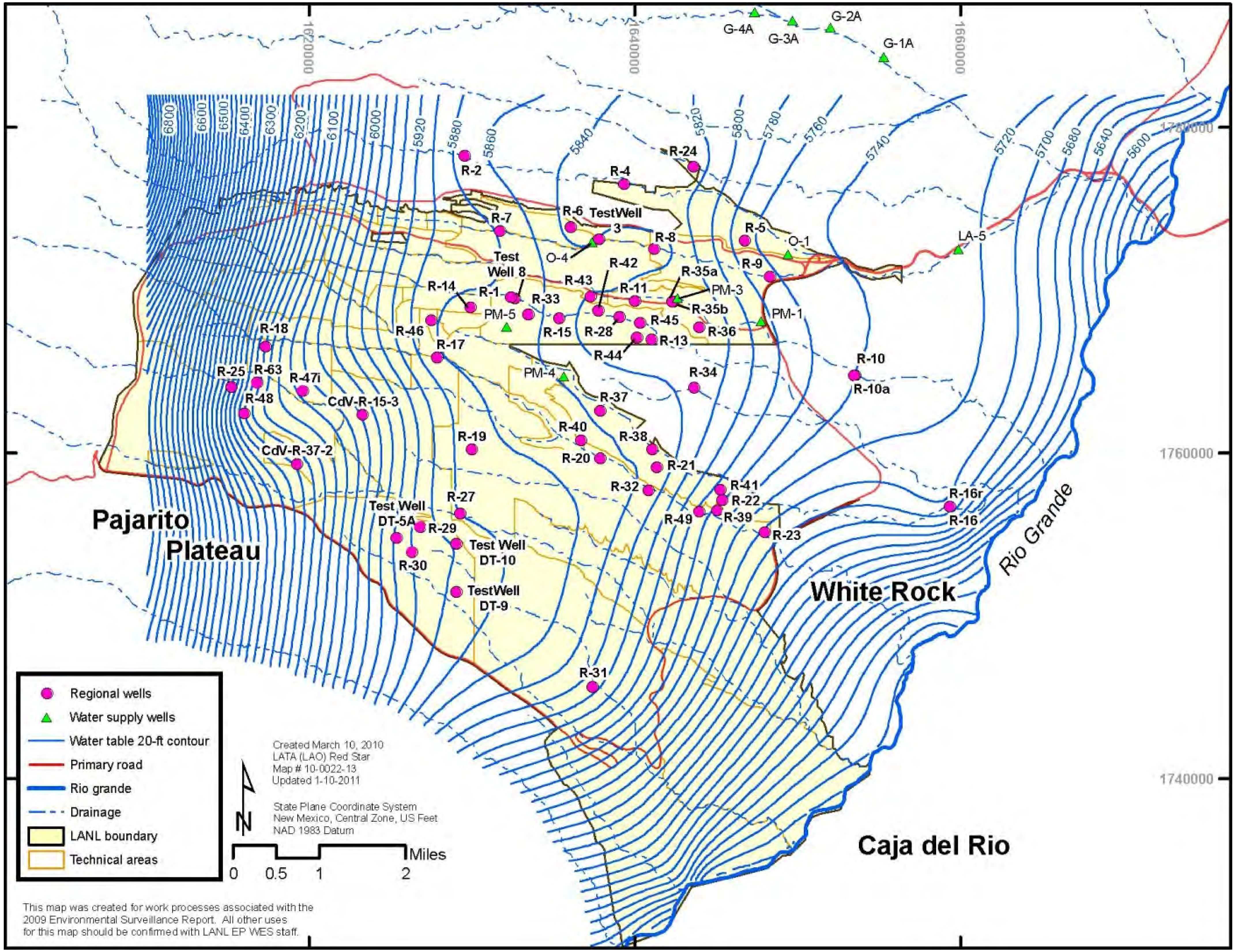
Figure 1.0-1 Location of Cañon de Valle Aggregate Area with respect to Laboratory technical areas



Bandelier Tuff	Tshirege Member	Qbt 4	Ash-flow units
		Qbt 3	
		Qbt 2	
		Qbt 1v	
		Qbt 1g	
		Tsankawi Pumice Bed	
Cerro Toledo interval		Volcaniclastic sediments and ash-falls	
Bandelier Tuff	Otowi Member	Ash-flow units	
		Guaje Pumice Bed	
Puye Formation and intercalated volcanic rocks	Fanglomerate	Fanglomerate facies includes sand, gravel, conglomerate, and tuffaceous sediments	
	Volcanic rocks	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 (called the "Chaquehui Formation" by Purtymun 1995, 45344)	
	Basalt		
	Coarse sediments		
	Basalt		
	Coarse sediments		
	Basalt		
	Coarse sediments		
	Basalt		
	Coarse sediments		
	Arkosic clastic sedimentary deposits	Undivided Santa Fe Group (includes Chamita[?] and Tesuque Formations)	

Source: Baltz et al. 1963, 8402; Purtymun 1995, 45344; LANL 1998, 59599; Broxton and Reneau 1995, 49726.

Figure 2.2-1 Generalized stratigraphy of bedrock geologic units of the Pajarito Plateau



Created March 10, 2010
LATA (LAO) Red Star
Map # 10-0022-13
Updated 1-10-2011

State Plane Coordinate System
New Mexico, Central Zone, US Feet
NAD 1983 Datum

This map was created for work processes associated with the 2009 Environmental Surveillance Report. All other uses for this map should be confirmed with LANL EP WES staff.

Figure 2.2-2 Depths to top of regional aquifer across the Laboratory

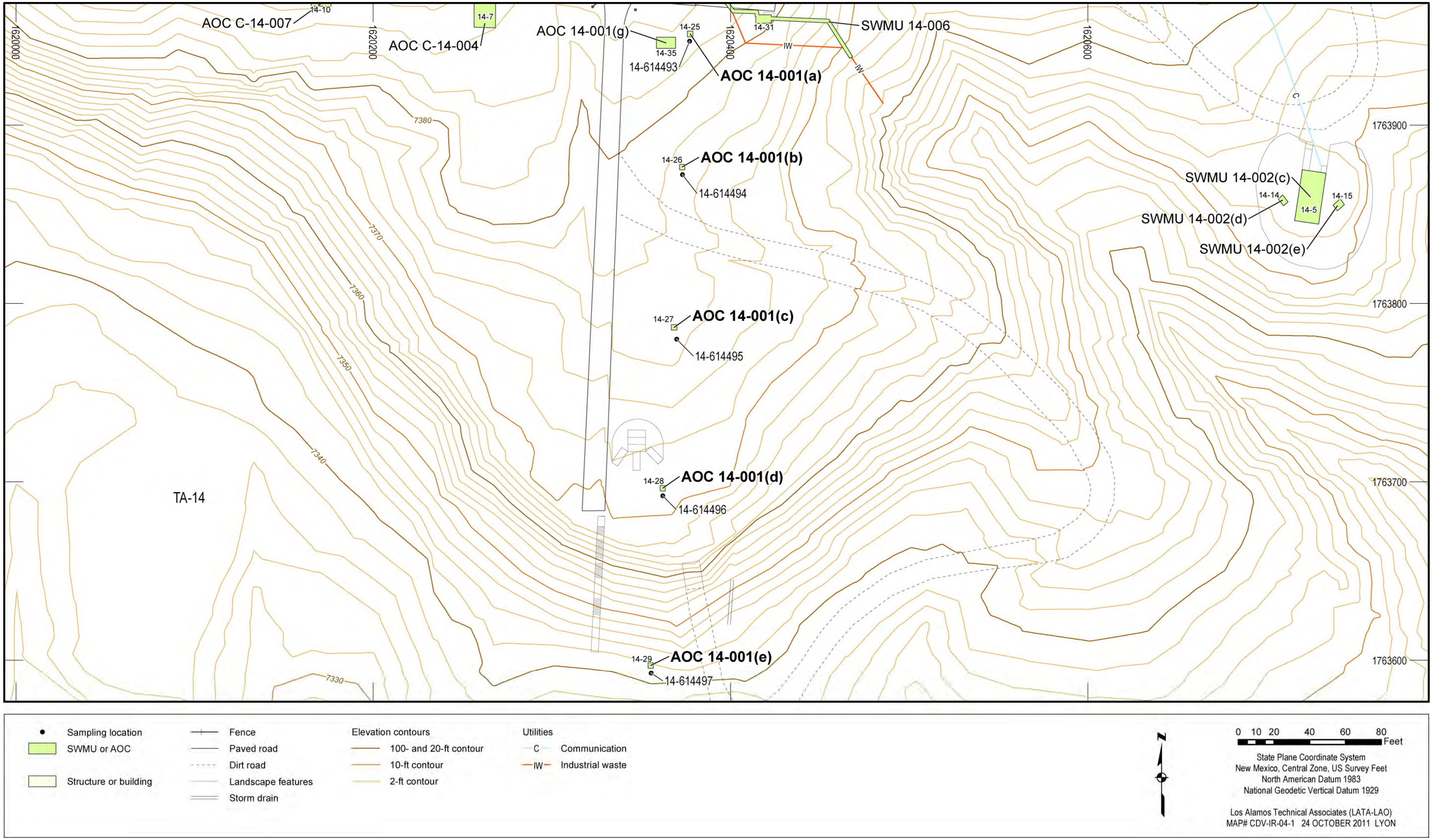


Figure 6.2-1 AOCs 14-001(a,b,c,d,e) site map and sampling locations

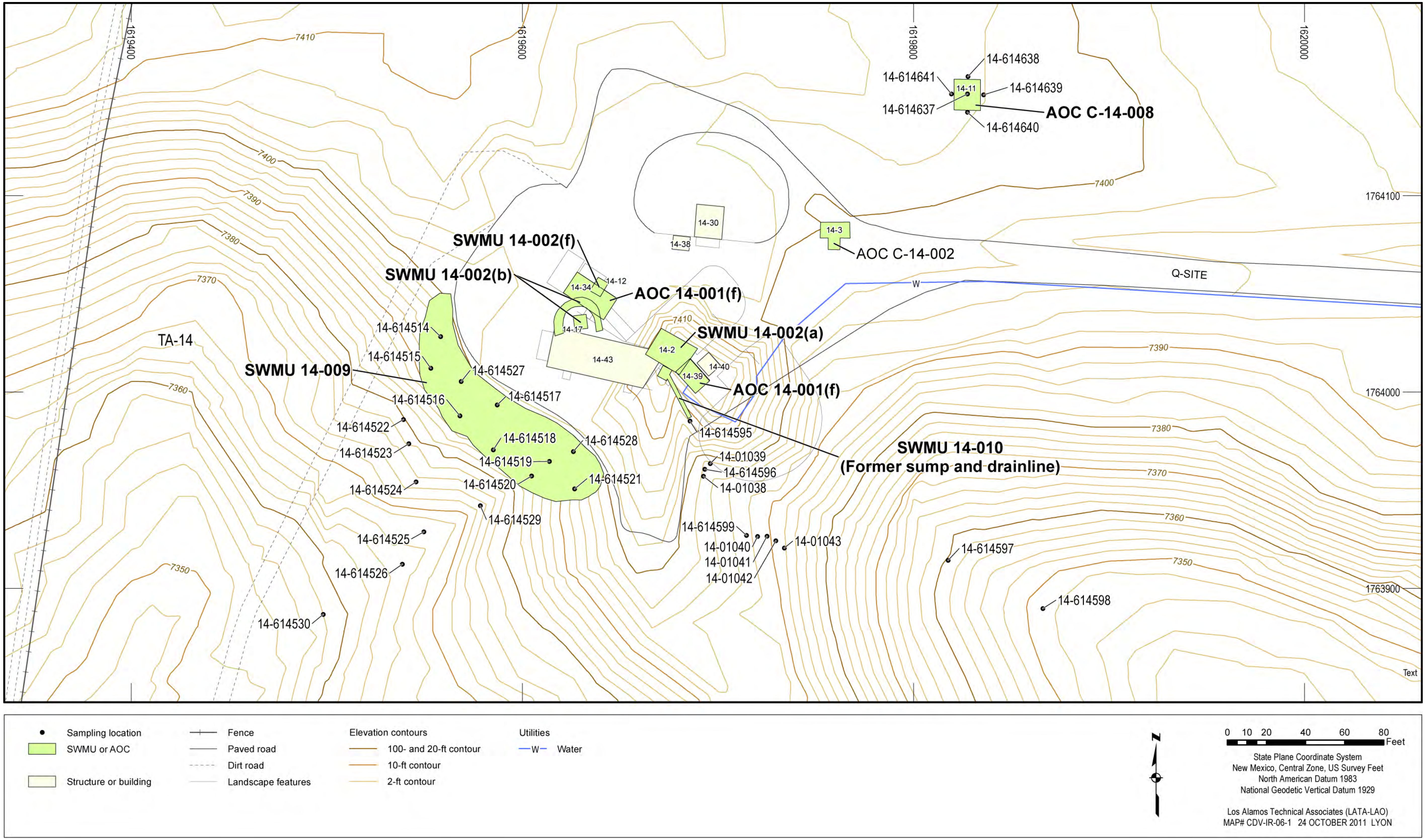


Figure 6.7-1 SWMUs 14-002(a,b,f), 14-009, and 14-010, and AOCs 14-001(f) and C-14-008 site map and sampling locations

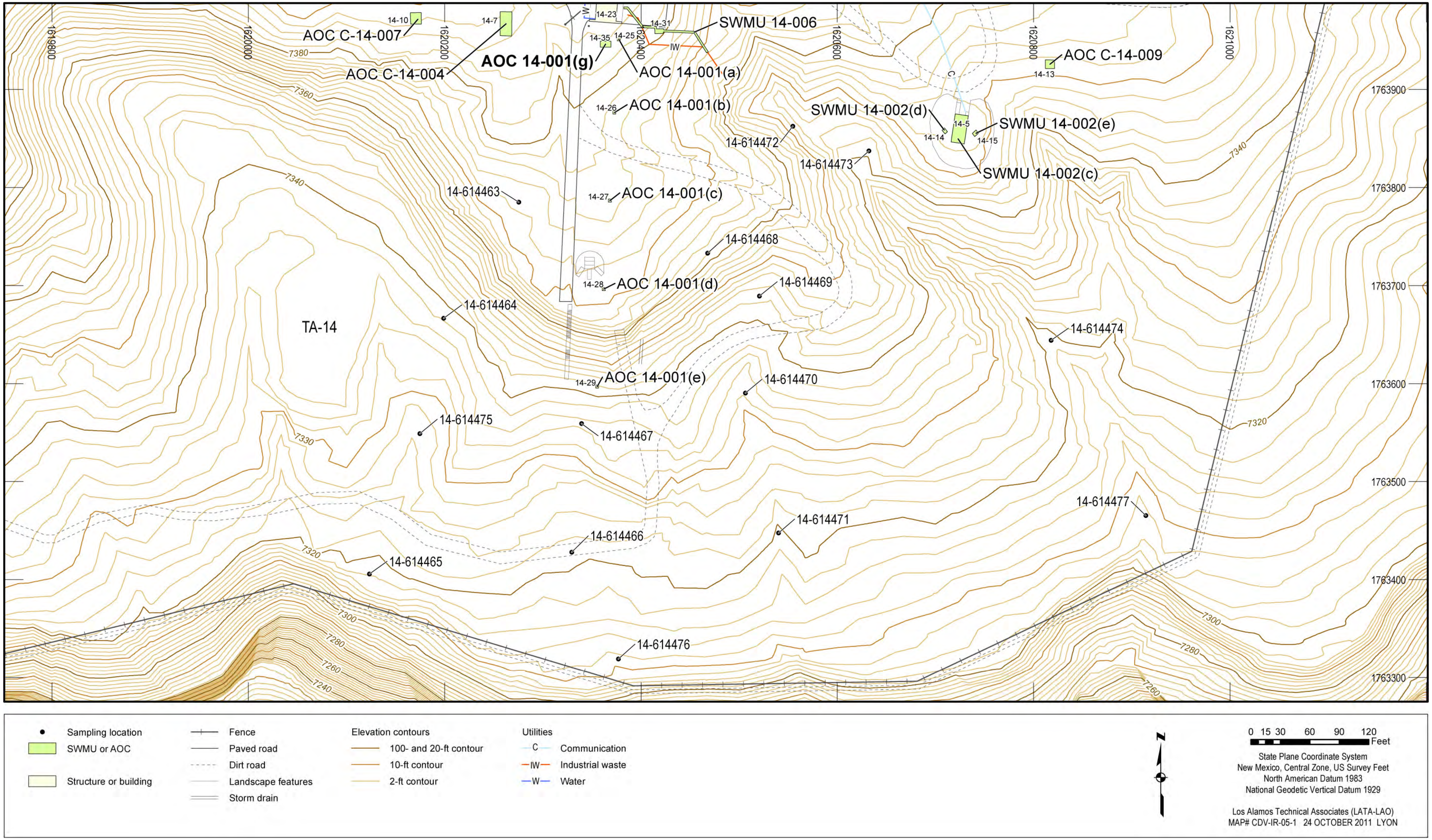


Figure 6.8-1 AOC 14-001(g) site map and sampling locations

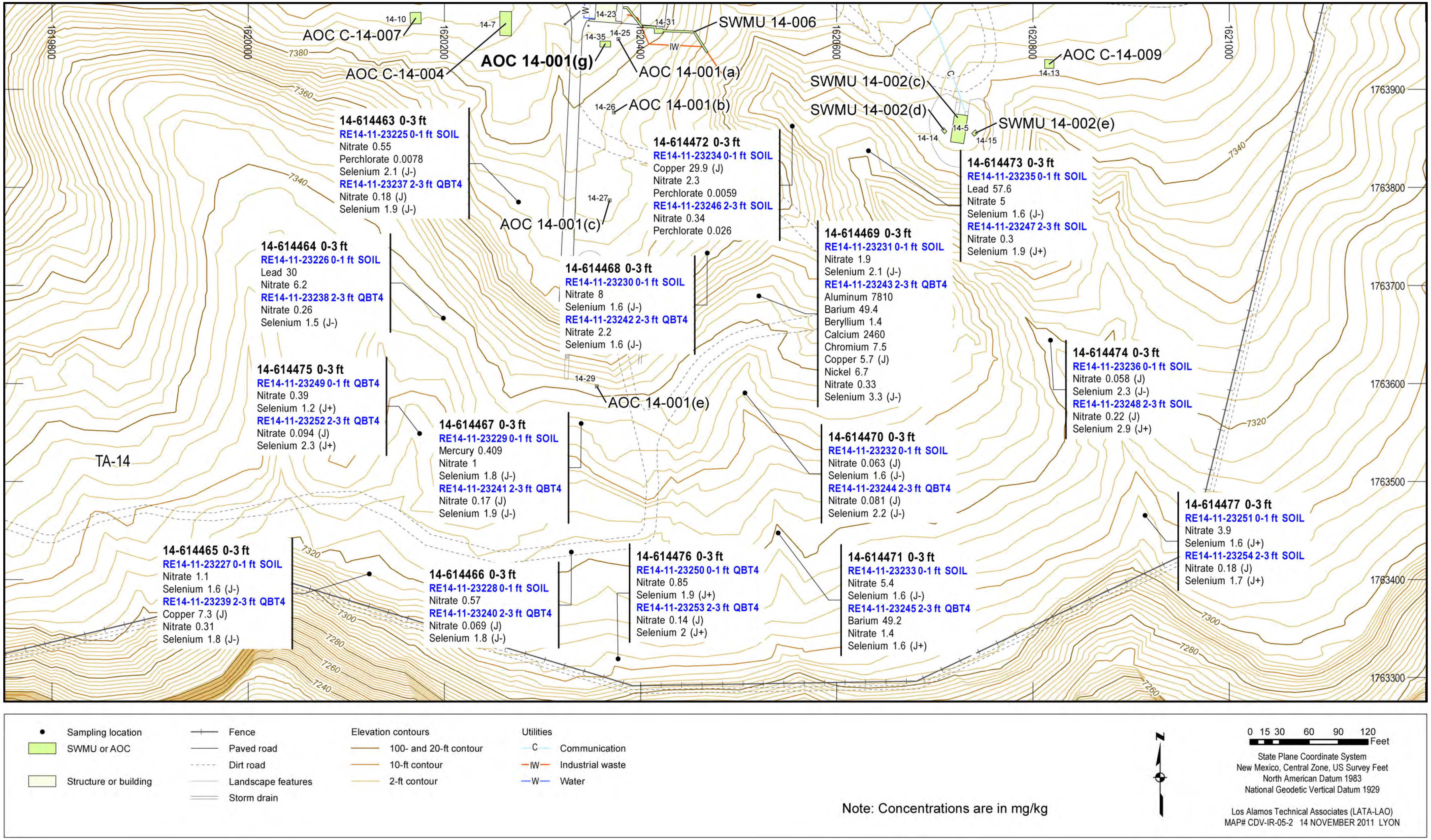


Figure 6.8-2 Inorganic chemicals detected or detected above BVs at AOC 14-001(g)

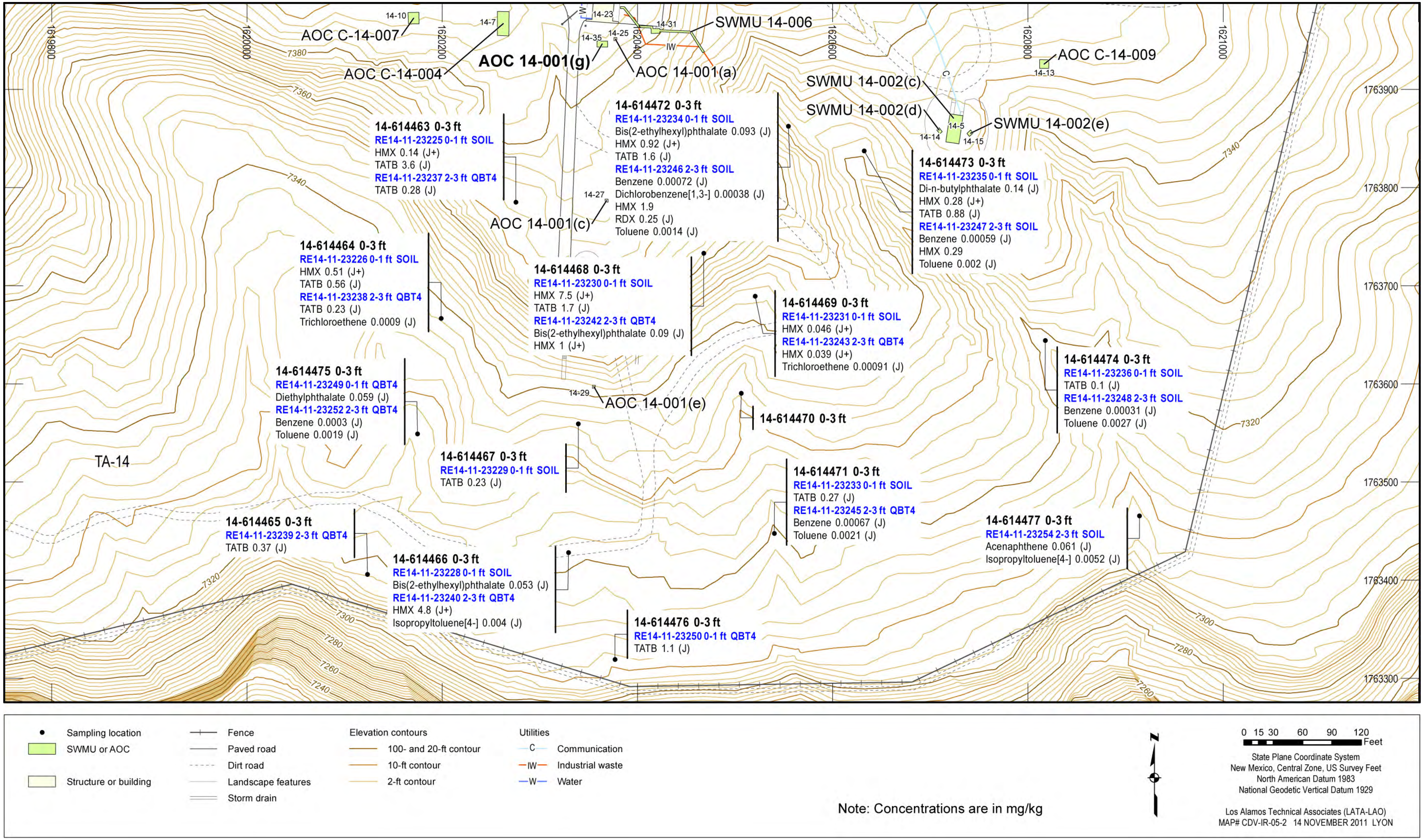


Figure 6.8-3 Organic chemicals detected at AOC 14-001(g)

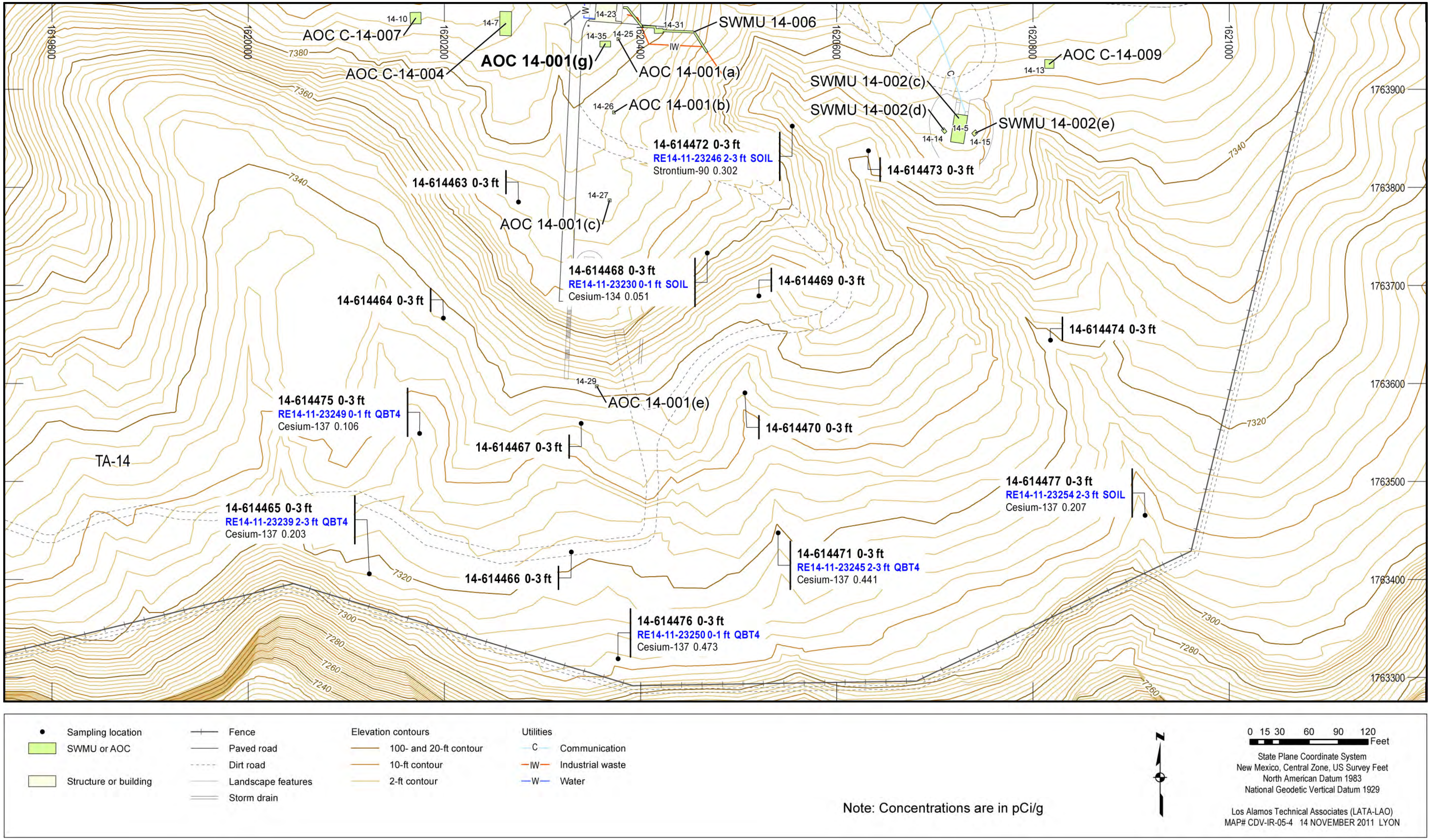


Figure 6.8-4 Radionuclides detected or detected above BVs/FVs at AOC 14-001(g)

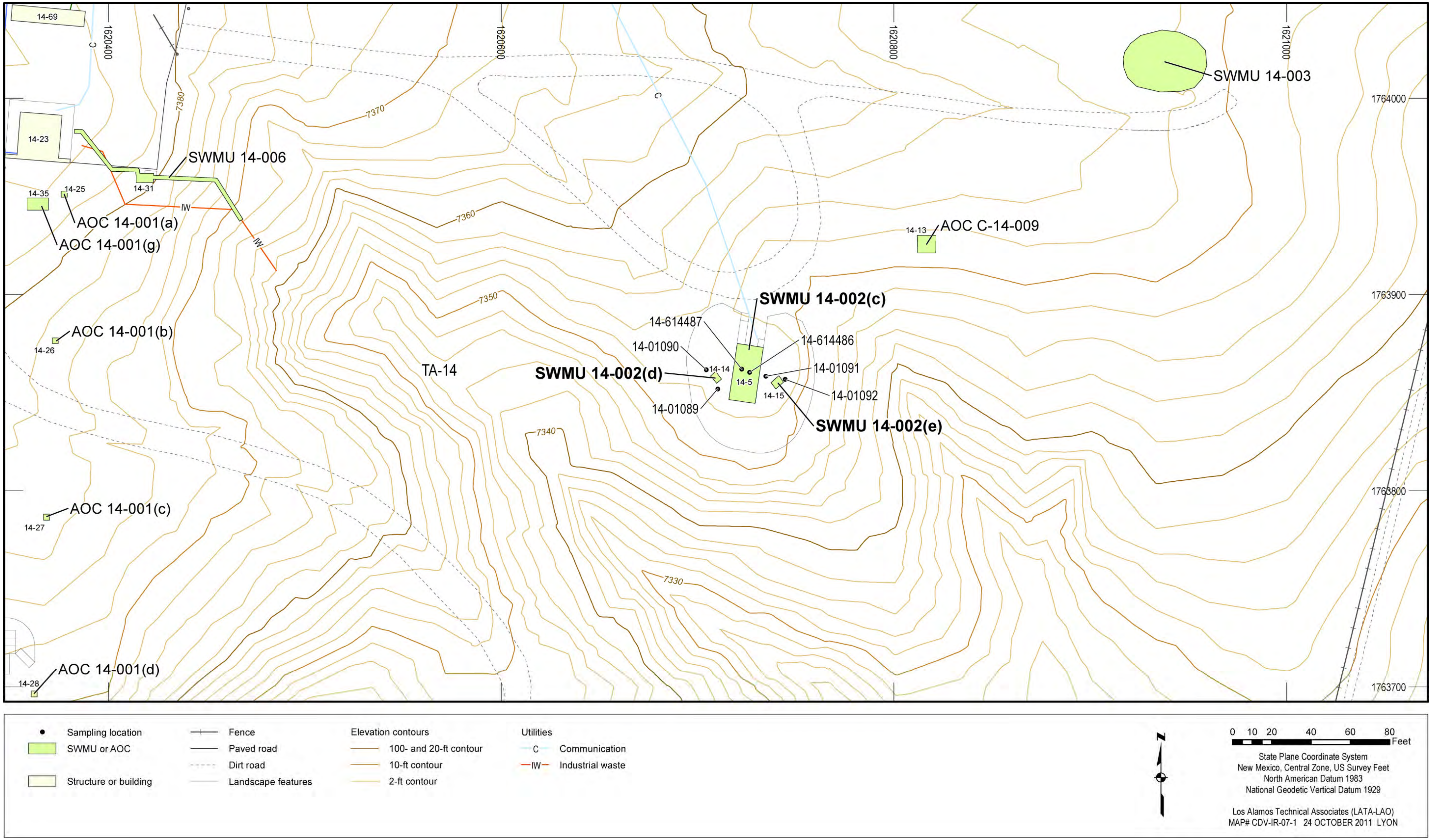


Figure 6.11-1 SWMUs 14-002(c,d,e) site map and sampling locations

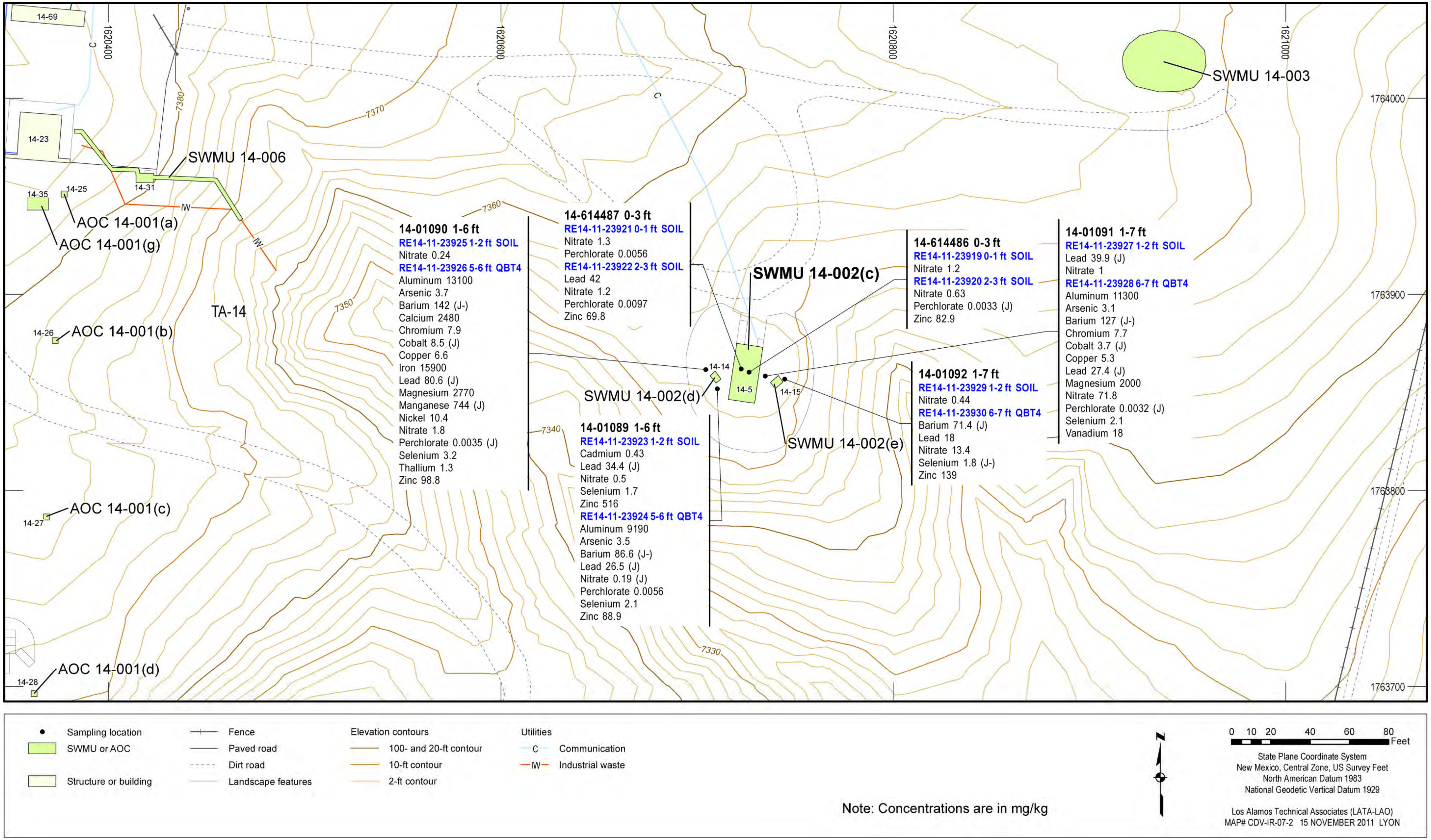


Figure 6.11-2 Inorganic chemicals detected or detected above BVs at SWMU 14-002(c)

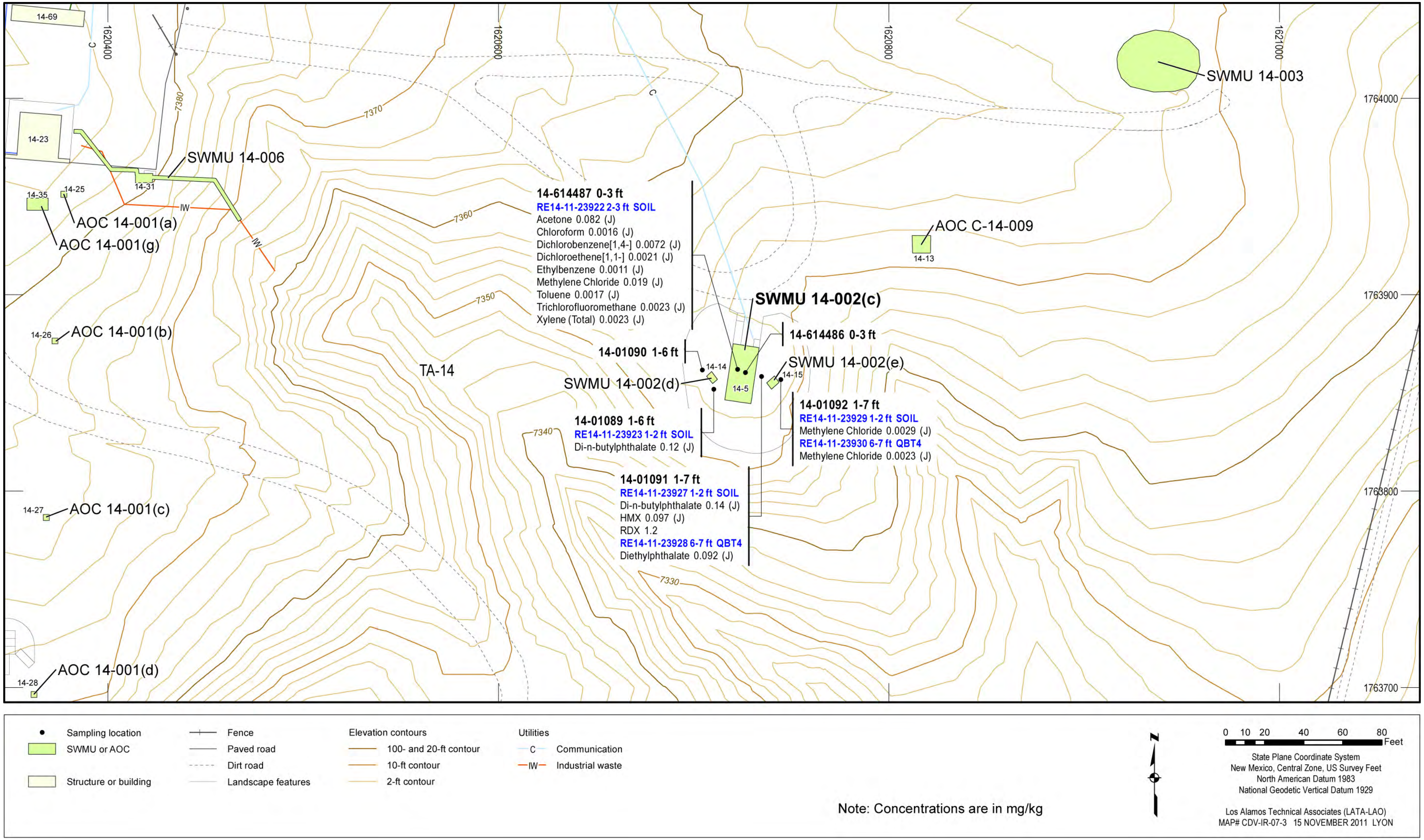


Figure 6.11-3 Organic chemicals detected at SWMU 14-002(c)

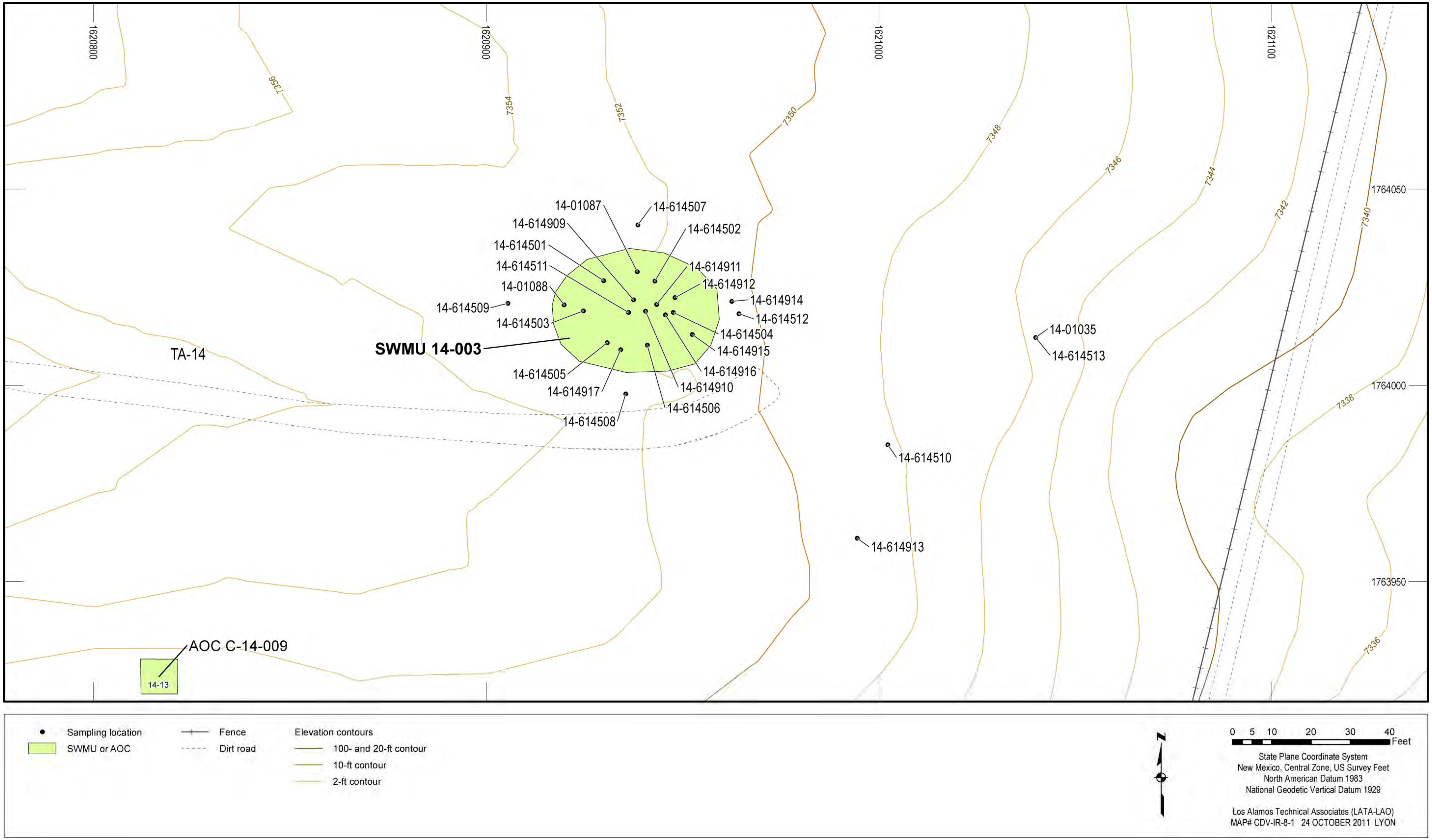
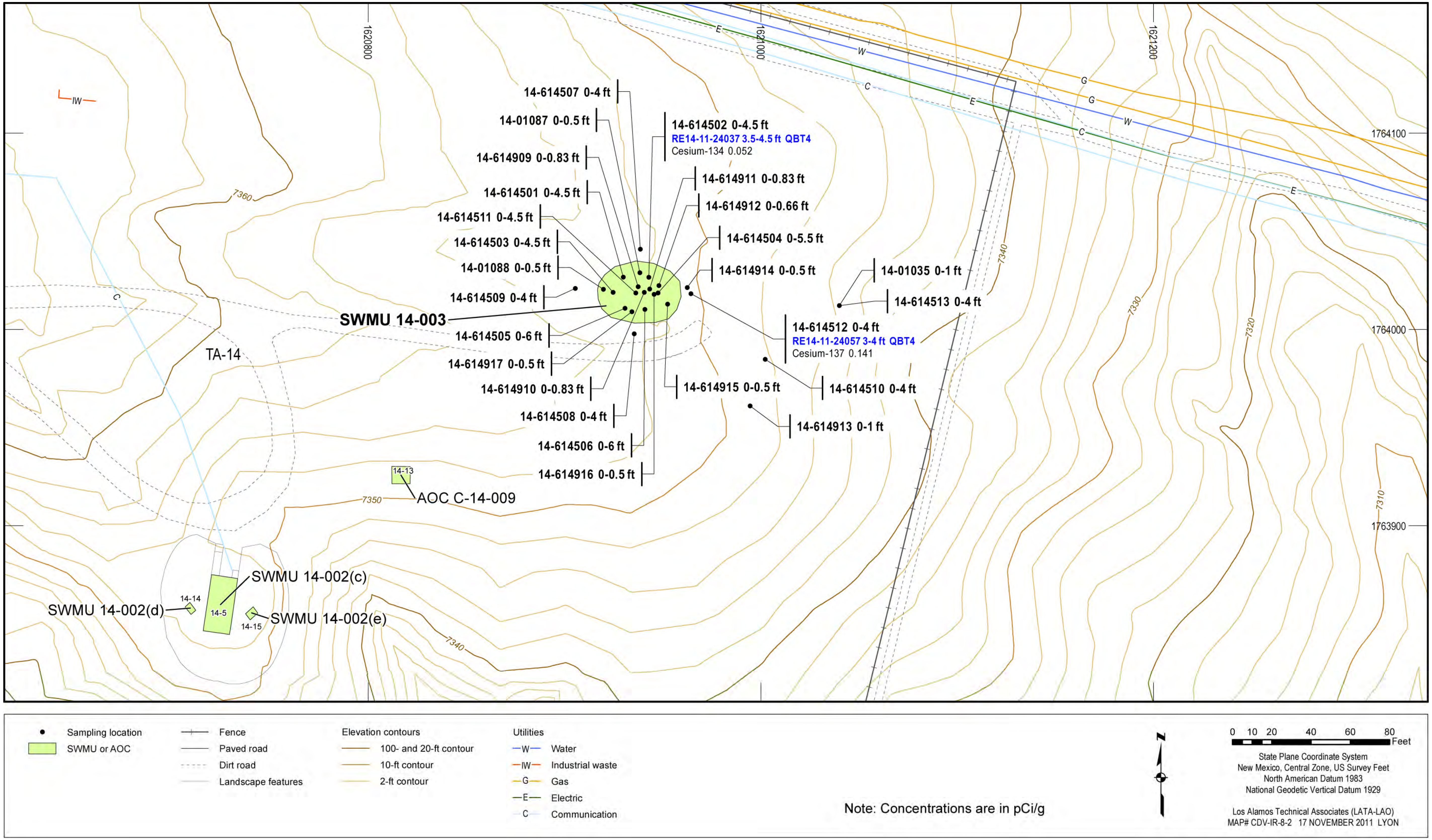


Figure 6.15-1 SWMU 14-003 site map and sampling locations



Note: Concentrations are in pCi/g

Figure 6.15-2 Radionuclides detected or detected above BVs/FVs at SWMU 14-003

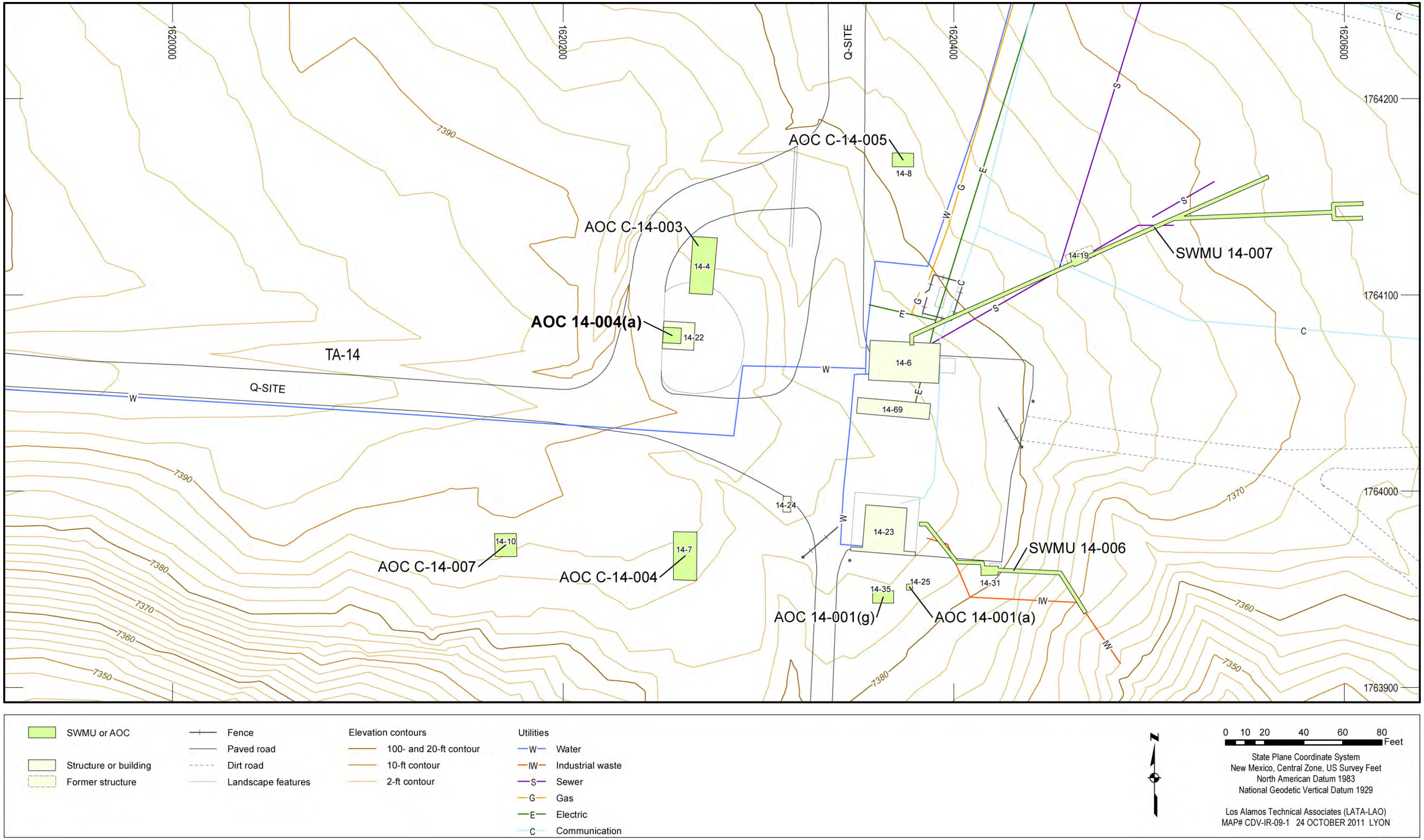


Figure 6.16-1 AOC 14-004(a) site map

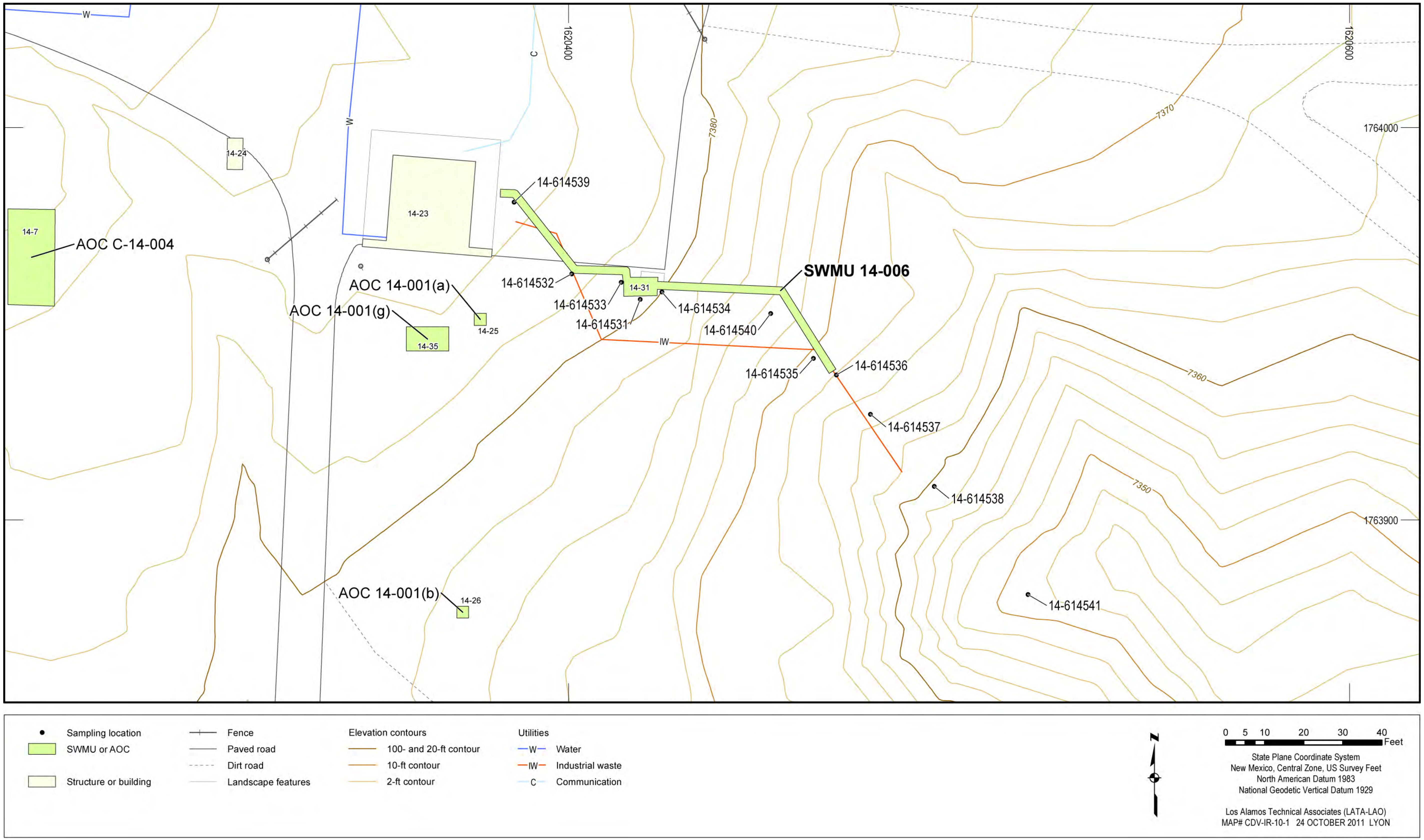
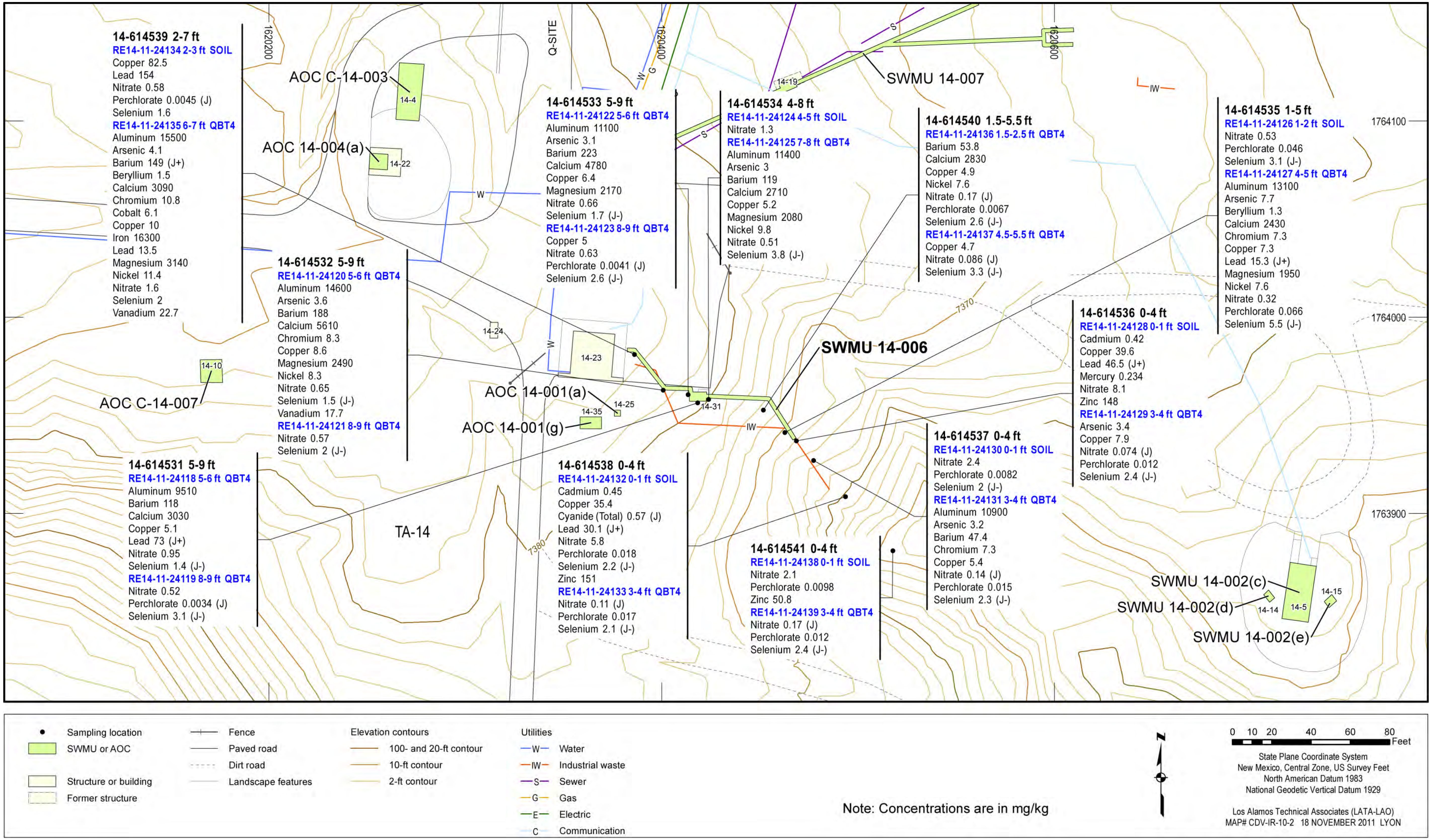


Figure 6.17-1 SWMU 14-006 site map and sampling locations



14-614539 2-7 ft
RE14-11-24134 2-3 ft SOIL
Copper 82.5
Lead 154
Nitrate 0.58
Perchlorate 0.0045 (J)
Selenium 1.6
RE14-11-24135 6-7 ft QBT4
Aluminum 15500
Arsenic 4.1
Barium 149 (J+)
Beryllium 1.5
Calcium 3090
Chromium 10.8
Cobalt 6.1
Copper 10
Iron 16300
Lead 13.5
Magnesium 3140
Nickel 11.4
Nitrate 1.6
Selenium 2
Vanadium 22.7

14-614532 5-9 ft
RE14-11-24120 5-6 ft QBT4
Aluminum 14600
Arsenic 3.6
Barium 188
Calcium 5610
Chromium 8.3
Copper 8.6
Magnesium 2490
Nickel 8.3
Nitrate 0.65
Selenium 1.5 (J-)
Vanadium 17.7
RE14-11-24121 8-9 ft QBT4
Nitrate 0.57
Selenium 2 (J-)

14-614531 5-9 ft
RE14-11-24118 5-6 ft QBT4
Aluminum 9510
Barium 118
Calcium 3030
Copper 5.1
Lead 73 (J+)
Nitrate 0.95
Selenium 1.4 (J-)
RE14-11-24119 8-9 ft QBT4
Nitrate 0.52
Perchlorate 0.0034 (J)
Selenium 3.1 (J-)

14-614533 5-9 ft
RE14-11-24122 5-6 ft QBT4
Aluminum 11100
Arsenic 3.1
Barium 223
Calcium 4780
Copper 6.4
Magnesium 2170
Nitrate 0.66
Selenium 1.7 (J-)
RE14-11-24123 8-9 ft QBT4
Copper 5
Nitrate 0.63
Perchlorate 0.0041 (J)
Selenium 2.6 (J-)

14-614538 0-4 ft
RE14-11-24132 0-1 ft SOIL
Cadmium 0.45
Copper 35.4
Cyanide (Total) 0.57 (J)
Lead 30.1 (J+)
Nitrate 5.8
Perchlorate 0.018
Selenium 2.2 (J-)
Zinc 151
RE14-11-24133 3-4 ft QBT4
Nitrate 0.11 (J)
Perchlorate 0.017
Selenium 2.1 (J-)

14-614534 4-8 ft
RE14-11-24124 4-5 ft SOIL
Nitrate 1.3
RE14-11-24125 7-8 ft QBT4
Aluminum 11400
Arsenic 3
Barium 119
Calcium 2710
Copper 5.2
Magnesium 2080
Nickel 9.8
Nitrate 0.51
Selenium 3.8 (J-)

14-614541 0-4 ft
RE14-11-24138 0-1 ft SOIL
Nitrate 2.1
Perchlorate 0.0098
Zinc 50.8
RE14-11-24139 3-4 ft QBT4
Nitrate 0.17 (J)
Perchlorate 0.012
Selenium 2.4 (J-)

14-614540 1.5-5.5 ft
RE14-11-24136 1.5-2.5 ft QBT4
Barium 53.8
Calcium 2830
Copper 4.9
Nickel 7.6
Nitrate 0.17 (J)
Perchlorate 0.0067
Selenium 2.6 (J-)
RE14-11-24137 4.5-5.5 ft QBT4
Copper 4.7
Nitrate 0.086 (J)
Selenium 3.3 (J-)

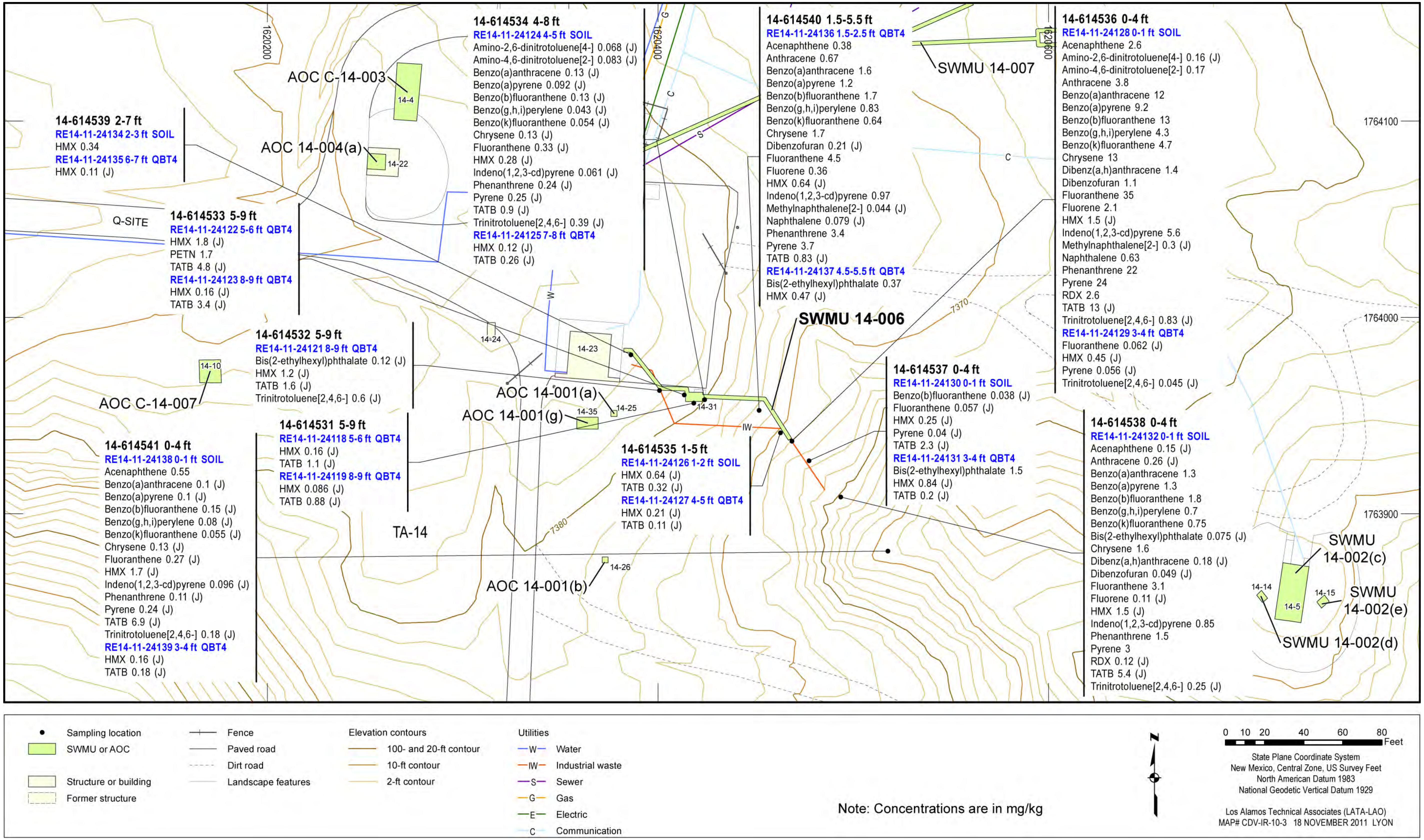
14-614537 0-4 ft
RE14-11-24130 0-1 ft SOIL
Nitrate 2.4
Perchlorate 0.0082
Selenium 2 (J-)
RE14-11-24131 3-4 ft QBT4
Aluminum 10900
Arsenic 3.2
Barium 47.4
Chromium 7.3
Copper 5.4
Nitrate 0.14 (J)
Perchlorate 0.015
Selenium 2.3 (J-)

14-614536 0-4 ft
RE14-11-24128 0-1 ft SOIL
Cadmium 0.42
Copper 39.6
Lead 46.5 (J+)
Mercury 0.234
Nitrate 8.1
Zinc 148
RE14-11-24129 3-4 ft QBT4
Arsenic 3.4
Copper 7.9
Nitrate 0.074 (J)
Perchlorate 0.012
Selenium 2.4 (J-)

14-614535 1-5 ft
RE14-11-24126 1-2 ft SOIL
Nitrate 0.53
Perchlorate 0.046
Selenium 3.1 (J-)
RE14-11-24127 4-5 ft QBT4
Aluminum 13100
Arsenic 7.7
Beryllium 1.3
Calcium 2430
Chromium 7.3
Copper 7.3
Lead 15.3 (J+)
Magnesium 1950
Nickel 7.6
Nitrate 0.32
Perchlorate 0.066
Selenium 5.5 (J-)

Note: Concentrations are in mg/kg

Figure 6.17-2 Inorganic chemicals detected or detected above BVs at SWMU 14-006



14-614539 2-7 ft
RE14-11-24134 2-3 ft SOIL
HMX 0.34
RE14-11-24135 6-7 ft QBT4
HMX 0.11 (J)

14-614533 5-9 ft
RE14-11-24122 5-6 ft QBT4
HMX 1.8 (J)
PETN 1.7
TATB 4.8 (J)
RE14-11-24123 8-9 ft QBT4
HMX 0.16 (J)
TATB 3.4 (J)

14-614534 4-8 ft
RE14-11-24124 4-5 ft SOIL
Amino-2,6-dinitrotoluene[4-] 0.068 (J)
Amino-4,6-dinitrotoluene[2-] 0.083 (J)
Benzo(a)anthracene 0.13 (J)
Benzo(a)pyrene 0.092 (J)
Benzo(b)fluoranthene 0.13 (J)
Benzo(g,h,i)perylene 0.043 (J)
Benzo(k)fluoranthene 0.054 (J)
Chrysene 0.13 (J)
Fluoranthene 0.33 (J)
HMX 0.28 (J)
Indeno(1,2,3-cd)pyrene 0.061 (J)
Phenanthrene 0.24 (J)
Pyrene 0.25 (J)
TATB 0.9 (J)
Trinitrotoluene[2,4,6-] 0.39 (J)
RE14-11-24125 7-8 ft QBT4
HMX 0.12 (J)
TATB 0.26 (J)

14-614540 1.5-5.5 ft
RE14-11-24136 1.5-2.5 ft QBT4
Acenaphthene 0.38
Anthracene 0.67
Benzo(a)anthracene 1.6
Benzo(a)pyrene 1.2
Benzo(b)fluoranthene 1.7
Benzo(g,h,i)perylene 0.83
Benzo(k)fluoranthene 0.64
Chrysene 1.7
Dibenzofuran 0.21 (J)
Fluoranthene 4.5
Fluorene 0.36
HMX 0.64 (J)
Indeno(1,2,3-cd)pyrene 0.97
Methylnaphthalene[2-] 0.044 (J)
Naphthalene 0.079 (J)
Phenanthrene 3.4
Pyrene 3.7
TATB 0.83 (J)
RE14-11-24137 4.5-5.5 ft QBT4
Bis(2-ethylhexyl)phthalate 0.37
HMX 0.47 (J)

14-614536 0-4 ft
RE14-11-24128 0-1 ft SOIL
Acenaphthene 2.6
Amino-2,6-dinitrotoluene[4-] 0.16 (J)
Amino-4,6-dinitrotoluene[2-] 0.17
Anthracene 3.8
Benzo(a)anthracene 12
Benzo(a)pyrene 9.2
Benzo(b)fluoranthene 13
Benzo(g,h,i)perylene 4.3
Benzo(k)fluoranthene 4.7
Chrysene 13
Dibenz(a,h)anthracene 1.4
Dibenzofuran 1.1
Fluoranthene 35
Fluorene 2.1
HMX 1.5 (J)
Indeno(1,2,3-cd)pyrene 5.6
Methylnaphthalene[2-] 0.3 (J)
Naphthalene 0.63
Phenanthrene 22
Pyrene 24
RDX 2.6
TATB 13 (J)
Trinitrotoluene[2,4,6-] 0.83 (J)
RE14-11-24129 3-4 ft QBT4
Fluoranthene 0.062 (J)
HMX 0.45 (J)
Pyrene 0.056 (J)
Trinitrotoluene[2,4,6-] 0.045 (J)

14-614532 5-9 ft
RE14-11-24121 8-9 ft QBT4
Bis(2-ethylhexyl)phthalate 0.12 (J)
HMX 1.2 (J)
TATB 1.6 (J)
Trinitrotoluene[2,4,6-] 0.6 (J)

14-614537 0-4 ft
RE14-11-24130 0-1 ft SOIL
Benzo(b)fluoranthene 0.038 (J)
Fluoranthene 0.057 (J)
HMX 0.25 (J)
Pyrene 0.04 (J)
TATB 2.3 (J)
RE14-11-24131 3-4 ft QBT4
Bis(2-ethylhexyl)phthalate 1.5
HMX 0.84 (J)
TATB 0.2 (J)

14-614541 0-4 ft
RE14-11-24138 0-1 ft SOIL
Acenaphthene 0.55
Benzo(a)anthracene 0.1 (J)
Benzo(a)pyrene 0.1 (J)
Benzo(b)fluoranthene 0.15 (J)
Benzo(g,h,i)perylene 0.08 (J)
Benzo(k)fluoranthene 0.055 (J)
Chrysene 0.13 (J)
Fluoranthene 0.27 (J)
HMX 1.7 (J)
Indeno(1,2,3-cd)pyrene 0.096 (J)
Phenanthrene 0.11 (J)
Pyrene 0.24 (J)
TATB 6.9 (J)
Trinitrotoluene[2,4,6-] 0.18 (J)
RE14-11-24139 3-4 ft QBT4
HMX 0.16 (J)
TATB 0.18 (J)

14-614531 5-9 ft
RE14-11-24118 5-6 ft QBT4
HMX 0.16 (J)
TATB 1.1 (J)
RE14-11-24119 8-9 ft QBT4
HMX 0.086 (J)
TATB 0.88 (J)

14-614535 1-5 ft
RE14-11-24126 1-2 ft SOIL
HMX 0.64 (J)
TATB 0.32 (J)
RE14-11-24127 4-5 ft QBT4
HMX 0.21 (J)
TATB 0.11 (J)

14-614538 0-4 ft
RE14-11-24132 0-1 ft SOIL
Acenaphthene 0.15 (J)
Anthracene 0.26 (J)
Benzo(a)anthracene 1.3
Benzo(a)pyrene 1.3
Benzo(b)fluoranthene 1.8
Benzo(g,h,i)perylene 0.7
Benzo(k)fluoranthene 0.75
Bis(2-ethylhexyl)phthalate 0.075 (J)
Chrysene 1.6
Dibenz(a,h)anthracene 0.18 (J)
Dibenzofuran 0.049 (J)
Fluoranthene 3.1
Fluorene 0.11 (J)
HMX 1.5 (J)
Indeno(1,2,3-cd)pyrene 0.85
Phenanthrene 1.5
Pyrene 3
RDX 0.12 (J)
TATB 5.4 (J)
Trinitrotoluene[2,4,6-] 0.25 (J)

Note: Concentrations are in mg/kg

Figure 6.17-3 Organic chemicals detected at SWMU 14-006

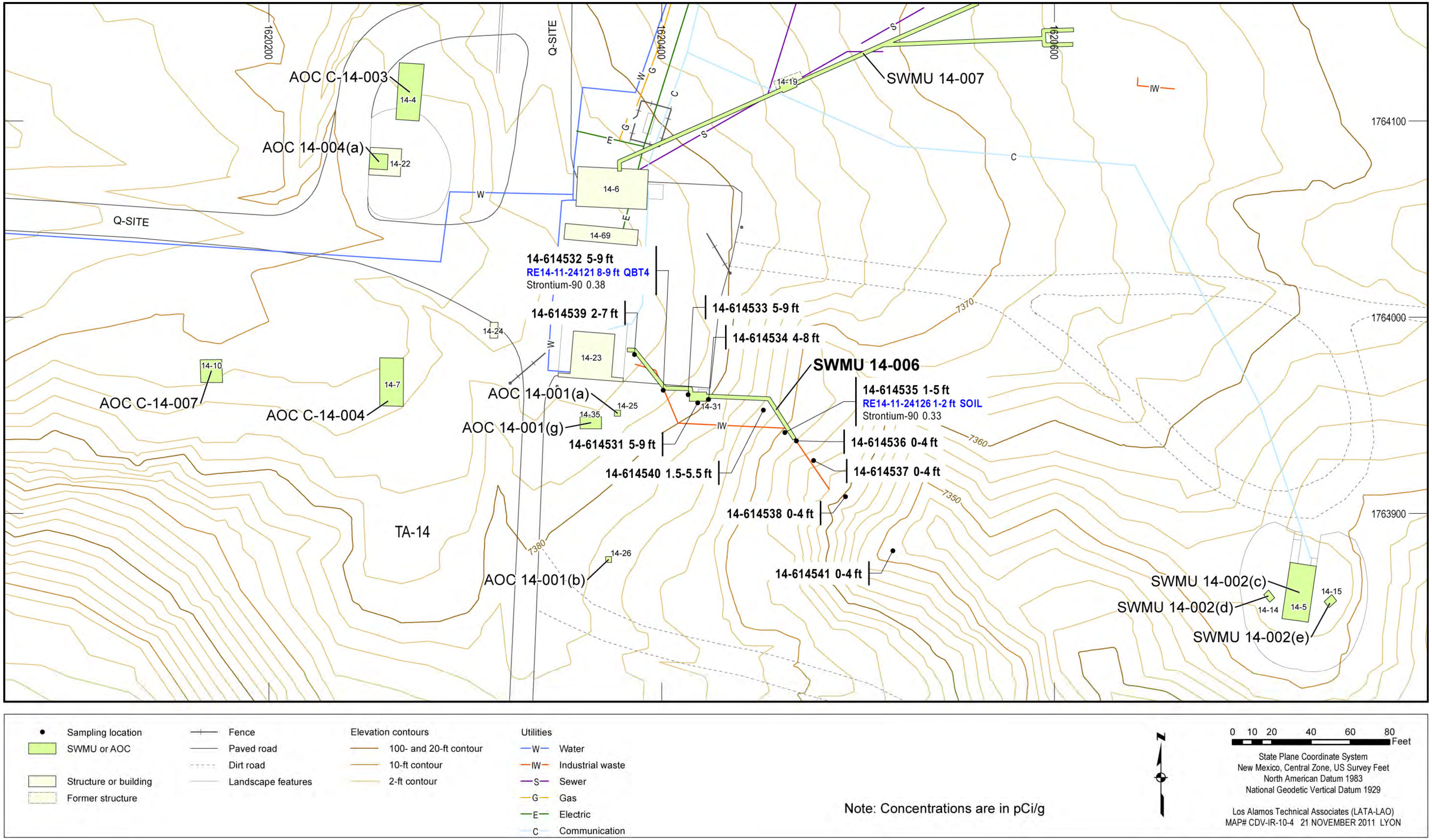


Figure 6.17-4 Radionuclides detected or detected above BVs/FVs at SWMU 14-006

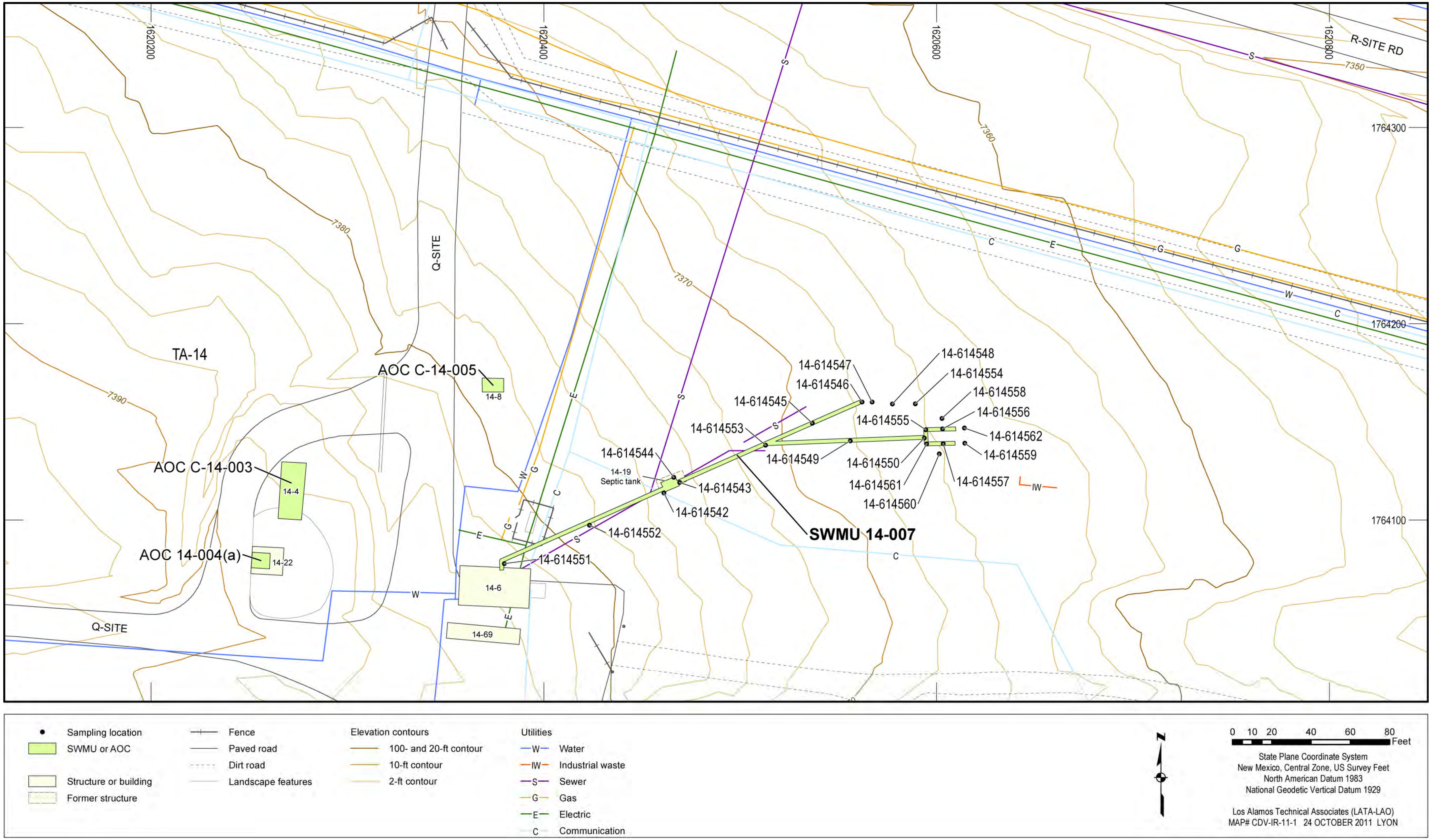


Figure 6.18-1 SWMU 14-007 site map and sampling locations

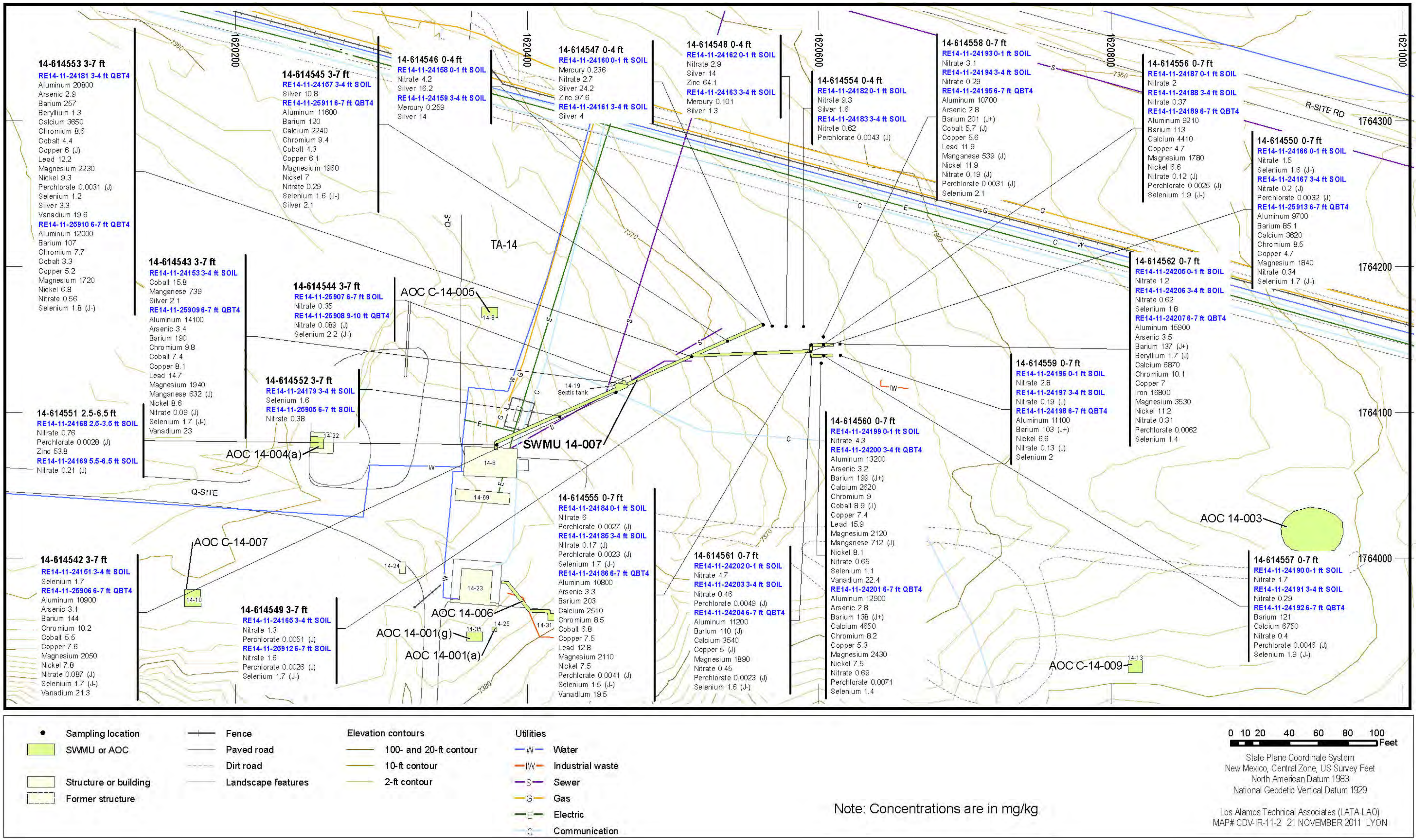


Figure 6.18-2 Inorganic chemicals detected or detected above BVs at SWMU 14-007

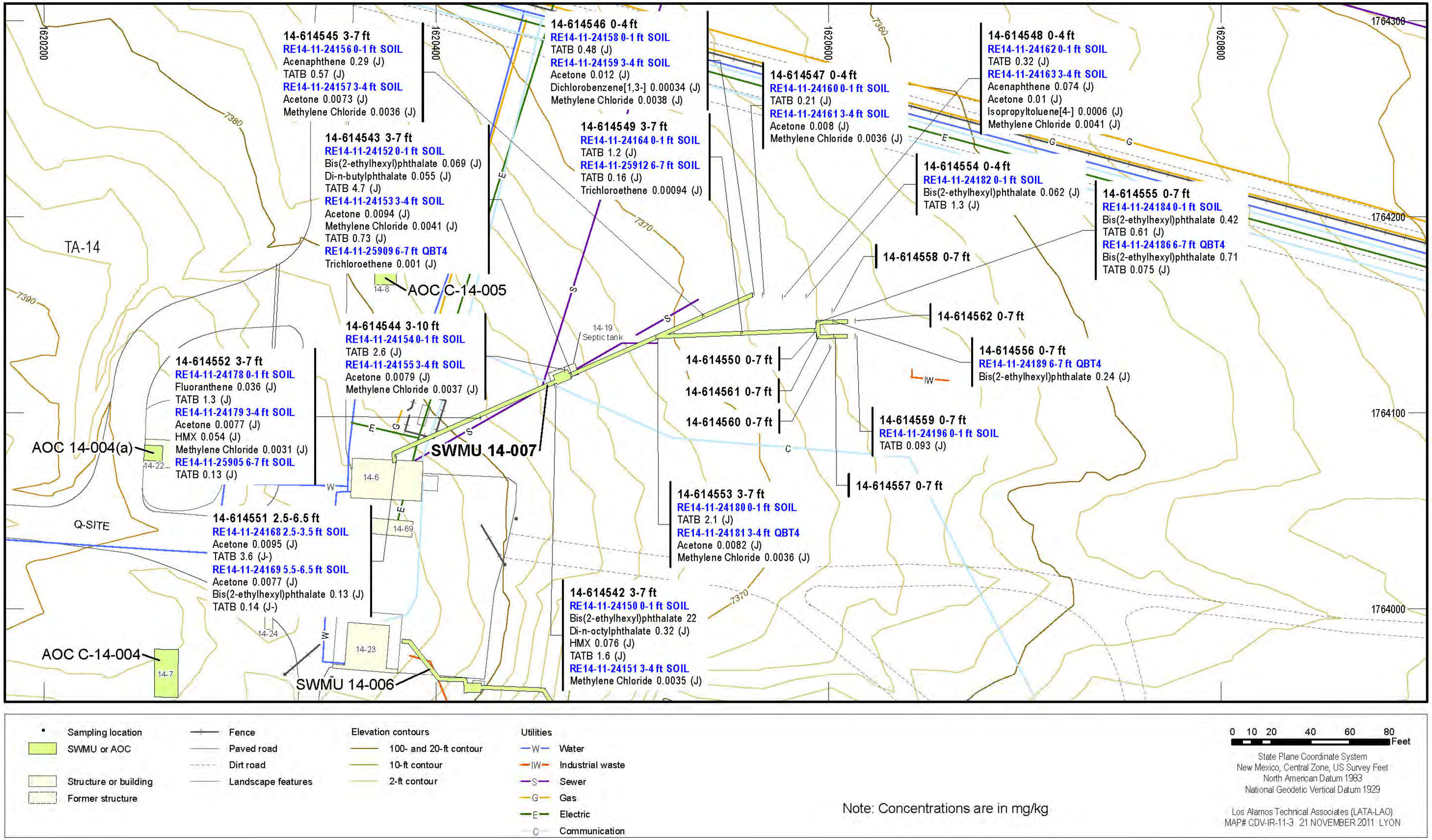


Figure 6.18-3 Organic chemicals detected at SWMU 14-007

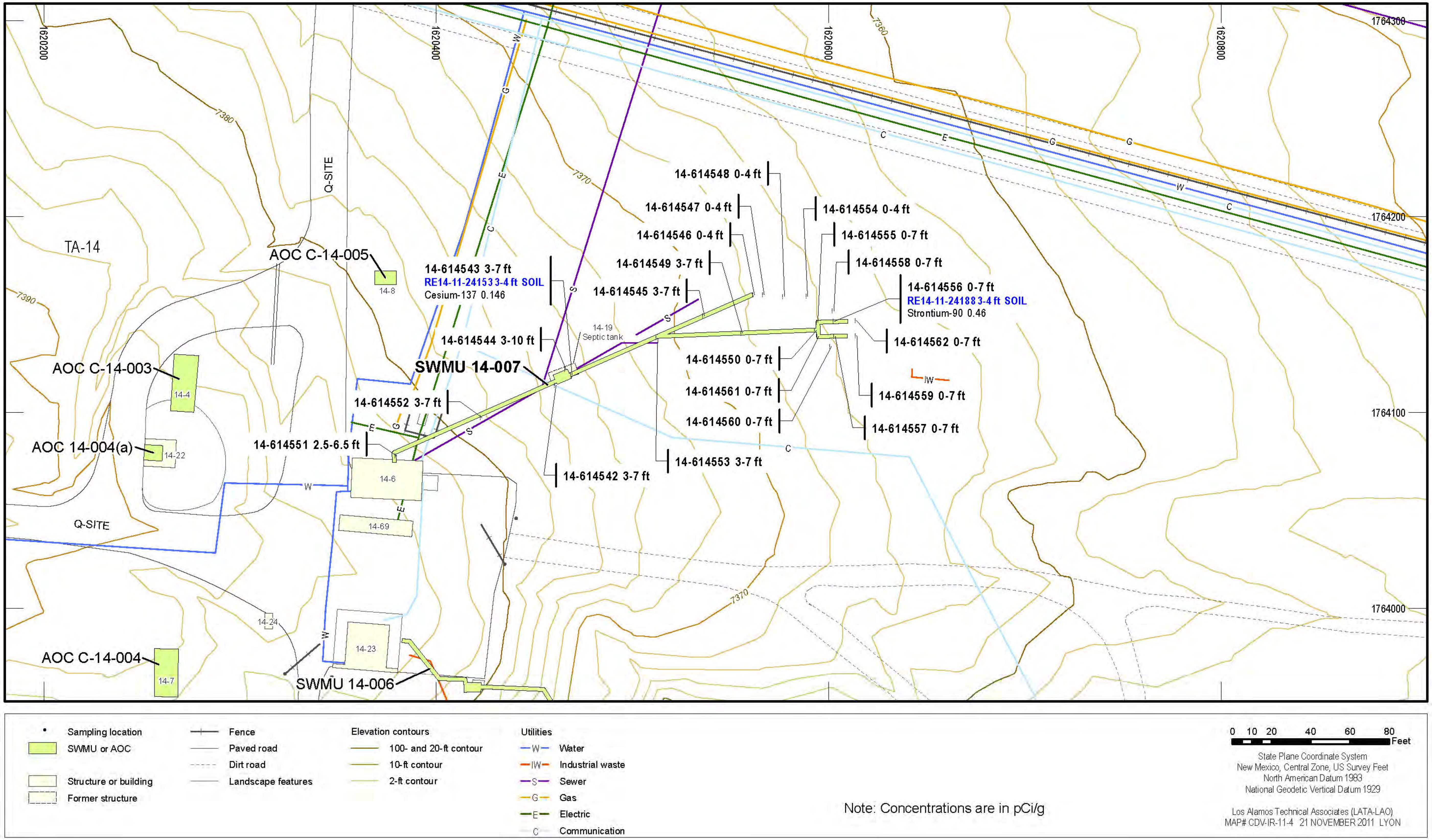


Figure 6.18-4 Radionuclides detected or detected above BVs/FVs at SWMU 14-007

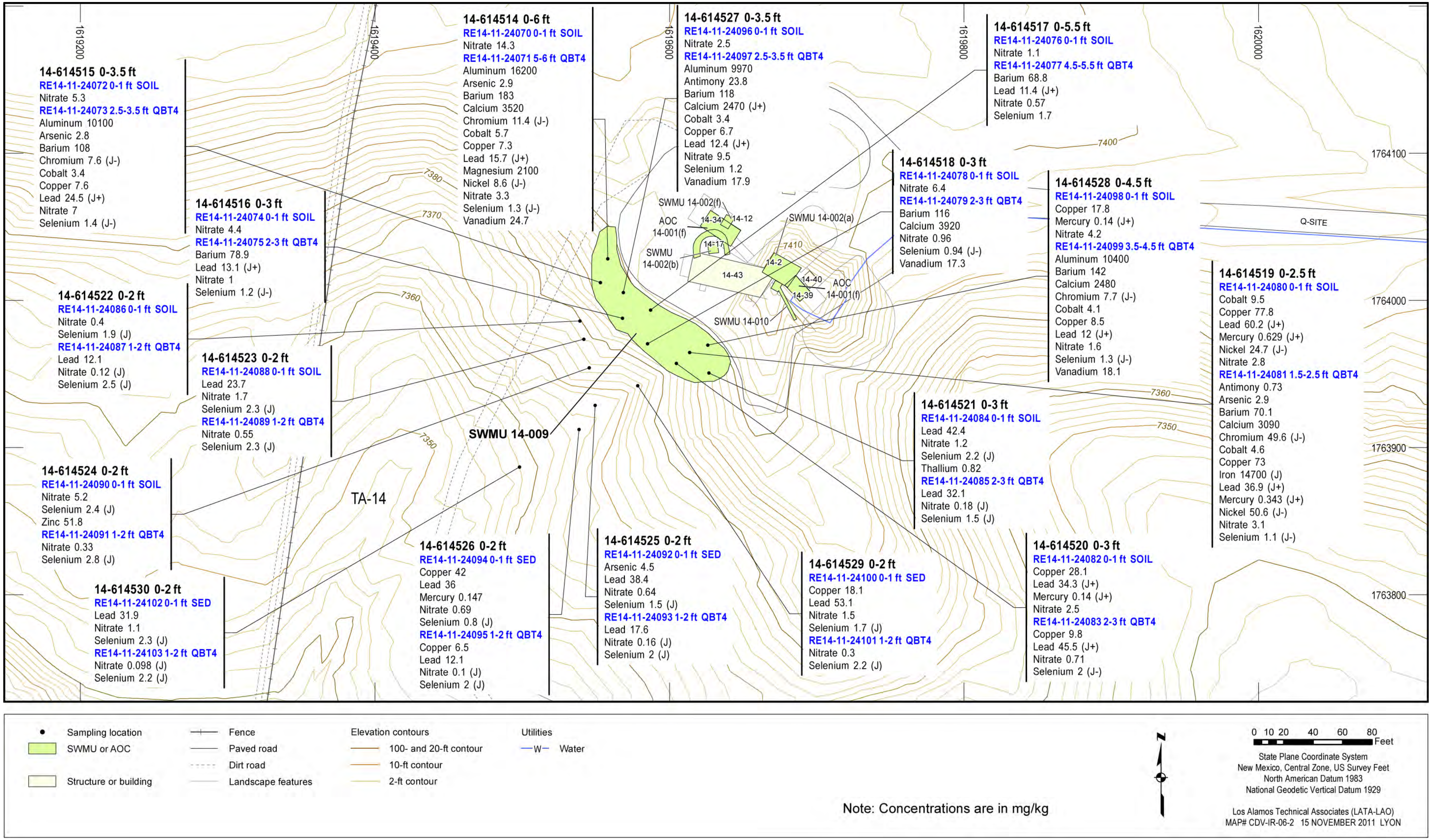


Figure 6.19-1 Inorganic chemicals detected or detected above BVs at SWMU 14-009

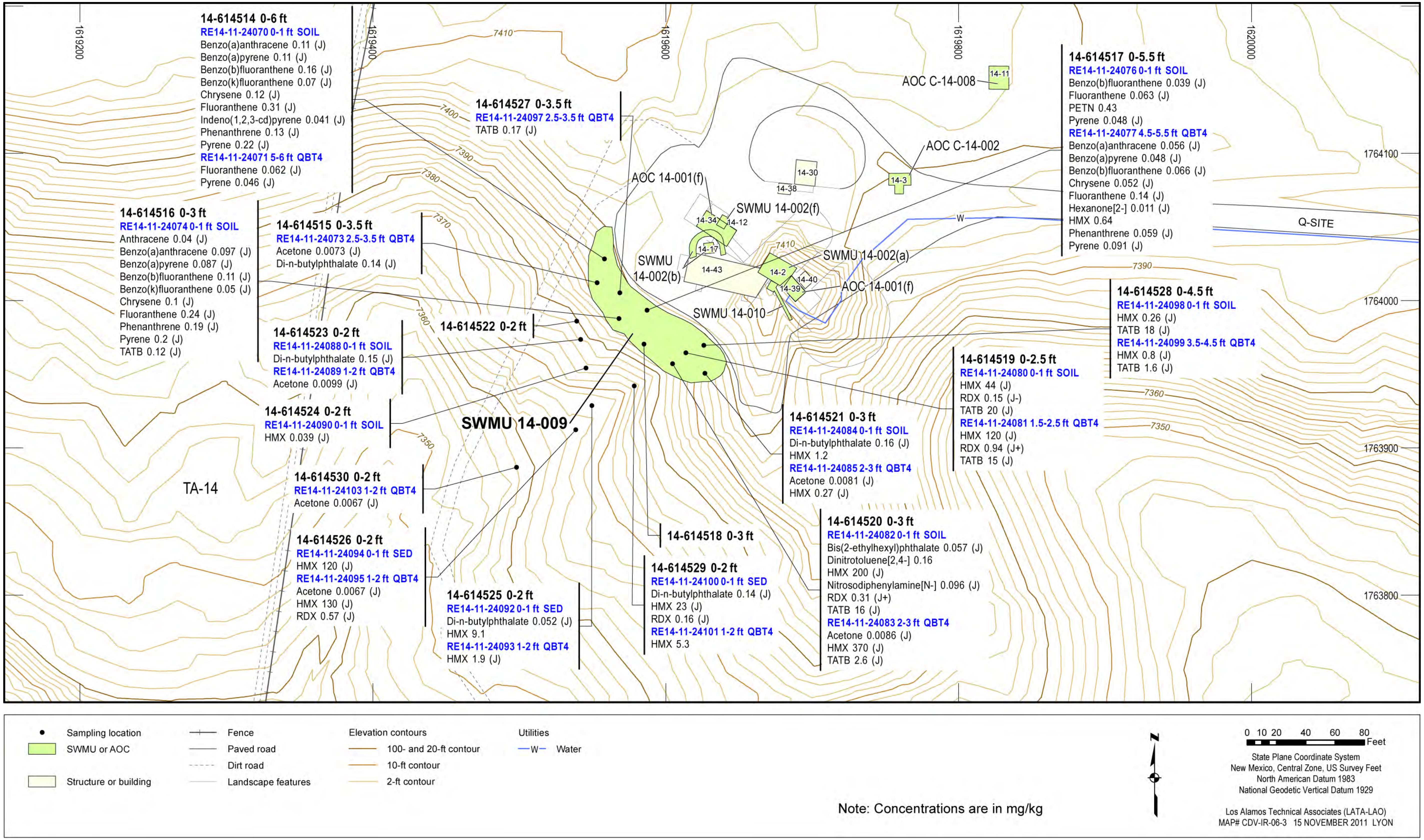


Figure 6.19-2 Organic chemicals detected at SWMU 14-009

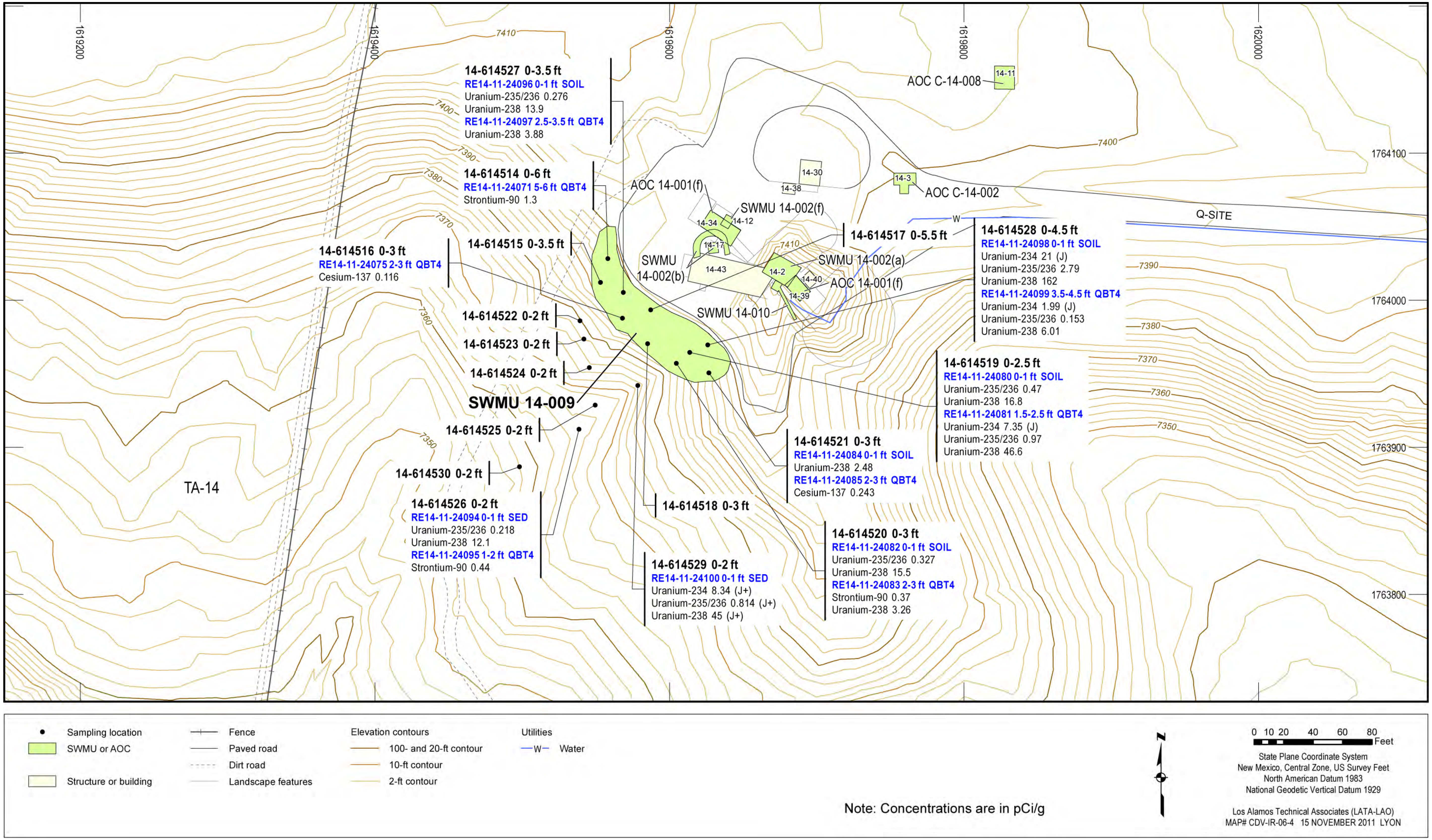


Figure 6.19-3 Radionuclides detected or detected above BVs/FVs at SWMU 14-009

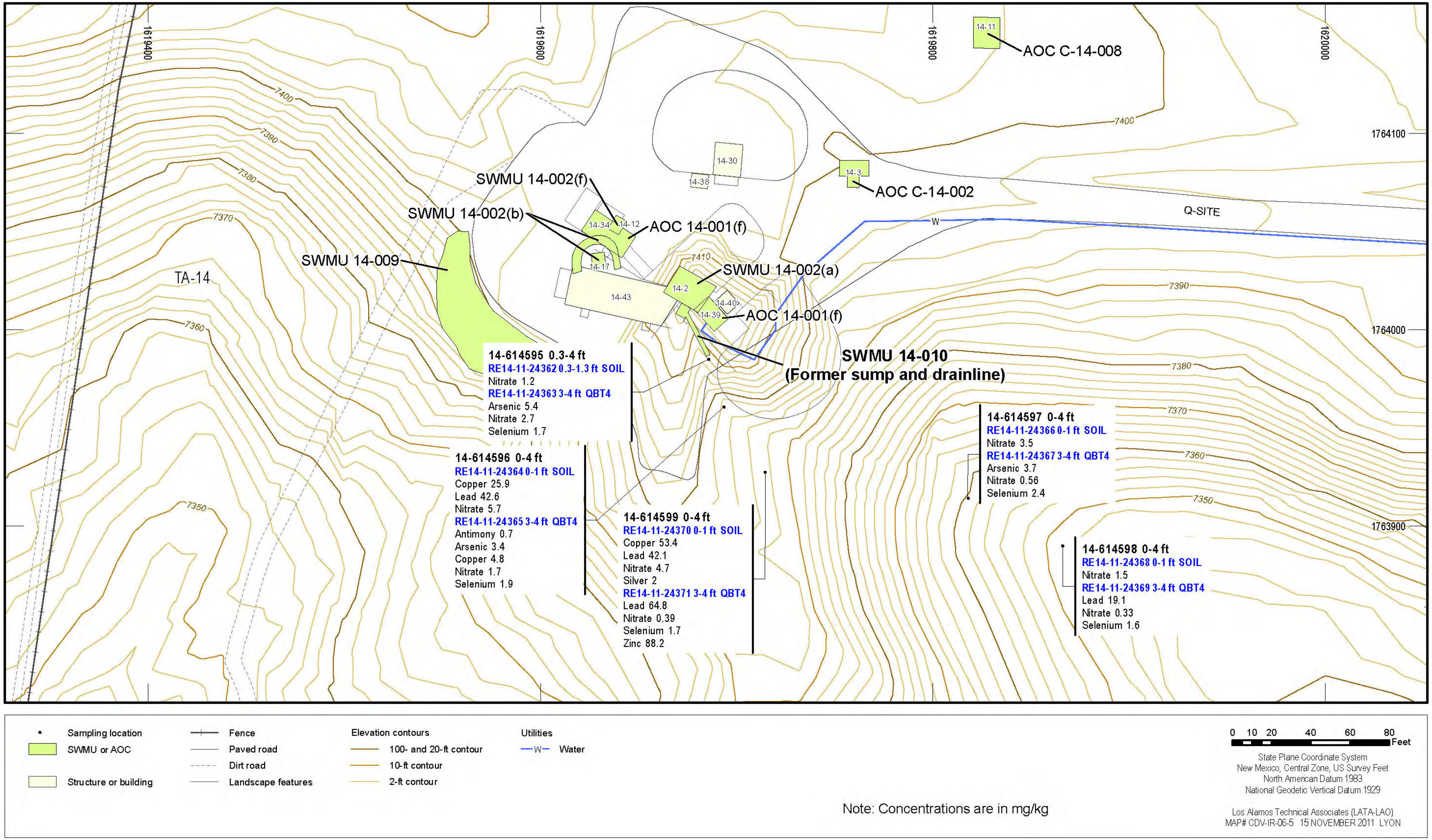


Figure 6.20-1 Inorganic chemicals detected or detected above BVs at SWMU 14-010

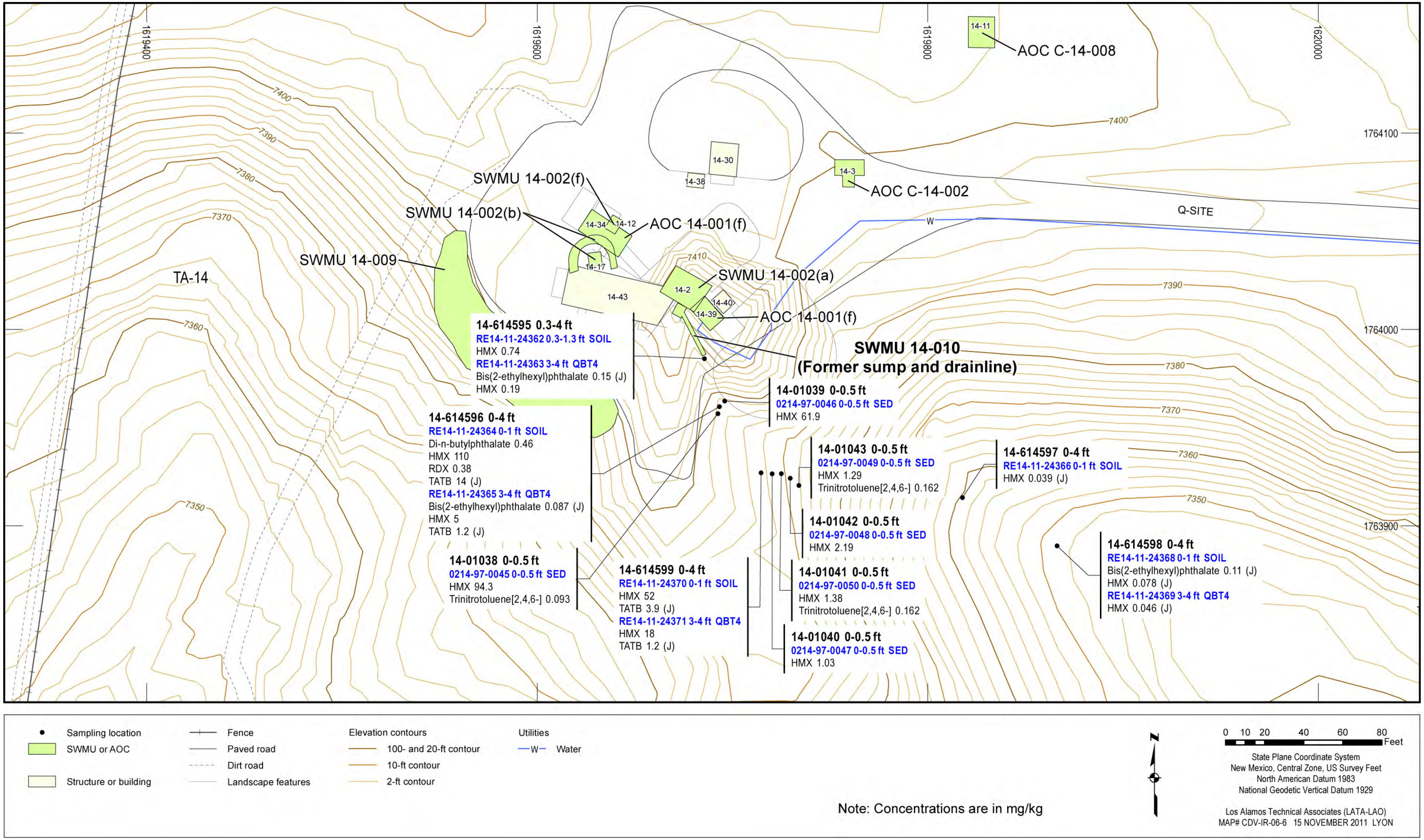
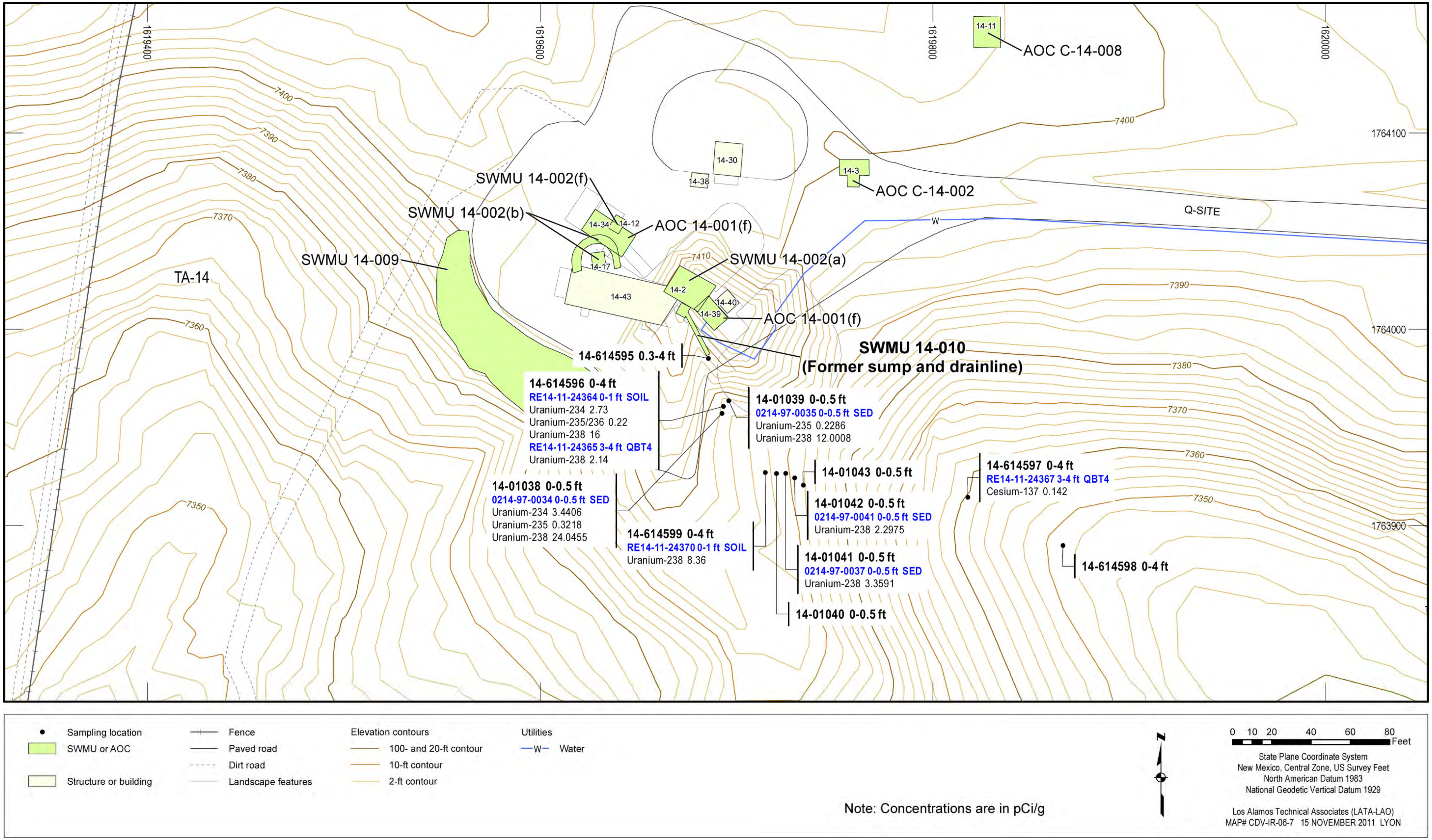


Figure 6.20-2 Organic chemicals detected at SWMU 14-010



Note: Concentrations are in pCi/g

Figure 6.20-3 Radionuclides detected or detected above BVs/FVs at SWMU 14-010

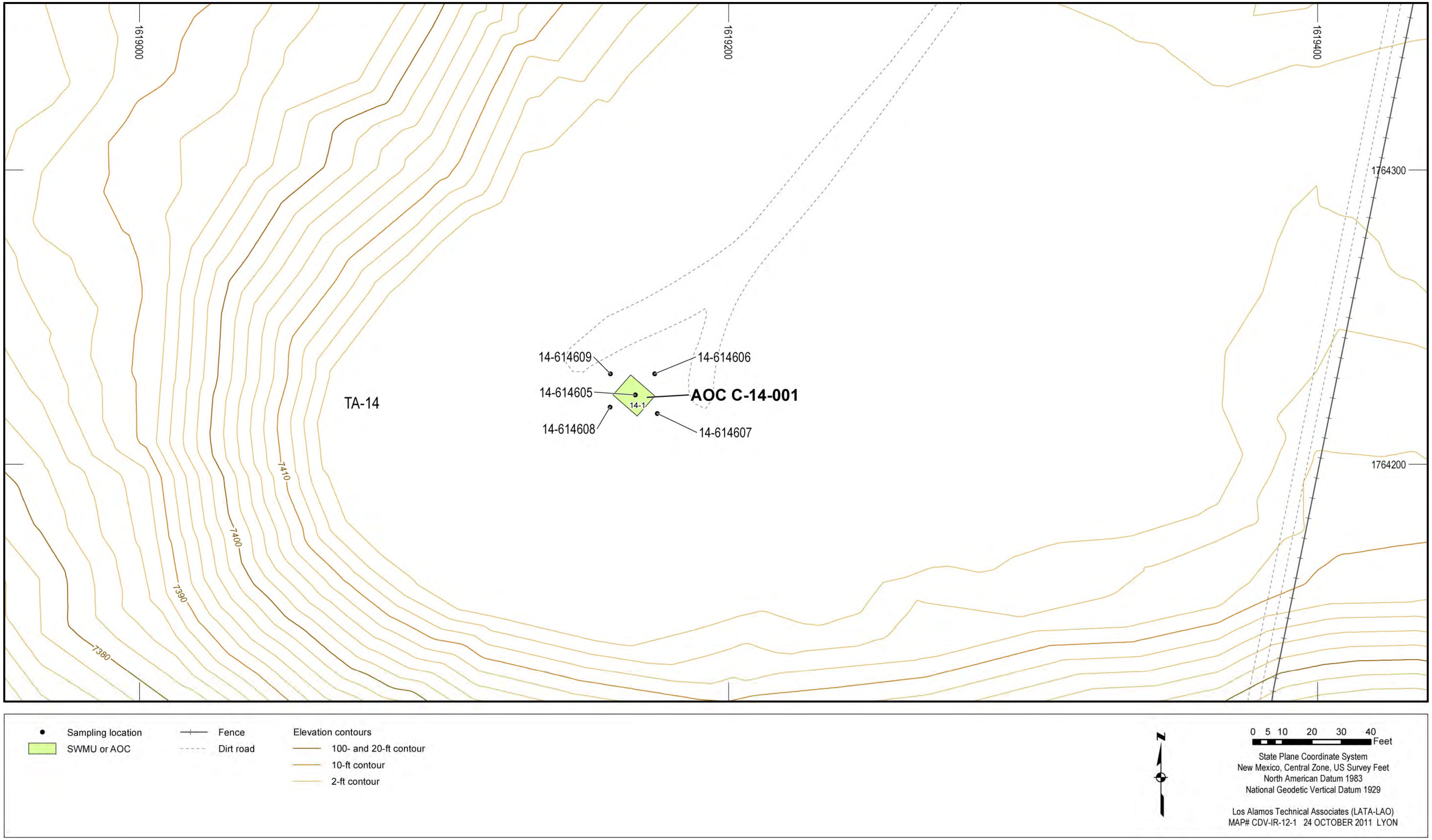


Figure 6.21-1 AOC C-14-001 site map and sampling locations

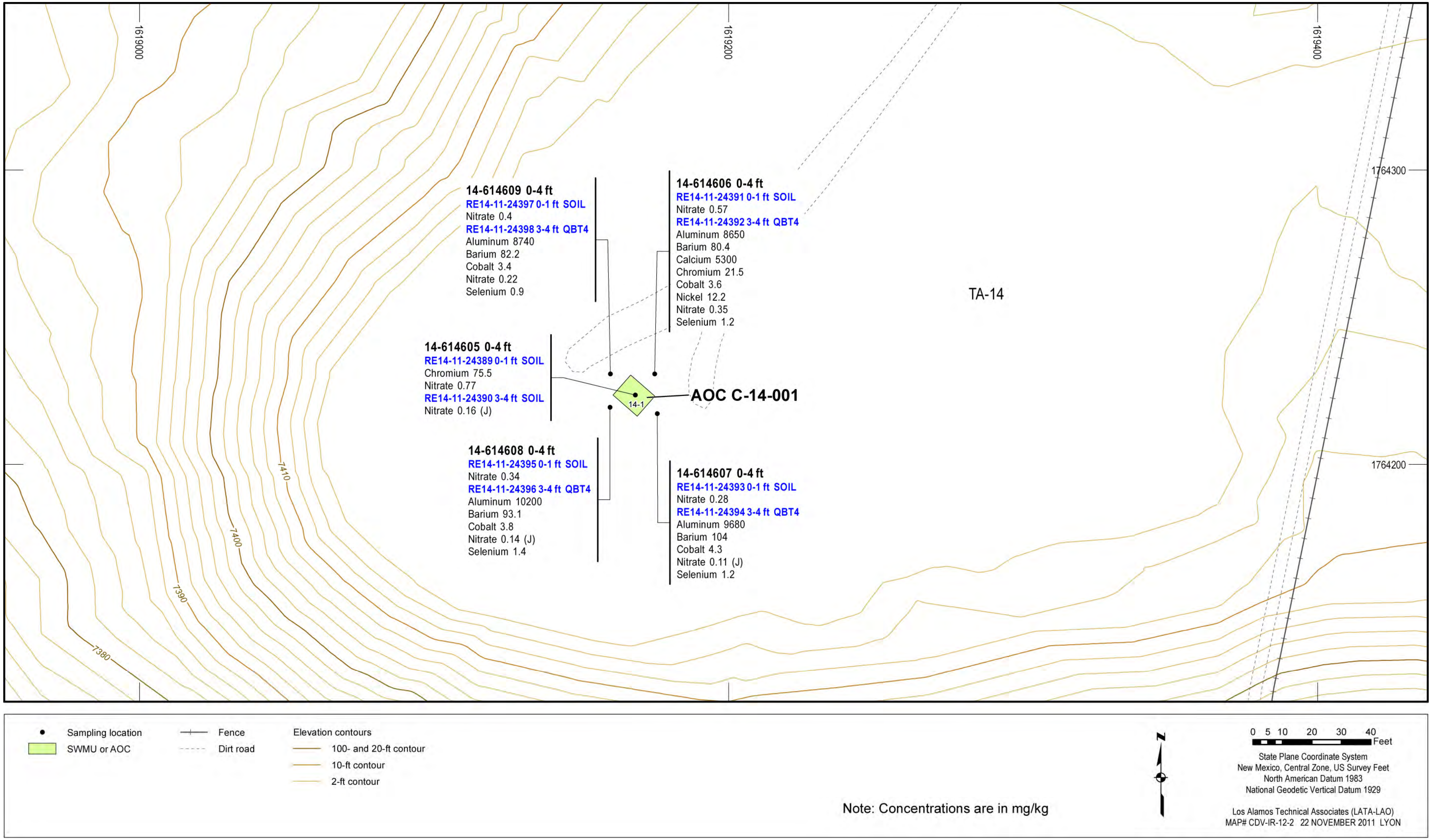
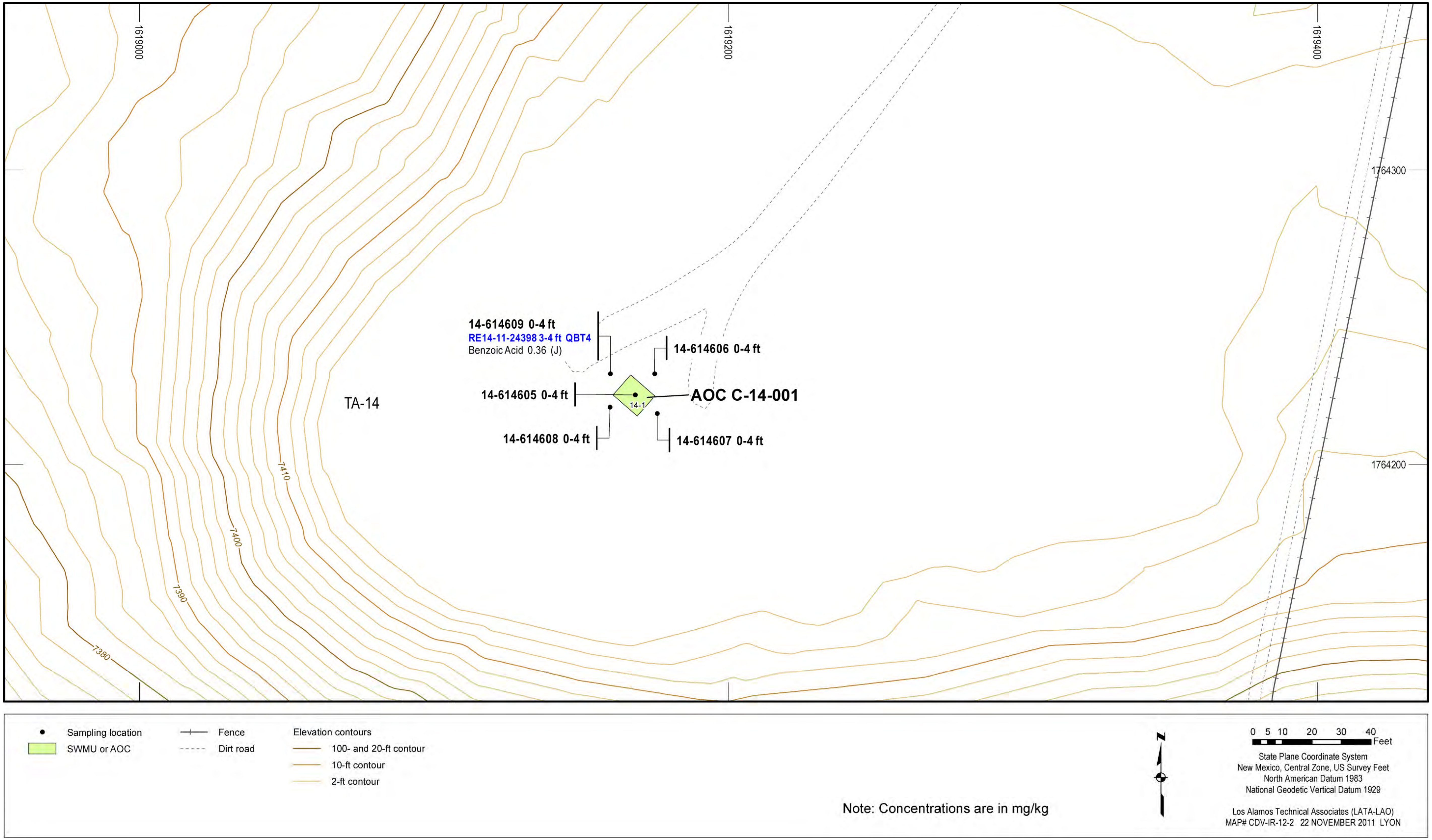


Figure 6.21-2 Inorganic chemicals detected or detected above BVs at AOC C-14-001



Note: Concentrations are in mg/kg

Figure 6.21-3 Organic chemicals detected at AOC C-14-001

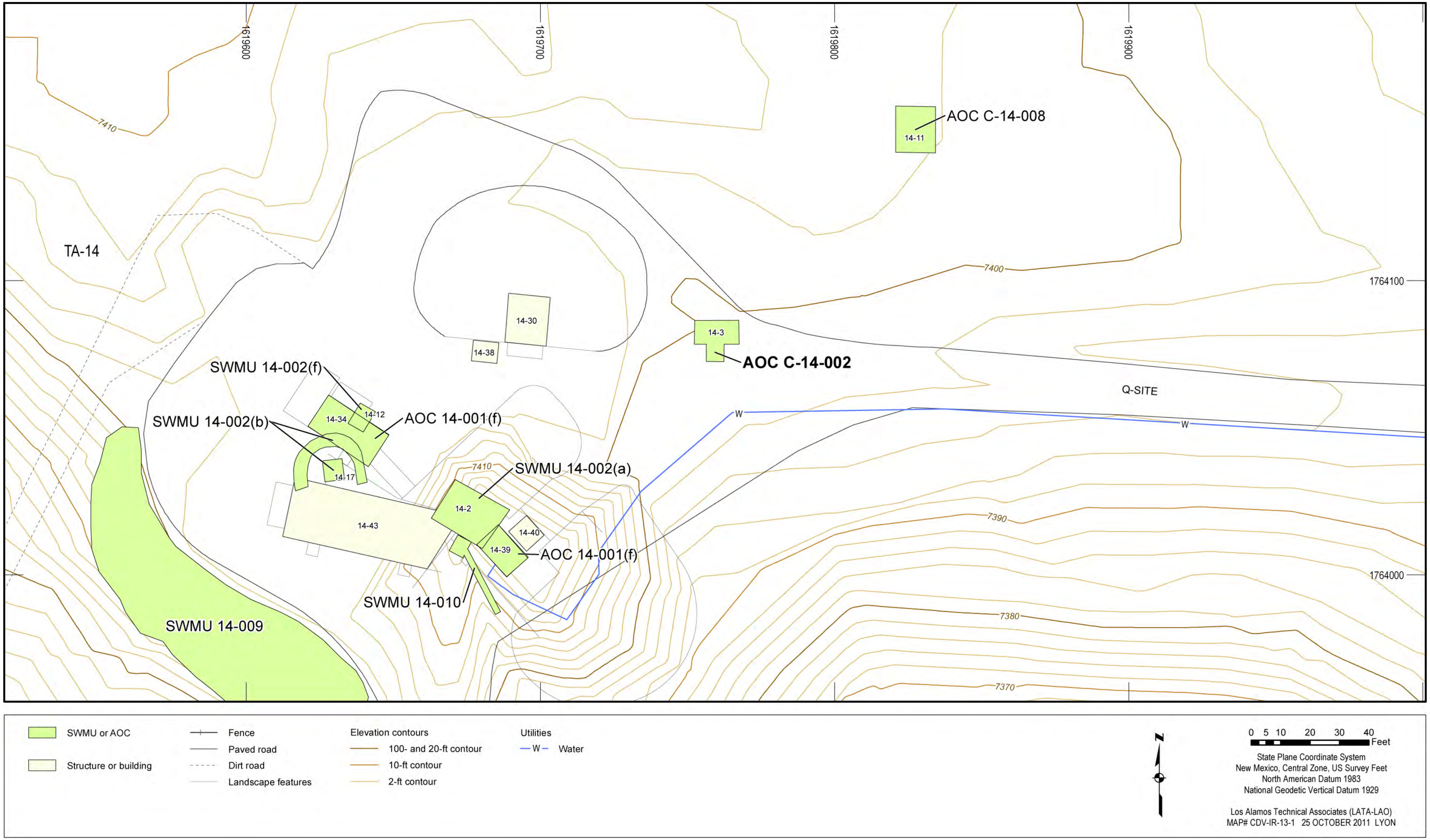


Figure 6.22-1 AOC C-14-002 site map

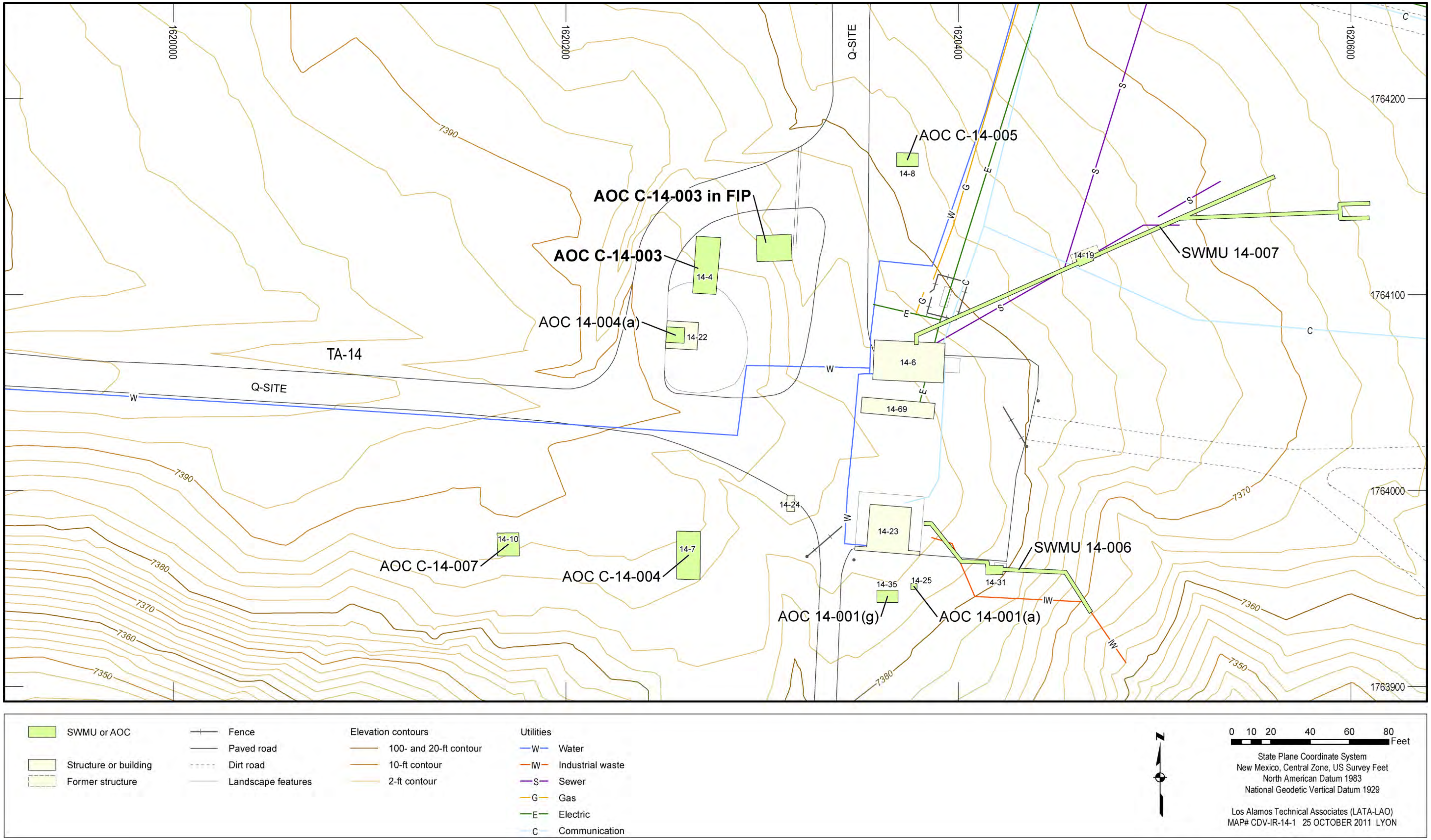


Figure 6.23-1 AOC C-14-003 site map

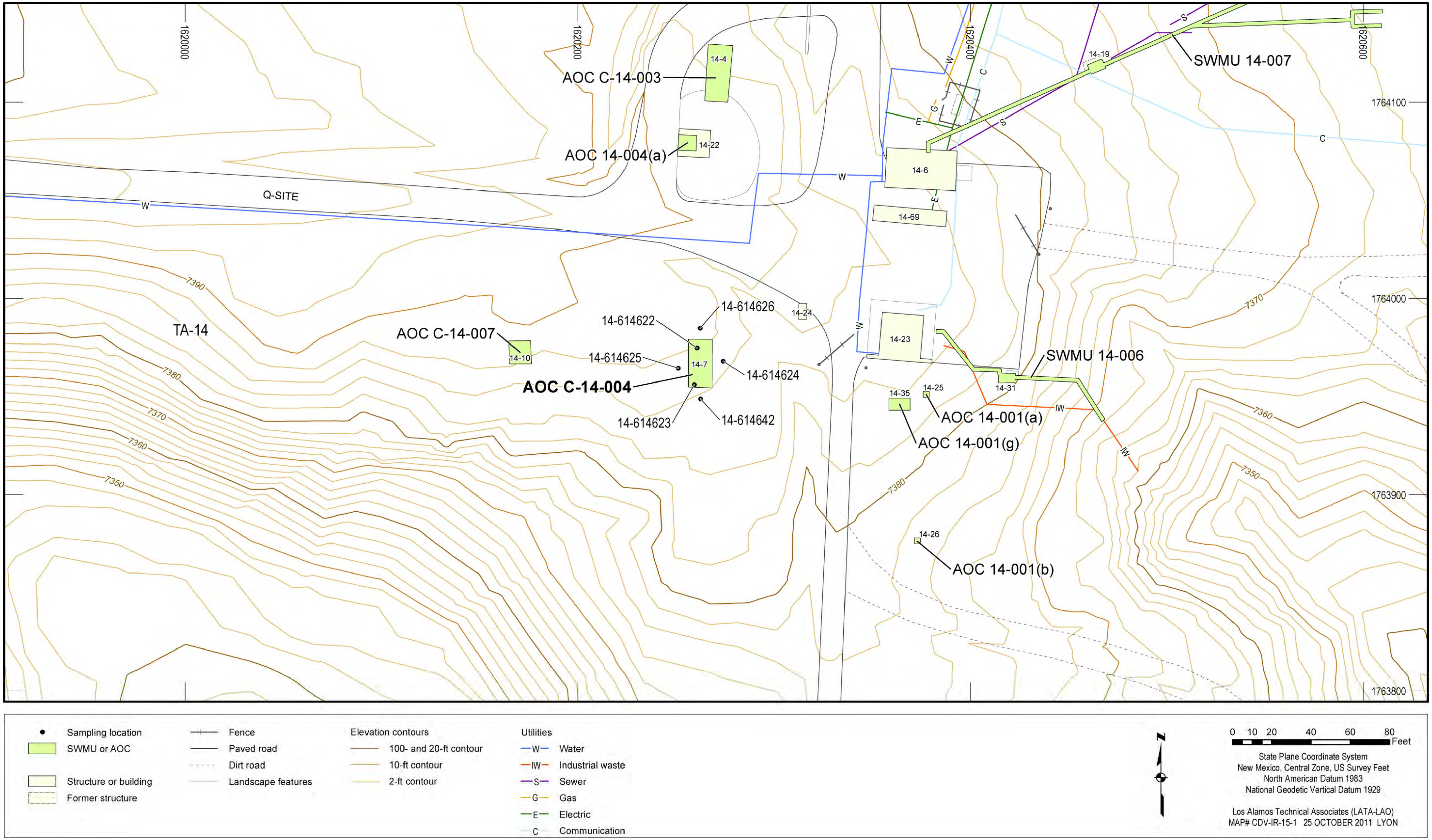


Figure 6.24-1 AOC C-14-004 site map and sampling locations

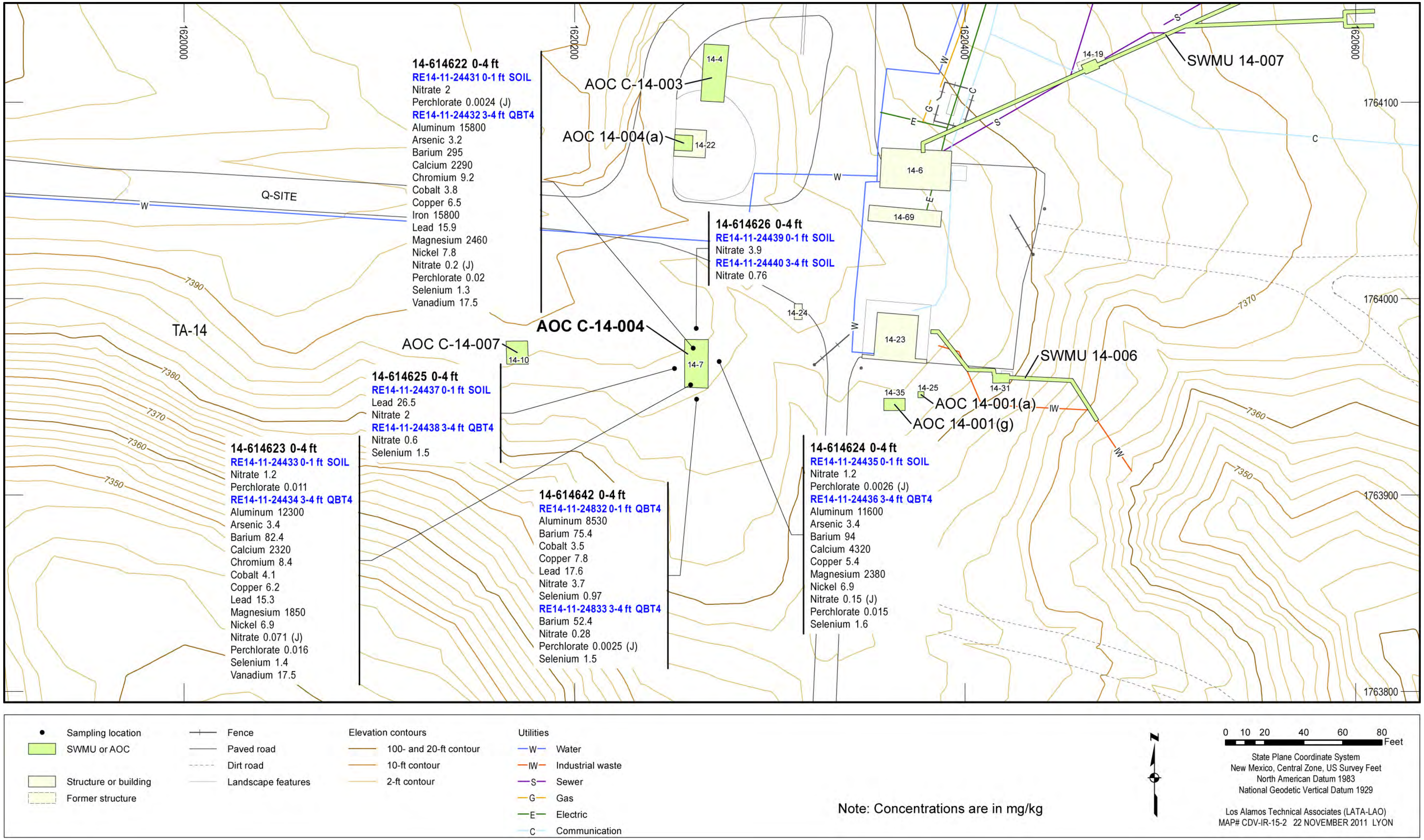


Figure 6.24-2 Inorganic chemicals detected or detected above BVs at AOC C-14-004

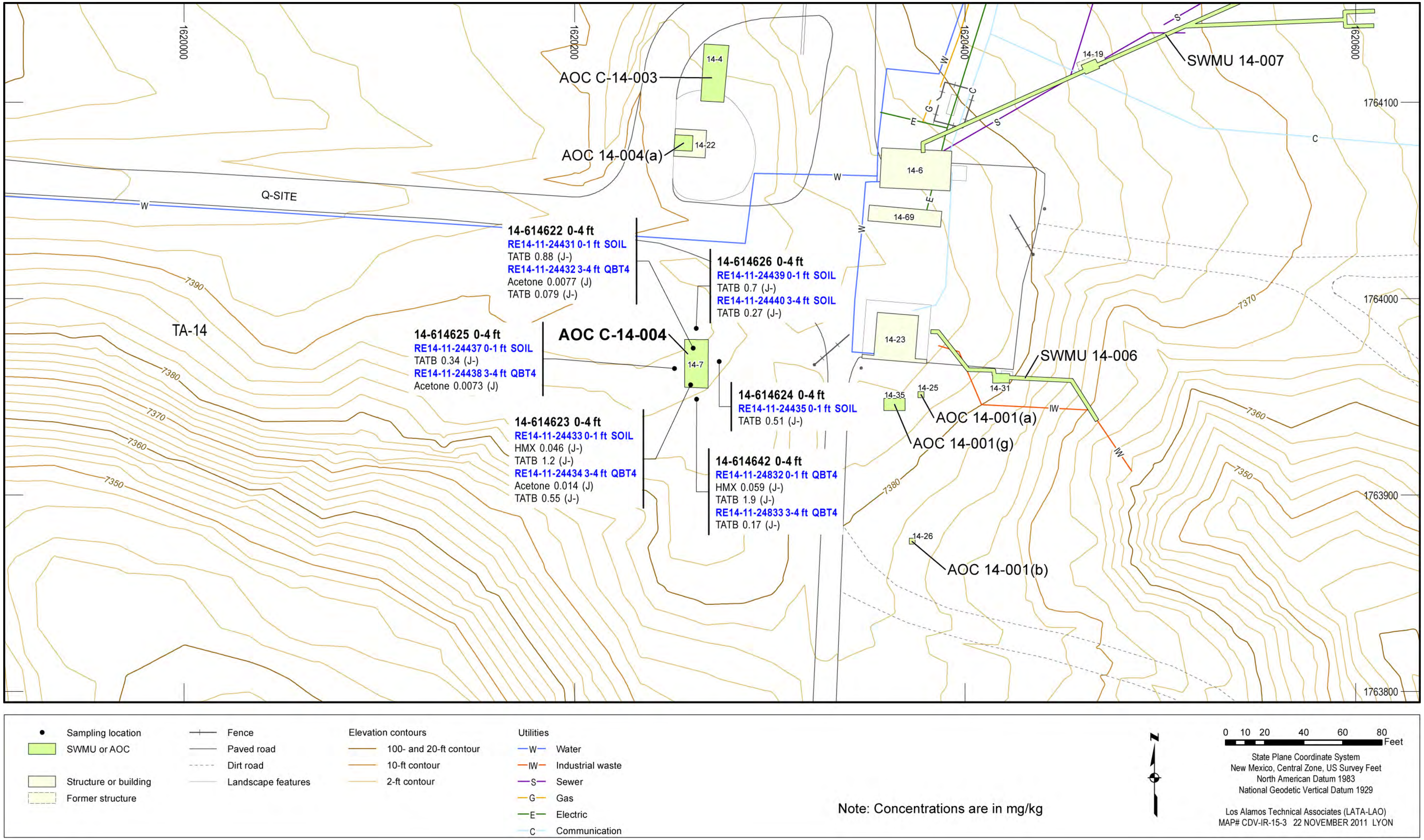


Figure 6.24-3 Organic chemicals detected at AOC C-14-004

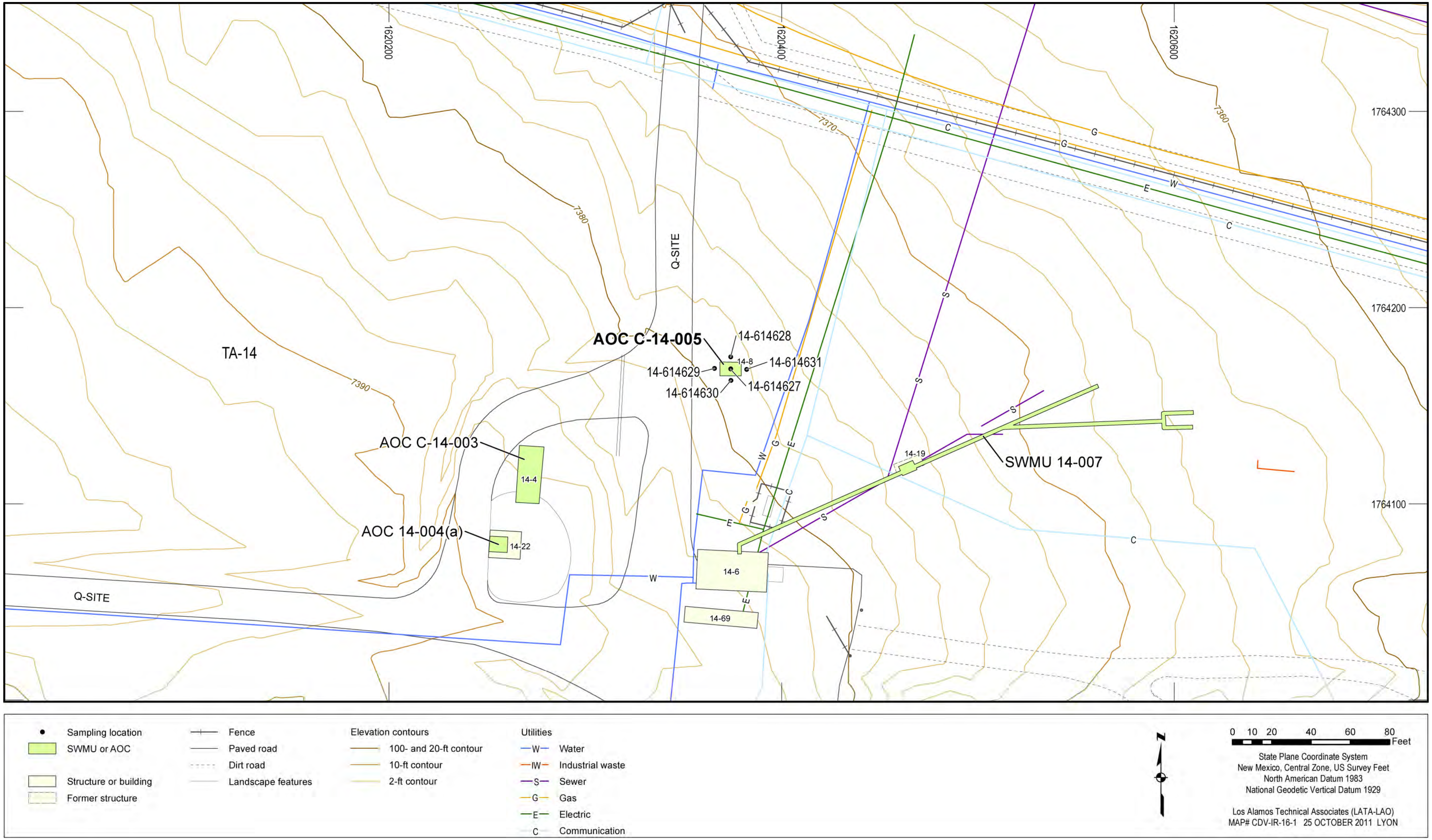


Figure 6.25-1 AOC C-14-005 site map and sampling locations

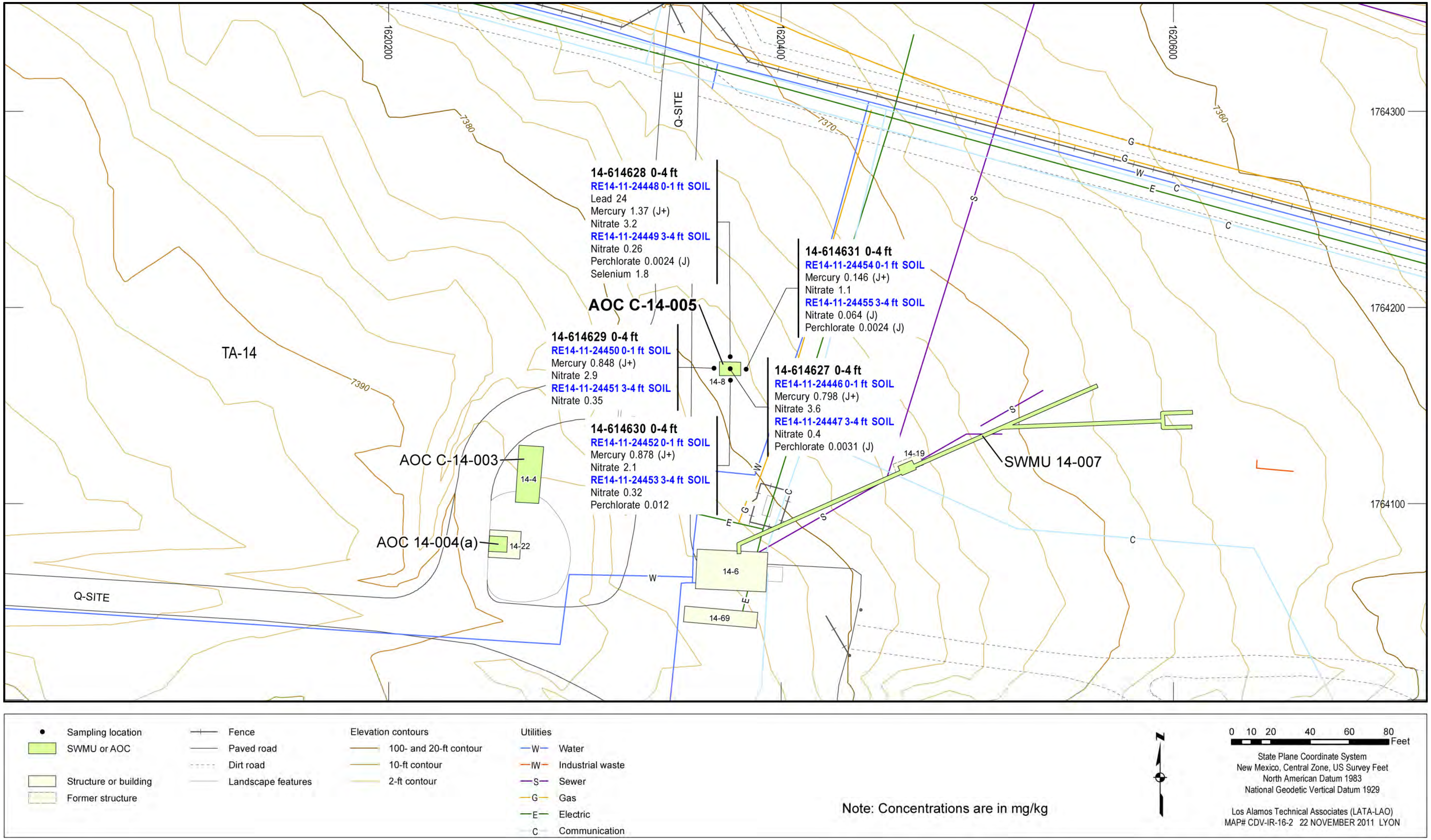


Figure 6.25-2 Inorganic chemicals detected or detected above BVs at AOC C-14-005

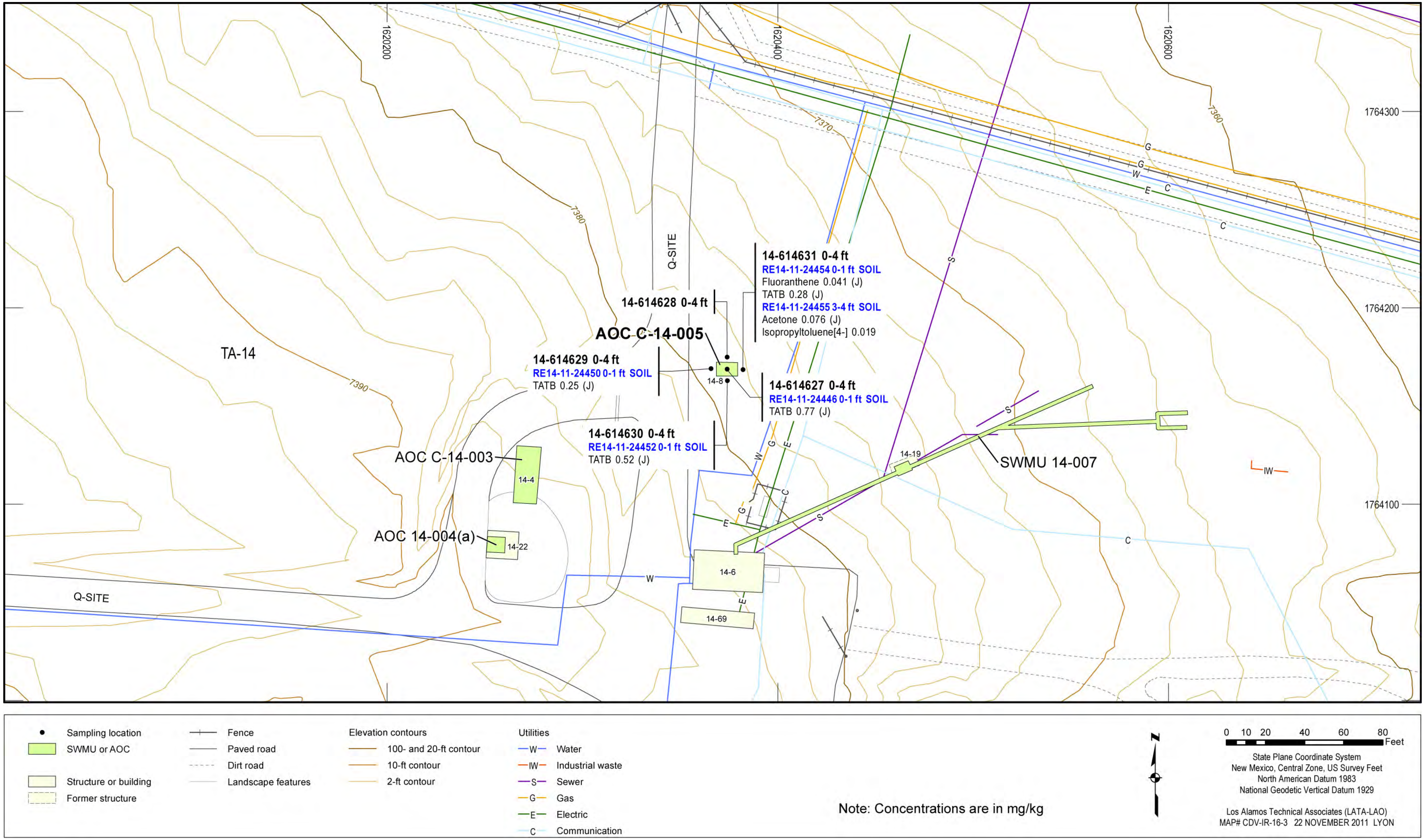


Figure 6.25-3 Organic chemicals detected at AOC C-14-005

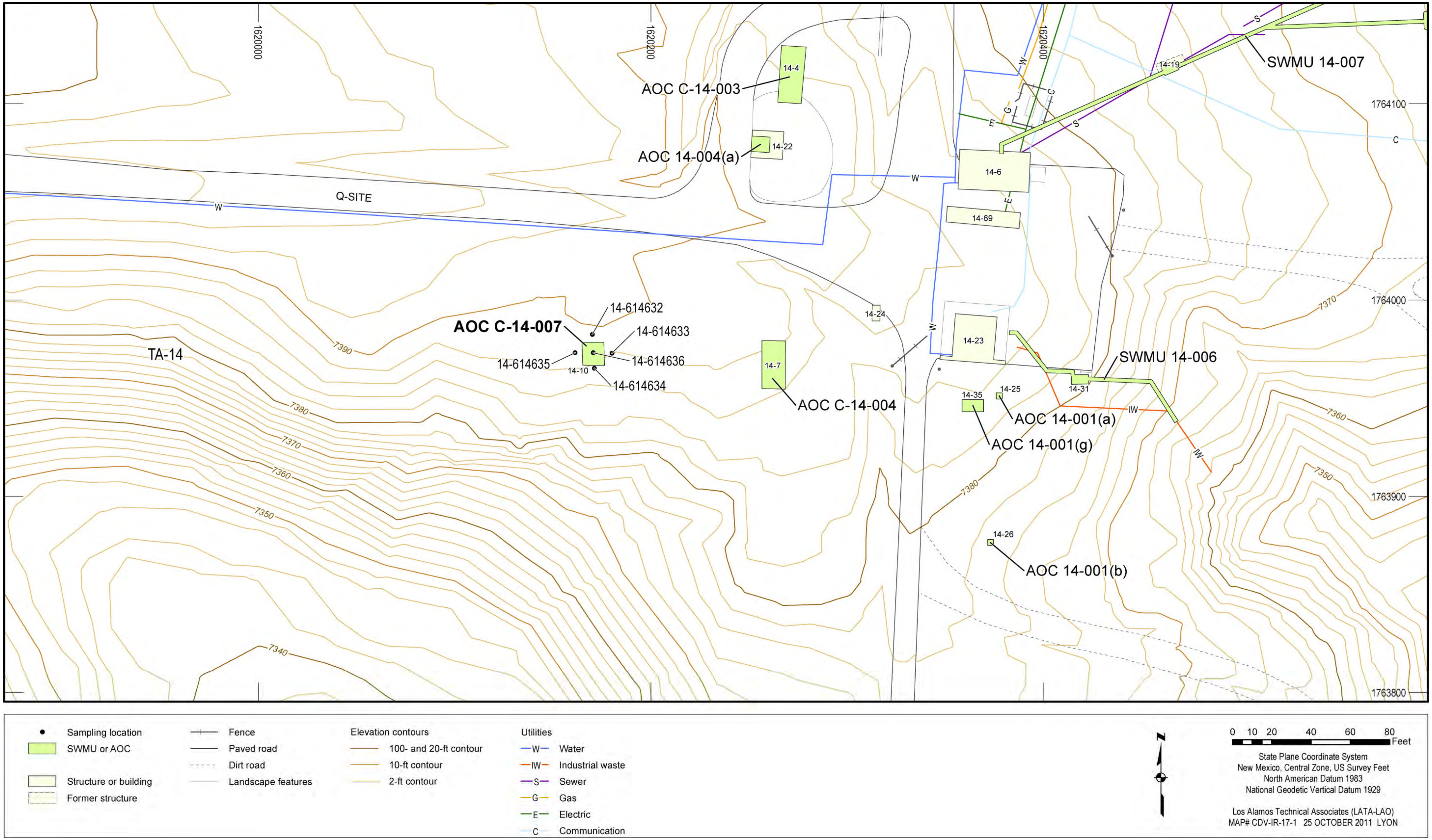


Figure 6.26-1 AOC C-14-007 site map and sampling locations

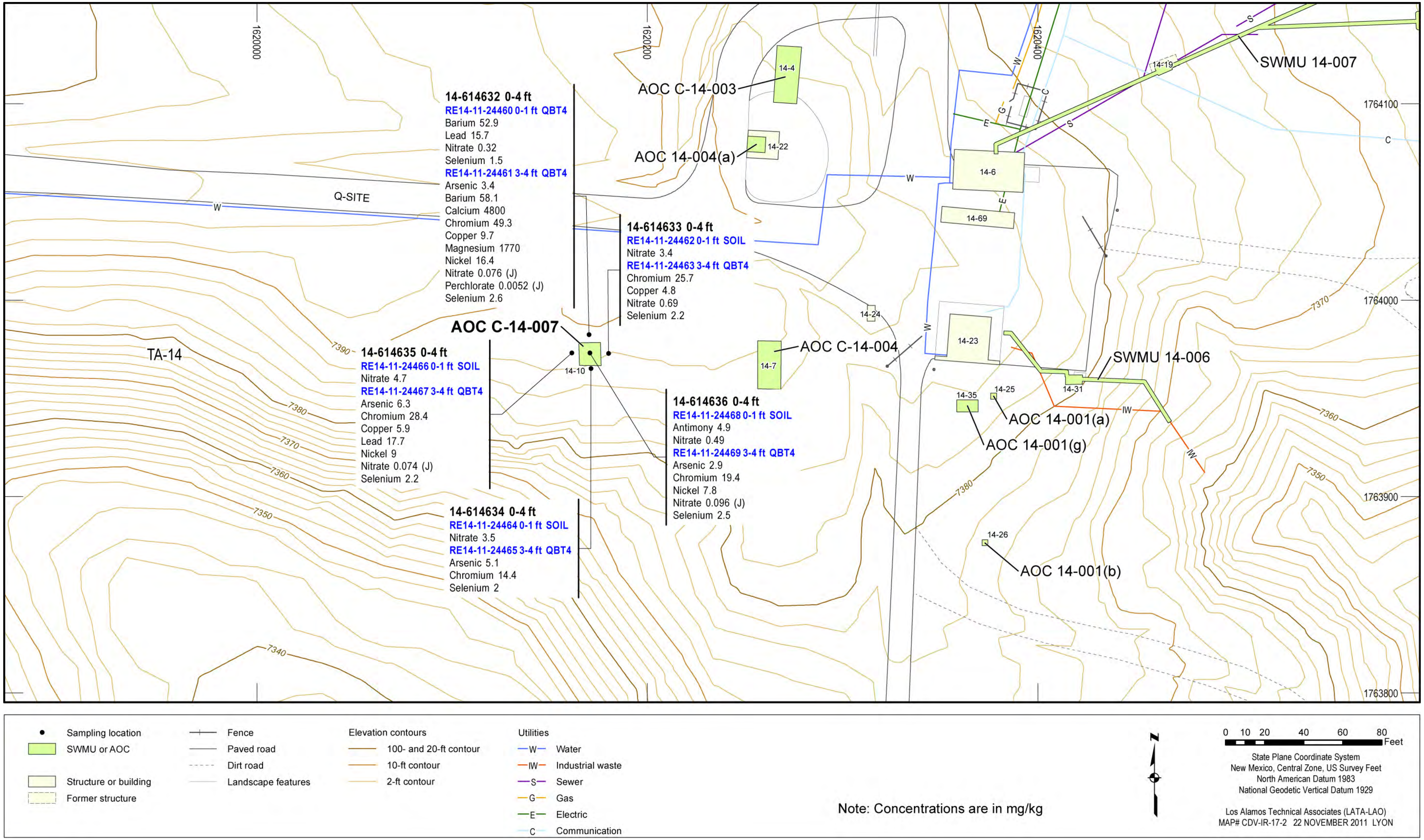
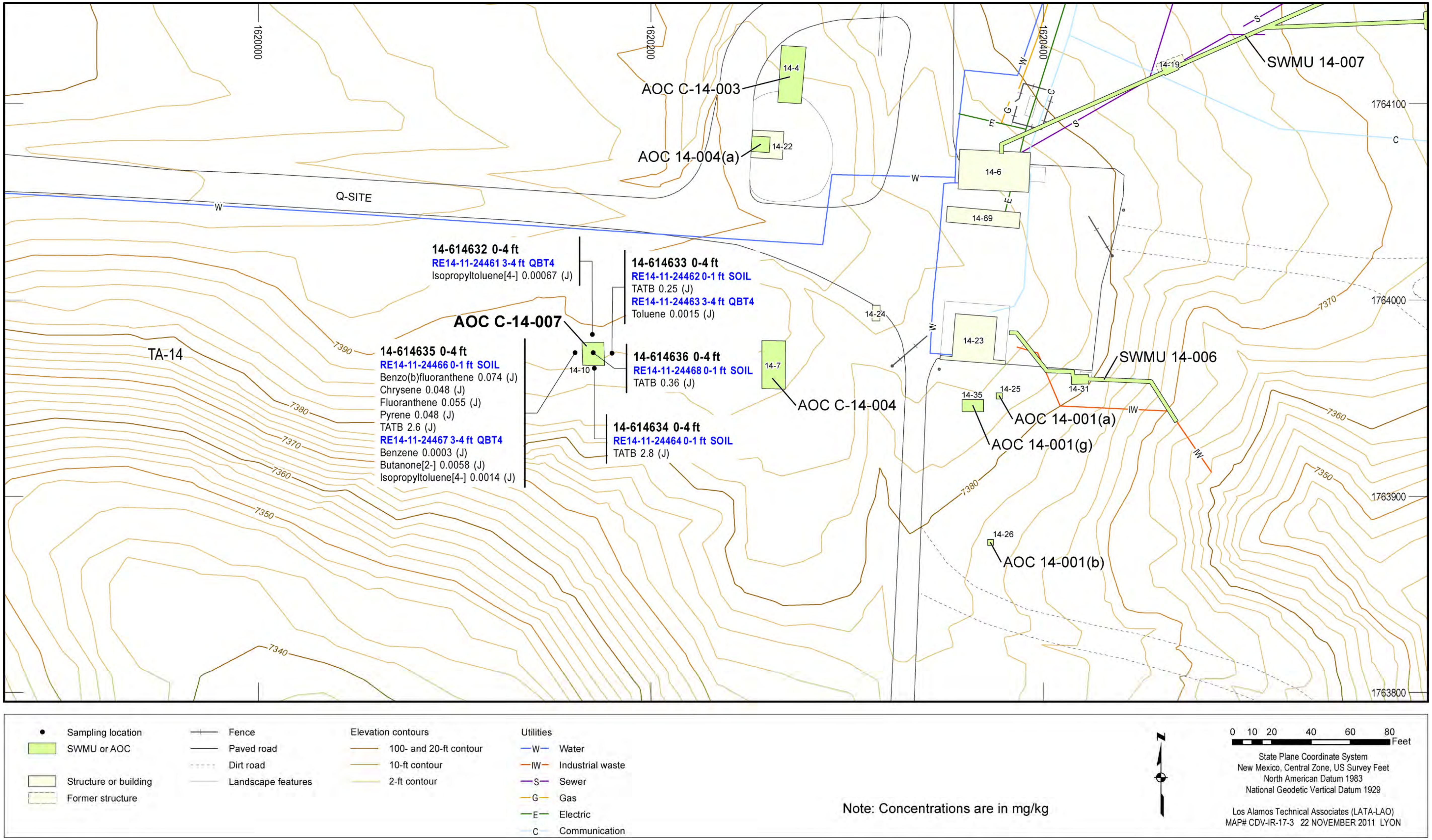


Figure 6.26-2 Inorganic chemicals detected or detected above BVs at AOC C-14-007



14-614632 0-4 ft
RE14-11-24461 3-4 ft QBT4
Isopropyltoluene[4-] 0.00067 (J)

14-614633 0-4 ft
RE14-11-24462 0-1 ft SOIL
TATB 0.25 (J)
RE14-11-24463 3-4 ft QBT4
Toluene 0.0015 (J)

14-614635 0-4 ft
RE14-11-24466 0-1 ft SOIL
Benzo(b)fluoranthene 0.074 (J)
Chrysene 0.048 (J)
Fluoranthene 0.055 (J)
Pyrene 0.048 (J)
TATB 2.6 (J)
RE14-11-24467 3-4 ft QBT4
Benzene 0.0003 (J)
Butanone[2-] 0.0058 (J)
Isopropyltoluene[4-] 0.0014 (J)

14-614636 0-4 ft
RE14-11-24468 0-1 ft SOIL
TATB 0.36 (J)

14-614634 0-4 ft
RE14-11-24464 0-1 ft SOIL
TATB 2.8 (J)

Note: Concentrations are in mg/kg

Figure 6.26-3 Organic chemicals detected at AOC C-14-007

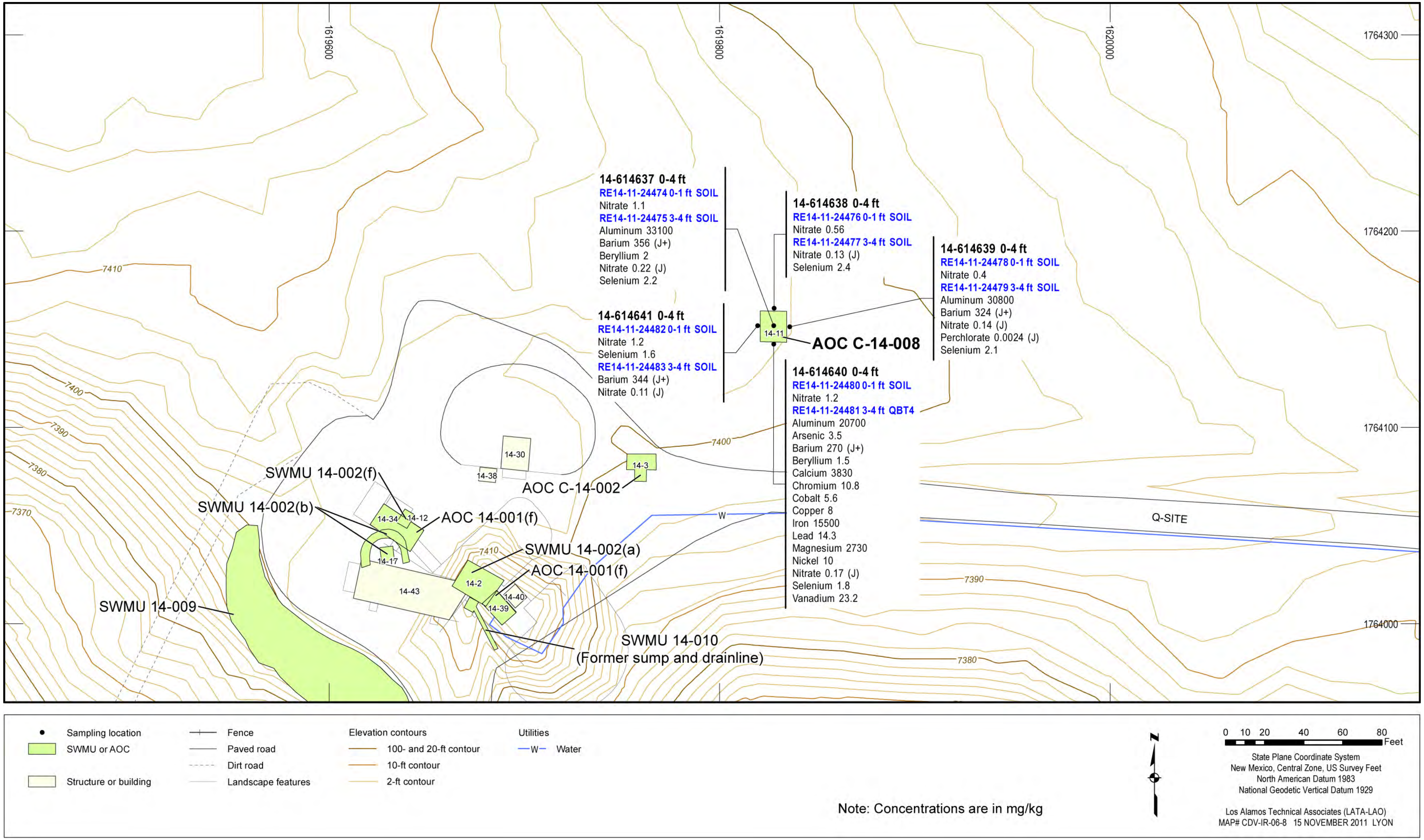


Figure 6.27-1 Inorganic chemicals detected or detected above BVs at AOC C-14-008

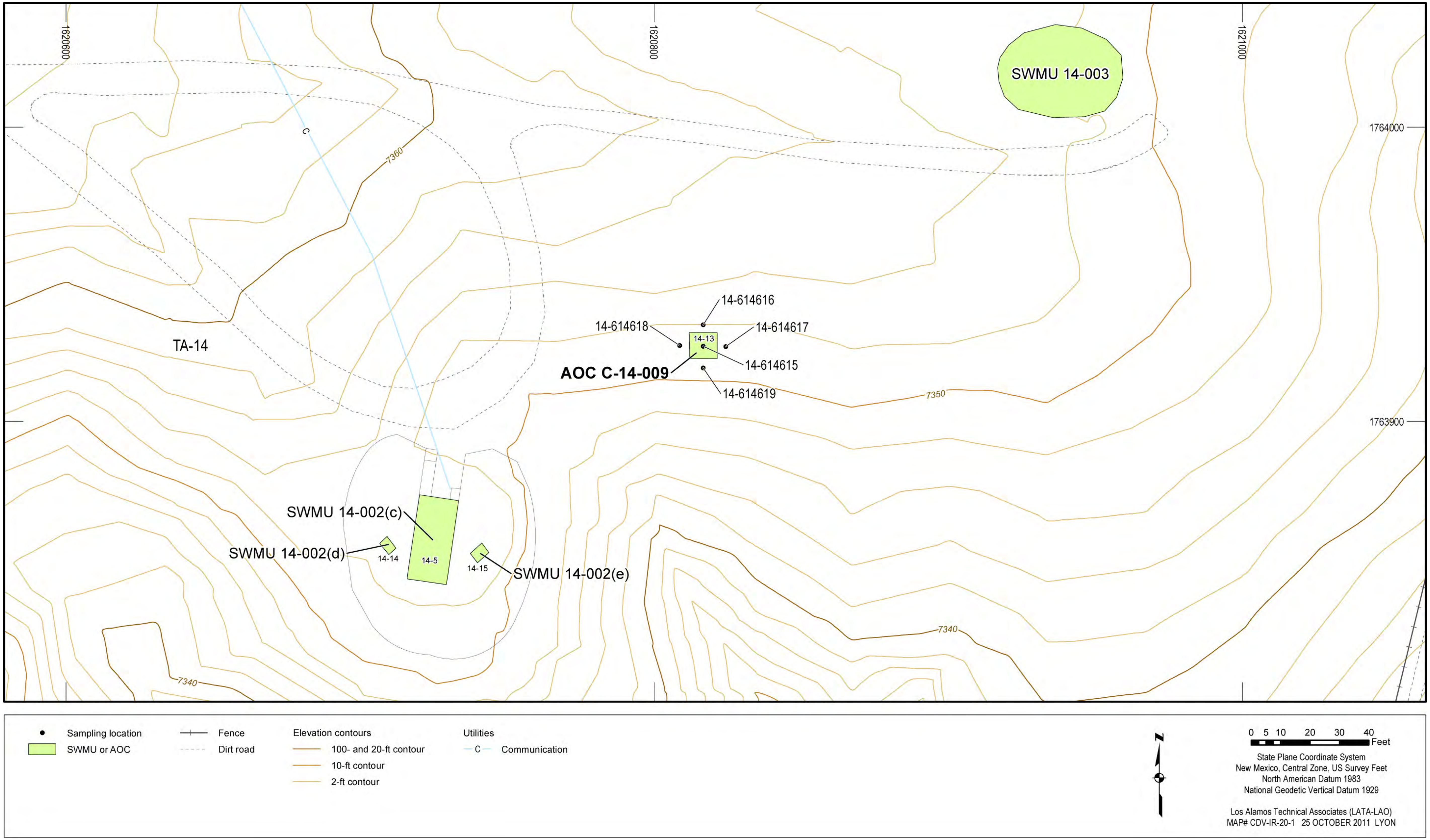


Figure 6.28-1 AOC C-14-009 site map and sampling locations

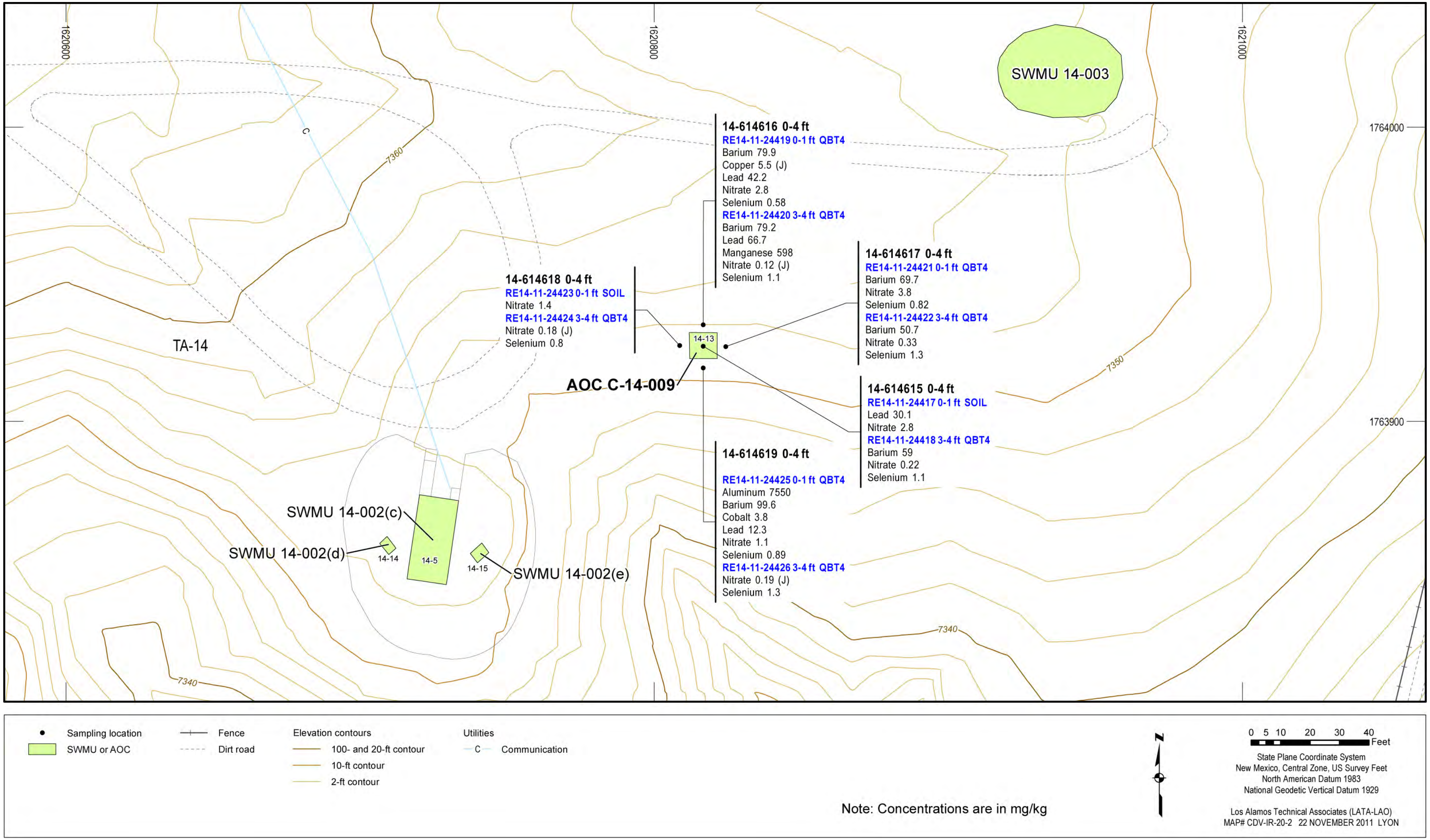


Figure 6.28-2 Inorganic chemicals detected or detected above BVs at AOC C-14-009

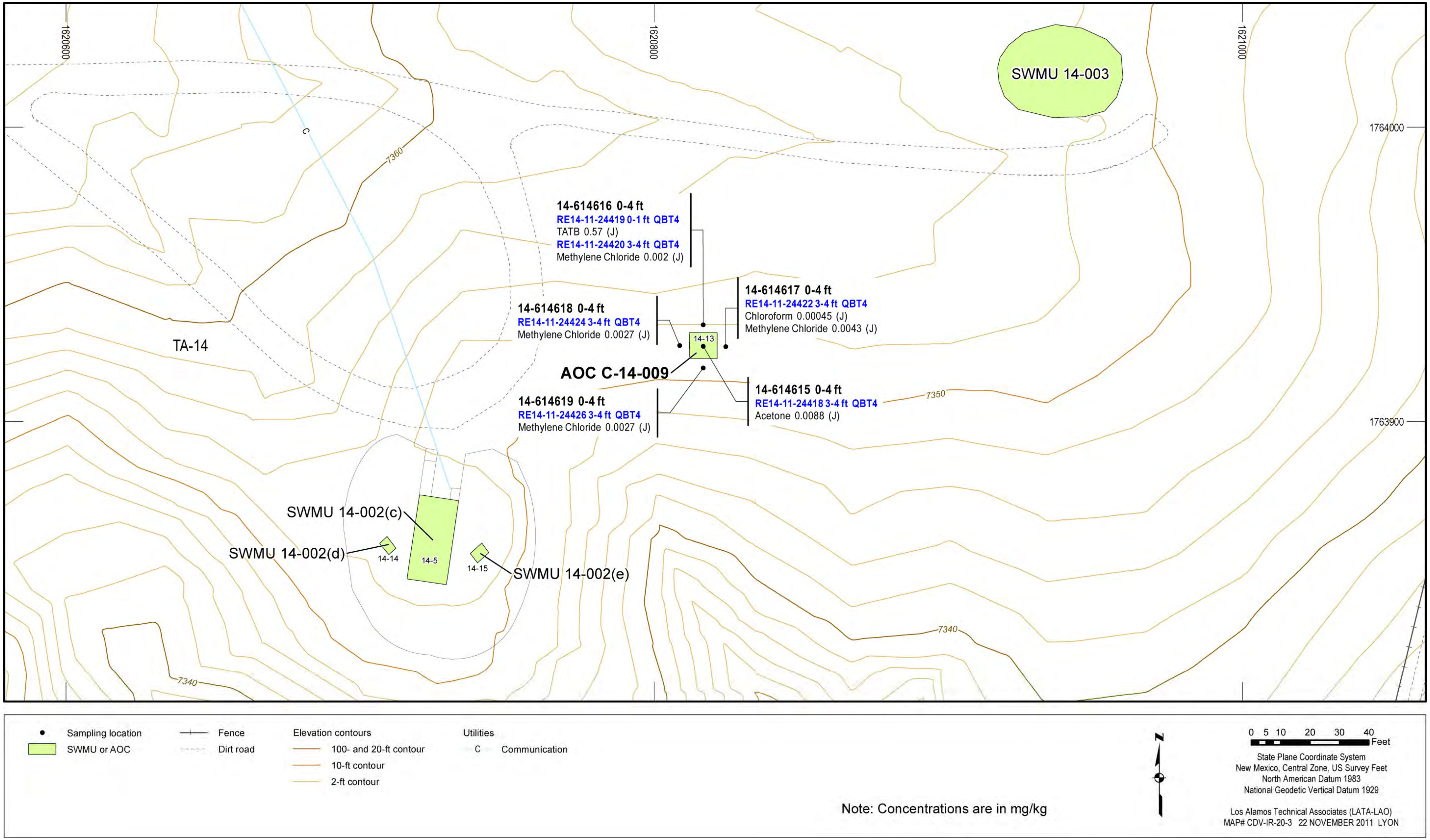


Figure 6.28-3 Organic chemicals detected at AOC C-14-009

Table 1.1-1
Summary of TA-14 Sites within the Cañon de Valle Aggregate Area and Their Status

SWMU/AOC	Brief Description	2011 Investigation	Current Status
AOC 14-001(a)	Pull box	Subsurface samples collected	Supplemental investigation report section 6.2
AOC 14-001(b)	Pull box	Subsurface samples collected	Supplemental investigation report section 6.3
AOC 14-001(c)	Pull box	Subsurface samples collected	Supplemental investigation report section 6.4
AOC 14-001(d)	Pull box	Subsurface samples collected	Supplemental investigation report section 6.5
AOC 14-001(e)	Pull box	Subsurface samples collected	Supplemental investigation report section 6.6
AOC 14-001(f)	Bullet test facility	Deferred per Table IV-2 of 2005 Consent Order	Deferred per Appendix A of 2016 Consent Order (supplemental investigation report section 6.7)
AOC 14-001(g)	Firing site	Surface and subsurface samples collected	Supplemental investigation report section 6.8
SWMU 14-002(a)	Former firing site	Deferred per Table IV-2 of 2005 Consent Order	Deferred per Appendix A of 2016 Consent Order (supplemental investigation report section 6.9)
SWMU 14-002(b)	Former firing site	Deferred per Table IV-2 of 2005 Consent Order	Deferred per Appendix A of 2016 Consent Order (supplemental investigation report section 6.10)
SWMU 14-002(c)	Decommissioned firing site	Surface and subsurface samples collected	Supplemental investigation report section 6.11
SWMU 14-002(d)	X-unit chamber	Deferred per Table IV-2 of 2005 Consent Order	Deferred per Appendix A of 2016 Consent Order (supplemental investigation report section 6.12)
SWMU 14-002(e)	X-unit chamber	Deferred per Table IV-2 of 2005 Consent Order	Deferred per Appendix A of 2016 Consent Order (supplemental investigation report section 6.13)
SWMU 14-002(f)	Former structure	None	Proposed for delayed investigation (supplemental investigation report section 6.14)
SWMU 14-003	Former burning area	Surface and subsurface samples collected	Supplemental investigation report section 6.15
AOC 14-004(a)	Storage area	None	Proposed for delayed investigation (supplemental investigation report section 6.16)
SWMU 14-004(b)	Satellite accumulation area	None	No further action (NFA) approved 12/23/98 (NMED 1998, 063042)

Table 1.1-1 (continued)

Site Number	Description	2011 Investigation	Current Status
AOC 14-004(c)	Storage area	None	NFA approved, 01/21/05 (EPA 2005, 088464)
SWMU 14-005	Incinerator	None	Subject to Resource Conservation and Recovery Act Closure, not Consent Order
SWMU 14-006	Decommissioned sump and outfall	Surface and subsurface samples collected	Supplemental investigation report section 6.17
SWMU 14-007	Decommissioned septic system	Surface and subsurface samples collected	Supplemental investigation report section 6.18
AOC 14-008	Landfill and surface disposal	None	NFA approved, 01/21/05 (EPA 2005, 088464)
SWMU 14-009	Surface disposal area	Surface and subsurface samples collected	Supplemental investigation report section 6.19
SWMU 14-010	Former sump	Surface and subsurface samples collected	Supplemental investigation report section 6.20
AOC C-14-001	Former magazine	Surface and subsurface samples collected	Supplemental investigation report section 6.21
AOC C-14-002	Former building	None	Proposed for delayed investigation (supplemental investigation report section 6.22)
AOC C-14-003	Former building	None	Proposed for delayed investigation (supplemental investigation report section 6.23)
AOC C-14-004	Former building	Surface and subsurface samples collected	Supplemental investigation report section 6.24
AOC C-14-005	Former building	Surface and subsurface samples collected	Supplemental investigation report section 6.25
AOC C-14-007	Former storage building	Surface and subsurface samples collected	Supplemental investigation report section 6.26
AOC C-14-008	Former magazine	Surface and subsurface samples collected	Supplemental investigation report section 6.27
AOC C-14-009	Former magazine	Surface and subsurface samples collected	Supplemental investigation report section 6.28

Table 3.0-1
Crosswalk Table of Sampling Requirements in the Approved Investigation Work Plan and the FIP

Consolidated Unit	SWMU/AOC	Description	Sampling Requirements in the Approved Work Plan	Sampling Requirements in the FIP
	AOC 14-001(a)	Pull box	Recommended for NFA	Collect samples from one location downgradient of the pull box for polychlorinated biphenyls (PCBs).
	AOC 14-001(b)	Pull box	Recommended for NFA	Collect samples from one location downgradient of the pull box for PCBs.
	AOC 14-001(c)	Pull box	Recommended for NFA	Collect samples from one location downgradient of the pull box for PCBs.
	AOC 14-001(d)	Pull box	Recommended for NFA	Collect samples from one location downgradient of the pull box for PCBs.
	AOC 14-001(e)	Pull box	Recommended for NFA	Collect samples from one location downgradient of the pull box for PCBs.
	AOC 14-001(g)	Firing site	Collect samples at locations where high explosives removal and/or radiological anomaly removal has been conducted.	Collect samples from 15 locations within the drainages downgradient of the active firing site.
14-002(a)-99	AOC 14-001(f)	Bullet test facility	No sampling proposed	No sampling proposed
	SWMU 14-002(a)	Former firing site	No sampling proposed	No sampling proposed
	SWMU 14-002(b)	Former firing site	No sampling proposed	No sampling proposed
	SWMU 14-002(f)	Former structure	Collect samples from three locations.	FIP proposed delayed sampling until adjacent firing sites are inactive.
	SWMU 14-009	Surface disposal area	Remove soil and debris, then collect confirmatory samples from six locations. Collect drainage samples from five locations.	Collect samples from 10 locations within the disposal area, from 4 locations on the bench at the bottom of the slope, and from 3 locations in the drainage. Soil and debris removal will be based on the results of the analytical samples and may be conducted during Phase II.
	SWMU 14-010	Former sump	Collect samples from the locations of the former sump and drainline.	Collect samples from one location at the former outfall and from four locations in the downgradient drainage.
	AOC C-14-008	Former magazine	Recommended for NFA	Collect samples from one location inside the former storage magazine and four locations outside the former storage magazine.

Table 3.0-1 (continued)

Consolidated Unit	SWMU/AOC	Description	Sampling Requirements in the Approved Work Plan	Sampling Requirements in the FIP
14-002(c)-99	SWMU 14-002(c)	Decommissioned firing site	Collect samples from four historical locations.	Collect samples from four historical locations.
	SWMU 14-002(d)	X-unit chamber	No sampling proposed	No sampling proposed
	SWMU 14-002(e)	X-unit chamber	No sampling proposed	No sampling proposed
	SWMU 14-003	Former burning area	No sampling proposed	Collect samples from seven locations within the burning are, from four step-out locations, and from two downgradient locations.
	AOC 14-004(a)	Storage area	Collect samples from two locations within the earthen floor of the magazine.	Although samples were recommended to be collected from the locations specified within the approved work plan, the magazine is active and the floor is concrete. Sampling will be delayed until decommissioning of magazine.
	SWMU 14-004(b)	Satellite accumulation area	No sampling proposed	No sampling proposed
	AOC 14-004(c)	Storage area	No sampling proposed	No sampling proposed
	SWMU 14-005	Incinerator	No sampling proposed	No sampling proposed
	SWMU 14-006	Decommissioned sump and outfall	Remove the sump and drainline. Collect confirmatory samples from eight locations.	Sump and drainlines have been filled with concrete. Collect samples from 11 locations along the inlet and outlet lines, next to the sump, and in the drainage below the outfall.
	SWMU 14-007	Decommissioned septic system	Remove the septic tank and drainlines. Collect confirmatory samples from two locations. Collect nature and extent samples from two historical sampling locations.	Although the septic tank was proposed for removal, it was filled with concrete for safety concerns. Collect samples from 21 locations along the inlet and outlet lines, next to the septic tank, and in the drain field.
	AOC 14-008	Landfill and surface disposal	No sampling proposed	No sampling proposed
	AOC C-14-001	Former magazine	Recommended for NFA	Collect samples from one location inside the former storage magazine and four locations outside the former storage magazine.
	AOC C-14-002	Former building	Recommended for NFA	Delayed

Table 3.0-1 (continued)

Consolidated Unit	SWMU/AOC	Description	Sampling Requirements in the Approved Work Plan	Sampling Requirements in the FIP
	AOC C-14-003	Former building	Recommended for NFA	Although sampling was proposed, the site boundary was modified and the site is partially covered by the berm area north of the active storage magazine (structure 14-22) that housed the storage area [AOC 14-004(a)]. Sampling will be delayed until decommissioning of the magazine.
	AOC C-14-004	Former building	Collect samples from two locations inside the shop.	Collect samples from two locations inside the former shop and four locations outside the former shop.
	AOC C-14-005	Former building	Collect samples from two locations inside the former storage building.	Collect samples from one location inside the former storage building and four locations outside the former storage building.
	AOC C-14-007	Former building	Collect samples from two locations inside the former storage building.	Collect samples from one location inside the former storage building and four locations outside the former storage building.
	AOC C-14-009	Former magazine	Recommended for NFA	Collect samples from one location inside the former storage magazine and four locations outside the former storage magazine.

Note: Shading denotes consolidated unit.

Table 3.2-1
Crosswalk of Proposed and Sampled Locations in 2011 Investigation with Surveyed Coordinates

Consolidated Unit/SWMU/AOC	Proposed Location in FIP	Location ID	Easting (ft)	Northing (ft)
14-001(a)	1a-1	14-614493	1620377.081	1763947.019
14-001(b)	1b-1	14-614494	1620373.019	1763872.271
14-001(c)	1c-1-reloc	14-614495	1620369.839	1763779.911
14-001(d)	1d-1	14-614496	1620362.081	1763692.112
14-001(e)	1e-1	14-614497	1620355.581	1763592.659
14-001(g)	1g-1	14-614463	1620275.438	1763785.142
14-001(g)	1g-2-reloc	14-614464	1620198.86	1763666.677
14-001(g)	1g-3	14-614475	1620174.743	1763549.03
14-001(g)	1g-4-reloc	14-614465	1620123.184	1763405.833
14-001(g)	1g-5-reloc	14-614467	1620339.362	1763559.265
14-001(g)	1g-6-reloc	14-614466	1620329.43	1763428.027
14-001(g)	1g-7-reloc	14-614476	1620376.864	1763319.192
14-001(g)	1g-8-reloc	14-614468	1620467.845	1763733.031
14-001(g)	1g-9	14-614469	1620520.577	1763689.308
14-001(g)	1g-10-reloc	14-614470	1620506.223	1763590.439
14-001(g)	1g-11	14-614471	1620540.021	1763447.642
14-001(g)	1g-12-reloc	14-614472	1620554.603	1763862.467
14-001(g)	1g-13-reloc	14-614473	1620632.093	1763837.232
14-001(g)	1g-14	14-614474	1620817.799	1763644.169
14-001(g)	1g-15-reloc	14-614477	1620914.311	1763465.317
Consolidated Unit 14-002(a)-99				
14-009	9-1	14-614514	1619558.051	1764028.265
14-009	9-2	14-614515	1619553.084	1764012.121
14-009	9-3	14-614527	1619568.607	1764005.29
14-009	9-4	14-614516	1619567.986	1763987.904
14-009	9-5-reloc	14-614517	1619587.135	1763993.448
14-009	9-6	14-614518	1619585.062	1763970.518
14-009	9-7-reloc	14-614519	1619613.728	1763964.623
14-009	9-8	14-614520	1619604.622	1763957.168
14-009	9-9	14-614528	1619626.044	1763969.586
14-009	9-10	14-614521	1619626.665	1763950.648
14-009	9-11	14-614522	1619539.121	1763986.013
14-009	9-12	14-614523	1619541.864	1763973.6
14-009	9-13-reloc	14-614524	1619545.571	1763954.167
14-009	9-14	14-614529	1619578.484	1763942.088
14-009	9-15	14-614525	1619549.541	1763928.706

Table 3.2-1 (continued)

Consolidated Unit/SWMU/AOC	Proposed Location in FIP	Location ID	Easting (ft)	Northing (ft)
14-009	9-16-reloc	14-614526	1619538.578	1763912.313
14-009	9-17-reloc	14-614530	1619498.041	1763886.723
14-010	10-1	14-614595	1619685.649	1763985.154
14-010	10-2-reloc	14-614596	1619693.246	1763960.593
14-010	10-3-reloc	14-614599	1619714.638	1763926.914
14-010	10-4-reloc	14-614597	1619817.798	1763914.248
14-010	10-5	14-614598	1619866.185	1763889.711
C-14-008	C8-1	14-614637	1619827.679	1764151.778
C-14-008	C8-2	14-614638	1619827.831	1764160.685
C-14-008	C8-3	14-614639	1619835.901	1764151.321
C-14-008	C8-4	14-614640	1619827.679	1764142.49
C-14-008	C8-5	14-614641	1619819.381	1764151.778
Consolidated Unit 14-002(c)-99				
14-002(c)	2c-1-reloc	14-614487	1620722.539	1763862.064
14-002(c)	2c-2-reloc	14-614486	1620726.474	1763860.299
14-002(c)	14-01089	14-01089	1620710.3	1763851.9
14-002(c)	14-01090	14-01090	1620704.4	1763861.7
14-002(c)	14-01091	14-01091	1620734.7	1763858.3
14-002(c)	14-01092	14-01092	1620744.6	1763856.8
14-003	3-1	14-614501	1620929.861	1764026.672
14-003	3-2	14-614502	1620942.919	1764026.564
14-003	3-3	14-614503	1620924.675	1764018.942
14-003	3-4	14-614511	1620936.2	1764018.542
14-003	3-5	14-614504	1620947.619	1764018.561
14-003	3-6	14-614505	1620930.744	1764010.853
14-003	3-7	14-614506	1620940.953	1764010.228
14-003	3-8	14-614507	1620938.591	1764040.918
14-003	3-9	14-614512	1620964.341	1764018.257
14-003	3-10	14-614508	1620935.466	1763997.793
14-003	3-11	14-614509	1620905.466	1764020.918
14-003	3-12	14-614510	1621002.203	1763984.811
14-003	3-13	14-614513	1621039.904	1764012.162
14-006	6-1-reloc	14-614539	1620386.043	1763981.04
14-006	6-2	14-614532	1620400.801	1763962.761
14-006	6-3	14-614533	1620413.464	1763960.557
14-006	6-4	14-614531	1620418.347	1763956.26
14-006	6-5	14-614534	1620423.893	1763958.13
14-006	6-6-reloc	14-614540	1620451.73	1763952.636

Table 3.2-1 (continued)

Consolidated Unit/SWMU/AOC	Proposed Location in FIP	Location ID	Easting (ft)	Northing (ft)
14-006	6-7-reloc	14-614535	1620462.691	1763941.167
14-006	6-8	14-614536	1620468.561	1763936.928
14-006	6-9	14-614537	1620477.307	1763926.964
14-006	6-10	14-614538	1620493.626	1763908.54
14-006	6-11	14-614541	1620517.666	1763880.99
14-007	7-1	14-614551	1620379.799	1764077.748
14-007	7-2-reloc	14-614552	1620423.22	1764097.313
14-007	7-3-reloc	14-614542	1620461.045	1764113.824
14-007	7-4-reloc	14-614544	1620466.122	1764121.764
14-007	7-5	14-614543	1620469.139	1764119.086
14-007	7-6	14-614553	1620512.847	1764138.093
14-007	7-7	14-614545	1620536.649	1764149.304
14-007	7-8	14-614546	1620562.059	1764160.1
14-007	7-9	14-614547	1620567.099	1764160.138
14-007	7-10	14-614548	1620577.455	1764159.125
14-007	7-11	14-614554	1620589.161	1764159.238
14-007	7-12	14-614549	1620556.002	1764140.359
14-007	7-13	14-614550	1620593.705	1764141.815
14-007	7-14	14-614555	1620594.452	1764146.068
14-007	7-15	14-614561	1620594.902	1764138.751
14-007	7-16	14-614556	1620603.031	1764146.518
14-007	7-17	14-614557	1620603.338	1764138.864
14-007	7-18	14-614558	1620602.645	1764151.854
14-007	7-19	14-614562	1620614.189	1764146.925
14-007	7-20	14-614559	1620614.383	1764139.132
14-007	7-21	14-614560	1620601.319	1764133.659
C-14-001	C1-1	14-614605	1619168.32	1764223.492
C-14-001	C1-2	14-614606	1619174.882	1764230.68
C-14-001	C1-3	14-614607	1619175.82	1764217.242
C-14-001	C1-4-reloc	14-614608	1619159.733	1764219.36
C-14-001	C1-5	14-614609	1619159.882	1764230.68
C-14-004	C4-1	14-614622	1620260.709	1763974.817
C-14-004	C4-2-reloc	14-614623	1620259.411	1763956.113
C-14-004	C4-3	14-614626	1620262.271	1763984.975
C-14-004	C4-4	14-614624	1620273.992	1763967.98
C-14-004	C4-5	14-614642	1620262.467	1763948.837
C-14-004	C4-6	14-614625	1620251.137	1763964.464
C-14-005	C5-1	14-614627	1620374.005	1764168.788

Table 3.2-1 (continued)

Consolidated Unit/SWMU/AOC	Proposed Location in FIP	Location ID	Easting (ft)	Northing (ft)
C-14-005	C5-2	14-614628	1620374.005	1764174.844
C-14-005	C5-3	14-614631	1620382.209	1764168.593
C-14-005	C5-4	14-614629	1620365.801	1764168.984
C-14-005	C5-5	14-614630	1620374.201	1764162.928
C-14-007	C7-1	14-614636	1620170.462	1763973.059
C-14-007	C7-2	14-614632	1620170.072	1763982.435
C-14-007	C7-3	14-614633	1620180.034	1763972.864
C-14-007	C7-4	14-614634	1620171.048	1763965.245
C-14-007	C7-5	14-614635	1620161.281	1763973.059
C-14-009	C9-1	14-614615	1620816.642	1763925.592
C-14-009	C9-2	14-614616	1620816.642	1763932.819
C-14-009	C9-3	14-614617	1620824.261	1763925.396
C-14-009	C9-4	14-614619	1620816.642	1763918.169
C-14-009	C9-5	14-614618	1620808.634	1763925.787

Notes: Shading denotes consolidated unit. Proposed locations delineated by “reloc” were relocated based on field conditions.

Table 3.2-2
Field-Screening Results for Samples Collected in 2011 Investigation

Consolidated Unit/SWMU/AOC	Location ID	Start Depth (ft)	End Depth (ft)	Sample ID	PID Reading (ppm)	Alpha Reading (dpm)*	Beta/Gamma Reading (dpm)*	HE Spot Test
14-001(a)	14-614493	3	4	RE14-11-23996	0.0	0	≤814	Negative
14-001(a)	14-614493	6	7	RE14-11-23997	0.0	≤20	≤724	Negative
14-001(b)	14-614494	3	4	RE14-11-23998	0.0	≤54	≤414	Negative
14-001(b)	14-614494	6	7	RE14-11-23999	0.0	0	≤277	Negative
14-001(c)	14-614495	3	4	RE14-11-24000	0.0	≤15	≤525	Negative
14-001(c)	14-614495	6	7	RE14-11-24001	0.0	≤20	≤646	Negative
14-001(d)	14-614496	3	4	RE14-11-24002	0.0	≤10	≤662	Negative
14-001(d)	14-614496	6	7	RE14-11-24003	0.0	≤15	≤604	Negative
14-001(e)	14-614497	3	4	RE14-11-24004	0.0	≤66	≤1139	Negative
14-001(e)	14-614497	6	7	RE14-11-24005	0.0	≤32	≤1134	Negative
14-001(g)	14-614463	0	1	RE14-11-23225	0.0	≤47	≤1002	Negative
14-001(g)	14-614463	2	3	RE14-11-23237	0.0	≤37	≤886	Negative
14-001(g)	14-614464	0	1	RE14-11-23226	0.0	≤27	≤833	Negative
14-001(g)	14-614464	2	3	RE14-11-23238	0.0	≤61	≤1336	Negative
14-001(g)	14-614475	0	1	RE14-11-23249	0.0	≤61	≤992	Negative

Table 3.2-2 (continued)

Consolidated Unit/SWMU/AOC	Location ID	Start Depth (ft)	End Depth (ft)	Sample ID	PID Reading (ppm)	Alpha Reading (dpm)*	Beta/Gamma Reading (dpm)*	HE Spot Test
14-001(g)	14-614475	2	3	RE14-11-23252	0.0	≤66	≤1039	Negative
14-001(g)	14-614465	0	1	RE14-11-23227	0.0	≤22	≤1155	Negative
14-001(g)	14-614465	2	3	RE14-11-23239	0.0	≤61	≤1287	Negative
14-001(g)	14-614467	0	1	RE14-11-23229	0.0	≤17	≤1060	Negative
14-001(g)	14-614467	2	3	RE14-11-23241	0.0	≤42	≤1266	Negative
14-001(g)	14-614466	0	1	RE14-11-23228	0.0	≤71	≤1044	Negative
14-001(g)	14-614466	2	3	RE14-11-23240	0.0	≤71	≤1371	Negative
14-001(g)	14-614476	0	1	RE14-11-23250	0.0	≤22	≤897	Negative
14-001(g)	14-614476	2	3	RE14-11-23253	0.0	≤66	≤1340	Negative
14-001(g)	14-614468	0	1	RE14-11-23230	0.0	≤37	≤775	Negative
14-001(g)	14-614468	2	3	RE14-11-23242	0.0	≤7	≤1187	Negative
14-001(g)	14-614469	0	1	RE14-11-23231	0.0	≤17	≤939	Negative
14-001(g)	14-614469	2	3	RE14-11-23243	0.0	≤42	≤870	Negative
14-001(g)	14-614470	0	1	RE14-11-23232	0.0	≤52	≤1287	Negative
14-001(g)	14-614470	2	3	RE14-11-23244	0.0	≤32	≤1155	Negative
14-001(g)	14-614471	0	1	RE14-11-23233	0.0	≤32	≤891	Negative
14-001(g)	14-614471	2	3	RE14-11-23245	0.0	≤47	≤1313	Negative
14-001(g)	14-614472	0	1	RE14-11-23234	0.0	≤17	≤475	Negative
14-001(g)	14-614472	2	3	RE14-11-23246	0.0	≤37	≤1013	Negative
14-001(g)	14-614473	0	1	RE14-11-23235	0.0	≤22	≤707	Negative
14-001(g)	14-614473	2	3	RE14-11-23247	0.0	≤37	≤1081	Negative
14-001(g)	14-614474	0	1	RE14-11-23236	0.0	≤76	≤886	Negative
14-001(g)	14-614474	2	3	RE14-11-23248	0.0	≤47	≤1197	Negative
14-001(g)	14-614477	0	1	RE14-11-23251	0.0	0	≤538	Negative
14-001(g)	14-614477	2	3	RE14-11-23254	0.0	≤22	≤485	Negative
Consolidated Unit 14-002(a)-99								
14-009	14-614514	0	1	RE14-11-24070	0.0	≤24	≤747	Negative
14-009	14-614514	5	6	RE14-11-24071	0.0	≤73	≤889	Negative
14-009	14-614515	0	1	RE14-11-24072	0.0	≤44	≤1242	Negative
14-009	14-614515	2.5	3.5	RE14-11-24073	0.0	≤68	≤1327	Negative
14-009	14-614527	0	1	RE14-11-24096	0.0	≤10	≤1026	Negative
14-009	14-614527	2.5	3.5	RE14-11-24097	0.0	≤15	≤654	Negative
14-009	14-614516	0	1	RE14-11-24074	0.0	≤58	≤683	Negative
14-009	14-614516	2	3	RE14-11-24075	0.0	≤44	≤1353	Negative
14-009	14-614517	0	1	RE14-11-24076	0.0	0	≤702	Negative
14-009	14-614517	4.5	5.5	RE14-11-24077	0.0	≤55	≤900	Negative
14-009	14-614518	0	1	RE14-11-24078	0.0	≤78	≤805	Negative

Table 3.2-2 (continued)

Consolidated Unit/SWMU/AOC	Location ID	Start Depth (ft)	End Depth (ft)	Sample ID	PID Reading (ppm)	Alpha Reading (dpm)*	Beta/Gamma Reading (dpm)*	HE Spot Test
14-009	14-614518	2	3	RE14-11-24079	0.0	≤24	≤1111	Negative
14-009	14-614519	0	1	RE14-11-24080	0.0	0	≤1042	Negative
14-009	14-614519	1.5	2.5	RE14-11-24081	0.0	0	≤689	Negative
14-009	14-614520	0	1	RE14-11-24082	0.0	≤93	≤1121	Negative
14-009	14-614520	2	3	RE14-11-24083	0.0	≤112	≤1659	Negative
14-009	14-614528	0	1	RE14-11-24098	0.0	≤147	≤3100	Negative
14-009	14-614528	3.5	4.5	RE14-11-24099	0.0	≤78	≤1975	Negative
14-009	14-614521	0	1	RE14-11-24084	0.0	0	≤871	Negative
14-009	14-614521	2	3	RE14-11-24085	0.0	≤19	≤1351	Negative
14-009	14-614522	0	1	RE14-11-24086	0.0	0	≤993	Negative
14-009	14-614522	1	2	RE14-11-24087	0.0	≤29	≤1520	Negative
14-009	14-614523	0	1	RE14-11-24088	0.0	≤19	≤1272	Negative
14-009	14-614523	1	2	RE14-11-24089	0.0	≤43	≤1304	Negative
14-009	14-614524	0	1	RE14-11-24090	0.0	0	≤1135	Negative
14-009	14-614524	1	2	RE14-11-24091	0.0	≤48	≤1014	Negative
14-009	14-614529	0	1	RE14-11-24100	0.0	0	≤1520	Negative
14-009	14-614529	1	2	RE14-11-24101	0.0	0	≤945	Negative
14-009	14-614525	0	1	RE14-11-24092	0.0	≤24	≤1683	Negative
14-009	14-614525	1	2	RE14-11-24093	0.0	0	≤1404	Negative
14-009	14-614526	0	1	RE14-11-24094	0.0	0	≤1683	Negative
14-009	14-614526	1	2	RE14-11-24095	0.0	0	≤1314	Negative
14-009	14-614530	0	1	RE14-11-24102	0.0	0	≤697	Negative
14-009	14-614530	1	2	RE14-11-24103	0.0	0	≤908	Negative
14-010	14-614595	0.3	1.3	RE14-11-24362	0.0	≤21	≤988	Negative
14-010	14-614595	3	4	RE14-11-24363	0.0	≤16	≤1273	Negative
14-010	14-614596	0	1	RE14-11-24364	0.0	≤90	≤1267	Negative
14-010	14-614596	3	4	RE14-11-24365	0.0	≤21	≤1141	Negative
14-010	14-614599	0	1	RE14-11-24370	0.0	≤51	≤909	Negative
14-010	14-614599	3	4	RE14-11-24371	0.0	≤36	≤1067	Negative
14-010	14-614597	0	1	RE14-11-24366	0.0	0	≤1041	Negative
14-010	14-614597	3	4	RE14-11-24367	0.0	≤21	≤977	Negative
14-010	14-614598	0	1	RE14-11-24368	0.0	≤21	≤577	Negative
14-010	14-614598	3	4	RE14-11-24369	0.0	0	≤635	Negative
C-14-008	14-614637	0	1	RE14-11-24474	0.0	≤26	≤719	Negative
C-14-008	14-614637	3	4	RE14-11-24475	0.0	≤7	≤577	Negative
C-14-008	14-614638	0	1	RE14-11-24476	0.0	≤11	≤593	Negative
C-14-008	14-614638	3	4	RE14-11-24477	0.0	≤2	≤524	Negative

Table 3.2-2 (continued)

Consolidated Unit/SWMU/AOC	Location ID	Start Depth (ft)	End Depth (ft)	Sample ID	PID Reading (ppm)	Alpha Reading (dpm)*	Beta/Gamma Reading (dpm)*	HE Spot Test
C-14-008	14-614639	0	1	RE14-11-24478	0.0	0	≤619	Negative
C-14-008	14-614639	3	4	RE14-11-24479	0.0	≤16	≤445	Negative
C-14-008	14-614640	0	1	RE14-11-24480	0.0	≤7	≤339	Negative
C-14-008	14-614640	3	4	RE14-11-24481	0.0	0	≤487	Negative
C-14-008	14-614641	0	1	RE14-11-24482	0.0	≤7	≤693	Negative
C-14-008	14-614641	3	4	RE14-11-24483	0.0	≤7	≤593	Negative
Consolidated Unit 14-002(c)-99								
14-002(c)	14-614487	0	1	RE14-11-23921	0.0	≤63	≤953	Negative
14-002(c)	14-614487	2	3	RE14-11-23922	0.0	≤9	≤675	Negative
14-002(c)	14-614486	0	1	RE14-11-23919	0.0	≤44	≤954	Negative
14-002(c)	14-614486	2	3	RE14-11-23920	0.0	≤53	≤633	Negative
14-002(c)	14-01089	1	2	RE14-11-23923	0.0	≤157	≤3110	Negative
14-002(c)	14-01089	5	6	RE14-11-23924	0.0	≤21	≤972	Negative
14-002(c)	14-01090	1	2	RE14-11-23925	0.0	≤16	≤3210	Negative
14-002(c)	14-01090	5	6	RE14-11-23926	0.0	≤103	≤3370	Negative
14-002(c)	14-01091	1	2	RE14-11-23927	0.0	≤93	≤3100	Negative
14-002(c)	14-01091	6	7	RE14-11-23928	0.0	≤58	≤3150	Negative
14-002(c)	14-01092	1	2	RE14-11-23929	0.0	≤103	≤1076	Negative
14-002(c)	14-01092	6	7	RE14-11-23930	0.0	≤68	≤1234	Negative
14-003	14-614501	0	1	RE14-11-24034	0.0	≤49	≤970	Negative
14-003	14-614501	3.5	4.5	RE14-11-24035	0.0	≤53	≤733	Negative
14-003	14-614502	0	1	RE14-11-24036	0.0	≤58	≤954	Negative
14-003	14-614502	3.5	4.5	RE14-11-24037	0.0	≤24	≤722	Negative
14-003	14-614503	0	1	RE14-11-24038	0.0	≤19	≤764	Negative
14-003	14-614503	3.5	4.5	RE14-11-24039	0.0	≤34	≤638	Negative
14-003	14-614511	0	1	RE14-11-24054	0.0	≤54	≤2640	Negative
14-003	14-614511	3.5	4.5	RE14-11-24055	0.0	≤49	≤2600	Negative
14-003	14-614504	0	1	RE14-11-24040	0.0	≤127	≤3060	Negative
14-003	14-614504	4.5	5.5	RE14-11-24041	0.0	≤63	≤3420	Negative
14-003	14-614505	0	1	RE14-11-24042	0.0	≤63	≤3290	Negative
14-003	14-614505	5	6	RE14-11-24043	0.0	≤83	≤3500	Negative
14-003	14-614506	0	1	RE14-11-24044	0.0	≤108	≤3100	Negative
14-003	14-614506	5	6	RE14-11-24045	0.0	≤73	≤3130	Negative
14-003	14-614507	0	1	RE14-11-24046	0.0	≤147	≤3130	Negative
14-003	14-614507	3	4	RE14-11-24047	0.0	≤83	≤2520	Negative
14-003	14-614512	0	1	RE14-11-24056	0.0	≤78	≤3150	Negative
14-003	14-614512	3	4	RE14-11-24057	0.0	≤68	≤3020	Negative

Table 3.2-2 (continued)

Consolidated Unit/SWMU/AOC	Location ID	Start Depth (ft)	End Depth (ft)	Sample ID	PID Reading (ppm)	Alpha Reading (dpm)*	Beta/Gamma Reading (dpm)*	HE Spot Test
14-003	14-614508	0	1	RE14-11-24048	0.0	≤63	≤3030	Negative
14-003	14-614508	3	4	RE14-11-24049	0.0	≤58	≤2740	Negative
14-003	14-614509	0	1	RE14-11-24050	0.0	≤113	≤2870	Negative
14-003	14-614509	3	4	RE14-11-24051	0.0	≤83	≤2920	Negative
14-003	14-614510	0	1	RE14-11-24052	0.0	≤63	≤2680	Negative
14-003	14-614510	3	4	RE14-11-24053	0.0	≤34	≤3090	Negative
14-003	14-614513	0	1	RE14-11-24058	0.0	≤29	≤2740	Negative
14-003	14-614513	3	4	RE14-11-24059	0.0	≤39	≤3050	Negative
14-006	14-614539	2	3	RE14-11-24134	0.0	≤5	≤524	Negative
14-006	14-614539	6	7	RE14-11-24135	0.0	0	≤287	Negative
14-006	14-614532	5	6	RE14-11-24120	0.0	≤39	≤582	Negative
14-006	14-614532	8	9	RE14-11-24121	0.0	≤69	≤1009	Negative
14-006	14-614533	5	6	RE14-11-24122	0.0	≤54	≤719	Negative
14-006	14-614533	8	9	RE14-11-24123	0.0	≤24	≤514	Negative
14-006	14-614531	5	6	RE14-11-24118	0.0	≤29	≤914	Negative
14-006	14-614531	8	9	RE14-11-24119	0.0	≤54	≤925	Negative
14-006	14-614534	4	5	RE14-11-24124	0.0	≤49	≤666	Negative
14-006	14-614534	7	8	RE14-11-24125	0.0	≤29	≤587	Negative
14-006	14-614540	1.5	2.5	RE14-11-24136	0.0	≤5	≤856	Negative
14-006	14-614540	4.5	5.5	RE14-11-24137	0.0	≤54	≤1020	Negative
14-006	14-614535	1	2	RE14-11-24126	0.0	≤19	≤788	Negative
14-006	14-614535	4	5	RE14-11-24127	0.0	≤34	≤313	Negative
14-006	14-614536	0	1	RE14-11-24128	0.0	≤29	≤297	Negative
14-006	14-614536	3	4	RE14-11-24129	0.0	≤49	≤962	Negative
14-006	14-614537	0	1	RE14-11-24130	0.0	≤29	≤514	Negative
14-006	14-614537	3	4	RE14-11-24131	0.0	≤19	≤919	Negative
14-006	14-614538	0	1	RE14-11-24132	0.0	≤5	≤849	Negative
14-006	14-614538	3	4	RE14-11-24133	0.0	≤24	≤329	Negative
14-006	14-614541	0	1	RE14-11-24138	0.0	≤64	≤682	Negative
14-006	14-614541	3	4	RE14-11-24139	0.0	≤29	≤814	Negative
14-007	14-614551	2.5	3.5	RE14-11-24168	0.0	≤77	≤960	Negative
14-007	14-614551	5.5	6.5	RE14-11-24169	0.0	≤52	≤859	Negative
14-007	14-614552	0	1	RE14-11-24178	0.0	≤63	≤3340	Negative
14-007	14-614552	3	4	RE14-11-24179	0.0	≤103	≤3110	Negative
14-007	14-614552	6	7	RE14-11-25905	0.0	≤1	≤1099	Negative
14-007	14-614542	0	1	RE14-11-24150	0.0	≤58	≤2920	Negative
14-007	14-614542	3	4	RE14-11-24151	0.0	≤49	≤2620	Negative

Table 3.2-2 (continued)

Consolidated Unit/SWMU/AOC	Location ID	Start Depth (ft)	End Depth (ft)	Sample ID	PID Reading (ppm)	Alpha Reading (dpm)*	Beta/Gamma Reading (dpm)*	HE Spot Test
14-007	14-614542	6	7	RE14-11-25906	0.0	≤49	≤984	Negative
14-007	14-614544	0	1	RE14-11-24154	0.0	≤58	≤3080	Negative
14-007	14-614544	3	4	RE14-11-24155	0.0	≤88	≤2880	Negative
14-007	14-614544	6	7	RE14-11-25907	0.0	≤64	≤899	Negative
14-007	14-614544	9	10	RE14-11-25908	0.0	≤39	≤1458	Negative
14-007	14-614543	0	1	RE14-11-24152	0.0	≤83	≤3050	Negative
14-007	14-614543	3	4	RE14-11-24153	0.0	≤68	≤3290	Negative
14-007	14-614543	6	7	RE14-11-25909	0.0	≤84	≤1000	Negative
14-007	14-614553	0	1	RE14-11-24180	0.0	≤113	≤3120	Negative
14-007	14-614553	3	4	RE14-11-24181	0.0	≤108	≤3230	Negative
14-007	14-614553	6	7	RE14-11-25910	0.0	≤25	≤1258	Negative
14-007	14-614545	0	1	RE14-11-24156	0.0	≤88	≤2800	Negative
14-007	14-614545	3	4	RE14-11-24157	0.0	≤88	≤2850	Negative
14-007	14-614545	6	7	RE14-11-25911	0.0	≤84	≤1079	Negative
14-007	14-614546	0	1	RE14-11-24158	0.0	≤73	≤2930	Negative
14-007	14-614546	3	4	RE14-11-24159	0.0	≤103	≤3200	Negative
14-007	14-614547	0	1	RE14-11-24160	0.0	≤88	≤2770	Negative
14-007	14-614547	3	4	RE14-11-24161	0.0	≤63	≤3060	Negative
14-007	14-614548	0	1	RE14-11-24162	0.0	≤88	≤2960	Negative
14-007	14-614548	3	4	RE14-11-24163	0.0	≤49	≤3040	Negative
14-007	14-614554	0	1	RE14-11-24182	0.0	≤78	≤2940	Negative
14-007	14-614554	3	4	RE14-11-24183	0.0	≤83	≤3310	Negative
14-007	14-614549	0	1	RE14-11-24164	0.0	≤63	≤3350	Negative
14-007	14-614549	3	4	RE14-11-24165	0.0	≤83	≤3250	Negative
14-007	14-614549	6	7	RE14-11-25912	0.0	≤15	≤567	Negative
14-007	14-614550	0	1	RE14-11-24166	0.0	≤93	≤3140	Negative
14-007	14-614550	3	4	RE14-11-24167	0.0	≤93	≤3220	Negative
14-007	14-614550	6	7	RE14-11-25913	0.0	≤20	≤1174	Negative
14-007	14-614555	0	1	RE14-11-24184	0.0	≤78	≤3050	Negative
14-007	14-614555	3	4	RE14-11-24185	0.0	≤41	≤596	Negative
14-007	14-614555	6	7	RE14-11-24186	0.0	≤26	≤601	Negative
14-007	14-614561	0	1	RE14-11-24202	0.0	≤41	≤548	Negative
14-007	14-614561	3	4	RE14-11-24203	0.0	≤71	≤511	Negative
14-007	14-614561	6	7	RE14-11-24204	0.0	≤22	≤717	Negative
14-007	14-614556	0	1	RE14-11-24187	0.0	0	≤553	Negative
14-007	14-614556	3	4	RE14-11-24188	0.0	≤7	≤717	Negative
14-007	14-614556	6	7	RE14-11-24189	0.0	0	≤664	Negative

Table 3.2-2 (continued)

Consolidated Unit/SWMU/AOC	Location ID	Start Depth (ft)	End Depth (ft)	Sample ID	PID Reading (ppm)	Alpha Reading (dpm)*	Beta/Gamma Reading (dpm)*	HE Spot Test
14-007	14-614557	0	1	RE14-11-24190	0.0	≤22	≤517	Negative
14-007	14-614557	3	4	RE14-11-24191	0.0	≤7	≤374	Negative
14-007	14-614557	6	7	RE14-11-24192	0.0	≤31	≤923	Negative
14-007	14-614558	0	1	RE14-11-24193	0.0	≤2	≤469	Negative
14-007	14-614558	3	4	RE14-11-24194	0.0	≤12	≤638	Negative
14-007	14-614558	6	7	RE14-11-24195	0.0	≤93	≤1328	Negative
14-007	14-614562	0	1	RE14-11-24205	0.0	≤39	≤917	Negative
14-007	14-614562	3	4	RE14-11-24206	0.0	≤44	≤954	Negative
14-007	14-614562	6	7	RE14-11-24207	0.0	≤34	≤1080	Negative
14-007	14-614559	0	1	RE14-11-24196	0.0	≤44	≤848	Negative
14-007	14-614559	3	4	RE14-11-24197	0.0	≤44	≤696	Negative
14-007	14-614559	6	7	RE14-11-24198	0.0	≤39	≤1275	Negative
14-007	14-614560	0	1	RE14-11-24199	0.0	≤34	≤1075	Negative
14-007	14-614560	3	4	RE14-11-24200	0.0	≤49	≤917	Negative
14-007	14-614560	6	7	RE14-11-24201	0.0	≤34	≤1123	Negative
C-14-001	14-614605	0	1	RE14-11-24389	0.0	0	≤1004	Negative
C-14-001	14-614605	3	4	RE14-11-24390	0.0	≤65	≤878	Negative
C-14-001	14-614606	0	1	RE14-11-24391	0.0	≤39	≤770	Negative
C-14-001	14-614606	3	4	RE14-11-24392	0.0	≤39	≤974	Negative
C-14-001	14-614607	0	1	RE14-11-24393	0.0	0	≤1282	Negative
C-14-001	14-614607	3	4	RE14-11-24394	0.0	0	≤1088	Negative
C-14-001	14-614608	0	1	RE14-11-24395	0.0	0	≤794	Negative
C-14-001	14-614608	3	4	RE14-11-24396	0.0	≤29	≤1202	Negative
C-14-001	14-614609	0	1	RE14-11-24397	0.0	≤19	≤950	Negative
C-14-001	14-614609	3	4	RE14-11-24398	0.0	0	≤1040	Negative
C-14-004	14-614622	0	1	RE14-11-24431	0.0	≤37	≤786	Negative
C-14-004	14-614622	3	4	RE14-11-24432	0.0	≤52	≤712	Negative
C-14-004	14-614623	0	1	RE14-11-24433	0.0	≤13	≤1123	Negative
C-14-004	14-614623	3	4	RE14-11-24434	0.0	≤37	≤775	Negative
C-14-004	14-614626	0	1	RE14-11-24439	0.0	≤62	≤569	Negative
C-14-004	14-614626	3	4	RE14-11-24440	0.0	≤27	≤559	Negative
C-14-004	14-614624	0	1	RE14-11-24435	0.0	≤32	≤596	Negative
C-14-004	14-614624	3	4	RE14-11-24436	0.0	≤32	≤770	Negative
C-14-004	14-614642	0	1	RE14-11-24832	0.0	≤22	≤728	Negative
C-14-004	14-614642	3	4	RE14-11-24833	0.0	≤32	≤986	Negative
C-14-004	14-614625	0	1	RE14-11-24437	0.0	≤47	≤928	Negative
C-14-004	14-614625	3	4	RE14-11-24438	0.0	≤57	≤1202	Negative

Table 3.2-2 (continued)

Consolidated Unit/SWMU/AOC	Location ID	Start Depth (ft)	End Depth (ft)	Sample ID	PID Reading (ppm)	Alpha Reading (dpm)*	Beta/Gamma Reading (dpm)*	HE Spot Test
C-14-005	14-614627	0	1	RE14-11-24446	0.0	≤54	≤553	Negative
C-14-005	14-614627	3	4	RE14-11-24447	0.0	≤64	≤1138	Negative
C-14-005	14-614628	0	1	RE14-11-24448	0.0	≤25	≤843	Negative
C-14-005	14-614628	3	4	RE14-11-24449	0.0	≤44	≤1012	Negative
C-14-005	14-614631	0	1	RE14-11-24454	0.0	≤39	≤1144	Negative
C-14-005	14-614631	3	4	RE14-11-24455	0.0	≤39	≤769	Negative
C-14-005	14-614629	0	1	RE14-11-24450	0.0	≤34	≤938	Negative
C-14-005	14-614629	3	4	RE14-11-24451	0.0	≤34	≤885	Negative
C-14-005	14-614630	0	1	RE14-11-24452	0.0	≤10	≤985	Negative
C-14-005	14-614630	3	4	RE14-11-24453	0.0	≤39	≤1260	Negative
C-14-007	14-614636	0	1	RE14-11-24468	0.0	0	≤424	Negative
C-14-007	14-614636	3	4	RE14-11-24469	0.0	≤18	≤1333	Negative
C-14-007	14-614632	0	1	RE14-11-24460	0.0	0	≤1057	Negative
C-14-007	14-614632	3	4	RE14-11-24461	0.0	≤28	≤1396	Negative
C-14-007	14-614633	0	1	RE14-11-24462	0.0	≤20	≤962	Negative
C-14-007	14-614633	3	4	RE14-11-24463	0.0	≤13	≤1212	Negative
C-14-007	14-614634	0	1	RE14-11-24464	0.0	≤33	≤1001	Negative
C-14-007	14-614634	3	4	RE14-11-24465	0.0	≤23	≤996	Negative
C-14-007	14-614635	0	1	RE14-11-24466	0.0	≤43	≤758	Negative
C-14-007	14-614635	3	4	RE14-11-24467	0.0	≤43	≤1080	Negative
C-14-009	14-614615	0	1	RE14-11-24417	0.0	≤29	≤917	Negative
C-14-009	14-614615	3	4	RE14-11-24418	0.0	≤14	≤854	Negative
C-14-009	14-614616	0	1	RE14-11-24419	0.0	≤34	≤817	Negative
C-14-009	14-614616	3	4	RE14-11-24420	0.0	≤39	≤975	Negative
C-14-009	14-614617	0	1	RE14-11-24421	0.0	≤29	≤659	Negative
C-14-009	14-614617	3	4	RE14-11-24422	0.0	≤58	≤780	Negative
C-14-009	14-614619	0	1	RE14-11-24425	0.0	≤14	≤775	Negative
C-14-009	14-614619	3	4	RE14-11-24426	0.0	≤58	≤986	Negative
C-14-009	14-614618	0	1	RE14-11-24423	0.0	≤34	≤944	Negative
C-14-009	14-614618	3	4	RE14-11-24424	0.0	≤34	≤1255	Negative

Note: Shading denotes consolidated unit.

* Results reported represent site background levels.

Table 6.2-1
Samples Collected and Analyses Requested at AOCs 14-001(a, b, c, d, e)

Site	Sample ID	Location ID	Depth (ft)	Media	PCBs
AOC 14-001(a)	RE14-11-23996	14-614493	3–4	SOIL	11-3409*
	RE14-11-23997	14-614493	6–7	SOIL	11-3409
AOC 14-001(b)	RE14-11-23998	14-614494	3–4	SOIL	11-3280
	RE14-11-23999	14-614494	6–7	SOIL	11-3280
AOC 14-001(c)	RE14-11-24000	14-614495	3–4	QBT4	11-3280
	RE14-11-24001	14-614495	6–7	QBT4	11-3280
AOC 14-001(d)	RE14-11-24002	14-614496	3–4	QBT4	11-3280
	RE14-11-24003	14-614496	6–7	QBT4	11-3280
AOC 14-001(e)	RE14-11-24004	14-614497	3–4	QBT4	11-3280
	RE14-11-24005	14-614497	6–7	QBT4	11-3280

* Request number.

Table 6.8-1
Samples Collected and Analyses Requested at AOC 14-001(g)

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
RE14-11-23225	14-614463	0–1	SOIL	11-3285[a]	11-3286	11-3284	11-3286	11-3285	—[b]	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23237	14-614463	2–3	QBT4	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	11-3284	11-3285
RE14-11-23226	14-614464	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23238	14-614464	2–3	QBT4	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	11-3284	11-3285
RE14-11-23227	14-614465	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23239	14-614465	2–3	QBT4	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	11-3284	11-3285
RE14-11-23228	14-614466	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23240	14-614466	2–3	QBT4	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	11-3284	11-3285

Table 6.8-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
RE14-11-23229	14-614467	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23241	14-614467	2–3	QBT4	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	11-3284	11-3285
RE14-11-23230	14-614468	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23242	14-614468	2–3	QBT4	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	11-3284	11-3285
RE14-11-23231	14-614469	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23243	14-614469	2–3	QBT4	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	11-3284	11-3285
RE14-11-23232	14-614470	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23244	14-614470	2–3	QBT4	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	11-3284	11-3285
RE14-11-23233	14-614471	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23245	14-614471	2–3	QBT4	11-3288	11-3289	11-3287	11-3289	11-3288	—	11-3288	11-3289	11-3287	11-3287	11-3288
RE14-11-23234	14-614472	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23246	14-614472	2–3	SOIL	11-3288	11-3289	11-3287	11-3289	11-3288	—	11-3288	11-3289	11-3287	11-3287	11-3288
RE14-11-23235	14-614473	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23247	14-614473	2–3	SOIL	11-3288	11-3289	11-3287	11-3289	11-3288	—	11-3288	11-3289	11-3287	11-3287	11-3288
RE14-11-23236	14-614474	0–1	SOIL	11-3285	11-3286	11-3284	11-3286	11-3285	—	11-3285	11-3286	11-3284	—	11-3285
RE14-11-23248	14-614474	2–3	SOIL	11-3288	11-3289	11-3287	11-3289	11-3288	—	11-3288	11-3289	11-3287	11-3287	11-3288
RE14-11-23249	14-614475	0–1	QBT4	11-3288	11-3289	11-3287	11-3289	11-3288	11-3287	11-3288	11-3289	11-3287	—	11-3288
RE14-11-23252	14-614475	2–3	QBT4	11-3288	11-3289	11-3287	11-3289	11-3288	11-3287	11-3288	11-3289	11-3287	11-3287	11-3288
RE14-11-23250	14-614476	0–1	QBT4	11-3288	11-3289	11-3287	11-3289	11-3288	11-3287	11-3288	11-3289	11-3287	—	11-3288
RE14-11-23253	14-614476	2–3	QBT4	11-3288	11-3289	11-3287	11-3289	11-3288	11-3287	11-3288	11-3289	11-3287	11-3287	11-3288
RE14-11-23251	14-614477	0–1	SOIL	11-3288	11-3289	11-3287	11-3289	11-3288	11-3287	11-3288	11-3289	11-3287	—	11-3288
RE14-11-23254	14-614477	2–3	SOIL	11-3288	11-3289	11-3287	11-3289	11-3288	11-3287	11-3288	11-3289	11-3287	11-3287	11-3288

[a] Request number.

[b] — = Analysis not requested.

Table 6.8-2
Inorganic Chemicals above BVs at AOC 14-001(g)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Barium	Beryllium	Calcium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Nitrate	Perchlorate	Selenium
Qbt 2,3,4 BV[a]				**7340**	**0.5**	**46**	**1.21**	**2200**	**7.14**	**4.66**	**0.5**	**11.2**	**0.1**	**6.58**	**na[b]**	**na**	**0.3**
Soil BV[a]				**29200**	**0.83**	**295**	**1.83**	**6120**	**19.3**	**14.7**	**0.5**	**22.3**	**0.1**	**15.4**	**na**	**na**	**1.52**
Construction Worker SSL[c]				**41,400**	**142**	**4390**	**148**	**8,850,000**	**134[d]**	**14,200**	**12.1**	**800**	**77.1**	**753**	**566,000**	**248**	**1750**
Industrial SSL[c]				**1,290,000**	**519**	**255,000**	**2580**	**32,400,000**	**505[d]**	**51,900**	**63.3**	**800**	**389**	**25,700**	**2,080,000**	**908**	**6490**
Residential SSL[c]				**78,000**	**31.3**	**15,600**	**156**	**13,000,000**	**96.6[d]**	**3130**	**11.2**	**400**	**23.5**	**1560**	**125,000**	**54.8**	**391**
RE14-11-23225	14-614463	0–1	SOIL	—[e]	—	—	—	—	—	—	0.61 (U)	—	—	—	0.55	0.0078	2.1 (J-)
RE14-11-23237	14-614463	2–3	QBT4	—	—	—	—	—	—	—	0.55 (U)	—	—	—	0.18 (J)	—	1.9 (J-)
RE14-11-23226	14-614464	0–1	SOIL	—	—	—	—	—	—	—	0.58 (U)	30	—	—	6.2	—	—
RE14-11-23238	14-614464	2–3	QBT4	—	0.51 (U)	—	—	—	—	—	0.51 (U)	—	—	—	0.26	—	1.5 (J-)
RE14-11-23227	14-614465	0–1	SOIL	—	—	—	—	—	—	—	0.55 (U)	—	—	—	1.1	—	1.6 (J-)
RE14-11-23239	14-614465	2–3	QBT4	—	—	—	—	—	—	7.3 (J)	0.52 (U)	—	—	—	0.31	—	1.8 (J-)
RE14-11-23228	14-614466	0–1	SOIL	—	—	—	—	—	—	—	0.57 (U)	—	—	—	0.57	—	—
RE14-11-23240	14-614466	2–3	QBT4	—	—	—	—	—	—	—	0.52 (U)	—	—	—	0.069 (J)	—	1.8 (J-)
RE14-11-23229	14-614467	0–1	SOIL	—	—	—	—	—	—	—	0.59 (U)	—	0.409	—	1	—	1.8 (J-)
RE14-11-23241	14-614467	2–3	QBT4	—	—	—	—	—	—	—	0.51 (U)	—	—	—	0.17 (J)	—	1.9 (J-)
RE14-11-23230	14-614468	0–1	SOIL	—	—	—	—	—	—	—	0.56 (U)	—	—	—	8	—	1.6 (J-)
RE14-11-23242	14-614468	2–3	QBT4	—	—	—	—	—	—	—	0.52 (U)	—	—	—	2.2	—	1.6 (J-)
RE14-11-23231	14-614469	0–1	SOIL	—	—	—	—	—	—	—	0.56 (U)	—	—	—	1.9	—	2.1 (J-)
RE14-11-23243	14-614469	2–3	QBT4	7810	—	49.4	1.4	2460	7.5	5.7 (J)	0.55 (U)	—	—	6.7	0.33	—	3.3 (J-)
RE14-11-23232	14-614470	0–1	SOIL	—	—	—	—	—	—	—	0.52 (U)	—	—	—	0.063 (J)	—	1.6 (J-)
RE14-11-23244	14-614470	2–3	QBT4	—	—	—	—	—	—	—	0.52 (U)	—	—	—	0.081 (J)	—	2.2 (J-)
RE14-11-23233	14-614471	0–1	SOIL	—	—	—	—	—	—	—	0.55 (U)	—	—	—	5.4	—	1.6 (J-)
RE14-11-23245	14-614471	2–3	QBT4	—	—	49.2	—	—	—	—	0.53 (U)	—	—	—	1.4	—	1.6 (J+)
RE14-11-23234	14-614472	0–1	SOIL	—	—	—	—	—	—	29.9 (J)	0.55 (U)	—	—	—	2.3	0.0059	—
RE14-11-23246	14-614472	2–3	SOIL	—	—	—	—	—	—	—	0.52 (U)	—	—	—	0.34	0.026	—
RE14-11-23235	14-614473	0–1	SOIL	—	—	—	—	—	—	—	0.6 (U)	57.6	—	—	5	—	1.6 (J-)
RE14-11-23247	14-614473	2–3	SOIL	—	—	—	—	—	—	—	0.52 (U)	—	—	—	0.3	—	1.9 (J+)
RE14-11-23236	14-614474	0–1	SOIL	—	—	—	—	—	—	—	0.55 (U)	—	—	—	0.058 (J)	—	2.3 (J-)
RE14-11-23248	14-614474	2–3	SOIL	—	—	—	—	—	—	—	0.58 (U)	—	—	—	0.22 (J)	—	2.9 (J+)
RE14-11-23249	14-614475	0–1	QBT4	—	—	—	—	—	—	—	0.53 (U)	—	—	—	0.39	—	1.2 (J+)
RE14-11-23252	14-614475	2–3	QBT4	—	—	—	—	—	—	—	0.53 (U)	—	—	—	0.094 (J)	—	2.3 (J+)

Table 6.8-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Barium	Beryllium	Calcium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Nitrate	Perchlorate	Selenium
Qbt 2,3,4 BV[a]				**7340**	**0.5**	**46**	**1.21**	**2200**	**7.14**	**4.66**	**0.5**	**11.2**	**0.1**	**6.58**	**na**	**na**	**0.3**
Soil BV[a]				**29,200**	**0.83**	**295**	**1.83**	**6120**	**19.3**	**14.7**	**0.5**	**22.3**	**0.1**	**15.4**	**na**	**na**	**1.52**
Construction Worker SSL[c]				**41,400**	**142**	**4390**	**148**	**8,850,000**	**134**[d]	**14,200**	**12.1**	**800**	**77.1**	**753**	**566,000**	**248**	**1750**
Industrial SSL[c]				**1,290,000**	**519**	**255,000**	**2580**	**32,400,000**	**505**[d]	**51,900**	**63.3**	**800**	**389**	**25,700**	**2,080,000**	**908**	**6490**
Residential SSL[c]				**78,000**	**31.3**	**15,600**	**156**	**13,000,000**	**96.6**[d]	**3130**	**11.2**	**400**	**23.5**	**1560**	**125,000**	**54.8**	**391**
RE14-11-23250	14-614476	0–1	QBT4	—	—	—	—	—	—	—	0.57 (U)	—	—	—	0.85	—	1.9 (J+)
RE14-11-23253	14-614476	2–3	QBT4	—	—	—	—	—	—	—	0.52 (U)	—	—	—	0.14 (J)	—	2 (J+)
RE14-11-23251	14-614477	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	—	3.9	—	1.6 (J+)
RE14-11-23254	14-614477	2–3	SOIL	—	—	—	—	—	—	—	0.73 (U)	—	—	—	0.18 (J)	—	1.7 (J+)

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915).

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

Table 6.8-3
Organic Chemicals Detected at AOC 14-001(g)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Benzene	Bis(2-ethylhexyl)phthalate	Dichlorobenzene[1,3-]	Diethylphthalate	Di-n-butylphthalate	HMX	Isopropyltoluene[4-]	RDX	TATB	Toluene	Trichloroethene
Construction Worker SSL[a]				**15,100**	**142**	**5380**	**2500[b]**	**215,000**	**26,900**	**17,400**	**2740[c]**	**1010**	**10,000[d,e]**	**14,000**	**6.9**
Industrial SSL[a]				**50,500**	**87.2**	**1830**	**130,000[b]**	**733,000**	**91,600**	**63,300**	**14,200[c]**	**311**	**32,000[e,f]**	**61,300**	**36.5**
Residential SSL[a]				**3480**	**17.8**	**380**	**2150[b]**	**49,300**	**6160**	**3850**	**2360[c]**	**60.4**	**2200[e,f]**	**5230**	**6.77**
RE14-11-23225	14-614463	0–1	SOIL	—[g]	NA[h]	—	—	—	—	0.14 (J+)	NA	—	3.6 (J)	NA	NA
RE14-11-23237	14-614463	2–3	QBT4	—	—	—	—	—	—	—	—	—	0.28 (J)	—	—
RE14-11-23226	14-614464	0–1	SOIL	—	NA	—	—	—	—	0.51 (J+)	NA	—	0.56 (J)	NA	NA
RE14-11-23238	14-614464	2–3	QBT4	—	—	—	—	—	—	—	—	—	0.23 (J)	—	0.0009 (J)
RE14-11-23239	14-614465	2–3	QBT4	—	—	—	—	—	—	—	—	—	0.37 (J)	—	—
RE14-11-23228	14-614466	0–1	SOIL	—	NA	0.053 (J)	—	—	—	—	NA	—	—	NA	NA
RE14-11-23240	14-614466	2–3	QBT4	—	—	—	—	—	—	4.8 (J+)	0.004 (J)	—	—	—	—
RE14-11-23229	14-614467	0–1	SOIL	—	NA	—	—	—	—	—	NA	—	0.23 (J)	NA	NA
RE14-11-23230	14-614468	0–1	SOIL	—	NA	—	—	—	—	7.5 (J+)	NA	—	1.7 (J)	NA	NA
RE14-11-23242	14-614468	2–3	QBT4	—	—	0.09 (J)	—	—	—	1 (J+)	—	—	—	—	—
RE14-11-23231	14-614469	0–1	SOIL	—	NA	—	—	—	—	0.046 (J+)	NA	—	—	NA	NA
RE14-11-23243	14-614469	2–3	QBT4	—	—	—	—	—	—	0.039 (J+)	—	—	—	—	0.00091 (J)
RE14-11-23233	14-614471	0–1	SOIL	—	NA	—	—	—	—	—	NA	—	0.27 (J)	NA	NA
RE14-11-23245	14-614471	2–3	QBT4	—	0.00067 (J)	—	—	—	—	—	—	—	—	0.0021 (J)	—
RE14-11-23234	14-614472	0–1	SOIL	—	NA	0.093 (J)	—	—	—	0.92 (J+)	NA	—	1.6 (J)	NA	NA
RE14-11-23246	14-614472	2–3	SOIL	—	0.00072 (J)	—	0.00038 (J)	—	—	1.9	—	0.25 (J)	—	0.0014 (J)	—
RE14-11-23235	14-614473	0–1	SOIL	—	NA	—	—	—	0.14 (J)	0.28 (J+)	NA	—	0.88 (J)	NA	NA
RE14-11-23247	14-614473	2–3	SOIL	—	0.00059 (J)	—	—	—	—	0.29	—	—	—	0.002 (J)	—
RE14-11-23236	14-614474	0–1	SOIL	—	NA	—	—	—	—	—	NA	—	0.1 (J)	NA	NA
RE14-11-23248	14-614474	2–3	SOIL	—	0.00031 (J)	—	—	—	—	—	—	—	—	0.0027 (J)	—
RE14-11-23249	14-614475	0–1	QBT4	—	NA	—	—	0.059 (J)	—	—	NA	—	—	NA	NA
RE14-11-23252	14-614475	2–3	QBT4	—	0.0003 (J)	—	—	—	—	—	—	—	—	0.0019 (J)	—
RE14-11-23250	14-614476	0–1	QBT4	—	NA	—	—	—	—	—	NA	—	1.1 (J)	NA	NA
RE14-11-23254	14-614477	2–3	SOIL	0.061 (J)	—	—	—	—	—	—	0.0052 (J)	—	—	—	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] Dichlorobenzene[1,2-] used as a surrogate based on structural similarity.

[c] Isopropylbenzene used as a surrogate based on structural similarity.

[d] SSL calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

[e] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[f] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] — = Not detected.

[h] NA = Not analyzed.

Table 6.8-4
Radionuclides Detected or Detected above BVs/FVs at AOC 14-001(g)

Sample ID	Location ID	Depth (ft)	Media	Cesium-134	Cesium-137	Strontium-90
Qbt 2,3,4 BV[a]				**na**[b]	**na**	**na**
Soil BV[a]				**na**	**1.65**	**1.31**
Construction Worker SAL[c]				**15**	**37**	**1400**
Industrial SAL[c]				**17**	**41**	**2400**
Residential SAL[c]				**5**	**12**	**15**
RE14-11-23239	14-614465	2–3	QBT4	—[d]	0.203	—
RE14-11-23230	14-614468	0–1	SOIL	0.051	—	—
RE14-11-23245	14-614471	2–3	QBT4	—	0.441	—
RE14-11-23246	14-614472	2–3	SOIL	—	—	0.302
RE14-11-23249	14-614475	0–1	QBT4	—	0.106	—
RE14-11-23250	14-614476	0–1	QBT4	—	0.473	—
RE14-11-23254	14-614477	2–3	SOIL	—	0.207	—

Notes: Results are in pCi/g.

[a] BVs/FVs from LANL (1998, 059730).

[b] na = Not available.

[c] SALs from LANL (2015, 600929).

[d] — = Not detected or not detected above BV/FV.

Table 6.11-1
Samples Collected and Analyses Requested at SWMU 14-002(c)

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
RE14-11-23923	14-01089	1–2	SOIL	11-3063[a]	11-3064	11-3062	11-3064	11-3063	—[b]	11-3063	11-3064	11-3062	11-3062	11-3063
RE14-11-23924	14-01089	5–6	QBT4	11-3063	11-3064	11-3062	11-3064	11-3063	—	11-3063	11-3064	11-3062	11-3062	11-3063
RE14-11-23925	14-01090	1–2	SOIL	11-3063	11-3064	11-3062	11-3064	11-3063	—	11-3063	11-3064	11-3062	11-3062	11-3063
RE14-11-23926	14-01090	5–6	QBT4	11-3063	11-3064	11-3062	11-3064	11-3063	—	11-3063	11-3064	11-3062	11-3062	11-3063
RE14-11-23927	14-01091	1–2	SOIL	11-3063	11-3064	11-3062	11-3064	11-3063	—	11-3063	11-3064	11-3062	11-3062	11-3063
RE14-11-23928	14-01091	6–7	QBT4	11-3063	11-3064	11-3062	11-3064	11-3063	—	11-3063	11-3064	11-3062	11-3062	11-3063
RE14-11-23929	14-01092	1–2	SOIL	11-3109	11-3110	11-3108	11-3110	11-3109	11-3108	11-3109	11-3110	11-3108	11-3108	11-3109
RE14-11-23930	14-01092	6–7	QBT4	11-3109	11-3110	11-3108	11-3110	11-3109	11-3108	11-3109	11-3110	11-3108	11-3108	11-3109
RE14-11-23919	14-614486	0–1	SOIL	11-3109	11-3110	11-3108	11-3110	11-3109	11-3108	11-3109	11-3110	11-3108	—	11-3109
RE14-11-23920	14-614486	2–3	SOIL	11-3109	11-3110	11-3108	11-3110	11-3109	11-3108	11-3109	11-3110	11-3108	11-3108	11-3109
RE14-11-23921	14-614487	0–1	SOIL	11-3109	11-3110	11-3108	11-3110	11-3109	11-3108	11-3109	11-3110	11-3108	—	11-3109
RE14-11-23922	14-614487	2–3	SOIL	11-3109	11-3110	11-3108	11-3110	11-3109	11-3108	11-3109	11-3110	11-3108	11-3108	11-3109

[a] Request number.

[b] — = Analysis not requested.

Table 6.11-2
Inorganic Chemicals above BVs at SWMU 14-002(c)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Nickel	Nitrate	Perchlorate	Selenium	Thallium	Vanadium	Zinc
Qbt 2,3,4 BV[a]				**7340**	**2.79**	**46**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**	**11.2**	**1690**	**482**	**6.58**	**na[b]**	**na**	**0.3**	**1.1**	**17**	**63.5**
Soil BV[a]				**29,200**	**8.17**	**295**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**	**22.3**	**4610**	**671**	**15.4**	**na**	**na**	**1.52**	**0.73**	**39.6**	**48.8**
Construction Worker SSL[c]				**41,400**	**57.4**	**4390**	**72.1**	**8,850,000**	**134[d]**	**36.6[e]**	**14,200**	**12.1**	**248,000**	**800**	**1,550,000**	**464**	**753**	**566,000**	**248**	**1750**	**3.54**	**614**	**106,000**
Industrial SSL[c]				**1,290,000**	**21.5**	**255,000**	**1110**	**32,400,000**	**505[d]**	**350[f]**	**51,900**	**63.3**	**908,000**	**800**	**5,680,000**	**160,000**	**25,700**	**2,080,000**	**908**	**6490**	**13**	**6530**	**389,000**
Residential SSL[c]				**78,000**	**4.25**	**15,600**	**70.5**	**13,000,000**	**96.6[d]**	**23[f]**	**3130**	**11.2**	**54,800**	**400**	**339,000**	**10,500**	**1560**	**125,000**	**54.8**	**391**	**0.782**	**394**	**23,500**
RE14-11-23923	14-01089	1–2	SOIL	—[g]	—	—	0.43	—	—	—	—	0.56 (U)	—	34.4 (J)	—	—	—	0.5	—	1.7	—	—	516
RE14-11-23924	14-01089	5–6	QBT4	9190	3.5	86.6 (J-)	—	—	—	—	—	0.53 (U)	—	26.5 (J)	—	—	—	0.19 (J)	0.0056	2.1	—	—	88.9
RE14-11-23925	14-01090	1–2	SOIL	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	0.24	—	—	—	—	—
RE14-11-23926	14-01090	5–6	QBT4	13,100	3.7	142 (J-)	—	2480	7.9	8.5 (J)	6.6	0.54 (U)	15,900	80.6 (J)	2770	744 (J)	10.4	1.8	0.0035 (J)	3.2	1.3	—	98.8
RE14-11-23927	14-01091	1–2	SOIL	—	—	—	—	—	—	—	—	0.52 (U)	—	39.9 (J)	—	—	—	1	—	—	—	—	—
RE14-11-23928	14-01091	6–7	QBT4	11,300	3.1	127 (J-)	—	—	7.7	3.7 (J)	5.3	0.53 (U)	—	27.4 (J)	2000	—	—	71.8	0.0032 (J)	2.1	—	18	—
RE14-11-23929	14-01092	1–2	SOIL	—	—	—	—	—	—	—	—	0.53 (U)	—	—	—	—	—	0.44	—	—	—	—	—
RE14-11-23930	14-01092	6–7	QBT4	—	—	71.4 (J)	—	—	—	—	—	0.52 (U)	—	18	—	—	—	13.4	—	1.8 (J-)	—	—	139
RE14-11-23919	14-614486	0–1	SOIL	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	1.2	—	—	—	—	—
RE14-11-23920	14-614486	2–3	SOIL	—	—	—	—	—	—	—	—	0.53 (U)	—	—	—	—	—	0.63	0.0033 (J)	—	—	—	82.9
RE14-11-23921	14-614487	0–1	SOIL	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	1.3	0.0056	—	—	—	—
RE14-11-23922	14-614487	2–3	SOIL	—	—	—	—	—	—	—	—	0.53 (U)	—	42	—	—	—	1.2	0.0097	—	—	—	69.8

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915), unless otherwise noted.

[d] SSL for total chromium.

[e] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[f] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] — = Not detected or not detected above BV.

Table 6.11-3
Organic Chemicals Detected at SWMU 14-002(c)

Sample ID	Location ID	Depth (ft)	Media	Acetone	Chloroform	Dichlorobenzene[1,4-]	Dichloroethene[1,1-]	Diethylphthalate	Di-n-butylphthalate	Ethylbenzene	HMX	Methylene Chloride	RDX	Toluene	Trichlorofluoromethane	Xylene (Total)
Construction Worker SSL[a]				**242,000**	**134**	**746**	**424**	**215,000**	**26,900**	**1770**	**17,400**	**1210**	**1010**	**14,000**	**1130**	**798**
Industrial SSL[a]				**960,000**	**28.7**	**159**	**2260**	**733,000**	**91,600**	**368**	**63,300**	**5130**	**311**	**61,300**	**6030**	**4280**
Residential SSL[a]				**66,300**	**5.9**	**32.8**	**440**	**49,300**	**6160**	**75.1**	**3850**	**409**	**60.4**	**5230**	**1230**	**871**
RE14-11-23923	14-01089	1–2	SOIL	—[b]	—	—	—	—	0.12 (J)	—	—	—	—	—	—	—
RE14-11-23927	14-01091	1–2	SOIL	—	—	—	—	—	0.14 (J)	—	0.097 (J)	—	1.2	—	—	—
RE14-11-23928	14-01091	6–7	QBT4	—	—	—	—	0.092 (J)	—	—	—	—	—	—	—	—
RE14-11-23929	14-01092	1–2	SOIL	—	—	—	—	—	—	—	—	0.0029 (J)	—	—	—	—
RE14-11-23930	14-01092	6–7	QBT4	—	—	—	—	—	—	—	—	0.0023 (J)	—	—	—	—
RE14-11-23922	14-614487	2–3	SOIL	0.082 (J)	0.0016 (J)	0.0072 (J)	0.0021 (J)	—	—	0.0011 (J)	—	0.019 (J)	—	0.0017 (J)	0.0023 (J)	0.0023 (J)

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2015, 600915).

[b] — = Not detected.

Table 6.15-1
Samples Collected and Analyses Requested at SWMU 14-003

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Dioxins/Furans	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
0214-97-0012	14-01035	0–1	SED	—[a]	—	—	3179R[b]	—	3180R	—	—	—	—	—	—
0214-97-0017	14-01087	0–0.5	SOIL	—	—	—	3392R	—	3393R	—	—	—	—	—	—
0214-97-0018	14-01088	0–0.5	SOIL	—	—	—	3392R	—	3393R	—	—	—	—	—	—
0214-97-0007	14-614909	0–0.83	SOIL	—	—	—	3179R	—	3180R	—	—	—	—	—	—
0214-97-0008	14-614910	0–0.83	SOIL	—	—	—	3179R	—	3180R	—	—	—	—	—	—
0214-97-0009	14-614911	0–0.83	SOIL	—	—	—	3179R	—	3180R	—	—	—	—	—	—
0214-97-0010	14-614912	0–0.66	SOIL	—	—	—	3179R	—	3180R	—	—	—	—	—	—
0214-97-0011	14-614913	0–1	SOIL	—	—	—	3179R	—	3180R	—	—	—	—	—	—
0214-97-0013	14-614914	0–0.5	SOIL	—	—	—	3392R	—	3393R	—	—	—	—	—	—

Table 6.15-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Dioxins/Furans	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
0214-97-0014	14-614915	0–0.5	SOIL	—	—	—	3392R	—	3393R	—	—	—	—	—	—
0214-97-0015	14-614916	0–0.5	SOIL	—	—	—	3392R	—	3393R	—	—	—	—	—	—
0214-97-0016	14-614917	0–0.5	SOIL	—	—	—	3392R	—	3393R	—	—	—	—	—	—
RE14-11-24034	14-614501	0–1	SOIL	11-3106	11-3104	11-3107	11-3105	11-3107	11-3106	—	11-3106	11-3107	11-3105	—	11-3106
RE14-11-24035	14-614501	3.5–4.5	QBT4	11-3106	11-3104	11-3107	11-3105	11-3107	11-3106	—	11-3106	11-3107	11-3105	11-3105	11-3106
RE14-11-24036	14-614502	0–1	SOIL	11-3106	11-3104	11-3107	11-3105	11-3107	11-3106	—	11-3106	11-3107	11-3105	—	11-3106
RE14-11-24037	14-614502	3.5–4.5	QBT4	11-3106	11-3104	11-3107	11-3105	11-3107	11-3106	—	11-3106	11-3107	11-3105	11-3105	11-3106
RE14-11-24038	14-614503	0–1	SOIL	11-3106	11-3104	11-3107	11-3105	11-3107	11-3106	—	11-3106	11-3107	11-3105	—	11-3106
RE14-11-24039	14-614503	3.5–4.5	QBT4	11-3106	11-3104	11-3107	11-3105	11-3107	11-3106	—	11-3106	11-3107	11-3105	11-3105	11-3106
RE14-11-24040	14-614504	0–1	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	—	11-3137
RE14-11-24041	14-614504	4.5–5.5	QBT4	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	11-3136	11-3137
RE14-11-24042	14-614505	0–1	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	—	11-3137
RE14-11-24043	14-614505	5–6	QBT4	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	11-3136	11-3137
RE14-11-24044	14-614506	0–1	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	—	11-3137
RE14-11-24045	14-614506	5–6	QBT4	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	11-3136	11-3137
RE14-11-24046	14-614507	0–1	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	—	11-3137
RE14-11-24047	14-614507	3–4	QBT4	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	11-3136	11-3137
RE14-11-24048	14-614508	0–1	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	—	11-3137
RE14-11-24049	14-614508	3–4	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	11-3136	11-3137
RE14-11-24050	14-614509	0–1	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	—	11-3137
RE14-11-24051	14-614509	3–4	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	11-3136	11-3137
RE14-11-24052	14-614510	0–1	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	—	11-3137
RE14-11-24053	14-614510	3–4	QBT4	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	—	11-3137	11-3138	11-3136	11-3136	11-3137
RE14-11-24054	14-614511	0–1	SOIL	11-3106	11-3104	11-3107	11-3105	11-3107	11-3106	11-3105	11-3106	11-3107	11-3105	—	11-3106
RE14-11-24055	14-614511	3.5–4.5	QBT4	11-3106	11-3104	11-3107	11-3105	11-3107	11-3106	11-3105	11-3106	11-3107	11-3105	11-3105	11-3106
RE14-11-24056	14-614512	0–1	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	11-3136	11-3137	11-3138	11-3136	—	11-3137
RE14-11-24057	14-614512	3–4	QBT4	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	11-3136	11-3137	11-3138	11-3136	11-3136	11-3137
RE14-11-24058	14-614513	0–1	SOIL	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	11-3136	11-3137	11-3138	11-3136	—	11-3137
RE14-11-24059	14-614513	3–4	QBT4	11-3137	11-3135	11-3138	11-3136	11-3138	11-3137	11-3136	11-3137	11-3138	11-3136	11-3136	11-3137

[a] — = Analysis not requested.

[b] Request number.

Table 6.15-2
Inorganic Chemicals above BVs at SWMU 14-003

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead
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**	**14,500**	**11.2**
Sediment BV[a]				**15,400**	**0.83**	**3.98**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**na**[b]	**13,800**	**19.7**
Soil BV[a]				**29,200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**	**22.3**
Construction Worker SSL[c]				**41,400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8,850,000**	**134**[d]	**36.6**[e]	**14,200**	**12.1**	**248,000**	**800**
Industrial SSL[c]				**1,290,000**	**519**	**21.5**	**255,000**	**2580**	**1110**	**32,400,000**	**505**[d]	**350**[f]	**51,900**	**63.3**	**908,000**	**800**
Residential SSL[c]				**78,000**	**31.3**	**4.25**	**15,600**	**156**	**70.5**	**13,000,000**	**96.6**[d]	**23**[f]	**3130**	**11.2**	**54,800**	**400**
0214-97-0012	14-01035	0–1	SED	—[g]	12 (U)	—	170	—	0.58 (U)	—	—	6.7	—	NA[h]	—	—
0214-97-0017	14-01087	0–0.5	SOIL	—	5.04 (U)	—	—	—	0.504 (U)	—	—	—	—	NA	—	—
0214-97-0018	14-01088	0–0.5	SOIL	—	4.96 (U)	—	—	—	0.496 (U)	—	—	—	—	NA	—	—
0214-97-0007	14-614909	0–0.83	SOIL	—	12 (U)	—	330	—	0.61 (U)	—	—	—	—	NA	—	—
0214-97-0008	14-614910	0–0.83	SOIL	42,000	13 (U)	—	860	2.1	0.64 (U)	—	21	—	—	NA	22,000	—
0214-97-0009	14-614911	0–0.83	SOIL	31,000	13 (U)	—	1800	—	0.64 (U)	—	—	—	—	NA	—	—
0214-97-0010	14-614912	0–0.66	SOIL	34,000	12 (U)	—	460	—	0.6 (U)	—	—	9.4	—	NA	—	—
0214-97-0011	14-614913	0–1	SOIL	—	12 (U)	—	—	—	0.6 (U)	—	—	—	—	NA	—	—
0214-97-0013	14-614914	0–0.5	SOIL	—	4.77 (U)	—	303	—	0.477 (U)	—	—	—	—	NA	—	—
0214-97-0014	14-614915	0–0.5	SOIL	—	4.77 (U)	—	—	—	0.477 (U)	—	—	—	—	NA	—	—
0214-97-0015	14-614916	0–0.5	SOIL	—	5.28 (U)	—	746	—	0.528 (U)	—	—	—	—	NA	—	—
0214-97-0016	14-614917	0–0.5	SOIL	—	4.46 (U)	—	—	—	0.446 (U)	—	—	—	—	NA	—	—
RE14-11-24034	14-614501	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.53 (UJ)	—	—
RE14-11-24035	14-614501	3.5–4.5	QBT4	8680	—	—	138	—	—	—	7.7	5	5.4 (J)	0.52 (UJ)	—	—
RE14-11-24036	14-614502	0–1	SOIL	—	—	—	361	—	—	—	—	—	—	0.53 (UJ)	—	—
RE14-11-24037	14-614502	3.5–4.5	QBT4	10,500	—	3	151	—	—	—	8.3	7.2	6 (J)	0.53 (UJ)	—	12.3
RE14-11-24038	14-614503	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.55 (UJ)	—	—
RE14-11-24039	14-614503	3.5–4.5	QBT4	12,300	—	3.4	250	—	—	3420	9.5	6.2	7.8 (J)	0.54 (UJ)	—	13.2
RE14-11-24040	14-614504	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—
RE14-11-24041	14-614504	4.5–5.5	QBT4	14,500	—	—	205 (J-)	—	—	3540	8.8	4.1	5.9	0.56 (U)	—	—
RE14-11-24042	14-614505	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.53 (U)	—	—
RE14-11-24043	14-614505	5–6	QBT4	13,200	—	—	150 (J-)	—	—	5030	9.3	3.6	5.9	0.55 (U)	—	—
RE14-11-24044	14-614506	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.53 (U)	—	—
RE14-11-24045	14-614506	5–6	QBT4	13,500	—	—	135 (J-)	—	—	2280	7.9	3.7	5	0.55 (U)	—	13.3
RE14-11-24046	14-614507	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.54 (U)	—	—
RE14-11-24047	14-614507	3–4	QBT4	16,600	—	3.3	223 (J-)	—	—	2220	9.5	5.5	7.9	0.55 (U)	—	13.2
RE14-11-24048	14-614508	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.54 (U)	—	—
RE14-11-24049	14-614508	3–4	SOIL	—	—	—	—	—	—	—	—	—	—	0.57 (U)	—	—

Table 6.15-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead
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**	**14,500**	**11.2**
Sediment BV[a]				**15,400**	**0.83**	**3.98**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**na**	**13,800**	**19.7**
Soil BV[a]				**29,200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**	**22.3**
Construction Worker SSL[c]				**41,400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8,850,000**	**134[d]**	**36.6[e]**	**14,200**	**12.1**	**248,000**	**800**
Industrial SSL[c]				**1,290,000**	**519**	**21.5**	**255,000**	**2580**	**1110**	**32,400,000**	**505[d]**	**350[f]**	**51,900**	**63.3**	**908,000**	**800**
Residential SSL[c]				**78,000**	**31.3**	**4.25**	**15,600**	**156**	**70.5**	**13,000,000**	**96.6[d]**	**23[f]**	**3130**	**11.2**	**54,800**	**400**
RE14-11-24050	14-614509	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.53 (U)	—	—
RE14-11-24051	14-614509	3–4	SOIL	—	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—
RE14-11-24052	14-614510	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.54 (U)	—	—
RE14-11-24053	14-614510	3–4	QBT4	13,100	—	—	184 (J-)	—	—	—	9	4.4	6.3	0.54 (U)	—	—
RE14-11-24054	14-614511	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.54 (UJ)	—	—
RE14-11-24055	14-614511	3.5–4.5	QBT4	11,300	—	3.3	265	—	—	4440	8.7	7.8	7.1 (J)	0.54 (UJ)	—	13.8
RE14-11-24056	14-614512	0–1	SOIL	—	—	—	318 (J-)	—	—	—	—	—	—	0.53 (U)	—	—
RE14-11-24057	14-614512	3–4	QBT4	17,000	—	—	236 (J-)	—	—	3020	9	4.7	6.3	0.55 (U)	—	11.5
RE14-11-24058	14-614513	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	0.53 (U)	—	—
RE14-11-24059	14-614513	3–4	QBT4	13,700	—	3.5	204 (J-)	—	—	—	10.9	5	7.3	0.55 (U)	15,200	12.1

Table 6.15-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Potassium	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Qbt 2,3,4 BV[a]				**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**3500**	**0.3**	**1**	**1.1**	**na**	**17**	**63.5**
Sediment BV[a]				**2370**	**543**	**0.1**	**9.38**	**na**	**na**	**2690**	**0.3**	**1**	**0.73**	**2.22**	**19.7**	**60.2**
Soil BV[a]				**4610**	**671**	**0.1**	**15.4**	**na**	**na**	**3460**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Construction Worker SSL[c]				**1,550,000**	**464**	**77.1**[e]	**753**	**566,000**	**248**	**19,900,000**	**1750**	**1770**	**3.54**	**277**	**614**	**106,000**
Industrial SSL[c]				**5,680,000**	**160,000**	**389**[f]	**25,700**	**2,080,000**	**908**	**73,000,000**	**6490**	**6490**	**13**	**3880**	**6530**	**389,000**
Residential SSL[c]				**339,000**	**10,500**	**23.5**[f]	**1560**	**125,000**	**54.8**	**15,600,000**	**391**	**391**	**0.782**	**234**	**394**	**23,500**
0214-97-0012	14-01035	0–1	SED	—	—	0.12 (U)	—	NA	NA	—	1.2 (U)	2.3 (U)	—	3.33	21	—
0214-97-0017	14-01087	0–0.5	SOIL	—	—	—	—	NA	NA	—	—	—	—	3.72 (U)	—	—
0214-97-0018	14-01088	0–0.5	SOIL	—	—	—	—	NA	NA	—	—	—	—	3.37 (U)	—	—
0214-97-0007	14-614909	0–0.83	SOIL	—	—	0.12 (U)	—	NA	NA	—	—	2.4 (U)	1	3.01	—	—
0214-97-0008	14-614910	0–0.83	SOIL	—	—	0.13 (U)	17	NA	NA	3500	—	2.6 (U)	0.9	3.11	—	55
0214-97-0009	14-614911	0–0.83	SOIL	—	—	0.13 (U)	—	NA	NA	—	—	2.6 (U)	—	3.14	—	—
0214-97-0010	14-614912	0–0.66	SOIL	—	—	0.12 (U)	—	NA	NA	—	—	2.4 (U)	0.89	3.45	—	51
0214-97-0011	14-614913	0–1	SOIL	—	—	0.12 (U)	—	NA	NA	—	—	2.4 (U)	1.2	3.29	—	71
0214-97-0013	14-614914	0–0.5	SOIL	—	—	—	—	NA	NA	—	—	—	—	3.83	—	—
0214-97-0014	14-614915	0–0.5	SOIL	—	—	—	—	NA	NA	—	—	1.97	—	4.61	—	—
0214-97-0015	14-614916	0–0.5	SOIL	—	—	—	—	NA	NA	—	—	1.5	—	3.46 (U)	—	—
0214-97-0016	14-614917	0–0.5	SOIL	—	—	—	—	NA	NA	—	—	—	—	2.98 (U)	—	—
RE14-11-24034	14-614501	0–1	SOIL	—	—	—	—	0.84	—	—	—	—	—	NA	—	—
RE14-11-24035	14-614501	3.5–4.5	QBT4	—	—	—	—	0.11 (J)	—	—	0.78	—	—	NA	19.8	—
RE14-11-24036	14-614502	0–1	SOIL	—	—	—	—	1.1	—	—	—	—	—	NA	—	—
RE14-11-24037	14-614502	3.5–4.5	QBT4	2030	—	—	6.6	—	—	—	0.9	—	—	NA	21.8	—
RE14-11-24038	14-614503	0–1	SOIL	—	—	—	—	1.4	—	—	—	—	—	NA	—	—
RE14-11-24039	14-614503	3.5–4.5	QBT4	2120	—	—	8.5	17.5	—	—	1.1	—	—	NA	22.7	—
RE14-11-24040	14-614504	0–1	SOIL	—	—	—	—	0.17 (J)	—	—	—	—	—	NA	—	—
RE14-11-24041	14-614504	4.5–5.5	QBT4	2260 (J-)	—	—	6.9	—	—	—	1.4 (U)	—	—	NA	17.6	—
RE14-11-24042	14-614505	0–1	SOIL	—	—	—	—	2.2	—	—	—	—	—	NA	—	—
RE14-11-24043	14-614505	5–6	QBT4	2250 (J-)	—	—	6.6	0.87	—	—	1.3 (U)	—	—	NA	17.9	—
RE14-11-24044	14-614506	0–1	SOIL	—	—	—	—	0.52	—	—	2.1 (U)	—	—	NA	—	—
RE14-11-24045	14-614506	5–6	QBT4	1910 (J-)	—	—	—	0.18 (J)	0.0049 (J)	—	1.1 (U)	—	—	NA	—	—
RE14-11-24046	14-614507	0–1	SOIL	—	—	—	—	0.39	0.0022 (J)	—	—	—	—	NA	—	—
RE14-11-24047	14-614507	3–4	QBT4	2200 (J-)	—	—	7.9	0.082 (J)	—	—	1.4 (U)	—	—	NA	21.8	—
RE14-11-24048	14-614508	0–1	SOIL	—	—	—	—	2.7	—	—	—	—	—	NA	—	—
RE14-11-24049	14-614508	3–4	SOIL	—	—	—	—	0.29	—	—	—	—	—	NA	—	—
RE14-11-24050	14-614509	0–1	SOIL	—	—	—	—	1.2	—	—	—	—	—	NA	—	—

Table 6.15-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Potassium	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Qbt 2,3,4 BV[a]				**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**3500**	**0.3**	**1**	**1.1**	**na**	**17**	**63.5**
Sediment BV[a]				**2370**	**543**	**0.1**	**9.38**	**na**	**na**	**2690**	**0.3**	**1**	**0.73**	**2.22**	**19.7**	**60.2**
Soil BV[a]				**4610**	**671**	**0.1**	**15.4**	**na**	**na**	**3460**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Construction Worker SSL[c]				**1,550,000**	**464**	**77.1**[e]	**753**	**566,000**	**248**	**19,900,000**	**1750**	**1770**	**3.54**	**277**	**614**	**106,000**
Industrial SSL[c]				**5,680,000**	**160,000**	**389**[f]	**25,700**	**2,080,000**	**908**	**73,000,000**	**6490**	**6490**	**13**	**3880**	**6530**	**389,000**
Residential SSL[c]				**339,000**	**10,500**	**23.5**[f]	**1560**	**125,000**	**54.8**	**15,600,000**	**391**	**391**	**0.782**	**234**	**394**	**23,500**
RE14-11-24051	14-614509	3–4	SOIL	—	—	—	—	0.28	—	—	1.7 (U)	—	—	NA	—	—
RE14-11-24052	14-614510	0–1	SOIL	—	—	—	—	1.5	—	—	—	—	—	NA	—	—
RE14-11-24053	14-614510	3–4	QBT4	2050 (J-)	—	—	7.1	0.2 (J)	0.0031 (J)	—	1 (U)	—	—	NA	18.7	—
RE14-11-24054	14-614511	0–1	SOIL	—	—	—	—	1.6	—	—	—	—	—	NA	—	—
RE14-11-24055	14-614511	3.5–4.5	QBT4	2030	486	—	7.9	0.22	0.029	—	0.86	—	—	NA	21.9	—
RE14-11-24056	14-614512	0–1	SOIL	—	—	—	—	1.8	—	—	—	—	—	NA	—	—
RE14-11-24057	14-614512	3–4	QBT4	2010 (J-)	—	—	7.8	0.22	—	—	1.6 (U)	—	—	NA	19.6	—
RE14-11-24058	14-614513	0–1	SOIL	—	—	—	—	2.1	—	—	—	—	—	NA	—	—
RE14-11-24059	14-614513	3–4	QBT4	2360 (J-)	—	—	8.4	0.14 (J)	—	—	1.3 (U)	—	—	NA	21.7	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915), unless otherwise noted.

[d] SSL for total chromium.

[e] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[f] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] — = Not detected or not detected above BV.

[h] NA = Not analyzed.

Table 6.15-3
Organic Chemicals Detected at SWMU 14-003

Sample ID	Location ID	Depth (ft)	Media	Amino-4,6-dinitrotoluene[2-]	Bis(2-ethylhexyl)phthalate	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)	HMX
Construction Worker SSL[a]				**695**[b]	**5380**	**na**[c]	**na**	**na**	**na**	**na**	**na**	**na**	**17,400**
Industrial SSL[a]				**2300**[d]	**1830**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**63,300**
Residential SSL[a]				**150**[d]	**380**	**na**	**na**	**na**	**na**	**na**	**na**	**na**	**3850**
0214-97-0015	14-614916	0–0.5	SOIL	0.107	NA[e]	NA	NA	NA	NA	NA	NA	NA	—[f]
RE14-11-24034	14-614501	0–1	SOIL	—	—	0.00000155 (J)	0.00000414 (J)	0.00000119 (J)	0.00000119 (J)	0.000000583 (J)	0.000000616 (J)	0.00000186 (J)	—
RE14-11-24035	14-614501	3.5–4.5	QBT4	—	—	0.000000534 (J)	0.000000534 (J)	—	—	—	—	—	—
RE14-11-24036	14-614502	0–1	SOIL	—	0.079 (J)	0.00000146 (J)	0.00000329 (J)	0.00000219 (J)	0.00000284 (J)	—	—	0.000000831 (J)	—
RE14-11-24037	14-614502	3.5–4.5	QBT4	—	—	—	—	—	—	—	—	—	—
RE14-11-24039	14-614503	3.5–4.5	QBT4	—	—	—	—	—	—	—	—	—	—
RE14-11-24040	14-614504	0–1	SOIL	—	—	0.00000084 (J)	0.00000189 (J)	—	—	—	—	—	—
RE14-11-24041	14-614504	4.5–5.5	QBT4	—	—	—	—	—	—	—	—	—	—
RE14-11-24042	14-614505	0–1	SOIL	—	—	—	0.000000482 (J)	—	—	—	—	—	—
RE14-11-24043	14-614505	5–6	QBT4	—	—	—	—	—	—	—	—	—	—
RE14-11-24044	14-614506	0–1	SOIL	—	—	0.000000583 (J)	0.000000583 (J)	—	—	—	—	—	—
RE14-11-24045	14-614506	5–6	QBT4	—	—	—	—	—	—	—	—	—	—
RE14-11-24046	14-614507	0–1	SOIL	—	—	0.000000931 (J)	0.00000193 (J)	—	—	—	—	—	—
RE14-11-24047	14-614507	3–4	QBT4	—	—	—	—	—	—	—	—	—	—
RE14-11-24048	14-614508	0–1	SOIL	—	—	0.00000209 (J)	0.00000412 (J)	0.000000697 (J)	0.0000025 (J)	—	—	—	—
RE14-11-24049	14-614508	3–4	SOIL	—	—	—	—	—	—	—	—	—	—
RE14-11-24050	14-614509	0–1	SOIL	—	—	0.000000823 (J)	0.000000823 (J)	—	—	—	—	—	—
RE14-11-24051	14-614509	3–4	SOIL	—	—	—	—	—	—	—	—	—	—
RE14-11-24053	14-614510	3–4	QBT4	—	—	—	—	—	—	—	—	—	—
RE14-11-24054	14-614511	0–1	SOIL	0.045 (J)	0.055 (J)	—	—	—	—	—	—	—	0.052 (J)
RE14-11-24055	14-614511	3.5–4.5	QBT4	—	—	—	—	—	—	—	—	—	0.13 (J)
RE14-11-24056	14-614512	0–1	SOIL	—	—	0.00000126 (J)	0.00000342 (J)	—	—	0.000000477 (J)	—	0.00000381 (J)	—
RE14-11-24057	14-614512	3–4	QBT4	—	—	—	—	—	—	—	—	—	—
RE14-11-24058	14-614513	0–1	SOIL	—	—	0.00000152 (J)	0.00000389 (J)	0.000000642 (J)	0.00000173 (J)	—	—	—	—
RE14-11-24059	14-614513	3–4	QBT4	—	—	—	—	—	—	—	—	—	—

Table 6.15-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Methylene Chloride	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 (Total)	PETN	TATB	Tetrachlorodibenzofuran[2,3,7,8-]	Tetrachlorodibenzofurans (Total)	TNT
Construction Worker SSL[a]				**1210**	**na**	**na**	**na**	**na**	**708[b]**	**10,000[b,g]**	**0.072**	**na**	**161**
Industrial SSL[a]				**5130**	**na**	**na**	**na**	**na**	**5700[d]**	**32,000[d,g]**	**0.00248**	**na**	**573**
Residential SSL[a]				**409**	**na**	**na**	**na**	**na**	**130[d]**	**2200[d,g]**	**0.00049**	**na**	**36**
0214-97-0015	14-614916	0–0.5	SOIL	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.131
RE14-11-24034	14-614501	0–1	SOIL	NA	0.00000708 (J)	—	—	0.0000013 (J)	—	0.16 (J)	0.000000428 (J)	0.0000014	—
RE14-11-24035	14-614501	3.5–4.5	QBT4	0.0029 (J)	—	—	—	—	—	—	—	—	—
RE14-11-24036	14-614502	0–1	SOIL	NA	—	0.00000154 (J)	—	—	—	—	—	—	—
RE14-11-24037	14-614502	3.5–4.5	QBT4	0.003 (J)	—	—	—	—	—	—	—	—	—
RE14-11-24039	14-614503	3.5–4.5	QBT4	0.0028 (J)	0.0000039 (J)	—	—	—	—	—	0.000000191 (J)	0.000000191 (J)	—
RE14-11-24040	14-614504	0–1	SOIL	NA	0.00000691 (J)	—	—	—	—	—	0.000000253 (J)	0.000000738 (J)	—
RE14-11-24041	14-614504	4.5–5.5	QBT4	—	0.00000266 (J)	—	—	—	—	—	NA	0.000000235 (J)	—
RE14-11-24042	14-614505	0–1	SOIL	NA	0.00000319 (J)	—	—	—	—	—	—	—	—
RE14-11-24043	14-614505	5–6	QBT4	—	NA	—	—	—	—	—	NA	0.000000388 (J)	—
RE14-11-24044	14-614506	0–1	SOIL	NA	0.00000317 (J)	—	—	—	—	—	—	—	—
RE14-11-24045	14-614506	5–6	QBT4	—	—	—	—	—	—	—	0.000000235 (J)	0.000000235 (J)	—
RE14-11-24046	14-614507	0–1	SOIL	NA	0.00000679 (J)	—	—	—	—	—	NA	0.000000217 (J)	—
RE14-11-24047	14-614507	3–4	QBT4	—	0.00000364 (J)	—	—	—	—	—	—	—	—
RE14-11-24048	14-614508	0–1	SOIL	NA	0.0000187	0.00000259 (J)	—	—	—	—	—	0.000000286 (J)	—
RE14-11-24049	14-614508	3–4	SOIL	—	0.00000205 (J)	—	—	—	—	—	0.000000164 (J)	0.000000164 (J)	—
RE14-11-24050	14-614509	0–1	SOIL	NA	0.00000669 (J)	—	—	—	—	—	0.000000297 (J)	0.000000297 (J)	—
RE14-11-24051	14-614509	3–4	SOIL	—	0.00000404 (J)	—	—	—	—	—	—	—	—
RE14-11-24053	14-614510	3–4	QBT4	—	0.00000179 (J)	—	—	—	—	—	—	0.000000348 (J)	—
RE14-11-24054	14-614511	0–1	SOIL	NA	0.0000036 (J)	—	—	—	0.13 (J)	0.11 (J)	—	—	—
RE14-11-24055	14-614511	3.5–4.5	QBT4	0.0033 (J)	0.0000041 (J)	—	—	—	—	—	0.000000194 (J)	0.000000194 (J)	—
RE14-11-24056	14-614512	0–1	SOIL	NA	0.00000797 (J)	—	0.000000678 (J)	0.00000599	—	—	—	0.000000643	—
RE14-11-24057	14-614512	3–4	QBT4	—	0.0000022 (J)	—	—	—	—	—	—	—	—
RE14-11-24058	14-614513	0–1	SOIL	NA	0.0000147	0.00000158 (J)	—	—	—	0.15 (J)	—	—	—
RE14-11-24059	14-614513	3–4	QBT4	—	0.00000208 (J)	—	—	—	—	—	—	—	—

Table 6.15-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Methylene Chloride	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 (Total)	PETN	TATB	Tetrachlorodibenzofuran[2,3,7,8-]	Tetrachlorodibenzofurans (Total)	TNT
Construction Worker SSL[a]				**1210**	**na**	**na**	**na**	**na**	**708[b]**	**10,000[b,g]**	**0.072**	**na**	**161**
Industrial SSL[a]				**5130**	**na**	**na**	**na**	**na**	**5700[d]**	**32,000[d,g]**	**0.00248**	**na**	**573**
Residential SSL[a]				**409**	**na**	**na**	**na**	**na**	**130[d]**	**2200[d,g]**	**0.00049**	**na**	**36**

Notes: Results are in mg/kg. Data qualifiers are

efined in Appendix A.

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[c] na = Not available.

[d] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[e] NA = Not analyzed.

[f] — = Not detected.

[g] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table 6.15-4
Radionuclides Detected or Detected above BVs/FVs at SWMU 14-003

Sample ID	Location ID	Depth (ft)	Media	Cesium-134	Cesium-137
Qbt 2,3,4 BV				**na[a]**	**na**
Construction Worker SAL[b]				**15**	**37**
Industrial SAL[b]				**17**	**41**
Residential SAL[b]				**5**	**12**
RE14-11-24037	14-614502	3.5–4.5	QBT4	0.052	—[c]
RE14-11-24057	14-614512	3–4	QBT4	—	0.141

Notes: Results are in pCi/g.

[a] na = Not available.

[b] SALs from LANL (2015, 600929).

[c] — = Not detected.

Table 6.17-1
Samples Collected and Analyses Requested at SWMU 14-006

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
RE14-11-24118	14-614531	5–6	QBT4	11-3271[a]	11-3272	11-3270	11-3272	11-3271	—[b]	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24119	14-614531	8–9	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24120	14-614532	5–6	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24121	14-614532	8–9	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24122	14-614533	5–6	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24123	14-614533	8–9	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24124	14-614534	4–5	SOIL	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24125	14-614534	7–8	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24126	14-614535	1–2	SOIL	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24127	14-614535	4–5	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24128	14-614536	0–1	SOIL	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	—	11-3271
RE14-11-24129	14-614536	3–4	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24130	14-614537	0–1	SOIL	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	—	11-3271
RE14-11-24131	14-614537	3–4	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24132	14-614538	0–1	SOIL	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	—	11-3271
RE14-11-24133	14-614538	3–4	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	—	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24134	14-614539	2–3	SOIL	11-3404	11-3404	11-3404	11-3404	11-3404	—	11-3404	11-3404	11-3404	11-3404	11-3404
RE14-11-24135	14-614539	6–7	QBT4	11-3404	11-3404	11-3404	11-3404	11-3404	—	11-3404	11-3404	11-3404	11-3404	11-3404
RE14-11-24136	14-614540	1.5–2.5	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	11-3270	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24137	14-614540	4.5–5.5	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	11-3270	11-3271	11-3272	11-3270	11-3270	11-3271
RE14-11-24138	14-614541	0–1	SOIL	11-3271	11-3272	11-3270	11-3272	11-3271	11-3270	11-3271	11-3272	11-3270	—	11-3271
RE14-11-24139	14-614541	3–4	QBT4	11-3271	11-3272	11-3270	11-3272	11-3271	11-3270	11-3271	11-3272	11-3270	11-3270	11-3271

[a] Request number.

[b] — = Analysis not requested.

Table 6.17-2
Inorganic Chemicals above BVs at SWMU 14-006

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Vanadium	Zinc
Qbt 2,3,4 BV[a]				**7340**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**	**11.2**	**1690**	**0.1**	**6.58**	**na[b]**	**na**	**0.3**	**17**	**63.5**
Soil BV[a]				**29,200**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**	**22.3**	**4610**	**0.1**	**15.4**	**na**	**na**	**1.52**	**39.6**	**48.8**
Construction Worker SSL[c]				**41,400**	**57.4**	**4390**	**148**	**72.1**	**8,850,000**	**134[d]**	**36.6[e]**	**14,200**	**12.1**	**248,000**	**800**	**1,550,000**	**77.1[e]**	**753**	**566,000**	**248**	**1750**	**614**	**106,000**
Industrial SSL[c]				**1,290,000**	**21.5**	**255,000**	**2580**	**1110**	**32,400,000**	**505[d]**	**350[f]**	**51,900**	**63.3**	**908,000**	**800**	**5,680,000**	**389[f]**	**25,700**	**2,080,000**	**908**	**6490**	**6530**	**389,000**
Residential SSL[c]				**78,000**	**4.25**	**15,600**	**156**	**70.5**	**13,000,000**	**96.6[d]**	**23[f]**	**3130**	**11.2**	**54,800**	**400**	**339,000**	**23.5[f]**	**1560**	**125,000**	**54.8**	**391**	**394**	**23,500**
RE14-11-24118	14-614531	5–6	QBT4	9510	—[g]	118	—	—	3030	—	—	5.1	0.63 (U)	—	73 (J+)	—	—	—	0.95	—	1.4 (J-)	—	—
RE14-11-24119	14-614531	8–9	QBT4	—	—	—	—	—	—	—	—	—	0.62 (U)	—	—	—	—	—	0.52	0.0034 (J)	3.1 (J-)	—	—
RE14-11-24120	14-614532	5–6	QBT4	14,600	3.6	188	—	—	5610	8.3	—	8.6	0.66 (U)	—	—	2490	—	8.3	0.65	—	1.5 (J-)	17.7	—
RE14-11-24121	14-614532	8–9	QBT4	—	—	—	—	—	—	—	—	—	0.6 (U)	—	—	—	—	—	0.57	—	2 (J-)	—	—
RE14-11-24122	14-614533	5–6	QBT4	11,100	3.1	223	—	—	4780	—	—	6.4	0.63 (U)	—	—	2170	—	—	0.66	—	1.7 (J-)	—	—
RE14-11-24123	14-614533	8–9	QBT4	—	—	—	—	—	—	—	—	5	0.63 (U)	—	—	—	—	—	0.63	0.0041 (J)	2.6 (J-)	—	—
RE14-11-24124	14-614534	4–5	SOIL	—	—	—	—	—	—	—	—	—	0.63 (U)	—	—	—	—	—	1.3	—	—	—	—
RE14-11-24125	14-614534	7–8	QBT4	11,400	3	119	—	—	2710	—	—	5.2	0.65 (U)	—	—	2080	—	9.8	0.51	—	3.8 (J-)	—	—
RE14-11-24126	14-614535	1–2	SOIL	—	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	0.53	0.046	3.1 (J-)	—	—
RE14-11-24127	14-614535	4–5	QBT4	13,100	7.7	—	1.3	—	2430	7.3	—	7.3	0.57 (U)	—	15.3 (J+)	1950	—	7.6	0.32	0.066	5.5 (J-)	—	—
RE14-11-24128	14-614536	0–1	SOIL	—	—	—	—	0.42	—	—	—	39.6	—	—	46.5 (J+)	—	0.234	—	8.1	—	—	—	148
RE14-11-24129	14-614536	3–4	QBT4	—	3.4	—	—	—	—	—	—	7.9	0.53 (U)	—	—	—	—	—	0.074 (J)	0.012	2.4 (J-)	—	—
RE14-11-24130	14-614537	0–1	SOIL	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	2.4	0.0082	2 (J-)	—	—
RE14-11-24131	14-614537	3–4	QBT4	10,900	3.2	47.4	—	—	—	7.3	—	5.4	0.54 (U)	—	—	—	—	—	0.14 (J)	0.015	2.3 (J-)	—	—
RE14-11-24132	14-614538	0–1	SOIL	—	—	—	—	0.45	—	—	—	35.4	0.57 (J)	—	30.1 (J+)	—	—	—	5.8	0.018	2.2 (J-)	—	151
RE14-11-24133	14-614538	3–4	QBT4	—	—	—	—	—	—	—	—	—	0.52 (U)	—	—	—	—	—	0.11 (J)	0.017	2.1 (J-)	—	—
RE14-11-24134	14-614539	2–3	SOIL	—	—	—	—	—	—	—	—	82.5	0.63 (U)	—	154	—	—	—	0.58	0.0045 (J)	1.6	—	—
RE14-11-24135	14-614539	6–7	QBT4	15,500	4.1	149 (J+)	1.5	—	3090	10.8	6.1	10	0.63 (U)	16,300	13.5	3140	—	11.4	1.6	—	2	22.7	—
RE14-11-24136	14-614540	1.5–2.5	QBT4	—	—	53.8	—	—	2830	—	—	4.9	0.54 (U)	—	—	—	—	7.6	0.17 (J)	0.0067	2.6 (J-)	—	—
RE14-11-24137	14-614540	4.5–5.5	QBT4	—	—	—	—	—	—	—	—	4.7	0.57 (U)	—	—	—	—	—	0.086 (J)	—	3.3 (J-)	—	—
RE14-11-24138	14-614541	0–1	SOIL	—	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	2.1	0.0098	—	—	50.8
RE14-11-24139	14-614541	3–4	QBT4	—	—	—	—	—	—	—	—	—	0.52 (U)	—	—	—	—	—	0.17 (J)	0.012	2.4 (J-)	—	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915), unless otherwise noted.

[d] SSL for total chromium.

[e] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[f] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] — = Not detected or not detected above BV.

Table 6.17-3
Organic Chemicals Detected at SWMU 14-006

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	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	Bis(2-ethylhexyl)phthalate	Chrysene	Dibenz(a,h)anthracene
Construction Worker SSL[a]				**15,100**	**688**[b]	**695**[b]	**75,300**	**240**	**24**	**240**	**7530**[c]	**2310**	**5380**	**23,100**	**24**
Industrial SSL[a]				**50,500**	**2300**[d]	**2300**[d]	**253,000**	**32.3**	**3.23**	**32.3**	**25,300**[c]	**323**	**1830**	**3230**	**3.23**
Residential SSL[a]				**3480**	**150**[d]	**150**[d]	**17,400**	**1.53**	**0.153**	**1.53**	**1740**[c]	**15.3**	**380**	**153**	**0.153**
RE14-11-24118	14-614531	5–6	QBT4	—[e]	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24119	14-614531	8–9	QBT4	—	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24121	14-614532	8–9	QBT4	—	—	—	—	—	—	—	—	—	0.12 (J)	—	—
RE14-11-24122	14-614533	5–6	QBT4	—	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24123	14-614533	8–9	QBT4	—	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24124	14-614534	4–5	SOIL	—	0.068 (J)	0.083 (J)	—	0.13 (J)	0.092 (J)	0.13 (J)	0.043 (J)	0.054 (J)	—	0.13 (J)	—
RE14-11-24125	14-614534	7–8	QBT4	—	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24126	14-614535	1–2	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24127	14-614535	4–5	QBT4	—	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24128	14-614536	0–1	SOIL	2.6	0.16 (J)	0.17	3.8	12	9.2	13	4.3	4.7	—	13	1.4
RE14-11-24129	14-614536	3–4	QBT4	—	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24130	14-614537	0–1	SOIL	—	—	—	—	—	—	0.038 (J)	—	—	—	—	—
RE14-11-24131	14-614537	3–4	QBT4	—	—	—	—	—	—	—	—	—	1.5	—	—
RE14-11-24132	14-614538	0–1	SOIL	0.15 (J)	—	—	0.26 (J)	1.3	1.3	1.8	0.7	0.75	0.075 (J)	1.6	0.18 (J)
RE14-11-24134	14-614539	2–3	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24135	14-614539	6–7	QBT4	—	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24136	14-614540	1.5–2.5	QBT4	0.38	—	—	0.67	1.6	1.2	1.7	0.83	0.64	—	1.7	—
RE14-11-24137	14-614540	4.5–5.5	QBT4	—	—	—	—	—	—	—	—	—	0.37	—	—
RE14-11-24138	14-614541	0–1	SOIL	0.55	—	—	—	0.1 (J)	0.1 (J)	0.15 (J)	0.08 (J)	0.055 (J)	—	0.13 (J)	—
RE14-11-24139	14-614541	3–4	QBT4	—	—	—	—	—	—	—	—	—	—	—	—

Table 6.17-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Dibenzofuran	Fluoranthene	Fluorene	HMX	Indeno(1,2,3-cd)pyrene	Methylnaphthalene[2-]	Naphthalene	PETN	Phenanthrene	Pyrene	RDX	TATB	TNT
Construction Worker SSL[a]				**354[b]**	**10,000**	**10,000**	**17,400**	**240**	**1420[b]**	**159**	**708[b]**	**7530**	**7530**	**1010**	**10,000[b, f]**	**161**
Industrial SSL[a]				**1000[d]**	**33,700**	**33,700**	**63,300**	**32.3**	**3000[d]**	**241**	**5700[d]**	**25,300**	**25,300**	**311**	**32,000[d, f]**	**573**
Residential SSL[a]				**73[d]**	**2320**	**2320**	**3850**	**1.53**	**240[d]**	**50**	**130[d]**	**1740**	**1740**	**60.4**	**2200[d, f]**	**36**
RE14-11-24118	14-614531	5–6	QBT4	—	—	—	0.16 (J)	—	—	—	—	—	—	—	1.1 (J)	—
RE14-11-24119	14-614531	8–9	QBT4	—	—	—	0.086 (J)	—	—	—	—	—	—	—	0.88 (J)	—
RE14-11-24121	14-614532	8–9	QBT4	—	—	—	1.2 (J)	—	—	—	—	—	—	—	1.6 (J)	0.6 (J)
RE14-11-24122	14-614533	5–6	QBT4	—	—	—	1.8 (J)	—	—	—	1.7	—	—	—	4.8 (J)	—
RE14-11-24123	14-614533	8–9	QBT4	—	—	—	0.16 (J)	—	—	—	—	—	—	—	3.4 (J)	—
RE14-11-24124	14-614534	4–5	SOIL	—	0.33 (J)	—	0.28 (J)	0.061 (J)	—	—	—	0.24 (J)	0.25 (J)	—	0.9 (J)	0.39 (J)
RE14-11-24125	14-614534	7–8	QBT4	—	—	—	0.12 (J)	—	—	—	—	—	—	—	0.26 (J)	—
RE14-11-24126	14-614535	1–2	SOIL	—	—	—	0.64 (J)	—	—	—	—	—	—	—	0.32 (J)	—
RE14-11-24127	14-614535	4–5	QBT4	—	—	—	0.21 (J)	—	—	—	—	—	—	—	0.11 (J)	—
RE14-11-24128	14-614536	0–1	SOIL	1.1	35	2.1	1.5 (J)	5.6	0.3 (J)	0.63	—	22	24	2.6	13 (J)	0.83 (J)
RE14-11-24129	14-614536	3–4	QBT4	—	0.062 (J)	—	0.45 (J)	—	—	—	—	—	0.056 (J)	—	—	0.045 (J)
RE14-11-24130	14-614537	0–1	SOIL	—	0.057 (J)	—	0.25 (J)	—	—	—	—	—	0.04 (J)	—	2.3 (J)	—
RE14-11-24131	14-614537	3–4	QBT4	—	—	—	0.84 (J)	—	—	—	—	—	—	—	0.2 (J)	—
RE14-11-24132	14-614538	0–1	SOIL	0.049 (J)	3.1	0.11 (J)	1.5 (J)	0.85	—	—	—	1.5	3	0.12 (J)	5.4 (J)	0.25 (J)
RE14-11-24134	14-614539	2–3	SOIL	—	—	—	0.34	—	—	—	—	—	—	—	—	—
RE14-11-24135	14-614539	6–7	QBT4	—	—	—	0.11 (J)	—	—	—	—	—	—	—	—	—
RE14-11-24136	14-614540	1.5–2.5	QBT4	0.21 (J)	4.5	0.36	0.64 (J)	0.97	0.044 (J)	0.079 (J)	—	3.4	3.7	—	0.83 (J)	—
RE14-11-24137	14-614540	4.5–5.5	QBT4	—	—	—	0.47 (J)	—	—	—	—	—	—	—	—	—
RE14-11-24138	14-614541	0–1	SOIL	—	0.27 (J)	—	1.7 (J)	0.096 (J)	—	—	—	0.11 (J)	0.24 (J)	—	6.9 (J)	0.18 (J)
RE14-11-24139	14-614541	3–4	QBT4	—	—	—	0.16 (J)	—	—	—	—	—	—	—	0.18 (J)	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[c] Pyrene used as a surrogate based on structural similarity.

[d] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[e] — = Not detected.

[f] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table 6.17-4
Radionuclides Detected or Detected above BVs/FVs at SWMU 14-006

Sample ID	Location ID	Depth (ft)	Media	Strontium-90
Qbt 2,3,4 BV				**na**[a]
Soil BV[b]				**1.31**
Construction Worker SAL[c]				**1400**
Industrial SAL[c]				**2400**
Residential SAL[c]				**15**
RE14-11-24121	14-614532	8–9	QBT4	0.38
RE14-11-24126	14-614535	1–2	SOIL	0.33

Notes: Results are in pCi/g

[a] na = Not available.

[b] BVs/FVs from LANL (1998, 059730).

[c] SALs from LANL (2015, 600929).

Table 6.18-1
Samples Collected and Analyses Requested at SWMU 14-007

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
RE14-11-24151	14-614542	3–4	SOIL	11-3140[a]	11-3141	11-3139	11-3141	11-3140	—[b]	11-3140	11-3141	11-3139	11-3139	11-3140
RE14-11-25906	14-614542	6–7	QBT4	11-3282	11-3283	11-3281	11-3283	11-3282	—	11-3282	11-3283	11-3281	11-3281	11-3282
RE14-11-24153	14-614543	3–4	SOIL	11-3140	11-3141	11-3139	11-3141	11-3140	—	11-3140	11-3141	11-3139	11-3139	11-3140
RE14-11-25909	14-614543	6–7	QBT4	11-3282	11-3283	11-3281	11-3283	11-3282	—	11-3282	11-3283	11-3281	11-3281	11-3282
RE14-11-24155	14-614544	3–4	SOIL	11-3140	11-3141	11-3139	11-3141	11-3140	—	11-3140	11-3141	11-3139	11-3139	11-3140
RE14-11-25907	14-614544	6–7	SOIL	11-3282	11-3283	11-3281	11-3283	11-3282	—	11-3282	11-3283	11-3281	11-3281	11-3282
RE14-11-25908	14-614544	9–10	QBT4	11-3282	11-3283	11-3281	11-3283	11-3282	—	11-3282	11-3283	11-3281	11-3281	11-3282
RE14-11-24157	14-614545	3–4	SOIL	11-3140	11-3141	11-3139	11-3141	11-3140	—	11-3140	11-3141	11-3139	11-3139	11-3140
RE14-11-25911	14-614545	6–7	QBT4	11-3282	11-3283	11-3281	11-3283	11-3282	—	11-3282	11-3283	11-3281	11-3281	11-3282
RE14-11-24158	14-614546	0–1	SOIL	11-3140	11-3141	11-3139	11-3141	11-3140	—	11-3140	11-3141	11-3139	—	11-3140
RE14-11-24159	14-614546	3–4	SOIL	11-3140	11-3141	11-3139	11-3141	11-3140	—	11-3140	11-3141	11-3139	11-3139	11-3140
RE14-11-24160	14-614547	0–1	SOIL	11-3140	11-3141	11-3139	11-3141	11-3140	—	11-3140	11-3141	11-3139	—	11-3140
RE14-11-24161	14-614547	3–4	SOIL	11-3140	11-3141	11-3139	11-3141	11-3140	—	11-3140	11-3141	11-3139	11-3139	11-3140
RE14-11-24162	14-614548	0–1	SOIL	11-3140	11-3141	11-3139	11-3141	11-3140	—	11-3140	11-3141	11-3139	—	11-3140
RE14-11-24163	14-614548	3–4	SOIL	11-3140	11-3141	11-3139	11-3141	11-3140	—	11-3140	11-3141	11-3139	11-3139	11-3140
RE14-11-24165	14-614549	3–4	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-25912	14-614549	6–7	SOIL	11-3282	11-3283	11-3281	11-3283	11-3282	—	11-3282	11-3283	11-3281	11-3281	11-3282
RE14-11-24166	14-614550	0–1	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	—	11-3164

Table 6.18-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
RE14-11-24167	14-614550	3–4	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-25913	14-614550	6–7	QBT4	11-3282	11-3283	11-3281	11-3283	11-3282	—	11-3282	11-3283	11-3281	11-3281	11-3282
RE14-11-24168	14-614551	2.5–3.5	SOIL	11-3218	11-3218	11-3218	11-3218	11-3218	—	11-3218	11-3218	11-3218	11-3218	11-3218
RE14-11-24169	14-614551	5.5–6.5	SOIL	11-3218	11-3218	11-3218	11-3218	11-3218	—	11-3218	11-3218	11-3218	11-3218	11-3218
RE14-11-24179	14-614552	3–4	SOIL	11-3140	11-3141	11-3139	11-3141	11-3140	11-3139	11-3140	11-3141	11-3139	11-3139	11-3140
RE14-11-25905	14-614552	6–7	SOIL	11-3406	11-3406	11-3406	11-3406	11-3406	11-3406	11-3406	11-3406	11-3406	11-3406	11-3406
RE14-11-24181	14-614553	3–4	QBT4	11-3140	11-3141	11-3139	11-3141	11-3140	11-3139	11-3140	11-3141	11-3139	11-3139	11-3140
RE14-11-25910	14-614553	6–7	QBT4	11-3282	11-3283	11-3281	11-3283	11-3282	11-3281	11-3282	11-3283	11-3281	11-3281	11-3282
RE14-11-24182	14-614554	0–1	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	11-3163	11-3164	11-3162	11-3163	—	11-3164
RE14-11-24183	14-614554	3–4	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	11-3163	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-24184	14-614555	0–1	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	—	11-3164
RE14-11-24185	14-614555	3–4	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-24186	14-614555	6–7	QBT4	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-24187	14-614556	0–1	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	—	11-3164
RE14-11-24188	14-614556	3–4	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-24189	14-614556	6–7	QBT4	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-24190	14-614557	0–1	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	—	11-3164
RE14-11-24191	14-614557	3–4	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-24192	14-614557	6–7	QBT4	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-24193	14-614558	0–1	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	—	11-3164
RE14-11-24194	14-614558	3–4	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	—	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-24195	14-614558	6–7	QBT4	11-3192	11-3191	11-3191	11-3191	11-3192	—	11-3192	11-3191	11-3191	11-3191	11-3192
RE14-11-24196	14-614559	0–1	SOIL	11-3192	11-3191	11-3191	11-3191	11-3192	—	11-3192	11-3191	11-3191	—	11-3192
RE14-11-24197	14-614559	3–4	SOIL	11-3192	11-3191	11-3191	11-3191	11-3192	—	11-3192	11-3191	11-3191	11-3191	11-3192
RE14-11-24198	14-614559	6–7	QBT4	11-3192	11-3191	11-3191	11-3191	11-3192	—	11-3192	11-3191	11-3191	11-3191	11-3192
RE14-11-24199	14-614560	0–1	SOIL	11-3192	11-3191	11-3191	11-3191	11-3192	—	11-3192	11-3191	11-3191	—	11-3192
RE14-11-24200	14-614560	3–4	QBT4	11-3192	11-3191	11-3191	11-3191	11-3192	—	11-3192	11-3191	11-3191	11-3191	11-3192
RE14-11-24201	14-614560	6–7	QBT4	11-3192	11-3191	11-3191	11-3191	11-3192	—	11-3192	11-3191	11-3191	11-3191	11-3192
RE14-11-24202	14-614561	0–1	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	11-3163	11-3164	11-3162	11-3163	—	11-3164
RE14-11-24203	14-614561	3–4	SOIL	11-3164	11-3162	11-3163	11-3162	11-3164	11-3163	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-24204	14-614561	6–7	QBT4	11-3164	11-3162	11-3163	11-3162	11-3164	11-3163	11-3164	11-3162	11-3163	11-3163	11-3164
RE14-11-24205	14-614562	0–1	SOIL	11-3192	11-3191	11-3191	11-3191	11-3192	11-3191	11-3192	11-3191	11-3191	—	11-3192
RE14-11-24206	14-614562	3–4	SOIL	11-3192	11-3191	11-3191	11-3191	11-3192	11-3191	11-3192	11-3191	11-3191	11-3191	11-3192
RE14-11-24207	14-614562	6–7	QBT4	11-3192	11-3191	11-3191	11-3191	11-3192	11-3191	11-3192	11-3191	11-3191	11-3191	11-3192

[a] Request number.

[b] — = Analysis not requested.

Table 6.18-2
Inorganic Chemicals above BVs at SWMU 14-007

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Arsenic	Barium	Beryllium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Vanadium	Zinc
Qbt 2,3,4 BV[a]				**7340**	**2.79**	**46**	**1.21**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**[b]	**na**	**0.3**	**1**	**17**	**63.5**
Soil BV[a]				**29,200**	**8.17**	**295**	**1.83**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na**	**na**	**1.52**	**1**	**39.6**	**48.8**
Construction Worker SSL[c]				**41,400**	**57.4**	**4390**	**148**	**8,850,000**	**134**[d]	**36.6**[e]	**14,200**	**12.1**	**248,000**	**800**	**1,550,000**	**464**	**77.1**[e]	**753**	**566,000**	**248**	**1750**	**1770**	**614**	**106,000**
Industrial SSL[c]				**1,290,000**	**21.5**	**255,000**	**2580**	**32,400,000**	**505**[d]	**350**[f]	**51,900**	**63.3**	**908,000**	**800**	**5,680,000**	**160,000**	**389**[f]	**25,700**	**2,080,000**	**908**	**6490**	**6490**	**6530**	**389,000**
Residential SSL[c]				**78,000**	**4.25**	**15,600**	**156**	**13,000,000**	**96.6**[d]	**23**[f]	**3130**	**11.2**	**54,800**	**400**	**339,000**	**10,500**	**23.5**[f]	**1560**	**125,000**	**54.8**	**391**	**391**	**394**	**23,500**
RE14-11-24151	14-614542	3–4	SOIL	—[g]	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	—	—	1.7	—	—	—
RE14-11-25906	14-614542	6–7	QBT4	10,900	3.1	144	—	—	10.2	5.5	7.6	0.54 (U)	—	—	2050	—	—	7.8	0.087 (J)	—	1.7 (J-)	—	21.3	—
RE14-11-24153	14-614543	3–4	SOIL	—	—	—	—	—	—	15.8	—	0.55 (U)	—	—	—	739	—	—	—	—	—	2.1	—	—
RE14-11-25909	14-614543	6–7	QBT4	14,100	3.4	190	—	—	9.8	7.4	8.1	0.54 (U)	—	14.7	1940	632 (J)	—	8.6	0.09 (J)	—	1.7 (J-)	—	23	—
RE14-11-24155	14-614544	3–4	SOIL	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	—	—	—	—	—	—
RE14-11-25907	14-614544	6–7	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.35	—	—	—	—	—
RE14-11-25908	14-614544	9–10	QBT4	—	—	—	—	—	—	—	—	0.52 (U)	—	—	—	—	—	—	0.089 (J)	—	2.2 (J-)	—	—	—
RE14-11-24157	14-614545	3–4	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	—	—	—	10.8	—	—
RE14-11-25911	14-614545	6–7	QBT4	11,600	—	120	—	2240	9.4	4.3	6.1	0.54 (U)	—	—	1960	—	—	7	0.29	—	1.6 (J-)	2.1	—	—
RE14-11-24158	14-614546	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4.2	—	—	16.2	—	—
RE14-11-24159	14-614546	3–4	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	0.259	—	—	—	—	14	—	—
RE14-11-24160	14-614547	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	0.236	—	2.7	—	—	24.2	—	97.6
RE14-11-24161	14-614547	3–4	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	—	—	—	4	—	—
RE14-11-24162	14-614548	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.9	—	—	14	—	64.1
RE14-11-24163	14-614548	3–4	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	0.101	—	—	—	—	1.3	—	—
RE14-11-24165	14-614549	3–4	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	1.3	0.0051 (J)	—	—	—	—
RE14-11-25912	14-614549	6–7	SOIL	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	1.6	0.0026 (J)	1.7 (J-)	—	—	—
RE14-11-24166	14-614550	0–1	SOIL	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	1.5	—	1.6 (J-)	—	—	—
RE14-11-24167	14-614550	3–4	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	0.2 (J)	0.0032 (J)	—	—	—	—
RE14-11-25913	14-614550	6–7	QBT4	9700	—	85.1	—	3620	8.5	—	4.7	0.54 (U)	—	—	1840	—	—	—	0.34	—	1.7 (J-)	—	—	—
RE14-11-24168	14-614551	2.5–3.5	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	0.76	0.0028 (J)	—	—	—	53.8
RE14-11-24169	14-614551	5.5–6.5	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	0.21 (J)	—	—	—	—	—
RE14-11-24179	14-614552	3–4	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	—	—	1.6	—	—	—
RE14-11-25905	14-614552	6–7	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.38	—	—	—	—	—
RE14-11-24181	14-614553	3–4	QBT4	20,800	2.9	257	1.3	3650	8.6	4.4	6 (J)	0.56 (U)	—	12.2	2230	—	—	9.3	—	0.0031 (J)	1.2	3.3	19.6	—
RE14-11-25910	14-614553	6–7	QBT4	12,000	—	107	—	—	7.7	3.3	5.2	0.55 (U)	—	—	1720	—	—	6.8	0.56	—	1.8 (J-)	—	—	—
RE14-11-24182	14-614554	0–1	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	9.3	—	—	1.6	—	—
RE14-11-24183	14-614554	3–4	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	0.62	0.0043 (J)	—	—	—	—

Table 6.18-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Arsenic	Barium	Beryllium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Vanadium	Zinc
Qbt 2,3,4 BV[a]				**7340**	**2.79**	**46**	**1.21**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**	**11.2**	**1690**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**17**	**63.5**
Soil BV[a]				**29,200**	**8.17**	**295**	**1.83**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**	**22.3**	**4610**	**671**	**0.1**	**15.4**	**na**	**na**	**1.52**	**1**	**39.6**	**48.8**
Construction Worker SSL[c]				**41,400**	**57.4**	**4390**	**148**	**8,850,000**	**134[d]**	**36.6[e]**	**14,200**	**12.1**	**248,000**	**800**	**1,550,000**	**464**	**77.1[e]**	**753**	**566,000**	**248**	**1750**	**1770**	**614**	**106,000**
Industrial SSL[c]				**1,290,000**	**21.5**	**255,000**	**2580**	**32,400,000**	**505[d]**	**350[f]**	**51,900**	**63.3**	**908,000**	**800**	**5,680,000**	**160,000**	**389[f]**	**25,700**	**2,080,000**	**908**	**6490**	**6490**	**6530**	**389,000**
Residential SSL[c]				**78,000**	**4.25**	**15,600**	**156**	**13,000,000**	**96.6[d]**	**23[f]**	**3130**	**11.2**	**54,800**	**400**	**339,000**	**10,500**	**23.5[f]**	**1560**	**125,000**	**54.8**	**391**	**391**	**394**	**23,500**
RE14-11-24184	14-614555	0–1	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	6	0.0027 (J)	—	—	—	—
RE14-11-24185	14-614555	3–4	SOIL	—	—	—	—	—	—	—	—	0.57 (U)	—	—	—	—	—	—	0.17 (J)	0.0023 (J)	1.7 (J-)	—	—	—
RE14-11-24186	14-614555	6–7	QBT4	10,800	3.3	203	—	2510	8.5	6.8	7.5	0.55 (U)	—	12.8	2110	—	—	7.5	—	0.0041 (J)	1.5 (J-)	—	19.5	—
RE14-11-24187	14-614556	0–1	SOIL	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	2	—	—	—	—	—
RE14-11-24188	14-614556	3–4	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.37	—	—	—	—	—
RE14-11-24189	14-614556	6–7	QBT4	9210	—	113	—	4410	—	—	4.7	0.57 (U)	—	—	1780	—	—	6.6	0.12 (J)	0.0025 (J)	1.9 (J-)	—	—	—
RE14-11-24190	14-614557	0–1	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	1.7	—	—	—	—	—
RE14-11-24191	14-614557	3–4	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.29	—	—	—	—	—
RE14-11-24192	14-614557	6–7	QBT4	—	—	121	—	6750	—	—	—	0.54 (U)	—	—	—	—	—	—	0.4	0.0046 (J)	1.9 (J-)	—	—	—
RE14-11-24193	14-614558	0–1	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	3.1	—	—	—	—	—
RE14-11-24194	14-614558	3–4	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	0.29	—	—	—	—	—
RE14-11-24195	14-614558	6–7	QBT4	10,700	2.8	201 (J+)	—	—	—	5.7 (J)	5.6	0.55 (U)	—	11.9	—	539 (J)	—	11.9	0.19 (J)	0.0031 (J)	2.1	—	—	—
RE14-11-24196	14-614559	0–1	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	2.8	—	—	—	—	—
RE14-11-24197	14-614559	3–4	SOIL	—	—	—	—	—	—	—	—	0.57 (U)	—	—	—	—	—	—	0.19 (J)	—	—	—	—	—
RE14-11-24198	14-614559	6–7	QBT4	11,100	—	103 (J+)	—	—	—	—	—	0.56 (U)	—	—	—	—	—	6.6	0.13 (J)	—	2	—	—	—
RE14-11-24199	14-614560	0–1	SOIL	—	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	—	—	4.3	—	—	—	—	—
RE14-11-24200	14-614560	3–4	QBT4	13,200	3.2	199 (J+)	—	2620	9	8.9 (J)	7.4	0.54 (U)	—	15.9	2120	712 (J)	—	8.1	0.65	—	1.1	—	22.4	—
RE14-11-24201	14-614560	6–7	QBT4	12,900	2.8	138 (J+)	—	4650	8.2	—	5.3	0.57 (U)	—	—	2430	—	—	7.5	0.69	0.0071	1.4	—	—	—
RE14-11-24202	14-614561	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4.7	—	—	—	—	—
RE14-11-24203	14-614561	3–4	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	0.46	0.0049 (J)	—	—	—	—
RE14-11-24204	14-614561	6–7	QBT4	11,200	—	110 (J)	—	3540	—	—	5 (J)	0.55 (U)	—	—	1890	—	—	—	0.45	0.0023 (J)	1.6 (J-)	—	—	—
RE14-11-24205	14-614562	0–1	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	—	1.2	—	—	—	—	—
RE14-11-24206	14-614562	3–4	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	—	0.62	—	1.8	—	—	—
RE14-11-24207	14-614562	6–7	QBT4	15,900	3.5	137 (J+)	1.7 (J)	6870	10.1	—	7	0.61 (U)	16800	—	3530	—	—	11.2	0.31	0.0062	1.4	—	—	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915), unless otherwise noted.

[d] SSL for total chromium.

[e] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[f] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] — = Not detected or not detected above BV.

Table 6.18-3
Organic Chemicals Detected at SWMU 14-007

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Bis(2-ethylhexyl)phthalate	Dichlorobenzene[1,3-]	HMX	Isopropyltoluene[4-]	Methylene Chloride	TATB	Trichloroethene
Construction Worker SSL[a]				**15,100**	**242,000**	**5380**	**5780**[b]	**17,400**	**2740**[c]	**1210**	**10,000**[d,e]	**6.9**
Industrial SSL[a]				**50,500**	**960,000**	**1830**	**140**[b]	**63,300**	**14,200**[c]	**5130**	**32,000**[e,f]	**36.5**
Residential SSL[a]				**3480**	**66,300**	**380**	**69**[b]	**3850**	**2360**[c]	**409**	**2200**[e,f]	**6.77**
RE14-11-24151	14-614542	3–4	SOIL	—[g]	—	—	—	—	—	0.0035 (J)	—	—
RE14-11-24153	14-614543	3–4	SOIL	—	0.0094 (J)	—	—	—	—	0.0041 (J)	0.73 (J)	—
RE14-11-25909	14-614543	6–7	QBT4	—	—	—	—	—	—	—	—	0.001 (J)
RE14-11-24155	14-614544	3–4	SOIL	—	0.0079 (J)	—	—	—	—	0.0037 (J)	—	—
RE14-11-24157	14-614545	3–4	SOIL	—	0.0073 (J)	—	—	—	—	0.0036 (J)	—	—
RE14-11-24158	14-614546	0–1	SOIL	—	NA[h]	—	—	—	NA	NA	0.48 (J)	NA
RE14-11-24159	14-614546	3–4	SOIL	—	0.012 (J)	—	0.00034 (J)	—	—	0.0038 (J)	—	—
RE14-11-24160	14-614547	0–1	SOIL	—	NA	—	—	—	NA	NA	0.21 (J)	NA
RE14-11-24161	14-614547	3–4	SOIL	—	0.008 (J)	—	—	—	—	0.0036 (J)	—	—
RE14-11-24162	14-614548	0–1	SOIL	—	NA	—	—	—	NA	NA	0.32 (J)	NA
RE14-11-24163	14-614548	3–4	SOIL	0.074 (J)	0.01 (J)	—	—	—	0.0006 (J)	0.0041 (J)	—	—
RE14-11-25912	14-614549	6–7	SOIL	—	—	—	—	—	—	—	0.16 (J)	0.00094 (J)
RE14-11-24168	14-614551	2.5–3.5	SOIL	—	0.0095 (J)	—	—	—	—	—	3.6 (J-)	—
RE14-11-24169	14-614551	5.5–6.5	SOIL	—	0.0077 (J)	0.13 (J)	—	—	—	—	0.14 (J-)	—
RE14-11-24179	14-614552	3–4	SOIL	—	0.0077 (J)	—	—	0.054 (J)	—	0.0031 (J)	—	—
RE14-11-25905	14-614552	6–7	SOIL	—	—	—	—	—	—	—	0.13 (J)	—
RE14-11-24181	14-614553	3–4	QBT4	—	0.0082 (J)	—	—	—	—	0.0036 (J)	—	—
RE14-11-24182	14-614554	0–1	SOIL	—	NA	0.062 (J)	—	—	NA	NA	1.3 (J)	NA
RE14-11-24184	14-614555	0–1	SOIL	—	NA	0.42	—	—	NA	NA	0.61 (J)	NA
RE14-11-24186	14-614555	6–7	QBT4	—	—	0.71	—	—	—	—	0.075 (J)	—
RE14-11-24189	14-614556	6–7	QBT4	—	—	0.24 (J)	—	—	—	—	—	—
RE14-11-24196	14-614559	0–1	SOIL	—	NA	—	—	—	NA	NA	0.093 (J)	NA

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] Dichlorobenzene[1,2-] used as a surrogate based on structural similarity.

[c] Isopropylbenzene used as a surrogate based on structural similarity.

[d] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[e] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[f] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] — = Not detected.

[h] NA = Not analyzed

Table 6.18-4
Radionuclides Detected or Detected above BVs/FVs at SWMU 14-007

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Strontium-90
Soil BV[a]				**1.65**	**1.31**
Construction Worker SAL[b]				**37**	**1400**
Industrial SAL[b]				**41**	**2400**
Residential SAL[b]				**12**	**15**
RE14-11-24153	14-614543	3–4	SOIL	0.146	—[c]
RE14-11-24188	14-614556	3–4	SOIL	—	0.46

Notes: Results are in pCi/g.

[a] BVs/FVs from LANL (1998, 059730).

[b] SALs from LANL (2015, 600929).

[c] — = Not detected.

Table 6.19-1
Samples Collected and Analyses Requested at SWMU 14-009

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
RE14-11-24070	14-614514	0–1	SOIL	11-3511[a]	11-3512	11-3512	11-3512	11-3511	—[b]	11-3511	11-3512	11-3512	—	11-3511
RE14-11-24071	14-614514	5–6	QBT4	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	11-3512	11-3511
RE14-11-24072	14-614515	0–1	SOIL	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	—	11-3511
RE14-11-24073	14-614515	2.5–3.5	QBT4	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	11-3512	11-3511
RE14-11-24074	14-614516	0–1	SOIL	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	—	11-3511
RE14-11-24075	14-614516	2–3	QBT4	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	11-3512	11-3511
RE14-11-24076	14-614517	0–1	SOIL	11-3704	11-3704	11-3703	11-3704	11-3704	—	11-3704	11-3704	11-3703	—	11-3704
RE14-11-24077	14-614517	4.5–5.5	QBT4	11-3704	11-3704	11-3703	11-3704	11-3704	—	11-3704	11-3704	11-3703	11-3703	11-3704
RE14-11-24078	14-614518	0–1	SOIL	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	—	11-3511
RE14-11-24079	14-614518	2–3	QBT4	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	11-3512	11-3511
RE14-11-24080	14-614519	0–1	SOIL	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	—	11-3511
RE14-11-24081	14-614519	1.5–2.5	QBT4	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	11-3512	11-3511
RE14-11-24082	14-614520	0–1	SOIL	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	—	11-3511
RE14-11-24083	14-614520	2–3	QBT4	11-3511	11-3512	11-3512	11-3512	11-3511	—	11-3511	11-3512	11-3512	11-3512	11-3511
RE14-11-24084	14-614521	0–1	SOIL	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	—	11-3525
RE14-11-24085	14-614521	2–3	QBT4	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	11-3524	11-3525
RE14-11-24086	14-614522	0–1	SOIL	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	—	11-3525
RE14-11-24087	14-614522	1–2	QBT4	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	11-3524	11-3525

Table 6.19-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
RE14-11-24088	14-614523	0–1	SOIL	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	—	11-3525
RE14-11-24089	14-614523	1–2	QBT4	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	11-3524	11-3525
RE14-11-24090	14-614524	0–1	SOIL	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	—	11-3525
RE14-11-24091	14-614524	1–2	QBT4	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	11-3524	11-3525
RE14-11-24092	14-614525	0–1	SED	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	—	11-3525
RE14-11-24093	14-614525	1–2	QBT4	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	11-3524	11-3525
RE14-11-24094	14-614526	0–1	SED	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	—	11-3525
RE14-11-24095	14-614526	1–2	QBT4	11-3525	11-3526	11-3524	11-3526	11-3525	—	11-3525	11-3526	11-3524	11-3524	11-3525
RE14-11-24096	14-614527	0–1	SOIL	11-3704	11-3704	11-3703	11-3704	11-3704	11-3703	11-3704	11-3704	11-3703	—	11-3704
RE14-11-24097	14-614527	2.5–3.5	QBT4	11-3704	11-3704	11-3703	11-3704	11-3704	11-3703	11-3704	11-3704	11-3703	11-3703	11-3704
RE14-11-24098	14-614528	0–1	SOIL	11-3511	11-3512	11-3512	11-3512	11-3511	11-3512	11-3511	11-3512	11-3512	—	11-3511
RE14-11-24099	14-614528	3.5–4.5	QBT4	11-3511	11-3512	11-3512	11-3512	11-3511	11-3512	11-3511	11-3512	11-3512	11-3512	11-3511
RE14-11-24100	14-614529	0–1	SED	11-3525	11-3526	11-3524	11-3526	11-3525	11-3524	11-3525	11-3526	11-3524	—	11-3525
RE14-11-24101	14-614529	1–2	QBT4	11-3525	11-3526	11-3524	11-3526	11-3525	11-3524	11-3525	11-3526	11-3524	11-3524	11-3525
RE14-11-24102	14-614530	0–1	SED	11-3525	11-3526	11-3524	11-3526	11-3525	11-3524	11-3525	11-3526	11-3524	—	11-3525
RE14-11-24103	14-614530	1–2	QBT4	11-3525	11-3526	11-3524	11-3526	11-3525	11-3524	11-3525	11-3526	11-3524	11-3524	11-3525

[a] Request number.

[b] — = Analysis not requested.

Table 6.19-2
Inorganic Chemicals above BVs at SWMU 14-009

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Mercury	Nickel	Nitrate	Selenium	Thallium	Vanadium	Zinc
Qbt 2,3,4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**	**11.2**	**1690**	**0.1**	**6.58**	**na[b]**	**0.3**	**1.1**	**17**	**63.5**
Sediment BV[a]				**15,400**	**0.83**	**3.98**	**127**	**4420**	**10.5**	**4.73**	**11.2**	**0.82**	**13,800**	**19.7**	**2370**	**0.1**	**9.38**	**na**	**0.3**	**0.73**	**19.7**	**60.2**
Soil BV[a]				**29,200**	**0.83**	**8.17**	**295**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**	**22.3**	**4610**	**0.1**	**15.4**	**na**	**1.52**	**0.73**	**39.6**	**48.8**
Construction Worker SSL[c]				**41,400**	**142**	**57.4**	**4390**	**8,850,000**	**134[d]**	**36.6[e]**	**14,200**	**12.1**	**248,000**	**800**	**1,550,000**	**77.1**	**753**	**566,000**	**1750**	**3.54**	**614**	**106,000**
Industrial SSL[c]				**1,290,000**	**519**	**21.5**	**255,000**	**32,400,000**	**505[d]**	**350[f]**	**51,900**	**63.3**	**908,000**	**800**	**5,680,000**	**389**	**25,700**	**2,080,000**	**6490**	**13**	**6530**	**389,000**
Residential SSL[c]				**78,000**	**31.3**	**4.25**	**15,600**	**13,000,000**	**96.6[d]**	**23[f]**	**3130**	**11.2**	**54,800**	**400**	**339,000**	**23.5**	**1560**	**125,000**	**391**	**0.782**	**394**	**23,500**
RE14-11-24070	14-614514	0–1	SOIL	—[g]	—	—	—	—	—	—	—	0.58 (U)	—	—	—	—	—	14.3	—	—	—	—
RE14-11-24071	14-614514	5–6	QBT4	16,200	—	2.9	183	3520	11.4 (J-)	5.7	7.3	0.55 (U)	—	15.7 (J+)	2100	—	8.6 (J-)	3.3	1.3 (J-)	—	24.7	—
RE14-11-24072	14-614515	0–1	SOIL	—	—	—	—	—	—	—	—	0.6 (U)	—	—	—	—	—	5.3	—	—	—	—
RE14-11-24073	14-614515	2.5–3.5	QBT4	10,100	—	2.8	108	—	7.6 (J-)	3.4	7.6	0.54 (U)	—	24.5 (J+)	—	—	—	7	1.4 (J-)	—	—	—
RE14-11-24074	14-614516	0–1	SOIL	—	—	—	—	—	—	—	—	0.56 (U)	—	—	—	—	—	4.4	—	—	—	—
RE14-11-24075	14-614516	2–3	QBT4	—	—	—	78.9	—	—	—	—	0.51 (U)	—	13.1 (J+)	—	—	—	1	1.2 (J-)	—	—	—
RE14-11-24076	14-614517	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.1	—	—	—	—
RE14-11-24077	14-614517	4.5–5.5	QBT4	—	—	—	68.8	—	—	—	—	0.53 (U)	—	11.4 (J+)	—	—	—	0.57	1.7	—	—	—
RE14-11-24078	14-614518	0–1	SOIL	—	—	—	—	—	—	—	—	0.57 (U)	—	—	—	—	—	6.4	—	—	—	—
RE14-11-24079	14-614518	2–3	QBT4	—	—	—	116	3920	—	—	—	0.51 (U)	—	—	—	—	—	0.96	0.94 (J-)	—	17.3	—
RE14-11-24080	14-614519	0–1	SOIL	—	—	—	—	—	—	9.5	77.8	0.54 (U)	—	60.2 (J+)	—	0.629 (J+)	24.7 (J-)	2.8	—	—	—	—
RE14-11-24081	14-614519	1.5–2.5	QBT4	—	0.73	2.9	70.1	3090	49.6 (J-)	4.6	73	0.54 (U)	14700 (J)	36.9 (J+)	—	0.343 (J+)	50.6 (J-)	3.1	1.1 (J-)	—	—	—
RE14-11-24082	14-614520	0–1	SOIL	—	—	—	—	—	—	—	28.1	0.52 (U)	—	34.3 (J+)	—	0.14 (J+)	—	2.5	—	—	—	—
RE14-11-24083	14-614520	2–3	QBT4	—	—	—	—	—	—	—	9.8	0.54 (U)	—	45.5 (J+)	—	—	—	0.71	2 (J-)	—	—	—
RE14-11-24084	14-614521	0–1	SOIL	—	—	—	—	—	—	—	—	0.62 (U)	—	42.4	—	—	—	1.2	2.2 (J)	0.82	—	—
RE14-11-24085	14-614521	2–3	QBT4	—	0.53 (U)	—	—	—	—	—	—	0.53 (U)	—	32.1	—	—	—	0.18 (J)	1.5 (J)	—	—	—
RE14-11-24086	14-614522	0–1	SOIL	—	—	—	—	—	—	—	—	0.59 (U)	—	—	—	—	—	0.4	1.9 (J)	—	—	—
RE14-11-24087	14-614522	1–2	QBT4	—	0.53 (U)	—	—	—	—	—	—	0.53 (U)	—	12.1	—	—	—	0.12 (J)	2.5 (J)	—	—	—
RE14-11-24088	14-614523	0–1	SOIL	—	—	—	—	—	—	—	—	0.57 (U)	—	23.7	—	—	—	1.7	2.3 (J)	—	—	—
RE14-11-24089	14-614523	1–2	QBT4	—	0.51 (U)	—	—	—	—	—	—	0.51 (U)	—	—	—	—	—	0.55	2.3 (J)	—	—	—
RE14-11-24090	14-614524	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.2	2.4 (J)	—	—	51.8
RE14-11-24091	14-614524	1–2	QBT4	—	0.51 (U)	—	—	—	—	—	—	0.51 (U)	—	—	—	—	—	0.33	2.8 (J)	—	—	—
RE14-11-24092	14-614525	0–1	SED	—	—	4.5	—	—	—	—	—	—	—	38.4	—	—	—	0.64	1.5 (J)	—	—	—
RE14-11-24093	14-614525	1–2	QBT4	—	—	—	—	—	—	—	—	0.52 (U)	—	17.6	—	—	—	0.16 (J)	2 (J)	—	—	—
RE14-11-24094	14-614526	0–1	SED	—	—	—	—	—	—	—	42	—	—	36	—	0.147	—	0.69	0.8 (J)	—	—	—
RE14-11-24095	14-614526	1–2	QBT4	—	—	—	—	—	—	—	6.5	0.52 (U)	—	12.1	—	—	—	0.1 (J)	2 (J)	—	—	—
RE14-11-24096	14-614527	0–1	SOIL	—	—	—	—	—	—	—	—	0.55 (U)	—	—	—	—	—	2.5	—	—	—	—

Table 6.19-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Mercury	Nickel	Nitrate	Selenium	Thallium	Vanadium	Zinc
Qbt 2,3,4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**	**11.2**	**1690**	**0.1**	**6.58**	**na**	**0.3**	**1.1**	**17**	**63.5**
Sediment BV[a]				**15,400**	**0.83**	**3.98**	**127**	**4420**	**10.5**	**4.73**	**11.2**	**0.82**	**13,800**	**19.7**	**2370**	**0.1**	**9.38**	**na**	**0.3**	**0.73**	**19.7**	**60.2**
Soil BV[a]				**29,200**	**0.83**	**8.17**	**295**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**	**22.3**	**4610**	**0.1**	**15.4**	**na**	**1.52**	**0.73**	**39.6**	**48.8**
Construction Worker SSL[c]				**41,400**	**142**	**57.4**	**4390**	**8,850,000**	**134**[d]	**36.6**[e]	**14,200**	**12.1**	**248,000**	**800**	**1,550,000**	**77.1**	**753**	**566,000**	**1750**	**3.54**	**614**	**106,000**
Industrial SSL[c]				**1,290,000**	**519**	**21.5**	**255,000**	**32,400,000**	**505**[d]	**350**[f]	**51,900**	**63.3**	**908,000**	**800**	**5,680,000**	**389**	**25,700**	**2,080,000**	**6490**	**13**	**6530**	**389,000**
Residential SSL[c]				**78,000**	**31.3**	**4.25**	**15,600**	**13,000,000**	**96.6**[d]	**23**[f]	**3130**	**11.2**	**54,800**	**400**	**339,000**	**23.5**	**1560**	**125,000**	**391**	**0.782**	**394**	**23,500**
RE14-11-24097	14-614527	2.5–3.5	QBT4	9970	23.8	—	118	2470 (J+)	—	3.4	6.7	0.53 (U)	—	12.4 (J+)	—	—	—	9.5	1.2	—	17.9	—
RE14-11-24098	14-614528	0–1	SOIL	—	—	—	—	—	—	—	17.8	0.55 (U)	—	—	—	0.14 (J+)	—	4.2	—	—	—	—
RE14-11-24099	14-614528	3.5–4.5	QBT4	10,400	—	—	142	2480	7.7 (J-)	4.1	8.5	0.55 (U)	—	12 (J+)	—	—	—	1.6	1.3 (J-)	—	18.1	—
RE14-11-24100	14-614529	0–1	SED	—	—	—	—	—	—	—	18.1	—	—	53.1	—	—	—	1.5	1.7 (J)	—	—	—
RE14-11-24101	14-614529	1–2	QBT4	—	0.59 (U)	—	—	—	—	—	—	0.59 (U)	—	—	—	—	—	0.3	2.2 (J)	—	—	—
RE14-11-24102	14-614530	0–1	SED	—	—	—	—	—	—	—	—	—	—	31.9	—	—	—	1.1	2.3 (J)	—	—	—
RE14-11-24103	14-614530	1–2	QBT4	—	0.52 (U)	—	—	—	—	—	—	0.52 (U)	—	—	—	—	—	0.098 (J)	2.2 (J)	—	—	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915), unless otherwise noted.

[d] SSL for total chromium.

[e] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[f] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] — = Not detected or not detected above BV.

Table 6.19-3
Organic Chemicals Detected at SWMU 14-009

Sample ID	Location ID	Depth (ft)	Media	Acetone	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate	Chrysene	Di-n-butylphthalate	Dinitrotoluene[2,4-]	Fluoranthene	Hexanone[2-]	HMX	Indeno(1,2,3-cd)pyrene	Nitrosodiphenylamine[N-]	PETN	Phenanthrene	Pyrene	RDX	TATB
Construction Worker SSL[a]				**242,000**	**75,300**	**240**	**24**	**240**	**2310**	**5380**	**23,100**	**26,900**	**536**	**10,000**	**1760[b]**	**17,400**	**240**	**37,900**	**708[b]**	**7530**	**7530**	**1010**	**10,000[b, c]**
Industrial SSL[a]				**960,000**	**253,000**	**32.3**	**3.23**	**32.3**	**323**	**1830**	**3230**	**91,600**	**82.3**	**33,700**	**1300[d]**	**63,300**	**32.3**	**5240**	**5700**	**25,300**	**25,300**	**311**	**32,000[c, d]**
Residential SSL[a]				**66,300**	**17,400**	**1.53**	**0.153**	**1.53**	**15.3**	**380**	**153**	**6160**	**17.1**	**2320**	**200[d]**	**3850**	**1.53**	**1090**	**130**	**1740**	**1740**	**60.4**	**2200[c, d]**
RE14-11-24070	14-614514	0–1	SOIL	NA[e]	—[f]	0.11 (J)	0.11 (J)	0.16 (J)	0.07 (J)	—	0.12 (J)	—	—	0.31 (J)	NA	—	0.041 (J)	—	—	0.13 (J)	0.22 (J)	—	—
RE14-11-24071	14-614514	5–6	QBT4	—	—	—	—	—	—	—	—	—	—	0.062 (J)	—	—	—	—	—	—	0.046 (J)	—	—
RE14-11-24073	14-614515	2.5–3.5	QBT4	0.0073 (J)	—	—	—	—	—	—	—	0.14 (J)	—	—	—	—	—	—	—	—	—	—	—
RE14-11-24074	14-614516	0–1	SOIL	NA	0.04 (J)	0.097 (J)	0.087 (J)	0.11 (J)	0.05 (J)	—	0.1 (J)	—	—	0.24 (J)	NA	—	—	—	—	0.19 (J)	0.2 (J)	—	0.12 (J)
RE14-11-24076	14-614517	0–1	SOIL	NA	—	—	—	0.039 (J)	—	—	—	—	—	0.063 (J)	NA	—	—	—	0.43	—	0.048 (J)	—	—
RE14-11-24077	14-614517	4.5–5.5	QBT4	—	—	0.056 (J)	0.048 (J)	0.066 (J)	—	—	0.052 (J)	—	—	0.14 (J)	0.011 (J)	0.64	—	—	—	0.059 (J)	0.091 (J)	—	—
RE14-11-24080	14-614519	0–1	SOIL	NA	—	—	—	—	—	—	—	—	—	—	NA	44 (J)	—	—	—	—	—	0.15 (J-)	20 (J)
RE14-11-24081	14-614519	1.5–2.5	QBT4	—	—	—	—	—	—	—	—	—	—	—	—	120 (J)	—	—	—	—	—	0.94 (J+)	15 (J)
RE14-11-24082	14-614520	0–1	SOIL	NA	—	—	—	—	—	0.057 (J)	—	—	0.16	—	NA	200 (J)	—	0.096 (J)	—	—	—	0.31 (J+)	16 (J)
RE14-11-24083	14-614520	2–3	QBT4	0.0086 (J)	—	—	—	—	—	—	—	—	—	—	—	370 (J)	—	—	—	—	—	—	2.6 (J)
RE14-11-24084	14-614521	0–1	SOIL	NA	—	—	—	—	—	—	—	0.16 (J)	—	—	NA	1.2	—	—	—	—	—	—	NA
RE14-11-24085	14-614521	2–3	QBT4	0.0081 (J)	—	—	—	—	—	—	—	—	—	—	—	0.27 (J)	—	—	—	—	—	—	NA
RE14-11-24088	14-614523	0–1	SOIL	NA	—	—	—	—	—	—	—	0.15 (J)	—	—	NA	—	—	—	—	—	—	—	NA
RE14-11-24089	14-614523	1–2	QBT4	0.0099 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NA
RE14-11-24090	14-614524	0–1	SOIL	NA	—	—	—	—	—	—	—	—	—	—	NA	0.039 (J)	—	—	—	—	—	—	NA
RE14-11-24092	14-614525	0–1	SED	NA	—	—	—	—	—	—	—	0.052 (J)	—	—	NA	9.1	—	—	—	—	—	—	NA
RE14-11-24093	14-614525	1–2	QBT4	—	—	—	—	—	—	—	—	—	—	—	—	1.9 (J)	—	—	—	—	—	—	NA
RE14-11-24094	14-614526	0–1	SED	NA	—	—	—	—	—	—	—	—	—	—	NA	120 (J)	—	—	—	—	—	—	NA
RE14-11-24095	14-614526	1–2	QBT4	0.0067 (J)	—	—	—	—	—	—	—	—	—	—	—	130 (J)	—	—	—	—	—	0.57 (J)	NA
RE14-11-24097	14-614527	2.5–3.5	QBT4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.17 (J)
RE14-11-24098	14-614528	0–1	SOIL	NA	—	—	—	—	—	—	—	—	—	—	NA	0.26 (J)	—	—	—	—	—	—	18 (J)
RE14-11-24099	14-614528	3.5–4.5	QBT4	—	—	—	—	—	—	—	—	—	—	—	—	0.8 (J)	—	—	—	—	—	—	1.6 (J)
RE14-11-24100	14-614529	0–1	SED	NA	—	—	—	—	—	—	—	0.14 (J)	—	—	NA	23 (J)	—	—	—	—	—	0.16 (J)	NA
RE14-11-24101	14-614529	1–2	QBT4	—	—	—	—	—	—	—	—	—	—	—	—	5.3	—	—	—	—	—	—	NA
RE14-11-24103	14-614530	1–2	QBT4	0.0067 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	NA

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[d] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[e] NA = Not analyzed.

[f] — = Not detected.

Table 6.19-4
Radionuclides Detected or Detected above BVs/FVs at SWMU 14-009

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Strontium-90	Uranium-234	Uranium-235/236	Uranium-238
Qbt 2,3,4 BV[a]				**na**[b]	**na**	**1.98**	**0.09**	**1.93**
Sediment BV[a]				**0.9**	**1.04**	**2.59**	**0.2**	**2.29**
Soil BV[a]				**1.65**	**1.31**	**2.59**	**0.2**	**2.29**
Construction Worker SAL[c]				**37**	**1400**	**1000**	**130**	**470**
Industrial SAL[c]				**41**	**2400**	**3100**	**160**	**710**
Residential SAL[c]				**12**	**15**	**290**	**42**	**150**
RE14-11-24071	14-614514	5–6	QBT4	—[d]	1.3	—	—	—
RE14-11-24075	14-614516	2–3	QBT4	0.116	—	—	—	—
RE14-11-24080	14-614519	0–1	SOIL	—	—	—	0.47	16.8
RE14-11-24081	14-614519	1.5–2.5	QBT4	—	—	7.35 (J)	0.97	46.6
RE14-11-24082	14-614520	0–1	SOIL	—	—	—	0.327	15.5
RE14-11-24083	14-614520	2–3	QBT4	—	0.37	—	—	3.26
RE14-11-24084	14-614521	0–1	SOIL	—	—	—	—	2.48
RE14-11-24085	14-614521	2–3	QBT4	0.243	—	—	—	—
RE14-11-24094	14-614526	0–1	SED	—	—	—	0.218	12.1
RE14-11-24095	14-614526	1–2	QBT4	—	0.44	—	—	—
RE14-11-24096	14-614527	0–1	SOIL	—	—	—	0.276	13.9
RE14-11-24097	14-614527	2.5–3.5	QBT4	—	—	—	—	3.88
RE14-11-24098	14-614528	0–1	SOIL	—	—	21 (J)	2.79	162
RE14-11-24099	14-614528	3.5–4.5	QBT4	—	—	1.99 (J)	0.153	6.01
RE14-11-24100	14-614529	0–1	SED	—	—	8.34 (J+)	0.814 (J+)	45 (J+)

Notes: Results are in pCi/g. Data qualifiers are defined in Appendix A.

[a] BVs/FVs from LANL (1998, 059730).

[b] na = Not available.

[c] SALs from LANL (2015, 600929).

[d] — = Not detected or not detected above BV/FV.

Table 6.20-1
Samples Collected and Analyses Requested at SWMU 14-010

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Gamma-Emitting Radionuclides	Explosive Compounds	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	SVOCs	VOCs	Cyanide (Total)
0214-97-0034	14-01038	0–0.5	SED	—[a]	—	—	3365R[b]	—	—	—	—	—	—	—
0214-97-0045	14-01038	0–0.5	SED	—	—	3628R	—	—	—	—	—	—	—	—
0214-97-0035	14-01039	0–0.5	SED	—	—	—	3365R	—	—	—	—	—	—	—
0214-97-0046	14-01039	0–0.5	SED	—	—	3628R	—	—	—	—	—	—	—	—
0214-97-0036	14-01040	0–0.5	SED	—	—	—	3365R	—	—	—	—	—	—	—
0214-97-0047	14-01040	0–0.5	SED	—	—	3628R	—	—	—	—	—	—	—	—
0214-97-0037	14-01041	0–0.5	SED	—	—	—	3365R	—	—	—	—	—	—	—
0214-97-0050	14-01041	0–0.5	SED	—	—	3628R	—	—	—	—	—	—	—	—
0214-97-0041	14-01042	0–0.5	SED	—	—	—	3365R	—	—	—	—	—	—	—
0214-97-0048	14-01042	0–0.5	SED	—	—	3628R	—	—	—	—	—	—	—	—
0214-97-0042	14-01043	0–0.08	SED	—	—	—	3365R	—	—	—	—	—	—	—
0214-97-0049	14-01043	0–0.5	SED	—	—	3628R	—	—	—	—	—	—	—	—
RE14-11-24362	14-614595	0.3–1.3	SOIL	11-3362	11-3348	11-3361	11-3348	11-3362	—	11-3362	11-3348	11-3361	—	11-3362
RE14-11-24363	14-614595	3–4	QBT4	11-3362	11-3348	11-3361	11-3348	11-3362	—	11-3362	11-3348	11-3361	11-3361	11-3362
RE14-11-24364	14-614596	0–1	SOIL	11-3362	11-3348	11-3361	11-3348	11-3362	—	11-3362	11-3348	11-3361	—	11-3362
RE14-11-24365	14-614596	3–4	QBT4	11-3362	11-3348	11-3361	11-3348	11-3362	—	11-3362	11-3348	11-3361	11-3361	11-3362
RE14-11-24366	14-614597	0–1	SOIL	11-3362	11-3348	11-3361	11-3348	11-3362	—	11-3362	11-3348	11-3361	—	11-3362
RE14-11-24367	14-614597	3–4	QBT4	11-3362	11-3348	11-3361	11-3348	11-3362	—	11-3362	11-3348	11-3361	11-3361	11-3362
RE14-11-24368	14-614598	0–1	SOIL	11-3362	11-3348	11-3361	11-3348	11-3362	—	11-3362	11-3348	11-3361	—	11-3362
RE14-11-24369	14-614598	3–4	QBT4	11-3362	11-3348	11-3361	11-3348	11-3362	—	11-3362	11-3348	11-3361	11-3361	11-3362
RE14-11-24370	14-614599	0–1	SOIL	11-3362	11-3348	11-3361	11-3348	11-3362	11-3361	11-3362	11-3348	11-3361	—	11-3362
RE14-11-24371	14-614599	3–4	QBT4	11-3362	11-3348	11-3361	11-3348	11-3362	11-3361	11-3362	11-3348	11-3361	11-3361	11-3362

[a] — = Analysis not requested.

[b] Request number.

Table 6.20-2
Inorganic Chemicals above BVs at SWMU 14-010

Sample ID	Location ID	Depth (ft)	Media	Antimony	Arsenic	Copper	Cyanide (Total)	Lead	Nitrate	Selenium	Silver	Zinc
Qbt 2,3,4 BV[a]				**0.5**	**2.79**	**4.66**	**0.5**	**11.2**	**na**[b]	**0.3**	**1**	**63.5**
Soil BV[a]				**0.83**	**8.17**	**14.7**	**0.5**	**22.3**	**na**	**1.52**	**1**	**48.8**
Construction Worker SSL[c]				**142**	**57.4**	**14,200**	**12.1**	**800**	**566,000**	**1750**	**1770**	**106,000**
Industrial SSL[c]				**519**	**21.5**	**51,900**	**63.3**	**800**	**2,080,000**	**6490**	**6490**	**389,000**
Residential SSL[c]				**31.3**	**4.25**	**3130**	**11.2**	**400**	**125,000**	**391**	**391**	**23,500**
RE14-11-24362	14-614595	0.3–1.3	SOIL	—[d]	—	—	0.6 (U)	—	1.2	—	—	—
RE14-11-24363	14-614595	3–4	QBT4	—	5.4	—	0.59 (U)	—	2.7	1.7	—	—
RE14-11-24364	14-614596	0–1	SOIL	—	—	25.9	0.55 (U)	42.6	5.7	—	—	—
RE14-11-24365	14-614596	3–4	QBT4	0.7	3.4	4.8	0.6 (U)	—	1.7	1.9	—	—
RE14-11-24366	14-614597	0–1	SOIL	—	—	—	0.58 (U)	—	3.5	—	—	—
RE14-11-24367	14-614597	3–4	QBT4	—	3.7	—	0.53 (U)	—	0.56	2.4	—	—
RE14-11-24368	14-614598	0–1	SOIL	—	—	—	0.62 (U)	—	1.5	—	—	—
RE14-11-24369	14-614598	3–4	QBT4	—	—	—	0.56 (U)	19.1	0.33	1.6	—	—
RE14-11-24370	14-614599	0–1	SOIL	—	—	53.4	0.57 (U)	42.1	4.7	—	2	—
RE14-11-24371	14-614599	3–4	QBT4	—	—	—	0.57 (U)	64.8	0.39	1.7	—	88.2

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915).

[d] — = Not detected or not detected above BV.

Table 6.20-3
Organic Chemicals Detected at SWMU 14-010

Sample ID	Location ID	Depth (ft)	Media	Bis(2-ethylhexyl)phthalate	Di-n-butylphthalate	HMX	RDX	TATB	TNT
Construction Worker SSL[a]				**5380**	**26,900**	**17,400**	**1010**	**10,000**[b,c]	**161**
Industrial SSL[a]				**1830**	**91,600**	**63,300**	**311**	**32,000**[c,d]	**573**
Residential SSL[a]				**380**	**6160**	**3850**	**60.4**	**2200**[c,d]	**36**
0214-97-0045	14-01038	0–0.5	SED	NA[e]	NA	94.3	—[f]	NA	0.093
0214-97-0046	14-01039	0–0.5	SED	NA	NA	61.9	—	NA	—
0214-97-0047	14-01040	0–0.5	SED	NA	NA	1.03	—	NA	—
0214-97-0050	14-01041	0–0.5	SED	NA	NA	1.38	—	NA	0.162
0214-97-0048	14-01042	0–0.5	SED	NA	NA	2.19	—	NA	—
0214-97-0049	14-01043	0–0.5	SED	NA	NA	1.29	—	NA	0.162
RE14-11-24362	14-614595	0.3–1.3	SOIL	—	—	0.74	—	—	—
RE14-11-24363	14-614595	3–4	QBT4	0.15 (J)	—	0.19	—	—	—
RE14-11-24364	14-614596	0–1	SOIL	—	0.46	110	0.38	14 (J)	—
RE14-11-24365	14-614596	3–4	QBT4	0.087 (J)	—	5	—	1.2 (J)	—
RE14-11-24366	14-614597	0–1	SOIL	—	—	0.039 (J)	—	—	—
RE14-11-24368	14-614598	0–1	SOIL	0.11 (J)	—	0.078 (J)	—	—	—
RE14-11-24369	14-614598	3–4	QBT4	—	—	0.046 (J)	—	—	—
RE14-11-24370	14-614599	0–1	SOIL	—	—	52	—	3.9 (J)	—
RE14-11-24371	14-614599	3–4	QBT4	—	—	18	—	1.2 (J)	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2015, 600915).

[b] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[d] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[e] NA = Not analyzed.

[f] — = Not detected.

Table 6.20-4
Radionuclides Detected or Detected above BVs/FVs at SWMU 14-010

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Uranium-234	Uranium-235	Uranium-235/236	Uranium-238
Qbt 2,3,4 BV[a]				**na**[b]	**1.98**	**0.09**	**0.09**	**1.93**
Sediment BV[a]				**na**	**2.59**	**0.2**	**0.2**	**2.29**
Soil BV[a]				**1.65**	**2.59**	**0.2**	**0.2**	**2.29**
Construction Worker SAL[c]				**37**	**1000**	**130**	**130**	**470**
Industrial SAL[c]				**41**	**3100**	**160**	**160**	**710**
Residential SAL[c]				**12**	**290**	**42**	**42**	**150**
0214-97-0034	14-01038	0–0.5	SED	NA[d]	3.44	0.322	NA	24.05
0214-97-0035	14-01039	0–0.5	SED	NA	—[e]	0.229	NA	12
0214-97-0037	14-01041	0–0.5	SED	NA	—	—	NA	3.36
0214-97-0041	14-01042	0–0.5	SED	NA	—	—	NA	2.3
RE14-11-24364	14-614596	0–1	SOIL	—	2.73	NA	0.22	16
RE14-11-24365	14-614596	3–4	QBT4	—	—	NA	—	2.14
RE14-11-24367	14-614597	3–4	QBT4	0.142	—	NA	—	—
RE14-11-24370	14-614599	0–1	SOIL	—	—	NA	—	8.36

Notes: Results are in pCi/g.

[a] BVs/FVs from LANL (1998, 059730).

[b] na = Not available.

[c] SALs from LANL (2015, 600929).

[d] NA = Not analyzed.

[e] — = Not detected or not detected above BV/FV.

Table 6.21-1
Samples Collected and Analyses Requested at AOC C-14-001

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Explosive Compounds	TAL Metals	PCBs	Perchlorate	SVOCs	VOCs	Cyanide (Total)
RE14-11-24389	14-614605	0–1	SOIL	11-3716[a]	11-3715	11-3716	—[b]	11-3716	11-3715	—	11-3716
RE14-11-24390	14-614605	3–4	SOIL	11-3716	11-3715	11-3716	—	11-3716	11-3715	11-3715	11-3716
RE14-11-24391	14-614606	0–1	SOIL	11-3716	11-3715	11-3716	—	11-3716	11-3715	—	11-3716
RE14-11-24392	14-614606	3–4	QBT4	11-3716	11-3715	11-3716	—	11-3716	11-3715	11-3715	11-3716
RE14-11-24393	14-614607	0–1	SOIL	11-3716	11-3715	11-3716	—	11-3716	11-3715	—	11-3716
RE14-11-24394	14-614607	3–4	QBT4	11-3716	11-3715	11-3716	—	11-3716	11-3715	11-3715	11-3716
RE14-11-24395	14-614608	0–1	SOIL	11-3716	11-3715	11-3716	—	11-3716	11-3715	—	11-3716
RE14-11-24396	14-614608	3–4	QBT4	11-3716	11-3715	11-3716	—	11-3716	11-3715	11-3715	11-3716
RE14-11-24397	14-614609	0–1	SOIL	11-3716	11-3715	11-3716	11-3715	11-3716	11-3715	—	11-3716
RE14-11-24398	14-614609	3–4	QBT4	11-3716	11-3715	11-3716	11-3715	11-3716	11-3715	11-3715	11-3716

[a] Request number.

[b] — = Analysis not requested.

Table 6.21-2
Inorganic Chemicals above BVs at AOC C-14-001

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Barium	Calcium	Chromium	Cobalt	Cyanide (Total)	Nickel	Nitrate	Selenium
Qbt 2,3,4 BV[a]				**7340**	**0.5**	**46**	**2200**	**7.14**	**3.14**	**0.5**	**6.58**	**na[b]**	**0.3**
Soil BV[a]				**29,200**	**0.83**	**295**	**6120**	**19.3**	**8.64**	**0.5**	**15.4**	**na**	**1.52**
Construction Worker SSL[c]				**41,400**	**142**	**4390**	**8,850,000**	**134[d]**	**36.6[e]**	**12.1**	**753**	**566,000**	**1750**
Industrial SSL[c]				**1,290,000**	**519**	**255,000**	**32,400,000**	**505[d]**	**350[f]**	**63.3**	**25,700**	**2,080,000**	**6490**
Residential SSL[c]				**78,000**	**31.3**	**15,600**	**13,000,000**	**96.6[d]**	**23[f]**	**11.2**	**1560**	**125,000**	**391**
RE14-11-24389	14-614605	0–1	SOIL	—[g]	—	—	—	75.5	—	0.54 (U)	—	0.77	—
RE14-11-24390	14-614605	3–4	SOIL	—	—	—	—	—	—	0.54 (U)	—	0.16 (J)	—
RE14-11-24391	14-614606	0–1	SOIL	—	—	—	—	—	—	0.57 (U)	—	0.57	—
RE14-11-24392	14-614606	3–4	QBT4	8650	0.53 (U)	80.4	5300	21.5	3.6	0.53 (U)	12.2	0.35	1.2
RE14-11-24393	14-614607	0–1	SOIL	—	—	—	—	—	—	0.54 (U)	—	0.28	—
RE14-11-24394	14-614607	3–4	QBT4	9680	0.53 (U)	104	—	—	4.3	0.53 (U)	—	0.11 (J)	1.2
RE14-11-24395	14-614608	0–1	SOIL	—	—	—	—	—	—	—	—	0.34	—
RE14-11-24396	14-614608	3–4	QBT4	10,200	0.54 (U)	93.1	—	—	3.8	0.54 (U)	—	0.14 (J)	1.4
RE14-11-24397	14-614609	0–1	SOIL	—	—	—	—	—	—	0.55 (U)	—	0.4	—
RE14-11-24398	14-614609	3–4	QBT4	8740	0.53 (U)	82.2	—	—	3.4	0.53 (U)	—	0.22	0.9

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915), unless otherwise noted.

[d] SSL for total chromium.

[e] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[f] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] — = Not detected or not detected above BV.

Table 6.21-3
Organic Chemicals Detected at AOC C-14-001

Sample ID	Location ID	Depth (ft)	Media	Benzoic Acid
Construction Worker SSL				**1,080,000**[a]
Industrial SSL				**3,300,000**[b]
Residential SSL				**250,000**[b]
RE14-11-24398	14-614609	3–4	QBT4	0.36 (J)

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[b] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table 6.24-1
Samples Collected and Analyses Requested at AOC C-14-004

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Explosive Compounds	TAL Metals	PCBs	Perchlorate	SVOCs	VOCs	Cyanide (Total)
RE14-11-24431	14-614622	0–1	SOIL	11-3220[a]	11-3219	11-3220	—[b]	11-3220	11-3219	—	11-3220
RE14-11-24432	14-614622	3–4	QBT4	11-3220	11-3219	11-3220	—	11-3220	11-3219	11-3219	11-3220
RE14-11-24433	14-614623	0–1	SOIL	11-3220	11-3219	11-3220	—	11-3220	11-3219	—	11-3220
RE14-11-24434	14-614623	3–4	QBT4	11-3220	11-3219	11-3220	—	11-3220	11-3219	11-3219	11-3220
RE14-11-24435	14-614624	0–1	SOIL	11-3220	11-3219	11-3220	—	11-3220	11-3219	—	11-3220
RE14-11-24436	14-614624	3–4	QBT4	11-3220	11-3219	11-3220	—	11-3220	11-3219	11-3219	11-3220
RE14-11-24437	14-614625	0–1	SOIL	11-3220	11-3219	11-3220	—	11-3220	11-3219	—	11-3220
RE14-11-24438	14-614625	3–4	QBT4	11-3220	11-3219	11-3220	—	11-3220	11-3219	11-3219	11-3220
RE14-11-24439	14-614626	0–1	SOIL	11-3220	11-3219	11-3220	11-3219	11-3220	11-3219	—	11-3220
RE14-11-24440	14-614626	3–4	SOIL	11-3220	11-3219	11-3220	11-3219	11-3220	11-3219	11-3219	11-3220
RE14-11-24832	14-614642	0–1	QBT4	11-3220	11-3219	11-3220	11-3219	11-3220	11-3219	—	11-3220
RE14-11-24833	14-614642	3–4	QBT4	11-3220	11-3219	11-3220	11-3219	11-3220	11-3219	11-3219	11-3220

[a] Request number.

[b] — = Analysis not requested.

Table 6.24-2
Inorganic Chemicals above BVs at AOC C-14-004

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Nickel	Nitrate	Perchlorate	Selenium	Vanadium
Qbt 2,3,4 BV[a]				**7340**	**0.5**	**2.79**	**46**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**	**11.2**	**1690**	**6.58**	**na[b]**	**na**	**0.3**	**17**
Soil BV[a]				**29,200**	**0.83**	**8.17**	**295**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**	**22.3**	**4610**	**15.4**	**na**	**na**	**1.52**	**39.6**
Construction Worker SSL[c]				**41,400**	**142**	**57.4**	**4390**	**8,850,000**	**134[d]**	**36.6[e]**	**14,200**	**12.1**	**248,000**	**800**	**1,550,000**	**753**	**566,000**	**248**	**1750**	**614**
Industrial SSL[c]				**1,290,000**	**519**	**21.5**	**255,000**	**32,400,000**	**505[d]**	**350[f]**	**51,900**	**63.3**	**908,000**	**800**	**5,680,000**	**25,700**	**2,080,000**	**908**	**6490**	**6530**
Residential SSL[c]				**78,000**	**31.3**	**4.25**	**15,600**	**13,000,000**	**96.6[d]**	**23[f]**	**3130**	**11.2**	**54,800**	**400**	**339,000**	**1560**	**125,000**	**54.8**	**391**	**394**
RE14-11-24431	14-614622	0–1	SOIL	—[g]	—	—	—	—	—	—	—	0.53 (U)	—	—	—	—	2	0.0024 (J)	—	—
RE14-11-24432	14-614622	3–4	QBT4	15,800	—	3.2	295	2290	9.2	3.8	6.5	0.56 (U)	15,800	15.9	2460	7.8	0.2 (J)	0.02	1.3	17.5
RE14-11-24433	14-614623	0–1	SOIL	—	—	—	—	—	—	—	—	0.52 (U)	—	—	—	—	1.2	0.011	—	—
RE14-11-24434	14-614623	3–4	QBT4	12,300	—	3.4	82.4	2320	8.4	4.1	6.2	0.56 (U)	—	15.3	1850	6.9	0.071 (J)	0.016	1.4	17.5
RE14-11-24435	14-614624	0–1	SOIL	—	—	—	—	—	—	—	—	0.52 (U)	—	—	—	—	1.2	0.0026 (J)	—	—
RE14-11-24436	14-614624	3–4	QBT4	11,600	0.56 (U)	3.4	94	4320	—	—	5.4	0.56 (U)	—	—	2380	6.9	0.15 (J)	0.015	1.6	—
RE14-11-24437	14-614625	0–1	SOIL	—	—	—	—	—	—	—	—	0.53 (U)	—	26.5	—	—	2	—	—	—
RE14-11-24438	14-614625	3–4	QBT4	—	0.52 (U)	—	—	—	—	—	—	0.52 (U)	—	—	—	—	0.6	—	1.5	—
RE14-11-24439	14-614626	0–1	SOIL	—	—	—	—	—	—	—	—	0.53 (U)	—	—	—	—	3.9	—	—	—
RE14-11-24440	14-614626	3–4	SOIL	—	—	—	—	—	—	—	—	0.57 (U)	—	—	—	—	0.76	—	—	—
RE14-11-24832	14-614642	0–1	QBT4	8530	—	—	75.4	—	—	3.5	7.8	0.54 (U)	—	17.6	—	—	3.7	—	0.97	—
RE14-11-24833	14-614642	3–4	QBT4	—	0.54 (U)	—	52.4	—	—	—	—	0.54 (U)	—	—	—	—	0.28	0.0025 (J)	1.5	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915), unless otherwise noted.

[d] SSL for total chromium.

[e] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[f] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] — = Not detected or not detected above BV.

Table 6.24-3
Organic Chemicals Detected at AOC C-14-004

Sample ID	Location ID	Depth (ft)	Media	Acetone	HMX	TATB
Construction Worker SSL[a]				**242,000**	**17,400**	**10,000**[b,c]
Industrial SSL[a]				**960,000**	**63,300**	**32,000**[c,d]
Residential SSL[a]				**66,300**	**3850**	**2200**[c,d]
RE14-11-24431	14-614622	0–1	SOIL	NA[e]	—[f]	0.88 (J-)
RE14-11-24432	14-614622	3–4	QBT4	0.0077 (J)	—	0.079 (J-)
RE14-11-24433	14-614623	0–1	SOIL	NA	0.046 (J-)	1.2 (J-)
RE14-11-24434	14-614623	3–4	QBT4	0.014 (J)	—	0.55 (J-)
RE14-11-24435	14-614624	0–1	SOIL	NA	—	0.51 (J-)
RE14-11-24437	14-614625	0–1	SOIL	NA	—	0.34 (J-)
RE14-11-24438	14-614625	3–4	QBT4	0.0073 (J)	—	—
RE14-11-24439	14-614626	0–1	SOIL	NA	—	0.7 (J-)
RE14-11-24440	14-614626	3–4	SOIL	—	—	0.27 (J-)
RE14-11-24832	14-614642	0–1	QBT4	NA	0.059 (J-)	1.9 (J-)
RE14-11-24833	14-614642	3–4	QBT4	—	—	0.17 (J-)

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2015, 600915).

[b] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[d] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[e] NA = Not analyzed.

[f] — = Not detected.

Table 6.25-1
Samples Collected and Analyses Requested at AOC C-14-005

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Explosive Compounds	TAL Metals	PCBs	Perchlorate	SVOCs	VOCs	Cyanide (Total)
RE14-11-24446	14-614627	0–1	SOIL	11-3190[a]	11-3189	11-3190	—[b]	11-3190	11-3189	—	11-3190
RE14-11-24447	14-614627	3–4	SOIL	11-3190	11-3189	11-3190	—	11-3190	11-3189	11-3189	11-3190
RE14-11-24448	14-614628	0–1	SOIL	11-3190	11-3189	11-3190	—	11-3190	11-3189	—	11-3190
RE14-11-24449	14-614628	3–4	SOIL	11-3190	11-3189	11-3190	—	11-3190	11-3189	11-3189	11-3190
RE14-11-24450	14-614629	0–1	SOIL	11-3190	11-3189	11-3190	—	11-3190	11-3189	—	11-3190
RE14-11-24451	14-614629	3–4	SOIL	11-3190	11-3189	11-3190	—	11-3190	11-3189	11-3189	11-3190
RE14-11-24452	14-614630	0–1	SOIL	11-3190	11-3189	11-3190	—	11-3190	11-3189	—	11-3190
RE14-11-24453	14-614630	3–4	SOIL	11-3190	11-3189	11-3190	—	11-3190	11-3189	11-3189	11-3190
RE14-11-24454	14-614631	0–1	SOIL	11-3190	11-3189	11-3190	11-3189	11-3190	11-3189	—	11-3190
RE14-11-24455	14-614631	3–4	SOIL	11-3190	11-3189	11-3190	11-3189	11-3190	11-3189	11-3189	11-3190

[a] Request number.

[b] — = Analysis not requested.

Table 6.25-2
Inorganic Chemicals above BVs at AOC C-14-005

Sample ID	Location ID	Depth (ft)	Media	Cyanide (Total)	Lead	Mercury	Nitrate	Perchlorate	Selenium
Soil BV[a]				**0.5**	**22.3**	**0.1**	**na**[b]	**na**	**1.52**
Construction Worker SSL[c]				**12.1**	**800**	**77.1**	**566,000**	**248**	**1750**
Industrial SSL[c]				**63.3**	**800**	**389**	**2,080,000**	**908**	**6490**
Residential SSL[c]				**11.2**	**400**	**23.5**	**125,000**	**54.8**	**391**
RE14-11-24446	14-614627	0–1	SOIL	0.54 (U)	—[d]	0.798 (J+)	3.6	—	—
RE14-11-24447	14-614627	3–4	SOIL	0.56 (U)	—	—	0.4	0.0031 (J)	—
RE14-11-24448	14-614628	0–1	SOIL	0.53 (U)	24	1.37 (J+)	3.2	—	—
RE14-11-24449	14-614628	3–4	SOIL	0.55 (U)	—	—	0.26	0.0024 (J)	1.8
RE14-11-24450	14-614629	0–1	SOIL	0.54 (U)	—	0.848 (J+)	2.9	—	—
RE14-11-24451	14-614629	3–4	SOIL	0.56 (U)	—	—	0.35	—	—
RE14-11-24452	14-614630	0–1	SOIL	0.53 (U)	—	0.878 (J+)	2.1	—	—
RE14-11-24453	14-614630	3–4	SOIL	0.56 (U)	—	—	0.32	0.012	—
RE14-11-24454	14-614631	0–1	SOIL	0.53 (U)	—	0.146 (J+)	1.1	—	—
RE14-11-24455	14-614631	3–4	SOIL	0.55 (U)	—	—	0.064 (J)	0.0024 (J)	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915).

[d] — = Not detected or not detected above BV.

Table 6.25-3
Organic Chemicals Detected at AOC C-14-005

Sample ID	Location ID	Depth (ft)	Media	Acetone	Fluoranthene	Isopropyltoluene[4-]	TATB
Construction Worker SSL[a]				**242,000**	**10,000**	**2740**[b]	**10,000**[c,d]
Industrial SSL[a]				**960,000**	**33,700**	**14,200**[b]	**32,000**[d,e]
Residential SSL[a]				**66,300**	**2320**	**2360**[b]	**2200**[d,e]
RE14-11-24446	14-614627	0–1	SOIL	NA[f]	—[g]	NA	0.77 (J)
RE14-11-24450	14-614629	0–1	SOIL	NA	—	NA	0.25 (J)
RE14-11-24452	14-614630	0–1	SOIL	NA	—	NA	0.52 (J)
RE14-11-24454	14-614631	0–1	SOIL	NA	0.041 (J)	NA	0.28 (J)
RE14-11-24455	14-614631	3–4	SOIL	0.076 (J)	—	0.019	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] Isopropylbenzene used as a surrogate based on structural similarity.

[c] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[e] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[f] NA = Not analyzed.

[g] — = Not detected.

Table 6.26-1
Samples Collected and Analyses Requested at AOC C-14-007

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Explosive Compounds	TAL Metals	PCBs	Perchlorate	SVOCs	VOCs	Cyanide (Total)
RE14-11-24460	14-614632	0–1	QBT4	11-3408[a]	11-3408	11-3408	—[b]	11-3408	11-3408	—	11-3408
RE14-11-24461	14-614632	3–4	QBT4	11-3430	11-3429	11-3430	—	11-3430	11-3429	11-3429	11-3430
RE14-11-24462	14-614633	0–1	SOIL	11-3408	11-3408	11-3408	—	11-3408	11-3408	—	11-3408
RE14-11-24463	14-614633	3–4	QBT4	11-3430	11-3429	11-3430	—	11-3430	11-3429	11-3429	11-3430
RE14-11-24464	14-614634	0–1	SOIL	11-3430	11-3429	11-3430	—	11-3430	11-3429	—	11-3430
RE14-11-24465	14-614634	3–4	QBT4	11-3430	11-3429	11-3430	—	11-3430	11-3429	11-3429	11-3430
RE14-11-24466	14-614635	0–1	SOIL	11-3430	11-3429	11-3430	—	11-3430	11-3429	—	11-3430
RE14-11-24467	14-614635	3–4	QBT4	11-3430	11-3429	11-3430	—	11-3430	11-3429	11-3429	11-3430
RE14-11-24468	14-614636	0–1	SOIL	11-3408	11-3408	11-3408	11-3408	11-3408	11-3408	—	11-3408
RE14-11-24469	14-614636	3–4	QBT4	11-3430	11-3429	11-3430	11-3429	11-3430	11-3429	11-3429	11-3430

[a] Request number.

[b] — = Analysis not requested.

Table 6.26-2
Inorganic Chemicals above BVs at AOC C-14-007

Sample ID	Location ID	Depth (ft)	Media	Antimony	Arsenic	Barium	Calcium	Chromium	Copper	Cyanide (Total)	Lead	Magnesium	Nickel	Nitrate	Perchlorate	Selenium
Qbt 2,3,4 BV[a]				**0.5**	**2.79**	**46**	**2200**	**7.14**	**4.66**	**0.5**	**11.2**	**1690**	**6.58**	**na**[b]	**na**	**0.3**
Soil BV[a]				**0.83**	**8.17**	**295**	**6120**	**19.3**	**14.7**	**0.5**	**22.3**	**4610**	**15.4**	**na**	**na**	**1.52**
Construction Worker SSL[c]				**142**	**57.4**	**4390**	**8,850,000**	**134**[d]	**14,200**	**12.1**	**800**	**1,550,000**	**753**	**566,000**	**248**	**1750**
Industrial SSL[c]				**519**	**21.5**	**255,000**	**32,400,000**	**505**[d]	**51,900**	**63.3**	**800**	**5,680,000**	**25,700**	**2,080,000**	**908**	**6490**
Residential SSL[c]				**31.3**	**4.25**	**15,600**	**13,000,000**	**96.6**[d]	**3130**	**11.2**	**400**	**339,000**	**1560**	**125,000**	**54.8**	**391**
RE14-11-24460	14-614632	0–1	QBT4	—[e]	—	52.9	—	—	—	0.56 (U)	15.7	—	—	0.32	—	1.5
RE14-11-24461	14-614632	3–4	QBT4	—	3.4	58.1	4800	49.3	9.7	0.53 (U)	—	1770	16.4	0.076 (J)	0.0052 (J)	2.6
RE14-11-24462	14-614633	0–1	SOIL	—	—	—	—	—	—	—	—	—	—	3.4	—	—
RE14-11-24463	14-614633	3–4	QBT4	—	—	—	—	25.7	4.8	0.55 (U)	—	—	—	0.69	—	2.2
RE14-11-24464	14-614634	0–1	SOIL	—	—	—	—	—	—	0.64 (U)	—	—	—	3.5	—	—
RE14-11-24465	14-614634	3–4	QBT4	—	5.1	—	—	14.4	—	0.51 (U)	—	—	—	—	—	2
RE14-11-24466	14-614635	0–1	SOIL	—	—	—	—	—	—	0.62 (U)	—	—	—	4.7	—	—
RE14-11-24467	14-614635	3–4	QBT4	—	6.3	—	—	28.4	5.9	0.52 (U)	17.7	—	9	0.074 (J)	—	2.2
RE14-11-24468	14-614636	0–1	SOIL	4.9	—	—	—	—	—	0.63 (U)	—	—	—	0.49	—	—
RE14-11-24469	14-614636	3–4	QBT4	—	2.9	—	—	19.4	—	0.51 (U)	—	—	7.8	0.096 (J)	—	2.5

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915).

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

Table 6.26-3
Organic Chemicals Detected at AOC C-14-007

Sample ID	Location ID	Depth (ft)	Media	Benzene	Benzo(b)fluoranthene	Butanone[2-]	Chrysene	Fluoranthene	Isopropyltoluene[4-]	Pyrene	TATB	Toluene
Construction Worker SSL[a]				**142**	**240**	**91,700**	**23,100**	**10,000**	**2740**[b]	**7530**	**10,000**[c,d]	**14,000**
Industrial SSL[a]				**87.2**	**32.3**	**411,000**	**3230**	**33,700**	**14,200**[b]	**25,300**	**32,000**[d,e]	**61,300**
Residential SSL[a]				**17.8**	**1.53**	**37,400**	**153**	**2320**	**2360**[b]	**1740**	**2200**[d,e]	**5230**
RE14-11-24461	14-614632	3–4	QBT4	—[f]	—	—	—	—	0.00067 (J)	—	—	—
RE14-11-24462	14-614633	0–1	SOIL	NA[g]	—	NA	—	—	NA	—	0.25 (J)	NA
RE14-11-24463	14-614633	3–4	QBT4	—	—	—	—	—	—	—	—	0.0015 (J)
RE14-11-24464	14-614634	0–1	SOIL	NA	—	NA	—	—	NA	—	2.8 (J)	NA
RE14-11-24466	14-614635	0–1	SOIL	NA	0.074 (J)	NA	0.048 (J)	0.055 (J)	NA	0.048 (J)	2.6 (J)	NA
RE14-11-24467	14-614635	3–4	QBT4	0.0003 (J)	—	0.0058 (J)	—	—	0.0014 (J)	—	—	—
RE14-11-24468	14-614636	0–1	SOIL	NA	—	NA	—	—	NA	—	0.36 (J)	NA

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] Isopropylbenzene used as a surrogate based on structural similarity.

[c] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[e] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[f] — = Not detected.

[g] NA = Not analyzed.

Table 6.27-1
Samples Collected and Analyses Requested at AOC C-14-008

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Explosive Compounds	TAL Metals	PCBs	Perchlorate	SVOCs	VOCs	Cyanide (Total)
RE14-11-24474	14-614637	0–1	SOIL	11-3364[a]	11-3363	11-3364	11-3363	11-3364	11-3363	—[b]	11-3364
RE14-11-24475	14-614637	3–4	SOIL	11-3364	11-3363	11-3364	11-3363	11-3364	11-3363	11-3363	11-3364
RE14-11-24476	14-614638	0–1	SOIL	11-3364	11-3363	11-3364	11-3363	11-3364	11-3363	—	11-3364
RE14-11-24477	14-614638	3–4	SOIL	11-3364	11-3363	11-3364	11-3363	11-3364	11-3363	11-3363	11-3364
RE14-11-24478	14-614639	0–1	SOIL	11-3364	11-3363	11-3364	11-3363	11-3364	11-3363	—	11-3364
RE14-11-24479	14-614639	3–4	SOIL	11-3364	11-3363	11-3364	11-3363	11-3364	11-3363	11-3363	11-3364
RE14-11-24480	14-614640	0–1	SOIL	11-3364	11-3363	11-3364	11-3363	11-3364	11-3363	—	11-3364
RE14-11-24481	14-614640	3–4	QBT4	11-3364	11-3363	11-3364	11-3363	11-3364	11-3363	11-3363	11-3364
RE14-11-24482	14-614641	0–1	SOIL	11-3364	11-3363	11-3364	11-3363	11-3364	11-3363	—	11-3364
RE14-11-24483	14-614641	3–4	SOIL	11-3364	11-3363	11-3364	11-3363	11-3364	11-3363	11-3363	11-3364

[a] Request number.

[b] — = Analysis not requested.

Table 6.27-2
Inorganic Chemicals above BVs at AOC C-14-008

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Arsenic	Barium	Beryllium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Magnesium	Nickel	Nitrate	Perchlorate	Selenium	Vanadium
Qbt 2,3,4 BV[a]				**7340**	**2.79**	**46**	**1.21**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**	**11.2**	**1690**	**6.58**	**na[b]**	**na**	**0.3**	**17**
Soil BV[a]				**29,200**	**8.17**	**295**	**1.83**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**	**22.3**	**4610**	**15.4**	**na**	**na**	**1.52**	**39.6**
Construction Worker SSL[c]				**41,400**	**57.4**	**4390**	**148**	**8,850,000**	**134[d]**	**36.6[e]**	**14,200**	**12.1**	**248,000**	**800**	**1,550,000**	**753**	**566,000**	**248**	**1750**	**614**
Industrial SSL[c]				**1,290,000**	**21.5**	**255,000**	**2580**	**32,400,000**	**505[d]**	**350[f]**	**51,900**	**63.3**	**908,000**	**800**	**5,680,000**	**25,700**	**2,080,000**	**908**	**6490**	**6530**
Residential SSL[c]				**78,000**	**4.25**	**15,600**	**156**	**13,000,000**	**96.6[d]**	**23[f]**	**3130**	**11.2**	**54,800**	**400**	**339,000**	**1560**	**125,000**	**54.8**	**391**	**394**
RE14-11-24474	14-614637	0–1	SOIL	—[g]	—	—	—	—	—	—	—	0.54 (U)	—	—	—	—	1.1	—	—	—
RE14-11-24475	14-614637	3–4	SOIL	33,100	—	356 (J+)	2	—	—	—	—	0.57 (U)	—	—	—	—	0.22 (J)	—	2.2	—
RE14-11-24476	14-614638	0–1	SOIL	—	—	—	—	—	—	—	—	0.57 (U)	—	—	—	—	0.56	—	—	—
RE14-11-24477	14-614638	3–4	SOIL	—	—	—	—	—	—	—	—	0.57 (U)	—	—	—	—	0.13 (J)	—	2.4	—
RE14-11-24478	14-614639	0–1	SOIL	—	—	—	—	—	—	—	—	0.58 (U)	—	—	—	—	0.4	—	—	—
RE14-11-24479	14-614639	3–4	SOIL	30,800	—	324 (J+)	—	—	—	—	—	0.58 (U)	—	—	—	—	0.14 (J)	0.0024 (J)	2.1	—
RE14-11-24480	14-614640	0–1	SOIL	—	—	—	—	—	—	—	—	0.61 (U)	—	—	—	—	1.2	—	—	—
RE14-11-24481	14-614640	3–4	QBT4	20,700	3.5	270 (J+)	1.5	3830	10.8	5.6	8	0.56 (U)	15,500	14.3	2730	10	0.17 (J)	—	1.8	23.2
RE14-11-24482	14-614641	0–1	SOIL	—	—	—	—	—	—	—	—	0.57 (U)	—	—	—	—	1.2	—	1.6	—
RE14-11-24483	14-614641	3–4	SOIL	—	—	344 (J+)	—	—	—	—	—	0.57 (U)	—	—	—	—	0.11 (J)	—	—	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915), unless otherwise noted.

[d] SSL for total chromium.

[e] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[f] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] — = Not detected or not detected above BV.

Table 6.28-1
Samples Collected and Analyses Requested at AOC C-14-009

Sample ID	Location ID	Depth (ft)	Media	Nitrate	Explosive Compounds	TAL Metals	PCBs	Perchlorate	SVOCs	VOCs	Cyanide (Total)
RE14-11-24417	14-614615	0–1	SOIL	11-3112[a]	11-3111	11-3112	—[b]	11-3112	11-3111	—	11-3112
RE14-11-24418	14-614615	3–4	QBT4	11-3112	11-3111	11-3112	—	11-3112	11-3111	11-3111	11-3112
RE14-11-24419	14-614616	0–1	QBT4	11-3112	11-3111	11-3112	—	11-3112	11-3111	—	11-3112
RE14-11-24420	14-614616	3–4	QBT4	11-3112	11-3111	11-3112	—	11-3112	11-3111	11-3111	11-3112
RE14-11-24421	14-614617	0–1	QBT4	11-3112	11-3111	11-3112	—	11-3112	11-3111	—	11-3112
RE14-11-24422	14-614617	3–4	QBT4	11-3112	11-3111	11-3112	—	11-3112	11-3111	11-3111	11-3112
RE14-11-24423	14-614618	0–1	SOIL	11-3112	11-3111	11-3112	—	11-3112	11-3111	—	11-3112
RE14-11-24424	14-614618	3–4	QBT4	11-3112	11-3111	11-3112	—	11-3112	11-3111	11-3111	11-3112
RE14-11-24425	14-614619	0–1	QBT4	11-3112	11-3111	11-3112	11-3111	11-3112	11-3111	—	11-3112
RE14-11-24426	14-614619	3–4	QBT4	11-3112	11-3111	11-3112	11-3111	11-3112	11-3111	11-3111	11-3112

[a] Request number.

[b] — = Analysis not requested.

Table 6.28-2
Inorganic Chemicals above BVs at AOC C-14-009

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Barium	Cobalt	Copper	Cyanide (Total)	Lead	Manganese	Nitrate	Selenium
Qbt 2,3,4 BV[a]				**7340**	**0.5**	**46**	**3.14**	**4.66**	**0.5**	**11.2**	**482**	**na[b]**	**0.3**
Soil BV[a]				**29,200**	**0.83**	**295**	**8.64**	**14.7**	**0.5**	**22.3**	**671**	**na**	**1.52**
Construction Worker SSL[c]				**41,400**	**142**	**4390**	**36.6[d]**	**14,200**	**12.1**	**800**	**464**	**566,000**	**1750**
Industrial SSL[c]				**1,290,000**	**519**	**255,000**	**350[e]**	**51,900**	**63.3**	**800**	**160,000**	**2,080,000**	**6490**
Residential SSL[c]				**78,000**	**31.3**	**15,600**	**23[e]**	**3130**	**11.2**	**400**	**10,500**	**125,000**	**391**
RE14-11-24417	14-614615	0–1	SOIL	—[f]	—	—	—	—	0.54 (UJ)	30.1	—	2.8	—
RE14-11-24418	14-614615	3–4	QBT4	—	—	59	—	—	0.52 (UJ)	—	—	0.22	1.1
RE14-11-24419	14-614616	0–1	QBT4	—	—	79.9	—	5.5 (J)	0.57 (UJ)	42.2	—	2.8	0.58
RE14-11-24420	14-614616	3–4	QBT4	—	—	79.2	—	—	0.53 (UJ)	66.7	598	0.12 (J)	1.1
RE14-11-24421	14-614617	0–1	QBT4	—	0.53 (U)	69.7	—	—	0.53 (UJ)	—	—	3.8	0.82
RE14-11-24422	14-614617	3–4	QBT4	—	—	50.7	—	—	0.53 (UJ)	—	—	0.33	1.3
RE14-11-24423	14-614618	0–1	SOIL	—	—	—	—	—	0.53 (UJ)	—	—	1.4	—
RE14-11-24424	14-614618	3–4	QBT4	—	—	—	—	—	0.51 (UJ)	—	—	0.18 (J)	0.8
RE14-11-24425	14-614619	0–1	QBT4	7550	—	99.6	3.8	—	0.52 (UJ)	12.3	—	1.1	0.89
RE14-11-24426	14-614619	3–4	QBT4	—	0.51 (U)	—	—	—	0.51 (UJ)	—	—	0.19 (J)	1.3

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2015, 600915), unless otherwise noted.

[d] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[e] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[f] — = Not detected or not detected above BV.

Table 6.28-3
Organic Chemicals Detected at AOC C-14-009

Sample ID	Location ID	Depth (ft)	Media	Acetone	Chloroform	Methylene Chloride	TATB
Construction Worker SSL[a]				**242,000**	**134**	**1210**	**10,000**[b,c]
Industrial SSL[a]				**960,000**	**28.7**	**5130**	**32,000**[b,d]
Residential SSL[a]				**66,300**	**5.9**	**409**	**2200**[b,d]
RE14-11-24418	14-614615	3–4	QBT4	0.0088 (J)	—[e]	—	—
RE14-11-24419	14-614616	0–1	QBT4	NA[f]	NA	NA	0.57 (J)
RE14-11-24420	14-614616	3–4	QBT4	—	—	0.002 (J)	—
RE14-11-24422	14-614617	3–4	QBT4	—	0.00045 (J)	0.0043 (J)	—
RE14-11-24424	14-614618	3–4	QBT4	—	—	0.0027 (J)	—
RE14-11-24426	14-614619	3–4	QBT4	—	—	0.0027 (J)	—

Notes: Results are in mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2015, 600915).

[b] SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation and parameters from NMED (2015, 600915).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

[d] SSL from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[e] — = Not detected.

[f] NA = Not analyzed.

Table 8.1-1
Summary of Investigation Results and Recommendations

SWMU/AOC	Brief Description	Extent Defined or No Further Sampling Warranted?	Potential Unacceptable Risk/Dose?	Recommendation
AOC 14-001(a)	Pull box	Yes	No	Corrective actions complete without controls
AOC 14-001(b)	Pull box	Yes	No	Corrective actions complete without controls
AOC 14-001(c)	Pull box	Yes	No	Corrective actions complete without controls
AOC 14-001(d)	Pull box	Yes	No	Corrective actions complete without controls
AOC 14-001(e)	Pull box	Yes	No	Corrective actions complete without controls
AOC 14-001(f)	Bullet test facility	n/a*	n/a	Investigation deferred per Appendix A of Consent Order
AOC 14-001(g)	Firing site	Yes (in drainages only)	No	Delayed investigation
SWMU 14-002(a)	Former firing site	n/a	n/a	Investigation deferred per Appendix A of Consent Order
SWMU 14-002(b)	Former firing site	n/a	n/a	Investigation deferred per Appendix A of Consent Order
SWMU 14-002(c)	Decommissioned firing site	Yes	No	Corrective actions complete without controls
SWMU 14-002(d)	X-unit chamber	n/a	n/a	Investigation deferred per Appendix A of Consent Order
SWMU 14-002(e)	X-unit chamber	n/a	n/a	Investigation deferred per Appendix A of Consent Order
SWMU 14-002(f)	Former structure	n/a	n/a	Delayed investigation
SWMU 14-003	Former burning area	Yes	No	Corrective actions complete without controls
AOC 14-004(a)	Storage area	n/a	n/a	Delayed investigation
SWMU 14-006	Decommissioned sump and outfall	Yes	No	Corrective actions complete without controls
SWMU 14-007	Decommissioned septic system	Yes	No	Corrective actions complete without controls
SWMU 14-009	Surface disposal area	Yes	No	Corrective actions complete without controls
SWMU 14-010	Former sump	Yes	No	Corrective actions complete without controls
AOC C-14-001	Former magazine	Yes	No	Corrective actions complete without controls
AOC C-14-002	Former building	n/a	n/a	Delayed investigation
AOC C-14-003	Former building	n/a	n/a	Delayed investigation
AOC C-14-004	Former building	Yes	No	Corrective actions complete without controls
AOC C-14-005	Former building	Yes	No	Corrective actions complete without controls
AOC C-14-007	Former storage building	Yes	No	Corrective actions complete without controls
AOC C-14-008	Former magazine	Yes	No	Corrective actions complete without controls
AOC C-14-009	Former magazine	Yes	No	Corrective actions complete without controls

*n/a = Not applicable.

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
2-ADNT	amino-4,6-dinitrotoluene(2-)
4-ADNT	amino-2,6-dinitrotoluene(4-)
ADEM	Associate Directorate for Environmental Management
AK	acceptable knowledge
ALARA	as low as reasonably achievable
amsl	above mean sea level
AOC	area of concern
ATSDR	Agency for Toxic Substances and Disease Registry
AUF	area use factor
bgs	below ground surface
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
CSM	conceptual site model
DAF	dilution attenuation factor
DL	detection limit
DOE	Department of Energy (U.S.)
dpm	disintegration(s) per minute
Eh	oxidation-reduction potential
EPA	Environmental Protection Agency (U.S.)
EPC	exposure point concentration
EQL	estimated quantitation limit
ESH	Environment, Safety, and Health
ESL	ecological screening level
FIP	field implementation plan
FV	fallout value
GNSS	Global Navigation Satellite System
HE	high explosives
HI	hazard index
HIR	historical investigation report

HMX	tetranitro-1,3,5,7-tetrazocine(1,3,5,7-)
HQ	hazard quotient
HR	home range
ICS	interference check sample
ICV	initial calibration verification
IDW	investigation-derived waste
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
LOAEL	lowest observed adverse effect level
MDC	minimum detectable concentration
MDL	method detection limit
mm Hg	millimeters of mercury
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
PAH	polycyclic aromatic hydrocarbon
PAUF	population area use factor
PCB	polychlorinated biphenyl
PETN	pentaerythritol tetranitrate
PID	photoionization detector
QA	quality assurance
QC	quality control
RESRAD	residual radioactive (a computer model)
RCRA	Resource Conservation and Recovery Act
RCT	radiation control technician
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RfD	reference dose
RFI	RCRA facility investigation
RL	reporting limit

RPD	relative percent difference
RPF	Records Processing Facility
RRF	relative response factor
SAL	screening action level
SCL	sample collection log
SF	slope factor
SMA	site monitoring area
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
SWSC	Sanitary Wastewater Systems Consolidation
T&E	threatened and endangered
TA	technical area
TATB	triaminotrinitrobenzene
TAL	target analyte list
TCDD	tetrachlorodibenzo-p-dioxin(2,3,7,8-)
TCDF	tetrachlorodibenzofuran(2,3,7,8-)
TEF	toxicity equivalency factor
TNT	trinitrotoluene(2,4,6-) (dynamite)
TRV	toxicity reference value
UAL	upper acceptance limit
UCL	upper confidence limit
VCA	voluntary corrective action
VOC	volatile organic compound
WCSF	waste characterization strategy form

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 (QA/QC) parameters.

Appendix B

Field Methods

B-1.0 INTRODUCTION

This appendix summarizes the field methods used during the 2011 investigation of the Technical Area 14 (TA-14) portion of the Cañon de Valle Aggregate Area at Los Alamos National Laboratory (LANL or the Laboratory). Table B-1.0-1 presents a summary of the field methods used, 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) in effect at the time of the investigation. These SOPs are listed in Table B-1.0-2 and are available at http://www.lanl.gov/environment/plans-procedures.php.

B-2.0 EXPLORATORY DRILLING CHARACTERIZATION

No exploratory drilling characterization was conducted during the 2011 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 as necessary for health and safety purposes. Field screening for radioactivity was performed on every sample submitted to the Sample Management Office (SMO). Field-screening results for all investigation activities are described in section 3.2.2 and are presented in Table 3.2-2 of the supplemental investigation report.

B-3.1 Field Screening for Organic Vapors

Field screening for organic vapors was conducted for all samples at all locations 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 Photo Ionization Detector. Screening measurements were recorded on the field sample collection logs (SCLs)/ chain-of-custody (COC) forms, provided on DVD in Appendix D. The field-screening results are presented in Table 3.2-2 of the supplemental investigation report.

B-3.2 Field Screening for Radioactivity

All samples collected were field screened for radioactivity before they were submitted to the SMO, targeting alpha and beta/gamma emitters. 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. Screening measurements were recorded on the SCL/COC forms and are provided in Appendix D on DVD. The screening results are presented in Table 3.2-2 of the supplemental investigation report.

B-3.3 Field Screening for High Explosives

Before they were collected, all samples were field screened for high explosives (HE) using an HE spot-test kit that detects most of the common HE. The detection limit of the test is approximately 100 to 200 ppm. The test is used strictly for qualitative analysis and can be performed on pure materials as well as contaminated soil, solvents, and equipment. The test consists of three reagents that are sequentially dropped on a small amount of sample. The spot test is performed by placing a small amount of sample on a piece of filter paper. A few drops of the first reagent are added to the paper, and the sample is observed for color. After the first reagent is dropped, a drop of the second and then the third reagent are added and the sample is again observed for color. No color change was observed, and all HE spot tests returned negative results during the TA-14 investigation. HE spot-test results were recorded on the SCL/COC forms provided on DVD in Appendix D.

B-4.0 FIELD INSTRUMENT CALIBRATION AND OPERATIONAL CHECK

An instrument calibration and/or functional check were completed daily. Several environmental factors affected the instruments' integrity, including air temperature, atmospheric pressure, wind speed, and humidity. A daily operational check of the PID was conducted by the site-safety officer. The RCT calibrated the Eberline E-600 instrument according to the manufacturer's specifications and requirements.

B-4.1 MiniRAE 2000 Instrument Operational Check

The MiniRAE 2000 PID was checked daily both to ambient air and a standard reference gas (100 ppm isobutylene). The ambient-air check determined the zero point of the instrument sensor calibration curve in ambient air. The check with the standard reference gas determined a second point of the sensor calibration curve. Each calibration was within 10% of 100 ppm isobutylene, qualifying the instrument for use.

The following information was recorded on daily operational check logs:

- instrument identification number
- final span settings
- date and time
- concentration and type of calibration gas used (isobutylene at 100 ppm)
- name of the personnel performing the instrument operational check.

All daily operational checks for the MiniRAE 2000 PID met the manufacturer's specifications for standard reference gas calibration. The daily operational check results were recorded in the field logbook.

B-4.2 Eberline E-600 Instrument Calibration

The Eberline E-600 was calibrated daily by the RCT before local background levels for radioactivity were measured. 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. Calibration results were recorded on the radiological survey forms.

B-5.0 SURFACE AND SUBSURFACE SAMPLING

This section summarizes the methods used to collect surface and subsurface samples, including soil, tuff, and sediment samples, according to the field implementation plan (FIP) (LANL 2011, 207481).

B-5.1 Surface Sampling Methods

Surface samples were collected using either hand-auger or spade-and-scoop methods. Surface 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 Collection of Soil Samples. A hand auger or spade and scoop were used to collect material in approximately 6-in. increments. Samples for volatile organic compound (VOC) analysis were collected immediately to minimize the loss of subsurface VOCs during the sample collection process. Containers for VOC samples were filled as completely as possible, leaving no or minimal headspace, and sealed with a Teflon-lined cap. Table B-1.0-1 provides additional details on collection of samples for VOC analysis. The description is specific to the sampling method rather than to the media (e.g., soil samples are collected using the spade-and-scoop method in the same manner as sediment samples). 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 and chemical preservatives, such as nitric acid, 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 they were transported to the SMO. Samples were managed in accordance with an 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 (see section B-5.7) immediately before each sample was collected in accordance with a subcontractor procedure technically equivalent to SOP-5061, Field Decontamination of Equipment.

B-5.2 Borehole Logging

Boreholes were not drilled to collect subsurface samples at any location. At all locations, samples were collected at the depths specified in the FIP using hand augers, occasionally assisted by power auger where necessary. Therefore, no boreholes logs were generated.

B-5.3 Subsurface Tuff Sampling Methods

Subsurface samples were collected in accordance with an approved subcontractor procedures technically equivalent to SOP-06.10, Hand Auger and Thin-Wall Tube Sampler.

Subsurface samples were collected using the hand-auger method, assisted by a power auger where necessary. Samples for VOC analysis were collected immediately to minimize the loss of subsurface VOCs during the sample collection process. Containers for VOC samples were filled as completely as possible, leaving no or minimal headspace, and sealed with a Teflon-lined cap. Table B-1.0-1 provides additional details on collection of samples for VOC analysis. The description is specific to the sampling method rather than to the media (e.g., soil samples are collected using the hand-auger method in the same manner as sediment samples). 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 and chemical preservatives, such as nitric acid, 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 they were transported to the SMO. Samples were managed in accordance with an 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 (see section B-5.7) immediately before each sample was collected in accordance with a subcontractor procedure technically equivalent to SOP-5061, Field Decontamination of Equipment.

B-5.4 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 the regular investigation samples 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., auger buckets and 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, cyanide, nitrate, and perchlorate) and were collected from sampling equipment at a frequency of at least 1 rinsate sample for every 10 solid samples.

Field trip blanks were collected at a frequency of one per day when samples were collected for VOCs. Trip blanks consisted of containers of certified clean sand opened and kept with the other sample containers during the sampling process. Trip blanks were analyzed for VOCs only.

B-5.5 Sample Documentation and Handling

Field personnel completed an SCL/COC form for each sample. Sample containers were sealed with signed 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 containers were removed from the site. The samples were transported to the SMO for processing and shipment to off-site contract analytical laboratories. The SMO personnel reviewed and approved the SCLs/COC forms and accepted custody of the samples.

B-5.6 Borehole Abandonment

No boreholes were drilled during the 2011 investigation. Hand-auger sampling locations were backfilled with cuttings. A power auger was used where necessary. The cuttings from the power-auger sampling locations were managed as investigation-derived waste (IDW), as discussed in Appendix E. All power-auger sampling locations were abandoned in accordance with an approved subcontractor procedure technically equivalent to SOP-5034, Monitoring Well and Borehole Abandonment, by filling the boreholes with bentonite chips up to 2.0–3.0 ft from the ground surface. The chips were hydrated and clean soil was placed on top.

B-5.7 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. 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.

B-5.8 Site Demobilization and Restoration

Before sampling equipment was removed from the site, a Laboratory RCT screened the equipment for radioactivity to ensure all equipment was clean of site contamination. All staging areas were dismantled and returned to preinvestigation conditions. All disturbed areas were recontoured.

B-6.0 GEODETIC SURVEYING

Geodetic surveys of all sampling locations were performed using a Trimble R8 Global Navigation Satellite System (GNSS) 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 Trimble R8 GNSS 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-7.0 IDW STORAGE AND DISPOSAL

All IDW generated during the field investigation was managed in accordance with an approved subcontractor procedure technically equivalent to SOP-5238, Characterization and Management of Environmental Programs 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. IDW was also managed in accordance with the approved waste characterization strategy form (WCSF) and the IDW management appendix of the approved investigation work plan (LANL 2006, 091698; NMED 2007, 095478). Details of IDW management for the TA-14 investigation are presented in Appendix E.

B-8.0 DEVIATIONS FROM THE FIP

After the Cañon de Valle Aggregate Area investigation work plan (LANL 2006, 091698) was approved in 2007 (NMED 2007, 095478), the Laboratory's Environmental Programs Directorate, in cooperation with and with the approval of NMED, revised and improved investigation sampling for sites regulated by the Compliance Order on Consent. A FIP for the TA-14 sites (LANL 2011, 207481) was developed in 2011 to incorporate updated strategies of collecting field samples and also to incorporate the modifications requested by NMED in its approval with modification of the work plan in a letter issued on February 9, 2007 (NMED 2007, 095478). Table 3.0-1 of the supplemental investigation report is a crosswalk that presents the sampling activities implemented in this report compared with the sampling activities proposed in the 2006 work plan (LANL 2006, 091698). In addition, deviations occurred while field activities were conducted as defined in the FIP (LANL 2011, 207481). The deviations did not adversely affect the completion or the results of the investigation. Specific deviations are described below.

- Sampling was proposed at Area of Concern (AOC) 14-004(a) in the FIP (LANL 2011, 207481, p. 5). However, during field activities, the storage magazine (structure 14-22) was found to be in use and the floor found to be concrete instead of an earthen floor as originally believed. Investigation of AOC 14-004(a) will be delayed until the decommissioning of the magazine (structure 14-22).
- The septic tank at Solid Waste Management Unit 14-007 was proposed to be removed in the FIP (LANL 2011, 207481, p. 6). Because of the TA-14 facility HE safety concerns associated with removing the tank, the septic tank was filled with concrete during field activities, and samples were collected next to the septic tank.
- Sampling was performed at AOC C-14-003 as proposed in the FIP (LANL 2011, 207481, pp. 6–7). However, a 1946 aerial photo was found during the investigation, and the site boundary was subsequently modified based on this new information (section 6.16.4 of the supplemental investigation report). The revised site boundary is partially covered by the berm area north of the active storage magazine (structure 14-22) [AOC 14-004(a)] and the sample locations proposed in the SIP are not representative of the site. Further investigation at AOC C-14-003 will be delayed until the decommissioning of the AOC 14-004(a) magazine.

B-9.0 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 2006. "Investigation Work Plan for Cañon de Valle Aggregate Area," Los Alamos National Laboratory document LA-UR-06-4960, Los Alamos, New Mexico. (LANL 2006, 091698)

LANL (Los Alamos National Laboratory), April 2011. "Field Implementation Plan for Cañon de Valle Aggregate Area Investigation, TA-14," Los Alamos National Laboratory document LA-UR-11-6344, Los Alamos, New Mexico. (LANL 2011, 207481)

NMED (New Mexico Environment Department), February 9, 2007. "Approval with Modifications for the Investigation Work Plan for Cañon de Valle Aggregate Area," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2007, 095478)

Table B-1.0-1
Summary of Field Investigation Methods

Method	Summary
Spade-and-Scoop Collection of Soil Samples	This method was used to collect shallow (i.e., approximately 0.0-12.0 in.) soil or sediment samples. The spade-and-scoop method involved digging a hole to the desired depth, as prescribed in the FIP, 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 for sampling soil or sediment at depths of less than 10.0–15.0 ft, but in some cases it may be used to collect samples of weathered or nonwelded tuff. The method involves hand-turning a stainless-steel bucket auger (typically 3.0–4.0 in. inside diameter), creating a vertical hole that can be advanced to the desired sampling depth. When the desired depth was reached during sampling, 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.
Handling, Packaging, and Shipping of Samples	Field team members sealed and labeled samples before packing to ensure the sample and the transport containers 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 to ship the samples to the analytical laboratories.
Sample Control and Field Documentation	The collection, screening, and transport of samples were documented on a standard form generated by the SMO. These included the SCLs/COC forms and sample container labels. SCL/COC forms 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 and verified the samples were not left unattended. Corresponding labels were initialed and applied to each sample container, and custody seals were placed around each sample container.
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, which was collected in a sample container and submitted for laboratory analysis *Trip Blanks*: Required daily 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 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 quality assurance. 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 in insulated containers with ice to maintain a temperature of 4°C.

Table B-1.0-1 (continued)

Method	Summary
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 R8 GNSS. 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.
Management of Environmental Restoration Project Waste, Waste Characterization	IDW was managed, characterized, and stored in accordance with an approved waste characterization and strategy form that documents the 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. Drummed IDW was stored on pallets to prevent the containers from deteriorating. 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 E.

Table B-1.0-2
SOPs Used for Investigation Activities Conducted at TA-14

SOP-5018, Integrated Fieldwork Planning and Authorization
SOP-5028, Coordinating and Evaluating Geodetic Surveys
SOP-5034, Monitoring Well and Borehole Abandonment
SOP-5238, Characterization and Management of Environmental Programs Waste
SOP-5055, General Instructions for Field Investigations
SOP-5056, Sample Containers and Preservation
SOP-5057, Handling, Packaging, and Transporting Field Samples
WES-EDA-QP-219, Sample Control and Field Documentation
SOP-5059, Field Quality Control Samples
SOP-5061, Field Decontamination of Equipment
SOP-5181, Notebook and Logbook Documentation for Environmental Directorate Technical and Field Activities
SOP-01.12, Field Site Closeout Checklist
SOP-06.09, Spade and Scoop Method for Collection of Soil Samples
SOP-06.10, Hand Auger and Thin-Wall Tube Sampler
SOP-06.33, Headspace Vapor Screening with a Photo Ionization Detector
EP-DIR-QAP-0001, Quality Assurance Plan for the Environmental Programs

Note: Procedures used were approved subcontractor procedures technically equivalent to the procedures listed.

Appendix C

Analytical Program

C-1.0 INTRODUCTION

This appendix discusses the analytical methods and data-quality review for samples collected during investigations of the Technical Area 14 (TA-14) portion of the Cañon de Valle 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 the Laboratory's statements of work (SOWs) for analytical laboratories (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 laboratories (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 http://www.lanl.gov/environment/plans-procedures.php, 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 Biphenyl (PCB) 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, 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-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 D (on DVD included with this document). The analytical data, instrument printouts, and data validation reports are also provided in Appendix D.

C-2.0 ANALYTICAL DATA ORGANIZATION

Decision-level historical data evaluated in this supplemental investigation report were collected during Resource Conservation and Recovery Act facility investigations and voluntary corrective actions. These data are determined to be of sufficient quality for decision-making purposes and have been reviewed and revalidated to current QA standards.

C-3.0 INORGANIC CHEMICAL ANALYSES

A total of 250 samples (plus 27 field duplicates) collected at TA-14, within the Cañon de Valle Aggregate Area, were analyzed for inorganic chemicals. A total of 250 samples (plus 27 field duplicates) were analyzed for target analyte list (TAL) metals; 238 samples (plus 24 field duplicates) were analyzed for nitrate; 238 samples (plus 24 field duplicates) were analyzed for perchlorate; and 238 samples (plus 24 field duplicates) were analyzed for total cyanide. The total uranium results from the 1997 VCA are screening level data and have been replaced by isotopic uranium results obtained in subsequent samples. The total uranium analysis was done using kinetic phosphorescence analysis (KPA), which is a screening method, and the data by KPA are not reliable for decision-making purposes. The analytical methods used for inorganic chemicals are listed in Table C-1.0-1.

Tables in the supplemental investigation report summarize the samples collected and the analyses requested for the 18 sites investigated at TA-14. All the analytical results are presented in Appendix D (on DVD included with this document).

C-3.1 Inorganic Chemical QA/QC Samples

QA/QC samples are used to measure the reliability of the data. The results of the QA/QC analyses performed on a sample provide confidence about whether a particular analyte is present and whether the concentration reported is accurate. To assess the accuracy and precision of inorganic chemical analyses, this investigation included analyses of LCSs, method blanks, MSs, laboratory duplicate samples, interference check samples (ICSs), and serial dilution samples. 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 inorganic chemicals in soil or tuff, LCS percent recoveries (%R) should fall within the control limits of 75% to 125% (LANL 1995, 049738; LANL 2008, 109962).

The 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 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% to 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% to 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%.

C-3.2 Data-Quality Results for Inorganic Chemicals

The majority of the analytical results for inorganic chemicals either were not assigned a qualifier or were qualified as not detected (U) because the analytes were not detected by the respective analytical methods. No quality issues are associated with this data.

A total of 56 nitrate, 34 perchlorate, 556 TAL metal, and 9 total cyanide results were qualified as estimated (J) because the analytical laboratory qualified the detected result as estimated.

C-3.2.1 Maintenance of COC

SCL/COC forms were maintained properly for all samples analyzed for inorganic chemicals (see Appendix D on DVD).

C-3.2.2 Sample Documentation

All samples analyzed for inorganic chemicals were properly documented on SCL/COC forms in the field (see Appendix D on DVD).

C-3.2.3 Sample Dilutions

Some samples were diluted for inorganic chemical analyses. No qualifiers were applied to any inorganic chemical sampling results because of dilutions.

C-3.2.4 Sample Preservation

Preservation criteria were met for all samples analyzed for inorganic chemicals.

C-3.2.5 Holding Times

Eighteen total cyanide results were qualified as estimated not detected (UJ) because the extraction holding time was exceeded by 2 times the acceptable holding time.

C-3.2.6 ICVs and CCVs

A total of 136 TAL metal results were qualified as not detected (U) because the sample result was less than or equal to the 5 times the concentration of the related analyte in the ICV/CCV.

C-3.2.7 Interference Check Sample and/or Serial Dilutions

Interference check and serial dilution criteria were met for all samples analyzed for inorganic chemicals.

C-3.2.8 Laboratory Duplicate Samples

A total of 124 TAL metal 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.

C-3.2.9 Blanks

A total of 102 TAL metal results were qualified as estimated (J) because the analyte was detected in the method blank but was greater than 5 times the RL.

A total of 1 total cyanide, 83 TAL metal, and 2 total uranium results were qualified as not detected (U) because the sample result was less than or equal to 5 times the concentration of the related analyte in the method blank.

A total of 1 total cyanide, 9 nitrate, and 206 TAL metal results were qualified as not detected (U) because the sample result was less than or equal to the 5 times the concentration of the related analyte in the trip blank or equipment rinsate blank.

C-3.2.10 MS Samples

A total of 216 TAL metal results were qualified as estimated and biased low (J-) because the associated MS recovery was below the lower acceptance limit (LAL) but greater than 10%.

A total of 125 TAL metal results were qualified as estimated and biased high (J+) because the associated MS recovery was above the upper acceptance limit (UAL).

Six TAL metal results were qualified as estimated not detected (UJ) because the associated MS recovery was below the LAL but greater than 10%.

Six TAL metal results were qualified as estimated not detected (UJ) because the associated MS recovery was above the UAL.

C-3.2.11 LCS Recoveries

No qualifiers were applied to any inorganic chemical results because of LCS recovery issues.

C-3.2.12 Detection Limits

Seven TAL metal results were qualified as estimated (J) because the results were between the estimated detection limit and the MDL.

C-3.2.13 Rejected Results

No inorganic chemical data were rejected. The results of the qualified data were used as reported and do not affect the usability of the sampling results.

C-4.0 ORGANIC CHEMICAL ANALYSES

A total of 266 samples (plus 28 field duplicates) collected at TA-14 were analyzed for organic chemicals. A total of 138 samples (plus 10 field duplicates) were analyzed for volatile organic chemicals (VOCs); 238 samples (plus 24 field duplicates) were analyzed for semivolatile organic chemicals (SVOCs); 76 samples (plus 23 field duplicates) were analyzed for polychlorinated biphenyls (PCBs); 256 samples (plus 27 field duplicates) were analyzed for explosive compounds; and 26 samples (plus 3 field duplicates) were analyzed for dioxins/furans. All QC procedures were followed as required by the analytical laboratory SOWs (LANL 1995, 049738; LANL 2008, 109962). The analytical methods used for organic chemicals are listed in Table C-1.0-1.

Tables in the supplemental investigation report summarize the samples collected and the analyses requested for the TA-14 sites investigated. All organic chemical results are provided on DVD in Appendix D.

C-4.1 Organic Chemical QA/QC Samples

QA/QC samples are used to measure the reliability of the data. The results of the QA/QC analyses performed on a sample provide confidence about whether a particular analyte is present and whether the concentration reported is accurate. To assess the accuracy and precision of organic chemical analyses, this investigation included calibration verifications and the analysis of LCSs, method blanks, MSs, surrogates, and ISs. 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.

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. Initial calibration verifies the accuracy of the calibration curve as well as the individual calibration standards used to perform the calibration. Continuing calibration ensures that the initial calibration is still holding and correct as the instrument is used to process samples. Continuing calibration also serves to determine that analyte identification criteria such as retention times and spectral matching are being met.

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 be within the method-specific acceptance criteria.

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.

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 LAL and UAL.

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 normally is not 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.

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 may 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%.

C-4.2 Data-Quality Results for Organic Chemicals

The majority of the analytical results for organic chemicals were either not assigned a qualifier or 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.

A total of 72 dioxin/furan, 13 explosive compounds, 101 SVOC, and 44 VOC results were qualified as estimated (J) because the analytical laboratory qualified the detected result as estimated.

Thirteen dioxin/furan results were qualified as not detected (U) because the project chemist identified quality deficiencies in the reported data that required further qualification.

Six explosive compounds results were qualified as estimated (J) because the contract-required detection limit check standard sample did not pass the method acceptance criteria.

A total of 92 explosive compounds results were qualified as estimated not detected (UJ) because the contract-required detection limit check standard sample did not pass the method acceptance criteria.

A total of 112 explosive compounds results were qualified as estimated not detected (UJ) because the contract-required detection limit check standard sample information was missing.

C-4.2.1 Maintenance of COC

SCL/COC forms were maintained properly for all samples analyzed for organic chemicals (see Appendix D on DVD).

C-4.2.2 Sample Documentation

All samples analyzed for organic chemicals were properly documented on the SCL in the field (see Appendix D on DVD).

C-4.2.3 Sample Dilutions

Some samples were diluted for organic chemical analyses. No qualifiers were applied to any organic chemical sampling results because of dilutions.

C-4.2.4 Sample Preservation

Preservation criteria were met for all samples analyzed for organic chemicals.

C-4.2.5 Holding Times

Fourteen explosive compounds results were qualified as estimated and biased low (J-) because the extraction holding time was exceeded by less than 2 times the applicable holding time requirement.

A total of 242 explosive compounds and 302 SVOC results were qualified as estimated not detected (UJ) because the extraction holding time was exceeded by less than 2 times the applicable holding time requirement.

C-4.2.6 ICVs and CCVs

Twenty VOC results were qualified as estimated (J) 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.

A total of 1 VOC and 60 explosive compounds results were qualified as estimated (J) because the affected analytes were analyzed with a relative response factor (RRF) of less than 0.05 in the initial calibration and/or CCV.

One SVOC and nine explosive compounds results were qualified as estimated (J) because the ICV and/or CCV were recovered outside the method-specific limits.

A total of 164 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 less than 0.995.

A total of 813 explosive compounds and 130 VOC results were qualified as estimated not detected (UJ) because the affected analytes were analyzed with an RRF of less than 0.05 in the initial calibration and/or CCV.

A total of 33 explosive compounds, 40 PCB, 240 SVOC, and 53 VOC results were qualified as estimated not detected (UJ) because the ICV and/or CCV were recovered outside the method-specific limits.

C-4.2.7 Surrogate Recoveries

Surrogate recovery criteria were met for all samples analyzed for organic chemicals.

C-4.2.8 IS Responses

Eight VOC results were qualified as estimated (J) because the quantitating IS area count was below 10% of the expected value.

One explosive compounds result was qualified as estimated and biased low (J-) because the IS area count for the quantitating IS was greater than 130% of the average of that obtained from the calibration standards.

Two SVOC results were qualified as not detected (U) because the mass spectrum did not meet specifications.

Four explosive compounds results were qualified as estimated not detected (UJ) because the IS area count for the quantitating IS was below 70% but above 25% of the average obtained from the calibration standards.

A total of 45 explosive compounds results were qualified as estimated not detected (UJ) because the IS area count for the quantitative IS was above 130% of the average of that obtained from the calibration standards.

C-4.2.9 Blanks

Three dioxin/furan and two VOC results were qualified as estimated (J) because the sample result was greater than 5 times the amount in the method blank.

A total of 12 dioxin/furan and 89 VOC results were qualified as not detected (U) because the associated sample concentration was less than or equal to 5 times the amount in the method blank.

Two VOC results were qualified as not detected (U) because the sample result was less than or equal to 5 times the concentration of the related analyte in the trip blank or equipment rinsate blank.

C-4.2.10 MS Samples

Twenty explosive compounds results were qualified as estimated (J) because the MS/matrix spike duplicate (MSD) %R was above 10% but below 70%.

Six explosive compounds results were qualified as estimated (J) because the MS/MSD RPD was above 30%.

Eleven explosive compounds results were qualified as estimated and biased high (J+) because the MS/MSD %R was above 130%.

A total of 44 explosive compounds results were qualified as estimated not detected (UJ) because the MS/MSD %R was above 10% but below 70%.

A total of 47 explosive compounds results were qualified as estimated not detected (UJ) because the MS/MSD RPD was greater than 30%.

C-4.2.11 Laboratory Duplicate Samples

Laboratory duplicates collected for organic chemical analyses indicated acceptable precision for all samples.

C-4.2.12 LCS Recoveries

Seventeen SVOC results were qualified as estimated not detected (UJ) because the LCS %R was less than the LAL but greater than 10%.

C-4.2.13 Rejected Data

Five dioxin/furan results were qualified as rejected (R) because the IS retention time and qualitative criteria for target compound identification were not met.

Sixteen explosive compounds results were qualified as rejected (R) because the MS/MSD %R was below 10%.

A total of 24 explosive compounds results were qualified as rejected (R) because the contract-required detection limit check standard sample information was missing.

Four explosive compounds results were qualified as rejected (R) because the affected results were not analyzed with a valid 5-point calibration curve and/or a standard at the RL.

Eight explosive compounds results were qualified as rejected (R) because the affected analytes were analyzed with an RRF of less than 0.05 in the initial calibration and/or CCV.

A total of 52 VOC results were qualified as rejected (R) because the quantitating IS area count was less than 10% of the expected value.

The rejected data were not used to determine the nature and extent of contamination or to assess the potential human and ecological risks. However, sufficient data of good quality are available to characterize the sites. The results of other qualified data were used as reported and do not affect the usability of the data.

C-5.0 RADIONUCLIDE ANALYSES

A total of 192 samples (plus 19 field duplicates) collected at TA-14 were analyzed for radionuclides. A total of 186 samples (plus 19 field duplicates) were analyzed for gamma-emitting radionuclides, 186 samples (plus 19 field duplicates) were analyzed for strontium-90, and 192 samples (plus 19 field duplicates) were analyzed for isotopic uranium. The analytical methods used for radionuclides are listed in Table C-1.0-1.

Tables in the supplemental investigation report summarize the samples collected and the analyses requested for the TA-14 sites investigated within the Cañon de Valle Aggregate Area. All radionuclide results are provided on DVD in Appendix D.

C-5.1 Radionuclide QA/QC Samples

To assess the accuracy and precision of radionuclide analyses, this investigation included analyses of LCSs, method blanks, MS samples, laboratory duplicate samples, and tracers. 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% and 120%.

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 minimum detectable concentration (MDC).

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% to 125%.

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.

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).

C-5.2 Data-Quality Results for Radionuclides

The majority of the analytical results for radionuclides either were not assigned a qualifier or were 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.

All procedures were followed as required by the analytical services SOWs (LANL 1995, 049738; LANL 2008, 109962). Some sampling results were qualified as not detected (U) because the associated sample concentration was less than or equal to the MDC. Some sampling results were qualified as not detected (U) because the associated sample concentration was less than or equal to 3 times the total propagated uncertainty. This data qualification is related only to the detection status, not to the quality of the data.

C-5.2.1 Maintenance of COC

SCL/COC forms were maintained properly for all samples (see Appendix D on DVD).

C-5.2.2 Sample Documentation

All samples were properly documented on the SCL/COC forms in the field (see Appendix D on DVD).

C-5.2.3 Sample Dilutions

Some samples were diluted for radionuclide analyses. No qualifiers were applied to any radionuclide sampling results because of dilutions.

C-5.2.4 Sample Preservation

Preservation criteria were met for all samples analyzed for radionuclides.

C-5.2.5 Holding Times

Holding-time criteria were met for all samples analyzed for radionuclides.

C-5.2.6 Method Blanks

Method blank criteria were met for all samples analyzed for radionuclides.

C-5.2.7 MS Samples

MS criteria were met for all samples analyzed for radionuclides.

C-5.2.8 Tracer Recoveries

A total of 23 isotopic uranium results were qualified as estimated and biased high (J+) because the tracer %R value was greater than the UAL.

C-5.2.9 LCS Recoveries

LCS recovery criteria were met for all samples analyzed for radionuclides.

C-5.2.10 Laboratory Duplicate Samples Recoveries

Twelve isotopic uranium results were qualified as estimated (J) because the associated duplicate sample had a duplicate error ratio or relative error ratio greater than the analytical laboratory acceptance limits.

C-5.2.11 Rejected Data

No radionuclide data were rejected. The results of the qualified data were used as reported and do not affect the usability of the sampling results.

C-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 C-1.0-1
Inorganic Chemical, Organic Chemical, and Radionuclide Analytical Methods for Samples Collected in the Cañon de Valle Aggregate Area, TA-14

Analytical Method	Analytical Description	Analytical Suite
Inorganic Chemicals		
EPA 300.0	Ion chromatography	Anions (nitrate)
EPA SW-846: 6010/6010B	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, 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, uranium, vanadium, and zinc (TAL metals)
EPA SW-846:9012A	Automated colorimetric/off-line distillation	Total cyanide
EPA SW-846:6850	Liquid chromatography–mass spectrometry/mass spectrometry	Perchlorate
EPA SW-846:7471A	Cold vapor atomic absorption	Mercury
Organic Chemicals		
EPA SW-846: 8082	Gas chromatography	PCBs
EPA SW-846:8240 EPA SW-846:8260 EPA SW-846:8260B	Gas chromatography mass spectrometry	VOCs
EPA SW-846:8270C	Gas chromatography mass spectrometry	SVOCs
EPA SW-846:8290	High-resolution gas chromatography/high-resolution mass spectrometry	Dioxins/furans
EPA SW-846: 8321A _MOD	High-performance liquid chromatography	Explosive compounds
Radionuclides		
EPA 901.1	Gamma spectroscopy	Cesium-134, cesium-137, cobalt-60, and sodium-22
HASL Method 300:ISOPU HASL Method 300:ISOU	Chemical separation alpha spectrometry	Isotopic uranium
EPA 905.0	Gas proportional counting	Strontium-90

Appendix D

Analytical Suites and Results and Analytical Reports
(on DVD included with this document)

Appendix E

Investigation-Derived Waste Management

E-1.0 INTRODUCTION

This appendix contains the waste management records for the investigation-derived waste (IDW) generated during the field activities of the investigation of the Technical Area 14 (TA-14) portion of the Cañon de Valle Aggregate Area at Los Alamos National Laboratory (LANL or the Laboratory). IDW generated during the field investigation was managed in accordance with Standard Operating Procedure (SOP) 5238, Characterization and Management of Environmental Programs Waste. This procedure incorporates the requirements of applicable U.S. Environmental Protection Agency and New Mexico Environment Department 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. All available waste documentation, including WCSFs and waste profile forms are provided in Attachment E-1 (on CD).

The selection of waste containers was based on U.S. Department of Transportation requirements, waste types, and estimated volumes of IDW to be generated. Immediately following containerization, each waste container was individually labeled with a unique identification number and with information regarding waste classification, contents, and radioactivity, if applicable.

Wastes were 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 annual Los Alamos National Laboratory Hazardous Waste Minimization Report.

E-2.0 WASTE STREAMS

The IDW streams generated and managed during the investigation of the TA-14 sites within the Cañon de Valle Aggregate Area are described below and are summarized in Table E-2.0-1. The waste numbers correspond with those identified in the WCSF.

- *WCSF Waste Stream #1: Municipal Solid Waste (MSW)*—MSW consisted of noncontact trash and debris such as sample marking flags, wooden stakes, and pallets. Approximately 0.3 yd^3 of MSW was generated. This waste was determined to be nonhazardous and nonradioactive and was stored in plastic-lined trash cans and disposed of at the Los Alamos County, New Mexico, landfill.
- *WCSF Waste Stream #2: Drill Cuttings*—Drill cuttings from mechanized power-auguring sampling consisted of sediment, soil, and tuff removed during investigation activities. Approximately 0.66 yd^3 of drill cuttings was generated during this investigation and stored in 55-gal. drums. The cuttings were characterized per the WCSF and land applied in accordance with ENV-RCRA-QP-11.2, Land Application of Drill Cuttings.

- *WCSF Waste Stream #3: Contact Waste IDW*—Contact waste consisted of spent personal protective equipment, material used in dry decontamination of sampling equipment (e.g., paper towels), and sampling equipment and other materials that contacted, or potentially contacted, contaminated environmental media and could not be decontaminated. This waste included, but was not limited to, plastic sheeting (e.g., tarps and liners), gloves, paper towels, plastic and glass sample bottles, and disposable sampling supplies. These wastes were containerized at the point of generation 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 0.13 yd^3 of contact waste was generated and was recycled through the Laboratory's Green is Clean program.
- *WCSF Waste Streams #4 and #5*—No decontamination fluids or petroleum-contaminated soil was generated.

Table E-2.0-1
Summary of IDW Generation and Management

WCSF Waste Stream No.	Waste Stream	Waste Type	Volume	Characterization Method	On-Site Management	Disposition
1	MSW	MSW	0.3 yd^3	AK	Plastic bags	Disposal path: Los Alamos County, NM, landfill
2	Drill cuttings	Land applied	0.66 yd^3	Direct container sampling	55-gal. drum	Land application
3	Contact waste	Industrial	0.13 yd^3	AK and analytical results of site characterization samples	5-gal. poly container	Recycled through Green is Clean program

Attachment E-1

Waste Documentation
(on CD included with this document)

Appendix F

Box Plots and Statistical Results

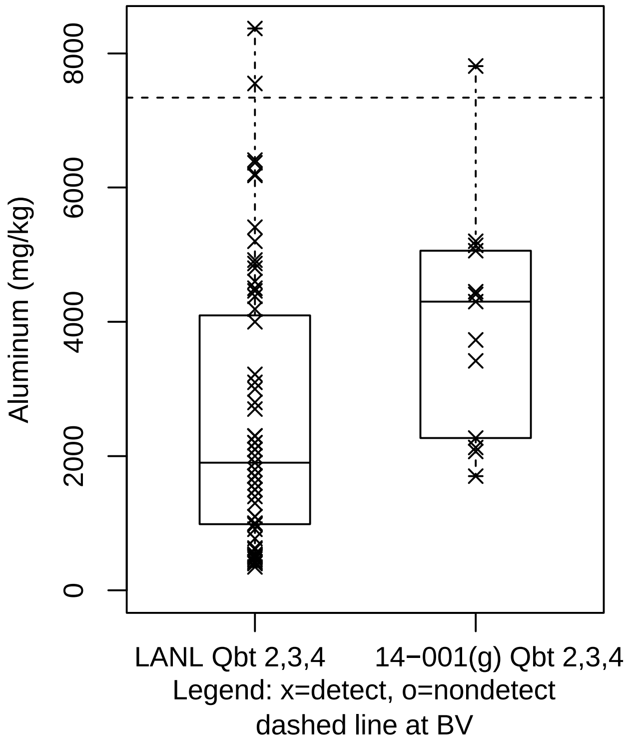


Figure F-1 Box plot for aluminum in tuff at Area of Concern (AOC) 14-001(g)

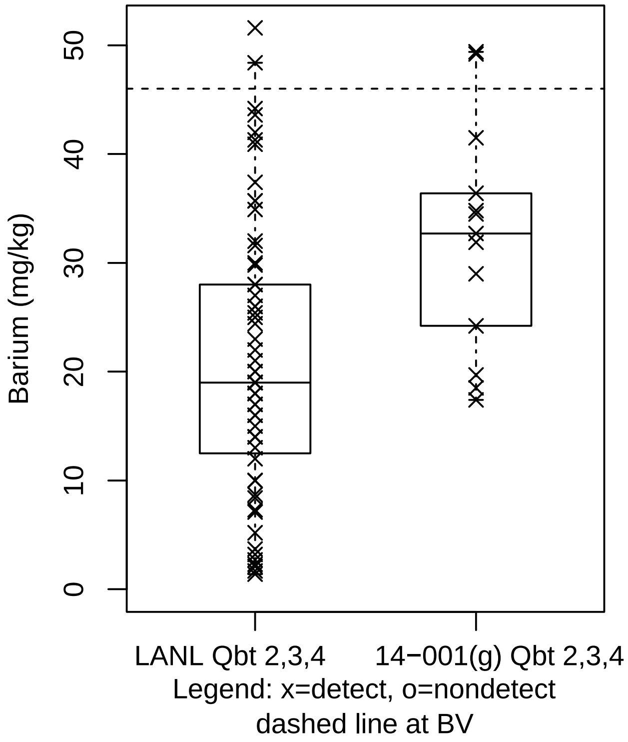


Figure F-2 Box plot for barium in tuff at AOC 14-001(g)

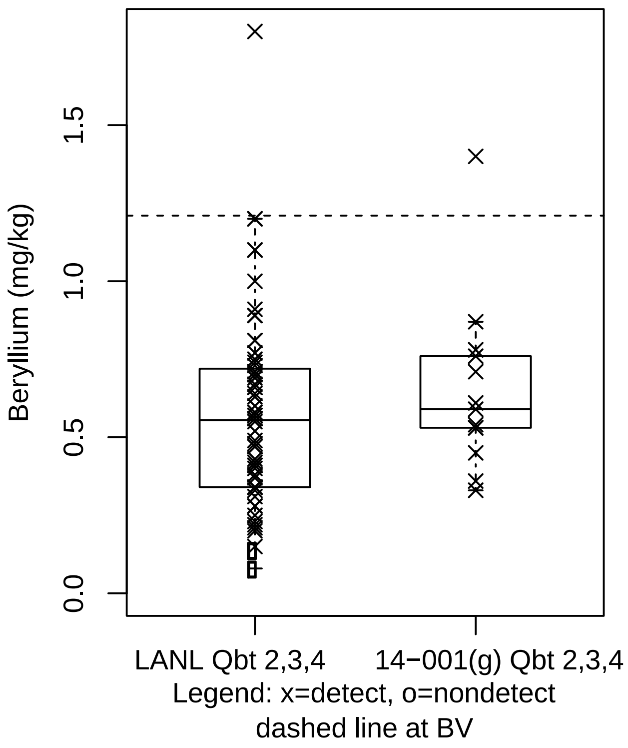


Figure F-3 Box plot for beryllium in tuff at AOC 14-001(g)

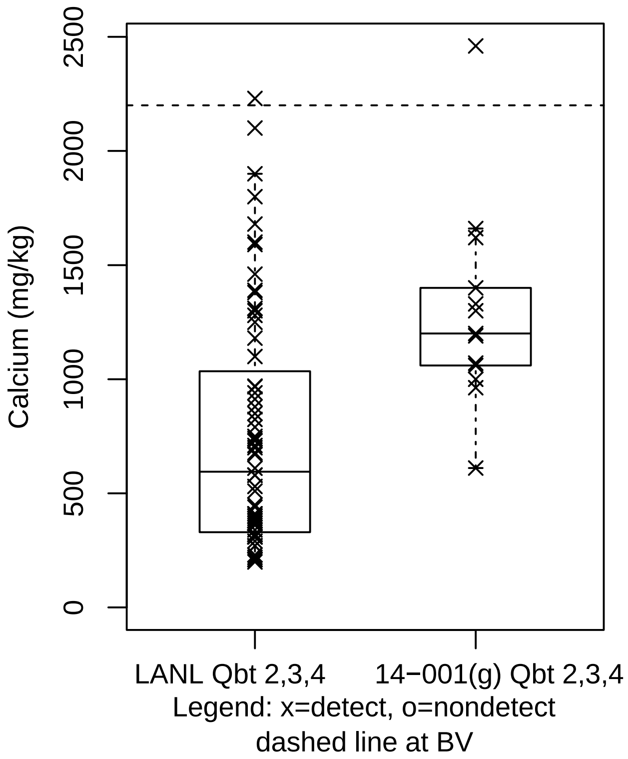


Figure F-4 Box plot for calcium in tuff at AOC 14-001(g)

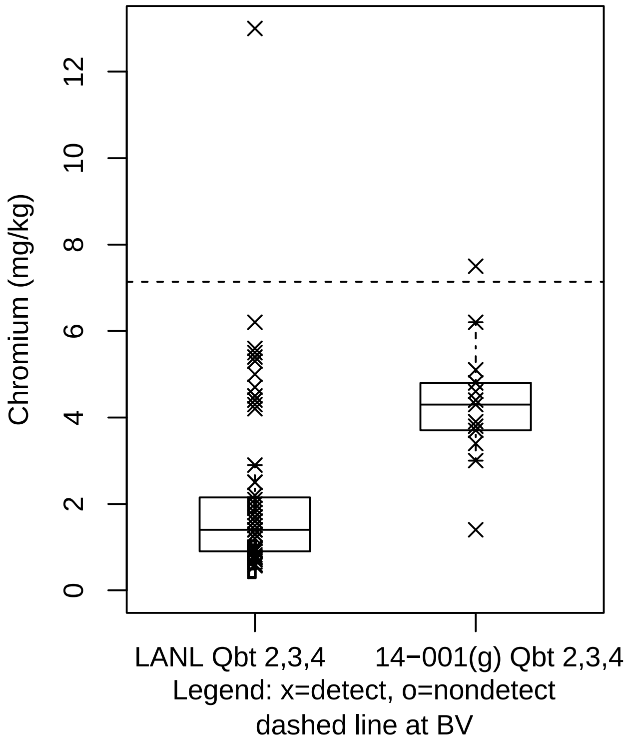


Figure F-5 **Box plot for chromium in tuff at AOC 14-001(g)**

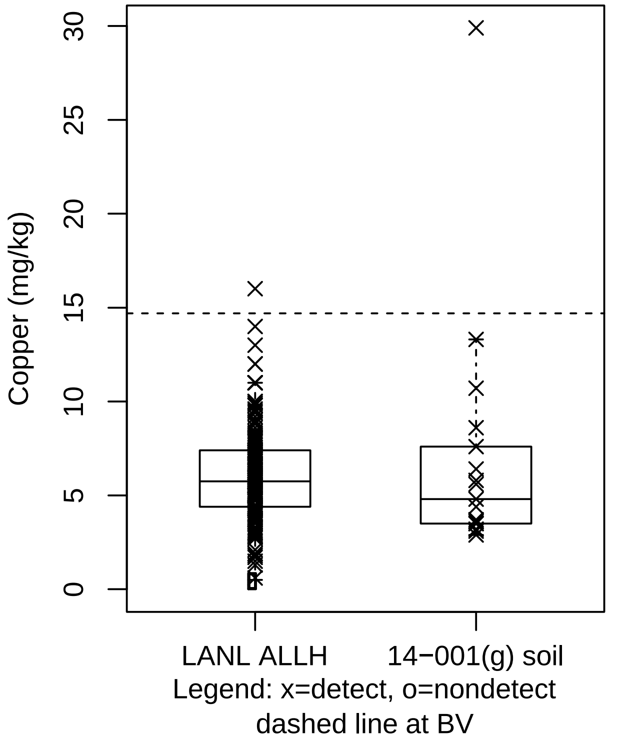


Figure F-6 **Box plot for copper in soil at AOC 14-001(g)**

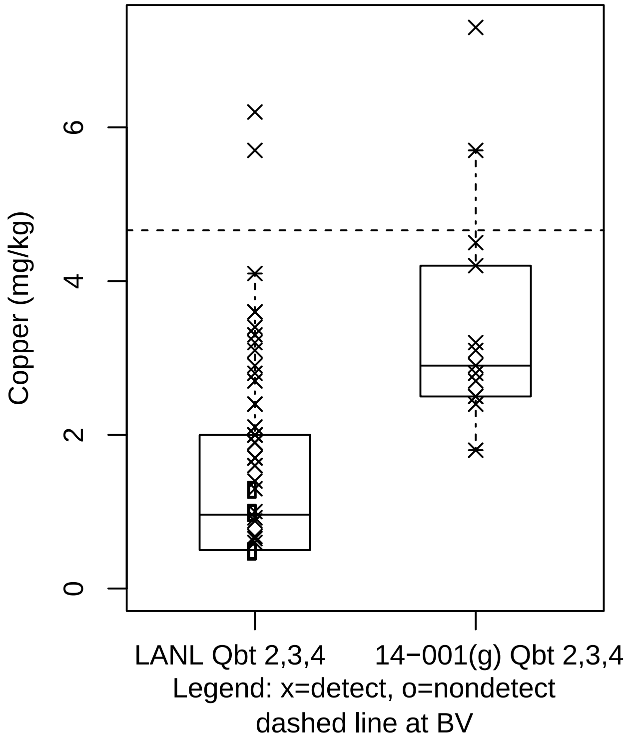


Figure F-7 Box plot for copper in tuff at AOC 14-001(g)

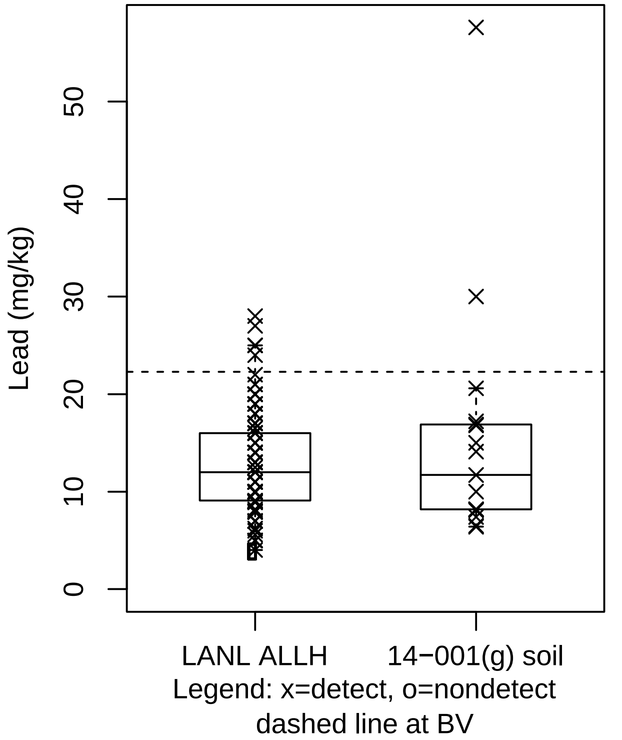


Figure F-8 Box plot for lead in soil at AOC 14-001(g)

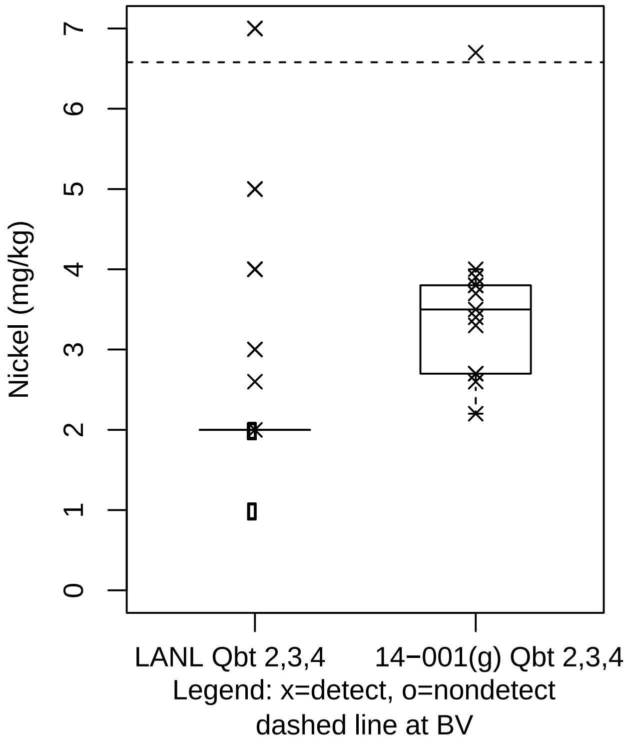


Figure F-9 Box plot for nickel in tuff at AOC 14-001(g)

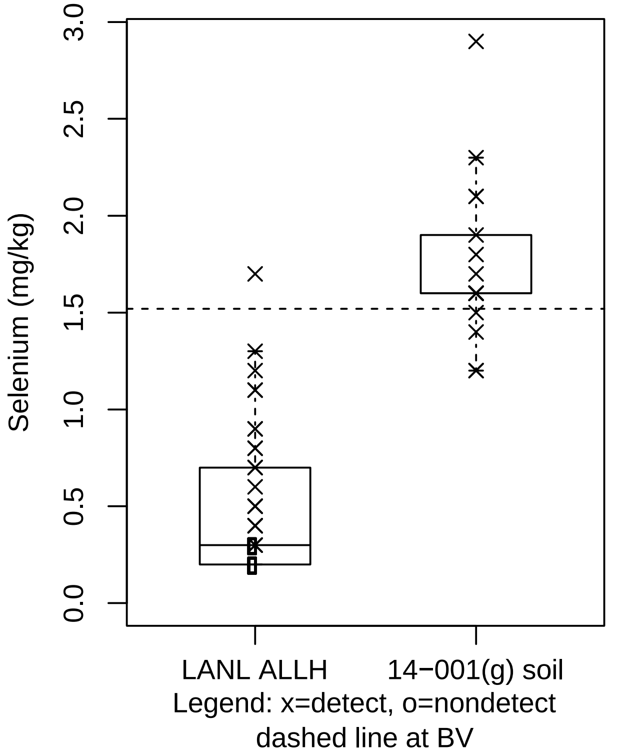


Figure F-10 Box plot for selenium in soil at AOC 14-001(g)

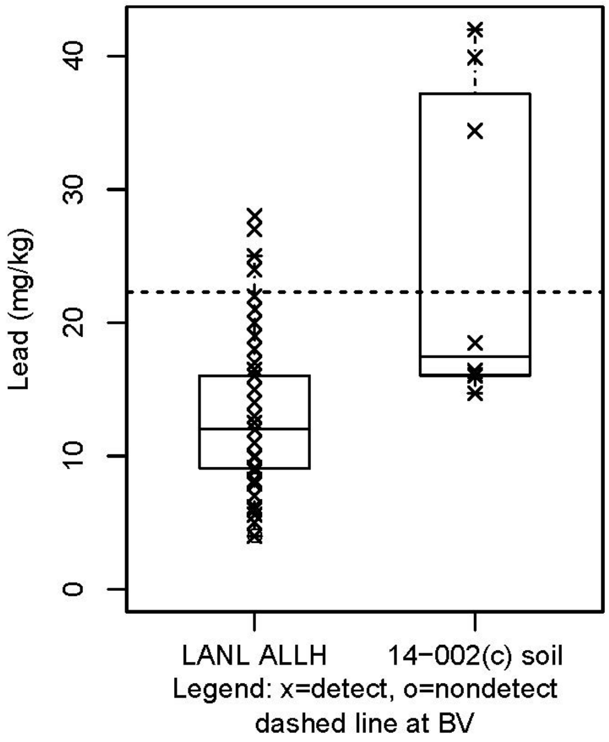


Figure F-11 **Box plot for lead in soil at Solid Waste Management Unit (SWMU) 14-002(c)**

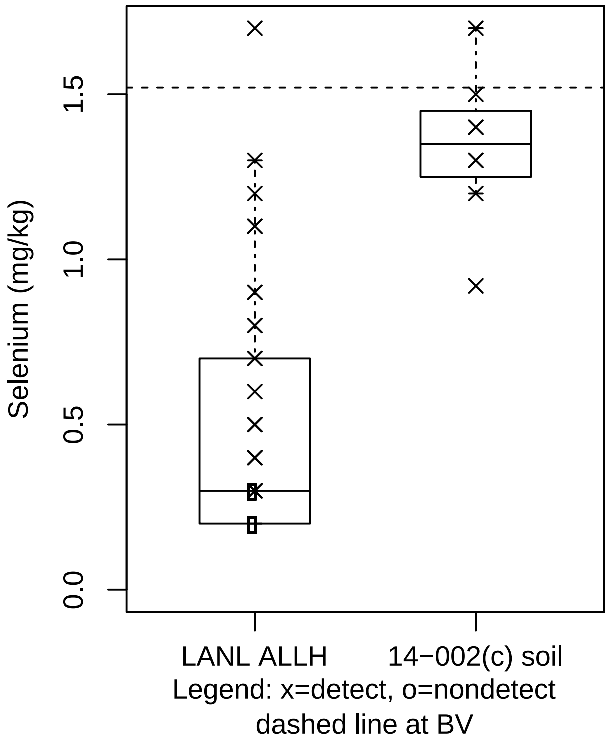


Figure F-12 **Box plot for selenium in soil at SWMU 14-002(c)**

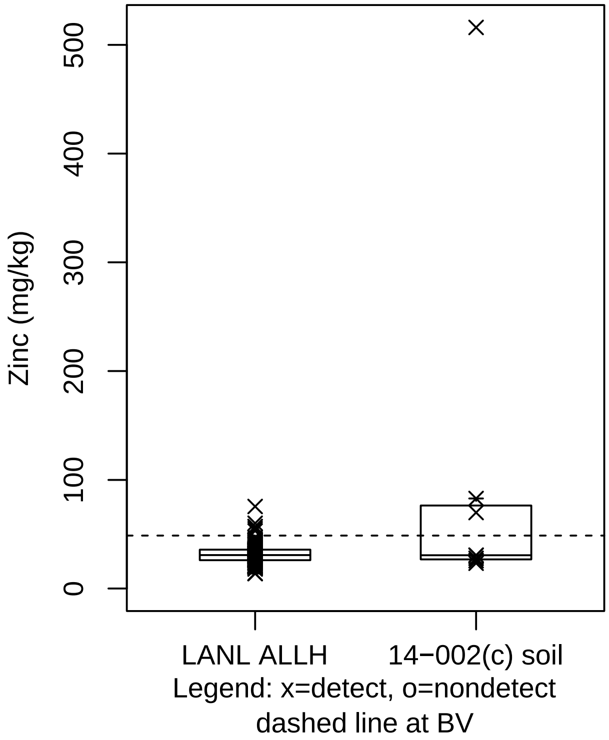


Figure F-13 Box plot for zinc in soil at SWMU 14-002(c)

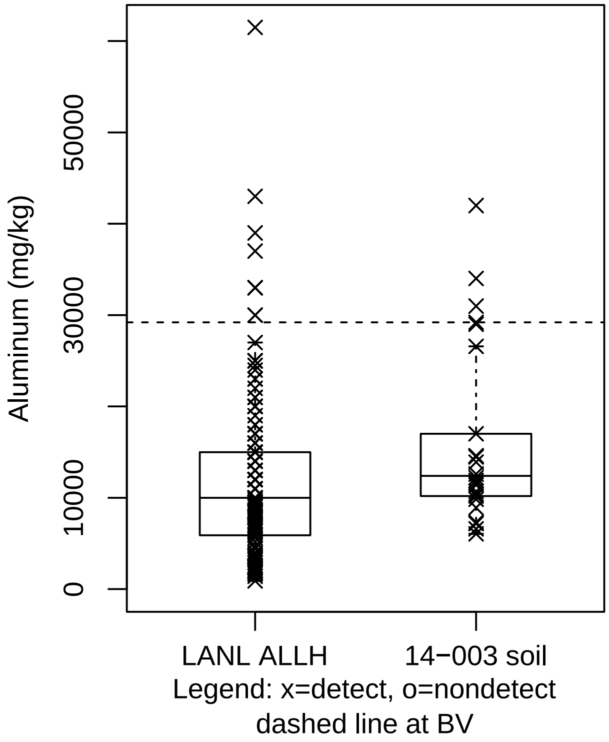


Figure F-14 Box plot for aluminum in soil at SWMU 14-003

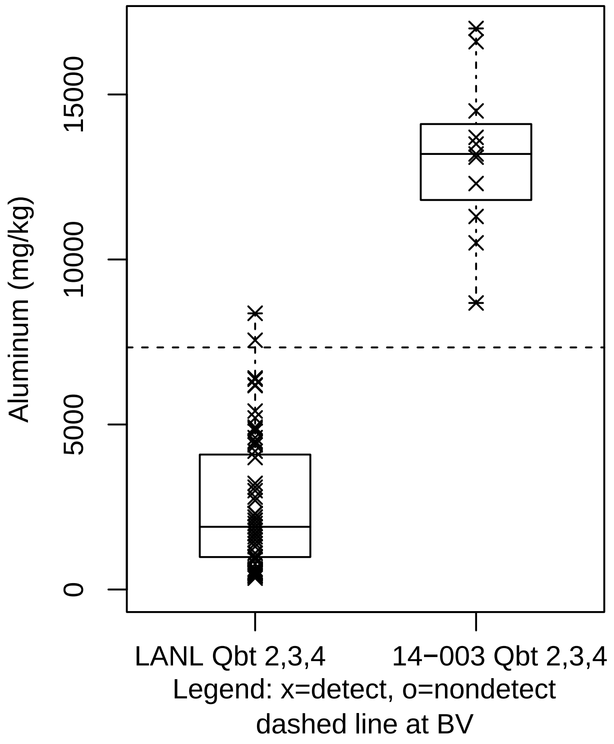


Figure F-15 Box plot for aluminum in tuff at SWMU 14-003

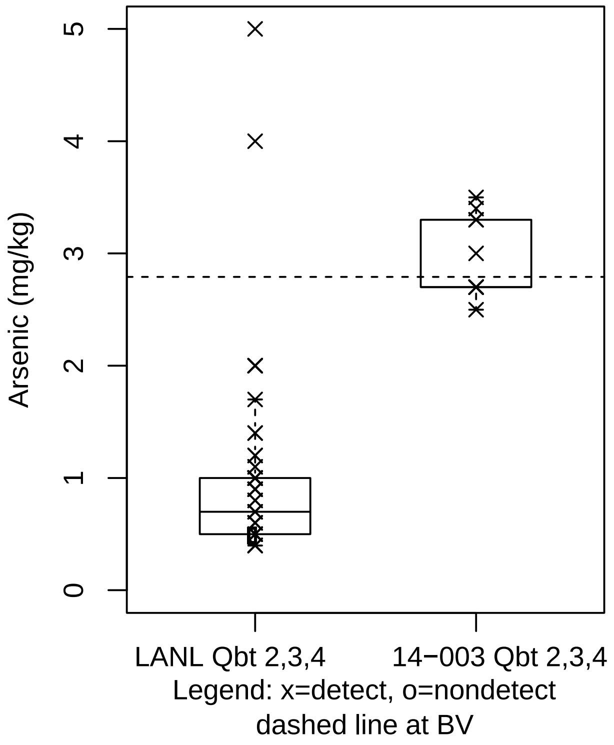


Figure F-16 Box plot for arsenic in tuff at SWMU 14-003

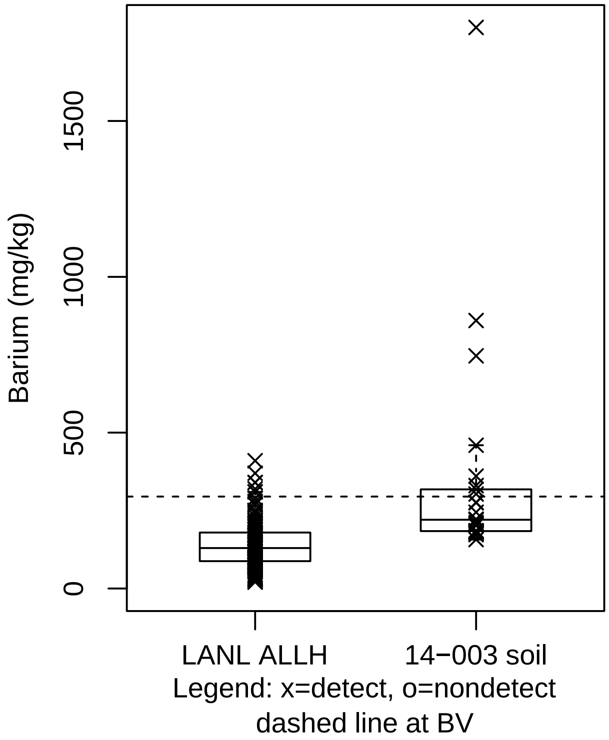


Figure F-17 **Box plot for barium in soil at SWMU 14-003**

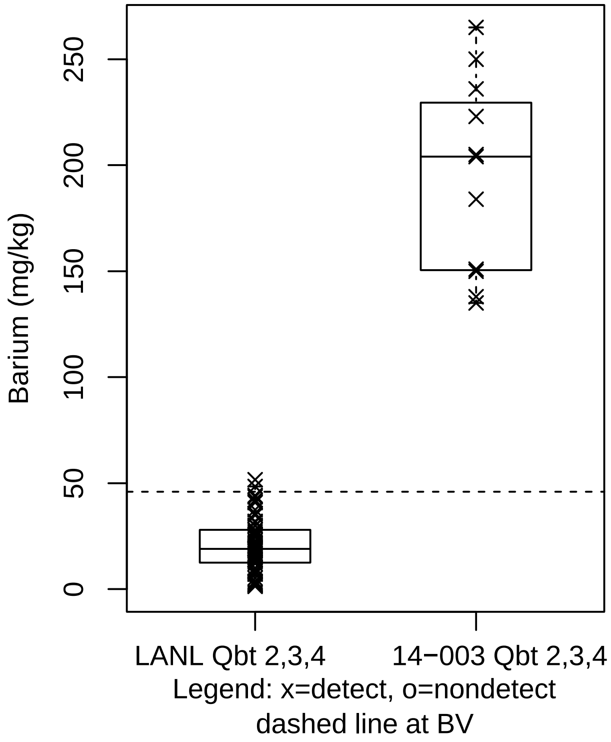


Figure F-18 **Box plot for barium in tuff at SWMU 14-003**

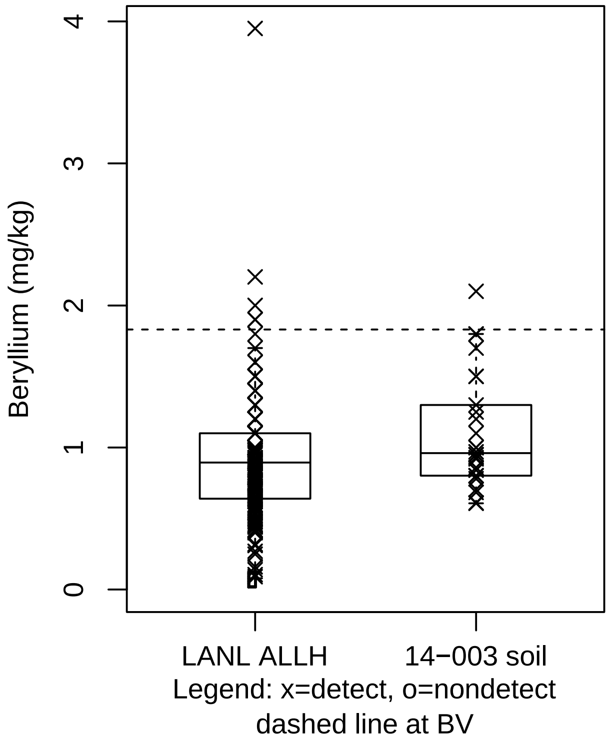


Figure F-19 **Box plot for beryllium in soil at SWMU 14-003**

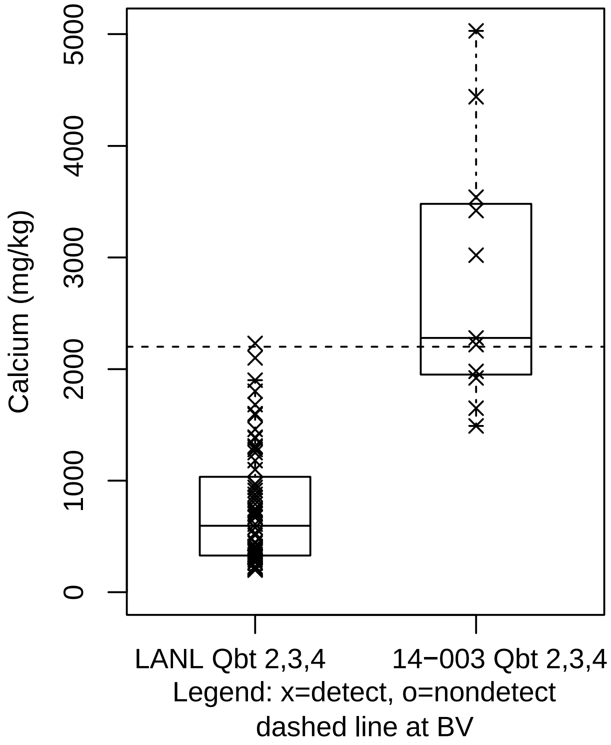


Figure F-20 **Box plot for calcium in tuff at SWMU 14-003**

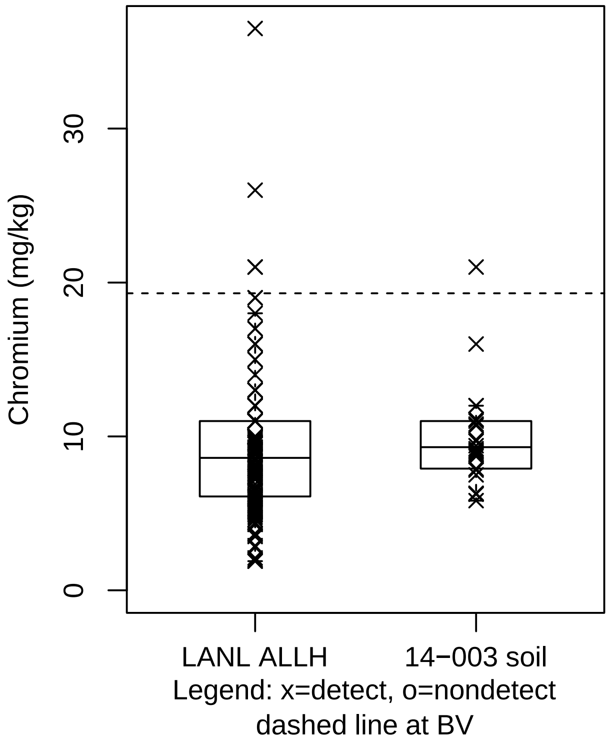


Figure F-21 **Box plot for chromium in soil at SWMU 14-003**

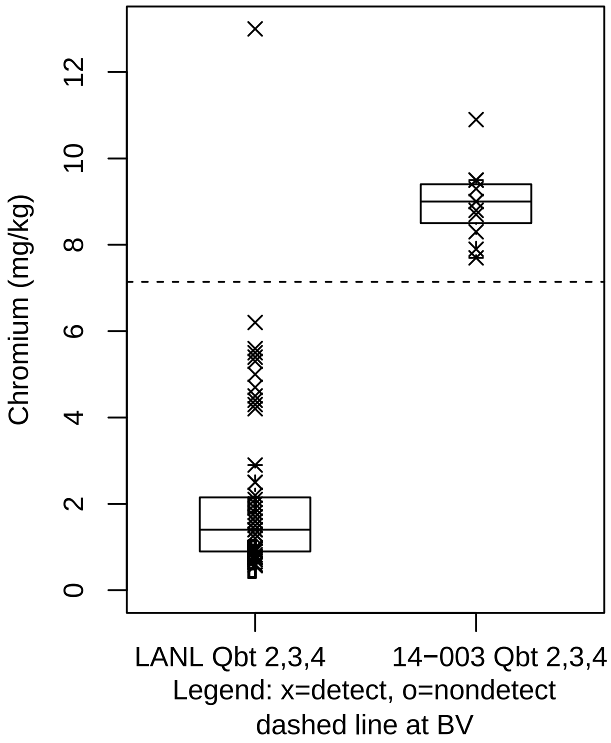


Figure F-22 **Box plot for chromium in tuff at SWMU 14-003**

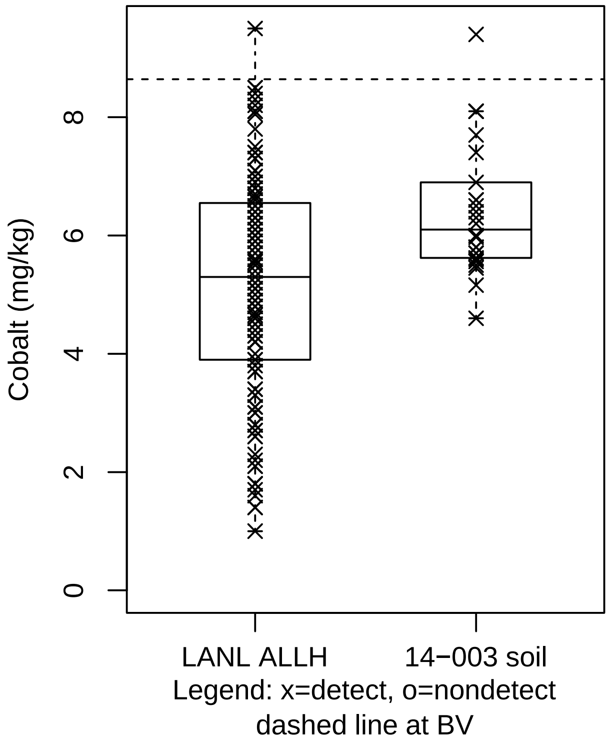


Figure F-23 Box plot for cobalt in soil at SWMU 14-003

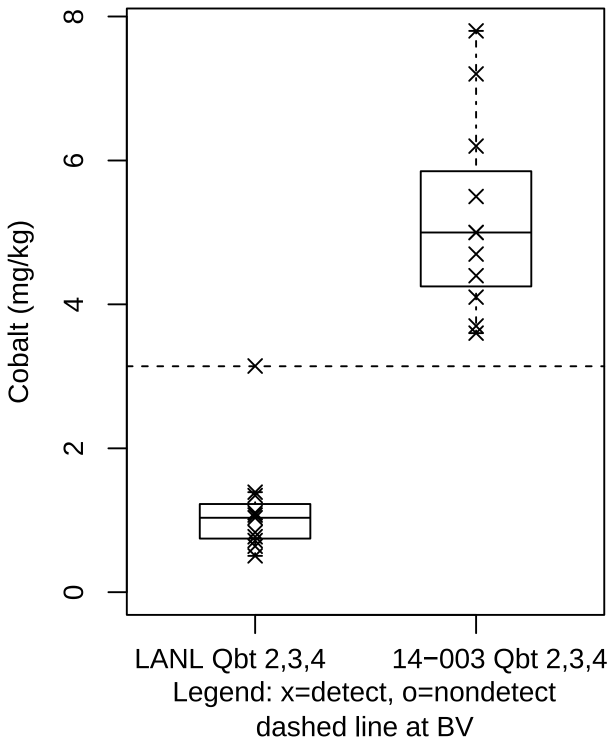


Figure F-24 Box plot for cobalt in tuff at SWMU 14-003

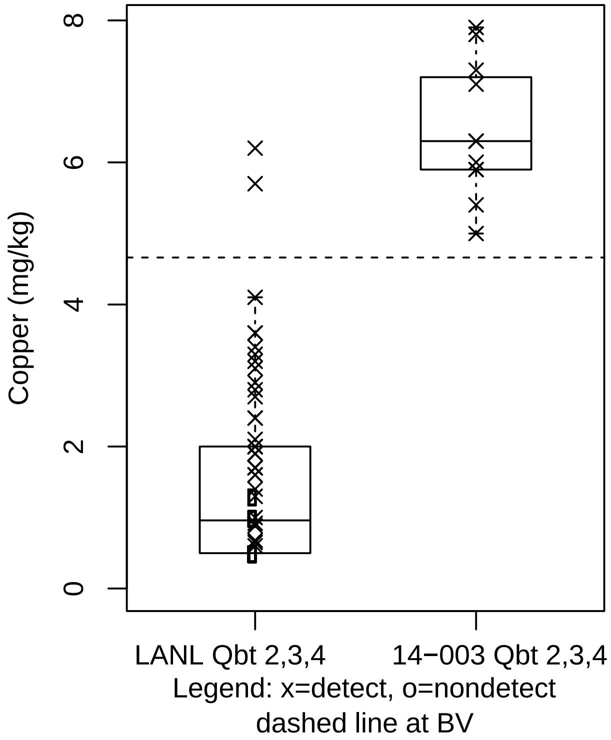


Figure F-25 Box plot for copper in tuff at SWMU 14-003

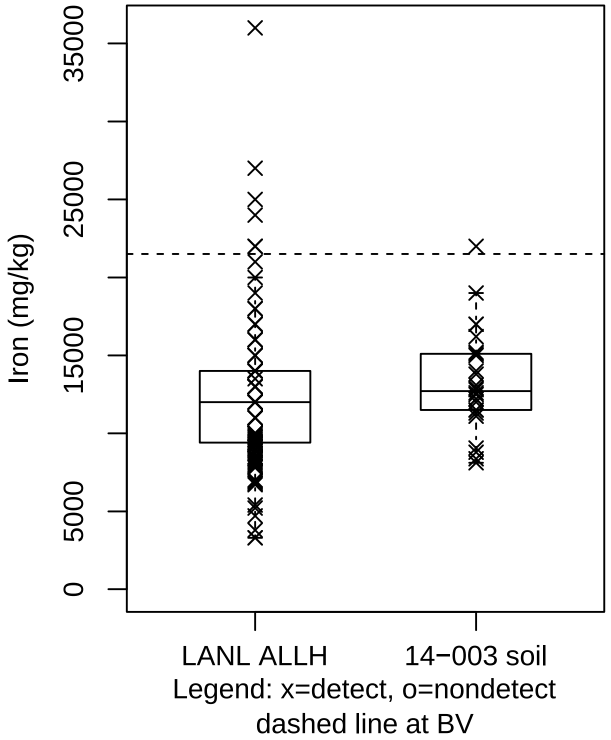


Figure F-26 Box plot for iron in soil at SWMU 14-003

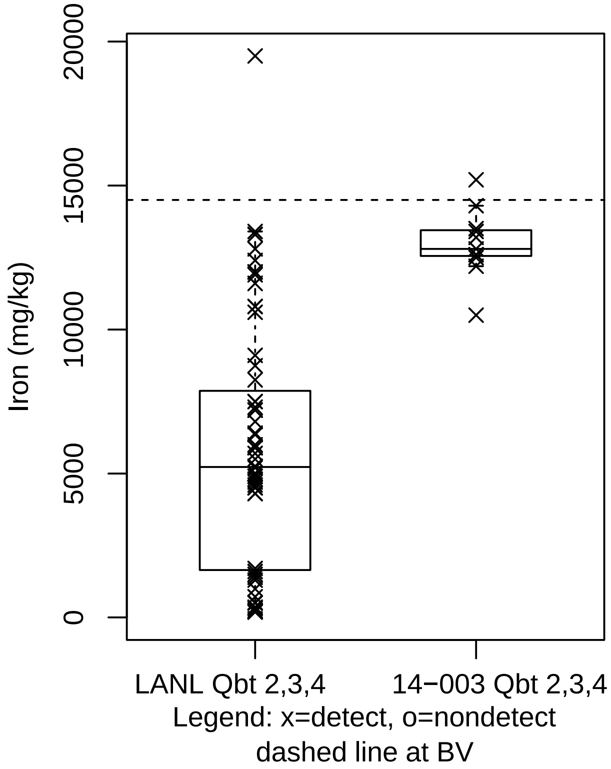


Figure F-27 **Box plot for iron in tuff at SWMU 14-003**

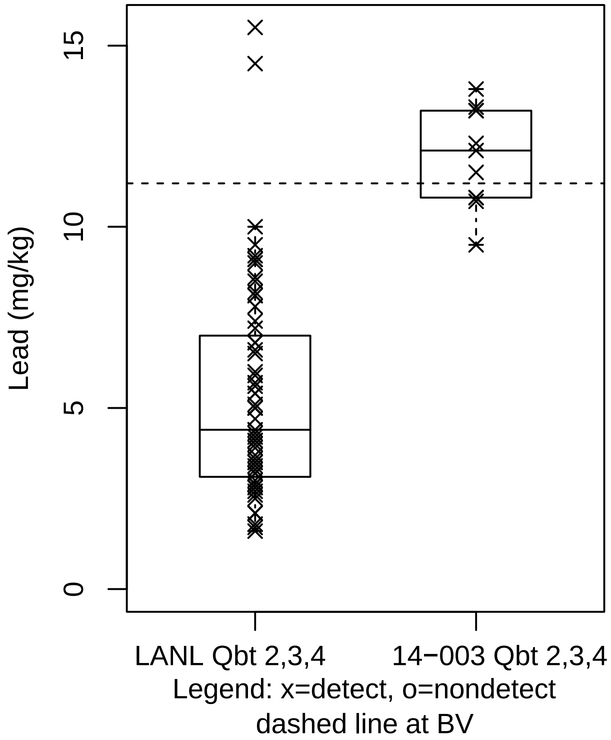


Figure F-28 **Box plot for lead in tuff at SWMU 14-003**

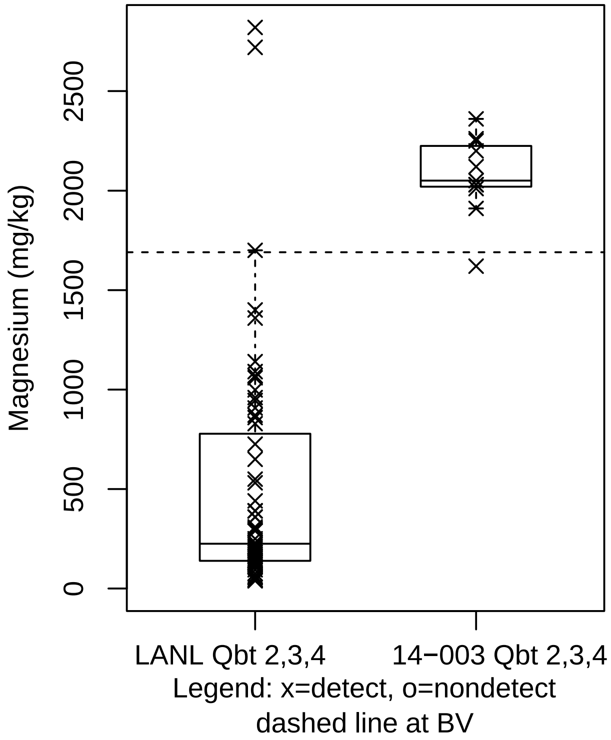


Figure F-29 Box plot for magnesium in tuff at SWMU 14-003

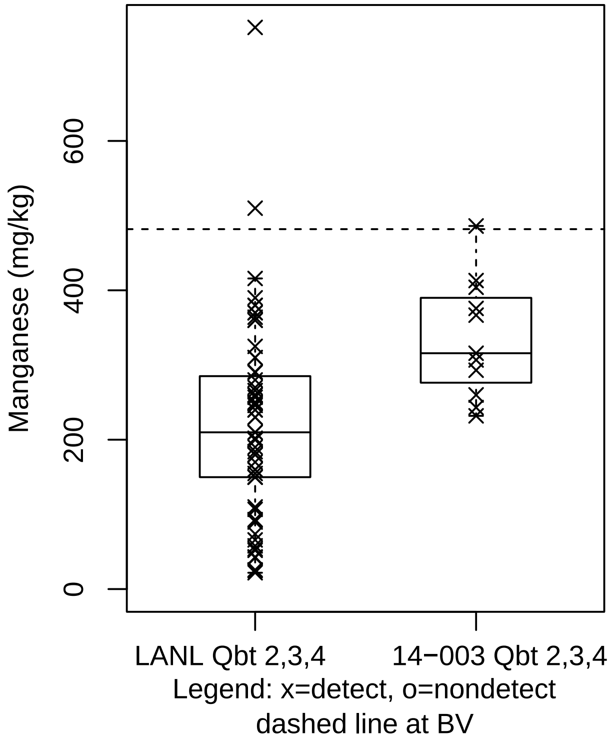


Figure F-30 Box plot for manganese in tuff at SWMU 14-003

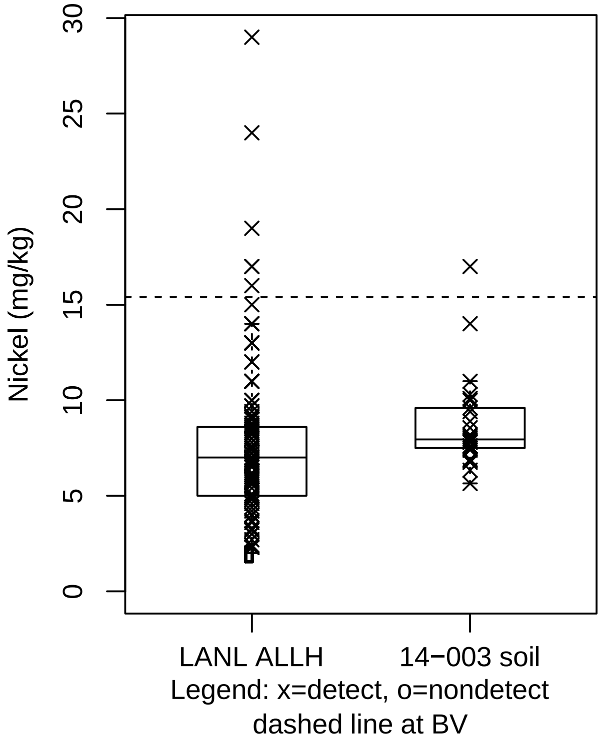


Figure F-31 **Box plot for nickel in soil at SWMU 14-003**

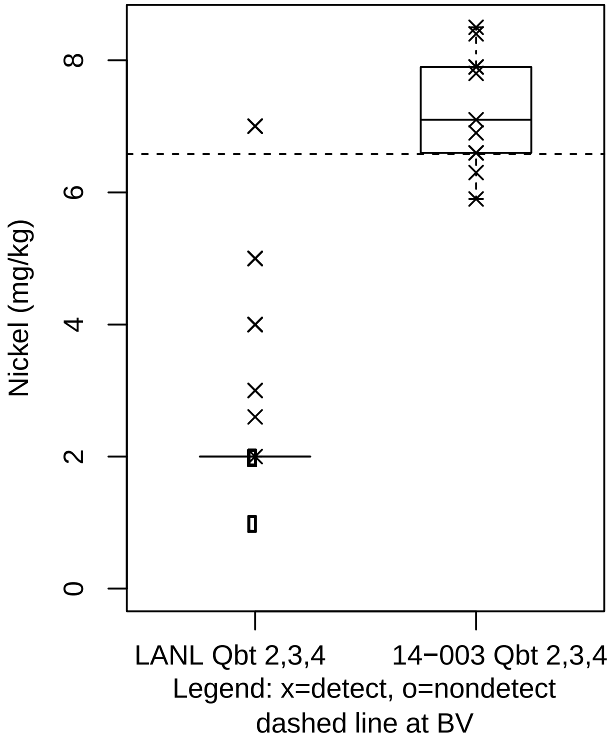


Figure F-32 **Box plot for nickel in tuff at SWMU 14-003**

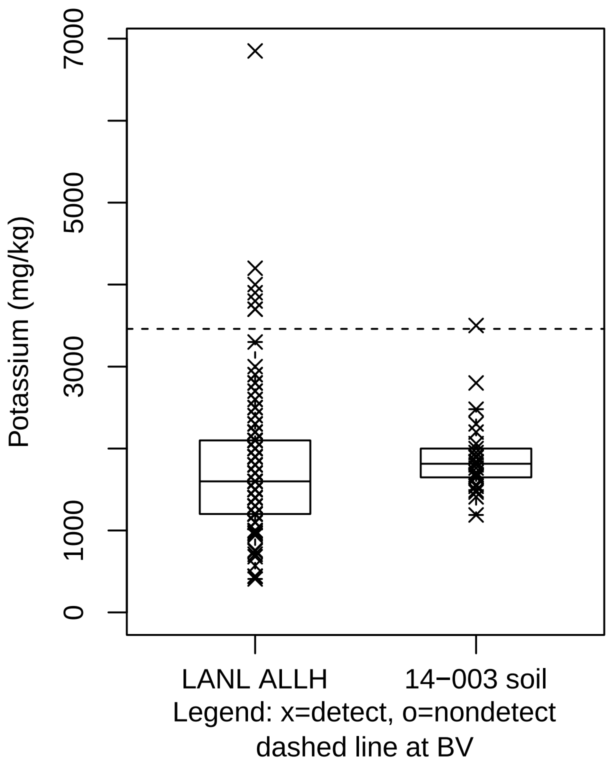


Figure F-33 Box plot for potassium in soil at SWMU 14-003

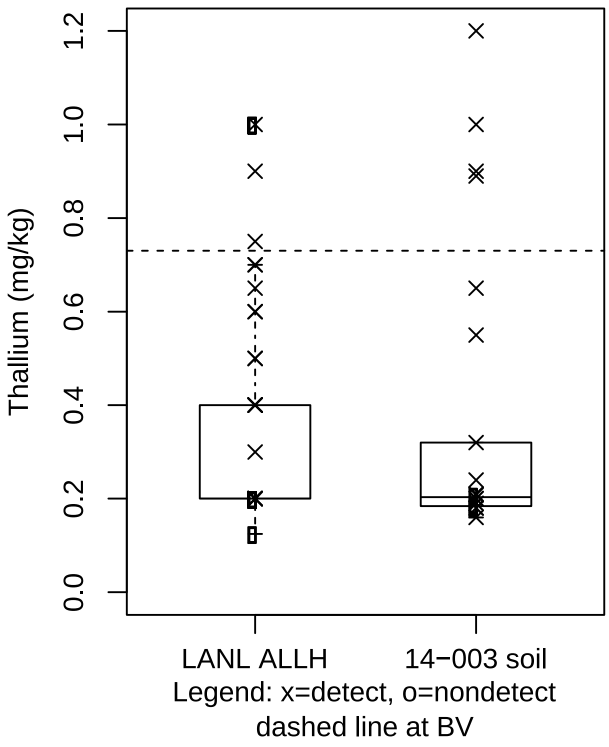


Figure F-34 Box plot for thallium in soil at SWMU 14-003

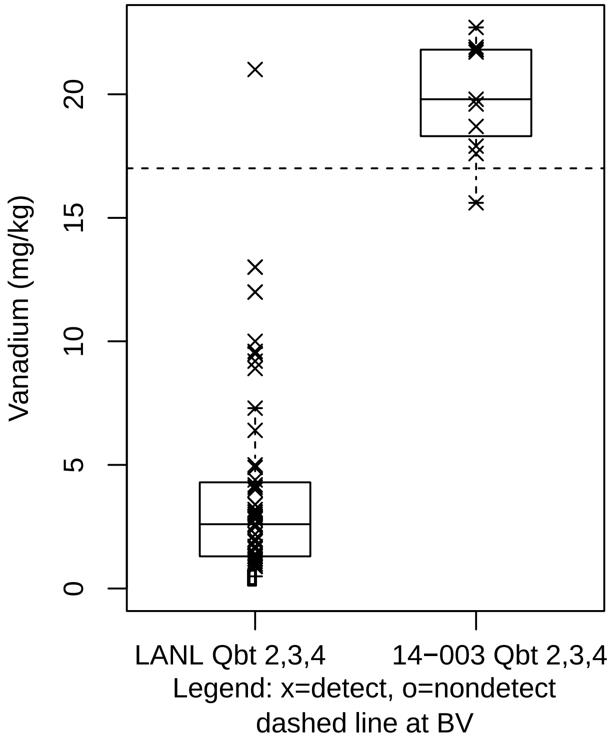


Figure F-35 **Box plot for vanadium in tuff at SWMU 14-003**

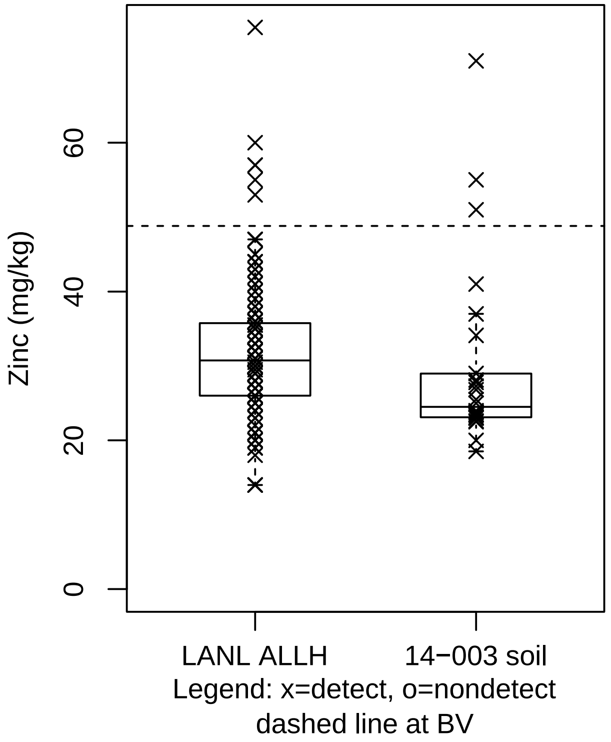


Figure F-36 **Box plot for zinc in soil at SWMU 14-003**

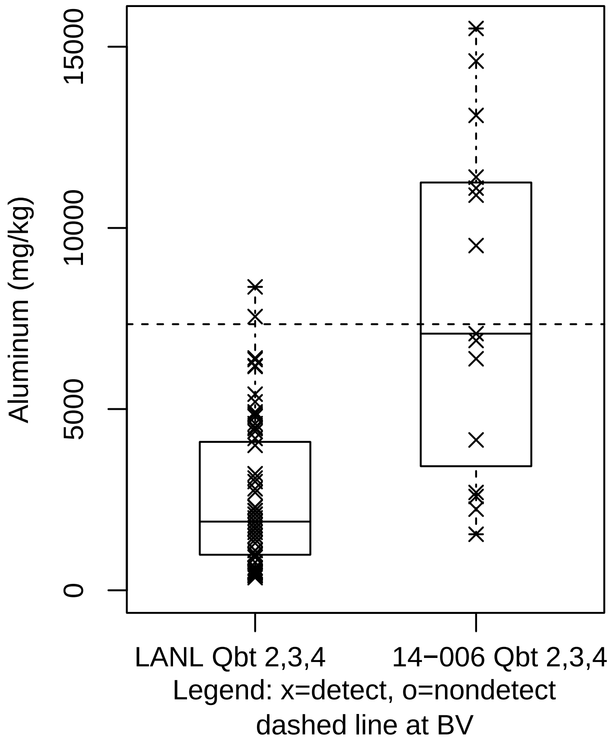


Figure F-37 Box plot for aluminum in tuff at SWMU 14-006

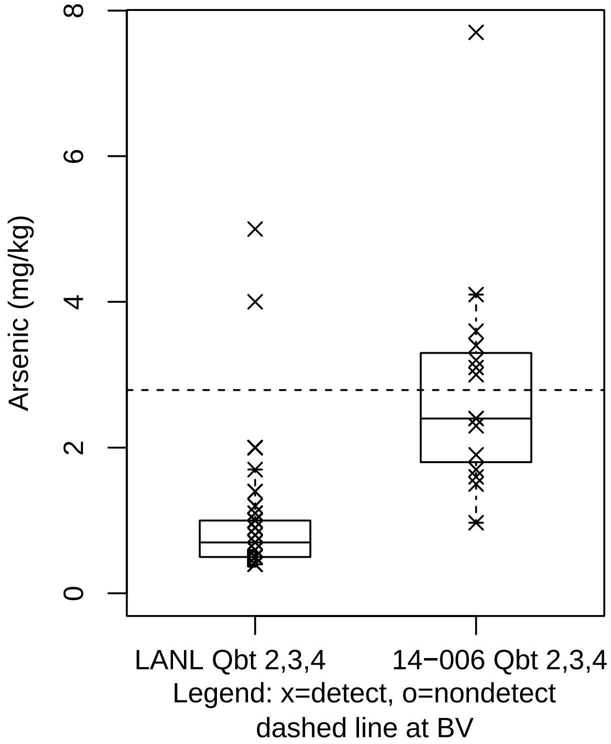


Figure F-38 Box plot for arsenic in tuff at SWMU 14-006

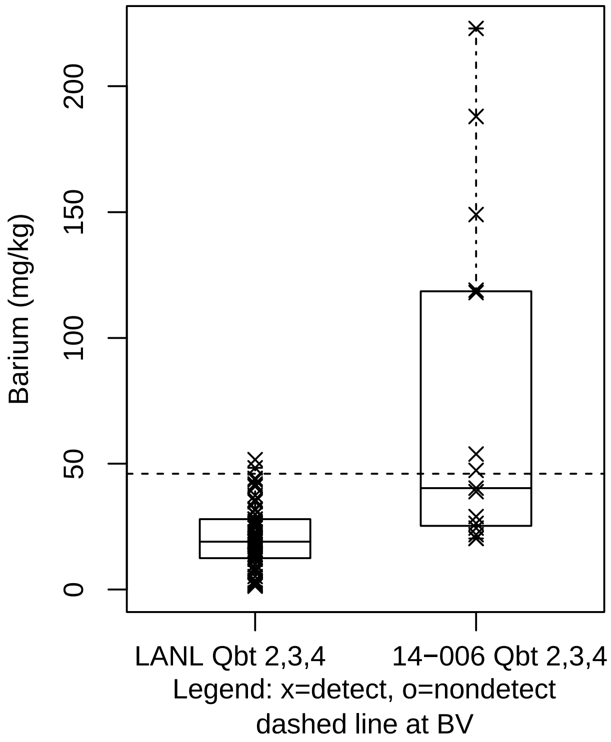


Figure F-39 Box plot for barium in tuff at SWMU 14-006

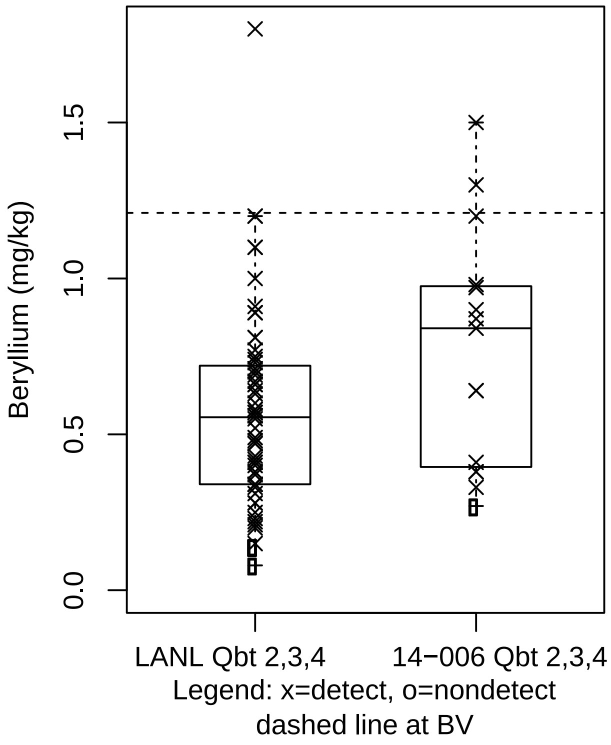


Figure F-40 Box plot for beryllium in tuff at SWMU 14-006

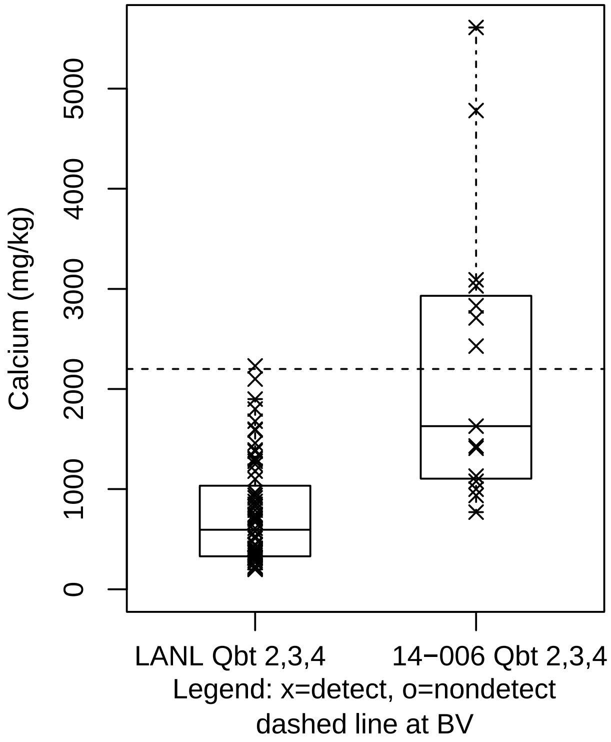


Figure F-41 Box plot for calcium in tuff at SWMU 14-006

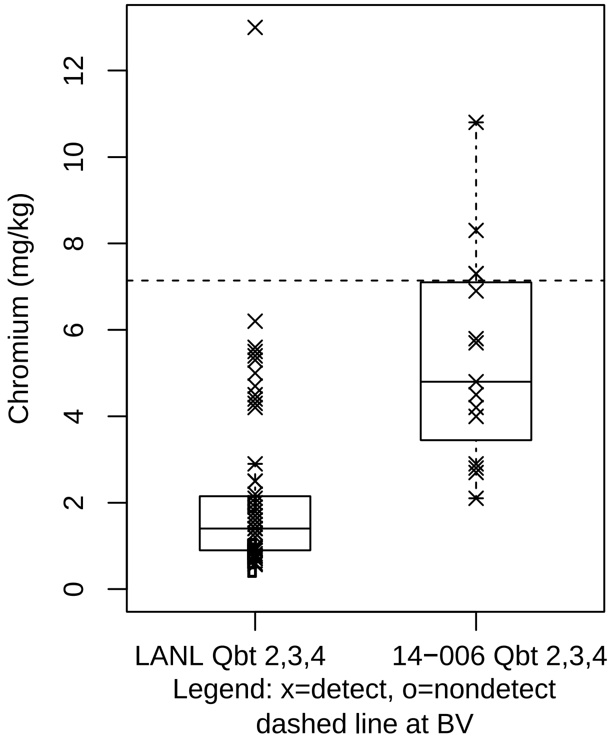


Figure F-42 Box plot for chromium in tuff at SWMU 14-006

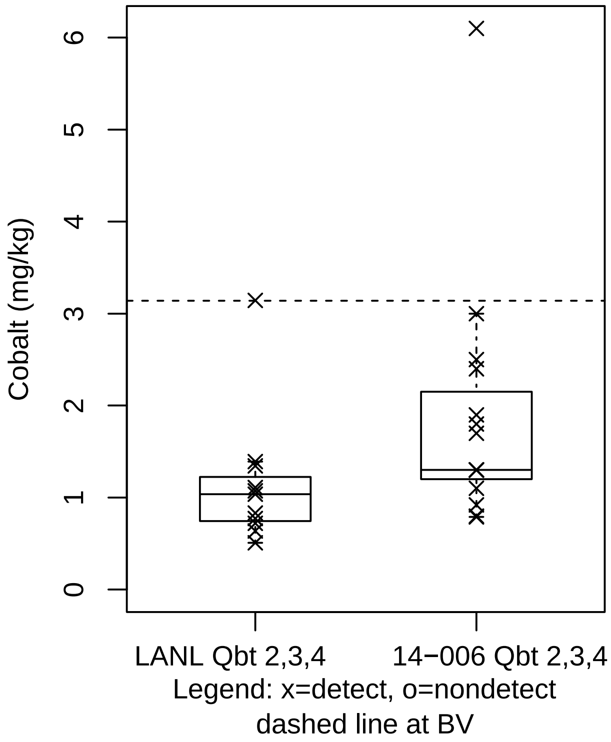


Figure F-43 Box plot for cobalt in tuff at SWMU 14-006

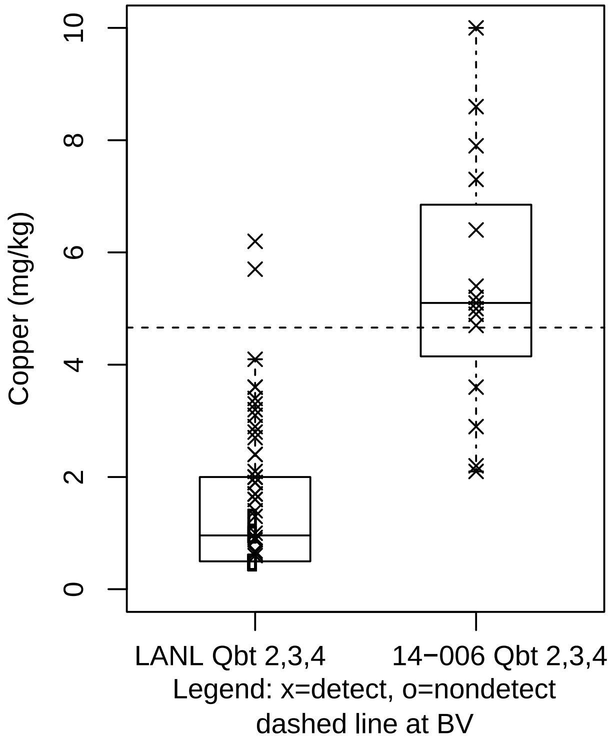


Figure F-44 Box plot for copper in tuff at SWMU 14-006

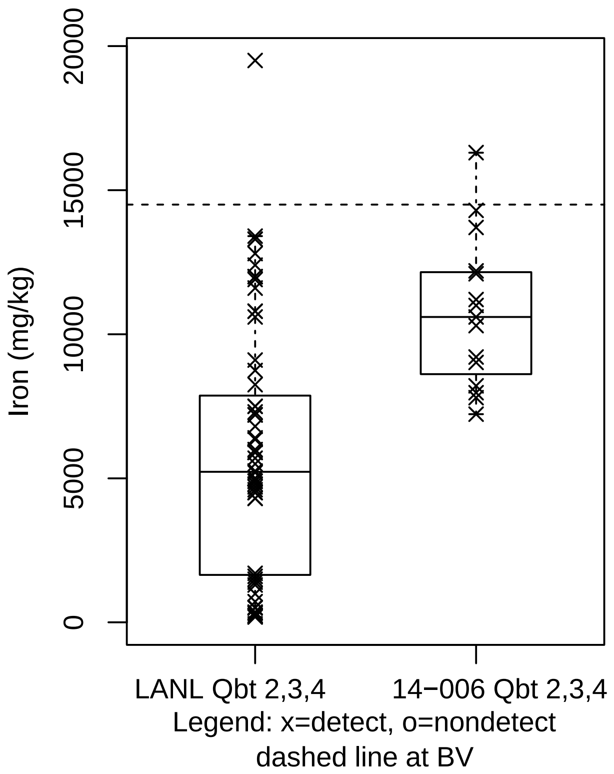


Figure F-45 **Box plot for iron in tuff at SWMU 14-006**

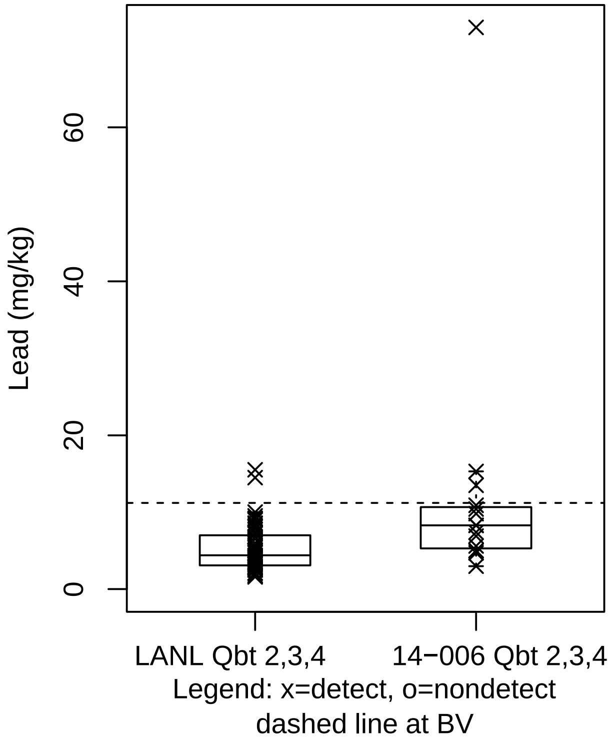


Figure F-46 **Box plot for lead in tuff at SWMU 14-006**

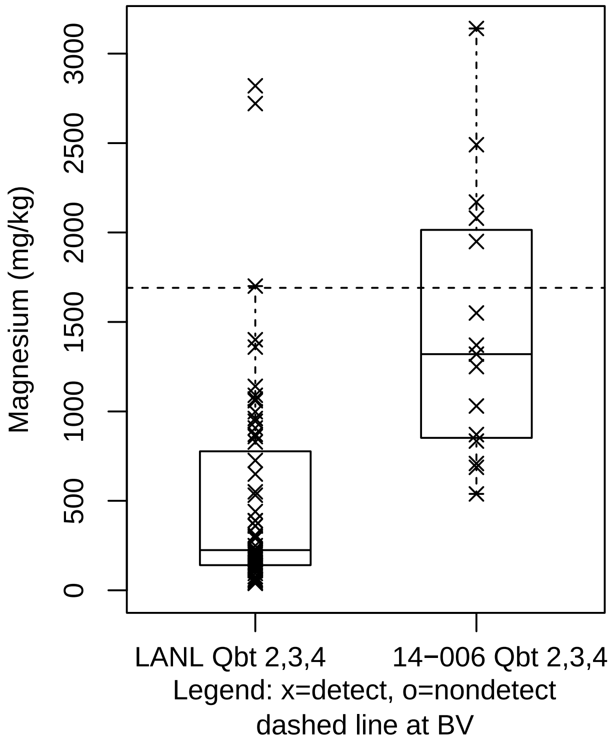


Figure F-47 Box plot for magnesium in tuff at SWMU 14-006

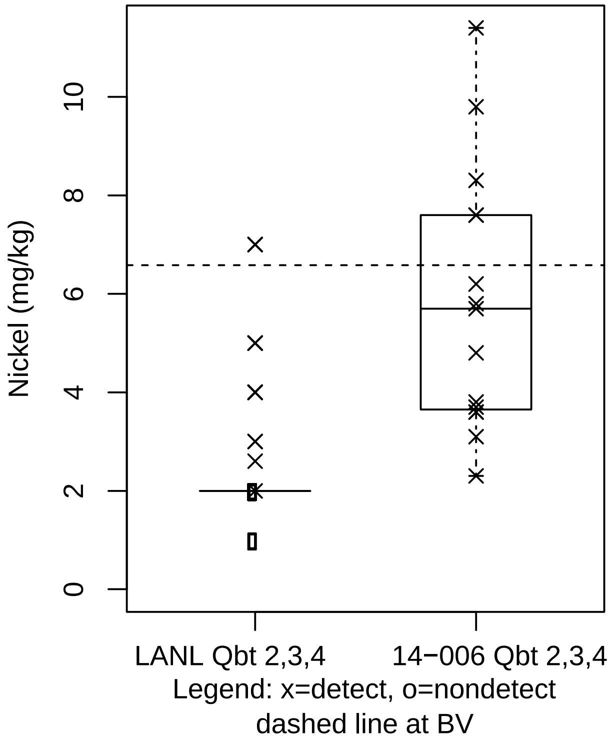


Figure F-48 Box plot for nickel in tuff at SWMU 14-006

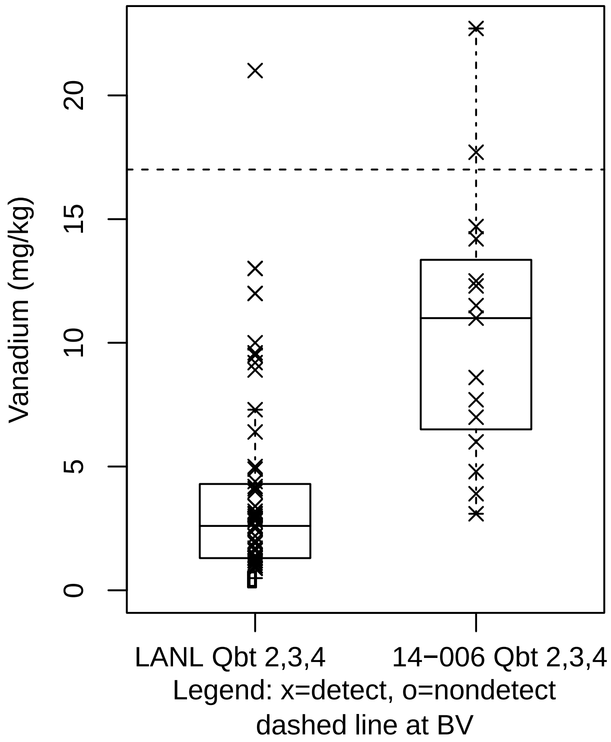


Figure F-49 **Box plot for vanadium in tuff at SWMU 14-006**

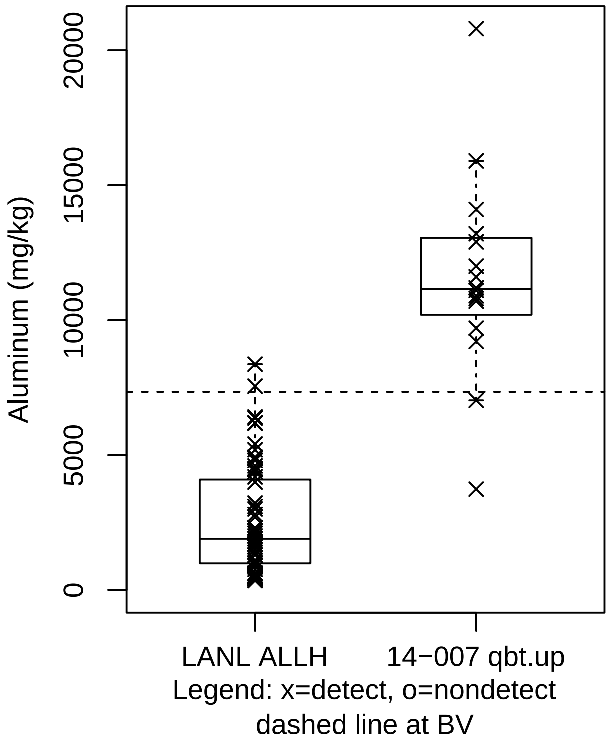


Figure F-50 **Box plot for aluminum in tuff at SWMU 14-007**

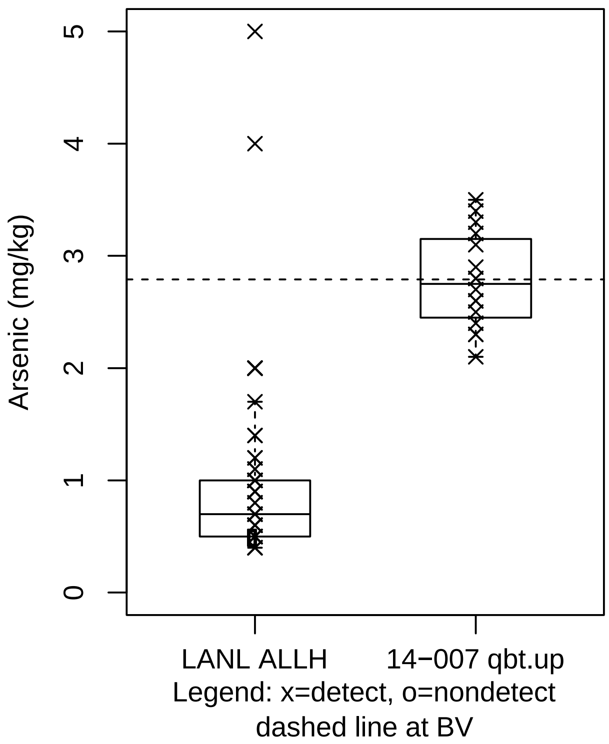


Figure F-51 **Box plot for arsenic in tuff at SWMU 14-007**

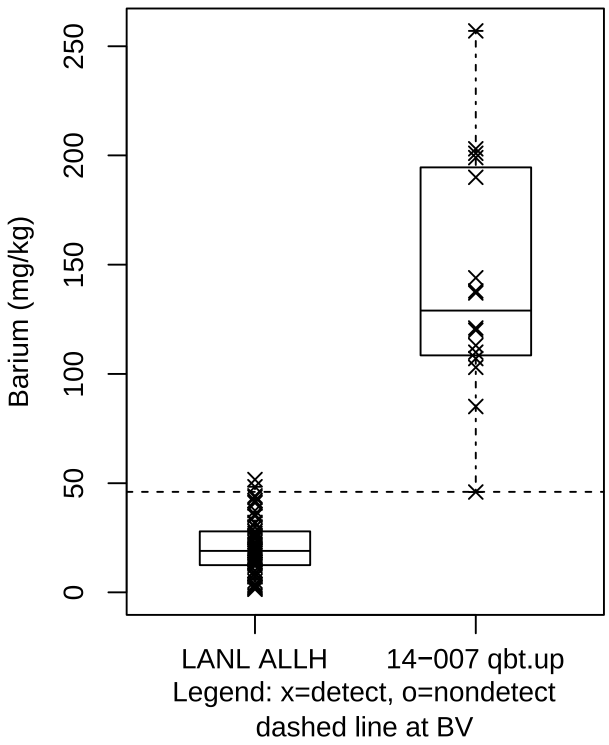


Figure F-52 **Box plot for barium in tuff at SWMU 14-007**

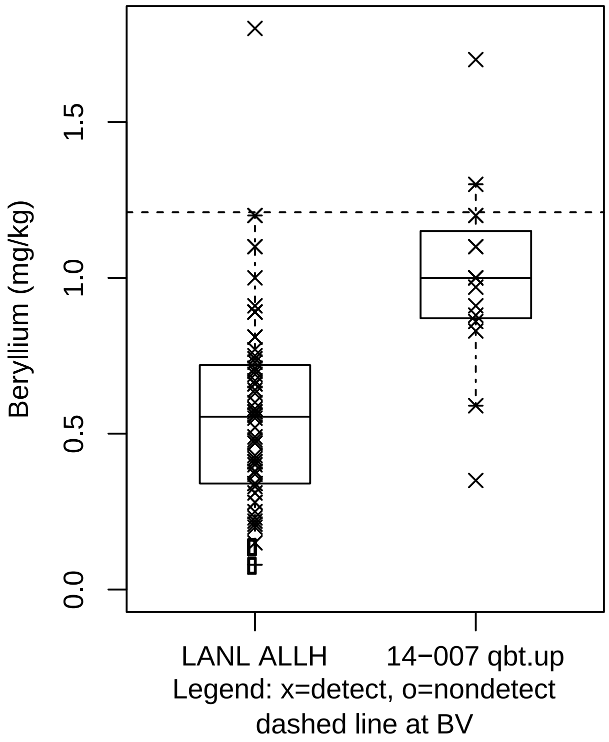


Figure F-53 Box plot for beryllium in tuff at SWMU 14-007

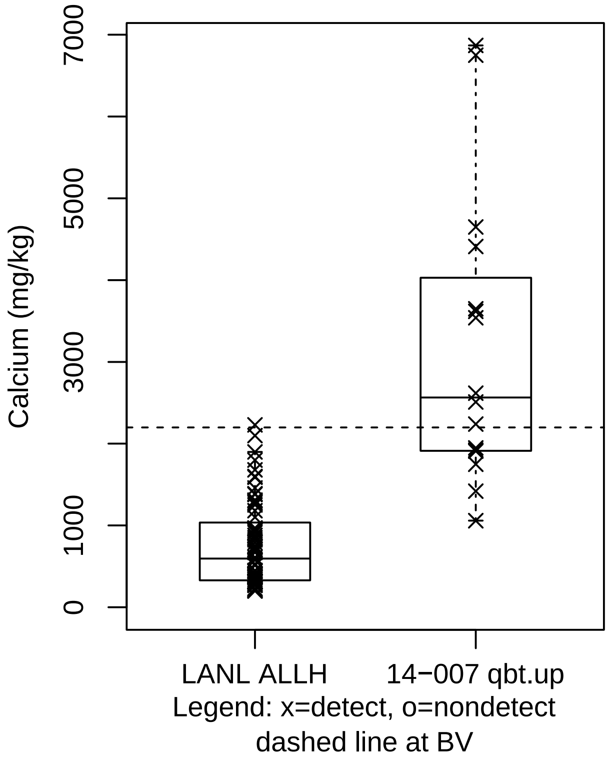


Figure F-54 Box plot for calcium in tuff at SWMU 14-007

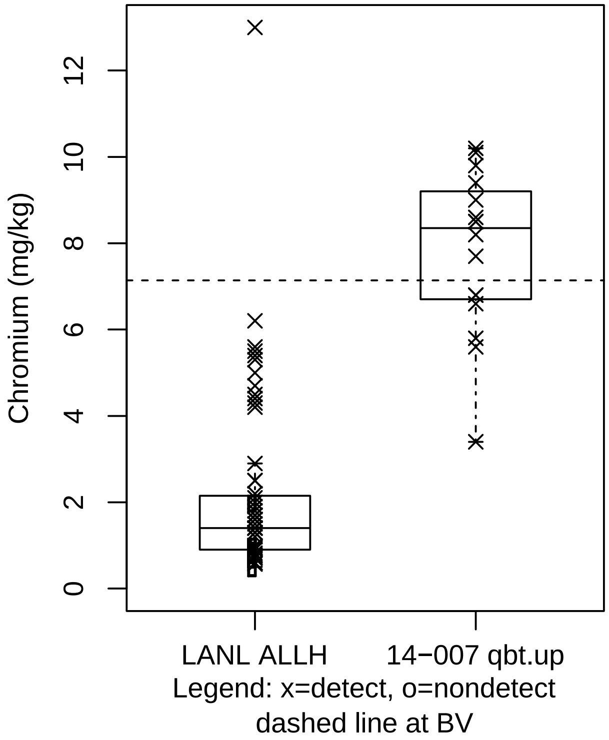


Figure F-55 **Box plot for chromium in tuff at SWMU 14-007**

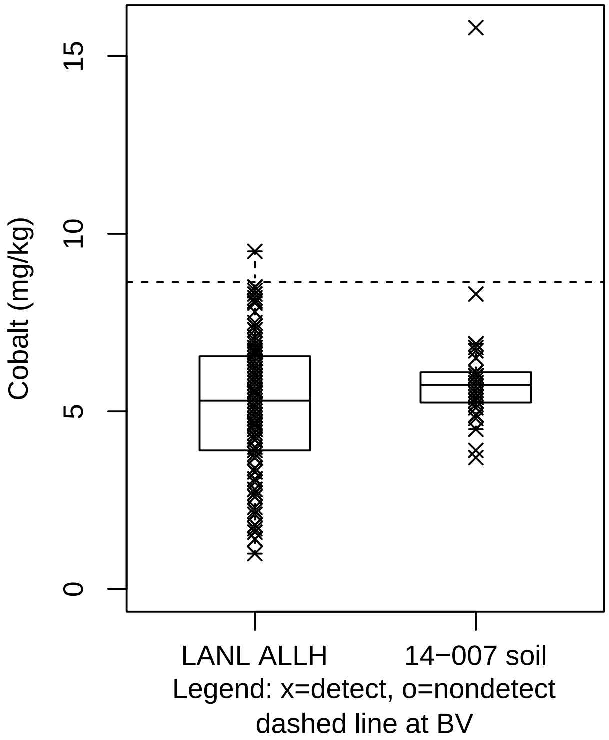


Figure F-56 **Box plot for cobalt in soil at SWMU 14-007**

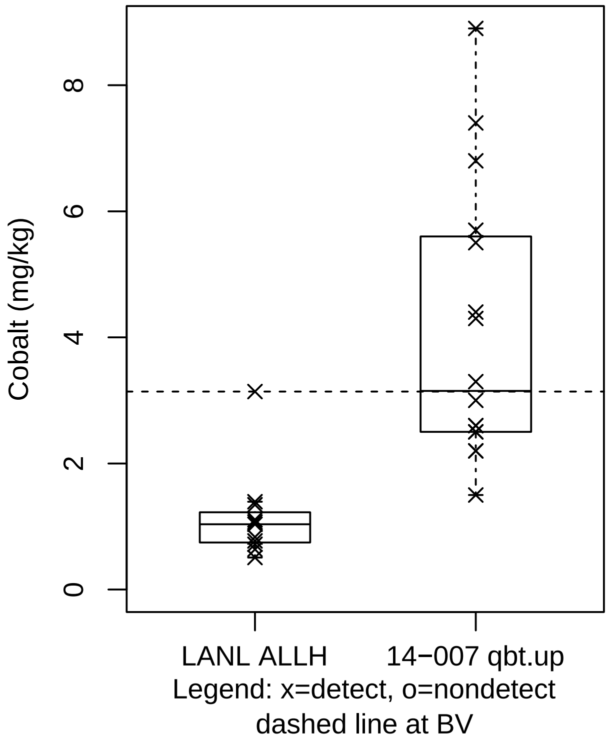


Figure F-57 **Box plot for cobalt in tuff at SWMU 14-007**

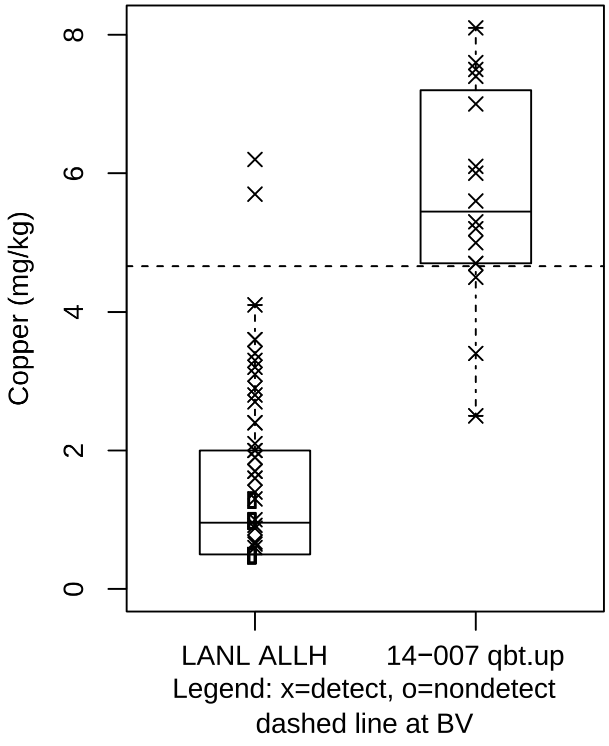


Figure F-58 **Box plot for copper in tuff at SWMU 14-007**

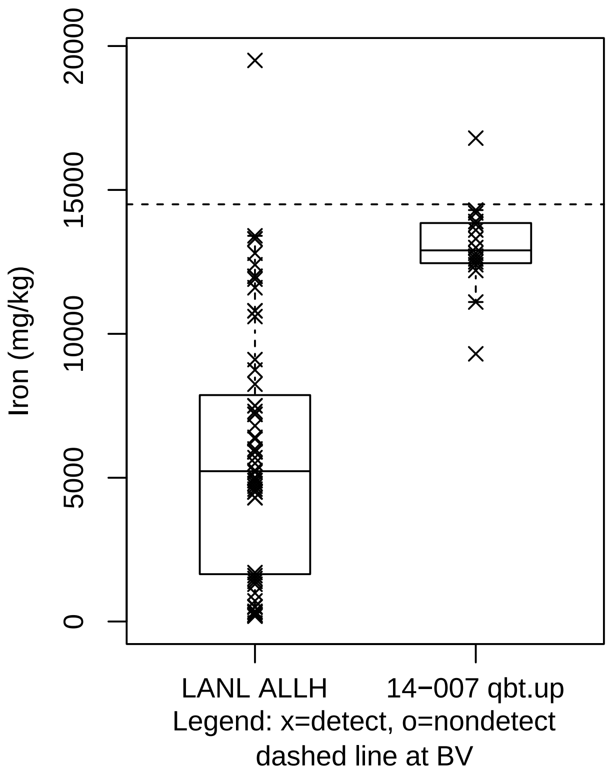


Figure F-59 **Box plot for iron in tuff at SWMU 14-007**

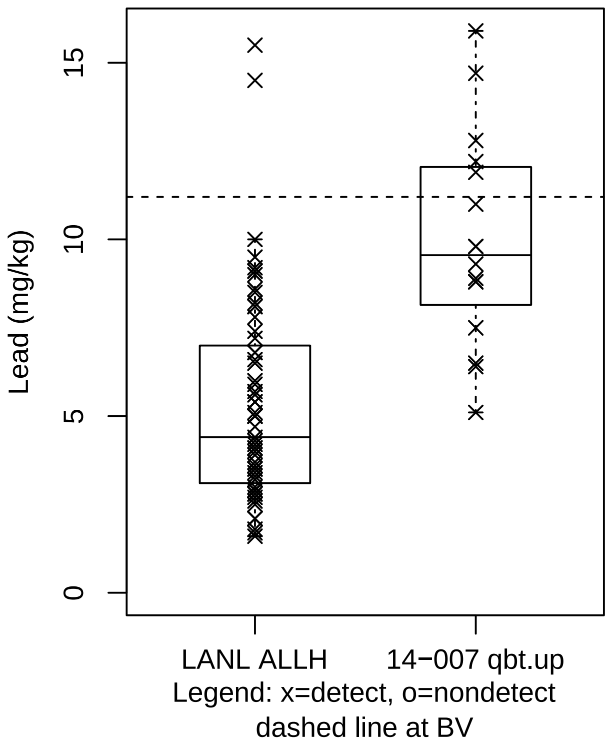


Figure F-60 **Box plot for lead in tuff at SWMU 14-007**

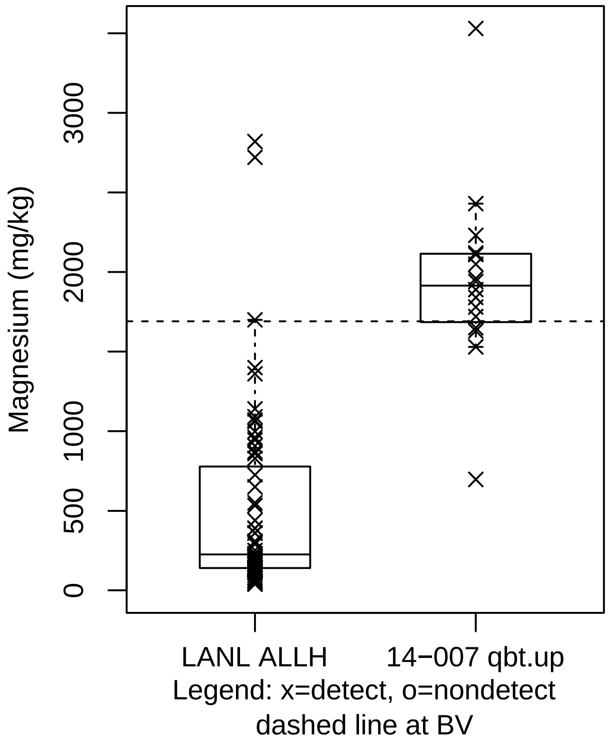


Figure F-61 Box plot for magnesium in tuff at SWMU 14-007

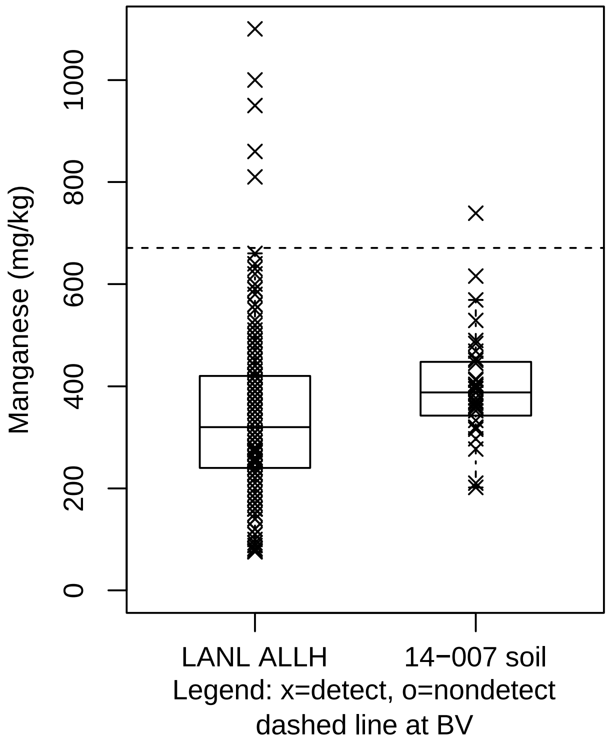


Figure F-62 Box plot for manganese in soil at SWMU 14-007

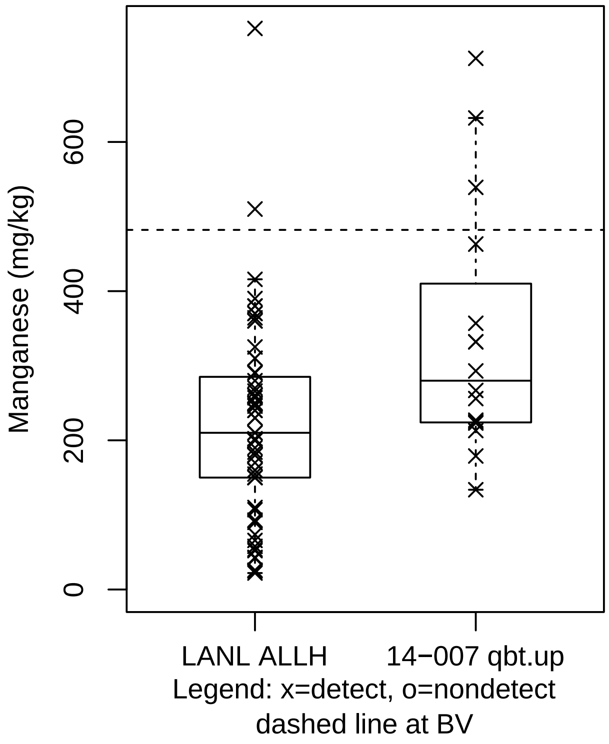


Figure F-63 **Box plot for manganese in tuff at SWMU 14-007**

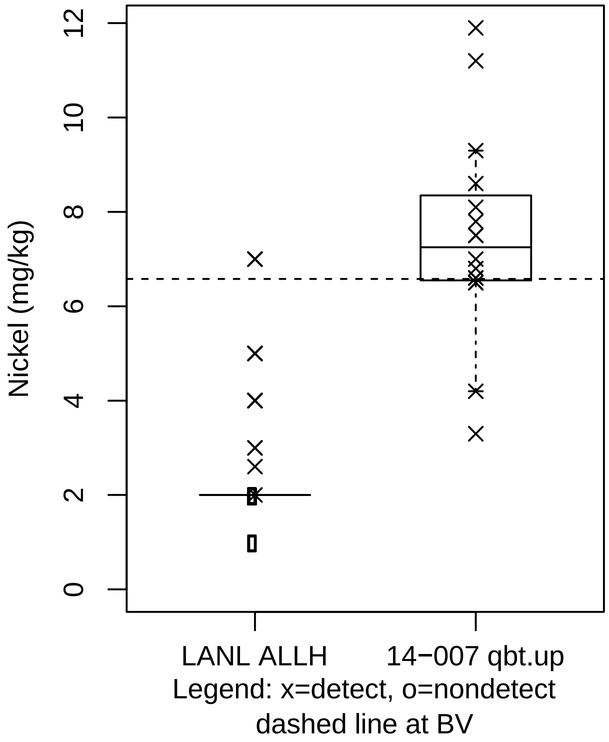


Figure F-64 **Box plot for nickel in tuff at SWMU 14-007**

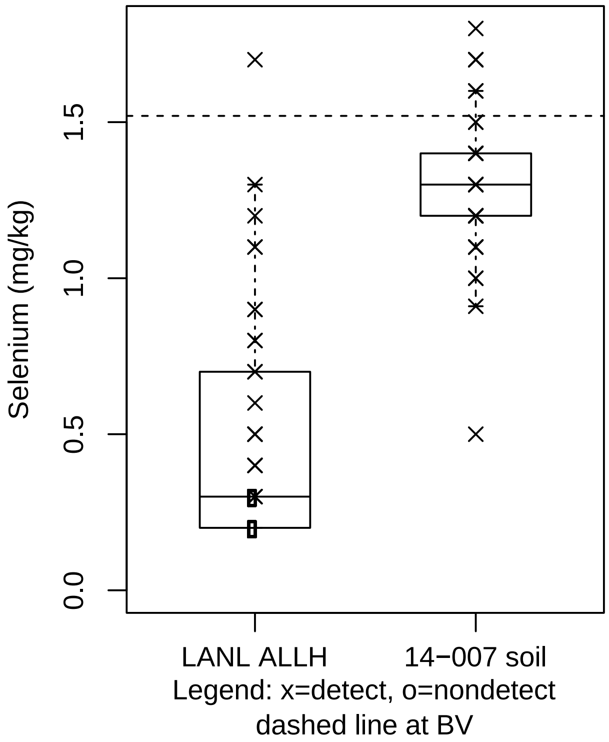


Figure F-65 **Box plot for selenium in soil at SWMU 14-007**

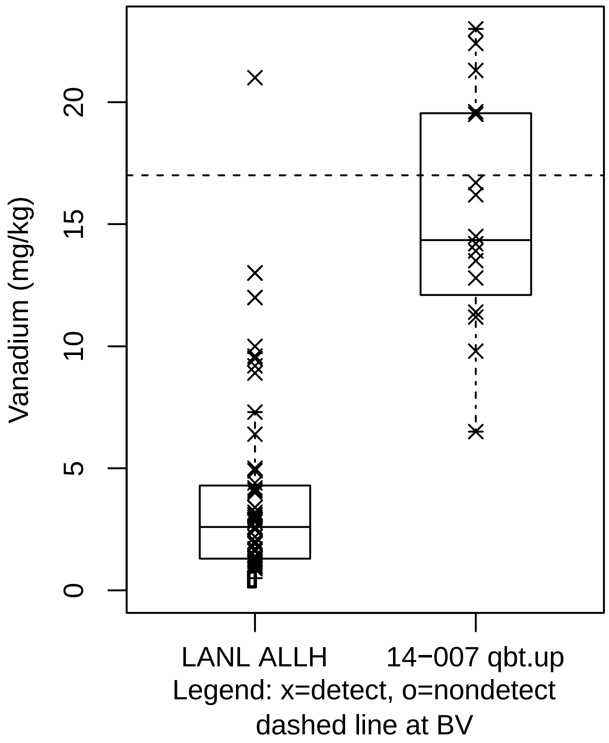


Figure F-66 **Box plot for vanadium in tuff at SWMU 14-007**

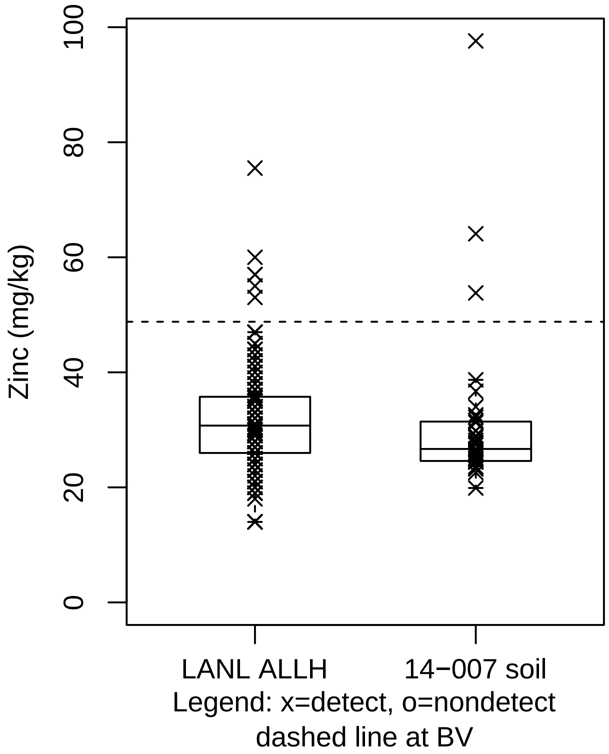


Figure F-67 **Box plot for zinc in soil at SWMU 14-007**

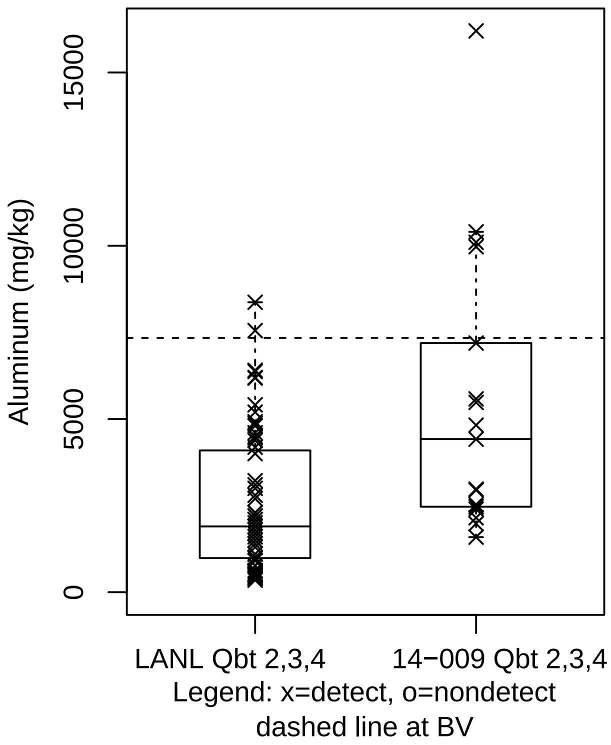


Figure F-68 **Box plot for aluminum in tuff at SWMU 14-009**

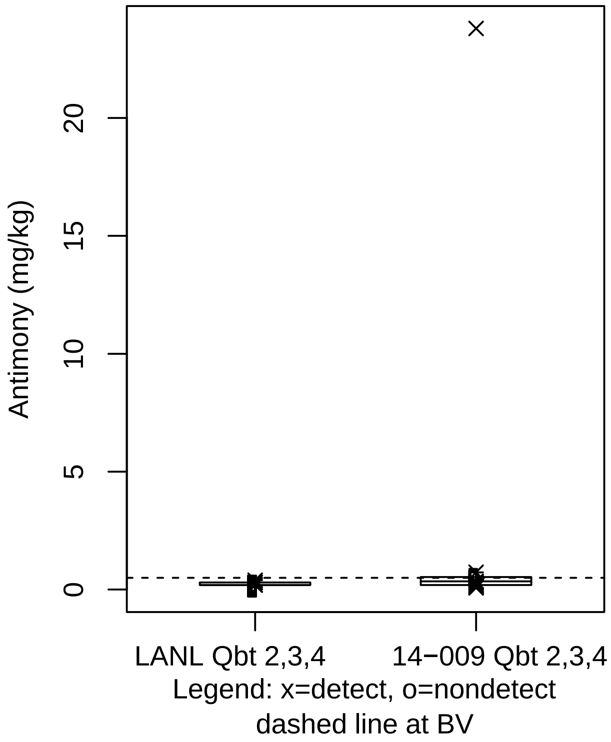


Figure F-69 Box plot for antimony in tuff at SWMU 14-009

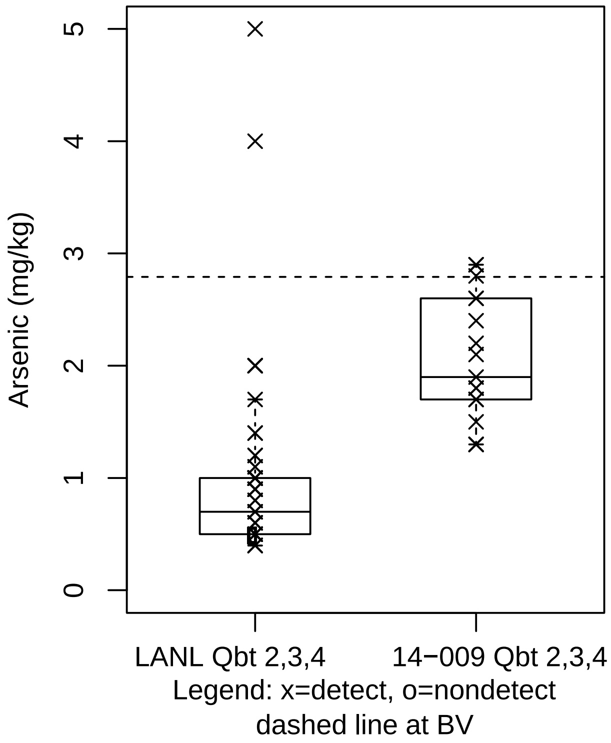


Figure F-70 Box plot for arsenic in tuff at SWMU 14-009

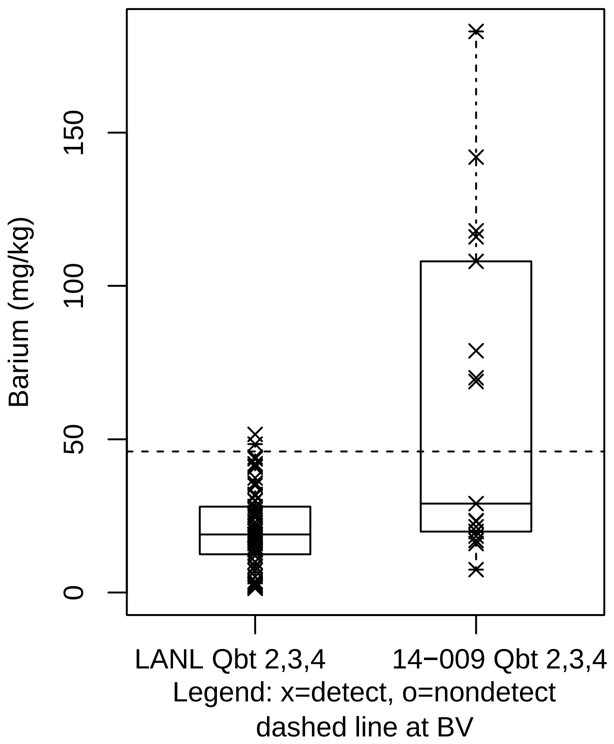


Figure F-71 **Box plot for barium in tuff at SWMU 14-009**

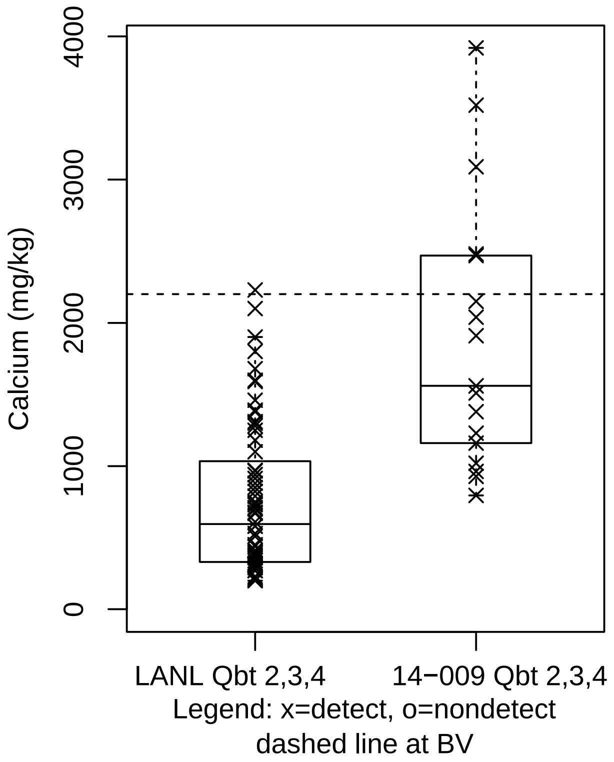


Figure F-72 **Box plot for calcium in tuff at SWMU 14-009**

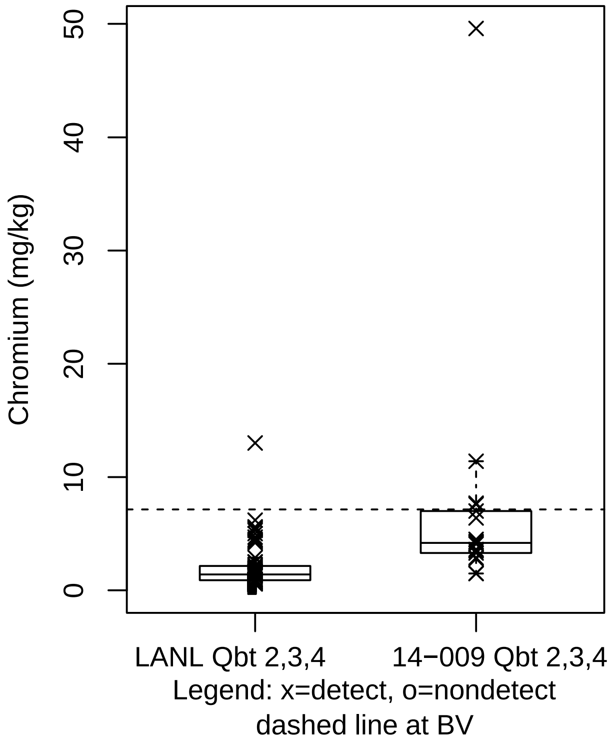


Figure F-73 **Box plot for chromium in tuff at SWMU 14-009**

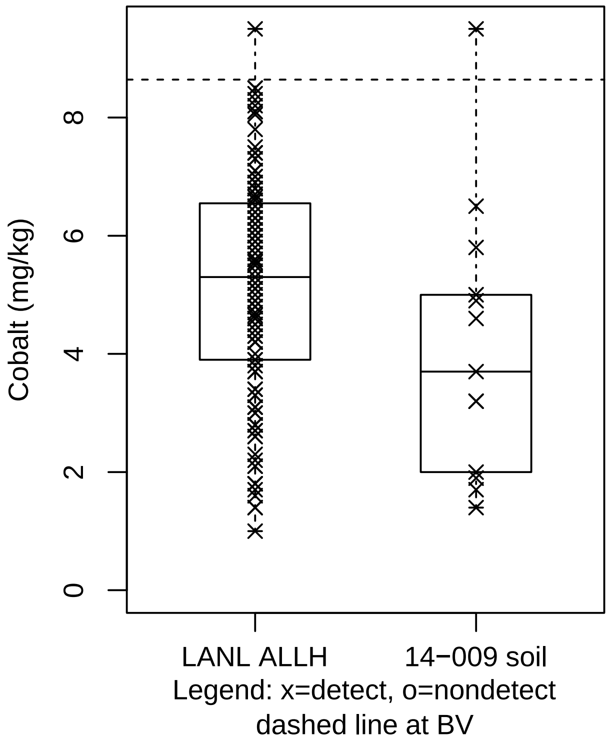


Figure F-74 **Box plot for cobalt in soil at SWMU 14-009**

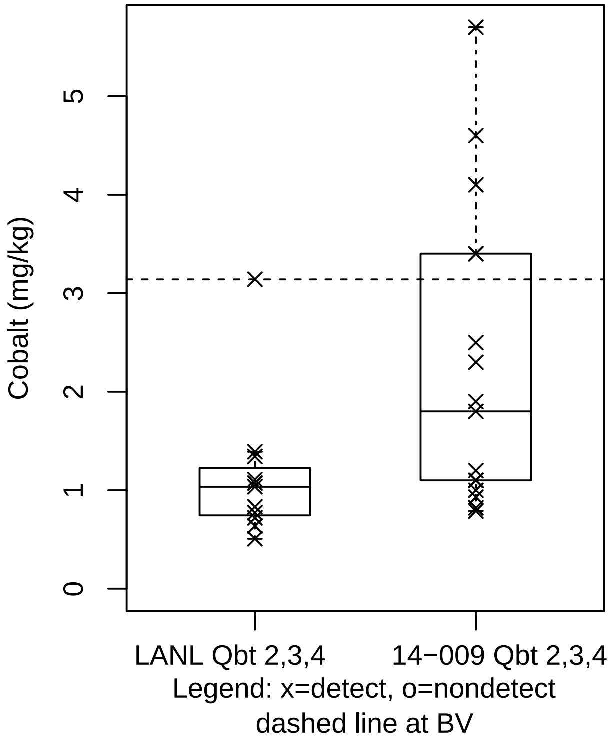


Figure F-75 Box plot for cobalt in tuff at SWMU 14-009

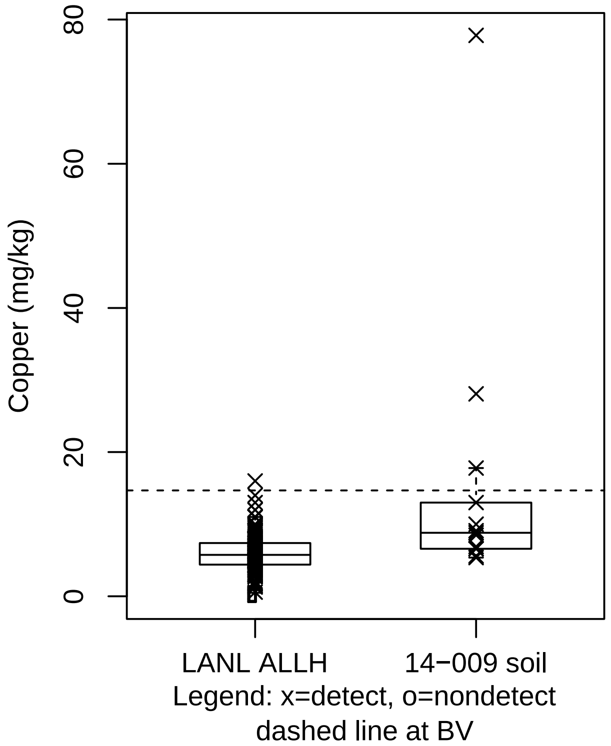


Figure F-76 Box plot for copper in soil at SWMU 14-009

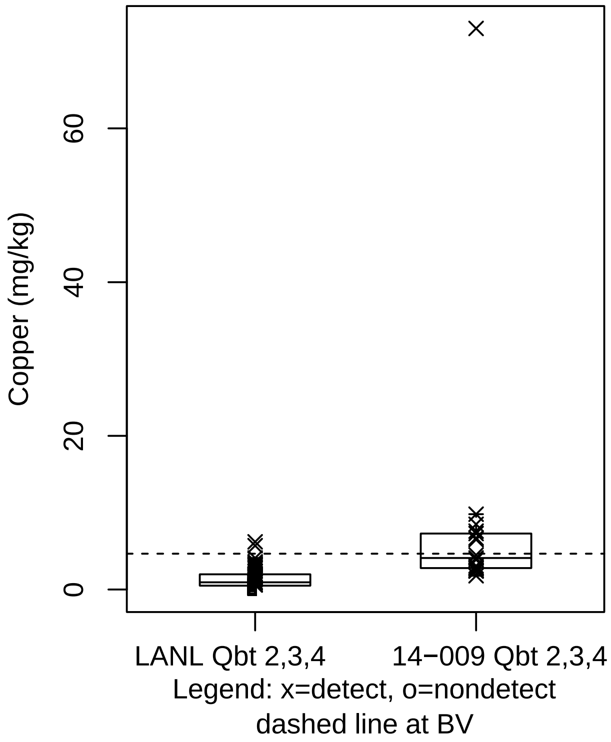


Figure F-77 Box plot for copper in tuff at SWMU 14-009

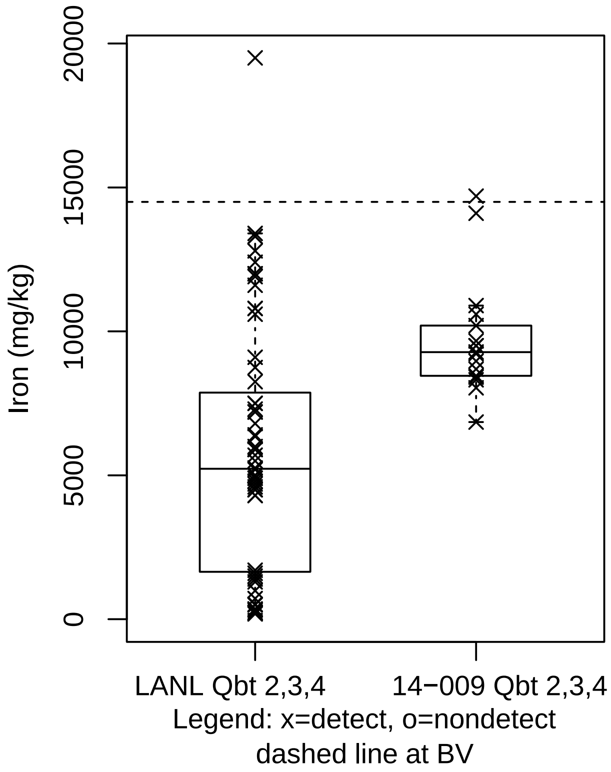


Figure F-78 Box plot for iron in tuff at SWMU 14-009

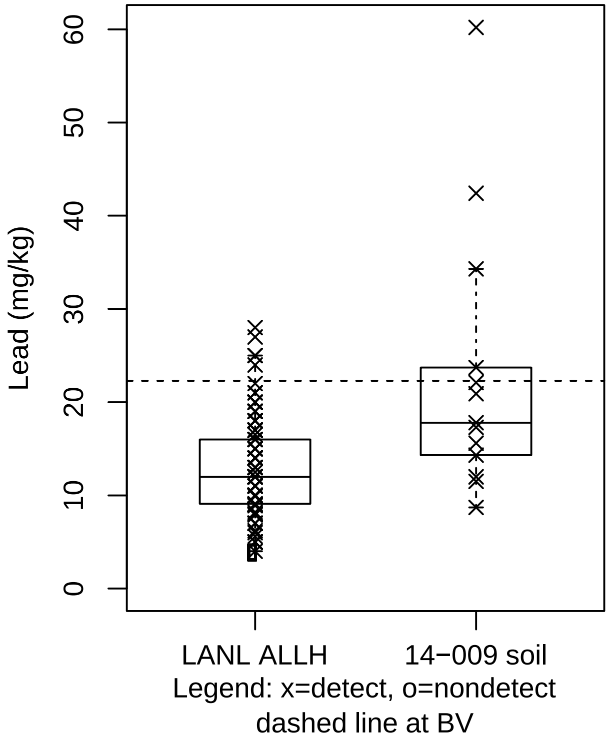


Figure F-79 **Box plot for lead in soil at SWMU 14-009**

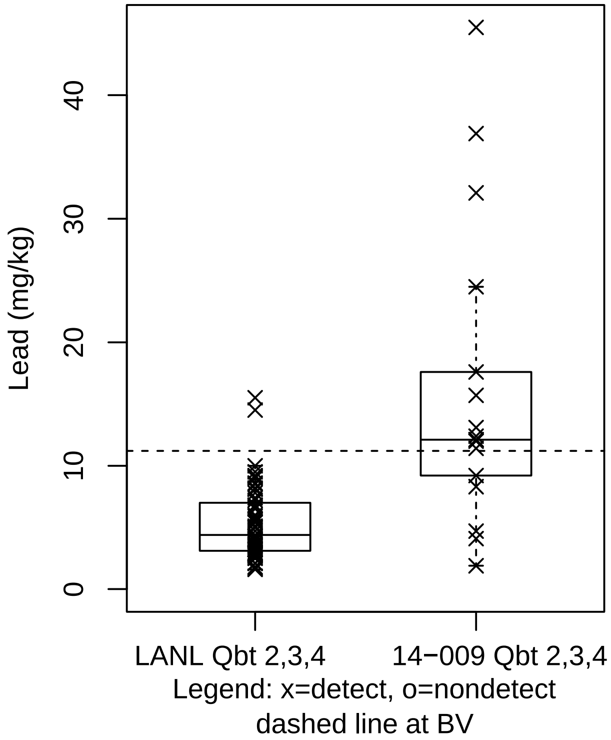


Figure F-80 **Box plot for lead in tuff at SWMU 14-009**

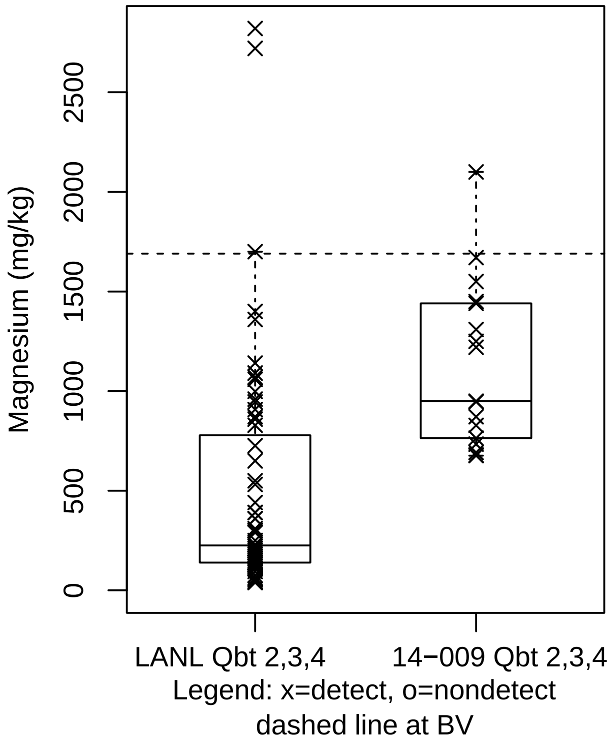


Figure F-81 Box plot for magnesium in tuff at SWMU 14-009

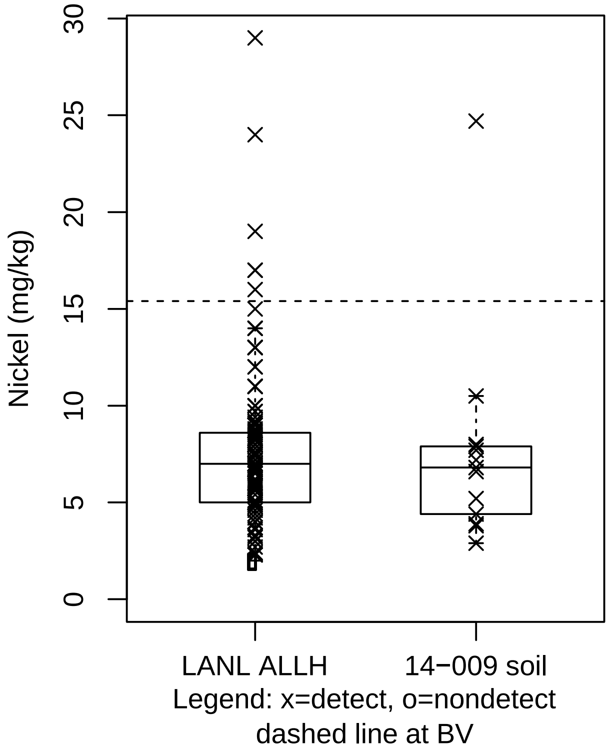


Figure F-82 Box plot for nickel in soil at SWMU 14-009

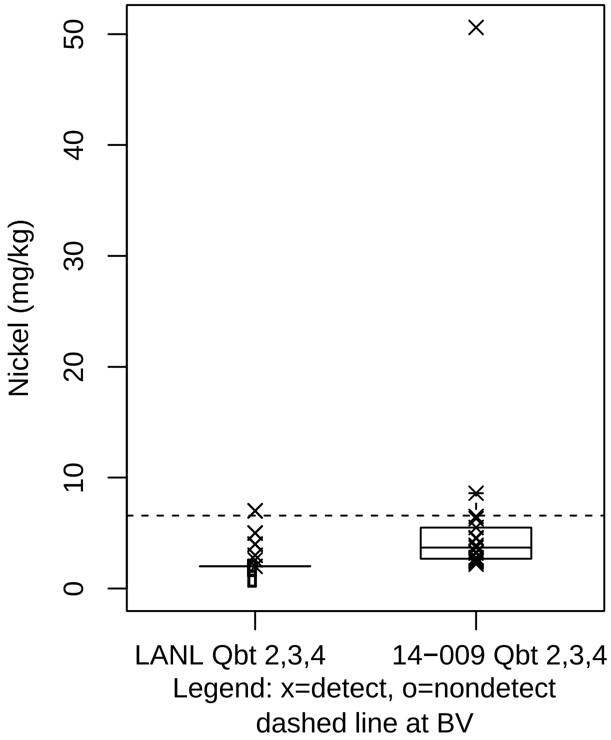


Figure F-83 **Box plot for nickel in tuff at SWMU 14-009**

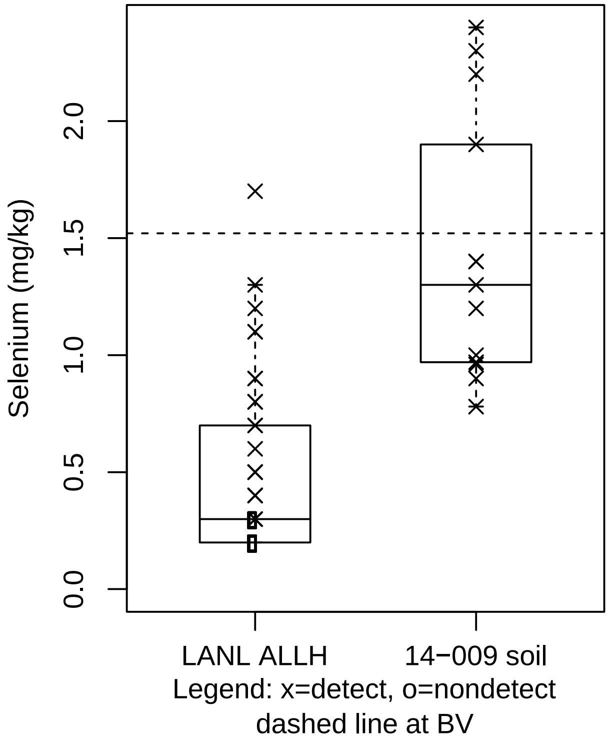


Figure F-84 **Box plot for selenium in soil at SWMU 14-009**

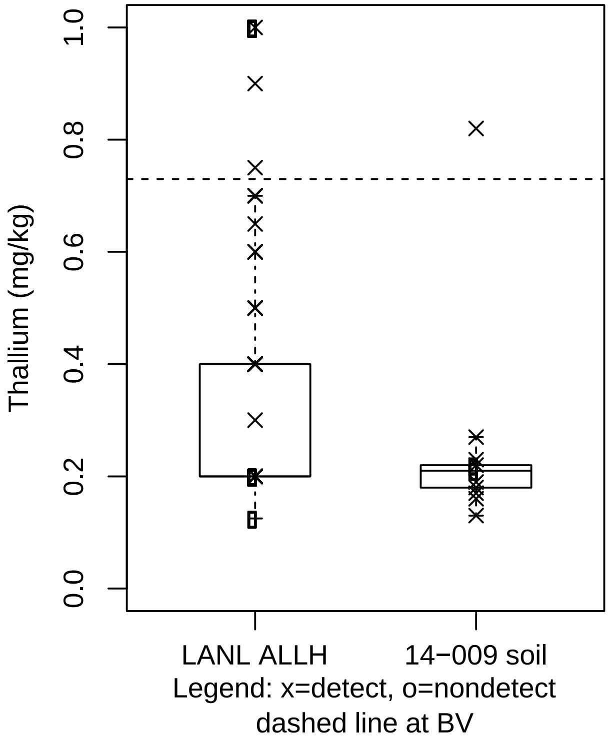


Figure F-85 **Box plot for thallium in soil at SWMU 14-009**

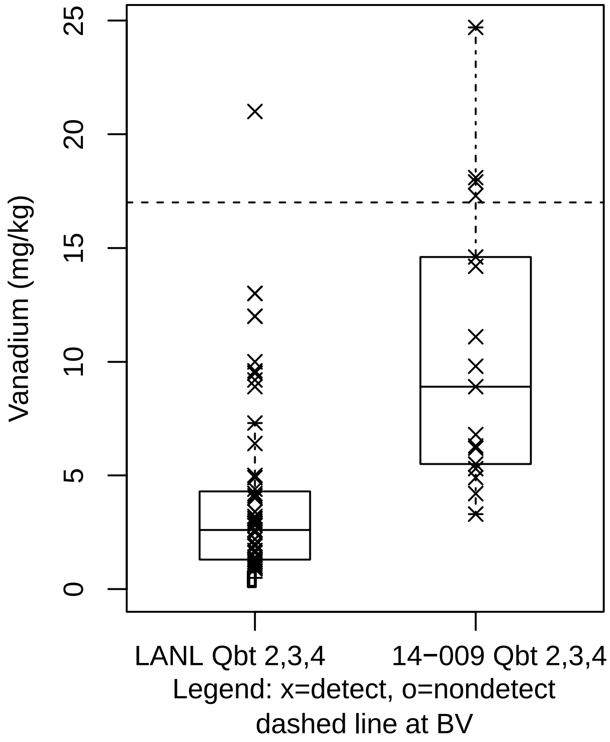


Figure F-86 **Box plot for vanadium in tuff at SWMU 14-009**

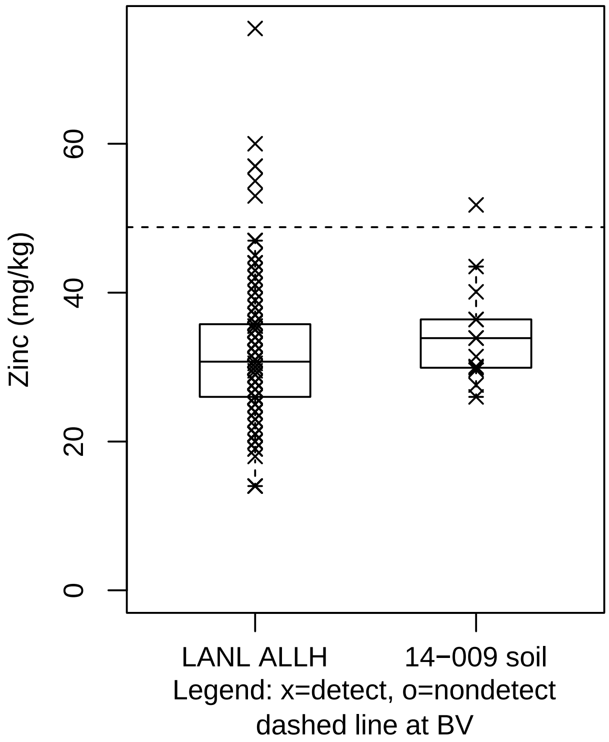


Figure F-87 Box plot for zinc in soil at SWMU 14-009

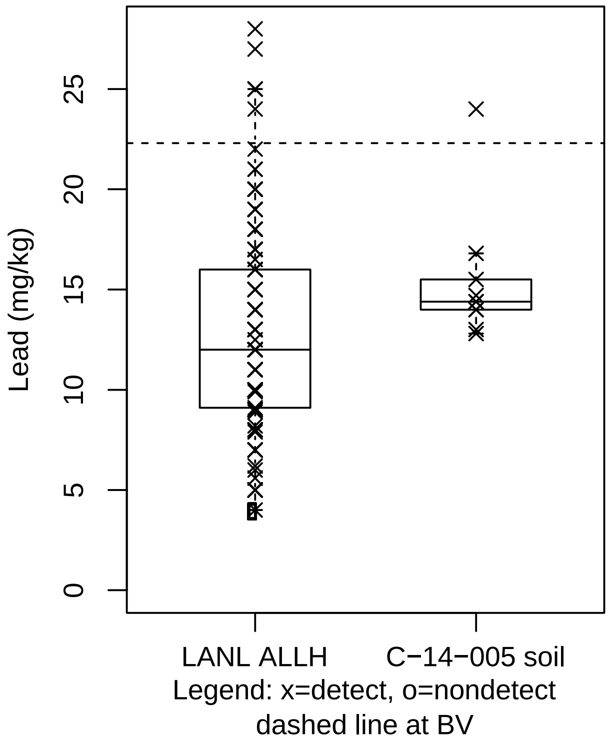


Figure F-88 Box plot for lead in soil at AOC C-14-005

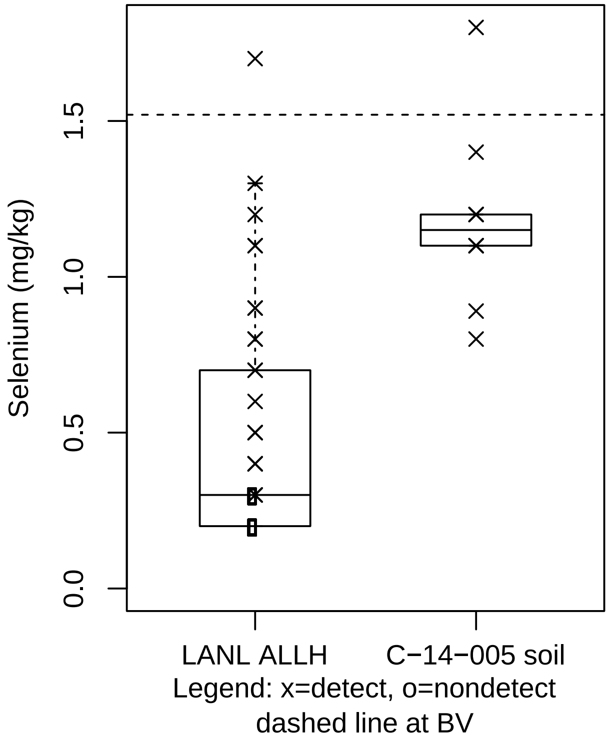


Figure F-89 **Box plot for selenium in soil at AOC C-14-005**

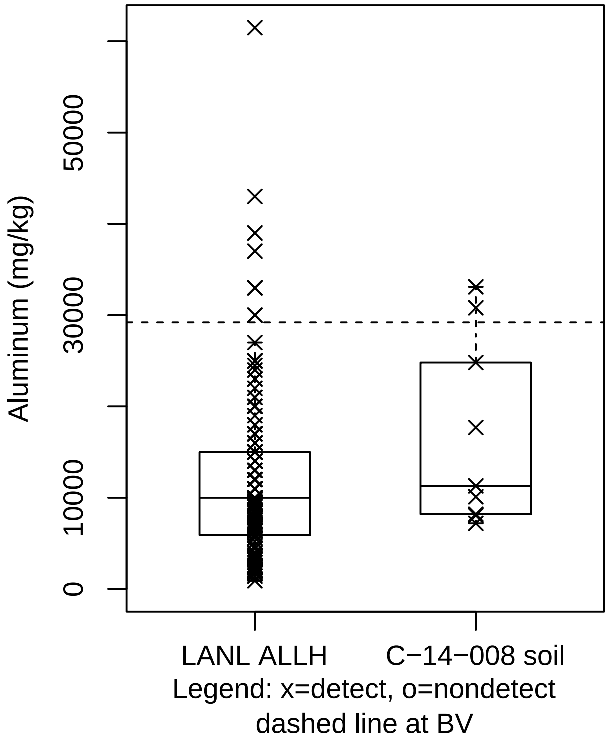


Figure F-90 **Box plot for aluminum in soil at AOC C-14-008**

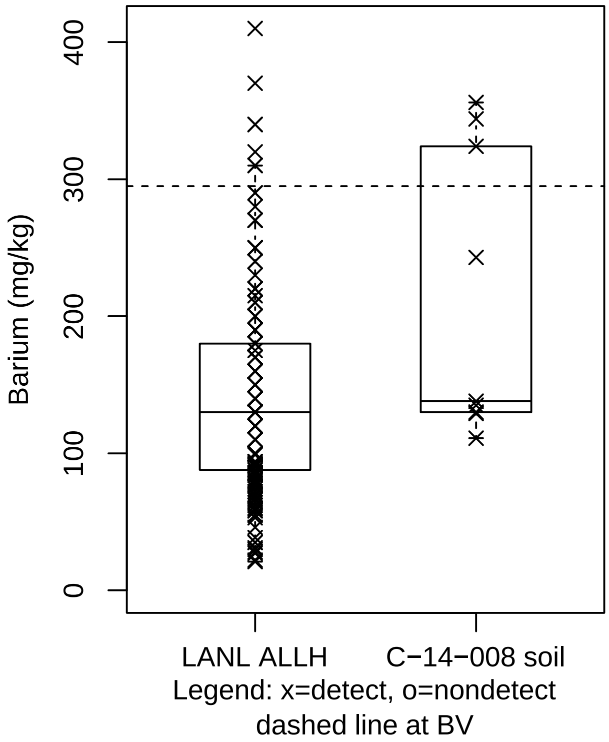


Figure F-91 **Box plot for barium in soil at AOC C-14-008**

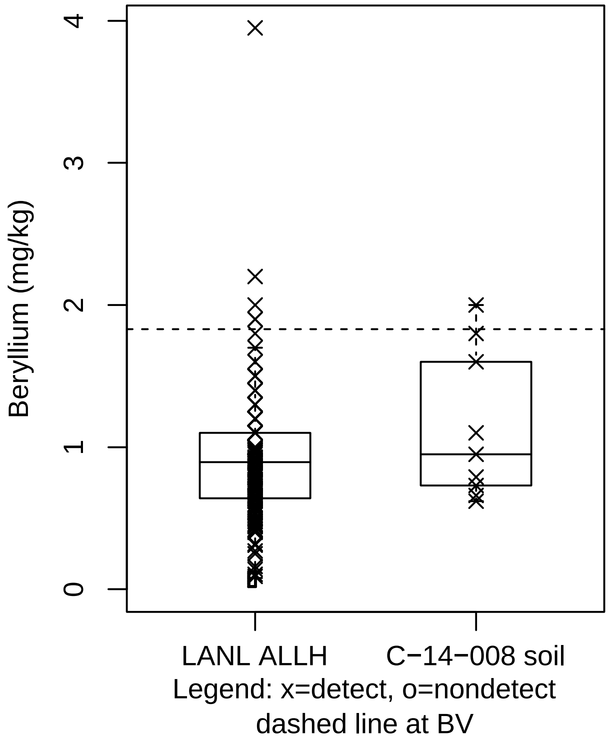


Figure F-92 **Box plot for beryllium in soil at AOC C-14-008**

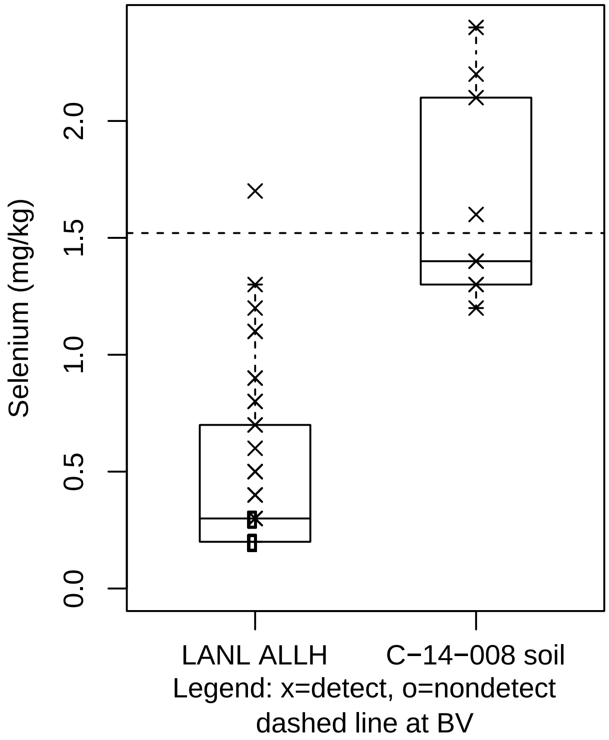


Figure F-93 **Box plot for selenium in soil at AOC C-14-008**

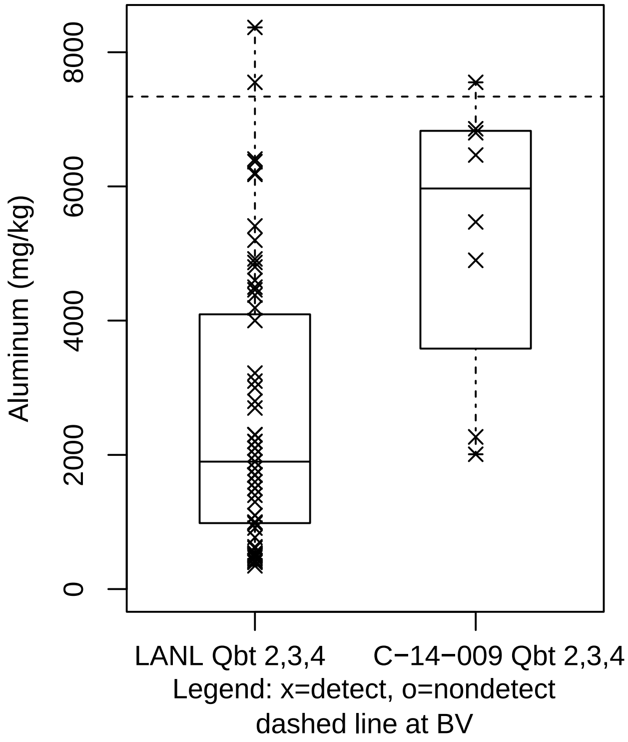


Figure F-94 **Box plot for aluminum in tuff at AOC C-14-009**

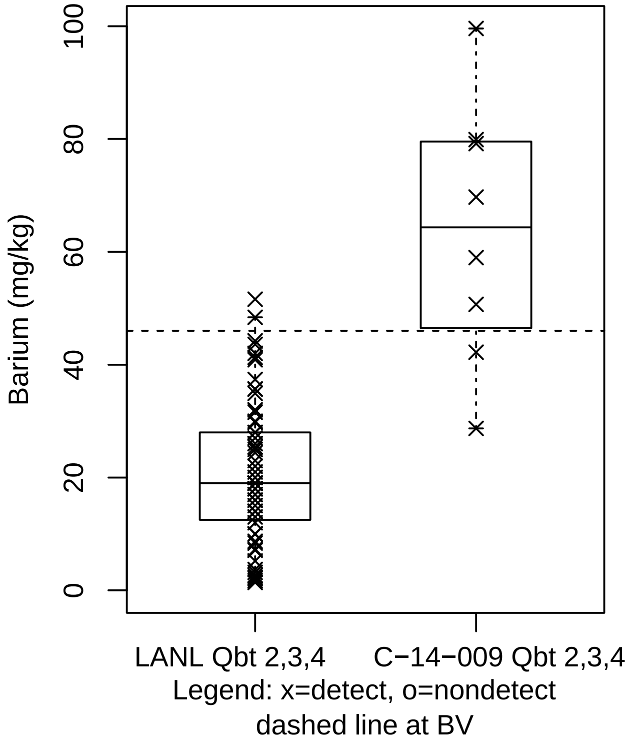


Figure F-95 **Box plot for barium in tuff at AOC C-14-009**

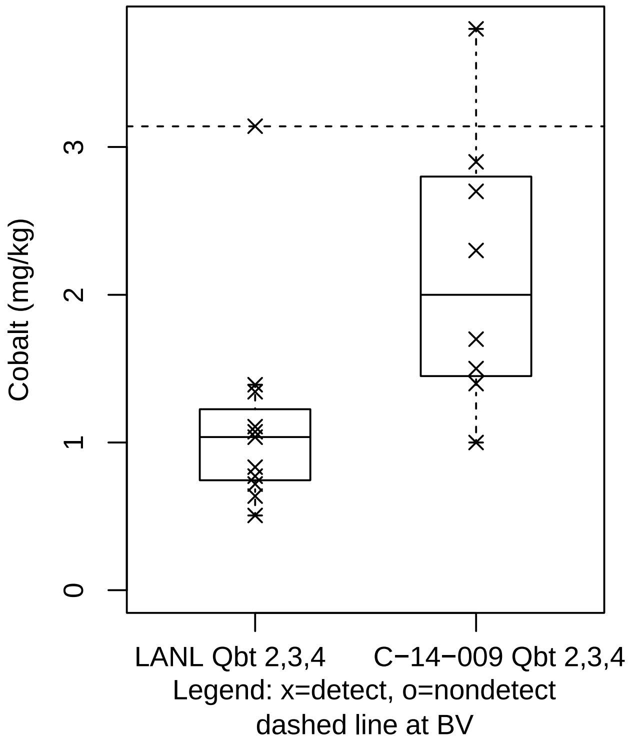


Figure F-96 **Box plot for cobalt in tuff at AOC C-14-009**

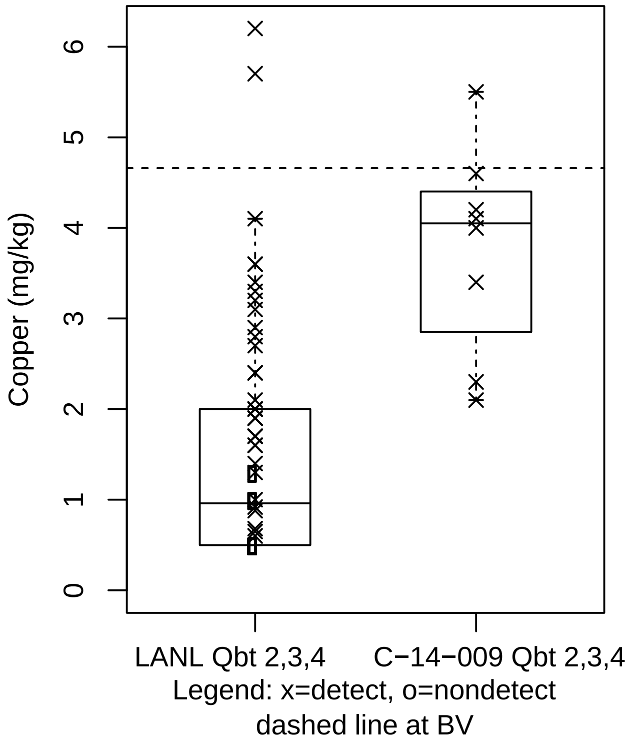


Figure F-97 **Box plot for copper in tuff at AOC C-14-009**

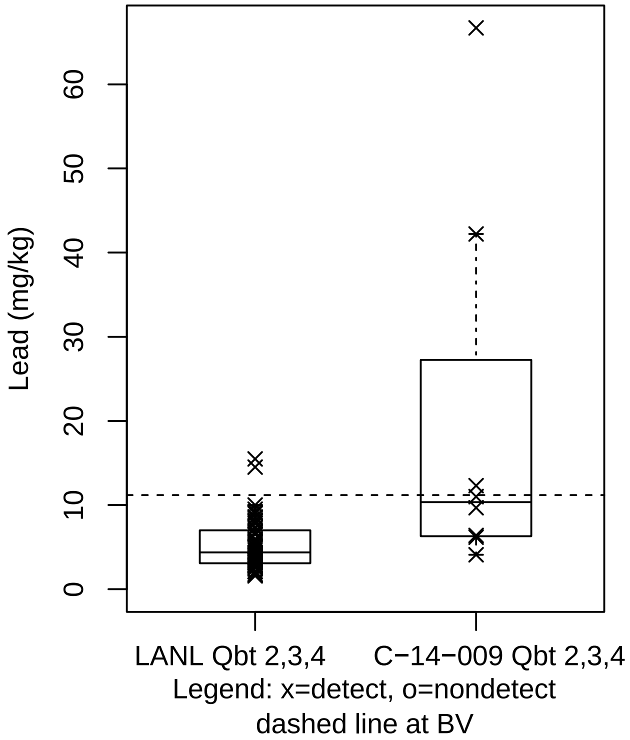


Figure F-98 **Box plot for lead in tuff at AOC C-14-009**

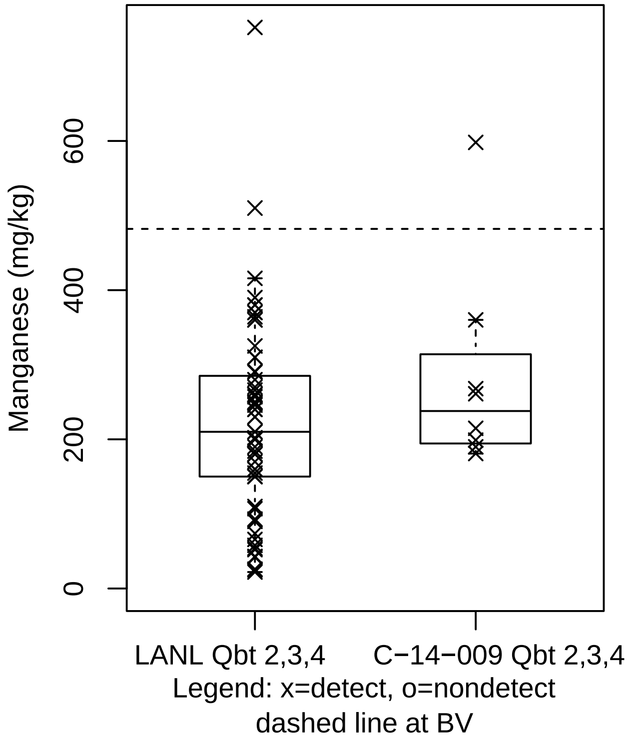


Figure F-99 **Box plot for manganese in tuff at AOC C-14-009**

Table F-1
Results for Statistical Tests for Inorganic Chemicals in Tuff at AOC 14-001(g)

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Aluminum	0.00412	0.23	1	No
Barium	0.00188	0.23	1	No
Beryllium	0.141	0.488	n/a*	No
Calcium	0.00032	0.071	0.169	No
Chromium	<0.0001	0.0229	n/a	Yes
Copper	<0.0001	0.0158	n/a	Yes
Nickel	n/a	0.498	1	No

* n/a = Not applicable.

Table F-2
Results for Statistical Tests for Inorganic Chemicals in Soil at AOC 14-001(g)

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Copper	0.766	0.449	n/a*	No
Lead	0.493	0.384	n/a	No
Selenium	<0.0001	0.000551	n/a	Yes

* n/a = Not applicable.

Table F-3
Results for Statistical Tests for Inorganic Chemicals in Soil at SWMU 14-002(c)

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Lead	0.000352	0.0464	n/a*	Yes
Selenium	<0.0001	<0.0001	n/a	Yes
Zinc	0.205	0.163	n/a	No

* n/a = Not applicable.

Table F-4
Results for Statistical Tests for Inorganic Chemicals in Soil at SWMU 14-003

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Aluminum	0.00764	0.287	1	No
Barium	<0.0001	<0.0001	n/a*	Yes
Beryllium	0.0182	0.0484	n/a	Yes
Chromium	0.0645	0.346	n/a	No
Cobalt	0.000849	0.198	1	No
Iron	0.0384	0.131	1	No
Nickel	0.00078	0.102	1	No
Potassium	0.0363	0.63	1	No
Thallium	0.316	n/a	0.131	No
Zinc	0.992	0.665	n/a	No

* n/a = Not applicable.

Table F-5
Results for Statistical Tests for Inorganic Chemicals in Tuff at SWMU 14-003

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Aluminum	<0.0001	<0.0001	n/a*	Yes
Arsenic	<0.0001	<0.0001	n/a	Yes
Barium	<0.0001	<0.0001	n/a	Yes
Calcium	<0.0001	<0.0001	n/a	Yes
Chromium	<0.0001	<0.0001	n/a	Yes
Cobalt	<0.0001	<0.0001	n/a	Yes
Copper	<0.0001	<0.0001	n/a	Yes
Iron	<0.0001	<0.0001	n/a	Yes
Lead	<0.0001	<0.0001	n/a	Yes
Magnesium	<0.0001	<0.0001	n/a	Yes
Manganese	0.00071	0.0267	n/a	Yes
Nickel	n/a	<0.0001	<0.0001	Yes
Vanadium	<0.0001	<0.0001	n/a	Yes

* n/a = Not applicable.

Table F-6
Results for Statistical Tests for Inorganic Chemicals in Tuff at SWMU 14-006

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Aluminum	<0.0001	<0.0001	n/a*	Yes
Arsenic	<0.0001	<0.0001	n/a	Yes
Barium	<0.0001	0.000898	n/a	Yes
Beryllium	0.0283	0.0448	n/a	Yes
Calcium	<0.0001	0.000815	n/a	Yes
Chromium	<0.0001	0.000815	n/a	Yes
Cobalt	0.0188	0.274	0.577	No
Copper	<0.0001	<0.0001	n/a	Yes
Iron	<0.0001	0.116	1	No
Lead	0.000667	0.0337	n/a	Yes
Magnesium	<0.0001	<0.0001	n/a	Yes
Nickel	n/a	0.000898	0.000142	Yes
Vanadium	<0.0001	0.000815	n/a	Yes

* n/a = Not applicable.

Table F-7
Results for Statistical Tests for Inorganic Chemicals in Tuff at SWMU 14-007

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Aluminum	<0.0001	<0.0001	n/a*	Yes
Arsenic	<0.0001	<0.0001	n/a	Yes
Barium	<0.0001	<0.0001	n/a	Yes
Beryllium	<0.0001	<0.0001	n/a	Yes
Calcium	<0.0001	<0.0001	n/a	Yes
Chromium	<0.0001	<0.0001	n/a	Yes
Cobalt	<0.0001	0.0541	0.0058	Yes
Copper	<0.0001	<0.0001	n/a	Yes
Iron	<0.0001	<0.0001	n/a	Yes
Lead	<0.0001	0.00032	n/a	Yes
Magnesium	<0.0001	<0.0001	n/a	Yes
Manganese	0.00767	0.18	1	No
Nickel	n/a	<0.0001	<0.0001	Yes
Vanadium	<0.0001	<0.0001	n/a	Yes

* n/a = Not applicable.

Table F-8
Results for Statistical Tests for Inorganic Chemicals in Soil at SWMU 14-007

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Cobalt	0.0461	0.895	0.216	No
Manganese	0.00103	0.248	1	No
Selenium	<0.0001	0.000168	n/a*	Yes
Zinc	0.979	0.888	n/a	No

* n/a = Not applicable.

Table F-9
Results for Statistical Tests for Inorganic Chemicals in Tuff at SWMU 14-009

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Aluminum	0.000249	0.02112	n/a*	Yes
Antimony	n/a	0.042	<0.0001	Yes
Arsenic	<0.0001	0.000496	n/a	Yes
Barium	0.00146	0.00404	n/a	Yes
Calcium	<0.0001	0.000496	n/a	Yes
Chromium	<0.0001	0.0196	n/a	Yes
Cobalt	0.0119	0.063	0.06296	No
Copper	<0.0001	<0.0001	n/a	Yes
Iron	<0.0001	0.661	1	No
Lead	<0.0001	<0.0001	n/a	Yes
Magnesium	<0.0001	0.0037	n/a	Yes
Nickel	n/a	0.00835	0.04304	Yes
Vanadium	<0.0001	0.0021	n/a	Yes

* n/a = Not applicable.

Table F-10
Results for Statistical Tests for Inorganic Chemicals in Soil at SWMU 14-009

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Cobalt	0.977	0.954	n/a*	No
Copper	0.000184	0.000878	n/a	Yes
Lead	0.000656	0.0245	n/a	Yes
Nickel	0.57	0.74	n/a	No
Selenium	<0.0001	0.000204	n/a	Yes
Thallium	0.871	0.196	n/a	No
Zinc	0.07	0.543	n/a	No

* n/a = Not applicable.

Table F-11
Results for Statistical Tests for Inorganic Chemicals in Soil at AOC C-14-005

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Lead	0.0248	0.921	1	No
Selenium	<0.0001	0.00546	n/a*	Yes

* n/a = Not applicable.

Table F-12
Results for Statistical Tests for Inorganic Chemicals in Soil at AOC C-14-008

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Aluminum	0.0602	0.0986	n/a*	No
Barium	0.0246	0.0776	1	No
Beryllium	0.1418	0.356	n/a	No
Selenium	<0.0001	<0.0001	n/a	Yes

* n/a = Not applicable.

Table F-13
Results for Statistical Tests for Inorganic Chemicals in Tuff at AOC C-14-009

Analyte	Gehan Test p-Value	Quantile Test p-Value	Slippage p-Value	COPC?
Aluminum	0.000729	0.00598	n/a*	Yes
Barium	<0.0001	<0.0001	n/a	Yes
Cobalt	0.00465	0.376	0.421	No
Copper	<0.0001	0.000432	n/a	Yes
Lead	0.00102	0.00598	n/a	Yes
Manganese	0.141	0.488	n/a	No

* n/a = Not applicable.

Appendix G

Risk Assessments

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Figure

Tables

Attachments

Attachment G-1	Dioxin and Furan Toxicity Equivalency Factor Calculations (on CD included with this document)
Attachment G-2	ProUCL Files (on CD included with this document)
Attachment G-3	Vapor Intrusion Spreadsheets (on CD included with this document)
Attachment G-4	Ecological Scoping Checklist

G-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 Technical Area 14 (TA-14) portion of the Cañon de Valle Aggregate Area, located in the southern portion of Los Alamos National Laboratory (LANL or the Laboratory). The evaluations of potential risk at 13 solid waste management units (SWMUs) and areas of concern (AOCs) are based on decision-level data from a historical (1997) investigation and the 2011 investigation.

G-2.0 BACKGROUND

This section first presents brief descriptions of the TA-14 portion of the Cañon de Valle Aggregate Area SWMUs and AOCs that were assessed for potential risk and dose. The section concludes with (1) a brief description of the analytical results included in the final data set used for the risk assessments and (2) the process used to identify chemicals of potential concern (COPCs) from this data set.

G-2.1 Site Descriptions and Operational History

The sites discussed in this appendix are located in the southeastern portion of TA-14 and on the northern side of Cañon de Valle. All of the TA-14 sites drain into Cañon de Valle. Elevations at TA-14 range from 7410 to 7280 ft above mean sea level. The topography has a gentle 2- to 5-degree slope to the south toward Cañon de Valle. Known as Q-site, TA-14 has been used since 1944 for explosives development and testing, including testing involving radioactive materials. In 1952, the firing site was renovated, the structures were removed, and a new firing site was constructed.

G-2.1.1 AOC 14-001(g), Firing Site

AOC 14-001(g) is an active firing pad (structure 14-35) located south of control building 14-23 at TA-14. Installed in 1964, the reinforced concrete pad is 5 ft square × 2 ft thick and surrounded on three sides with a blast shield. At the base, the shield is a 6-ft-square × 2-ft-thick concrete pad overlain by a neoprene shock pad, a 4.5-in.-thick steel plate, and several inches of sand. The shield directs the force of detonations away from nearby control building 14-23. The AOC 14-001(g) firing pad is used to conduct test shot experiments.

G-2.1.2 SWMU 14-002(c), Decommissioned Firing Site

SWMU 14-002(c) is a decommissioned firing site (structure 14-5) located in the southeastern portion of TA-14. Structure 14-5 consisted of a control building and firing pad. Constructed in 1944, the wood-framed control building measured 11 ft wide × 18 ft long × 10 ft high and was surrounded on three sides by an earthen berm. A 10-ft-square × 8-ft-high concrete firing pad faced with a 0.5-in. steel plate was attached to the exterior south wall of the control building. The firing site was used to conduct small-scale explosive tests until the mid-1950s. The control building was converted to a storage site in 1961 and used to store cyanogen gas from 1965 to the 1970s. In 1980, a 5-ft-diameter metal sphere was installed on the firing pad at the south side of structure 14-5. The sphere was used to conduct slow-combustion experiments, which continued until 1985, when building operations ceased. The firing pad was removed at an unknown date. The control building was partially destroyed by the Cerro Grande fire in 2000; only the concrete portions of the roof and walls remain.

G-2.1.3 SWMU 14-003, Former Burning Area

SWMU 14-003 is a former burning area located approximately 300 ft northeast of a control building (structure 14-5) in the southeastern portion of TA-14. The burning area measured approximately 30 ft wide × 40 ft long and was surrounded on three sides by a U-shaped, 3-ft-high soil berm. The area was used for burning combustible high explosives– (HE-) contaminated debris and for flash-burning noncombustible HE-contaminated debris from test shots. Burning operations began in 1951 and ceased in the 1960s. In 1997, the burning area soil was removed, and the site, including the berms, was regraded during a voluntary corrective action (VCA) conducted at the site.

G-2.1.4 SWMU 14-006, Decommissioned Sump and Outfall

SWMU 14-006 is a decommissioned HE sump (structure 14-31), associated drainline, and outfall that are located at TA-14 approximately 45 ft east of control building 14-23. Installed in 1952, the steel-lined sump is constructed of reinforced concrete and measures approximately 4.5 ft wide × 8 ft long × 5 ft deep. The sump received discharges from sink and floor drains in building 14-23 and discharged to an outfall approximately 55 ft southeast of the sump. The sump has been filled with concrete and its outlet is plugged (date not known). Currently the outfall receives storm water only.

G-2.1.5 SWMU 14-007, Decommissioned Septic System

SWMU 14-007 is a decommissioned septic system located at TA-14, approximately 70 ft northeast of building 14-6. The septic system consists of an inactive septic tank (structure 14-19) installed in 1944 and an inactive drain field installed in 1988. The reinforced concrete tank measures 4 ft wide × 7 ft long × 6 ft deep and has a capacity of 640 gal. The drain field is approximately 9 ft wide × 18 ft long. The septic system received effluent from a photoprocessing sink and the restroom in building 14-6, a shop and dark room that was later converted to storage. Originally, the tank discharged to an outfall located 130 ft northeast of the septic tank. In 1988, a drain field and a new drainline (from the septic tank to the drain field) were installed and the portion of the original drainline that discharged to the outfall was decommissioned in place. The septic tank and drain field were disconnected in 1992 when building 14-6 was connected to the Sanitary Wastewater Systems Consolidation (SWSC) plant.

G-2.1.6 SWMU 14-009, Surface Disposal Area

SWMU 14-009 is a surface disposal area located south and west of building 14-43 at TA-14. The disposal area measures approximately 30 ft × 140 ft and consists of sand and ruptured sandbags used during explosives tests performed at nearby firing sites [SWMUs 14-002(a) and 14-002(b)].

G-2.1.7 SWMU 14-010, Former Sump

SWMU 14-010 is a former HE sump that was located on the exterior south wall of a former firing chamber [structure 14-2, SWMU 14-002(a)]. The sump received waste from firing chamber 14-2 and discharged to an outfall located approximately 24 ft southeast of the sump. The SWMU 14-010 sump was removed in 1973. The drainline remains in place.

G-2.1.8 AOC C-14-001, Former Magazine

AOC C-14-001 is the location of a former HE magazine (structure 14-1) in the south-central portion of TA-14. Constructed in 1944, the wood-framed magazine measured 9 ft wide × 11 ft long × 8 ft high and was covered with an earthen berm on three sides and the top. The magazine was destroyed by burning in 1963.

G-2.1.9 AOC C-14-004, Former Building

AOC C-14-004 is the location of a former electronics shop (structure 14-7) that was approximately 75 ft west of building 14-23 in the southeastern portion of TA-14. Constructed in 1945, the wood-framed building with concrete foundation measured 15 ft wide × 24 ft long × 9 ft high. The building, including the concrete foundation, was removed in 1952.

G-2.1.10 AOC C-14-005, Former Building

AOC C-14-005 is the location of a former storage building (structure 14-8) that was approximately 75 ft north of building 14-6 at TA-14. Constructed in 1944, the wood-framed building measured 6 ft wide × 16 ft long × 9 ft high. The building was removed in 1952.

G-2.1.11 AOC C-14-007, Former Storage Building

AOC C-14-007 is the location of a former storage building (structure 14-10) that was located approximately 130 ft west of building 14-24 in the southeastern portion of TA-14. Constructed in 1945, the wood-framed building measured 10 ft square × 8 ft high. The building was removed in 1952.

G-2.1.12 AOC C-14-008, Former Magazine

AOC C-14-008 is a former HE magazine (structure 14-11) located at TA-14. Constructed in 1945, the wood-framed magazine measured 5 ft square × 5 ft high, with an earthen berm on three sides and on top. The magazine was removed in 1952.

G-2.1.13 AOC C-14-009, Former Magazine

AOC C-14-009 is a former HE magazine (structure 14-13) located approximately 125 ft northeast of structure 14-5. Constructed in 1945, the wood-framed magazine measured 3 ft wide × 4 ft long × 3 ft high and was covered with an earthen berm on three sides and the top. The magazine was destroyed by burning in 1960.

G-2.2 Investigation Sampling

The final data set used to identify COPCs for the TA-14 portion of the Cañon de Valle Aggregate Area and used in this appendix to evaluate the potential risks to human health and the environment are the qualified analytical results from historical sampling activities (1997) and the 2011 investigation. Only those data determined to be of decision-level quality following the data quality assessment (Appendix F) are included in the final data set evaluated in this appendix.

G-2.3 Determination of COPCs

Section 5.0 of the supplemental investigation report summarizes the COPC selection process. The industrial scenario and the ecological screening used data for samples collected from 0.0 to 1.0 ft and 0.0 to 5.0 ft below ground surface (bgs), respectively. The residential and construction worker scenarios used data for samples collected from 0.0 to 10.0 ft bgs. However, sampling depths often overlapped because of multiple investigations; therefore, samples with a starting depth less than the lower bound of the interval were included in the risk-screening assessments for a given scenario as appropriate.

Tables G-2.3-1 to G-2.3-31 summarize the COPCs evaluated for potential risk for each of the TA-14 sites in the Cañon de Valle Aggregate Area, along with their exposure point concentrations (EPCs), discussed in section G-3.3. 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.

G-3.0 CONCEPTUAL SITE MODEL

The primary mechanisms of release related to historical contaminant sources are described in detail in the historical investigation report (LANL 2006, 091697) and summarized in section 2.0 of the approved investigation work plan (LANL 2006, 091698; NMED 2007, 095478). Releases from the TA-14 portion of the Cañon de Valle Aggregate Area may have occurred as a result of air emissions, surface releases, subsurface leaks, or effluent discharges. Previous sampling results indicated contamination from inorganic chemicals, organic chemicals, and radionuclides (LANL 2012, 210350).

G-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 below ground surface [bgs]) at the site. Human receptors 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 and the construction worker. The exposure pathways are the same as those for surface soil. Sources, exposure pathways, and receptors are shown in the conceptual site model (CSM) (Figure G-3.1-1).

New Mexico Environment Department (NMED) guidance (NMED 2015, 600915) requires that sites larger than 2 acres be evaluated to determine if beef ingestion is a plausible and complete exposure pathway. The sites in the TA-14 portion of the Cañon de Valle Aggregate Area are smaller than 2 acres. In addition, grazing is not allowed on Laboratory property. Therefore, further evaluation of the beef ingestion pathway is not necessary.

The TA-14 portion of the Cañon de Valle Aggregate Area is an industrial area on Laboratory property. Some of the sites are active, and others are inactive or removed and provide habitat 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 (ecological) or 10.0 ft (human health) are not complete unless contaminated soil or tuff was excavated and brought to the surface.

When unpaved sites or areas where potential habitat is present are considered, exposure pathways are complete to surface soil and tuff for ecological receptors. 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 exposure was not evaluated because of the lack of surface-water features. Sources, exposure pathways, and receptors are presented in the CSM (Figure G-3.1-1).

G-3.2 Environmental Fate and Transport

The evaluation of environmental fate addresses the chemical processes affecting the persistence of chemicals in the environment, and the evaluation of transport addresses the physical processes affecting mobility along a migration pathway. Migration into soil and tuff depends on precipitation or snowmelt, soil moisture content, depth of soil, soil 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 migration of materials through the vadose zone to groundwater occurs.

Contamination at depth is addressed in the discussion of nature and extent in the supplemental investigation report. Results from the deepest samples collected at most sites showed either no detected concentrations of COPCs or low- to trace-level concentrations of only a few inorganic, radionuclide, and/or organic 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, the physical and chemical properties of the COPCs, and the lack of saturated conditions, the potential for contaminant migration to groundwater is very low.

NMED guidance (NMED 2015, 600915) 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 through the use of dilution attenuation factors (DAFs). These DAF soil screening levels (SSLs) may 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 does not, however, 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., migration to groundwater is assumed to have already occurred). This assumption, however, is inappropriate for cases such as the sites in the TA-14 portion of the Cañon de Valle 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 the reasons stated above, screening of contaminant concentrations in soil against the DAF SSLs was not performed for the risk assessments at these sites.

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 and the potential for ion exchange (barium and other inorganic chemicals) 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.

Current potential transport mechanisms that may lead to exposure include

- dissolution and/or particulate transport of surface contaminants during precipitation and runoff events,
- airborne transport of contaminated surface soil,
- continued dissolution and advective/dispersive transport of chemical contaminants contained in subsurface soil and tuff as a result of past operations,

- disturbance of contaminants in shallow soil and subsurface tuff by Laboratory operations, and
- disturbance and uptake of contaminants in shallow soil by plants and animals.

Contaminant distributions at the sites indicate that after the initial deposition of contaminants from operational activities and historical remediation efforts, elevated levels of COPCs tend to remain concentrated in the vicinity of the original release points. The primary potential release and transport mechanisms identified for sites in the TA-14 portion of the Cañon de Valle 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.

G-3.2.1 Inorganic Chemicals

In general, and particularly in a semiarid climate, inorganic chemicals are not highly soluble or mobile in the environment, although there are exceptions. The physical and chemical factors that determine the distribution of inorganic COPCs within the soil and tuff at sites in the TA-14 portion of the Cañon de Valle Aggregate Area are the soil-water partition coefficient (K_d) of the inorganic chemicals, the pH of the soil, soil characteristics (such as sand or clay content), and oxidation-reduction potential (Eh). The interaction of these factors is complex, but the K_d values provide a general criterion to assess the potential for migration through the subsurface; chemicals with higher K_d values are less likely to be mobile than those with lower ones. 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 G-3.2-1 presents the K_d values and water solubility for the inorganic COPCs for sites in the TA-14 portion of the Cañon de Valle Aggregate Area. Based on this criterion, the following COPCs have a low potential to mobilize and migrate through soil and the vadose zone: aluminum, antimony, barium, beryllium, chromium, cobalt, lead, manganese, mercury, nickel, thallium, vanadium, and zinc. The K_d values for arsenic, copper, iron, selenium, and silver are less than 40 and may indicate a greater potential to mobilize and migrate through soil and the vadose zone beneath the sites.

It is important to note that other factors besides the K_d values (e.g., speciation in soil, Eh, pH, and soil mineralogy) also play significant roles in the likelihood that inorganic chemicals will migrate. The COPCs with K_d values less than 40 are discussed further below. 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). (Also see http://www.atsdr.cdc.gov/toxpro2.)

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 slightly alkaline soil pH) present at sites in the TA-14 portion of the Cañon de Valle Aggregate Area.

Copper movement in soil is determined by physical and chemical interactions with the soil components. Most copper deposited in soil will be strongly adsorbed and remains in the upper few centimeters of soil. Copper will adsorb to organic matter, carbonate minerals, clay minerals, or 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. Soil in the area is neutral to slightly alkaline, so the leaching of copper is not a concern at this site. Copper binds to soil much 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.

Iron is naturally occurring in soil and tuff and may be relatively mobile under reducing conditions. Iron is sensitive to soil pH conditions, occurring 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 minerals, such as lepidcrocite, hematite, and goethite. Iron is not expected to be mobile in the neutral to slightly alkaline, well-drained soil at sites in the TA-14 portion of the Cañon de Valle Aggregate Area.

Nitrate is highly soluble in water and may migrate with water molecules in saturated soil. As noted above, the subsurface material beneath the Cañon de Valle Aggregate Area TA-14 sites has low moisture content, which inhibits the mobility of nitrate as well as most other inorganic chemicals.

Perchlorate is somewhat soluble in water and may migrate with water molecules in saturated soil. As noted above, the subsurface material beneath the Cañon de Valle Aggregate Area TA-14 sites has low moisture content, which inhibits the mobility of perchlorate as well as most other inorganic chemicals.

Selenium is not often found in the environment in its elemental form but is usually combined with sulfide minerals or with silver, copper, lead, and nickel minerals. In soil, pH and Eh are determining factors in the transport and partitioning of selenium. In soil with a pH of greater than 7.5, selenates, which have high solubility and a low tendency to adsorb onto soil particles, are the major selenium species and are very mobile. The soil pH at sites in the TA-14 portion of the Cañon de Valle Aggregate Area is neutral to slightly alkaline, indicating that selenium is not likely to migrate.

Silver sorbs onto soil and sediment and tends to form complexes with inorganic chemicals and humic substances in soil. Natural processes, such as the weathering of rock and the erosion of soil, release silver to air and water. 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.

G-3.2.2 Organic Chemicals

Table G-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 sites in the TA-14 portion of the Cañon de Valle Aggregate Area. The physical and chemical properties of organic chemicals are important considerations in evaluations of their fate and transport. The following physiochemical property information illustrates some aspects of the fate and transport of COPCs at sites in the TA-14 portion of the Cañon de Valle Aggregate Area. 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. Several chemicals detected at sites in the TA-14 portion of the Cañon de Valle Aggregate Area have water solubilities greater than 1000 mg/L, including acetone; 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; benzene; benzoic acid; 2-butanone; chloroform; di-n-butylphthalate; 1,1-dichloroethene; diethylphthalate; 2-hexanone; methylene chloride; HMX (1,3,5,7-tetranitro-1,3,5,7-tetrazocine); trichloroethene; trichlorofluoromethane; and TNT (2,4,6-trinitrotoluene).

The lower the water solubility of an organic 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, are slightly prone to biodegradation, and are metabolized in plants and animals. The chemicals identified as having water solubilities less than 10 mg/L are acenaphthene; benzo(b)fluoranthene; bis(2-ethylhexyl)phthalate; chrysene; dibenzofuran; fluoranthene; pyrene; and 2,3,7,8-tetrachlorodibenzofuran (TCDF).

Vapor pressure is a characteristic used to evaluate the tendency of organic chemicals to volatilize. Chemicals with vapor pressure greater than 0.01 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 towards groundwater. Acetone; benzene; 2-butanone; chloroform; 1,3-dichlorobenzene; 1,4-dichlorobenzene; 1,1-dichloroethene; ethylbenzene; 2-hexanone; 4-isopropyltoluene; methylene chloride; n-nitrosodiphenylamine; toluene; trichloroethene; trichlorofluoromethane; and total xylene 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(b)fluoranthene; bis(2-ethylhexyl)phthalate; chrysene; RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine); HMX; pentaerythritol tetranitrate (PETN); and triaminotrinitrobenzene (TATB), 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} above 1000, the greater the affinity the chemical has for bioaccumulation/bioconcentration in the food chain, the greater the potential for sorption in the soil, and the lower the mobility (Ney 1995, 058210). Acenaphthene; benzo(b)fluoranthene; bis(2-ethylhexyl)phthalate; chrysene; di-n-butylphthalate; dibenzofuran; 1,3-dichlorobenzene; 1,4-dichlorobenzene; ethylbenzene; fluoranthene; 4-isopropyltoluene; n-nitrosodiphenylamine; pyrene; RDX; and total xylene all have a K_{ow} greater than 1000. A K_{ow} of less than 500 indicates high water solubility and mobility, little to no affinity for bioaccumulation, and degradability by microbes, plants, and animals. Acetone; 4-amino-2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene; benzene; benzoic acid; 2-butanone; chloroform; 2,4-dinitrotoluene; 2-hexanone; HMX; methylene chloride; TATB; and TNT have a K_{ow} much less than 500.

The K_{oc} measures the tendency of a chemical to adsorb to organic carbon in soil. K_{oc} values above 500 cm^3/g indicate a strong tendency to adsorb to soil, leading to low mobility (NMED 2012, 219971; NMED 2015, 600915). Many organic chemicals detected have K_{oc} values above 500 cm^3/g, indicating a very low potential to migrate toward groundwater. The organic chemicals with K_{oc} values less than 500 cm^3/g include acetone; 4-amino-2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; benzene; benzoic acid; 2-butanone; chloroform; di-n-butylphthalate; 1,3-dichlorobenzene; 1,4-dichlorobenzene; 1,1-dichloroethene; diethylphthalate; 2-hexanone; methylene chloride; RDX; toluene; trichloroethene; trichlorofluoromethane; and total xylene.

The polycyclic aromatic hydrocarbons, phthalates, and 2,3,7,8-TCDF are the least mobile and the most likely to bioaccumulate. Acetone, benzene, 2-butanone, methylene chloride, and toluene are more soluble and volatile and are more likely to travel toward the atmosphere and not migrate toward groundwater. Because the organic chemicals detected were at low concentrations and extent is defined, they are not likely to migrate to groundwater.

G-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 G-3.2-3 gives physical and chemical properties of the radionuclide COPCs identified at sites in the TA-14 portion of the Cañon de Valle Aggregate Area. Based on K_d values, cesium-134 and cesium-137 have a very low potential to migrate towards groundwater at the sites in the TA-14 portion of the Cañon de Valle Aggregate Area. The K_d values for strontium-90, uranium-234, uranium-235/236, and uranium-238 are less than 40 and indicate a potential to migrate towards groundwater.

Strontium-90 is relatively immobile in the subsurface as indicated by the K_d value (Table G-3.2-3). A portion of stable and radioactive strontium in soil dissolves in water, so there is the potential to move deeper into the subsurface.

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 therefore are 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.

G-3.3 Exposure Point Concentration Calculations

The 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 (maximum detection limits were used as the EPCs for some inorganic COPCs). The summary statistics, including the EPC for each COPC for the human health and the ecological risk-screening assessments and the distributions used for the calculations, are presented in Tables G-2.3-1 to G-2.3-31.

The EPCs for the dioxin and furan congeners are the sums of the detected congeners weighted by the toxic equivalency factors (TEFs) (NMED 2015, 600915); the sum is expressed as the 2,3,7,8-tetrachlorodibenzo-p-dioxin– (2,3,7,8-TCDD-) equivalent concentration. The TEFs used are presented in Table G-3.2-4. The results of the TEF calculations for SWMU 14-003 are presented in Attachment G-1, and the 2,3,7,8-TCDD–

equivalent concentrations (95% UCLs or maximum concentrations) for SWMU-14-003 are presented in Tables G-2.3-6 to G-2.3-8.

Calculation of UCLs of the mean concentrations was done using the U.S. Environmental Protection Agency (EPA) ProUCL 5.1.002 software (EPA 2015, 601725), 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 there were too few detections to calculate a UCL. Input and output data files for ProUCL calculations are provided on CD as Attachment G-2.

G-4.0 HUMAN HEALTH RISK-SCREENING EVALUATIONS

Human health risk-screening assessments were conducted for sites in the TA-14 portion of the Cañon de Valle 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 compared 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.

G-4.1 Human Health SSLs and SALs

Human health risk-screening assessments were conducted using SSLs for the industrial, construction worker, and residential scenarios obtained from NMED guidance (NMED 2015, 600915). The NMED SSLs are based on a target hazard quotient (HQ) of 1 and a target cancer risk of 1×10^{-5} (NMED 2015, 600915). If SSLs were not available from NMED guidance, the May 2016 EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) were used. EPA regional screening levels are not available for construction workers; therefore, when regional screening levels were used for a COPC, the construction worker SSLs were calculated using toxicity values from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and exposure parameters from NMED guidance (NMED 2015, 600915). The EPA regional screening levels 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}. Surrogate chemicals were also used for some COPCs without SSLs based on structural similarity or because the COPC is a breakdown product (NMED 2003, 081172). Exposure parameters used to calculate the industrial, construction worker, and residential SSLs are presented in Table G-4.1-1.

Radionuclide SALs were used for comparison with radionuclide COPC EPCs and were derived using the RESRAD model, Version 7.0 (LANL 2015, 600929). The SALs are based on a 25-mrem/yr dose as authorized by U.S. Department of Energy (DOE) Order 458.1. Exposure parameters used to calculate the SALs are presented in Tables G-4.1-2 and G-4.1-3.

G-4.2 Results of Human Health Screening Evaluation

The EPC of each COPC was compared with the SSLs for the industrial, construction worker, and residential scenarios, as appropriate. 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 results are presented in Tables G-4.2-1 to G-4.2-76 and are described below for each SWMU and AOC evaluated.

G-4.2.1 AOC 14-001(g)

The results of the risk-screening assessment for the industrial scenario are presented in Tables G-4.2-1, G-4.2-2, and G-4.2-3. The total excess cancer risk for the industrial scenario is 5×10^{-10}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.0009, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.3 mrem/yr, which is less than 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 G-4.2-4 and G-4.2-5. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.04, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.2 mrem/yr, which is less than 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 G-4.2-6, G-4.2-7, and G-4.2-8. The total excess cancer risk for the residential scenario is 6×10^{-7}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.01, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 2 mrem/yr, which is less than the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

G-4.2.2 SWMU 14-002(c)

The results of the risk-screening assessment for the industrial scenario are presented in Table G-4.2-9. No carcinogenic COPCs were identified in the 0.0- to 1.0-ft depth interval. The industrial HI is 0.000006, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables G-4.2-10 and G-4.2-11. The total excess cancer risk for the construction worker scenario is 2×10^{-10}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.7, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified.

The results of the risk-screening assessment for the residential scenario are presented in Tables I-4.2-12 and G-4.2-13. The total excess cancer risk for the residential scenario is 2×10^{-7}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.6, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified.

G-4.2.3 SWMU 14-003

The results of the risk-screening assessment for the industrial scenario are presented in Tables G-4.2-14 and G-4.2-15. The total excess cancer risk for the industrial scenario is 2×10^{-7}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.06, which is less than the

NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified in the 0.0- to 1.0-ft depth interval.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables G-4.2-16 and G-4.2-17. 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, 600915). The total dose is 0.1 mrem/yr, which is less than 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 G-4.2-18, G-4.2-19, and G-4.2-20. The total excess cancer risk for the residential scenario is 9×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 1, which is equivalent to the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.4 mrem/yr, which is less than the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

G-4.2.4 SWMU 14-006

The results of the risk-screening assessment for the industrial scenario are presented in Tables G-4.2-21 and G-4.2-22. The total excess cancer risk for the industrial scenario is 8×10^{-8}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified in the 0.0- to 1.0-ft depth interval.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables G-4.2-23 and G-4.2-24. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.007 mrem/yr, which is less than 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 G-4.2-25, G-4.2-26, and G-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, 600915). The residential HI is 0.3, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.6 mrem/yr, which is less than the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

G-4.2.5 SWMU 14-007

The results of the risk-screening assessment for the industrial scenario are presented in Tables G-4.2-28 and G-4.2-29. The total excess cancer risk for the industrial scenario is 2×10^{-9}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.003, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified in the 0.0- to 1.0-ft depth interval.

The results of the risk-screening assessment for the construction worker scenario are presented in Tables G-4.2-30 and G-4.2-31. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.8, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.02 mrem/yr, which is less than 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 G-4.2-32, G-4.2-33, and G-4.2-34. The total excess cancer risk for the residential scenario is 8×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.8, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.9 mrem/yr, which is less than the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

G-4.2.6 SWMU 14-009

The results of the risk-screening assessment for the industrial scenario are presented in Tables G-4.2-35, G-4.2-36, and G-4.2-37. The total excess cancer risk for the industrial scenario is 1×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.05, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 2 mrem/yr, which is less than 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 G-4.2-38, G-4.2-39, and G-4.2-40. The total excess cancer risk for the construction worker scenario is 3×10^{-11}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.4, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 2 mrem/yr, which is less than 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 G-4.2-41, G-4.2-42, and G-4.2-43. The total excess cancer risk for the residential scenario is 7×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.4, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 7 mrem/yr, which is less than the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

G-4.2.7 SWMU 14-010

The results of the risk-screening assessment for the industrial scenario are presented in Tables G-4.2-44, G-4.2-45, and G-4.2-46. The total excess cancer risk for the industrial scenario is 1×10^{-8}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.6 mrem/yr, which is less than 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 G-4.2-47 and G-4.2-48. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.1, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 1 mrem/yr, which is less than 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 G-4.2-49, G-4.2-50, and G-4.2-51. The total excess cancer risk for the residential scenario is 8×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.1, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 3 mrem/yr, which is less than the target dose of 25 mrem/yr as authorized by DOE Order 458.1.

G-4.2.8 AOC C-14-001

The results of the risk-screening assessment for the industrial scenario are presented in Table G-4.2-52. The total excess cancer risk for the industrial scenario is 2×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). No noncarcinogenic COPCs were identified in the 0.0− to 1.0-ft depth interval.

The results of the risk-screening assessment for the construction worker scenario are presented in Table G-4.2-53. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.8, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the residential scenario are presented in Tables G-4.2-54 and G-4.2-55. The total excess cancer risk for the residential scenario is 5×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.4, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.2.9 AOC C-14-004

The results of the risk-screening assessment for the industrial scenario are presented in Table G-4.2-56. No carcinogenic COPCs were identified in the 0.0- to 1.0-ft depth interval. The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the construction worker scenario are presented in Table G-4.2-57. No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.6, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the residential scenario are presented in Tables G-4.2-58 and G-4.2-59. The total excess cancer risk for the residential scenario is 8×10^{-7}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.5, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.2.10 AOC C-14-005

The results of the risk-screening assessment for the industrial scenario are presented in Table G-4.2-60. No carcinogenic COPCs were identified in the 0.0- to 1.0-ft depth interval. The industrial HI is 0.004, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the construction worker scenario are presented in Table G-4.2-61. No carcinogenic COPCs were identified in the 0.0- to 10.0-ft depth interval. The construction worker HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the residential scenario are presented in Table G-4.2-62. No carcinogenic COPCs were identified in the 0.0- to 10.0-ft depth interval. The residential HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.2.11 AOC C-14-007

The results of the risk-screening assessment for the industrial scenario are presented in Tables G-4.2-63 and G-4.2-64. The total excess cancer risk for the industrial scenario is 2×10^{-8}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.04, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the construction worker scenario are presented in Tables G-4.2-65 and G-4.2-66. The total excess cancer risk for the construction worker scenario is 3×10^{-9}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.3, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the residential scenario are presented in Tables G-4.2-67 and G-4.2-68. 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, 600915). The residential HI is 0.2, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.2.12 AOC C-14-008

The results of the risk-screening assessment for the industrial scenario are presented in Table G-4.2-69. No carcinogenic COPCs were identified in the 0.0- to 1.0-ft depth interval. The industrial HI is 0.0002, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the construction worker scenario are presented in Table G-4.2-70. No carcinogenic COPCs were identified in the 0.0- to 10.0-ft depth interval. The construction worker HI is 0.9, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the residential scenario are presented in Table G-4.2-71. No carcinogenic COPCs were identified in the 0.0- to 10.0-ft depth interval. The residential HI is 0.7, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.2.13 AOC C-14-009

The results of the risk-screening assessment for the industrial scenario are presented in Table G-4.2-72. No carcinogenic COPCs were identified in the 0.0- to 1.0-ft depth interval. The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the construction worker scenario are presented in Tables G-4.2-73 and G-4.2-74. The total excess cancer risk for the construction worker scenario is 3×10^{-11}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.2, which is less than the NMED target HI of 1 (NMED 2015, 600915).

The results of the risk-screening assessment for the residential scenario are presented in Tables G-4.2-75 and G-4.2-76. The total excess cancer risk for the residential scenario is 8×10^{-10}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.2, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.3 Vapor Intrusion Pathway

NMED guidance (NMED 2015, 600915) 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 all 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, 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-REV2-4.xls) was used to calculate risk-based soil concentrations for VOCs at all sites. The maximum detected concentrations of the VOC COPCs were compared with the vapor intrusion screening levels or the risk-based concentration generated by the model for each site. The model inputs and risk-based concentrations generated are provided on CD as Attachment G-3. HQs and HIs were calculated for noncarcinogenic COPCs and total excess cancer risks for carcinogenic COPCs. The NMED target risk level of 1×10^{-5} and NMED target HI of 1 were applied.

The vapor intrusion pathway was qualitatively evaluated as part of the residential scenario for some of the sites in this report. Among the factors considered for the vapor intrusion pathway to be relevant to human health risk is the current extent of structures and their proximity to the VOC source. One may also consider if construction of buildings is possible or proposed in the reasonably foreseeable future. Structures exist in the TA-14 portion of the Cañon de Valle Aggregate Area but they differ considerably in whether they are actively used.

Samples collected at AOC 14-001(g) and SWMUs 14-009 and 14-010 are located in drainages and are not suitable for placement of a structure. In addition, part of SWMU 14-006 is also in a drainage and not buildable; there were no VOCs detected at the SWMU 14-006 mesa-top locations. Therefore, the vapor intrusion pathway was not evaluated for these sites.

No VOCs were detected at AOCs C-14-001 and C-14-008. Therefore, the vapor intrusion pathway is incomplete for these sites. The potential for the vapor intrusion pathway is discussed for each of the remaining sites.

None of the site descriptions indicated that solvents were used at these sites, and in most cases these sites are inactive or removed. Therefore, there are no suspected sources of VOCs other than small quantities possibly used in a photographic laboratory.

G-4.3.1 SWMU 14-002(c)

SWMU 14-002(c) is a decommissioned firing site (structure 14-5) located in the southeastern portion of TA-14. Structure 14-5 consisted of a control building and firing pad. Constructed in 1944, the wood-framed control building measured 11 ft wide × 18 ft long × 10 ft high and was surrounded on three sides by an earthen berm. A 10-ft-square × 8-ft-high concrete firing pad faced with a 0.5-in. steel plate was attached to the exterior south wall of the control building. The firing site was used to conduct small-scale explosive tests until the mid-1950s. The control building was converted to a storage site in 1961 and used to store cyanogen gas from 1965 to the 1970s. In 1980, a 5-ft-diameter metal sphere was installed on the firing pad at the south side of structure 14-5. The sphere was used to conduct slow-combustion experiments, which continued until 1985, when building operations ceased. The firing pad was removed at an unknown date. The control building was partially destroyed by the Cerro Grande fire in 2000; only the concrete portions of the roof and walls remain. The site description does not indicate a history of solvent usage.

Eight VOCs (acetone, chloroform; 1,4-dichlorobenzene; 1,1-dichloroethene; ethylbenzene; toluene; trichlorofluoromethane; and total xylene) were detected at this site with one detected concentration in 10 samples, and methylene chloride was detected in 3 of 10 samples; the concentrations were less than the estimated quantitation limit (EQLs), except for acetone and methylene chloride.

Acetone was detected in one sample from 0.0 to 0.5 ft bgs (0.082 mg/kg) and was not detected in deeper samples collected at other locations. Methylene chloride was detected in three samples; the highest concentration (0.019 mg/kg) was in a sample from 2.0 to 3.0 ft bgs. The other methylene chloride concentrations were in samples from 1.0 to 2.0 ft bgs and 6.0 to 7.0 ft bgs (0.0029 mg/kg and 0.0023 mg/kg, respectively) and below the EQLs.

Because acetone and methylene chloride had concentrations exceeding EQLs, these VOCs were evaluated in the screening assessment. The result of the residential vapor intrusion screening assessment is presented in Table G-4.3-1. The HI is approximately 0.0006, which is less than the NMED target HI of 1 (NMED 2015, 600915). The result does not change the HI calculated as a result of exposure to soil, discussed in section G-4.2.

The screening of the bulk soil data using the Johnson and Ettinger model indicates that the soil has not been impacted. The vapor intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600915), but no additional evaluation is necessary.

G-4.3.2 SWMU 14-003

SWMU 14-003 is a former burning area located approximately 300 ft northeast of a control building (structure 14-5) in the southeastern portion of TA-14. The burning area measured approximately 5 ft wide × 20 ft long and was surrounded on three sides by a U-shaped, 3-ft-high soil berm. The area was used for burning combustible HE-contaminated debris and for flash-burning noncombustible HE-contaminated debris from test shots. Burning operations began in 1951 and ceased in the 1960s. In 1997, the burning area soil was removed, and the site, including the berms, was regraded during a VCA conducted at the site. The site description does not indicate a history of solvent usage.

One VOC was detected at this site: methylene chloride was detected in 4 of 13 samples. The concentrations were less than the EQLs and decreased with depth. The site description indicated that solvents were not used, so no sources of VOCs are present. In addition, the berm has been removed, the area regraded, and the site is inactive. The vapor intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600915), but no additional evaluation is necessary.

G-4.3.3 SWMU 14-007

SWMU 14-007 is a decommissioned septic system located at TA-14, approximately 70 ft northeast of building 14-6. The septic system consists of an inactive septic tank (structure 14-19) installed in 1944 and an inactive drain field installed in 1988. The reinforced concrete tank measures 4 ft wide × 7 ft long × 6 ft deep and has a capacity of 640 gal. The drain field is approximately 9 ft wide × 18 ft long. The septic system received effluent from a photoprocessing sink and the restroom in building 14-6, a shop and dark room that was later converted to storage. Originally, the tank discharged to an outfall located 130 ft northeast of the septic tank. In 1988, a drain field and a new drainline (from the septic tank to the drain field) were installed and the portion of the original drainline that discharged to the outfall was decommissioned in place. The septic tank and drain field were disconnected in 1992 when building 14-6 was connected to the SWSC. The site description does not specifically indicate a history of solvent usage, but solvents may have been used as part of photoprocessing in building 14-6.

The VOCs were minimally detected at this site with 1 or 2 detected concentrations out of 39 samples for 1,3-dichlorobenzene, 4-isopropyltoluene, and trichloroethene. Acetone was detected in 10 of 39 samples, and methylene chloride was detected in 9 of 39 samples. The detected concentrations were less than the EQLs for all VOCs.

Because of the potential for VOC sources, the detected VOCs were evaluated in the screening assessment. The result of the residential vapor intrusion screening assessment is presented in Table G-4.3-2. The HI is approximately 0.001, which is less than the NMED target HI of 1 (NMED 2015, 600915). The result does not change the HI calculated as a result of exposure to soil, as discussed in section G-4.2.

The screening of the bulk soil data using the Johnson and Ettinger model indicates that the soil has not been impacted. The vapor intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600915), but no additional evaluation is necessary.

G-4.3.4 AOC C-14-004

AOC C-14-004 is the location of a former electronics shop (structure 14-7) that was approximately 75 ft west of building 14-23 in the southeastern portion of TA-14. Constructed in 1945, the wood-framed building with concrete foundation measured 15 ft wide × 24 ft long × 9 ft high. The building, including the concrete foundation, was removed in 1952. The site description does not indicate a history of solvent usage.

The VOCs were minimally detected at this site. One VOC (acetone) was detected in three samples. The detected concentrations were less than or slightly greater than the EQLs and were collected from a single depth. The site description indicated that solvents were not used, so no sources of VOCs are present. In addition, the structure has been removed and the site is inactive. The vapor intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600915), but no additional evaluation is necessary.

G-4.3.5 AOC C-14-005

AOC C-14-005 is the location of a former storage building (structure 14-8) that was approximately 75 ft north of building 14-6 at TA-14. Constructed in 1944, the wood-framed building measured 6 ft wide × 16 ft long × 9 ft high. The building was removed in 1952. The site description does not indicate a history of solvent usage.

VOCs were minimally detected at this site with one detected concentration for each. The single detections of acetone and 4-isopropyltoluene were greater than the EQLs, and VOCs were analyzed for at a single depth. The site description indicated that solvents were not used at the site and thus no sources of VOCs are present. In addition, the structure has been removed and the site is inactive.

Because acetone and 4-isopropyltoluene had concentrations exceeding EQLs, these VOCs were evaluated in the screening assessment. The result of the residential vapor intrusion screening assessment is presented in Table G-4.3-3. The HI is approximately 0.0002, which is less than the NMED target HI of 1 (NMED 2015, 600915). The result does not change the HI calculated as a result of exposure to soil, discussed in section G-4.2.

The screening of the bulk soil data using the Johnson and Ettinger model indicates that the soil has not been impacted. The vapor intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600915), but no additional evaluation is necessary

G-4.3.6 AOC C-14-007

AOC C-14-007 is the location of a former storage building (structure 14-10) that was located approximately 130 ft west of building 14-24 in the southeastern portion of TA-14. Constructed in 1945, the wood-framed building measured 10 ft square × 8 ft high. The building was removed in 1952. The site description does not indicate a history of solvent usage.

The VOCs were minimally detected at this site. Four VOCs (benzene, 2-butanone, 4-isopropyltoluene, and toluene) were detected in one or two samples each. The detected concentrations were less than the EQLs, and VOCs were analyzed for at a single depth. The site description indicated that solvents were not used, so no sources of VOCs are present. In addition, the structure has been removed and the site is inactive. The vapor intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600915), but no additional evaluation is necessary.

G-4.3.7 AOC C-14-009

AOC C-14-009 is a former HE magazine (structure 14-13) located approximately 125 ft northeast of structure 14-5. Constructed in 1945, the wood-framed magazine measured 3 ft wide × 4 ft long × 3 ft high and was covered with an earthen berm on three sides and the top. The magazine was destroyed by burning in 1960. The site description does not indicate a history of solvent usage.

Two VOCs (acetone and chloroform) were minimally detected at this site with one detected concentration each. The single detections of acetone and chloroform were less than the EQLs, and VOCs were analyzed for at a single depth. Methylene chloride was detected in four samples, and one result was approximately 2 times the EQL. The site description indicated that solvents were not used at the site and thus no sources of VOCs are present. In addition, the structure has been removed and the site is inactive.

Because methylene chloride had one concentration exceeding EQLs, methylene chloride was evaluated in the screening assessment. The result of the residential vapor intrusion screening assessment is presented in Table G-4.3-4. The HI is approximately 0.00002, which is less than the NMED target HI of 1 (NMED 2015, 600915). The result does not change the HI calculated as a result of exposure to soil, discussed in section G-4.2.

The screening of the bulk soil data using the Johnson and Ettinger model indicates that the soil has not been impacted. The vapor intrusion pathway is therefore potentially complete based on NMED guidance (NMED 2015, 600915), but no additional evaluation is necessary

G-4.4 Essential Nutrients

NMED has SSLs for evaluation of essential nutrients (NMED 2015, 600915). The maximum concentrations of calcium and magnesium were compared with the appropriate NMED SSLs at those sites where they were identified as COPCs. The results of the comparisons found calcium and magnesium to be substantially less than the SSLs (Table G-4.4-1). Further evaluation of calcium and magnesium at these sites is not necessary.

G-4.5 Uncertainty Analysis

G-4.5.1 Data Evaluation and COPC Identification Process

A primary uncertainty associated with the COPC identification process is the possibility that a chemical may be inappropriately identified as a COPC 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 are appropriately identified as COPCs because only the chemicals detected or that have detection limits above background are retained for further analysis. There are no established BVs for organic chemicals, and all detected organic chemicals are identified as COPCs and are retained for further analysis. Other uncertainties may include errors in sampling, laboratory analysis, and data analysis. However, because concentrations used in the risk-screening evaluations include those detected below the estimated quantitation limits and nondetections above BVs, data evaluation uncertainties are expected to have little effect on the risk-screening results.

G-4.5.2 Exposure Evaluation

The current and reasonably foreseeable future land use for the TA-14 portion of the Cañon de Valle Aggregate Area is industrial. To the degree actual activity patterns are not represented by those activities assumed by the industrial scenario, uncertainties are introduced in the assessment, and the evaluation presented in this assessment overestimates potential risk. An individual may be subject to exposures in a different manner than the exposure assumptions used to derive the industrial SSLs. For the sites evaluated, individuals might not be on-site at present or in the future for that frequency and duration. The construction worker assumptions for the SSLs are that the potentially exposed individual is outside on-site for 8 h/d, 250 d/yr, and 1 yr (NMED 2015, 600915). The industrial assumptions for the SSLs are that the potentially exposed individual is outside on-site for 8 h/d, 225 d/yr, and 25 yr (NMED 2015, 600915). The residential SSLs are based on exposure of 24 h/d, 350 d/yr, and 30 yr (NMED 2015, 600915). As a result, the industrial, contraction worker, and residential scenarios evaluated at these sites likely overestimate the exposure and risk.

A number of assumptions are made relative to exposure pathways, including input parameters, completeness of a given pathway, the contaminated media to which an individual may be exposed, and intake rates for different routes of exposure. In the absence of site-specific data, the exposure assumptions used were consistent with default values (NMED 2015, 600915). When several upper-bound values (as are found in NMED 2015, 600915) are combined to estimate exposure for any one pathway, the resulting risk estimate can exceed the 99th percentile, and therefore, can exceed the range of risk that may be reasonably expected. Also, the assumption that residual concentrations of chemicals in the tuff are available and 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. Risk from a single location or area with relatively high COPC concentrations may be underestimated by using a representative sitewide value. The use of a UCL is intended to provide a protective upper-bound (i.e., conservative) 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 overestimated if a representative sitewide 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. In addition, the maximum detection limit was used as the EPC for some inorganic COPCs with elevated detection limits above BVs.

One site within TA-14 of the Cañon de Valle Aggregate Area has potential risks that are equivalent to or exceed NMED target levels. The potential risks are overestimated because of uncertainties associated with the EPCs and/or the COPCs.

SWMU 14-003

The construction worker HI at SWMU 14-003 is approximately 2 (HI of 1.87) primarily from manganese (HQ = 0.89). Manganese was detected in tuff above the Qbt 2,3,4 BV (482 mg/kg) at one location in one sample at a concentration of 486 mg/kg, which is only 4 mg/kg above the BV and below the two highest Qbt 2,3,4 background concentrations (510 mg/kg and 752 mg/kg). (Note that the concentration is also below the soil BV [671 mg/kg] and maximum soil background concentration of 1100 mg/kg). Manganese was not detected above the soil BV or Qbt 2,3,4 BV in any of the other 37 samples; manganese was detected at higher concentrations in 3 soil samples (510 mg/kg, 515 mg/kg, and 566 mg/kg) below the soil BV. The manganese EPC is 413 mg/kg, which is less than the 3 highest Qbt 2,3,4 background concentrations (416 mg/kg, 510 mg/kg, and 752 mg/kg), and includes 37 of 38 sample results below the BVs. In addition, the construction worker SSL (464 mg/kg) is within the ranges of manganese background concentrations for Qbt 2,3,4 and soil (22 mg/kg to 752 mg/kg and 76 mg/kg to 1100 mg/kg, respectively) and is less than the respective BVs. Therefore, the exposure to manganese at the site is to background concentrations, and the SSL is comparable with naturally occurring manganese levels. As a result, the construction worker risk to manganese is overestimated, and the manganese HQ is not representative of potential risk to a construction worker. Without manganese, the construction worker HI is approximately 1 (0.98), which is equivalent to the NMED target HI, and is much more representative of the potential risk. Given the conservative nature of the screening process, which applies a data set, an EPC, and a SSL analogous to naturally occurring manganese concentrations, the presence of one sample result slightly above the manganese Qbt 2,3,4 BV but below the maximum Qbt 2,3,4 background concentration indicates manganese does not pose a potential risk to the construction worker.

The residential HI is approximately 1 (HI of 0.95), which includes lead. Because the lead SSL is based upon blood lead levels, lead is evaluated separately from the other noncarcinogenic COPCs. The maximum lead concentration (18 mg/kg) is less than the residential SSL (400 mg/kg). Without lead, the residential HI is approximately 0.9.

G-4.5.3 Toxicity Evaluation

The primary uncertainty associated with the SSLs is related to the derivation of toxicity values used in their calculation. Toxicity values (reference doses [RfDs] and slope factors [SFs]) were used to derive the SSLs used in this risk-screening evaluation (NMED 2015, 600915). 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, including the use of the EPA regional arsenic SSL in calculating the residential cancer risk estimates, (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 in chemical absorption, metabolism, excretion, and toxic responses between animals and humans. Differences in body weight, surface area, and pharmacokinetic relationships between animals and humans are taken into account to address these uncertainties in the dose-response relationship. However, conservatism is usually incorporated 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 evaluation; 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, such as arsenic, discussed below, may change as new information is evaluated.

Arsenic

The May 2016 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/risk/risk-based-screening-table-generic-tables). 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 EPA regional residential screening value for arsenic of 6.8 mg/kg changes the total excess cancer risk results for six sites evaluated in this appendix. The changes are as follows:

- SWMU 14-003—Residential cancer risk becomes 6×10^{-6}
- SWMU 14-006—Residential cancer risk becomes 7×10^{-6}
- SWMU 14-007—Residential cancer risk becomes 6×10^{-6}
- SWMU 14-009—Residential cancer risk becomes 5×10^{-6}
- SWMU 14-010—Residential cancer risk becomes 5×10^{-6}
- AOC C-14-007—Residential cancer risk becomes 9.8×10^{-6}

Chemical Form of the COPC. COPCs may be bound to the environment matrix and not be available for absorption into the human body. However, the COPCs are assumed to be 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 the risk assessment. Surrogates were used to provide SSLs for 1,3-dichlorobenzene, 4-isopropyltoluene, and TATB based on structural similarity. A surrogate was also used to provide vapor intrusion screening levels for 4-isopropyltoluene based on structural similarity. The overall impact of surrogates on the risk assessment is minimal because these COPCs were detected infrequently and at low concentrations.

G-4.5.4 Additive Approach

For noncarcinogens, the effects of exposure to multiple chemicals are generally unknown, 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 or by different modes of action but are addressed additively.

G-4.6 Interpretation of Human Health Risk-Screening Results

G-4.6.1 AOC 14-001(g)

Industrial Scenario

The total excess cancer risk for the industrial scenario is 5×10^{-10}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.0009, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.3 mrem/yr, which is less than 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^{-6}, based on conversion from dose using RESRAD Version 7.0.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.04, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.2 mrem/yr, which is less than 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^{-7}, based on conversion from dose using RESRAD Version 7.0.

Residential Scenario

The total excess cancer risk for the residential scenario is 6 × 10^{-7}, which is less than the NMED target risk level of 1 × 10^{-5} (NMED 2015, 600915). The residential HI is 0.01, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 2 mrem/yr, which is less than 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^{-5}, based on conversion from dose using RESRAD Version 7.0.

G-4.6.2 SWMU 14-002(c)

Industrial Scenario

No carcinogenic COPCs were identified in the 0.0- to 1.0 ft-depth interval. The industrial HI is 0.000006, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 2 × 10^{-10}, which is less than the NMED target risk level of 1 × 10^{-5} (NMED 2015, 600915). The construction worker HI is 0.7, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified.

Residential Scenario

The total excess cancer risk for the residential scenario is 2 × 10^{-7}, which is less than the NMED target risk level of 1 × 10^{-5} (NMED 2015, 600915). The residential HI is 0.6, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified.

G-4.6.3 SWMU 14-003

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2 × 10^{-7}, which is less than the NMED target risk level of 1 × 10^{-5} (NMED 2015, 600915). The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified in the 0.0- to 1.0-ft depth interval.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is approximately 1 (see the discussion of uncertainty in section G-4.5.2), which is equivalent to the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.1 mrem/yr, which is less than 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^{-7}, based on conversion from dose using RESRAD Version 7.0.

Residential Scenario

The total excess cancer risk for the residential scenario is 6×10^{-6} (based on the EPA regional screening value for arsenic), which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.9 (see the discussion of uncertainty in section G-4.5.2), which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.4 mrem/yr, which is less than 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 3×10^{-6}, based on conversion from dose using RESRAD Version 7.0.

G-4.6.4 SWMU 14-006

Industrial Scenario

The total excess cancer risk for the industrial scenario is 8×10^{-8}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified in the 0.0- to 1.0-ft depth interval.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.5, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.007 mrem/yr, which is less than 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 5×10^{-9}, based on conversion from dose using RESRAD Version 7.0.

Residential Scenario

The total excess cancer risk for the residential scenario is 7×10^{-6} (based on the EPA regional screening value for arsenic), which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.3, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.6 mrem/yr, which is less than 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 7.0.

G-4.6.5 SWMU 14-007

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-9}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.003, which is less than the NMED target HI of 1 (NMED 2015, 600915). No radionuclide COPCs were identified in the 0.0- to 1.0-ft depth interval.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.8, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.02 mrem/yr, which is less than 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^{-8}, based on conversion from dose using RESRAD Version 7.0.

Residential Scenario

The total excess cancer risk for the residential scenario is 6×10^{-6} (based on the EPA regional screening value for arsenic), which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.8, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.9 mrem/yr, which is less than 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 6×10^{-6}, based on conversion from dose using RESRAD Version 7.0.

G-4.6.6 SWMU 14-009

Industrial Scenario

The total excess cancer risk for the industrial scenario is 1×10^{-6}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.05, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 2 mrem/yr, which is less than 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 4×10^{-5}, based on conversion from dose using RESRAD Version 7.0.

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 3×10^{-11}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.4, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 2 mrem/yr, which is less than 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 7.0.

Residential Scenario

The total excess cancer risk for the residential scenario is 5×10^{-6} (based on the EPA regional screening value for arsenic), which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.4, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 7 mrem/yr, which is less than 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 7.0.

G-4.6.7 SWMU 14-010

Industrial Scenario

The total excess cancer risk for the industrial scenario is 1×10^{-8}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 0.6 mrem/yr, which is less than 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 7.0.

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.1, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 1 mrem/yr, which is less than 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^{-7}, based on conversion from dose using RESRAD Version 7.0.

Residential Scenario

The total excess cancer risk for the residential scenario is 5 × 10^{-6} (based on the EPA regional screening value for arsenic), which is less than the NMED target risk level of 1 × 10^{-5} (NMED 2015, 600915). The residential HI is 0.1, which is less than the NMED target HI of 1 (NMED 2015, 600915). The total dose is 3 mrem/yr, which is less than 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 7.0.

G-4.6.8 AOC C-14-001

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2 × 10^{-6}, which is less than the NMED target risk level of 1 × 10^{-5} (NMED 2015, 600915).

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.8, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

The total excess cancer risk for the residential scenario is 5 × 10^{-6}, which is less than the NMED target risk level of 1 × 10^{-5} (NMED 2015, 600915). The residential HI is 0.4, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.6.9 AOC C-14-004

Industrial Scenario

No carcinogenic COPCs were identified in the 0.0- to 1.0-ft depth interval. The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Construction Worker Scenario

No carcinogenic COPCs were identified for the construction worker scenario. The construction worker HI is 0.6, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

The total excess cancer risk for the residential scenario is 8×10^{-7}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.5, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.6.10 AOC C-14-005

Industrial Scenario

No carcinogenic COPCs were identified in the 0.0- to 1.0-ft depth interval. The industrial HI is 0.004, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Construction Worker Scenario

No carcinogenic COPCs were identified in the 0.0- to 10.0-ft depth interval. The construction worker HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

No carcinogenic COPCs were identified in the 0.0- 10.0-ft depth interval. The residential HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.6.11 AOC C-14-007

Industrial Scenario

The total excess cancer risk for the industrial scenario is 2×10^{-8}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The industrial HI is 0.04, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 3×10^{-9}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.3, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

The total excess cancer risk for the residential scenario is 1×10^{-5} (based on the EPA regional screening value for arsenic), which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.2, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.6.12 AOC C-14-008

Industrial Scenario

No carcinogenic COPCs were identified in the 0.0- to 1.0-ft depth interval. The industrial HI is 0.0002, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Construction Worker Scenario

No carcinogenic COPCs were identified in the 0.0- to 10.0-ft depth interval. The construction worker HI is 0.9, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

No carcinogenic COPCs were identified in the 0.0- to 10.0-ft depth interval. The residential HI is 0.7, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-4.6.13 AOC C-14-009

Industrial Scenario

No carcinogenic COPCs were identified in the 0.0- to 1.0-ft depth interval. The industrial HI is 0.06, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Construction Worker Scenario

The total excess cancer risk for the construction worker scenario is 3×10^{-11}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The construction worker HI is 0.2, which is less than the NMED target HI of 1 (NMED 2015, 600915).

Residential Scenario

The total excess cancer risk for the residential scenario is 8×10^{-10}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2015, 600915). The residential HI is 0.2, which is less than the NMED target HI of 1 (NMED 2015, 600915).

G-5.0 ECOLOGICAL RISK-SCREENING EVALUATIONS

The approach for conducting ecological evaluations is described in the “Screening Level Ecological Risk Evaluation Methods, Revision 4” (LANL 2015, 600982). The evaluation consists of four parts: a scoping evaluation, a screening evaluation, an uncertainty analysis, and an interpretation of the results.

G-5.1 Scoping Evaluation

The scoping evaluation establishes the breadth and focus of the screening evaluation. The ecological scoping checklist (Attachment G-4) is a useful tool for organizing existing ecological information. The information was used to determine whether ecological receptors might be affected, identify the types of receptors that might be present, and develop the ecological CSM for sites in the TA-14 portion of the Cañon de Valle Aggregate Area (Attachment G-4). Although the quality of the habitat varies, most of the land within the aggregate area has native grasses, forbs, and trees that can be suitable habitat for ecological receptors.

The scoping evaluation indicated that terrestrial receptors were appropriate for evaluating the concentrations of COPCs in soil and tuff. Exposure is assessed across a site to a depth of 0.0 to 5.0 ft bgs. Aquatic receptors were not evaluated because no aquatic communities and no aquatic habitat or perennial source of water exist at any of the sites. The depth of the regional aquifer (greater than 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, and food web transport. 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.

The potential risk was evaluated in the risk-screening assessments for the following ecological receptors representing several trophic levels:

- plants
- soil-dwelling invertebrates (represented by the earthworm)
- the deer mouse (mammalian omnivore)
- the montane shrew (mammalian insectivore)
- desert cottontail (mammalian herbivore)
- red fox (mammalian carnivore)
- American robin (avian insectivore, avian omnivore, and avian herbivore)
- American kestrel (avian insectivore and avian carnivore [surrogate for threatened and endangered (T&E) species (primarily the Mexican spotted owl)])

The rationale for using these receptors is presented in “Screening Level Ecological Risk Evaluation Methods, Revision 4” (LANL 2015, 600982). The Mexican spotted owl is the only T&E species known to frequent the area and may use the TA-14 portion of the Cañon de Valle Aggregate Area for foraging.

G-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). 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 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 COPCs, and their potential for exposure to those COPCs. 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.

G-5.3 Ecological Risk Screening Evaluation

The ecological screening evaluation identifies chemicals of potential ecological concern (COPECs) and is based on the comparison of EPCs (95% UCLs, maximum detected concentrations, or maximum detection limits) to ecological screening levels (ESLs). The EPCs used in the assessments for the TA-14 portion of the Cañon de Valle Aggregate Area are presented in Tables G-2.3-1 through G-2.3-31.

The ESLs were obtained from the ECORISK Database, Version 3.3 (LANL 2015, 600921) and are presented in Table G-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, are presented in the ECORISK Database, Version 3.3 (LANL 2015, 600921).

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 greater than 0.3 are used to identify COPECs requiring additional evaluation (LANL 2015, 600982). Individual HQs for a receptor are summed to derive an HI; COPCs without ESLs are retained as COPECs and evaluated further in the uncertainty analysis (section G-5.4). 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.

G-5.3.1 AOC 14-001(g)

The results of the minimum ESL comparisons are presented in Table G-5.3-2. Copper, mercury, selenium, bis(2-ethylhexyl)phthalate, and di-n-butylphthalate are retained as COPECs because the HQs were greater than 0.3.

Perchlorate, 4-isopropyltoluene, and TATB do not have ESLs, are retained as COPECs, and are discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-3. The HI analysis indicates that the kestrel (intermediate carnivore), robin (all feeding guilds), shrew, deer mouse, earthworm, and plant have HIs greater than 1. The HI for the cottontail was equivalent to 1 and the HIs for the red fox and kestrel (top carnivore) were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.2 SWMU 14-002(c)

The results of the minimum ESL comparisons are presented in Table G-5.3-4. Lead, selenium, zinc, di-n-butylphthalate, and RDX are retained as COPECs because the HQs were greater than 0.3.

Perchlorate and ethylbenzene do not have ESLs, are retained as COPECs, and are discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-5. The HI analysis indicates that the kestrel (intermediate carnivore), robin (all feeding guilds), shrew, deer mouse, earthworm, and plant have HIs greater than 1. The HI for the cottontail was equivalent to 1 and the HIs for the red fox and kestrel (top carnivore) were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.3 SWMU 14-003

The results of the minimum ESL comparisons are presented in Table G-5.3-6. Arsenic, barium, beryllium, chromium, cobalt, copper, lead, manganese, nickel, selenium, vanadium, and bis(2-ethylhexyl)phthalate are retained as COPECs because the HQs were greater than 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained as a COPEC 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 soil pH for the TA-14 portion of the Cañon de Valle Aggregate Area is neutral to slightly alkaline.

Calcium, iron, magnesium, perchlorate, and TATB do not have ESLs, are retained as COPECs, and are discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-7. The HI analysis indicates that the kestrel (intermediate carnivore), robin (all feeding guilds), shrew, deer mouse, earthworm, and plant have HIs greater than 1. The HIs for the red fox, kestrel (top carnivore), and cottontail were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.4 SWMU 14-006

The results of the minimum ESL comparisons are presented in Table G-5.3-8. Arsenic, barium, beryllium, copper, lead, mercury, nickel, selenium, zinc, bis(2-ethylhexyl)phthalate, and RDX are retained as COPECs because the HQs were greater than 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained as a COPEC 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 soil pH for the TA-14 portion of the Cañon de Valle Aggregate Area is neutral to slightly alkaline.

Calcium, magnesium, perchlorate, and TATB do not have ESLs, are retained as COPECs, and are discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-9. The HI analysis indicates that the kestrel (intermediate carnivore), robin (all feeding guilds), cottontail, shrew, deer mouse, earthworm, and plant have HIs greater than 1. The HIs for the red fox and kestrel (top carnivore) were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.5 SWMU 14-007

The results of the minimum ESL comparisons are presented in Table G-5.3-10. Arsenic, barium, beryllium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, vanadium, and bis(2-ethylhexyl)phthalate are retained as COPECs because the HQs were greater than 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained as a COPEC 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 soil pH for the TA-14 portion of the Cañon de Valle Aggregate Area is neutral to slightly alkaline.

Calcium, magnesium, perchlorate, 4-isopropyltoluene, and TATB do not have ESLs, are retained as COPECs, and are discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-11. The HI analysis indicates that the kestrel (intermediate carnivore), robin (all feeding guilds), shrew, deer mouse, earthworm, and plant have HIs greater than 1. The HI for the cottontail was equivalent to 1 and the HIs for the red fox and kestrel (top carnivore) were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.6 SWMU 14-009

The results of the minimum ESL comparisons are presented in Table G-5.3-12. Antimony, arsenic, barium, chromium, copper, lead, mercury, nickel, selenium, vanadium, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, and HMX are retained as COPECs because the HQs were greater than 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained as a COPEC 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 soil pH for the TA-14 portion of the Cañon de Valle Aggregate Area is neutral to slightly alkaline.

Calcium, N-nitrosodiphenylamine, and TATB do not have ESLs, are retained as COPECs, and are discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-13. The HI analysis indicates that the kestrel (intermediate carnivore), robin (all feeding guilds), cottontail, shrew, deer mouse, earthworm, and plant have HIs greater than 1. The HIs for the red fox and kestrel (top carnivore) were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.7 SWMU 14-010

The results of the minimum ESL comparisons are presented in Table G-5.3-14. Arsenic, copper, lead, selenium, silver, zinc, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, and HMX are retained as COPECs because the HQs were greater than 0.3.

TATB does not have ESLs, is retained as a COPEC, and is discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-15. The HI analysis indicates that the kestrel (intermediate carnivore), robin (all feeding guilds), shrew, deer mouse, earthworm, and plant have HIs greater than 1. The HI for the cottontail was equivalent to 1 and the HIs for the red fox and kestrel (top carnivore) were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.8 AOC C-14-001

The results of the minimum ESL comparisons are presented in Table G-5.3-16. Barium, chromium, cobalt, nickel, selenium, and benzoic acid are retained as COPECs because the HQs were greater than 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained as a COPEC 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 soil pH for the TA-14 portion of the Cañon de Valle Aggregate Area is neutral to slightly alkaline.

Calcium does not have ESLs, is retained as a COPEC, and is discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-17. The HI analysis indicates that the robin (all feeding guilds), shrew, deer mouse, and plant have HIs greater than 1. The HIs for the red fox, kestrel (both feeding guilds), cottontail, and earthworm were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.9 AOC C-14-004

The results of the minimum ESL comparisons are presented in Table G-5.3-18. Barium, cobalt, copper, lead, nickel, selenium, and vanadium are retained as COPECs because the HQs were greater than 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained as a COPEC 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 soil pH for the TA-14 portion of the Cañon de Valle Aggregate Area is neutral to slightly alkaline.

Calcium, perchlorate, and TATB do not have ESLs, are retained as COPECs, and are discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-19. The HI analysis indicates that the robin (all feeding guilds), shrew, deer mouse, and plant have HIs greater than 1. The HIs for the red fox, kestrel (both feeding guilds), cottontail, and earthworm were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.10 AOC C-14-005

The results of the minimum ESL comparisons are presented in Table G-5.3-20. Mercury and selenium are retained as COPECs because the HQs were greater than 0.3.

Perchlorate, 4-isopropyltoluene, and TATB do not have ESLs, are retained as COPECs, and are discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-21. The HI analysis indicates that the kestrel (both feeding guilds), robin (all feeding guilds), shrew, deer mouse, earthworm, and plant have HIs greater than 1. The HIs for the red fox and cottontail were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.11 AOC C-14-007

The results of the minimum ESL comparisons are presented in Table G-5.3-22. Antimony, arsenic, barium, chromium, copper, lead, nickel, and selenium are retained as COPECs because the HQs were greater than 0.3.

Calcium, perchlorate, 4-isopropyltoluene, and TATB do not have ESLs, are retained as COPECs, and are discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-23. The HI analysis indicates that the robin (all feeding guilds), cottontail, shrew, deer mouse, earthworm, and plant have HIs greater than 1. The HI for the kestrel (intermediate carnivore) was equivalent to 1 and the HIs for the red fox and kestrel (top carnivore) were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.12 AOC C-14-008

The results of the minimum ESL comparisons are presented in Table G-5.3-24. Barium, cobalt, copper, nickel, selenium, and vanadium are retained as COPECs because the HQs were greater than 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained as a COPEC 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 soil pH for the TA-14 portion of the Cañon de Valle Aggregate Area is neutral to slightly alkaline.

Calcium and perchlorate do not have ESLs, are retained as COPECs, and are discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-25. The HI analysis indicates that the robin (all feeding guilds), shrew, deer mouse, and plant have HIs greater than 1. The HIs for the kestrel (intermediate carnivore), cottontail, and earthworm were equivalent to 1 and the HIs for the red fox and kestrel (top carnivore) were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-5.3.13 AOC C-14-009

The results of the minimum ESL comparisons are presented in Table G-5.3-26. Barium, lead, and selenium are retained as COPECs because the HQs were greater than 0.3.

Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained as a COPEC 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 soil pH for the TA-14 portion of the Cañon de Valle Aggregate Area is neutral to slightly alkaline.

TATB does not have ESLs, is retained as a COPEC, and is discussed in the uncertainty analysis (section G-5.4).

The HQs and HIs for each COPEC and receptor combination are presented in Table G-5.3-27. The HI analysis indicates that the robin (all feeding guilds), shrew, deer mouse, and plant have HIs greater than 1. The HIs for the red fox, kestrel (both feeding guilds), cottontail, and earthworm were less than 1. The COPECs and receptors are discussed in the uncertainty analysis (section G-5.4).

G-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 for sites. The following narrative contains a qualitative uncertainty analysis of the issues relevant to evaluating the potential ecological risk at the TA-14 portion of the Cañon de Valle Aggregate Area.

G-5.4.1 Chemical Form

The assumptions used in the ESL derivations were conservative and not necessarily representative of actual conditions. These assumptions include maximum chemical bioavailability, maximum receptor ingestion rates, minimum body weight, and additive effects of multiple COPECs. Most of these factors tend to result in conservative estimates of the ESLs, 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, largely because of a limitation on analytical quantitation of individual chemical species. Toxicological data are typically based on the most toxic and bioavailable chemical species not likely found in the environment. The inorganic, organic, and radionuclide COPECs are generally not 100% bioavailable to receptors in the natural environment because of 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 2015, 600982), and the values were biased toward overestimating the potential risk to receptors.

G-5.4.2 Exposure Assumptions

The EPCs used in the calculations of HQs were the 95% UCL, the maximum detected concentration, or the maximum detection limit to a depth of 5.0 ft, thereby conservatively estimating the exposure to each COPC. As a result, the exposure of individuals within a population was evaluated using this specific concentration, which was assumed constant throughout the exposure area. The sampling also focused on areas of known contamination, and receptors were assumed to ingest 100% of their food and spend 100% of their time at the site. The assumptions made regarding exposure for terrestrial receptors results in an overestimation of the potential exposure and risk because COPECs varied across the site and were infrequently detected.

G-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 may result in an under- or overestimation of potential risk.

G-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 a receptor is likely to spend within the contaminated areas based on the size of the receptor’s home range (HR). The AUF for individual organisms is calculated 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 (EPA 1993, 059384). The site areas and AUFs for each site are presented in Table G-5.4-1. The kestrel (top carnivore) is used as the surrogate receptor for the Mexican spotted owl.

One site (AOC C-14-005) had an HI for the kestrel (top carnivore) above 1. Application of the AUF for the Mexican spotted owl to the HI for the kestrel (top carnivore) resulted in an adjusted HI of 0.0001. Therefore, there are no potential adverse impacts to the Mexican spotted owl at any of the sites.

G-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 at these sites in the TA-14 portion of the Cañon de Valle Aggregate Area 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) estimate that the median dispersal distance for mammals is seven times the linear dimension of the HR (i.e., the square root of the HR area). If only the dispersal distances for the mammals with HRs within the range of the screening receptors are used (Bowman et al. 2002, 073475), the median dispersal distance becomes 3.6 times the square root of the HR (R^2=0.91). If the receptors are assumed to be able to 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 40HR.

The HRs for the kestrel, robin, deer mouse, shrew, cottontail, and red fox were determined using the data in EPA’s wildlife exposure factors handbook (EPA 1993, 059384). The HRs were either for specific environments or averages of different environments presented in the respective exposure parameter/population dynamic tables (EPA 1993, 059384). Laboratory guidance (2015, 600982, Table 3.3-1) presents how the EPA data were used to derive the HRs for each receptor. The HRs were used to calculate the population areas for each receptor as described in the previous paragraph.

G-5.4.5.1 AOC 14-001(g)

The area of AOC 14-001(g) is approximately 0.155 ha. The population area use factors (PAUFs) are estimated by dividing the site area by the population area of each receptor population (Table G-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 AOC 14-001(g) are less than 1 for all receptors. The plant had an unadjusted HI of 4 and the earthworm had an unadjusted HI of 2 (Table G-5.4-3).

G-5.4.5.2 SWMU 14-002(c)

The area of SWMU 14-002(c) is approximately 0.00218 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-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 14-002(c) are less than 1 for all receptors. The plant had an unadjusted HI of 4 and the earthworm had an unadjusted HI of 2 (Table G-5.4-5).

G-5.4.5.3 SWMU 14-003

The area of SWMU 14-003 is approximately 0.0488 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-5.4-6). 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 14-003 are less than 1 for all receptors. The plant had an unadjusted HI of 10 and the earthworm had an unadjusted HI of 3 (Table G-5.4-7).

G-5.4.5.4 SWMU 14-006

The area of SWMU 14-006 is approximately 0.0183 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-5.4-8). 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 14-006 are less than 1 for all receptors, except for the robin (insectivore), which had an adjusted HI equivalent to 1 (Table G-5.4-9). The plant had an unadjusted HI of 9 and the earthworm had an unadjusted HI of 5 (Table G-5.4-9).

G-5.4.5.5 SWMU 14-007

The area of SWMU 14-007 is approximately 0.0476 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-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 14-007 are less than 1 for all receptors (Table G-5.4-11). The plant had an unadjusted HI of 7 and the earthworm had an unadjusted HI of 3 (Table G-5.4-11).

G-5.4.5.6 SWMU 14-009

The area of SWMU 14-009 is approximately 0.0732 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-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 14-009 are less than 1 for all receptors (Table G-5.4-13). The plant had an unadjusted HI of 6 and the earthworm had an unadjusted HI of 9 (Table G-5.4-13).

G-5.4.5.7 SWMU 14-010

The area of SWMU 14-010 is approximately 0.0391 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-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 SWMU 14-010 are less than 1 for all receptors (Table G-5.4-15). The plant had an unadjusted HI of 5 and the earthworm had an unadjusted HI of 5 (Table G-5.4-15).

G-5.4.5.8 AOC C-14-001

The area of AOC C-14-001 is approximately 0.00178 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-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 AOC C-14-001 are less than 1 for all receptors. The plant had an unadjusted HI of 4 and the earthworm had an unadjusted HI of 0.7 (Table G-5.4-17).

G-5.4.5.9 AOC C-14-004

The area of AOC C-14-004 is approximately 0.00384 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-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-14-004 are less than 1 for all receptors. The plant had an unadjusted HI of 5 and the earthworm had an unadjusted HI of 0.9 (Table G-5.4-19).

G-5.4.5.10 AOC C-14-005

The area of AOC C-14-005 is approximately 0.000908 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-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-14-005 are less than 1 for all receptors. The plant had an unadjusted HI of 3 and the earthworm had an unadjusted HI of 27 (Table G-5.4-21).

G-5.4.5.11 AOC C-14-007

The area of AOC C-14-007 is approximately 0.0015 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-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 C-14-007 are less than 1 for all receptors. The plant had an unadjusted HI of 6 and the earthworm had an unadjusted HI of 2 (Table G-5.4-23).

G-5.4.5.12 AOC C-14-008

The area of AOC C-14-008 is approximately 0.0014 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-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-14-008 are less than 1 for all receptors. The plant had an unadjusted HI of 8 and the earthworm had an unadjusted HI equivalent to 1 (Table G-5.4-25).

G-5.4.5.13 AOC C-14-009

The area of AOC C-14-009 is approximately 0.00106 ha. The PAUFs are estimated by dividing the site area by the population area of each receptor population (Table G-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 AOC C-14-009 are less than 1 for all receptors. The plant had an unadjusted HI of 3 and the earthworm had an unadjusted HI of 0.6 (Table G-5.4-27).

G-5.4.6 LOAEL Analysis

Some of the sites have HIs greater than 1 for one or more receptors. To address these HIs and reduce the associated uncertainty, analyses were conducted using ESLs derived from LOAELs rather than NOAELs. The LOAEL-based ESLs were calculated based on toxicity information in the ECORISK Database, Release 3.3 (LANL 2015, 600921) and are presented in Table G-5.4-28. The analyses address some of the uncertainties and conservativeness of the ESLs used in the initial screening assessments. The LOAEL-based ESLs were used to conduct HI analyses and adjusted HI analyses. .

G-5.4.7 Site Discussions

G-5.4.7.1 AOC 14-001(g)

The HIs for AOC 14-001(g) are greater than 1 for the earthworm and plant, with selenium being the primary COPEC for the plant and mercury and selenium being the primary COPECs for the earthworm. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.2 for the earthworm and 0.7 for the plant (Table G-5.4-29).

G-5.4.7.2 SWMU 14-002(c)

The HIs for SWMU 14-002(c) are greater than 1 for the earthworm and plant, with selenium and zinc being the primary COPECs. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.3 for the earthworm and 0.8 for the plant (Table G-5.4-30).

G-5.4.7.3 SWMU 14-003

The HIs for SWMU 14-003 are greater than 1 for the earthworm and plant, with barium, beryllium, cobalt, manganese, selenium, and vanadium being the primary COPECs for the plant and arsenic, barium and manganese being the primary COPECs for the earthworm. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.3 for the earthworm and 3 for the plant (Table G-5.4-31).

Barium was detected in all 36 samples in the 0.0- to 5.0-ft depth interval with an EPC of 519 mg/kg. The EPC, which represents the average exposure concentration, is about 20% greater than the maximum soil background concentration (410 mg/kg). The EPC is influenced by four soil concentrations greater than the maximum barium background maximum concentration (460 mg/kg, 746 mg/kg, 860 mg/kg, and 1800 mg/kg); the elevated concentrations were confined to the surface and an area of approximately 0.00037 ha (less than 1% of the site area). The EPC without the maximum concentration of 1800 mg/kg is 306 mg/kg, and within the range of background concentrations. The plant LOAEL-based ESL for barium is 260 mg/kg, which is less than the soil BV (295 mg/kg) and below the maximum soil background concentration (410 mg/kg). Manganese was detected in all 36 samples in the 0.0- to 5.0-ft depth interval with an EPC of 420 mg/kg. Only one concentration was above a BV (486 mg/kg was above the Qbt 2,3,4 BV of 482 mg/kg), and manganese was detected at higher concentrations in three soil samples (510 mg/kg, 515 mg/kg, and 566 mg/kg) but below the soil BV (671 mg/kg). The EPC, which represents the average exposure concentration, is within the range of soil and Qbt 2,3,4 background concentrations (maximum background concentrations are 1100 mg/kg and 752 mg/kg, respectively). The plant LOAEL-based ESL for manganese is 1100 mg/kg, which is the same as the maximum soil background concentration. The EPCs for barium and manganese indicate the average exposure to the COPECs is similar to background, and the screening levels are also similar to background concentrations. In addition, the small area with elevated barium and manganese concentrations indicates the plant community as a whole is not impacted. Therefore, the potential ecological risks to plants are overestimated.

Furthermore, field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment G-4). The site currently has minimal active operations and is becoming naturalized, with abundant habitat for ecological receptors, including plants. Therefore, the HI does not indicate potential risk to plants or other biota.

G-5.4.7.4 SWMU 14-006

The HIs for SWMU 14-006 are equivalent to or greater than 1 for the earthworm and plant, with arsenic, barium, beryllium, copper, lead, mercury, selenium, zinc, and RDX being the primary COPECs for one or more receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.6 for the earthworm, and 2 for the plant (Table G-5.4-32).

Barium was detected in all 14 samples in the 0.0- to 5.0-ft depth interval with an EPC of 124 mg/kg. The EPC, which represents the average exposure concentration, is within the range of soil background concentrations. The plant LOAEL-based ESL for barium is 260 mg/kg, which is less than the soil BV (295 mg/kg) and below the maximum soil background concentration (410 mg/kg). The ranges of barium concentrations in soil versus tuff were similar (48.2 mg/kg to 280 mg/kg for soil and 20.3 to 188 mg/kg for tuff), with all soil concentrations being below the soil BV (295 mg/kg). The EPC indicates the average exposure to barium is similar to background, and the screening level is also similar to background concentrations. SWMU 14-006 is a small site with an area of approximately 0.0183 ha. The limited area of contamination indicates the plant community as a whole is not impacted. Therefore, the potential ecological risks to plants are overestimated.

In addition, field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment G-4). The site currently has minimal active operations and is becoming naturalized, with abundant habitat for ecological receptors, including plants. Therefore, the HI does not indicate potential risk to plants or other biota.

G-5.4.7.5 SWMU 14-007

The HIs for SWMU 14-007 are equivalent to or greater than 1 for the earthworm and plant, with arsenic, barium, beryllium, cobalt, mercury, selenium, and vanadium being the primary COPECs for one or more receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.3 for the earthworm and 2 for the plant (Table G-5.4-33).

Barium was detected in all 34 samples in the 0.0- to 5.0-ft depth interval with an EPC of 216 mg/kg. The EPC, which represents the average exposure concentration, is within the range of soil background concentrations. The ranges of barium concentrations in soil versus tuff were similar (116 mg/kg to 293 mg/kg for soil and 45.9 mg/kg to 257 mg/kg for tuff), with all soil concentrations being below the soil BV (295 mg/kg). The plant LOAEL-based ESL for barium is 260 mg/kg, which is less than the soil BV and below the maximum soil background concentration (410 mg/kg). Selenium was detected in all 14 samples, and the EPC (1.36 mg/kg) was less than the soil BV (1.52 mg/kg) and the maximum soil background concentration (1.7 mg/kg). The EPCs indicate the average exposure to barium and selenium is similar to background, and the barium screening level is also similar to background concentrations. Therefore, the potential ecological risks to plants are overestimated.

In addition, field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment G-4). The site currently has minimal active operations and is becoming naturalized, with abundant habitat for ecological receptors, including plants. Therefore, the HI does not indicate potential risk to plants or other biota.

G-5.4.7.6 SWMU 14-009

The HIs for SWMU 14-009 are equivalent to or greater than 1 for the earthworm and plant, with antimony, arsenic, barium, mercury, selenium, and HMX being the primary COPECs for one or more receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.9 for the earthworm and approximately 1 (1.02) for the plant (Table G-5.4-34).

In addition, field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment G-4). The site currently has minimal active operations and is becoming naturalized, with abundant habitat for ecological receptors, including plants. Therefore, the HI does not indicate potential risk to plants or other biota.

G-5.4.7.7 SWMU 14-010

The HIs for SWMU 14-010 are equivalent to or greater than 1 for the earthworm and plant, with arsenic, copper, selenium, zinc, and HMX being the primary COPECs for one or more receptors. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.6 for the earthworm and 0.7 for the plant (Table G-5.4-35).

G-5.4.7.8 AOC C-14-001

The HI for AOC C-14-001 is greater than 1 for the plant, with barium, cobalt, and selenium being the primary COPECs. The HI analysis using LOAEL-based ESLs resulted in an HI of 0.9 for the plant (Table G-5.4-36).

G-5.4.7.9 AOC C-14-004

The HI for AOC C-14-004 is greater than 1 for the plant, with barium, cobalt, and selenium being the primary COPECs. The HI analysis using LOAEL-based ESLs resulted in an HI of approximately 1 (1.04) for the plant (Table G-5.4-37).

Barium was detected in all 12 samples in the 0.0- to 5.0-ft depth interval with an EPC of 144 mg/kg. The EPC, which represents the average exposure concentration, is within the range of soil background concentrations. The plant LOAEL-based ESL for barium is 260 mg/kg, which is less than the soil BV (295 mg/kg) and below the maximum soil background concentration (410 mg/kg). Selenium was detected in all 12 samples, and the EPC (1.34 mg/kg) was less than the maximum soil background concentration (1.7 mg/kg). AOC C-14-004 is a small site with an area of approximately 0.00384 ha. The limited area of contamination indicates the plant community as a whole is not impacted.

In addition, field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment G-4). The site currently has minimal active operations and is becoming naturalized, with abundant habitat for ecological receptors, including plants. Therefore, the HI does not indicate potential risk to plants or other biota.

G-5.4.7.10 AOC C-14-005

The HIs for AOC C-14-005 are greater than 1 for the earthworm and plant, with selenium being the primary COPEC for the plant and mercury and selenium being the primary COPECs for the earthworm. The HI analysis using LOAEL-based ESLs resulted in HIs of 3 for the earthworm and 0.5 for the plant (Table G-5.4-38).

Mercury was detected in all 10 samples collected from the 0.0- to 5.0-ft depth interval. Mercury was above the BV in only the surface samples. AOC C-14-005 is a small site with an area of approximately 0.000908 ha. The limited area of mercury contamination indicates the soil invertebrate community as a whole is not impacted.

In addition, field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment G-4). The site currently has minimal active operations and is becoming naturalized, with abundant habitat for ecological receptors, including plants. Therefore, the HI does not indicate potential risk to plants or other biota.

G-5.4.7.11 AOC C-14-007

The HIs for AOC C-14-007 are greater than 1 for the earthworm and plant, with barium and selenium being the primary COPECs for the plant and arsenic and selenium being the primary COPECs for the earthworm. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.1 for the earthworm and approximately 1 (1.01) for the plant (Table G-5.4-39).

Barium was detected in all 10 samples in the 0.0- to 5.0-ft depth interval with an EPC of 74.2 mg/kg. The EPC, which represents the average exposure concentration, is within the range of soil background concentrations. The plant LOAEL-based ESL for barium is 260 mg/kg, which is less than the soil BV (295 mg/kg) and below the maximum soil background concentration (410 mg/kg). AOC C-14-007 is a small site with an area of approximately 0.0015 ha. The limited area of contamination indicates the plant community as a whole is not impacted.

In addition, field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment G-4). The site currently has minimal active operations and is becoming naturalized, with abundant habitat for ecological receptors, including plants. Therefore, the HI does not indicate potential risk to plants or other biota.

G-5.4.7.12 AOC C-14-008

The HIs for AOC C-14-008 are greater than 1 for the earthworm and plant, with barium, cobalt, selenium, and vanadium being the primary COPECs for the plant and barium and selenium being the primary COPECs for the earthworm. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.1 for the earthworm and 2 for the plant (Table G-5.4-40).

Barium was detected in all 10 samples in the 0.0- to 5.0-ft depth interval with an EPC of 276 mg/kg. The EPC, which represents the average exposure concentration, is within the range of soil background concentrations. The plant LOAEL-based ESL for barium is 260 mg/kg, which is less than the soil BV (295 mg/kg) and below the maximum soil background concentration (410 mg/kg). Vanadium was detected in all 10 samples in the 0.0- to 5.0-ft depth interval with an EPC of 25.9 mg/kg. The EPC, which represents the average exposure concentration, is within the range of soil background concentrations. Only one concentration was above a BV (the Qbt 2,3,4 BV), and this concentration was only 2.2 mg/kg above the maximum Qbt 2,3,4 background concentration (21 mg/kg). All other vanadium concentrations were in soil. Concentrations were similar regardless of the medium (ranged from 20.3 mg/kg to 30 mg/kg), with the higher concentrations in soil (27.1 mg/kg, 28.7 mg/kg, and 30 mg/kg) but below the soil BV (39.6 mg/kg). The EPCs indicate the average exposure to barium and vanadium is similar to background, and the barium screening level is also similar to background concentrations. In addition, AOC C-14-008 is a small site with an area of approximately 0.0014 ha. The limited area of contamination indicates the plant community as a whole is not impacted. Therefore, the potential ecological risks to plants are overestimated.

Furthermore, field observations made during the site visit found no indication of adverse effects from COPECs on the plant community (Attachment G-4). The site currently has minimal active operations and is becoming naturalized, with abundant habitat for ecological receptors, including plants. Therefore, the HI does not indicate potential risk to plants or other biota.

G-5.4.7.13 AOC C-14-009

The HI for AOC C-14-009 is greater than 1 for the plant, with barium, lead, and selenium being the primary COPECs. The HI analysis using LOAEL-based ESLs resulted in a HI of 0.8 for the plant (Table G-5.4-41).

G-5.4.8 Chemicals without ESLs

Several COPECs do not have ESLs for any receptor in version 3.3 of the ECORISK Database (LANL 2015, 600921). In an effort to address this uncertainty and to provide a quantitative assessment of potential ecological risk, several online toxicity database searches were 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.

In the absence of a chemical-specific ESL, COPEC concentrations can be compared with ESLs for a surrogate chemical. Comparison with surrogate ESLs provides an estimate of potential effects of a chemically related compound and a line of evidence to indicate the likelihood that ecological receptors are potentially impacted.

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 often infrequently detected across the TA-14 portion of the Cañon de Valle Aggregate Area. When they are detected, comparisons with residential human health SSLs are presented as part of a qualitative assessment. The comparison of COPEC concentrations with residential human health SSLs is a viable alternative for several reasons. Animal studies are used to infer effects on humans and are the basic premise of modern toxicology (EPA 1989, 008021). In addition, toxicity values derived for the calculation of human health SSLs are often based on potential effects that are more sensitive than the ones used to derive ESLs (e.g., cellular effects for humans versus survival or reproductive effects for terrestrial animals). The EPA also applies uncertainty factors or modifying factors to ensure that the toxicity values are protective (i.e., they are adjusted by uncertainty factors to values much lower than the study results). COPEC concentrations compared with these values are an order of magnitude or more below the SSLs, which corresponds to uncertainty factors of 10 or more. Therefore, the differences in toxicity are assumed not to be more than an order of magnitude for any given chemical. The relative difference between values provides a weight of evidence that the potential toxicity of the COPC is likely to be low or very low to the receptor(s). The COPECs without ESLs were common to many of the sites and are discussed below for each site.

Toxicity data are not available for calcium, iron, magnesium, perchlorate, ethylbenzene, 4-isopropyltoluene, N-nitrosodiphenylamine, and TATB. For calcium, iron, magnesium, N-nitrosodiphenylamine, and perchlorate no surrogate or other toxicity information is available. For ethylbenzene, 4-isopropyltoluene, and TATB, a surrogate is used based on structural similarity to evaluate the potential toxicity.

Calcium was identified as a COPC from 0.0 to 5.0 ft at eight sites with maximum concentrations ranging from 3290 mg/kg to 6870 mg/kg. As presented in Table G-4.4-1, concentrations of calcium are substantially less than the NMED essential nutrient SSLs. Calcium is eliminated as a COPEC.

Iron was identified as a COPC from 0.0 to 5.0 ft at one site with a maximum concentration of 22,000 mg/kg. The concentrations are below the maximum soil background concentration (36,000 mg/kg). Iron is an essential micronutrient for plants and animals. Consequently, organisms regulate its uptake. In well-aerated soil between pH 5 and 8 (soil pH for the sites in the TA-14 portion of the Cañon de Valle Aggregate Area is neutral to slightly alkaline), iron is not expected to be toxic to plants (EPA 2003, 111415). In addition, the NMED residential SSL is 54,800 mg/kg, indicating that potential toxicity is very low. Iron is eliminated as a COPEC.

Magnesium was identified as a COPC from 0.0 to 5.0 ft at three sites with maximum concentrations ranging from 1790 mg/kg to 2280 mg/kg. As presented in Table G-4.4-1, concentrations of magnesium are substantially less than the NMED essential nutrient SSLs. Magnesium is eliminated as a COPEC.

Perchlorate was identified as a COPC from 0.0 to 5.0 ft at nine sites with maximum concentrations ranging from 0.0024 mg/kg to 0.066 mg/kg. The NMED residential SSL for perchlorate is 54.5 mg/kg, indicating that potential toxicity is low. Because of the potential low toxicity, perchlorate is eliminated as a COPEC.

Ethylbenzene was identified as a COPC from 0.0 to 5.0 ft at one site at a concentration of 0.0011 mg/kg. The minimum ESL for benzene (24 mg/kg for the deer mouse) is used to screen the ethylbenzene concentrations and results in a maximum HQ of 0.00005. Because the maximum HQ is less than 0.3, ethylbenzene is eliminated as a COPEC.

Isopropyltoluene[4-] was identified as a COPC from 0.0 to 5.0 ft at four sites with maximum concentrations ranging from 0.0006 mg/kg to 0.019 mg/kg. The minimum ESL for toluene (23 mg/kg for the shrew) is used to screen 4-isopropyltoluene and results in a maximum HQ of 0.0008. Because the maximum HQ is less than 0.3, 4-isopropyltoluene is eliminated as a COPEC.

Nitrosodiphenylamine[N-] was identified as a COPC from 0.0 to 5.0 ft at one site at a concentration of 0.096 mg/kg. The NMED residential SSL for N-nitrosodiphenylamine is 1090 mg/kg, indicating that potential toxicity is low. Because of the potential low toxicity and infrequent detection, N-nitrosodiphenylamine is eliminated as a COPEC.

TATB was identified as a COPC from 0.0 to 5.0 ft at 10 sites. The maximum concentrations ranged from 0.16 mg/kg to 20 mg/kg. Trinitrobenzene[1,3,5-] is used as a surrogate for TATB based on structural similarity. The minimum ESL for 1,3,5-trinitrobenzene (10 mg/kg for the earthworm) is used to screen TATB and results in a maximum HQ of approximately 2. The earthworm LOAEL-based ESL for 1,3,5-trinitrobenzene is 28 mg/kg and results in an HQ of 0.7 using the overall maximum detected concentration (20 mg/kg). Because the potential risk to the earthworm is overestimated by the maximum detected concentrations, a 95% UCL was calculated for the data set with the overall maximum detected concentration (SWMU 14-009). The 95% UCL for this data set is 7.67 mg/kg, which results in an HQ of 0.3 using the LOAEL-based ESL. The HQ for the site with the next highest maximum detected concentration (14 mg/kg at SWMU 14-010) is 0.5 using the LOAEL-based ESL. The 95% UCL (10 samples, 4 detects) is 4.99 mg/kg and results in an HQ of 0.2 using the LOAEL-based ESL, while the mode for this data set is 1.2 mg/kg and and results in an HQ of 0.04 using the LOAEL-based ESL. The other TATB HQs are less than 0.3 using the maximum detected concentrations and the LOAEL-based ESL. TATB is eliminated as a COPEC.

G-5.5 Interpretation of Ecological Risk Screening Results

G-5.5.1 Receptor Lines of Evidence

Based on the ecological risk-screening assessments, several COPECs (including COPECs without an ESL) were identified for the TA-14 portion of the Cañon de Valle Aggregate Area. Receptors were evaluated using several lines of evidence: minimum ESL comparisons, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of detected concentrations and detection limits to background concentrations.

Plant

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the plant, were less than 0.3.
- The HIs were greater than 1 for the plant at all sites.
- The HI analyses using the LOAEL-based ESLs resulted in HIs less than or equivalent to 1 for SWMUs 14-002(c), 14-009, and 14-010 and AOCs 14-001(g), C-14-001, C-14-004, C-14-005, C-14-007, and C-14-009.
- Field observations made during the site visits found no indication of adverse effects on the plant community from COPECs. The TA-14 portion of the Cañon de Valle Aggregate Area currently has minimal active operations and is becoming naturalized, with abundant habitat for ecological receptors, including plants.
- As discussed in section G-5.4.7, the potential risks to the plant are overestimated.

These lines of evidence support the conclusion that no potential ecological risk to the plants exists at the TA-14 portion of the Cañon de Valle Aggregate Area.

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 less than 0.3.
- The HIs were greater than 1 for the earthworm at all sites, except at AOCs C-14-001, C-14-004, and C-14-009.
- The HI analyses using the LOAEL-based ESLs resulted in HIs less than 1 for all sites, except for AOC C-14-005.
- Field observations made during the site visits found no indication of adverse effects on the plant community from COPECs. The site currently has minimal active operations and is becoming naturalized, with abundant habitat for ecological receptors, including plants.
- As discussed in section G-5.4.7, the potential risks to the earthworms are overestimated.

These lines of evidence support the conclusion that no potential ecological risk to the earthworm exists at the TA-14 portion of the Cañon de Valle 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 shrew, were less than 0.3.
- The HIs were greater than 1 for the shrew at all sites.
- The HIs were adjusted by the PAUF, which is the ratio of the site area to the shrew population area. The adjusted HIs were less than 1 for all sites.

These lines of evidence support the conclusion that no potential ecological risk to the montane shrew exists at the TA-14 portion of the Cañon de Valle Aggregate Area.

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 less than 0.3.
- The HIs were greater than or equivalent to 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 population area. The adjusted HIs were less than 1 for all sites.

These lines of evidence support the conclusion that no potential ecological risk to the deer mouse exists at the TA-14 portion of the Cañon de Valle Aggregate Area.

Desert Cottontail (Herbivore)

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the cottontail, were less than 0.3.
- The HIs were equivalent to or less than 1 for the cottontail at all sites, except at SWMUs 14-006 and 14-009 and AOC C-14-007.

- The HIs were adjusted by the PAUFs, which is the ratio of the site area to the cottontail population area. The adjusted HIs were less than 1 at all sites.

These lines of evidence support the conclusion that no potential ecological risk to the cottontail exists at the TA-14 portion of the Cañon de Valle Aggregate Area.

Red Fox (Carnivore)

- Initial screening using the minimum ESLs eliminated a number of COPECs because the HQs for all of the receptors, including the fox, were less than 0.3.
- The HIs were less than 1 for the red fox at all sites.

These lines of evidence support the conclusion that no potential ecological risk to the red fox exists at the TA-14 portion of the Cañon de Valle 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 less than 0.3.
- The HIs were greater than or equivalent to 1 for the robin (all feeding guilds) at all sites.
- The HIs were adjusted by the PAUFs. The adjusted HIs were less than 1 at all sites.

These lines of evidence support the conclusion that no potential ecological risk to the robin (all feeding guilds) exists at the TA-14 portion of the Cañon de Valle 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 (intermediate carnivore), were less than 0.3.
- The HIs were greater than or equivalent to 1 for the kestrel (intermediate carnivore) at all sites, except AOCs C-14-001, C-14-004, and C-14-009.
- The HIs were adjusted by the PAUFs, which is the ratio of the site area to the kestrel’s population area. The adjusted HIs were less than 1 for all sites.

These lines of evidence support the conclusion that no potential ecological risk to the kestrel (intermediate carnivore) exists at the TA-14 portion of the Cañon de Valle 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 (top carnivore), were less than 0.3.
- The HIs were less than 1 for the kestrel (top carnivore) at all sites, except AOC C-14-005.
- The HIs were adjusted by the PAUFs, which is the ratio of the site area to the kestrel’s population area. The adjusted HIs were less than 1 for all sites.
- The kestrel (top carnivore) is a surrogate for the Mexican spotted owl. The HIs were adjusted by the Mexican spotted owl AUFs. The adjusted HIs were less than 1 at all sites.

These lines of evidence support the conclusion that no potential ecological risks to the kestrel (top carnivore) and the Mexican spotted owl exist at the TA-14 portion of the Cañon de Valle Aggregate Area.

G-5.5.2 COPECs with No ESLs

COPECs without ESLs were eliminated based on comparisons to surrogate ESLs or human health SSLs. The analysis of COPECs without ESLs supports the conclusion that no potential ecological risk to receptors exists at the TA-14 portion of the Cañon de Valle Aggregate Area.

G-5.5.3 Summary

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist for the TA-14 portion of the Cañon de Valle Aggregate Area.

G-6.0 CONCLUSIONS

G-6.1 Human Health Risk

The total excess cancer risks were less than or equivalent to the target risk level of 1×10^{-5} and the HIs were less than or equivalent to the target HI of 1 for the industrial, construction worker, and residential scenarios at all sites.

The total doses were below the target dose limit of 25 mrem/yr as authorized by DOE Order 458.1 for the industrial, construction worker, and residential scenarios at all sites. The total doses were equivalent to total risks ranging from 3×10^{-6} to 4×10^{-5} for the industrial scenario, from 5×10^{-9} to 2×10^{-6} for the construction worker scenario, and from 3×10^{-6} to 1×10^{-4} for the residential scenario, based on conversion from dose using RESRAD Version 7.0.

Sites in the TA-14 portion of the Cañon de Valle Aggregate Area are not accessible by 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. Note 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.

G-6.2 Ecological Risk

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, the relationship of detected concentrations and screening levels to background concentrations, and COPECs without ESLs, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist in the TA-14 portion of the Cañon de Valle Aggregate Area.

G-7.0 REFERENCES

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID 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 New Mexico Environment Department 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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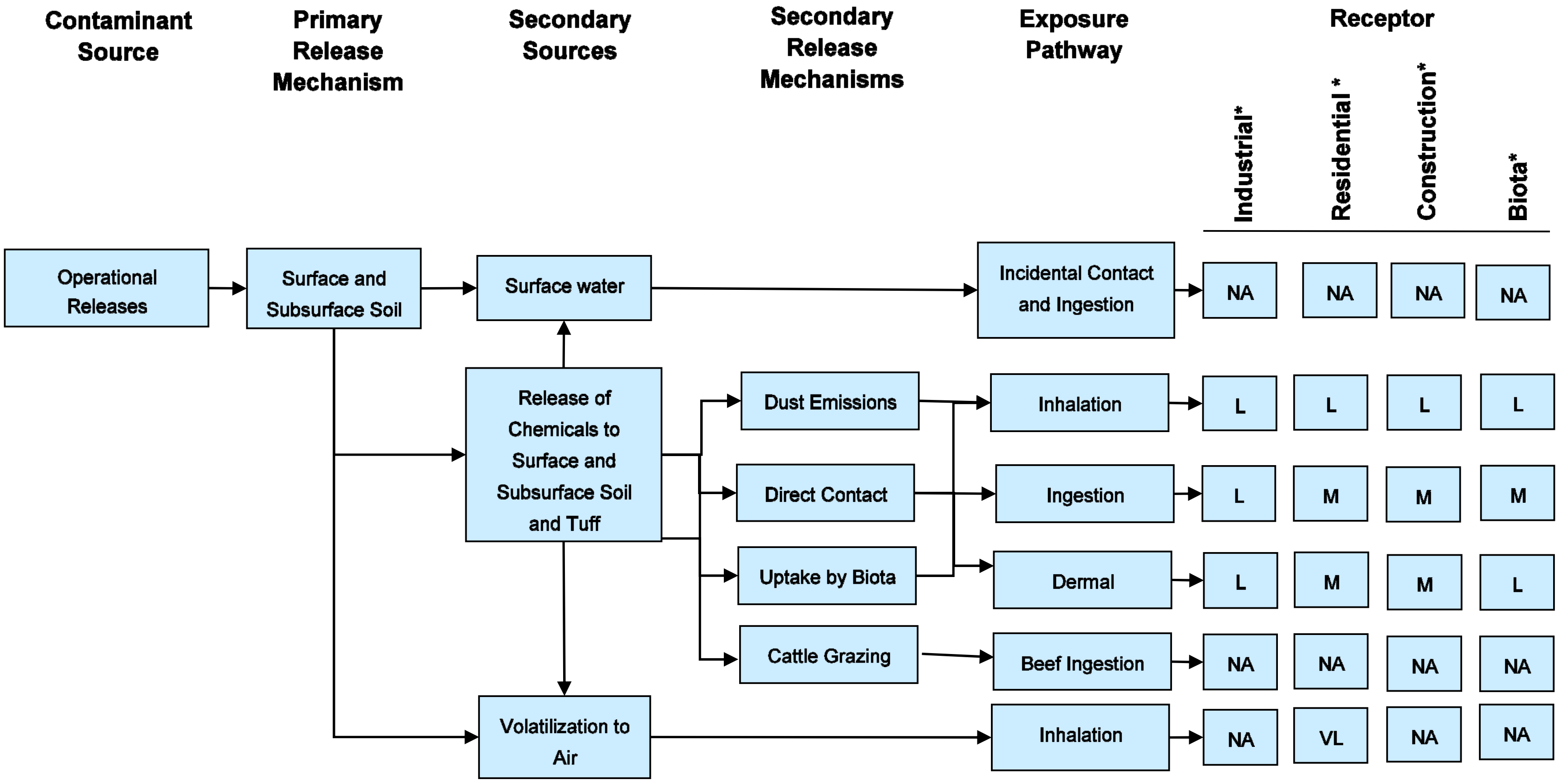


* Very Low (VL), Low (L), and Moderate (M) designations indicate the pathway is a potentially complete pathway and is evaluated in the risk assessments.
Not Applicable (NA) indicates the pathway is incomplete and is not evaluated in the risk assessments.

Figure G-3.1-1 Conceptual site model for Cañon de Valle TA-14 sites

Table G-2.3-1
EPCs at AOC 14-001(g) for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Copper	15	15	2.5	29.9	Gamma	11	95% Adjusted Gamma
Mercury	15	5	0.0142	0.409	Normal	0.0997	95% KM (t)
Perchlorate	15	2	0.0052(U)	0.0078	n/a*	0.0078	Maximum detected concentration
Selenium	15	15	1.2	2.3	Normal	1.82	95% Student's-t
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	15	2	0.053	0.45(U)	n/a	0.093	Maximum detected concentration
Di-n-butylphthalate	15	1	0.14	0.45(U)	n/a	0.14	Maximum detected concentration
Diethylphthalate	15	1	0.059	0.45(U)	n/a	0.059	Maximum detected concentration
HMX	15	6	0.046	7.5	Gamma	4.1	95% Gamma Adjusted KM
TATB	15	9	0.1	3.6	Normal	1.2	95% KM (t)
Radionuclides (pCi/g)							
Cesium-134	15	1	−0.064(U)	0.051	n/a	0.051	Maximum detected concentration
Cesium-137	15	12	0.029(U)	0.593	Normal	0.308	95% KM (t)

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-2
EPCs at AOC 14-001(g) for the Construction Worker and Residential Scenarios and Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Chromium (total)	30	30	1.4	7.5	Normal	4.97	95% Student's-t
Copper	30	30	1.8	29.9	Lognormal	7.18	95% Jackknife
Mercury	30	9	0.0142	0.409	Nonparametric	0.0945	95% KM (Chebyshev)
Perchlorate	30	3	0.0051(U)	0.026	n/a*	0.026	Maximum detected concentration
Selenium	30	30	1.2	3.3	Gamma	1.97	95% Adjusted Gamma
Organic Chemicals (mg/kg)							
Acenaphthene	30	1	0.061	0.45(U)	n/a	0.061	Maximum detected concentration
Benzene	15	5	0.0003	0.0073(U)	Normal	0.000675	95% KM (t)
Bis(2-ethylhexyl)phthalate	30	3	0.053	0.48(U)	n/a	0.093	Maximum detected concentration
Di-n-butylphthalate	30	1	0.14	0.48(U)	n/a	0.14	Maximum detected concentration
Dichlorobenzene[1,3-]	30	1	0.00038	0.45(U)	n/a	0.00038	Maximum detected concentration
Diethylphthalate	30	1	0.059	0.48(U)	n/a	0.059	Maximum detected concentration
HMX	30	11	0.039	7.5	Gamma	1.7	95% Gamma Adjusted KM
Isopropyltoluene[4-]	15	2	0.004	0.0058(U)	n/a	0.0052	Maximum detected concentration
RDX	30	1	0.25	0.44(UJ)	n/a	0.25	Maximum detected concentration
TATB	30	12	0.1	3.6	Normal	0.741	95% KM (t)
Toluene	15	5	0.0014	0.0073(U)	Normal	0.00239	95% KM (t)
Trichloroethene	15	2	0.0009	0.0073(U)	n/a	0.00091	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-134	30	1	−0.064(U)	0.082(U)	n/a	0.051	Maximum detected concentration
Cesium-137	30	15	−0.038(U)	0.593	Normal	0.182	95% KM (t)
Strontium-90	30	2	-0.113(U)	0.71	n/a	0.71	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-3
EPCs at SWMU 14-002(c) for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Perchlorate	2	1	0.0054(U)	0.0056	n/a*	0.0056	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-4
EPCs at SWMU 14-002(c) for the Construction Worker and Residential Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	12	12	6770	19,300	Normal	15,300	95% Student’s-t
Barium	12	12	71.4	247	Normal	206	95% Student’s-t
Cobalt	12	12	2.1	8.5	Normal	6.9	95% Student’s-t
Copper	12	12	3.5	12	Normal	8.72	95% Student’s-t
Lead	12	12	14.7	80.6	Normal	39	95% Student’s-t
Nickel	12	12	4.8	11.9	Normal	9.99	95% Student’s-t
Nitrate	12	12	0.19	71.8	Nonparametric	33.6	95% Chebyshev (Mean, Sd)
Perchlorate	12	6	0.0032	0.0097	Normal	0.0053	95% KM (t)
Selenium	12	12	0.92	3.2	Normal	1.97	95% Student’s-t
Zinc	12	12	23.2	516	Gamma	190	95% Adjusted Gamma
Organic Chemicals (mg/kg)							
Acetone	10	1	0.0082(U)	0.082	n/a*	0.082	Maximum detected concentration
Chloroform	10	1	0.0016	0.0056(U)	n/a	0.0016	Maximum detected concentration
Di-n-butylphthalate	12	2	0.12	0.36(U)	n/a	0.14	Maximum detected concentration
Dichlorobenzene[1,4-]	12	1	0.0052(U)	0.36(U)	n/a	0.0072	Maximum detected concentration
Dichloroethene[1,1-]	10	1	0.0021	0.0056(U)	n/a	0.0021	Maximum detected concentration

Table G-2.3-4 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Diethylphthalate	12	1	0.092	0.37(U)	n/a	0.092	Maximum detected concentration
Ethylbenzene	10	1	0.0011	0.0056(U)	n/a	0.0011	Maximum detected concentration
HMX	12	1	0.097	0.11(U)	n/a	0.097	Maximum detected concentration
Methylene chloride	10	3	0.0023	0.019	n/a	0.019	Maximum detected concentration
RDX	12	1	0.31(U)	1.2	n/a	1.2	Maximum detected concentration
Toluene	10	1	0.0017	0.0056(U)	n/a	0.0017	Maximum detected concentration
Trichlorofluoromethane	10	1	0.0023	0.011(U)	n/a	0.0023	Maximum detected concentration
Xylene (total)	10	1	0.0023	0.0056(U)	n/a	0.0023	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.
* n/a = Not applicable.

Table G-2.3-5
EPCs at SWMU 14-002(c) for Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Lead	8	8	14.7	42	Nonparametric	32.7	95% Student's-t
Selenium	8	8	0.92	1.7	Normal	1.49	95% Student's-t
Zinc	8	8	23.2	516	Nonparametric	214	95% Jackknife
Organic Chemicals (mg/kg)							
Acetone	6	1	0.0082(U)	0.082	n/a*	0.082	Maximum detected concentration
Chloroform	6	1	0.0016	0.0056(U)	n/a	0.0016	Maximum detected concentration
Di-n-butylphthalate	8	2	0.12	0.36(U)	n/a	0.14	Maximum detected concentration
Dichlorobenzene[1,4-]	8	1	0.0052(U)	0.36(U)	n/a	0.0072	Maximum detected concentration
Dichloroethene[1,1-]	6	1	0.0021	0.0056(U)	n/a	0.0021	Maximum detected concentration
Ethylbenzene	6	1	0.0011	0.0056(U)	n/a	0.0011	Maximum detected concentration
HMX	8	1	0.097	0.11(U)	n/a	0.097	Maximum detected concentration

Table G-2.3-5 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Methylene chloride	6	2	0.0029	0.019	n/a	0.019	Maximum detected concentration
RDX	8	1	0.32(U)	1.2	n/a	1.2	Maximum detected concentration
Toluene	6	1	0.0017	0.0056(U)	n/a	0.0017	Maximum detected concentration
Trichlorofluoromethane	6	1	0.0023	0.011(U)	n/a	0.0023	Maximum detected concentration
Xylene (total)	6	1	0.0023	0.0056(U)	n/a	0.0023	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-6
EPCs at SWMU 14-003 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	25	25	6070	42,000	Nonparametric	22,900	95% Chebyshev (Mean, Sd)
Antimony	25	4	0.17(U)	13(U)	n/a*	0.28	Maximum detected concentration
Barium	25	25	157	1800	Nonparametric	646	95% Chebyshev (Mean, Sd)
Beryllium	25	25	0.607	2.1	Lognormal	1.2	95% Student's-t
Chromium (total)	25	25	5.82	21	Gamma	10.9	95% Adjusted Gamma
Cobalt	25	25	5.16	9.4	Normal	6.87	95% Student's-t
Iron	25	25	8110	22,000	Normal	14,100	95% Student's-t
Nickel	25	25	5.65	17	Lognormal	9.43	95% Student's-t
Perchlorate	13	1	0.0022	0.0055(U)	n/a	0.0022	Maximum detected concentration
Selenium	25	2	0.225(U)	2.1(U)	n/a	1.2	Maximum detected concentration
Silver	25	15	0.036	2.6(U)	Lognormal	0.478	95% BCA Bootstrap
Vanadium	25	25	17.5	32	Normal	24.8	95% Student's-t

Table G-2.3-6 (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-]	25	2	0.045	0.25(U)	n/a	0.107	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	13	2	0.055	0.36(U)	n/a	0.079	Maximum detected concentration
HMX	25	1	0.052	2.2(U)	n/a	0.052	Maximum detected concentration
PETN	13	1	0.13	0.22(U)	n/a	0.13	Maximum detected concentration
TATB	13	3	0.11	0.44(UJ)	n/a	0.16	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	13	13	9.57E-10	2.18E-07	Gamma	1.56E-07	95% Adjusted Gamma
TNT	25	1	0.085(U)	0.25(U)	n/a	0.131	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-7
EPCs at SWMU 14-003 for the Construction Worker and Residential Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	38	38	6070	42,000	Nonparametric	17,300	95% Student’s-t
Antimony	38	8	0.14	13(U)	Normal	0.18	95% KM (t)
Arsenic	38	38	1.61	5.5	Normal	3.31	95% Student’s-t
Barium	38	38	135	1800	Nonparametric	500	95% Chebyshev (Mean, Sd)
Beryllium	38	38	0.607	2.1	Lognormal	1.16	95% Student’s-t
Chromium (total)	38	38	5.82	21	Nonparametric	10.3	95% Student’s-t
Cobalt	38	38	3.6	9.4	Normal	6.42	95% Student’s-t
Copper	38	38	4.94	12.3	Lognormal	7.73	95% Student’s-t
Iron	38	38	8110	22,000	Normal	13,900	95% Student’s-t
Lead	38	37	0.789(U)	18	Normal	14.5	95% KM (t)

Table G-2.3-7 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Manganese	38	38	232	566	Normal	413	95% Student’s-t
Nickel	38	38	5.65	17	Nonparametric	8.89	95% Student’s-t
Perchlorate	26	4	0.0022	0.029	n/a*	0.029	Maximum detected concentration
Selenium	38	6	0.225(U)	2.1(U)	Normal	0.655	95% KM (t)
Silver	38	28	0.028	2.6(U)	Nonparametric	0.506	95% KM (Chebyshev)
Vanadium	38	38	15.6	32	Normal	23.5	95% Student’s-t
Organic Chemicals (mg/kg)							
Amino-4,6-dinitrotoluene[2-]	38	2	0.045	0.25(U)	n/a	0.107	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	26	2	0.055	0.37(U)	n/a	0.079	Maximum detected concentration
HMX	38	2	0.052	2.2(U)	n/a	0.13	Maximum detected concentration
Methylene chloride	13	4	0.0028	0.0057(U)	n/a	0.0033	Maximum detected concentration
PETN	26	1	0.13	0.23(U)	n/a	0.13	Maximum detected concentration
TATB	26	3	0.11	0.45(UJ)	n/a	0.16	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	26	26	5.37E-10	2.18E-07	Gamma	8.21E-08	95% Adjusted Gamma
TNT	38	1	0.085(U)	0.25(U)	n/a	0.131	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-134	26	1	−0.129(U)	0.064(U)	n/a	0.052	Maximum detected concentration
Cesium-137	26	6	−0.04(U)	0.328	Normal	0.0574	95% KM (t)

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-8
EPCs at SWMU 14-003 for Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	36	8	0.14	13(U)	Normal	0.18	95% KM (t)
Arsenic	36	36	1.61	5.5	Normal	3.35	95% Student's-t
Barium	36	36	138	1800	Nonparametric	519	95% Chebyshev (Mean, Sd)
Beryllium	36	36	0.607	2.1	Lognormal	1.18	95% Student's-t
Chromium (total)	36	36	5.82	21	Lognormal	10.4	95% Student's-t
Cobalt	36	36	4.1	9.4	Normal	6.54	95% Student's-t
Copper	36	36	4.94	12.3	Lognormal	7.84	95% Student's-t
Iron	36	36	8110	22,000	Normal	13,900	95% Student's-t
Lead	36	35	0.789(U)	18	Normal	14.7	95% KM (t)
Manganese	36	36	260	566	Normal	420	95% Student's-t
Nickel	36	36	5.65	17	Nonparametric	9.01	95% Student's-t
Selenium	36	6	0.225(U)	2.1(U)	Normal	0.661	95% KM (t)
Silver	36	26	0.028	2.6(U)	Nonparametric	0.537	95% KM (Chebyshev)
Vanadium	36	36	17.5	32	Gamma	23.8	95% Adjusted Gamma
Organic Chemicals (mg/kg)							
Amino-4,6-dinitrotoluene[2-]	36	2	0.045	0.25(U)	n/a*	0.107	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	24	2	0.055	0.37(U)	n/a	0.079	Maximum detected concentration
HMX	36	2	0.052	2.2(U)	n/a	0.13	Maximum detected concentration
Methylene chloride	11	4	0.0028	0.0057(U)	n/a	0.0033	Maximum detected concentration
PETN	24	1	0.13	0.23(U)	n/a	0.13	Maximum detected concentration
TATB	24	3	0.11	0.45(UJ)	n/a	0.16	Maximum detected concentration
TCDD[2,3,7,8-] equivalent	24	24	5.37E-10	2.18E-07	Gamma	8.27E-08	95% Adjusted Gamma
TNT	36	1	0.085(U)	0.25(U)	n/a	0.131	Maximum detected concentration

Table G-2.3-8 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Radionuclides (pCi/g)							
Cesium-134	24	1	−0.129(U)	0.064(U)	n/a	0.052	Maximum detected concentration
Cesium-137	24	6	−0.04(U)	0.328	Normal	0.0652	95% KM (t)

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-9

EPCs at SWMU 14-006 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Copper	4	4	9.1	39.6	n/a*	39.6	Maximum detected concentration
Lead	4	4	12.7	46.5	n/a	46.5	Maximum detected concentration
Mercury	4	4	0.0233	0.234	n/a	0.234	Maximum detected concentration
Perchlorate	4	3	0.0059(U)	0.018	n/a	0.018	Maximum detected concentration
Selenium	4	4	1.3	2.2	n/a	2.2	Maximum detected concentration
Zinc	4	4	38.6	151	n/a	151	Maximum detected concentration
Organic Chemicals (mg/kg)							
Amino-2,6-dinitrotoluene[4-]	4	1	0.11(U)	0.16	n/a	0.16	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	4	1	0.11(U)	0.17	n/a	0.17	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	4	1	0.075	0.39(U)	n/a	0.075	Maximum detected concentration
Dibenzofuran	4	2	0.049	1.1	n/a	1.1	Maximum detected concentration
HMX	4	4	0.25	1.7	n/a	1.7	Maximum detected concentration
RDX	4	2	0.12	2.6	n/a	2.6	Maximum detected concentration
TATB	4	4	2.3	13	n/a	13	Maximum detected concentration
TNT	4	3	0.11(UJ)	0.83	n/a	0.83	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-10
EPCs at SWMU 14-006 for the Construction Worker and Residential Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	22	22	1550	15,700	Normal	10,600	95% Student’s-t
Arsenic	22	22	0.97	7.7	Normal	3.84	95% Student’s-t
Barium	22	22	20.3	280	Gamma	126	95% Adjusted Gamma
Beryllium	22	21	0.27(U)	1.5	Normal	0.969	95% KM (t)
Chromium (total)	22	22	2.1	10.8	Normal	7.06	95% Student’s-t
Copper	22	22	2.1	82.5	Lognormal	18.9	95% Standard Bootstrap
Lead	22	22	3	154	Lognormal	33.6	95% Standard Bootstrap
Mercury	22	17	0.0142	0.234	Gamma	0.0685	95% KM Adjusted Gamma
Nickel	22	22	2.3	11.4	Normal	7.05	95% Student’s-t
Perchlorate	22	13	0.0034	0.066	Gamma	0.0211	95% KM Adjusted Gamma
Selenium	22	22	1.3	5.5	Normal	2.71	95% Student’s-t
Vanadium	22	22	3.1	22.7	Normal	15.1	95% Student’s-t
Zinc	22	22	19.7	151	Lognormal	55	95% Standard Bootstrap
Organic Chemicals (mg/kg)							
Amino-2,6-dinitrotoluene[4-]	22	2	0.068	0.16	n/a*	0.16	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	22	2	0.083	0.17	n/a	0.17	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	22	4	0.075	1.5	n/a	1.5	Maximum detected concentration
Dibenzofuran	22	3	0.049	1.1	n/a	1.1	Maximum detected concentration
HMX	22	20	0.086	1.8	Gamma	0.896	95% KM Adjusted Gamma
PETN	22	1	0.21(U)	1.7	n/a	1.7	Maximum detected concentration
RDX	22	2	0.12	2.6	n/a	2.6	Maximum detected concentration
TATB	22	16	0.11	13	Gamma	4.07	95% Gamma Adjusted KM

Table G-2.3-10 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
TNT	22	6	0.045	0.83	Normal	0.219	95% KM (t)
Radionuclides (pCi/g)							
Strontium-90	22	2	−0.116(U)	0.38	n/a	0.38	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-11
EPCs at SWMU 14-006 for Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Arsenic	14	14	1.5	7.7	Normal	4.46	95% Student’s-t
Barium	14	14	20.3	280	Gamma	124	95% Adjusted Gamma
Beryllium	14	14	0.33	1.5	Normal	1.02	95% Student’s-t
Chromium (total)	14	14	2.7	10.1	Normal	7.48	95% Student’s-t
Copper	14	14	2.1	82.5	Lognormal	42.4	95% Chebyshev (Mean, Sd)
Lead	14	14	3	154	Gamma	47.7	95% Adjusted Gamma
Mercury	14	10	0.0142	0.234	Gamma	0.0983	95% KM Adjusted Gamma
Nickel	14	14	2.3	9.6	Normal	7	95% Student’s-t
Selenium	14	14	1.3	5.5	Normal	2.91	95% Student’s-t
Zinc	14	14	23.5	151	Nonparametric	101	95% Chebyshev (Mean, Sd)
Organic Chemicals (mg/kg)							
Amino-2,6-dinitrotoluene[4-]	14	2	0.068	0.16	n/a*	0.16	Maximum detected concentration
Amino-4,6-dinitrotoluene[2-]	14	2	0.083	0.17	n/a	0.17	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	14	3	0.075	1.5	n/a	1.5	Maximum detected concentration
Dibenzofuran	14	3	0.049	1.1	n/a	1.1	Maximum detected concentration

Table G-2.3-11 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
HMX	14	13	0.1(UJ)	1.7	Normal	0.905	95% KM (t)
RDX	14	2	0.12	2.6	n/a	2.6	Maximum detected concentration
TATB	14	10	0.11	13	Gamma	5.98	95% KM Bootstrap t
TNT	14	5	0.045	0.83	Normal	0.263	95% KM (t)
Radionuclides (pCi/g)							
Strontium-90	14	1	−0.116(U)	0.33	n/a	0.33	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-12
EPCs at SWMU 14-007 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Mercury	13	4	0.0134	0.236	n/a*	0.236	Maximum detected concentration
Perchlorate	13	1	0.0027	0.0057(U)	n/a	0.0027	Maximum detected concentration
Selenium	13	13	0.91	1.6	Normal	1.35	95% Student’s-t
Silver	13	13	0.042	24.2	Nonparametric	14.2	95% Chebyshev(Mean, Sd)
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	13	2	0.062	0.42	n/a	0.42	Maximum detected concentration
TATB	13	6	0.093	1.3	Normal	0.526	95% KM (t)

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-13
EPCs at SWMU 14-007 for the Construction Worker and Residential Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	52	52	3740	28,200	Normal	15,300	95% Student’s-t
Arsenic	52	52	2.1	4.2	Normal	3.17	95% Student’s-t
Barium	52	52	45.9	293	Nonparametric	196	95% Student’s-t
Beryllium	52	52	0.35	1.7	Normal	1.15	95% Student’s-t
Chromium (total)	52	52	3.4	11.9	Normal	9.23	95% Student’s-t
Cobalt	52	52	1.5	15.8	Nonparametric	5.9	95% Student’s-t
Copper	52	52	2.5	9.1	Normal	6.94	95% Student’s-t
Iron	52	52	9300	17,400	Normal	13,700	95% Student’s-t
Lead	52	52	5.1	21.9	Normal	13.9	95% Student’s-t
Mercury	52	25	0.0134	0.259	Nonparametric	0.0629	95% KM (Chebyshev)
Nickel	52	52	3.3	11.9	Normal	8.58	95% Student’s-t
Perchlorate	52	16	0.0023	0.0071	Gamma	0.00381	95% KM Approximate Gamma
Selenium	52	52	0.5	2.2	Normal	1.49	95% Student’s-t
Silver	52	52	0.031	24.2	Nonparametric	4.83	95% Chebyshev (Mean, Sd)
Vanadium	52	52	6.5	29	Nonparametric	21.5	95% Student’s-t
Organic Chemicals (mg/kg)							
Acenaphthene	52	1	0.074	0.4(U)	n/a*	0.074	Maximum detected concentration
Acetone	39	10	0.0073	0.024(UJ)	Normal	0.00876	95% KM (t)
Bis(2-ethylhexyl)phthalate	52	5	0.062	0.71	Normal	0.24	95% KM (t)
Dichlorobenzene[1,3-]	52	1	0.00034	0.38(U)	n/a	0.00034	Maximum detected concentration
HMX	52	1	0.054	0.12(U)	n/a	0.054	Maximum detected concentration
Isopropyltoluene[4-]	39	1	6.00E-04	0.0061(U)	n/a	0.0006	Maximum detected concentration

Table G-2.3-13 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Methylene chloride	39	9	0.0031	0.0061(U)	Normal	0.00385	95% KM (t)
TATB	52	12	0.075	3.6	Gamma	0.445	95% KM Approximate Gamma
Trichloroethene	39	2	0.00093(U)	0.0061(U)	n/a	0.001	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-137	52	8	−0.04(U)	0.243	Normal	0.0173	95% KM (t)
Strontium-90	52	3	−0.15(U)	0.52	n/a	0.52	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-14
EPCs at SWMU 14-007 for Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Arsenic	34	34	2.4	4.2	Nonparametric	3.35	95% Student’s-t
Barium	34	34	162	293	Normal	216	95% Student’s-t
Beryllium	34	34	0.9	1.6	Normal	1.21	95% Student’s-t
Chromium (total)	34	34	8.1	11.9	Gamma	9.65	95% Adjusted Gamma
Cobalt	34	34	4.4	15.8	Nonparametric	6.75	95% Student’s-t
Copper	34	34	5.4	9.1	Nonparametric	7.46	95% Student’s-t
Lead	34	34	11.6	21.9	Normal	15.6	95% Student's-t
Mercury	34	16	0.0134	0.259	Nonparametric	0.0841	95% KM (Chebyshev)
Nickel	34	34	7.1	11.8	Normal	8.92	95% Student’s-t
Selenium	34	34	0.91	1.8	Normal	1.36	95% Student’s-t
Silver	34	34	0.042	24.2	Nonparametric	7.13	95% Chebyshev (Mean, Sd)
Vanadium	34	34	19.6	29	Lognormal	23.6	95% Student’s-t

Table G-2.3-14 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Acenaphthene	34	1	0.074	0.38(U)	n/a*	0.074	Maximum detected concentration
Acetone	21	9	0.0073	0.022(UJ)	Normal	0.00922	95% KM (t)
Bis(2-ethylhexyl)phthalate	34	2	0.062	0.42	n/a	0.42	Maximum detected concentration
Dichlorobenzene[1,3-]	34	1	0.00034	0.38(U)	n/a	0.00034	Maximum detected concentration
HMX	34	1	0.054	0.11(U)	n/a	0.054	Maximum detected concentration
Isopropyltoluene[4-]	21	1	6.00E-04	0.0057(U)	n/a	0.0006	Maximum detected concentration
Methylene chloride	21	9	0.0031	0.0057(U)	Normal	0.00385	95% KM (t)
TATB	34	8	0.093	3.6	Gamma	0.659	95% Gamma Adjusted KM
Radionuclides (pCi/g)							
Cesium-137	34	8	−0.04(U)	0.243	Normal	0.0463	95% KM (t)
Strontium-90	34	3	−0.12(U)	0.52	n/a	0.52	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-15
EPCs at SWMU 14-009 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Arsenic	17	17	1.5	4.5	Normal	2.93	95% Student’s-t
Copper	17	17	4.7	77.8	Lognormal	24.3	95% Jackknife
Lead	17	17	8.7	60.2	Normal	33.5	95% Student’s-t
Mercury	17	13	0.0161	0.629	Nonparametric	0.242	95% KM (Chebyshev)
Nickel	17	17	2.9	24.7	Gamma	9.15	95% Adjusted Gamma
Selenium	17	17	0.78	2.4	Normal	1.71	95% Student's-t
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	17	1	0.057	0.41(U)	n/a*	0.057	Maximum detected concentration
Di-n-butylphthalate	17	4	0.052	0.4(U)	n/a	0.16	Maximum detected concentration
Dinitrotoluene[2,4-]	17	1	0.11(U)	0.16	n/a	0.16	Maximum detected concentration
HMX	17	8	0.039	200	Normal	47.4	95% KM (t)
Nitrosodiphenylamine[N-]	17	1	0.096	0.41(UJ)	n/a	0.096	Maximum detected concentration
PETN	17	1	0.21(U)	0.43	n/a	0.43	Maximum detected concentration
RDX	17	3	0.15	0.37(UJ)	n/a	0.31	Maximum detected concentration
TATB	9	4	0.12	20	n/a	20	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	17	17	0.436	21	Lognormal	8.11	95% Chebyshev (Mean, Sd)
Uranium-235/236	17	7	0.0099(U)	2.79	Gamma	1.09	95% Gamma Adjusted KM
Uranium-238	17	17	0.569	162	Nonparametric	57.9	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-16
EPCs at SWMU 14-009 for the Construction Worker and Residential Scenarios

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	34	34	1590	16,200	Gamma	7870	95% Adjusted Gamma
Antimony	34	22	0.073	23.8	Nonparametric	4	95% KM (Chebyshev)
Arsenic	34	34	1.3	4.5	Normal	2.54	95% Student's-t
Barium	34	34	7.5	185	Normal	94	95% Student's-t
Chromium (total)	34	34	1.5	49.6	Lognormal	9.45	95% Jackknife
Copper	34	34	1.8	77.8	Lognormal	17.8	95% Jackknife
Lead	34	34	1.9	60.2	Gamma	26.9	95% Adjusted Gamma
Mercury	34	21	0.0127	0.629	Nonparametric	0.155	95% KM (Chebyshev)
Nickel	34	34	2.2	50.6	Lognormal	9.39	95% Jackknife
Selenium	34	34	0.78	2.8	Normal	1.77	95% Student's-t
Vanadium	34	34	3.3	25.2	Gamma	14.6	95% Adjusted Gamma
Organic Chemicals (mg/kg)							
Acetone	17	6	0.0067	0.024(UJ)	Normal	0.00877	95% KM (t)
Bis(2-ethylhexyl)phthalate	34	1	0.057	0.41(U)	n/a*	0.057	Maximum detected concentration
Di-n-butylphthalate	34	5	0.052	0.4(U)	Nonparametric	0.161	95% KM (t)
Dinitrotoluene[2,4-]	34	1	0.1(U)	0.16	n/a	0.16	Maximum detected concentration
Hexanone[2-]	17	1	0.011	0.024(U)	n/a	0.011	Maximum detected concentration
HMX	34	16	0.039	370	Gamma	75.1	95% Gamma Adjusted KM
Nitrosodiphenylamine[N-]	34	1	0.096	0.41(UJ)	n/a	0.096	Maximum detected concentration
PETN	34	1	0.2(U)	0.43	n/a	0.43	Maximum detected concentration
RDX	34	5	0.15	0.94	Normal	0.262	95% KM (t)
TATB	18	8	0.12	20	Normal	7.27	95% KM (t)

Table G-2.3-16 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Radionuclides (pCi/g)							
Cesium-137	34	8	−0.05(U)	0.964	Gamma	0.27	95% KM Adjusted Gamma
Strontium-90	34	7	−0.09(U)	1.3	Nonparametric	0.311	95% KM (Chebyshev)
Uranium-234	34	34	0.272	21	Nonparametric	4.75	95% Chebyshev (Mean, Sd)
Uranium-235/236	34	12	0(U)	2.79	Gamma	0.505	95% Gamma Adjusted KM
Uranium-238	34	34	0.193	162	Nonparametric	31.9	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-17
EPCs at SWMU 14-009 for Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	33	21	0.073	23.8	Nonparametric	4.12	95% KM (Chebyshev)
Arsenic	33	33	1.3	4.5	Normal	2.52	95% Student's-t
Barium	33	33	7.5	185	Normal	90.3	95% Student's-t
Chromium (total)	33	33	1.5	49.6	Lognormal	9.38	95% Jackknife
Copper	33	33	1.8	77.8	Lognormal	18.1	95% Jackknife
Lead	33	33	1.9	60.2	Gamma	27.3	95% Adjusted Gamma
Mercury	33	21	0.0127	0.629	Nonparametric	0.159	95% KM (Chebyshev)
Nickel	33	33	2.2	50.6	Lognormal	9.42	95% Jackknife
Selenium	33	33	0.78	2.8	Normal	1.79	95% Student's-t
Vanadium	33	33	3.3	25.2	Gamma	14.2	95% Adjusted Gamma

Table G-2.3-17 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg)							
Acetone	16	6	0.0067	0.024(UJ)	Normal	0.00878	95% KM (t)
Bis(2-ethylhexyl)phthalate	33	1	0.057	0.41(U)	n/a*	0.057	Maximum detected concentration
Di-n-butylphthalate	33	5	0.052	0.4(U)	Nonparametric	0.161	95% KM (t)
Dinitrotoluene[2,4-]	33	1	0.1(U)	0.16	n/a	0.16	Maximum detected concentration
Hexanone[2-]	16	1	0.011	0.024(U)	n/a	0.011	Maximum detected concentration
HMX	33	16	0.039	370	Gamma	77.4	95% Gamma Adjusted KM
Nitrosodiphenylamine[N-]	33	1	0.096	0.41(UJ)	n/a	0.096	Maximum detected concentration
PETN	33	1	0.2(U)	0.43	n/a	0.43	Maximum detected concentration
RDX	33	5	0.15	0.94	Normal	0.264	95% KM (t)
TATB	17	8	0.12	20	Normal	7.67	95% KM (t)
Radionuclides (pCi/g)							
Cesium-137	33	8	-0.05(U)	0.964	Gamma	0.271	95% KM Adjusted Gamma
Strontium-90	33	6	-0.09(U)	0.87	Nonparametric	0.213	95% KM (Chebyshev)
Uranium-234	33	33	0.272	21	Nonparametric	4.87	95% Chebyshev (Mean, Sd)
Uranium-235/236	33	11	0(U)	2.79	Gamma	0.523	95% Gamma Adjusted KM
Uranium-238	33	33	0.193	162	Nonparametric	32.9	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-18
EPCs at SWMU 14-010 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Copper	5	5	4.8	53.4	n/a*	53.4	Maximum detected concentration
Lead	5	5	13.4	42.6	n/a	42.6	Maximum detected concentration
Silver	5	5	0.031	2	n/a	2	Maximum detected concentration
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	5	1	0.11	0.4(U)	n/a	0.11	Maximum detected concentration
Di-n-butylphthalate	5	1	0.38(U)	0.46	n/a	0.46	Maximum detected concentration
HMX	11	11	0.039	110	Gamma	52.7	95% Jackknife
RDX	11	1	0.162(U)	0.38	n/a	0.38	Maximum detected concentration
TATB	5	2	0.46(UJ)	14	n/a	14	Maximum detected concentration
TNT	11	3	0.085(U)	0.162	n/a	0.162	Maximum detected concentration
Radionuclides (pCi/g)							
Uranium-234	11	11	0.676	3.4406	Normal	2.1	95% Student's-t
Uranium-235/236	11	5	0.0044(U)	0.322	Normal	0.166	95% KM (t)
Uranium-238	11	11	0.709	24.0455	Gamma	14.8	95% Adjusted Gamma

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-19

EPCs at SWMU 14-010 for the Construction Worker and Residential Scenarios and Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Arsenic	10	10	1.1	5.4	Normal	3.41	95% Student’s-t
Copper	10	10	1.5	53.4	Lognormal	33.9	95% Chebyshev (Mean, Sd)
Lead	10	10	3.6	64.8	Normal	35.2	95% Student’s-t
Selenium	10	10	0.7	2.4	Normal	1.79	95% Student’s-t
Silver	10	10	0.023	2	Nonparametric	1.1	95% Chebyshev (Mean, Sd)
Zinc	10	10	12.6	88.2	Normal	48.5	95% Student’s-t
Organic Chemicals (mg/kg)							
Bis(2-ethylhexyl)phthalate	10	3	0.087	0.4(U)	n/a*	0.15	Maximum detected concentration
Di-n-butylphthalate	10	1	0.35(U)	0.46	n/a	0.46	Maximum detected concentration
HMX	16	15	0.039	110	Gamma	58.1	95% Gamma Adjusted KM
RDX	16	1	0.162(U)	0.38	n/a	0.38	Maximum detected concentration
TATB	10	4	0.43(UJ)	14	n/a	14	Maximum detected concentration
TNT	16	3	0.085(U)	0.162	n/a	0.162	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-137	10	2	−0.013(U)	0.346	n/a	0.346	Maximum detected concentration
Uranium-234	16	16	0.355	3.4406	Normal	1.67	95% Student’s-t
Uranium-235/236	16	5	0.0044(U)	0.322	Normal	0.118	95% KM (t)
Uranium-238	16	16	0.403	24.0455	Lognormal	12.3	95% Chebyshev (Mean, Sd)

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-20
EPCs at AOC C-14-001 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)	5	5	6.9	75.5	n/a*	75.5	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable

Table G-2.3-21
EPCs at AOC C-14-001 for the Construction Worker and Residential Scenarios and Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	10	10	8650	12,500	Normal	11,100	95% Student’s-t
Barium	10	10	80.4	138	Normal	114	95% Student’s-t
Chromium (total)	10	10	6.3	75.5	Nonparametric	45.2	95% Chebyshev (Mean, Sd)
Cobalt	10	10	3.4	6	Normal	5.31	95% Student’s-t
Nickel	10	10	4.6	12.2	Normal	7.96	95% Student’s-t
Selenium	10	10	0.9	1.4	Normal	1.31	95% Student’s-t
Organic Chemicals (mg/kg)							
Benzoic acid	10	1	0.36	1.8(U)	n/a*	0.36	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable

Table G-2.3-22
EPCs at AOC C-14-004 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	6070	9470	n/a*	9470	Maximum detected concentration
Barium	6	6	66.6	171	n/a	171	Maximum detected concentration
Cobalt	6	6	3.5	7.2	n/a	7.2	Maximum detected concentration
Copper	6	6	3.4	8.9	n/a	8.9	Maximum detected concentration
Lead	6	6	12.7	26.5	n/a	26.5	Maximum detected concentration
Perchlorate	6	3	0.0024	0.011	n/a	0.011	Maximum detected concentration
Selenium	6	6	0.82	1.2	n/a	1.2	Maximum detected concentration
Organic Chemicals (mg/kg)							
HMX	6	2	0.046	0.11(UJ)	n/a	0.059	Maximum detected concentration
TATB	6	6	0.34	1.9	n/a	1.9	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-23
EPCs at AOC C-14-004 for the Construction Worker and Residential Scenarios and Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	12	12	2470	15,800	Normal	11,000	95% Student's-t
Barium	12	12	24.1	295	Normal	144	95% Student's-t
Chromium (total)	12	12	2.4	10.9	Normal	7.92	95% Student's-t
Cobalt	12	12	0.86	7.2	Normal	5.2	95% Student's-t
Copper	12	12	1.8	8.9	Normal	6.81	95% Student's-t
Lead	12	12	4.3	26.5	Normal	17.7	95% Student's-t
Nickel	12	12	2.4	8.4	Normal	6.53	95% Student's-t
Perchlorate	12	7	0.0024	0.02	Normal	0.0104	95% KM (t)
Selenium	12	12	0.82	1.6	Normal	1.34	95% Student's-t
Vanadium	12	12	3.9	21.8	Normal	18.2	95% Student's-t
Organic Chemicals (mg/kg)							
Acetone	6	3	0.0073	0.023(UJ)	n/a*	0.014	Maximum detected concentration
HMX	12	2	0.046	0.11(UJ)	n/a	0.059	Maximum detected concentration
TATB	12	10	0.079	1.9	Normal	0.865	95% KM (t)

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-24
EPCs at AOC C-14-005 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Mercury	5	5	0.146	1.37	n/a*	1.37	Maximum detected concentration
Organic Chemicals (mg/kg)							
Fluoranthene	5	1	0.041	0.36(U)	n/a	0.041	Maximum detected concentration
TATB	5	4	0.25	0.77	n/a	0.77	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-25
EPCs at AOC C-14-005 for the Construction Worker and Residential Scenarios and Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Mercury	10	10	0.0193	1.37	Gamma	1.32	95% Adjusted Gamma
Perchlorate	10	4	0.0024	0.012	n/a*	0.012	Maximum detected concentration
Selenium	10	10	0.8	1.8	Normal	1.34	95% Student's-t
Organic Chemicals (mg/kg)							
Acetone	5	1	0.022(UJ)	0.076	n/a	0.076	Maximum detected concentration
Fluoranthene	10	1	0.041	0.37(U)	n/a	0.041	Maximum detected concentration
Isopropyltoluene[4-]	5	1	0.0055(U)	0.019	n/a	0.019	Maximum detected concentration
TATB	10	4	0.25	0.77	n/a	0.77	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-26
EPCs at AOC C-14-007 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	5	5	0.14	4.9	n/a*	4.9	Maximum detected concentration
Barium	5	5	52.9	104	n/a	104	Maximum detected concentration
Lead	5	5	15.7	21.9	n/a	21.9	Maximum detected concentration
Selenium	5	5	1.2	1.5	n/a	1.5	Maximum detected concentration
Organic Chemicals (mg/kg)							
Benzo(b)fluoranthene	5	1	0.074	0.44(U)	n/a	0.074	Maximum detected concentration
Chrysene	5	1	0.048	0.44(U)	n/a	0.048	Maximum detected concentration
Fluoranthene	5	1	0.055	0.44(U)	n/a	0.055	Maximum detected concentration
Pyrene	5	1	0.048	0.44(U)	n/a	0.048	Maximum detected concentration
TATB	5	4	0.25	2.8	n/a	2.8	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-27

EPCs at AOC C-14-007 for the Construction Worker and Residential Scenarios and Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	10	10	0.14	4.9	Nonparametric	2.8	95% Chebyshev (Mean, Sd)
Arsenic	10	10	1.9	6.3	Normal	4.84	95% Student’s-t
Barium	10	10	15.7	104	Normal	74.2	95% Student’s-t
Chromium (total)	10	10	4.4	49.3	Normal	25.3	95% Student’s-t
Copper	10	10	3.4	9.7	Normal	7.37	95% Student’s-t
Lead	10	10	3.3	21.9	Normal	17.8	95% Student’s-t
Nickel	10	10	3.8	16.4	Normal	9.27	95% Student’s-t
Perchlorate	10	1	0.0051(U)	0.0067(U)	n/a*	0.0052	Maximum detected concentration
Selenium	10	10	1.2	2.6	Normal	2.15	95% Student’s-t
Organic Chemicals (mg/kg)							
Benzene	5	1	0.0003	0.0055(U)	n/a	0.0003	Maximum detected concentration
Benzo(b)fluoranthene	10	1	0.074	0.44(U)	n/a	0.074	Maximum detected concentration
Butanone[2-]	5	1	0.0058	0.022(UJ)	n/a	0.0058	Maximum detected concentration
Chrysene	10	1	0.048	0.44(U)	n/a	0.048	Maximum detected concentration
Fluoranthene	10	1	0.055	0.44(U)	n/a	0.055	Maximum detected concentration
Isopropyltoluene[4-]	5	2	0.00067	0.0055(U)	n/a	0.0014	Maximum detected concentration
Pyrene	10	1	0.048	0.44(U)	n/a	0.048	Maximum detected concentration
TATB	10	4	0.25	2.8	n/a	2.8	Maximum detected concentration
Toluene	5	1	0.0015	0.0053(U)	n/a	0.0015	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.

* n/a = Not applicable.

Table G-2.3-28
EPCs at AOC C-14-008 for the Industrial Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Selenium	5	5	1.3	1.6	n/a*	1.6	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.
* n/a = Not applicable.

Table G-2.3-29
EPCs at AOC C-14-008 for the Construction Worker and Residential Scenarios and Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	10	10	7200	33,100	Normal	22,900	95% Student's-t
Barium	10	10	111	356	Nonparametric	276	95% Student's-t
Cobalt	10	10	5.2	7.4	Normal	6.8	95% Student's-t
Copper	10	10	4.7	9.3	Normal	8.25	95% Student's-t
Nickel	10	10	5.8	12.5	Normal	10.3	95% Student's-t
Perchlorate	10	1	0.0024	0.0061(U)	n/a*	0.0024	Maximum detected concentration
Selenium	10	10	1.2	2.4	Normal	1.92	95% Student's-t
Vanadium	10	10	20.3	30	Lognormal	25.9	95% Student's-t

Note: Data qualifiers are defined in Appendix A.
* n/a = Not applicable.

Table G-2.3-30
EPCs at AOC C-14-009 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	6650	7550	n/a*	7550	Maximum detected concentration
Barium	5	5	69.7	135	n/a	135	Maximum detected concentration
Copper	5	5	3.7	5.5	n/a	5.5	Maximum detected concentration
Lead	5	5	9.7	42.2	n/a	42.2	Maximum detected concentration
Selenium	5	4	0.36(U)	0.89	n/a	0.89	Maximum detected concentration
Organic Chemicals (mg/kg)							
TATB	5	1	0.42(UJ)	0.57	n/a	0.57	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.
* n/a = Not applicable.

Table G-2.3-31
EPCs at AOC C-14-009 for the Construction Worker and Residential Scenarios and Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Aluminum	10	10	2010	7550	Nonparametric	6720	95% Student's-t
Barium	10	10	28.7	135	Normal	94.3	95% Student's-t
Copper	10	10	2.1	5.5	Normal	4.38	95% Student's-t
Lead	10	10	4.1	66.7	Gamma	40.3	95% Adjusted Gamma
Selenium	10	9	0.36(U)	1.3	Normal	1.07	95% KM (t)
Organic Chemicals (mg/kg)							
Acetone	5	1	0.0088	0.016(U)	n/a*	0.0088	Maximum detected concentration
Chloroform	5	1	0.00045	0.0053(U)	n/a	0.00045	Maximum detected concentration
Methylene chloride	5	4	0.002	0.0043	n/a	0.0043	Maximum detected concentration
TATB	10	1	0.41(UJ)	0.57	n/a	0.57	Maximum detected concentration

Note: Data qualifiers are defined in Appendix A.
* n/a = Not applicable.

Table G-3.2-1
Physical and Chemical Properties of Inorganic COPCs for Cañon de Valle Aggregate Area, TA-14

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
Chromium (total)	850	Insoluble
Cobalt	45	Insoluble
Copper	35	Insoluble
Iron	25	Insoluble
Lead	900	Insoluble
Manganese	65	Insoluble
Mercury	52	Insoluble
Nickel	65	Insoluble
Nitrate	na[c]	Soluble
Perchlorate	na	245
Selenium	5	Insoluble
Silver	8.3	Insoluble
Vanadium	1000	Insoluble
Zinc	62	Insoluble

[a] Information from http://rais.ornl.gov/cgi-bin/tools/TOX_search.

[b] Denotes reference information from http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm.

[c] na = Not available.

Table G-3.2-2
Physical and Chemical Properties of Organic COPCs for Cañon de Valle Aggregate Area, TA-14

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-]	1.22E+03	2.83E+02	1.84E+00	1.07E-05
Amino-4,6-dinitrotoluene[2-]	1.22E+03	2.83E+02	1.84E+00	1.07E-05
Benzene	1.79E+03	1.66E+02	2.13E+00	1.79E+03
Benzo(b)fluoranthene	1.50E-03[b]	8.03E+05	5.78E+00[b]	5.00E-07[b]
Benzoic acid	3.40E+03[b]	1.45E+01	1.87E+00[b]	7.00E-04[b]
Bis(2-ethylhexyl)phthalate	2.70E-01[b]	1.65E+05	7.60E+00[b]	1.42E-07[b]
Butanone[2-]	2.23E+05	3.83E+00	2.90E-01	9.06E+01
Chloroform	7.95E+03	3.18E+01	1.97E+00	1.97E+02
Chrysene	6.30E-03[b]	2.36E+05	5.81E+00[b]	6.23E-09[b]
Di-n-butylphthalate	1.46E+03	4.50E+00	4.70E+00[b]	2.01E-05
Dibenzofuran	3.10E+00	1.13E+04	4.12E+00	2.48E-03
Dichlorobenzene[1,3-]	1.25E+02	3.00E+02	3.53E+00	2.15E+00
Dichlorobenzene[1,4-]	8.13E+01	3.75E+02	3.44E+00	1.74E+00
Dichloroethene[1,1-]	2.42E+03	3.18E+01	2.13E+00	6.34E+02
Diethylphthalate	1.08E+03	1.05E+02	2.42E+00	2.10E-03
Dinitrotoluene[2,4-]	2.00E+02	5.76E+02	1.98E+00	1.47E-04
Ethylbenzene	1.69E+02	5.18E+02	3.15E+00	9.60E+00
Fluoranthene	2.06E-01[c]	7.09E+04[c]	5.16E+00[c]	9.22E-06[c]
Hexanone[2-]	1.75E+04	1.30E+01	1.38E+00	1.16E+01
HMX	9.44E+03[c]	5.32E+02[c]	2.60E-01	3.30E-14[c]
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]
Nitrosodiphenylamine[N-]	3.50E+01	1.20E+03	3.13E+00	1.00E-01
PETN	4.30E+01	6.48E+02	2.38E+00	5.45E-09
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+00[c]	4.10E-09
TATB	na	na	−2.93E+00	8.67E-18
TCDF[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
Trichloroethene	1.28E+03	6.07E+01	2.42E+00	6.90E+01
Trichlorofluoromethane	1.10E+03	4.39E+01	2.53E+00	8.03E+02
TNT	1.15E+02	2.81E+03	1.60E+00	8.02E-06
Xylene (total)	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, 600915).

[d] na = Not available.

Table G-3.2-3
Physical and Chemical Properties of Radionuclide COPCs for Cañon de Valle Aggregate Area, TA-14

COPC	Soil-Water Partition Coefficient, K_d[a] (cm^3/g)	Water Solubility[b] (g/L)
Cesium-134	1000	Insoluble
Cesium-137	1000	Insoluble
Strontium-90	35	Soluble
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 G-3.2-4
TEFs Used for Calculating TCDD-Equivalent Concentrations

Dioxin and Furan Congeners	TEFs*
TCDD[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
TCDF[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 G-4.1-1
Exposure Parameters Used to Calculate Chemical SSLs for the Industrial, Construction Worker, and Residential Scenarios

Parameters	Industrial Values	Construction Worker Values	Residential Values
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	Semivolatile organic compound (SVOC) = 0.1	SVOC = 0.1	SVOC = 0.1
	Chemical-specific	Chemical-specific	Chemical-specific
Adherence factor–child	n/a[a]	n/a	0.2 mg/cm^2
Body weight–child	n/a	(mg/kg-d)$^{-1}$	15 kg (0–6 yr of age)
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	225 d/yr	250 d/yr	350 d/yr
Exposure time	8 h/day	n/a	24 h/d
Exposure duration–child	n/a	n/a	6 yr[b]
Age-adjusted ingestion factor for carcinogens	n/a	n/a	36,750 mg/kg
Age-adjusted ingestion factor for mutagens	n/a	n/a	25,550 mg/kg
Soil ingestion rate–child	n/a	n/a	200 mg/d
Particulate emission factor	6.61×10^9 m^3/kg	2.1×10^6 m^3/kg	6.61×10^9 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	n/a	n/a	2690 cm^2/d
Age-adjusted skin contact factor for carcinogens	n/a	n/a	112,266 mg/kg
Age-adjusted skin contact factor for mutagens	n/a	n/a	166,833 mg/kg
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]	25 yr	1 yr	30 yr[d]
Adherence factor–adult	0.12 mg/cm^2	0.3 mg/cm^2	0.07 mg/cm^2
Soil ingestion rate–adult	100 mg/d	330 mg/d	100 mg/d
Exposed surface area–adult	3470 cm^2/d	3300 cm^2/d	6032 cm^2/d

Note: Parameter values from NMED (2015, 600915).

[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 G-4.1-2
Parameter Values Used to Calculate Radionuclide SALs for the Residential Scenario

Parameters	Residential, Child	Residential, Adult
Inhalation rate (m^3/yr)	4712[a]	7780[b]
Mass loading (g/m^3)	1.5×10^{-7}[c]	1.5×10^{-7}[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 ($1 / 6.6 \times 10^9$ m^3/kg) × 1000 g/kg, where 6.6×10^9 m^3/kg is the particulate emission factor (NMED 2015, 600915).

[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, 600915; 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, 600915).

Table G-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)	1.51×10^{-7}[b]	4.76×10^{-7}[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, 600915).

[c] Calculated as (1 / 2.1×10^6 m^3/kg) x 1000 g/kg, where 2.1×10^6 m^3/kg is the particulate emission factor (NMED 2015, 600915).

[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, 600915).

[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, 600915).

[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, 600915).

[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, 600915).

[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 adult soil-ingestion rate (NMED 2015, 600915).

Table G-4.2-1
Industrial Carcinogenic Screening Evaluation for AOC 14-001(g)

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Bis(2-ethylhexyl)phthalate	0.093	1830	5.08E-10
		Total Excess Cancer Risk	**5E-10**

* SSLs from NMED (2015, 600915).

Table G-4.2-2
Industrial Noncarcinogenic Screening Evaluation for AOC 14-001(g)

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Copper	11	51,900	2.12E-04
Mercury	0.0997	389	2.56E-04
Perchlorate	0.0078	908	8.59E-06
Selenium	1.82	6490	2.80E-04
Di-n-butylphthalate	0.14	91,600	1.53E-06
Diethylphthalate	0.059	733,000	8.05E-08
HMX	4.1	63,300	6.48E-05
TATB	1.2	32,000[b,c]	3.75E-05
		HI	**0.0009**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as surrogate based on structural similarity.

Table G-4.2-3
Industrial Radionuclide Screening Evaluation for AOC 14-001(g)

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Cesium-134	0.051	17	0.075
Cesium-137	0.308	41	0.188
		Total Dose	**0.3**

* SALs from LANL (2015, 600929).

Table G-4.2-4
Construction Worker Noncarcinogenic Screening Evaluation for AOC 14-001(g)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Chromium (total)	4.97	134	0.037
Copper	7.18	14,200	0.000506
Mercury	0.0945	20.7	0.00456
Perchlorate	0.026	248	0.000105
Selenium	1.97	1750	0.00112
Acenaphthene	0.061	15,100	4.04E-06
Benzene	0.000675	142	4.75E-06
Bis(2-ethylhexyl)phthalate	0.093	5380	1.73E-05
Di-n-butylphthalate	0.14	26,900	5.20E-06
Dichlorobenzene[1,3-]	0.00038	2500[b]	1.52E-07
Diethylphthalate	0.059	215,000	2.74E-07
HMX	1.7	17,400	9.77E-05
Isopropyltoluene[4-]	0.0052	2740[c]	1.90E-06
RDX	0.25	1010	0.000248
TATB	0.741	8760[d,e]	8.46E-05
Toluene	0.00239	14,000	1.71E-07
		HI	**0.04**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] Dichlorobenzene[1,2-] used as a surrogate based on structural similarity.

[c] Isopropylbenzene used as a surrogate based on structural similarity.

[d] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[e] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-5
Construction Worker Radionuclide Screening Evaluation for AOC 14-001(g)

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Cesium-134	0.051	15	0.085
Cesium-137	0.182	37	0.123
Strontium-90	0.71	1400	0.0127
		Total Dose	**0.2**

* SALs from LANL (2015, 600929).

Table G-4.2-6
Residential Carcinogenic Screening Evaluation for AOC 14-001(g)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Chromium (total)	4.97	96.6	5.14E-07
Benzene	0.000675	17.8	3.79E-10
Bis(2-ethylhexyl)phthalate	0.093	380	2.45E-09
RDX	0.25	60.4	4.14E-08
		Total Excess Cancer Risk	**6E-07**

* SSLs from NMED (2015, 600915).

Table G-4.2-7
Residential Noncarcinogenic Screening Evaluation for AOC 14-001(g)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Copper	7.18	3130	0.00229
Mercury	0.0945	23.5	0.00402
Perchlorate	0.026	54.8	0.000474
Selenium	1.97	391	0.00504
Acenaphthene	0.061	3480	1.75E-05
Di-n-butylphthalate	0.14	6160	2.27E-05
Dichlorobenzene[1,3-]	0.00038	2150[b]	1.77E-07
Diethylphthalate	0.059	49,300	1.20E-06
HMX	1.7	3850	0.000441
Isopropyltoluene[4-]	0.0052	2360[c]	2.20E-06
TATB	0.741	2200[d,e]	0.000337
Toluene	0.00239	5230	4.57E-07
Trichloroethene	0.00091	6.77	0.000134
		HI	**0.01**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] Dichlorobenzene[1,2-] used as a surrogate based on structural similarity.

[c] Isopropylbenzene used as a surrogate based on structural similarity.

[d] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[e] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-8
Residential Radionuclide Screening Evaluation for AOC 14-001(g)

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Cesium-134	0.051	5	0.255
Cesium-137	0.182	12	0.379
Strontium-90	0.71	15	1.18
		Total Dose	**2**

* SALs from LANL (2015, 600929).

Table G-4.2-9
Industrial Noncarcinogenic Screening Evaluation for SWMU 14-002(c)

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	HQ
Perchlorate	0.0056	908	6.17E-06
		HI	**0.000006**

* SSLs from NMED (2015, 600915) unless otherwise noted.

Table G-4.2-10
Construction Worker Carcinogenic Screening Evaluation for SWMU 14-002(c)

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	Cancer Risk
Chloroform	0.0016	134	1.19E-10
Dichlorobenzene[1,4-]	0.0072	746	9.65E-11
Ethylbenzene	0.0011	1770	6.21E-12
		Total Excess Cancer Risk	**2E-10**

* SSLs from NMED (2015, 600915).

Table G-4.2-11
Construction Worker Noncarcinogenic Screening Evaluation for SWMU 14-002(c)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	15,300	41,400	0.37
Barium	206	4390	0.0469
Cobalt	6.9	36.6[b]	0.188
Copper	8.72	14,200	0.000614
Lead	39	800	0.0488
Nickel	9.99	753	0.0133
Nitrate	33.6	566,000	5.94E-05
Perchlorate	0.0053	248	2.14E-05
Selenium	1.97	1750	0.00112
Zinc	190	106,000	0.00179
Acetone	0.082	242,000	3.39E-07
Di-n-butylphthalate	0.14	26,900	5.20E-06
Dichloroethene[1,1-]	0.0021	424	4.95E-06
Diethylphthalate	0.092	215,000	4.28E-07
HMX	0.097	17,400	5.57E-06
Methylene chloride	0.019	1210	1.57E-05
RDX	1.2	1010	0.00119
Toluene	0.0017	14,000	1.21E-07
Trichlorofluoromethane	0.0023	1130	2.04E-06
Xylene (total)	0.0023	753	2.88E-06
		HI	**0.7**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

Table G-4.2-12
Residential Carcinogenic Screening Evaluation for SWMU 14-002(c)

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Chloroform	0.0016	5.9	2.71E-09
Dichlorobenzene[1,4-]	0.0072	32.8	2.22E-09
Ethylbenzene	0.0011	75.1	1.46E-10
RDX	1.2	60.4	1.99E-07
		Total Excess Cancer Risk	**2E-07**

* SSLs from NMED (2015, 600915).

Table G-4.2-13
Residential Noncarcinogenic Screening Evaluation for SWMU 14-002(c)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	15,300	78,000	0.196
Barium	206	15,600	0.0132
Cobalt	6.9	23[b]	0.3
Copper	8.72	3130	0.00278
Lead	39	400	0.0975
Nickel	9.99	1560	0.0064
Nitrate	33.6	125,000	0.000269
Perchlorate	0.0053	54.8	9.67E-05
Selenium	1.97	391	0.00504
Zinc	190	23,500	0.00808
Acetone	0.082	66,300	1.24E-06
Di-n-butylphthalate	0.14	6160	2.27E-05
Dichloroethene[1,1-]	0.0021	440	4.77E-06
Diethylphthalate	0.092	49,300	1.87E-06
HMX	0.097	3850	2.52E-05
Methylene chloride	0.019	409	4.64E-05
Toluene	0.0017	5230	3.25E-07
Trichlorofluoromethane	0.0023	1230	1.87E-06
Xylene (total)	0.0023	871	2.64E-06
		HI	**0.6**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-14
Industrial Carcinogenic Screening Evaluation for SWMU 14-003

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	Cancer Risk
Chromium (total)	10.9	505	2.16E-07
Bis(2-ethylhexyl)phthalate	0.079	1830	4.32E-10
PETN	0.13	5700[b]	2.28E-10
TCDD[2,3,7,8-] equivalent	0.000000156	0.000248	6.29E-09
		Total Excess Cancer Risk	**2E-07**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-15
Industrial Noncarcinogenic Screening Evaluation for SWMU 14-003

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Aluminum	22,900	1,290,000	0.0178
Antimony	0.28	519	0.000539
Barium	646	255,000	0.00253
Beryllium	1.2	2580	0.000465
Cobalt	6.87	350[b]	0.0196
Iron	14,100	908,000	0.0155
Nickel	9.43	25,700	0.000367
Perchlorate	0.0022	908	2.42E-06
Selenium	1.2	6490	0.000185
Silver	0.478	6490	7.36E-05
Vanadium	24.8	6530	0.0038
Amino-4,6-dinitrotoluene[2-]	0.107	2300[b]	4.65E-05
HMX	0.052	63,300	8.21E-07
TATB	0.16	32,000[b,c]	5.00E-06
TNT	0.131	573	0.000229
		HI	**0.06**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-16
Construction Worker Noncarcinogenic Screening Evaluation for SWMU 14-003

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	17,300	41,400	0.418
Antimony	0.18	142	0.00127
Arsenic	3.31	57.4	0.0577
Barium	500	4390	0.114
Beryllium	1.16	148	0.00784
Chromium (total)	10.3	134	0.0769
Cobalt	6.42	36.6[b]	0.175
Copper	7.73	14,200	0.000544
Iron	13,900	248,000	0.056
Lead	14.5	800	0.0181
Manganese	413	464	0.89
Nickel	8.89	753	0.0118
Perchlorate	0.029	248	0.000117

Table G-4.2-16 (continued)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Selenium	0.655	1750	0.000374
Silver	0.506	1770	0.000286
Vanadium	23.5	614	0.0383
Amino-4,6-dinitrotoluene[2-]	0.107	695[b]	0.000154
Bis(2-ethylhexyl)phthalate	0.079	5380	1.47E-05
HMX	0.13	17,400	7.47E-06
Methylene chloride	0.0033	1210	2.73E-06
PETN	0.13	708[b]	0.000184
TATB	0.16	8760[c,d]	1.83E-05
TCDD[2,3,7,8-] equivalent	8.21E-08	0.000226	0.000363
TNT	0.131	161	0.000814
		HI	**2**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915)

[c] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-17
Construction Worker Radionuclide Screening Evaluation for SWMU 14-003

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Cesium-134	0.052	15	0.0867
Cesium-137	0.0574	37	0.0388
		Total Dose	**0.1**

* SALs from LANL (2015, 600929).

Table G-4.2-18
Residential Carcinogenic Screening Evaluation for SWMU 14-003

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Arsenic	3.31	4.25 (6.8)[b]	7.79E-06 (4.87E-06)[c]
Chromium (total)	10.3	96.6	1.07E-06
Bis(2-ethylhexyl)phthalate	0.079	380	2.08E-09
TCDD[2,3,7,8-] equivalent	8.21E-08	0.000049	1.68E-08
		Total Excess Cancer Risk	**9E-06 (6E-06)**[c]

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Based on the EPA regional screening level of 6.8 mg/kg (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-19
Residential Noncarcinogenic Screening Evaluation for SWMU 14-003

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	17,300	78,000	0.222
Antimony	0.18	31.3	0.00575
Barium	500	15,600	0.032
Beryllium	1.16	156	0.00744
Cobalt	6.42	23[b]	0.279
Copper	7.73	3130	0.00247
Iron	13,900	54,800	0.254
Lead	14.5	400	0.0362
Manganese	413	10,500	0.0393
Nickel	8.89	1560	0.0057
Perchlorate	0.029	54.8	0.000529
Selenium	0.655	391	0.00168
Silver	0.506	391	0.00129
Vanadium	23.5	394	0.0596
Amino-4,6-dinitrotoluene[2-]	0.107	150[b]	0.000713
HMX	0.13	3850	3.38E-05
Methylene chloride	0.0033	409	8.07E-06
PETN	0.13	130[b]	0.001
TATB	0.16	2200[b,c]	7.27E-05
TNT	0.131	36	0.00364
		HI	**1**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-20
Residential Radionuclide Screening Evaluation for SWMU 14-003

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Cesium-134	0.052	5	0.26
Cesium-137	0.0574	12	0.12
		Total Dose	**0.4**

* SALs from LANL (2015, 600929).

Table G-4.2-21
Industrial Carcinogenic Screening Evaluation for SWMU 14-006

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Bis(2-ethylhexyl)phthalate	0.075	1830	4.10E-10
RDX	2.6	311	8.36E-08
		Total Excess Cancer Risk	**8E-08**

* SSLs from NMED (2015, 600915).

Table G-4.2-22
Industrial Noncarcinogenic Screening Evaluation for SWMU 14-006

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Copper	39.6	51,900	0.000763
Lead	46.5	800	0.0581
Mercury	0.234	389	0.000602
Perchlorate	0.018	908	1.98E-05
Selenium	2.2	6490	0.000339
Zinc	151	389,000	0.000388
Amino-2,6-dinitrotoluene[4-]	0.16	2300[b]	6.96E-05
Amino-4,6-dinitrotoluene[2-]	0.17	2300[b]	7.39E-05
Dibenzofuran	1.1	1000[b]	0.0011
HMX	1.7	63,300	2.68E-05
TATB	13	32,000[b,c]	0.000406
TNT	0.83	573	0.00145
		HI	**0.06**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-23
Construction Worker Noncarcinogenic Screening Evaluation for SWMU 14-006

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	10,600	41,400	0.256
Arsenic	3.84	57.4	0.0669
Barium	126	4390	0.0287
Beryllium	0.969	148	0.00654
Chromium (total)	7.06	134	0.0527
Copper	18.9	14,200	0.00133
Lead	33.6	800	0.042
Mercury	0.0685	20.7	0.0033
Nickel	7.05	753	0.00936
Perchlorate	0.0211	248	8.51E-05
Selenium	2.71	1750	0.00155
Vanadium	15.1	614	0.0246
Zinc	55	106,000	0.000519
Amino-2,6-dinitrotoluene[4-]	0.16	688[b]	0.000232
Amino-4,6-dinitrotoluene[2-]	0.17	695[b]	0.000245
Bis(2-ethylhexyl)phthalate	1.5	5380	0.000279
Dibenzofuran	1.1	354[b]	0.00311
HMX	0.896	17,400	5.15E-05
PETN	1.7	708[b]	0.0024
RDX	2.6	1010	0.00257
TATB	4.07	8760[c,d]	0.000465
TNT	0.219	161	0.00136
		HI	**0.5**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

[c] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-24
Construction Worker Radionuclide Screening Evaluation for SWMU 14-006

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Strontium-90	0.381	1400	0.00678
		Total Dose	**0.007**

* SALs from LANL (2015, 600929).

Table G-4.2-25
Residential Carcinogenic Screening Evaluation for SWMU 14-006

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Arsenic	3.84	4.25 (6.8)[b]	9.04E-06 (5.65E-06)[c]
Chromium (total)	7.06	96.6	7.31E-07
Bis(2-ethylhexyl)phthalate	1.5	380	3.95E-08
RDX	2.6	60.4	4.30E-07
		Total Excess Cancer Risk	**1E-05 (7E-06)**[c]

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Based on the EPA regional screening level of 6.8 mg/kg (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-26
Residential Noncarcinogenic Screening Evaluation for SWMU 14-006

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	10,600	78,000	0.136
Barium	126	15,600	0.00808
Beryllium	0.969	156	0.00621
Copper	18.9	3130	0.00604
Lead	33.6	400	0.084
Mercury	0.0685	23.5	0.00291
Nickel	7.05	1560	0.00452
Perchlorate	0.0211	54.8	0.000385
Selenium	2.71	391	0.00693
Vanadium	15.1	394	0.0383
Zinc	55	23,500	0.00234
Amino-2,6-dinitrotoluene[4-]	0.16	150[b]	0.00107
Amino-4,6-dinitrotoluene[2-]	0.17	150[b]	0.00113
Dibenzofuran	1.1	73[b]	0.0151
HMX	0.896	3850	0.000233
PETN	1.7	130[b]	0.0131
TATB	4.07	2200[b,c]	0.00185
TNT	0.219	36	0.00608
		HI	**0.3**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-27
Residential Radionuclide Screening Evaluation for SWMU 14-006

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Strontium-90	0.38	15	0.633
		Total Dose	**0.6**

* SALs from LANL (2015, 600929).

Table G-4.2-28
Industrial Carcinogenic Screening Evaluation for SWMU 14-007

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Bis(2-ethylhexyl)phthalate	0.42	1830	2.30E-09
		Total Excess Cancer Risk	**2E-09**

* SSLs from NMED (2015, 600915).

Table G-4.2-29
Industrial Noncarcinogenic Screening Evaluation for SWMU 14-007

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Mercury	0.236	389	0.000607
Perchlorate	0.0027	908	2.97E-06
Selenium	1.35	6490	0.000208
Silver	14.2	6490	0.00219
TATB	0.526	32,000[b,c]	1.64E-05
		HI	**0.003**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-30
Construction Worker Noncarcinogenic Screening Evaluation for SWMU 14-007

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	15,300	41,400	0.37
Arsenic	3.17	57.4	0.0552
Barium	196	4390	0.0446
Beryllium	1.15	148	0.00777
Chromium (total)	9.23	134	0.0689
Cobalt	5.9	36.6[b]	0.161
Copper	6.94	14,200	0.000489
Iron	13,700	248,000	0.0552
Lead	13.9	800	0.0173
Mercury	0.0629	20.7	0.00304
Nickel	8.58	753	0.0114
Perchlorate	0.00381	248	1.54E-05
Selenium	1.49	1750	0.000851
Silver	4.83	1770	0.00273
Vanadium	21.5	614	0.035
Acenaphthene	0.074	15,100	4.90E-06
Acetone	0.00876	242,000	3.62E-08
Bis(2-ethylhexyl)phthalate	0.24	5380	4.46E-05
Dichlorobenzene[1,3-]	0.00034	2500[c]	1.36E-07
HMX	0.054	17,400	3.10E-06
Isopropyltoluene[4-]	0.0006	2740[d]	2.19E-07
Methylene chloride	0.00385	1210	3.18E-06
TATB	0.445	8760[b,e]	5.08E-05
Trichloroethene	0.001	6.9	0.000145
		HI	**0.8**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

[c] Dichlorobenzene[1,2-] used as a surrogate based on structural similarity.

[d] Isopropylbenzene used as a surrogate based on structural similarity.

[e] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-31
Construction Worker Radionuclide Screening Evaluation for SWMU 14-007

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.0173	37	0.0117
Strontium-90	0.52	1400	0.00928
		Total Dose	**0.02**

* SALs from LANL (2015, 600929).

Table G-4.2-32
Residential Carcinogenic Screening Evaluation for SWMU 14-007

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Arsenic	3.17	4.25 (6.8)[b]	7.46E-06 (4.66E-06)[c]
Chromium (total)	9.23	96.6	9.55E-07
Bis(2-ethylhexyl)phthalate	0.24	380	6.32E-09
		Total Excess Cancer Risk	**8E-06 (6E-06)**[c]

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Based on the EPA regional screening level of 6.8 mg/kg (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-33
Residential Noncarcinogenic Screening Evaluation for SWMU 14-007

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	15,300	78,000	0.196
Barium	196	15,600	0.0126
Beryllium	1.15	156	0.00737
Cobalt	5.9	23[b]	0.256
Copper	6.94	3130	0.00222
Iron	13,700	54,800	0.25
Lead	13.9	400	0.0348
Mercury	0.0629	23.5	0.00268
Nickel	8.58	1560	0.0055
Perchlorate	0.00381	54.8	6.95E-05
Selenium	1.49	391	0.00381
Silver	4.83	391	0.0124
Vanadium	21.5	394	0.0546
Acenaphthene	0.074	3480	2.13E-05

Table G-4.2-33 (continued)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Acetone	0.00876	66,300	1.32E-07
Dichlorobenzene[1,3-]	0.00034	2150[c]	1.58E-07
HMX	0.054	3850	1.4E-05
Isopropyltoluene[4-]	0.0006	2360[d]	2.54E-07
Methylene chloride	0.00385	409	9.41E-06
TATB	0.445	2200[b,e]	0.000202
		HI	**0.8**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Dichlorobenzene[1,2-] used as a surrogate based on structural similarity.

[d] Isopropylbenzene used as a surrogate based on structural similarity.

[e] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-34
Residential Radionuclide Screening Evaluation for SWMU 14-007

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.0173	12	0.036
Strontium-90	0.52	15	0.867
		Total Dose	**0.9**

* SALs from LANL (2015, 600929).

Table G-4.2-35
Industrial Carcinogenic Screening Evaluation for SWMU 14-009

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	Cancer Risk
Arsenic	2.93	21.5	1.36E-06
Bis(2-ethylhexyl)phthalate	0.057	1830	3.11E-10
Dinitrotoluene[2,4-]	0.16	82.3	1.94E-08
Nitrosodiphenylamine[N-]	0.096	5240	1.83E-10
PETN	0.43	5700[b]	7.54E-10
RDX	0.31	311	9.97E-09
		Total Excess Cancer Risk	**1E-06**

[a] SSLs from NMED (2015, 600915).

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-36
Industrial Noncarcinogenic Screening Evaluation for SWMU 14-009

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Copper	24.3	51,900	0.000468
Lead	33.5	800	0.0419
Mercury	0.242	389	0.000622
Nickel	9.15	25,700	0.000356
Selenium	1.71	6490	0.000263
Di-n-butylphthalate	0.16	91,600	1.75E-06
HMX	47.4	63,300	0.000749
TATB	20	32,000[b,c]	0.000625
		HI	**0.05**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-37
Industrial Radionuclide Screening Evaluation for SWMU 14-009

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	8.11	3100	0.0654
Uranium-235/236	1.09	160	0.17
Uranium-238	57.9	710	2.04
		Total Dose	**2**

* SALs from LANL (2015, 600929).

Table G-4.2-38
Construction Worker Carcinogenic Screening Evaluation for SWMU 14-009

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	Cancer Risk
Nitrosodiphenylamine[N-]	0.096	37,900	2.53E-11
		Total Excess Cancer Risk	**3E-11**

* SSLs from NMED (2015, 600915).

Table G-4.2-39
Construction Worker Noncarcinogenic Screening Evaluation for SWMU 14-009

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	7870	41,400	0.19
Antimony	4	142	0.0282
Arsenic	2.54	57.4	0.0442
Barium	94	4390	0.0214
Chromium (total)	9.45	134	0.0705
Copper	17.8	14,200	0.00125
Lead	26.9	800	0.0336
Mercury	0.155	20.7	0.00749
Nickel	9.39	753	0.0125
Selenium	1.77	1750	0.00101
Vanadium	14.6	614	0.0238
Acetone	0.00877	242,000	3.62E-08
Bis(2-ethylhexyl)phthalate	0.057	5380	1.06E-05
Di-n-butylphthalate	0.161	26,900	5.98E-06
Dinitrotoluene[2,4-]	0.16	536	0.000298
Hexanone[2-]	0.011	1760[b]	6.25E-06
HMX	75.1	17,400	0.00432
PETN	0.43	708[b]	0.000607
RDX	0.262	1010	0.000259
TATB	7.27	8760[b,c]	0.00083
		HI	**0.4**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-40
Construction Worker Radionuclide Screening Evaluation for SWMU 14-009

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.27	37	0.182
Strontium-90	0.311	1400	0.00555
Uranium-234	4.75	1000	0.119
Uranium-235/236	0.505	130	0.0971
Uranium-238	31.9	470	1.7
		Total Dose	**2**

* SALs from LANL (2015, 600929).

Table G-4.2-41
Residential Carcinogenic Screening Evaluation for SWMU 14-009

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Arsenic	2.54	4.25 (6.8)[b]	5.98E-06 (3.74E-06)[c]
Chromium (total)	9.45	96.6	9.78E-07
Bis(2-ethylhexyl)phthalate	0.057	380	1.50E-09
Dinitrotoluene[2,4-]	0.16	17.1	9.36E-08
Nitrosodiphenylamine[N-]	0.096	1090	8.81E-10
RDX	0.262	60.4	4.34E-08
		Total Excess Cancer Risk	**7E-06 (5E-06)**[c]

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Based on the EPA regional screening level of 6.8 mg/kg (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-42
Residential Noncarcinogenic Screening Evaluation for SWMU 14-009

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	7870	78,000	0.1
Antimony	4	31.3	0.128
Barium	94	15,600	0.00602
Copper	17.8	3130	0.00569
Lead	26.9	400	0.0672
Mercury	0.155	23.5	0.0066
Nickel	9.39	1560	0.00602
Selenium	1.77	391	0.00453
Vanadium	14.6	394	0.037
Acetone	0.00877	66,300	1.32E-07
Di-n-butylphthalate	0.161	6160	2.61E-05
Hexanone[2-]	0.011	200[b]	0.000055
HMX	75.1	3850	0.0195
PETN	0.43	130[b]	0.00331
TATB	7.27	2200[b,c]	0.0033
		HI	**0.4**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-43
Residential Radionuclide Screening Evaluation for SWMU 14-009

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.27	12	0.562
Strontium-90	0.311	15	0.518
Uranium-234	4.75	290	0.409
Uranium-235/236	0.505	42	0.3
Uranium-238	31.9	150	5.32
		Total Dose	**7**

* SALs from LANL (2015, 600929).

Table G-4.2-44
Industrial Carcinogenic Screening Evaluation for SWMU 14-010

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Bis(2-ethylhexyl)phthalate	0.11	1830	6.01E-10
RDX	0.38	311	1.22E-08
		Total Excess Cancer Risk	**1E-08**

* SSLs from NMED (2015, 600915).

Table G-4.2-45
Industrial Noncarcinogenic Screening Evaluation for SWMU 14-010

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Copper	53.4	51,900	0.00103
Lead	42.6	800	0.0532
Silver	2	6490	0.000308
Di-n-butylphthalate	0.46	91,600	5.02E-06
HMX	52.7	63,300	0.000832
TATB	14	32,000 [b,c]	0.000438
TNT	0.162	573	0.000283
		HI	**0.06**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-46
Industrial Radionuclide Screening Evaluation for SWMU 14-010

COPC	EPC (pCi/g)	Industrial SAL* (pCi/g)	Dose (mrem/yr)
Uranium-234	2.1	3100	0.0169
Uranium-235/236	0.166	160	0.0259
Uranium-238	14.8	710	0.521
		Total Dose	**0.6**

* SALs from LANL (2015, 600929).

Table G-4.2-47
Construction Worker Noncarcinogenic Screening Evaluation for SWMU 14-010

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Arsenic	3.41	57.4	0.0594
Copper	33.9	14,200	0.00239
Lead	35.2	800	0.044
Selenium	1.79	1750	0.00102
Silver	1.1	1770	0.000621
Zinc	48.5	106,000	0.000458
Bis(2-ethylhexyl)phthalate	0.15	5380	2.79E-05
Di-n-butylphthalate	0.46	26,900	1.71E-05
HMX	58.1	17,400	0.00334
RDX	0.38	1010	0.000376
TATB	14	8760[b,c]	0.0016
TNT	0.162	161	0.00101
		HI	**0.1**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-48
Construction Worker Radionuclide Screening Evaluation for SWMU 14-010

COPC	EPC (pCi/g)	Construction Worker SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.346	37	0.234
Uranium-234	1.67	1000	0.0418
Uranium-235/236	0.118	130	0.0227
Uranium-238	12.3	470	0.654
		Total Dose	**1**

* SALs from LANL (2015, 600929).

Table G-4.2-49
Residential Carcinogenic Screening Evaluation for SWMU 14-010

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Arsenic	3.41	4.25 (6.8)[b]	8.02E-06 (5.01E-06)[c]
Bis(2-ethylhexyl)phthalate	0.15	380	3.95E-09
RDX	0.38	60.4	6.29E-08
		Total Excess Cancer Risk	**8E-06 (5E-06)**[c]

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Based on the EPA regional screening level of 6.8 mg/kg (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-50
Residential Noncarcinogenic Screening Evaluation for SWMU 14-010

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Copper	33.9	3130	0.0108
Lead	35.2	400	0.088
Selenium	1.79	391	0.00458
Silver	1.1	391	0.00281
Zinc	48.5	23,500	0.00206
Di-n-butylphthalate	0.46	6160	7.47E-05
HMX	58.1	3850	0.0151
TATB	14	2200[b,c]	0.00636
TNT	0.162	36	0.0045
		HI	**0.1**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-51
Residential Radionuclide Screening Evaluation for SWMU 14-010

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.346	12	0.721
Uranium-234	1.67	290	0.144
Uranium-235/236	0.118	42	0.0702
Uranium-238	12.3	150	2.05
		Total Dose	**3**

* SALs from LANL (2015, 600929).

Table G-4.2-52
Industrial Carcinogenic Screening Evaluation for AOC C-14-001

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Chromium (total)	75.5	505	1.5E-06
		Total Excess Cancer Risk	**2E-06**

* SSLs from NMED (2015, 600915).

Table G-4.2-53
Construction Worker Noncarcinogenic Screening Evaluation for AOC C-14-001

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	11,100	41,400	0.268
Barium	114	4390	0.026
Chromium (total)	45.2	134	0.337
Cobalt	5.31	36.6[b]	0.145
Nickel	7.96	753	0.0106
Selenium	1.31	1750	0.000748
Benzoic acid	0.36	1,080,000[b]	3.33E-07
		HI	**0.8**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

Table G-4.2-54
Residential Carcinogenic Screening Evaluation for AOC C-14-001

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Chromium (total)	45.2	96.6	4.68E-06
		Total Excess Cancer Risk	**5E-06**

* SSLs from NMED (2015, 600915).

Table G-4.2-55
Residential Noncarcinogenic Screening Evaluation for AOC C-14-001

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	11,100	78,000	0.142
Barium	114	15,600	0.00731
Cobalt	5.31	23[b]	0.231
Nickel	7.96	1560	0.0051
Selenium	1.31	391	0.00335
Benzoic acid	0.36	250,000[b]	1.44E-06
		HI	**0.4**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-56
Industrial Noncarcinogenic Screening Evaluation for AOC C-14-004

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Aluminum	9470	1,290,000	0.00734
Barium	171	255,000	0.00067
Cobalt	7.2	350[b]	0.0206
Copper	8.9	51,900	0.000171
Lead	26.5	800	0.0331
Perchlorate	0.011	908	1.21E-05
Selenium	1.2	6490	0.000185
HMX	0.059	63,300	9.32E-07
TATB	1.9	32,000[b,c]	5.94E-05
		HI	**0.06**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-57
Construction Worker Noncarcinogenic Screening Evaluation for AOC C-14-004

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	11,000	41,400	0.266
Barium	144	4390	0.0328
Chromium (total)	7.92	134	0.0591
Cobalt	5.2	36.6[b]	0.142
Copper	6.81	14,200	0.00048
Lead	17.7	800	0.0221
Nickel	6.53	753	0.00867
Perchlorate	0.0104	248	4.19E-05
Selenium	1.34	1750	0.000766
Vanadium	18.2	614	0.0296
Acetone	0.014	242,000	5.78E-08
HMX	0.059	17,400	3.39E-06
TATB	0.865	8760[b,c]	9.87E-05
		HI	**0.6**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-58
Residential Carcinogenic Screening Evaluation for AOC C-14-004

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Chromium (total)	7.92	96.6	8.20E-07
		Total Excess Cancer Risk	**8E-07**

* SSLs from NMED (2015, 600915).

Table G-4.2-59
Residential Noncarcinogenic Screening Evaluation for AOC C-14-004

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	11,000	78,000	0.141
Barium	144	15,600	0.00923
Cobalt	5.2	23[b]	0.226
Copper	6.81	3130	0.00218
Lead	17.7	400	0.0442
Nickel	6.53	1560	0.00418
Perchlorate	0.0104	54.8	0.00019
Selenium	1.34	391	0.00343
Vanadium	18.2	394	0.0462
Acetone	0.014	66,300	2.12E-07
HMX	0.059	3850	1.53E-05
TATB	0.865	2200[b,c]	0.000393
		HI	**0.5**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-60
Industrial Noncarcinogenic Screening Evaluation for AOC C-14-005

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Mercury	1.37	389	0.00352
Fluoranthene	0.041	33,700	1.22E-06
TATB	0.77	32,000[b,c]	2.41E-05
		HI	**0.004**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-61
Construction Worker Noncarcinogenic Screening Evaluation for AOC C-14-005

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Mercury	1.32	20.7	0.0638
Perchlorate	0.012	248	4.84E-05
Selenium	1.34	1750	0.000766
Acetone	0.076	242,000	3.14E-07
Fluoranthene	0.041	10,000	4.10E-06
Isopropyltoluene[4-]	0.019	2740[b]	6.93E-06
TATB	0.77	8760[c,d]	8.79E-05
		HI	**0.06**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] Isopropylbenzene used as a surrogate based on structural similarity.

[c] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-62
Residential Noncarcinogenic Screening Evaluation for AOC C-14-005

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Mercury	1.32	23.5	0.0562
Perchlorate	0.012	54.8	0.000219
Selenium	1.34	391	0.00343
Acetone	0.076	66,300	1.15E-06
Fluoranthene	0.041	2320	1.77E-05
Isopropyltoluene[4-]	0.019	2360[b]	8.05E-06
TATB	0.77	2200[c,d]	0.00035
		HI	**0.06**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] Isopropylbenzene used as a surrogate based on structural similarity.

[c] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-63
Industrial Carcinogenic Screening Evaluation for AOC C-14-007

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	Cancer Risk
Benzo(b)fluoranthene	0.074	32.3	2.29E-08
Chrysene	0.048	3230	1.49E-10
Total Excess Cancer Risk			**2E-08**

* SSLs from NMED (2015, 600915).

Table G-4.2-64
Industrial Noncarcinogenic Screening Evaluation for AOC C-14-007

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Antimony	4.9	519	0.00944
Barium	104	255,000	0.000408
Lead	21.9	800	0.0274
Selenium	1.5	6490	0.000231
Fluoranthene	0.055	33,700	1.63E-06
Pyrene	0.048	25,300	1.90E-06
TATB	2.8	32,000[b,c]	8.75E-05
HI			**0.04**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-65
Construction Worker Carcinogenic Screening Evaluation for AOC C-14-007

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	Cancer Risk
Benzo(b)fluoranthene	0.074	240	3.08E-09
Chrysene	0.048	23,100	2.08E-11
Total Excess Cancer Risk			**3E-09**

* SSLs from NMED (2015, 600915).

Table G-4.2-66
Construction Worker Noncarcinogenic Screening Evaluation for AOC C-14-007

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Antimony	2.8	142	0.0197
Arsenic	4.84	57.4	0.0843
Barium	74.2	4390	0.0169
Chromium (total)	25.3	134	0.189
Copper	7.37	14,200	0.000519
Lead	17.8	800	0.0222
Nickel	9.27	753	0.0123
Perchlorate	0.0052	248	2.10E-05
Selenium	2.15	1750	0.00123
Benzene	0.0003	142	2.11E-06
Butanone[2-]	0.0058	91,700	6.32E-08
Fluoranthene	0.055	10,000	5.50E-06
Isopropyltoluene[4-]	0.0014	2740[b]	5.11E-07
Pyrene	0.048	7530	6.37E-06
TATB	2.8	8760[c,d]	0.00032
Toluene	0.0015	14,000	1.07E-07
		HI	**0.3**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] Isopropylbenzene used as a surrogate based on structural similarity.

[c] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-67
Residential Carcinogenic Screening Evaluation for AOC C-14-007

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Arsenic	4.84	4.25 (6.8)[b]	1.14E-05 (7.12E-06)[c]
Chromium (total)	25.3	96.6	2.62E-06
Benzene	0.0003	17.8	1.68E-10
Benzo(b)fluoranthene	0.074	1.53	4.84E-07
Chrysene	0.048	153	3.14E-09
		Total Excess Cancer Risk	**1E-05 (1E-05)**[c]

[a] SSLs from NMED (2015, 600915), unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Based on the EPA regional screening level of 6.8 mg/kg (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-68
Residential Noncarcinogenic Screening Evaluation for AOC C-14-007

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Antimony	2.8	31.3	0.0894
Barium	74.2	15,600	0.00476
Copper	7.37	3130	0.00235
Lead	17.8	400	0.0445
Nickel	9.27	1560	0.00594
Perchlorate	0.0052	54.8	9.49E-05
Selenium	2.15	391	0.0055
Butanone[2-]	0.0058	37,400	1.55E-07
Fluoranthene	0.055	2320	2.37E-05
Isopropyltoluene[4-]	0.0014	2360[b]	5.93E-07
Pyrene	0.048	1740	2.76E-05
TATB	2.8	2200[c,d]	0.00127
Toluene	0.0015	5230	2.87E-07
		HI	**0.2**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] Isopropylbenzene used as a surrogate based on structural similarity.

[c] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[d] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-69
Industrial Noncarcinogenic Screening Evaluation for AOC C-14-008

COPC	EPC (mg/kg)	Industrial SSL* (mg/kg)	HQ
Selenium	1.6	6490	0.000246
		HI	**0.0002**

* SSLs from NMED (2015, 600915) unless otherwise noted.

Table G-4.2-70
Construction Worker Noncarcinogenic Screening Evaluation for AOC C-14-008

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	22,900	41,400	0.553
Barium	276	4390	0.0629
Cobalt	6.8	36.6[b]	0.186
Copper	8.25	14,200	0.000581
Nickel	10.3	753	0.0137
Perchlorate	0.0024	248	9.68E-06
Selenium	1.92	1750	0.0011
Vanadium	25.9	614	0.0422
		HI	**0.9**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] SSLs calculated using toxicity value from EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables) and equation parameters from NMED (2015, 600915).

Table G-4.2-71
Residential Noncarcinogenic Screening Evaluation for AOC C-14-008

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	22,900	78,000	0.293
Barium	276	15,600	0.0177
Cobalt	6.8	23[b]	0.296
Copper	8.25	3130	0.00264
Nickel	10.3	1560	0.0066
Perchlorate	0.0024	54.8	4.38E-05
Selenium	1.92	391	0.00491
Vanadium	25.9	394	0.0657
		HI	**0.7**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table G-4.2-72
Industrial Noncarcinogenic Screening Evaluation for AOC C-14-009

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	HQ
Aluminum	7550	1,290,000	0.00585
Barium	135	255,000	0.000529
Copper	5.5	51,900	0.000106
Lead	42.2	800	0.0528
Selenium	0.89	6490	0.000137
TATB	0.57	32,000[b,c]	1.78E-05
		HI	**0.06**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-73
Construction Worker Carcinogenic Screening Evaluation for AOC C-14-009

COPC	EPC (mg/kg)	Construction Worker SSL* (mg/kg)	Cancer Risk
Chloroform	0.00045	134	3.36E-11
		Total Excess Cancer Risk	**3E-11**

* SSLs from NMED (2015, 600915).

Table G-4.2-74
Construction Worker Noncarcinogenic Screening Evaluation for AOC C-14-009

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Aluminum	6720	41,400	0.162
Barium	94.3	4390	0.0215
Copper	4.38	14,200	0.000308
Lead	40.3	800	0.0504
Selenium	1.07	1750	0.000611
Acetone	0.0088	242,000	3.64E-08
Methylene chloride	0.0043	1210	3.55E-06
TATB	0.57	8760[b,c]	6.51E-05
		HI	**0.2**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.2-75
Residential Carcinogenic Screening Evaluation for AOC C-14-009

COPC	EPC (mg/kg)	Residential SSL* (mg/kg)	Cancer Risk
Chloroform	0.00045	5.9	7.63E-10
		Total Excess Cancer Risk	**8E-10**

* SSLs from NMED (2015, 600915).

Table G-4.2-76
Residential Noncarcinogenic Screening Evaluation for AOC C-14-009

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Aluminum	6720	78,000	0.0862
Barium	94.3	15,600	0.00605
Copper	4.38	3130	0.0014
Lead	40.3	400	0.101
Selenium	1.07	391	0.00274
Acetone	0.0088	66,300	1.33E-07
Methylene chloride	0.0043	409	1.05E-05
TATB	0.57	2200[b,c]	0.000259
		HI	**0.2**

[a] SSLs from NMED (2015, 600915) unless otherwise noted.

[b] EPA regional screening level (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[c] Trinitrobenzene[1,3,5-] used as a surrogate based on structural similarity.

Table G-4.3-1
Residential Noncarcinogenic Screening of Vapor Intrusion for SWMU 14-002(c)

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Acetone	0.082	9880	8.30E-06
Methylene chloride	0.019	31.3	6.07E-04
		HI	**0.0006**

[a] Maximum detected concentration.

[b] Vapor intrusion risk values generated by the Johnson and Ettinger advanced soil model.

Table G-4.3-2
Residential Noncarcinogenic Screening of Vapor Intrusion for SWMU 14-007

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Acetone	0.012	2430	4.94E-06
Dichlorobenzene[1,3-]	0.00034	61.7	5.51E-06
Isopropyltoluene[4-]	0.0006	123[c]	4.87E-06
Methylene chloride	0.0041	185	2.22E-05
Trichloroethene	0.001	0.956	1.05E-03
		HI	**0.001**

[a] Maximum detected concentration.

[b] Vapor intrusion risk values generated by the Johnson and Ettinger advanced soil model.

[c] Isopropylbenzene used as surrogate based on structural similarity.

Table G-4.3-3
Residential Noncarcinogenic Screening of Vapor Intrusion for AOC C-14-005

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Acetone	0.076	9560	7.95E-06
Isopropyltoluene[4-]	0.019	123[c]	1.54E-04
		HI	**0.0002**

[a] Maximum detected concentration.

[b] Vapor intrusion risk values generated by the Johnson and Ettinger advanced soil model.

[c] Isopropylbenzene used as surrogate based on structural similarity.

Table G-4.3-4
Residential Noncarcinogenic Screening of Vapor Intrusion for AOC C-14-009

COPC	EPC[a] (mg/kg)	Vapor Intrusion Risk-Based Concentration[b] (mg/kg)	HQ
Methylene chloride	0.0043	185	2.32E-05
		HI	**0.00002**

[a] Maximum detected concentration.

[b] Vapor intrusion risk values generated by the Johnson and Ettinger advanced soil model.

Table G-4.4-1
Essential Nutrient Screening Assessment

SWMU/ AOC	Scenario	COPC	Maximum Concentration (mg/kg)	SSL (mg/kg)*	Ratio
14-002(c)	Construction worker	Magnesium	2770	1,550,000	0.00179
14-002(c)	Residential	Magnesium	2770	339,000	0.00817
14-003	Construction worker	Calcium	5030	8,850,000	0.000568
14-003	Construction worker	Magnesium	4100	1,550,000	0.00265
14-003	Residential	Calcium	5030	13,000,000	0.000387
14-003	Residential	Magnesium	4100	339,000	0.0121
14-006	Construction worker	Calcium	5610	8,850,000	0.000634
14-006	Construction worker	Magnesium	3140	1,550,000	0.00203
14-006	Residential	Calcium	5610	13,000,000	0.000432
14-006	Residential	Magnesium	3140	339,000	0.00926
14-007	Construction worker	Calcium	6870	8,850,000	0.000776
14-007	Construction worker	Magnesium	3530	1,550,000	0.00228
14-007	Residential	Calcium	6870	13,000,000	0.000528
14-007	Residential	Magnesium	3530	339,000	0.0104
14-009	Construction worker	Calcium	3920	8,850,000	0.000443
14-009	Construction worker	Magnesium	2590	1,550,000	0.00167
14-009	Residential	Calcium	3920	13,000,000	0.000302
14-009	Residential	Magnesium	2590	339,000	0.00764
C-14-001	Construction worker	Calcium	5300	8,850,000	0.000599
C-14-001	Residential	Calcium	5300	13,000,000	0.000408
C-14-004	Construction worker	Calcium	4320	8,850,000	0.000488
C-14-004	Residential	Calcium	4320	13,000,000	0.000332
C-14-007	Construction worker	Calcium	4930	8,850,000	0.000557
C-14-007	Residential	Calcium	4930	13,000,000	0.000379
C-14-008	Construction worker	Calcium	3830	8,850,000	0.000433
C-14-008	Residential	Calcium	3830	13,000,000	0.000295

Note: Calcium and magnesium were not detected above BVs in the 0.0- to 1.0-ft depth interval and are therefore not evaluated for the industrial scenario.

* SSLs from NMED (2015, 600915).

Table G-5.3-1
Ecological Screening Levels for Terrestrial Receptors

COPEC	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Generic Plant (terrestrial autotroph-producer)
Inorganic Chemicals (mg/kg)											
Antimony	46	na*	na	na	na	na	2.6	2.6	2.4	78	11
Arsenic	820	850	120	42	26	18	140	15	32	6.8	18
Barium	41,000	28,000	8600	820	930	1000	2900	1300	1800	330	110
Beryllium	420	na	na	na	na	na	150	18	56	40	2.5
Chromium (total)	1800	1000	200	68	40	28	750	45	110	na	na
Cobalt	5500	2700	720	170	120	96	1600	160	400	na	13
Copper	4000	1300	92	38	22	15	240	38	64	80	70
Lead	3700	630	95	21	16	14	330	72	120	1700	120
Manganese	41,000	69,000	27,000	1400	1900	3100	1800	1500	1400	450	220
Mercury	61	0.29	0.066	0.07	0.022	0.013	20	1.7	3	0.05	34
Nickel	1200	2300	120	160	38	21	440	9.7	20	280	38
Selenium	90	81	4.3	1	0.87	0.75	1.9	0.66	0.83	4.1	0.52
Silver	4300	670	14	11	4.3	2.6	140	14	24	na	560
Vanadium	3300	130	64	8.9	7.6	6.7	1300	140	480	na	60
Zinc	7800	2400	250	350	85	48	1600	98	170	120	160

Table G-5.3-1 (continued)

COPEC	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Generic Plant (terrestrial autotroph-producer)
Organic Chemicals (mg/kg)											
Acenaphthene	25,000	na	na	na	na	na	440	120	160	na	0.25
Acetone	7800	76,000	970	7.5	14	170	1.3	15	1.2	na	na
Amino-2,6-dinitrotoluene[4-]	6400	na	na	na	na	na	290	12	23	18	33
Amino-4,6-dinitrotoluene[2-]	9400	na	na	na	na	na	92	15	24	43	14
Benzene	17,000	na	na	na	na	na	31	47	24	na	na
Benzo(b)fluoranthene	2400	na	na	na	na	na	110	38	52	na	18
Benzoic acid	1800	na	na	na	na	na	3.7	1	1.3	na	na
Bis(2-ethylhexyl)phthalate	380	8.1	0.1	20	0.04	0.02	2400	0.59	1.1	na	na
Butanone[2-]	1,300,000	na	na	na	na	na	380	2600	360	na	na
Chloroform	8200	na	na	na	na	na	15	8.2	8	na	na
Chrysene	110	na	na	na	na	na	5.8	2.4	3.1	na	na
Di-n-butylphthalate	48,000	1.7	0.059	0.39	0.021	0.011	14,000	180	370	na	160
Dibenzofuran	na	na	na	na	na	na	na	na	na	na	6.1
Dichlorobenzene[1,3-]	300	na	na	na	na	na	10	0.73	1.3	na	na
Dichlorobenzene[1,4-]	380	na	na	na	na	na	10	0.88	1.5	1.2	na
Dichloroethene[1,1-]	13,000	na	na	na	na	na	35	11	14	na	na
Diethylphthalate	2,200,000	na	na	na	na	na	7200	3600	3600	na	100
Dinitrotoluene[2,4-]	2000	na	na	na	na	na	66	13	20	18	6

Table G-5.3-1 (continued)

COPEC	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Generic Plant (terrestrial autotroph-producer)
Fluoranthene	3300	na	na	na	na	na	230	22	38	10	na
Hexanone[2-]	5700	320	2	0.47	0.41	0.36	13	5.4	6.1	na	na
HMX	59,000	na	na	na	na	na	340	900	300	16	2700
Methylene chloride	4200	na	na	na	na	na	3	9	2.6	na	1600
PETN	45,000	na	na	na	na	na	100	870	100	na	na
Pyrene	2800	3100	190	71	46	34	99	22	32	10	na
RDX	7000	890	13	2.3	2.4	2.4	31	16	16	8.4	na
TCDD[2,3,7,8-]	0.000083	na	na	na	na	na	0.000043	0.00000029	0.00000058	5	na
Toluene	11,000	na	na	na	na	na	54	23	25	na	200
Trichloroethene	37,000	na	na	na	na	na	150	42	55	na	na
Trichlorofluoromethane	52,000	na	na	na	na	na	1500	52	98	na	na
TNT	26,000	3500	1500	7.6	14	170	96	1000	96	32	62
Xylene (total)	640	12,000	220	90	56	41	6.2	1.4	2	na	100

Table G-5.3-1 (continued)

COPEC	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Generic Plant (terrestrial autotroph-producer)
Radionuclides (pCi/g)											
Cesium-134	730	1000	1000	690	1200	2100	550	1100	1100	1000	700
Cesium-137	1500	3900	4300	1400	2600	4600	1200	2400	2300	2300	1500
Strontium-90	800	2000	2500	340	810	3000	1000	1700	1600	1700	1100
Uranium-234	110,000	260,000	260,000	15,000	31,000	92,000	18,000	140,000	120,000	2200	440
Uranium-235/236	5200	10,000	10,000	6500	8200	9800	4200	5200	5200	1600	440
Uranium-238	2100	4200	4200	3400	3800	4100	1900	2100	2100	1100	400

*na = Not available.

Table G-5.3-2
Minimum ESL Comparison for AOC 14-001(g)

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Chromium (total)	4.97	28	Robin (insectivore)	0.18
Copper	7.18	15	Robin (insectivore)	**0.48**
Mercury	0.0945	0.013	Robin (insectivore)	**7.27**
Selenium	1.97	0.52	Plant	**3.79**
Organic Chemicals (mg/kg)				
Acenaphthene	0.061	0.25	Plant	0.24
Benzene	0.000675	24	Deer mouse	0.000028
Bis(2-ethylhexyl)phthalate	0.093	0.02	Robin (insectivore)	**4.65**
Di-n-butylphthalate	0.14	0.011	Robin (insectivore)	**12.7**
Dichlorobenzene[1,3-]	0.00038	0.73	Shrew	0.00052
Diethylphthalate	0.059	100	Plant	0.00059
HMX	1.7	16	Earthworm	0.11
RDX	0.25	2.3	Robin (herbivore)	0.11
Toluene	0.00239	23	Shrew	0.0001
Trichloroethene	0.00091	42	Shrew	0.000022
Radionuclides (pCi/g)				
Cesium-134	0.051	550	Cottontail	0.000093
Cesium-137	0.182	1200	Cottontail	0.00015
Strontium-90	0.71	340	Robin (herbivore)	0.0021

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-3
HI Analysis for AOC 14-001(g)

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Copper	7.18	1.8E-03	5.5E-03	0.078	0.19	**0.33**	**0.48**	0.03	0.19	0.11	0.09	0.1
Mercury	0.0945	1.5E-03	**0.33**	**1.43**	**1.35**	**4.3**	**7.27**	4.7E-03	0.056	0.032	**1.89**	2.8E-03
Selenium	1.97	0.022	0.024	**0.46**	**1.97**	**2.26**	**2.63**	**1.04**	**2.98**	**2.37**	**0.48**	**3.79**
Bis(2-ethylhexyl)phthalate	0.093	2.4E-04	0.011	**0.93**	4.7E-03	**2.33**	**4.65**	3.9E-05	0.16	0.085	na*	na
Di-n-butylphthalate	0.14	2.9E-06	0.082	**2.37**	**0.36**	**6.67**	**12.7**	1.0E-05	7.8E-04	3.8E-04	na	8.8E-04
HI		0.03	0.5	**5**	**4**	**16**	**28**	1	**3**	**3**	**2**	**4**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.
*na = Not available.

Table G-5.3-4
Minimum ESL Comparison for SWMU 14-002(c)

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Lead	32.7	14	Robin (insectivore)	**2.34**
Selenium	1.49	0.52	Plant	**2.87**
Zinc	214	48	Robin (insectivore)	**4.46**
Organic Chemicals (mg/kg)				
Acetone	0.082	1.2	Deer mouse	0.068
Chloroform	0.0016	8	Deer mouse	0.0002
Di-n-butylphthalate	0.14	0.011	Robin (insectivore)	**12.7**
Dichlorobenzene[1,4-]	0.0072	0.88	Shrew	0.0082
Dichloroethene[1,1-]	0.0021	11	Shrew	0.00019
HMX	0.097	16	Earthworm	0.0061
Methylene chloride	0.019	2.6	Deer mouse	0.0073
RDX	1.2	2.3	Robin (herbivore)	**0.52**
Toluene	0.0017	23	Shrew	0.000074
Trichlorofluoromethane	0.0023	52	Shrew	0.000044
Xylene (total)	0.0023	1.4	Shrew	0.0016

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-5
HI Analysis for SWMU 14-002(c)

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Lead	32.7	8.8E-03	0.052	**0.34**	**1.56**	**2.04**	**2.34**	0.099	**0.45**	0.27	0.019	0.27
Selenium	1.49	0.017	0.018	**0.35**	**1.49**	**1.71**	**1.99**	**0.78**	**2.26**	**1.8**	**0.36**	**2.87**
Zinc	214	0.027	0.089	**0.86**	**0.61**	**2.52**	**4.46**	0.13	**2.18**	**1.26**	**1.78**	**1.34**
Di-n-butylphthalate	0.14	2.9E-06	0.082	**2.37**	**0.36**	**6.67**	**12.7**	1.0E-05	7.8E-04	3.8E-04	na*	8.8E-04
RDX	1.2	1.7E-04	1.3E-03	0.092	**0.52**	**0.5**	**0.5**	0.039	0.075	0.075	0.14	na
HI		0.05	0.2	**4**	**5**	**13**	**22**	1	**5**	**3**	**2**	**4**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.3-6
Minimum ESL Comparison for SWMU 14-003

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	0.18	2.4	Deer mouse	0.075
Arsenic	3.35	6.8	Earthworm	**0.49**
Barium	519	110	Plant	**4.72**
Beryllium	1.18	2.5	Plant	**0.47**
Chromium (total)	10.4	28	Robin (insectivore)	**0.37**
Cobalt	6.54	13	Plant	**0.5**
Copper	7.84	15	Robin (insectivore)	**0.52**
Lead	14.7	14	Robin (insectivore)	**1.05**
Manganese	420	220	Plant	**1.91**
Nickel	9.01	9.7	Shrew	**0.93**
Selenium	0.661	0.52	Plant	**1.27**
Silver	0.537	2.6	Robin (insectivore)	0.21
Vanadium	23.8	6.7	Robin (insectivore)	**3.55**
Organic Chemicals (mg/kg)				
Amino-4,6-dinitrotoluene[2-]	0.107	14	Plant	0.0076
Bis(2-ethylhexyl)phthalate	0.079	0.02	Robin (insectivore)	**3.95**
HMX	0.13	16	Earthworm	0.0081
Methylene chloride	0.0033	2.6	Deer mouse	0.0013
PETN	0.13	100	Deer mouse	0.0013
PETN	0.13	100	Cottontail	0.0013
TCDD[2,3,7,8-]	8.27E-08	0.00000029	Shrew	0.29
TNT	0.131	7.6	Robin (herbivore)	0.017
Radionuclides (pCi/g)				
Cesium-134	0.052	550	Cottontail	0.000095
Cesium-137	0.0652	1200	Cottontail	0.000054

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-7
HI Analysis for SWMU 14-003

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Arsenic	3.35	4.1E-03	3.9E-03	0.028	0.08	0.13	0.19	0.024	0.22	0.1	**0.49**	0.19
Barium	519	0.013	0.019	0.06	**0.63**	**0.56**	**0.52**	0.18	**0.4**	0.29	**1.57**	**4.72**
Beryllium	1.18	2.8E-03	na*	na	na	na	na	7.9E-03	0.066	0.021	0.03	**0.47**
Chromium (total)	10.4	5.8E-03	0.01	0.052	0.15	0.26	**0.37**	0.014	0.23	0.095	na	na
Cobalt	6.54	1.2E-03	2.4E-03	9.1E-03	0.038	0.055	0.068	4.1E-03	0.041	0.016	na	**0.5**
Copper	7.84	2.0E-03	6.0E-03	0.085	0.21	**0.36**	**0.52**	0.033	0.21	0.12	0.098	0.11
Lead	14.7	4.0E-03	0.023	0.15	**0.7**	**0.92**	**1.05**	0.045	0.2	0.12	8.6E-03	0.12
Manganese	420	0.01	6.1E-03	0.016	0.3	0.22	0.14	0.23	0.28	0.3	**0.93**	**1.91**
Nickel	9.01	7.5E-03	3.9E-03	0.075	0.056	0.24	**0.43**	0.02	**0.93**	**0.45**	0.032	0.24
Selenium	0.661	7.3E-03	8.2E-03	0.15	**0.66**	**0.76**	**0.88**	**0.35**	**1**	**0.8**	0.16	**1.27**
Vanadium	23.8	7.2E-03	0.18	**0.37**	**2.67**	**3.13**	**3.55**	0.018	0.17	0.05	na	**0.4**
Bis(2-ethylhexyl)phthalate	0.079	2.1E-04	9.8E-03	**0.79**	4.0E-03	**1.98**	**3.95**	3.3E-05	0.13	0.072	na	na
HI		0.07	0.3	**2**	**5**	**9**	**12**	0.9	**4**	**2**	**3**	**10**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.3-8
Minimum ESL Comparison for SWMU 14-006

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Arsenic	4.46	6.8	Earthworm	**0.66**
Barium	124	110	Plant	**1.13**
Beryllium	1.02	2.5	Plant	**0.41**
Chromium (total)	7.48	28	Robin (insectivore)	0.27
Copper	42.4	15	Robin (insectivore)	**2.83**
Lead	47.7	14	Robin (insectivore)	**3.41**
Mercury	0.0983	0.013	Robin (insectivore)	**7.56**
Nickel	7	9.7	Shrew	**0.72**
Selenium	2.91	0.52	Plant	**5.6**
Zinc	101	48	Robin (insectivore)	**2.1**
Organic Chemicals (mg/kg)				
Amino-2,6-dinitrotoluene[4-]	0.16	12	Shrew	0.013
Amino-4,6-dinitrotoluene[2-]	0.17	14	Plant	0.012
Bis(2-ethylhexyl)phthalate	1.5	0.02	Robin (insectivore)	**75**
Dibenzofuran	1.1	6.1	Plant	0.18
HMX	0.905	16	Earthworm	0.057
RDX	2.6	2.3	Robin (herbivore)	**1.13**
TNT	0.263	7.6	Robin (herbivore)	0.035
Radionuclides (pCi/g)				
Strontium-90	0.33	340	Robin (herbivore)	0.00097

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-9
HI Analysis for SWMU 14-006

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Arsenic	4.46	5.4E-03	5.2E-03	0.037	0.11	0.17	0.25	0.032	0.3	0.14	**0.66**	0.25
Barium	124	3.0E-03	4.4E-03	0.014	0.15	0.13	0.12	0.043	0.095	0.069	**0.38**	**1.13**
Beryllium	1.02	2.4E-03	na*	na	na	na	na	6.8E-03	0.057	0.018	0.026	**0.41**
Copper	42.4	0.011	0.033	**0.46**	**1.12**	**1.93**	**2.83**	0.18	**1.12**	**0.66**	**0.53**	**0.61**
Lead	47.7	0.013	0.076	**0.5**	**2.27**	**2.98**	**3.41**	0.14	**0.66**	**0.4**	0.028	**0.4**
Mercury	0.0983	1.6E-03	**0.34**	**1.49**	**1.4**	**4.47**	**7.56**	4.9E-03	0.058	0.033	**1.97**	2.9E-03
Nickel	7	5.8E-03	3.0E-03	0.058	0.044	0.18	**0.33**	0.016	**0.72**	**0.35**	0.025	0.18
Selenium	2.91	0.032	0.036	**0.68**	**2.91**	**3.34**	**3.88**	**1.53**	**4.41**	**3.51**	**0.71**	**5.6**
Zinc	101	0.013	0.042	**0.4**	0.29	**1.19**	**2.1**	0.063	**1.03**	**0.59**	**0.84**	**0.63**
Bis(2-ethylhexyl)phthalate	1.5	3.9E-03	0.19	**15**	0.075	**37.5**	**75**	6.3E-04	**2.54**	**1.36**	na	na
RDX	2.6	3.7E-04	2.9E-03	0.2	**1.13**	**1.08**	**1.08**	0.084	0.16	0.16	**0.31**	na
	HI	0.09	0.7	**19**	**9**	**53**	**97**	**2**	**11**	**7**	**5**	**9**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.3-10
Minimum ESL Comparison for SWMU 14-007

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Arsenic	3.35	6.8	Earthworm	**0.49**
Barium	216	110	Plant	**1.96**
Beryllium	1.21	2.5	Plant	**0.48**
Chromium (total)	9.65	28	Robin (insectivore)	**0.34**
Cobalt	6.75	13	Plant	**0.52**
Copper	7.46	15	Robin (insectivore)	**0.5**
Lead	15.6	14	Robin (insectivore)	**1.11**
Mercury	0.0841	0.013	Robin (insectivore)	**6.47**
Nickel	8.92	9.7	Shrew	**0.92**
Selenium	1.36	0.52	Plant	**2.62**
Silver	7.13	2.6	Robin (insectivore)	**2.74**
Vanadium	23.6	6.7	Robin (insectivore)	**3.52**
Organic Chemicals (mg/kg)				
Acenaphthene	0.074	0.25	Plant	0.3
Acetone	0.00922	1.2	Deer mouse	0.0077
Bis(2-ethylhexyl)phthalate	0.42	0.02	Robin (insectivore)	**21**
Dichlorobenzene[1,3-]	0.00034	0.73	Shrew	0.00047
HMX	0.054	16	Earthworm	0.0034
Methylene chloride	0.00385	2.6	Deer mouse	0.0015
Radionuclides (pCi/g)				
Cesium-137	0.0463	1200	Cottontail	0.000039
Strontium-90	0.52	340	Robin (herbivore)	0.0015

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-11
HI Analysis for SWMU 14-007

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Arsenic	3.35	4.1E-03	3.9E-03	0.028	0.08	0.13	0.19	0.024	0.22	0.1	**0.49**	0.19
Barium	216	5.3E-03	7.7E-03	0.025	0.26	0.23	0.22	0.074	0.17	0.12	**0.65**	**1.96**
Beryllium	1.21	2.9E-03	na*	na	na	na	na	8.1E-03	0.067	0.022	0.03	**0.48**
Chromium (total)	9.65	5.4E-03	9.7E-03	0.048	0.14	0.24	**0.34**	0.013	0.21	0.088	na	na
Cobalt	6.75	1.2E-03	2.5E-03	9.4E-03	0.04	0.056	0.07	4.2E-03	0.042	0.017	na	**0.52**
Copper	7.46	1.9E-03	5.7E-03	0.081	0.2	**0.34**	**0.5**	0.031	0.2	0.12	0.093	0.11
Lead	15.6	4.2E-03	0.025	0.16	**0.74**	**0.98**	**1.11**	0.047	0.22	0.13	9.2E-03	0.13
Mercury	0.0841	1.4E-03	0.29	**1.27**	**1.2**	**3.82**	**6.47**	4.2E-03	0.049	0.028	**1.68**	2.5E-03
Nickel	8.92	7.4E-03	3.9E-03	0.074	0.056	0.23	**0.42**	0.02	**0.92**	**0.45**	0.032	0.23
Selenium	1.36	0.015	0.017	**0.32**	**1.36**	**1.56**	**1.81**	**0.72**	**2.06**	**1.64**	**0.33**	**2.62**
Silver	7.13	1.7E-03	0.011	**0.51**	**0.65**	**1.66**	**2.74**	0.051	**0.51**	0.3	na	0.013
Vanadium	23.6	7.2E-03	0.18	**0.37**	**2.65**	**3.11**	**3.52**	0.018	0.17	0.049	na	**0.39**
Bis(2-ethylhexyl)phthalate	0.42	1.1E-03	0.052	**4.2**	0.021	**10.5**	**21**	1.8E-04	**0.71**	**0.38**	na	na
	HI	0.06	0.6	**7**	**7**	**23**	**38**	1	**6**	**3**	**3**	**7**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.3-12
Minimum ESL Comparison for SWMU 14-009

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	4.12	2.4	Deer mouse	**1.72**
Arsenic	2.52	6.8	Earthworm	**0.37**
Barium	90.3	110	Plant	**0.82**
Chromium (total)	9.38	28	Robin (insectivore)	**0.34**
Copper	18.1	15	Robin (insectivore)	**1.21**
Lead	27.3	14	Robin (insectivore)	**1.95**
Mercury	0.159	0.013	Robin (insectivore)	**12.2**
Nickel	9.42	9.7	Shrew	**0.97**
Selenium	1.79	0.52	Plant	**3.44**
Vanadium	14.2	6.7	Robin (insectivore)	**2.12**
Organic Chemicals (mg/kg)				
Acetone	0.00878	1.2	Deer mouse	0.0073
Bis(2-ethylhexyl)phthalate	0.057	0.02	Robin (insectivore)	**2.85**
Di-n-butylphthalate	0.161	0.011	Robin (insectivore)	**14.6**
Dinitrotoluene[2,4-]	0.16	6	Plant	0.027
Hexanone[2-]	0.011	0.36	Robin (insectivore)	0.031
HMX	77.4	16	Earthworm	**4.84**
PETN	0.43	100	Deer mouse	0.0043
PETN	0.43	100	Cottontail	0.0043
RDX	0.264	2.3	Robin (herbivore)	0.11
Radionuclides (pCi/g)				
Cesium-137	0.271	1200	Cottontail	0.00023
Strontium-90	0.213	340	Robin (herbivore)	0.00063
Uranium-234	4.87	440	Plant	0.011
Uranium-235/236	0.523	440	Plant	0.0012
Uranium-238	32.9	400	Plant	0.082

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-13
HI Analysis for SWMU 14-009

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Antimony	4.12	0.09	na*	na	na	na	na	**1.58**	**1.58**	**1.72**	0.053	**0.37**
Arsenic	2.52	3.1E-03	3.0E-03	0.021	0.06	0.097	0.14	0.018	0.17	0.079	**0.37**	0.14
Barium	90.3	2.2E-03	3.2E-03	0.011	0.11	0.097	0.09	0.031	0.069	0.05	0.27	**0.82**
Chromium (total)	9.38	5.2E-03	9.4E-03	0.047	0.14	0.23	**0.34**	0.013	0.21	0.085	na	na
Copper	18.1	4.5E-03	0.014	0.2	**0.48**	**0.82**	**1.21**	0.075	**0.48**	0.28	0.23	0.26
Lead	27.3	7.4E-03	0.043	0.29	**1.3**	**1.71**	**1.95**	0.083	**0.38**	0.23	0.016	0.23
Mercury	0.159	2.6E-03	**0.55**	**2.41**	**2.27**	**7.23**	**12.2**	8.0E-03	0.094	0.053	**3.18**	4.7E-03
Nickel	9.42	7.9E-03	0.0041	0.079	0.059	0.25	**0.45**	0.021	**0.97**	**0.47**	0.034	0.25
Selenium	1.79	0.02	0.022	**0.42**	**1.79**	**2.06**	**2.39**	**0.94**	**2.71**	**2.16**	**0.44**	**3.44**
Vanadium	14.2	4.3E-03	0.11	0.22	**1.6**	**1.87**	**2.12**	0.011	0.1	0.03	na	0.24
Bis(2-ethylhexyl)phthalate	0.057	1.5E-04	7.0E-03	**0.57**	2.9E-03	**1.43**	**2.85**	2.4E-05	0.097	0.052	na	na
Di-n-butylphthalate	0.161	3.4E-06	0.095	**2.73**	**0.41**	**7.67**	**14.6**	1.2E-05	8.9E-04	4.4E-04	na	1.0E-03
HMX	77.4	1.3E-03	na	na	na	na	na	0.23	0.086	0.26	**4.84**	0.029
	HI	0.1	0.9	**7**	**8**	**23**	**38**	**3**	**7**	**5**	**9**	**6**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.3-14
Minimum ESL Comparison for SWMU 14-010

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Arsenic	3.41	6.8	Earthworm	**0.5**
Copper	33.9	15	Robin (insectivore)	**2.26**
Lead	35.2	14	Robin (insectivore)	**2.51**
Selenium	1.79	0.52	Plant	**3.44**
Silver	1.1	2.6	Robin (insectivore)	**0.42**
Zinc	48.5	48	Robin (insectivore)	**1.01**
Organic Chemicals (mg/kg)				
Bis(2-ethylhexyl)phthalate	0.15	0.02	Robin (insectivore)	**7.5**
Di-n-butylphthalate	0.46	0.011	Robin (insectivore)	**41.8**
HMX	58.1	16	Earthworm	**3.63**
RDX	0.38	2.3	Robin (herbivore)	0.17
TNT	0.162	7.6	Robin (herbivore)	0.021
Radionuclides (pCi/g)				
Cesium-137	0.346	1200	Cottontail	0.00029
Uranium-234	1.67	440	Plant	0.0038
Uranium-235/236	0.118	440	Plant	0.00027
Uranium-238	12.3	400	Plant	0.031

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-15
HI Analysis for SWMU 14-010

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Arsenic	3.41	4.2E-03	4.0E-03	0.028	0.081	0.13	0.19	0.024	0.23	0.11	**0.5**	0.19
Copper	33.9	8.5E-03	0.026	**0.37**	**0.89**	**1.54**	**2.26**	0.14	**0.89**	**0.53**	**0.42**	**0.48**
Lead	35.2	9.5E-03	0.056	**0.37**	**1.68**	**2.2**	**2.51**	0.11	**0.49**	0.29	0.021	0.29
Selenium	1.79	0.02	0.022	**0.42**	**1.79**	**2.06**	**2.39**	**0.94**	**2.71**	**2.16**	**0.44**	**3.44**
Silver	1.1	2.6E-04	0.0016	0.079	0.1	0.26	**0.42**	7.9E-03	0.079	0.046	na*	2.0E-03
Zinc	48.5	6.2E-03	0.02	0.19	0.14	**0.57**	**1.01**	0.03	**0.49**	0.29	**0.4**	0.3
Bis(2-ethylhexyl)phthalate	0.15	3.9E-04	0.019	**1.5**	7.5E-03	**3.75**	**7.5**	6.3E-05	0.25	0.14	na	na
Di-n-butylphthalate	0.46	9.6E-06	0.27	**7.8**	**1.18**	**21.9**	**41.8**	3.3E-05	2.6E-03	1.2E-03	na	2.9E-03
HMX	58.1	9.8E-04	na	na	na	na	na	0.17	0.065	0.19	**3.63**	0.022
HI		0.05	0.4	**11**	**6**	**32**	**58**	1	**5**	**4**	**5**	**5**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.3-16
Minimum ESL Comparison for AOC C-14-001

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Barium	114	110	Plant	**1.04**
Chromium (total)	45.2	28	Robin (insectivore)	**1.61**
Cobalt	5.31	13	Plant	**0.41**
Nickel	7.96	9.7	Shrew	**0.82**
Selenium	1.31	0.52	Plant	**2.52**
Organic Chemicals (mg/kg)				
Benzoic acid	0.36	1	Shrew	**0.36**

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-17
HI Analysis for AOC C-14-001

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Barium	114	2.8E-03	4.1E-03	0.013	0.14	0.12	0.11	0.039	0.088	0.063	**0.35**	**1.04**
Chromium (total)	45.2	0.025	0.045	0.23	**0.66**	**1.13**	**1.61**	0.06	**1**	**0.41**	na*	na
Cobalt	5.31	9.7E-04	2.0E-03	7.4E-03	0.031	0.044	0.055	3.3E-03	0.033	0.013	na	**0.41**
Nickel	7.96	6.6E-03	3.5E-03	0.066	0.05	0.21	**0.38**	0.018	**0.82**	**0.4**	0.028	0.21
Selenium	1.31	0.015	0.016	0.3	**1.31**	**1.51**	**1.75**	**0.69**	**1.98**	**1.58**	**0.32**	**2.52**
Benzoic acid	0.36	2.0E-04	na	na	na	na	na	0.097	**0.36**	0.28	na	na
	HI	0.05	0.07	0.6	**2**	**3**	**4**	0.9	**4**	**3**	0.7	**4**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.3-18
Minimum ESL Comparison for AOC C-14-004

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Barium	144	110	Plant	**1.31**
Chromium (total)	7.92	28	Robin (insectivore)	0.28
Cobalt	5.2	13	Plant	**0.4**
Copper	6.81	15	Robin (insectivore)	**0.45**
Lead	17.7	14	Robin (insectivore)	**1.26**
Nickel	6.53	9.7	Shrew	**0.67**
Selenium	1.34	0.52	Plant	**2.58**
Vanadium	18.2	6.7	Robin (insectivore)	**2.72**
Organic Chemicals (mg/kg)				
Acetone	0.014	1.2	Deer mouse	0.012
HMX	0.059	16	Earthworm	0.0037

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-19
HI Analysis for AOC C-14-004

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Barium	144	3.5E-03	5.1E-03	0.017	0.18	0.15	0.14	0.05	0.11	0.08	**0.44**	**1.31**
Cobalt	5.2	9.5E-04	1.9E-03	7.2E-03	0.031	0.043	0.054	3.3E-03	0.033	0.013	na*	**0.4**
Copper	6.81	1.7E-03	5.2E-03	0.074	0.18	**0.31**	**0.45**	0.028	0.18	0.11	0.085	0.097
Lead	17.7	4.8E-03	0.028	0.19	**0.84**	**1.11**	**1.26**	0.054	0.25	0.15	0.01	0.15
Nickel	6.53	5.4E-03	2.8E-03	0.054	0.041	0.17	**0.31**	0.015	**0.67**	**0.33**	0.023	0.17
Selenium	1.34	0.015	0.017	**0.31**	**1.34**	**1.54**	**1.79**	**0.71**	**2.03**	**1.61**	**0.33**	**2.58**
Vanadium	18.2	5.5E-03	0.14	0.28	**2.04**	**2.39**	**2.72**	0.014	0.13	0.038	na	0.3
	HI	0.03	0.2	0.9	**4**	**6**	**7**	0.8	**3**	**2**	0.49	**5**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.3-20
Minimum ESL Comparison for AOC C-14-005

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Mercury	1.32	0.013	Robin (insectivore)	**102**
Selenium	1.34	0.52	Plant	**2.58**
Organic Chemicals (mg/kg)				
Acetone	0.076	1.2	Deer mouse	0.063
Fluoranthene	0.041	10	Earthworm	0.0041

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-21
HI Analysis for AOC C-14-005

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Mercury	1.32	0.022	**4.55**	**20**	**18.9**	**60**	**102**	0.066	**0.78**	**0.44**	**26.4**	0.039
Selenium	1.34	0.015	0.017	**0.31**	**1.34**	**1.54**	**1.79**	**0.71**	**2.03**	**1.61**	**0.33**	**2.58**
HI		0.04	**5**	**20**	**20**	**62**	**104**	0.8	**3**	**2**	**27**	**3**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

Table G-5.3-22
Minimum ESL Comparison for AOC C-14-007

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	2.8	2.4	Deer mouse	**1.17**
Arsenic	4.84	6.8	Earthworm	**0.71**
Barium	74.2	110	Plant	**0.67**
Chromium (total)	25.3	28	Robin (insectivore)	**0.9**
Copper	7.37	15	Robin (insectivore)	**0.49**
Lead	17.8	14	Robin (insectivore)	**1.27**
Nickel	9.27	9.7	Shrew	**0.96**
Selenium	2.15	0.52	Plant	**4.13**
Organic Chemicals (mg/kg)				
Benzene	0.0003	24	Deer mouse	0.000013
Benzo(b)fluoranthene	0.074	18	Plant	0.0041
Butanone[2-]	0.0058	360	Deer mouse	0.000016
Chrysene	0.048	2.4	Shrew	0.02
Fluoranthene	0.055	10	Earthworm	0.0055
Pyrene	0.048	10	Earthworm	0.0048
Toluene	0.0015	23	Shrew	0.000065

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-23
HI Analysis for AOC C-14-007

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Antimony	2.8	0.061	na*	na	na	na	na	**1.08**	**1.08**	**1.17**	0.036	0.25
Arsenic	4.84	5.9E-03	5.7E-03	0.04	0.12	0.19	0.27	0.035	**0.32**	0.15	**0.71**	0.27
Barium	74.2	1.8E-03	2.7E-03	8.6E-03	0.09	0.08	0.074	0.026	0.057	0.041	0.22	**0.67**
Chromium (total)	25.3	0.014	0.025	0.13	**0.37**	**0.63**	**0.9**	0.034	**0.56**	0.23	na	na
Copper	7.37	1.8E-03	5.7E-03	0.08	0.19	**0.34**	**0.49**	0.031	0.19	0.12	0.092	0.11
Lead	17.8	4.8E-03	0.028	0.19	**0.85**	**1.11**	**1.27**	0.054	0.25	0.15	0.01	0.15
Nickel	9.27	7.7E-03	4.0E-03	0.077	0.058	0.24	**0.44**	0.021	**0.96**	**0.46**	0.033	0.24
Selenium	2.15	0.024	0.027	**0.5**	**2.15**	**2.47**	**2.87**	**1.13**	**3.26**	**2.59**	**0.52**	**4.13**
HI		0.1	0.1	1	**4**	**5**	**6**	**2**	**7**	**5**	**2**	**6**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.3-24
Minimum ESL Comparison for AOC C-14-008

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Barium	276	110	Plant	**2.51**
Cobalt	6.8	13	Plant	**0.52**
Copper	8.25	15	Robin (insectivore)	**0.55**
Nickel	10.3	9.7	Shrew	**1.06**
Selenium	1.92	0.52	Plant	**3.69**
Vanadium	25.9	6.7	Robin (insectivore)	**3.87**

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-25
HI Analysis for AOC C-14-008

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Barium	276	6.7E-03	9.9E-03	0.032	**0.34**	0.3	0.28	0.095	0.21	0.15	**0.84**	**2.51**
Cobalt	6.8	1.2E-03	2.5E-03	9.4E-03	0.04	0.057	0.071	4.3E-03	0.043	0.017	na*	**0.52**
Copper	8.25	2.1E-03	6.3E-03	0.09	0.22	**0.38**	**0.55**	0.034	0.22	0.13	0.1	0.12
Nickel	10.3	8.6E-03	4.5E-03	0.086	0.064	0.27	**0.49**	0.023	**1.06**	**0.52**	0.037	0.27
Selenium	1.92	0.021	0.024	**0.45**	**1.92**	**2.21**	**2.56**	**1.01**	**2.91**	**2.31**	**0.47**	**3.69**
Vanadium	25.9	7.8E-03	0.2	**0.4**	**2.91**	**3.41**	**3.87**	0.02	0.19	0.054	na	**0.43**
	HI	0.05	0.2	1	**5**	**7**	**8**	1	**5**	**3**	1	**8**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.3-26
Minimum ESL Comparison for AOC C-14-009

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Barium	94.3	110	Plant	**0.86**
Copper	4.38	15	Robin (insectivore)	0.29
Lead	40.3	14	Robin (insectivore)	**2.88**
Selenium	1.07	0.52	Plant	**2.06**
Organic Chemicals (mg/kg)				
Acetone	0.0088	1.2	Deer mouse	0.0073
Chloroform	0.00045	8	Deer mouse	0.000056
Methylene chloride	0.0043	2.6	Deer mouse	0.0017

Note: Bolded values indicate HQs greater than 0.3.

Table G-5.3-27
HI Analysis for AOC C-14-009

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Barium	94.3	2.3E-03	3.4E-03	0.011	0.12	0.1	0.094	0.033	0.073	0.052	0.29	**0.86**
Lead	40.3	0.011	0.064	**0.42**	**1.92**	**2.52**	**2.88**	0.12	**0.56**	**0.34**	0.024	**0.34**
Selenium	1.07	0.012	0.013	0.25	**1.07**	**1.23**	**1.43**	**0.56**	**1.62**	**1.29**	0.26	**2.06**
	HI	0.03	0.08	0.7	**3**	**4**	**4**	0.7	**2**	**2**	0.6	**3**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

Table G-5.4-1
Mexican Spotted Owl AUFs for Cañon de Valle Aggregate Area, TA-14

Site	Site Area (ha)	AUF*
AOC 14-001(g)	0.155	0.000423
SWMU 14-002(c)	0.00218	0.00000595
SWMU 14-003	0.0488	0.000133
SWMU 14-006	0.0183	0.00005
SWMU 14-007	0.0476	0.00013
SWMU 14-009	0.0732	0.0002
SWMU 14-010	0.0391	0.000107
AOC C-14-001	0.00178	0.00000487
AOC C-14-004	0.00384	0.0000105
AOC C-14-005	0.000908	0.00000248
AOC C-14-007	0.0015	0.00000409
AOC C-14-008	0.0014	0.00000382
AOC C-14-009	0.00106	0.00000291

*AUF is calculated as the area of the site divided by the owl HR of 366 ha.

Table G-5.4-2
PAUFs for Ecological Receptors for AOC 14-001(g)

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	3.66E-05
American Robin	0.42	16.8	9.23E-03
Deer Mouse	0.077	3	5.17E-02
Desert Cottontail	3.1	124	1.25E-03
Montane Shrew	0.39	15.6	9.94E-03
Red Fox	1038	41,520	3.73E-06

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.155 ha) divided by the population area.

Table G-5.4-3
Adjusted HIs for AOC 14-001(g)

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Copper	7.18	6.7E-09	2.0E-07	2.9E-06	0.0017	0.003	0.0044	3.7E-05	0.0019	0.0058	0.09	0.1
Mercury	0.0945	5.8E-09	1.2E-05	5.2E-05	0.012	0.04	0.067	5.9E-06	5.5E-04	0.0016	**1.89**	2.8E-03
Selenium	1.97	8.2E-08	8.9E-07	1.7E-05	0.018	0.021	0.024	0.0013	0.03	0.12	**0.48**	**3.79**
Bis(2-ethylhexyl)phthalate	0.093	9.1E-10	4.2E-07	3.4E-05	4.3E-05	0.021	0.043	4.8E-08	0.0016	0.0044	na*	na
Di-n-butylphthalate	0.14	1.1E-11	3.0E-06	8.7E-05	0.0033	0.062	0.12	1.3E-08	7.7E-06	2.0E-05	na	8.8E-04
Adjusted HI		1E-07	2E-05	0.0002	0.04	0.1	0.3	0.001	0.03	0.1	**2**	**4**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-4
PAUFs for Ecological Receptors for SWMU 14-002(c)

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	5.13E-07
American Robin	0.42	16.8	1.30E-04
Deer Mouse	0.077	3	7.26E-04
Desert Cottontail	3.1	124	1.76E-05
Montane Shrew	0.39	15.6	1.40E-04
Red Fox	1038	41,520	5.24E-08

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.00218 ha) divided by the population area.

Table G-5.4-5
Adjusted HIs for SWMU 14-002(c)

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Lead	32.7	4.6E-10	2.7E-08	1.8E-07	2.0E-04	2.6E-04	3.0E-04	1.7E-06	6.3E-05	2.0E-04	0.019	0.27
Selenium	1.49	8.7E-10	9.4E-09	1.8E-07	1.9E-04	2.2E-04	2.6E-04	1.4E-05	3.1E-04	0.0013	**0.36**	**2.87**
Zinc	214	1.4E-09	4.6E-08	4.4E-07	7.9E-05	3.3E-04	5.8E-04	2.3E-06	3.0E-04	9.1E-04	**1.78**	**1.34**
Di-n-butylphthalate	0.14	1.5E-13	4.2E-08	1.2E-06	4.7E-05	8.6E-04	0.0016	1.8E-10	1.1E-07	2.7E-07	na*	8.8E-04
RDX	1.2	9.0E-12	6.9E-10	4.7E-08	6.8E-05	6.5E-05	6.5E-05	6.8E-07	1.0E-05	5.4E-05	0.14	na
Adjusted HI		3E-09	1E-07	2E-06	0.0006	0.002	0.003	2E-05	0.0007	0.002	**2**	**4**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-6
PAUFs for Ecological Receptors for SWMU 14-003

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	1.15E-05
American Robin	0.42	16.8	2.91E-03
Deer Mouse	0.077	3	1.63E-02
Desert Cottontail	3.1	124	3.94E-04
Montane Shrew	0.39	15.6	3.13E-03
Red Fox	1038	41,520	1.18E-06

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0488 ha) divided by the population area.

Table G-5.4-7
Adjusted HIs for SWMU 14-003

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Arsenic	3.35	4.8E-09	4.5E-08	3.2E-07	2.3E-04	3.7E-04	5.4E-04	9.4E-06	7.0E-04	0.0017	**0.49**	0.19
Barium	519	1.5E-08	2.1E-07	7.0E-07	0.0018	0.0016	0.0015	7.0E-05	0.0013	0.0047	**1.57**	**4.72**
Beryllium	1.18	3.3E-09	na*	na	na	na	na	3.1E-06	2.1E-04	3.4E-04	0.03	**0.47**
Chromium (total)	10.4	6.8E-09	1.2E-07	6.0E-07	4.4E-04	7.6E-04	0.0011	5.5E-06	7.2E-04	0.0015	na	na
Cobalt	6.54	1.4E-09	2.8E-08	1.0E-07	1.1E-04	1.6E-04	2.0E-04	1.6E-06	1.3E-04	2.7E-04	na	**0.5**
Copper	7.84	2.3E-09	6.9E-08	9.8E-07	6.0E-04	0.001	0.0015	1.3E-05	6.5E-04	0.002	0.098	0.11
Lead	14.7	4.7E-09	2.7E-07	1.8E-06	0.002	0.0027	0.0031	1.8E-05	6.4E-04	0.002	8.6E-03	0.12
Manganese	420	1.2E-08	7.0E-08	1.8E-07	8.7E-04	6.4E-04	3.9E-04	9.2E-05	8.8E-04	0.0049	**0.93**	**1.91**
Nickel	9.01	8.8E-09	4.5E-08	8.6E-07	1.6E-04	6.9E-04	0.0012	8.1E-06	0.0029	0.0073	0.032	0.24
Selenium	0.661	8.6E-09	9.4E-08	1.8E-06	0.0019	0.0022	0.0026	1.4E-04	0.0031	0.013	0.16	**1.27**
Vanadium	23.8	8.5E-09	2.1E-06	4.3E-06	0.0078	0.0091	0.01	7.2E-06	5.3E-04	8.1E-04	na	**0.4**
Bis(2-ethylhexyl)phthalate	0.079	2.4E-10	1.1E-07	9.1E-06	1.1E-05	0.0057	0.011	1.3E-08	4.2E-04	0.0012	na	na
Adjusted HI		8E-08	3E-06	2E-05	0.02	0.02	0.03	0.0004	0.01	0.04	**3**	**10**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-8
PAUFs for Ecological Receptors for SWMU 14-006

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	4.32E-06
American Robin	0.42	16.8	1.09E-03
Deer Mouse	0.077	3	6.10E-03
Desert Cottontail	3.1	124	1.48E-04
Montane Shrew	0.39	15.6	1.17E-03
Red Fox	1038	41,520	4.41E-07

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0183 ha) divided by the population area.

Table G-5.4-9
Adjusted HIs for SWMU 14-006

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Arsenic	4.46	2.4E-09	2.3E-08	1.6E-07	1.2E-04	1.9E-04	2.7E-04	4.7E-06	3.5E-04	8.5E-04	**0.66**	0.25
Barium	124	1.3E-09	1.9E-08	6.2E-08	1.6E-04	1.5E-04	1.4E-04	6.3E-06	1.1E-04	4.2E-04	**0.38**	**1.13**
Beryllium	1.02	1.1E-09	na*	na	na	na	na	1.0E-06	6.6E-05	1.1E-04	0.026	**0.41**
Copper	42.4	4.7E-09	1.4E-07	2.0E-06	0.0012	0.0021	0.0031	2.6E-05	0.0013	0.004	**0.53**	**0.61**
Lead	47.7	5.7E-09	3.3E-07	2.2E-06	0.0025	0.0032	0.0037	2.1E-05	7.8E-04	0.0024	0.028	**0.4**

Table G-5.4-9 (continued)

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Mercury	0.0983	7.1E-10	1.5E-06	6.4E-06	0.0015	0.0049	0.0082	7.3E-07	6.8E-05	2.0E-04	**1.97**	2.9E-03
Nickel	7	2.6E-09	1.3E-08	2.5E-07	4.8E-05	2.0E-04	3.6E-04	2.3E-06	8.5E-04	0.0021	0.025	0.18
Selenium	2.91	1.4E-08	1.6E-07	2.9E-06	0.0032	0.0036	0.0042	2.3E-04	0.0052	0.021	**0.71**	**5.6**
Zinc	101	5.7E-09	1.8E-07	1.7E-06	3.1E-04	0.0013	0.0023	9.3E-06	0.0012	0.0036	**0.84**	**0.63**
Bis(2-ethylhexyl)phthalate	1.5	1.7E-09	8.0E-07	6.5E-05	8.2E-05	0.041	0.082	9.2E-08	0.003	0.0083	na	na
RDX	2.6	1.6E-10	1.3E-08	8.6E-07	0.0012	0.0012	0.0012	1.2E-05	1.9E-04	9.9E-04	**0.31**	na
Adjusted HI		4E-08	3E-06	8E-05	0.01	0.06	0.1	0.0003	0.01	0.04	**5**	**9**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-10
PAUFs for Ecological Receptors for SWMU 14-007

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	1.12E-05
American Robin	0.42	16.8	2.83E-03
Deer Mouse	0.077	3	1.59E-02
Desert Cottontail	3.1	124	3.84E-04
Montane Shrew	0.39	15.6	3.05E-03
Red Fox	1038	41,520	1.15E-06

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0476 ha) divided by the population area.

Table G-5.4-11
Adjusted HIs for SWMU 14-007

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Arsenic	3.35	4.7E-09	4.4E-08	3.1E-07	2.3E-04	3.7E-04	5.3E-04	9.2E-06	6.8E-04	0.0017	**0.49**	0.19
Barium	216	6.0E-09	8.7E-08	2.8E-07	7.5E-04	6.6E-04	6.1E-04	2.9E-05	5.1E-04	0.0019	**0.65**	**1.96**
Beryllium	1.21	3.3E-09	na*	na	na	na	na	3.1E-06	2.1E-04	3.4E-04	0.03	**0.48**
Chromium (total)	9.65	6.1E-09	1.1E-07	5.4E-07	4.0E-04	6.8E-04	9.8E-04	4.9E-06	6.5E-04	0.0014	na	na
Cobalt	6.75	1.4E-09	2.8E-08	1.1E-07	1.1E-04	1.6E-04	2.0E-04	1.6E-06	1.3E-04	2.7E-04	na	**0.52**
Copper	7.46	2.1E-09	6.4E-08	9.1E-07	5.6E-04	9.6E-04	0.0014	1.2E-05	6.0E-04	0.0018	0.093	0.11
Lead	15.6	4.8E-09	2.8E-07	1.8E-06	0.0021	0.0028	0.0032	1.8E-05	6.6E-04	0.0021	9.2E-03	0.13
Mercury	0.0841	1.6E-09	3.3E-06	1.4E-05	0.0034	0.011	0.018	1.6E-06	1.5E-04	4.4E-04	**1.68**	2.5E-03
Nickel	8.92	8.5E-09	4.4E-08	8.3E-07	1.6E-04	6.7E-04	0.0012	7.8E-06	0.0028	0.0071	0.032	0.23
Selenium	1.36	1.7E-08	1.9E-07	3.6E-06	0.0039	0.0044	0.0051	2.7E-04	0.0063	0.026	**0.33**	**2.62**
Silver	7.13	1.9E-09	1.2E-07	5.7E-06	0.0018	0.0047	0.0078	2.0E-05	0.0016	0.0047	na	0.013
Vanadium	23.6	8.2E-09	2.0E-06	4.1E-06	0.0075	0.0088	0.01	7.0E-06	5.1E-04	7.8E-04	na	**0.39**
Bis(2-ethylhexyl)phthalate	0.42	1.3E-09	5.8E-07	4.7E-05	6.0E-05	0.03	0.06	6.7E-08	0.0022	0.0061	na	na
Adjusted HI		7E-08	7E-06	8E-05	0.02	0.07	0.1	0.0004	0.02	0.05	**3**	**7**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-12
PAUFs for Ecological Receptors for SWMU 14-009

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	1.73E-05
American Robin	0.42	16.8	4.36E-03
Deer Mouse	0.077	3	2.44E-02
Desert Cottontail	3.1	124	5.91E-04
Montane Shrew	0.39	15.6	4.69E-03
Red Fox	1038	41,520	1.76E-06

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0732 ha) divided by the population area.

Table G-5.4-13
Adjusted HIs for SWMU 14-009

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Antimony	4.12	1.6E-07	na*	na	na	na	na	9.4E-04	0.0074	0.042	0.053	**0.37**
Arsenic	2.52	5.4E-09	5.1E-08	3.6E-07	2.6E-04	4.2E-04	6.1E-04	1.1E-05	7.9E-04	0.0019	**0.37**	0.14
Barium	90.3	3.9E-09	5.6E-08	1.8E-07	4.8E-04	4.2E-04	3.9E-04	1.8E-05	3.3E-04	0.0012	0.27	**0.82**
Chromium (total)	9.38	9.2E-09	1.6E-07	8.1E-07	6.0E-04	0.001	0.0015	7.4E-06	9.8E-04	0.0021	na	na
Copper	18.1	8.0E-09	2.4E-07	3.4E-06	0.0021	0.0036	0.0053	4.5E-05	0.0022	0.0069	0.23	0.26
Lead	27.3	1.3E-08	7.5E-07	5.0E-06	0.0057	0.0074	0.0085	4.9E-05	0.0018	0.0056	0.016	0.23

Table G-5.4-13 (continued)

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Mercury	0.159	4.6E-09	9.5E-06	4.2E-05	0.0099	0.032	0.053	4.7E-06	4.4E-04	0.0013	**3.18**	4.7E-03
Nickel	9.42	1.4E-08	7.1E-08	1.4E-06	2.6E-04	0.0011	0.002	1.3E-05	0.0046	0.011	0.034	0.25
Selenium	1.79	3.5E-08	3.8E-07	7.2E-06	0.0078	0.009	0.01	5.6E-04	0.013	0.053	**0.44**	**3.44**
Vanadium	14.2	7.6E-09	1.9E-06	3.8E-06	0.007	0.0081	0.0092	6.5E-06	4.8E-04	7.2E-04	na	0.24
Bis(2-ethylhexyl)phthalate	0.057	2.6E-10	1.2E-07	9.8E-06	1.2E-05	0.0062	0.012	1.4E-08	4.5E-04	0.0013	na	na
Di-n-butylphthalate	0.161	5.9E-12	1.6E-06	4.7E-05	0.0018	0.033	0.064	6.8E-09	4.2E-06	1.1E-05	na	1.0E-03
HMX	77.4	2.3E-09	na	na	na	na	na	1.3E-04	4.0E-04	0.0063	**4.84**	0.029
Adjusted HI		3E-07	1E-05	0.0001	0.04	0.1	0.2	0.002	0.03	0.1	**9**	**6**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-14
PAUFs for Ecological Receptors for SWMU 14-010

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	9.21E-06
American Robin	0.42	16.8	2.32E-03
Deer Mouse	0.077	3	1.30E-02
Desert Cottontail	3.1	124	3.15E-04
Montane Shrew	0.39	15.6	2.50E-03
Red Fox	1038	41,520	9.41E-07

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0391 ha) divided by the population area.

Table G-5.4-15
Adjusted HIs for SWMU 14-010

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Arsenic	3.41	3.9E-09	3.7E-08	2.6E-07	1.9E-04	3.0E-04	4.4E-04	7.7E-06	5.7E-04	0.0014	**0.5**	0.19
Copper	33.9	8.0E-09	2.4E-07	3.4E-06	0.0021	0.0036	0.0053	4.4E-05	0.0022	0.0069	**0.42**	**0.48**
Lead	35.2	8.9E-09	5.1E-07	3.4E-06	0.0039	0.0051	0.0058	3.4E-05	0.0012	0.0038	0.021	0.29
Selenium	1.79	1.9E-08	2.0E-07	3.8E-06	0.0042	0.0048	0.0055	3.0E-04	0.0068	0.028	**0.44**	**3.44**
Silver	1.1	2.4E-10	1.5E-08	7.2E-07	2.3E-04	5.9E-04	9.8E-04	2.5E-06	2.0E-04	6.0E-04	na*	2.0E-03
Zinc	48.5	5.8E-09	1.9E-07	1.8E-06	3.2E-04	0.0013	0.0023	9.5E-06	0.0012	0.0037	**0.4**	0.3
Bis(2-ethylhexyl)phthalate	0.15	3.7E-10	1.7E-07	1.4E-05	1.7E-05	0.0087	0.017	2.0E-08	6.4E-04	0.0018	na	na
Di-n-butylphthalate	0.46	9.0E-12	2.5E-06	7.2E-05	0.0027	0.051	0.097	1.0E-08	6.4E-06	1.6E-05	na	2.9E-03
HMX	58.1	9.3E-10	na	na	na	na	na	5.4E-05	1.6E-04	0.0025	**3.63**	0.022
Adjusted HI		5E-08	4E-06	0.0001	0.01	0.08	0.1	0.0005	0.01	0.05	**5**	**5**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-16
PAUFs for Ecological Receptors for AOC C-14-001

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	4.21E-07
American Robin	0.42	16.8	1.06E-04
Deer Mouse	0.077	3	5.95E-04
Desert Cottontail	3.1	124	1.44E-05
Montane Shrew	0.39	15.6	1.14E-04
Red Fox	1038	41,520	4.30E-08

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.00178 ha) divided by the population area.

Table G-5.4-17
Adjusted HIs for AOC C-14-001

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Barium	114	1.2E-10	1.7E-09	5.6E-09	1.5E-05	1.3E-05	1.2E-05	5.7E-07	1.0E-05	3.8E-05	**0.35**	**1.04**
Chromium (total)	45.2	1.1E-09	1.9E-08	9.5E-08	7.1E-05	1.2E-04	1.7E-04	8.7E-07	1.1E-04	2.4E-04	na	na
Cobalt	5.31	4.1E-11	8.3E-10	3.1E-09	3.3E-06	4.7E-06	5.9E-06	4.8E-08	3.8E-06	7.9E-06	na	**0.41**
Nickel	7.96	2.8E-10	1.5E-09	2.8E-08	5.3E-06	2.2E-05	4.0E-05	2.6E-07	9.4E-05	2.4E-04	0.028	0.21
Selenium	1.31	6.3E-10	6.8E-09	1.3E-07	1.4E-04	1.6E-04	1.9E-04	9.9E-06	2.3E-04	9.4E-04	**0.32**	**2.52**
Benzoic acid	0.36	8.6E-12	na*	na	na	na	na	1.4E-06	4.1E-05	1.6E-04	na	na
Adjusted HI		2E-09	3E-08	3E-07	0.0002	0.0003	0.0004	1E-05	0.0005	0.002	0.7	**4**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-18
PAUFs for Ecological Receptors for AOC C-14-004

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	9.06E-07
American Robin	0.42	16.8	2.29E-04
Deer Mouse	0.077	3	1.28E-03
Desert Cottontail	3.1	124	3.10E-05
Montane Shrew	0.39	15.6	2.46E-04
Red Fox	1038	41,520	9.25E-08

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.00384 ha) divided by the population area.

Table G-5.4-19
Adjusted HIs for AOC C-14-004

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Barium	144	3.2E-10	4.7E-09	1.5E-08	4.0E-05	3.5E-05	3.3E-05	1.5E-06	2.7E-05	1.0E-04	**0.44**	**1.31**
Cobalt	5.2	8.7E-11	1.7E-09	6.5E-09	7.0E-06	9.9E-06	1.2E-05	1.0E-07	8.0E-06	1.7E-05	na*	**0.4**
Copper	6.81	1.6E-10	4.7E-09	6.7E-08	4.1E-05	7.1E-05	1.0E-04	8.8E-07	4.4E-05	1.4E-04	0.085	0.097
Lead	17.7	4.4E-10	2.5E-08	1.7E-07	1.9E-04	2.5E-04	2.9E-04	1.7E-06	6.1E-05	1.9E-04	0.01	0.15
Nickel	6.53	5.0E-10	2.6E-09	4.9E-08	9.3E-06	3.9E-05	7.1E-05	4.6E-07	1.7E-04	4.2E-04	0.023	0.17
Selenium	1.34	1.4E-09	1.5E-08	2.8E-07	3.1E-04	3.5E-04	4.1E-04	2.2E-05	5.0E-04	0.0021	**0.33**	**2.58**
Vanadium	18.2	5.1E-10	1.3E-07	2.6E-07	4.7E-04	5.5E-04	6.2E-04	4.3E-07	3.2E-05	4.9E-05	na	0.3
Adjusted HI		3E-09	2E-07	8E-07	0.001	0.001	0.002	3E-05	0.0008	0.003	0.9	**5**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-20
PAUFs for Ecological Receptors for AOC C-14-005

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	2.14E-07
American Robin	0.42	16.8	5.40E-05
Deer Mouse	0.077	3	3.03E-04
Desert Cottontail	3.1	124	7.32E-06
Montane Shrew	0.39	15.6	5.82E-05
Red Fox	1038	41,520	2.19E-08

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.000908 ha) divided by the population area.

Table G-5.4-21
Adjusted HIs for AOC C-14-005

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Mercury	1.32	4.7E-10	9.7E-07	4.3E-06	0.001	0.0032	0.0055	4.8E-07	4.5E-05	1.3E-04	**26.4**	0.039
Selenium	1.34	3.3E-10	3.5E-09	6.7E-08	7.2E-05	8.3E-05	9.7E-05	5.2E-06	1.2E-04	4.9E-04	**0.33**	**2.58**
Adjusted HI		8E-10	1E-06	4E-06	0.001	0.003	0.006	6E-06	0.0002	0.0006	**27**	**3**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

Table G-5.4-22
PAUFs for Ecological Receptors for AOC C-14-007

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	3.53E-07
American Robin	0.42	16.8	8.91E-05
Deer Mouse	0.077	3	4.99E-04
Desert Cottontail	3.1	124	1.21E-05
Montane Shrew	0.39	15.6	9.59E-05
Red Fox	1038	41,520	3.60E-08

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0015 ha) divided by the population area.

Table G-5.4-23
Adjusted HIs for AOC C-14-007

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Antimony	2.8	2.2E-09	na*	na	na	na	na	1.3E-05	1.0E-04	5.8E-04	0.036	0.25
Arsenic	4.84	2.1E-10	2.0E-09	1.4E-08	1.0E-05	1.7E-05	2.4E-05	4.2E-07	3.1E-05	7.5E-05	**0.71**	0.27
Barium	74.2	6.5E-11	9.4E-10	3.0E-09	8.1E-06	7.1E-06	6.6E-06	3.1E-07	5.5E-06	2.1E-05	0.22	**0.67**
Chromium (total)	25.3	5.1E-10	8.9E-09	4.5E-08	3.3E-05	5.6E-05	8.0E-05	4.1E-07	5.4E-05	1.1E-04	na	na
Copper	7.37	6.6E-11	2.0E-09	2.8E-08	1.7E-05	3.0E-05	4.4E-05	3.7E-07	1.9E-05	5.7E-05	0.092	0.11
Lead	17.8	1.7E-10	1.0E-08	6.6E-08	7.6E-05	9.9E-05	1.1E-04	6.5E-07	2.4E-05	7.4E-05	0.01	0.15
Nickel	9.27	2.8E-10	1.4E-09	2.7E-08	5.2E-06	2.2E-05	3.9E-05	2.5E-07	9.2E-05	2.3E-04	0.033	0.24
Selenium	2.15	8.6E-10	9.4E-09	1.8E-07	1.9E-04	2.2E-04	2.6E-04	1.4E-05	3.1E-04	0.0013	**0.52**	**4.13**
Adjusted HI		4E-09	3E-08	4E-07	0.0003	0.0005	0.0006	3E-05	0.0006	0.002	**2**	**6**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-24
PAUFs for Ecological Receptors for AOC C-14-008

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	3.29E-07
American Robin	0.42	16.8	8.31E-05
Deer Mouse	0.077	3	4.66E-04
Desert Cottontail	3.1	124	1.13E-05
Montane Shrew	0.39	15.6	8.95E-05
Red Fox	1038	41,520	3.36E-08

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.0014 ha) divided by the population area.

Table G-5.4-25
Adjusted HIs for AOC C-14-008

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Barium	276	2.3E-10	3.2E-09	1.1E-08	2.8E-05	2.5E-05	2.3E-05	1.1E-06	1.9E-05	7.1E-05	**0.84**	**2.51**
Cobalt	6.8	4.2E-11	8.3E-10	3.1E-09	3.3E-06	4.7E-06	5.9E-06	4.8E-08	3.8E-06	7.9E-06	na*	**0.52**
Copper	8.25	6.9E-11	2.1E-09	3.0E-08	1.8E-05	3.1E-05	4.6E-05	3.9E-07	1.9E-05	6.0E-05	0.1	0.12
Nickel	10.3	2.9E-10	1.5E-09	2.8E-08	5.4E-06	2.3E-05	4.1E-05	2.6E-07	9.5E-05	2.4E-04	0.037	0.27
Selenium	1.92	7.2E-10	7.8E-09	1.5E-07	1.6E-04	1.8E-04	2.1E-04	1.1E-05	2.6E-04	0.0011	**0.47**	**3.69**
Vanadium	25.9	2.6E-10	6.6E-08	1.3E-07	2.4E-04	2.8E-04	3.2E-04	2.2E-07	1.7E-05	2.5E-05	na	**0.43**
Adjusted HI		2E-09	8E-08	4E-07	0.0005	0.0005	0.0006	1E-05	0.0004	0.002	1	**8**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

*na = Not available.

Table G-5.4-26
PAUFs for Ecological Receptors for AOC C-14-009

Receptor	HR (ha)[a]	Population Area (ha)	PAUF[b]
American Kestrel	106	4240	2.51E-07
American Robin	0.42	16.8	6.33E-05
Deer Mouse	0.077	3	3.54E-04
Desert Cottontail	3.1	124	8.58E-06
Montane Shrew	0.39	15.6	6.82E-05
Red Fox	1038	41,520	2.56E-08

[a] Values from EPA (1993, 059384).

[b] PAUF is calculated as the area of the site (0.00106 ha) divided by the population area.

Table G-5.4-27
Adjusted HIs for AOC C-14-009

COPEC	EPC (mg/kg)	Red Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	American Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil-dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Barium	94.3	5.9E-11	8.4E-10	2.8E-09	7.3E-06	6.4E-06	6.0E-06	2.8E-07	4.9E-06	1.9E-05	0.29	**0.86**
Lead	40.3	2.8E-10	1.6E-08	1.1E-07	1.2E-04	1.6E-04	1.8E-04	1.0E-06	3.8E-05	1.2E-04	0.024	**0.34**
Selenium	1.07	3.0E-10	3.3E-09	6.2E-08	6.8E-05	7.8E-05	9.0E-05	4.8E-06	1.1E-04	4.6E-04	0.26	**2.06**
Adjusted HI		6E-10	2E-08	2E-07	0.0002	0.0002	0.0003	6E-06	0.0002	0.0006	0.6	**3**

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

Table G-5.4-28
Summary of LOAEL-Based ESLs for Terrestrial Receptors

COPEC	Receptor	LOAEL-Based ESL* (mg/kg)
Antimony	Plant	58
Arsenic	Earthworm	68
Barium	Earthworm	3200
	Plant	260
Beryllium	Plant	25
Cobalt	Plant	130
Copper	Earthworm	530
	Plant	490
HMX	Earthworm	160
Lead	Plant	570
Manganese	Earthworm	4500
	Plant	1100
Mercury	Earthworm	0.5
RDX	Earthworm	15
Selenium	Earthworm	41
	Plant	3
Vanadium	Plant	80
Zinc	Earthworm	930
	Plant	810

*LOAEL-based ESLs from ECORISK Database, Version 3.3 (LANL 2015, 600929)

Table G-5.4-29
HI Analysis Using LOAEL-Based ESLs for AOC 14-001(g)

COPEC	EPC (mg/kg)	Earthworm	Plant
Mercury	0.0945	0.19	n/a*
Selenium	1.97	0.048	**0.66**
	HI	0.2	0.7

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.

*n/a = Not applicable.

Table G-5.4-30
HI Analysis Using LOAEL-Based ESLs for SWMU 14-002(c)

COPEC	EPC (mg/kg)	Earthworm	Plant
Selenium	1.49	0.036	**0.5**
Zinc	214	0.23	0.26
	HI	0.3	0.8

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.

Table G-5.4-31
HI Analysis Using LOAEL-Based ESLs for SWMU 14-003

COPEC	EPC (mg/kg)	Earthworm	Plant
Arsenic	3.35	0.049	n/a[a]
Barium	519	0.16	**2**
Beryllium	1.18	n/a	0.047
Cobalt	6.54	na[b]	0.05
Manganese	420	0.093	**0.38**
Selenium	0.661	n/a	0.22
Vanadium	23.8	n/a	0.3
	HI	0.3	**3**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Table G-5.4-32
HI Analysis Using LOAEL-Based ESLs for SWMU 14-006

COPEC	EPC (mg/kg)	Earthworm	Plant
Arsenic	4.46	0.066	n/a
Barium	124	0.039	**0.48**
Beryllium	1.02	n/a	0.041
Copper	42.4	0.08	0.087
Lead	47.7	n/a	0.084
Mercury	0.0983	0.2	n/a
Selenium	2.91	0.071	**0.97**
Zinc	101	0.11	0.12
RDX	2.6	0.17	na
	HI	0.6	**2**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Table G-5.4-33
HI Analysis Using LOAEL-Based ESLs for SWMU 14-007

COPEC	EPC (mg/kg)	Earthworm	Plant
Arsenic	3.35	0.049	n/a
Barium	216	0.068	**0.83**
Beryllium	1.21	n/a	0.048
Cobalt	6.75	na	0.052
Mercury	0.0841	0.17	n/a
Selenium	1.36	0.033	**0.45**
Vanadium	23.6	na	0.3
	HI	0.3	**2**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Table G-5.4-34
HI Analysis Using LOAEL-Based ESLs for SWMU 14-009

COPEC	EPC (mg/kg)	Earthworm	Plant
Antimony	4.12	n/a[b]	0.071
Arsenic	2.52	0.037	n/a
Barium	90.3	n/a	**0.35**
Mercury	0.159	**0.32**	n/a
Selenium	1.79	0.044	**0.6**
HMX	77.4	**0.48**	n/a
	HI	0.9	1

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.

[a] na = Not available.

[b] n/a = Not applicable.

Table G-5.4-35
HI Analysis Using LOAEL-Based ESLs for SWMU 14-010

COPEC	EPC (mg/kg)	Earthworm	Plant
Arsenic	3.41	0.05	n/a
Copper	33.9	0.064	0.069
Selenium	1.79	0.044	**0.6**
Zinc	48.5	0.052	n/a
HMX	58.1	**0.36**	n/a
	HI	0.6	0.7

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.

[a] n/a = Not applicable.

[b] na = Not available.

Table G-5.4-36
HI Analysis Using LOAEL-Based ESLs for AOC C-14-001

COPEC	EPC (mg/kg)	Plant
Barium	114	**0.44**
Cobalt	5.31	0.041
Selenium	1.31	**0.44**
	HI	0.9

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.

Table G-5.4-37
HI Analysis Using LOAEL-Based ESLs for AOC C-14-004

COPEC	EPC (mg/kg)	Plant
Barium	144	**0.55**
Cobalt	5.2	0.04
Selenium	1.34	**0.45**
	HI	1

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.

Table G-5.4-38
HI Analysis Using LOAEL-Based ESLs for AOC C-14-005

COPEC	EPC (mg/kg)	Earthworm	Plant
Mercury	1.32	**2.64**	n/a*
Selenium	1.34	0.033	**0.45**
	HI	**3**	0.5

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.
*n/a = Not applicable.

Table G-5.4-39
HI Analysis Using LOAEL-Based ESLs for AOC C-14-007

COPEC	EPC (mg/kg)	Earthworm	Plant
Arsenic	4.84	0.071	n/a*
Barium	74.2	n/a	0.29
Selenium	2.15	0.052	**0.72**
	HI	0.1	1

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.
*n/a = Not applicable.

Table G-5.4-40
HI Analysis Using LOAEL-Based ESLs for AOC C-14-008

COPEC	EPC (mg/kg)	Earthworm	Plant
Barium	276	0.086	**1.06**
Cobalt	6.8	na*	0.052
Selenium	1.92	0.047	**0.64**
Vanadium	25.9	na	**0.32**
	HI	0.1	**2**

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.
*****na = Not available.

Table G-5.4-41
HI Analysis Using LOAEL-Based ESLs for AOC C-14-009

COPEC	EPC (mg/kg)	Plant
Barium	94.3	**0.36**
Lead	40.3	0.071
Selenium	1.07	**0.36**
	HI	0.8

Note: Bolded values indicate HQ greater than 0.3 or HI greater than 1.

Attachment G-1

Dioxin and Furan Toxicity Equivalency Factor Calculations
(on CD included with this document)

Attachment G-2

ProUCL Files
(on CD included with this document)

Attachment G-3

Vapor Intrusion Spreadsheets
(on CD included with this document)

Attachment G-4

Ecological Scoping Checklist

G4-1.0 PART A—SCOPING MEETING DOCUMENTATION

Site IDs	Areas of Concern (AOCs) 14-001(g), C-14-001, C-14-004, C-14-005, C-14-007, C-14-008, and C-14-009; Solid Waste Management Units (SWMUs) 14-002(c), 14-003, 14-006, 14-007, 14-009, and 14-010
Form of site releases (solid, liquid, vapor). Describe all relevant known or suspected <u>mechanisms</u> of release (spills, dumping, material disposal, outfall, explosive testing, etc.), and describe potential <u>areas</u> of release. Reference locations on a map as appropriate.	Technical Area 14 (TA-14) is located north of Cañon de Valle and east of TA-16 and includes sites associated with firing sites, burning areas, an incinerator, a high explosives (HE) sump and drainline, and a septic system. Known as Q-site, TA-14 has been used since 1944 for explosives development and testing, including testing that involves radioactive materials. In 1952, the firing site was renovated, the structures were removed, and a new firing site was constructed. Spatially, the Cañon de Valle sites at TA-14 are located within relatively close proximity to each other. AOC 14-001(g) is an active firing pad (structure 14-35) located south of control building 14-23. SWMU 14-002(c) is a decommissioned firing site (structure 14-5) located in the southeastern portion of TA-14. SWMU 14-003 is a former burning area located approximately 300 ft northeast of a control building in the southeastern portion of TA-14. The area was used for burning combustible HE-contaminated debris and for flash-burning noncombustible HE-contaminated debris from test shots. SWMU 14-006 is a decommissioned HE sump (structure 14-31), associated drainline, and outfall located approximately 45 ft east of control building 14-23. SWMU 14-007 is a decommissioned septic system located approximately 70 ft northeast of building 14-6. SWMU 14-009 is a surface disposal area located south and west of building 14-43. SWMU 14-010 is a former HE sump that was located on the exterior south wall of a former firing chamber [structure 14-2, SWMU 14-002(a)]. AOC C-14-001 is the location of a former HE magazine in the south-central portion of TA-14. Constructed in 1944, the magazine was destroyed by burning in 1963. AOC C-14-004 is the location of a former electronics shop (structure 14-7) that was approximately 75 ft west of building 14-23 in the southeastern portion of TA-14. AOC C-14-005 is the location of a former storage building (structure 14-8) that was approximately 75 ft north of building 14-6. Constructed in 1944, the building was removed in 1952. AOC C-14-007 is the location of a former storage building (structure 14-10) that was located approximately 130 ft west of building 14-24 in the southeastern portion of TA-14. Constructed in 1945, the building was removed in 1952. AOC C-14-008 is a former HE magazine (structure 14-11). Constructed in 1945, the magazine was removed in 1952.

	AOC C-14-009 is a former HE magazine (structure 14-13) located approximately 125 ft northeast of structure 14-5. Potential releases from all of these sites were to surface and subsurface media.
List of Primary Impacted Media **(Indicate all that apply.)**	**Surface soil –** X **Surface water/sediment –** NA **Subsurface –** X **Groundwater –** NA **Other, explain –** NA
Vegetation Class Based on GIS Vegetation Coverage **(Indicate all that apply.)**	**Water** – NA **Bare ground/unvegetated** – X **Spruce/fir/aspen/mixed conifer** – NA **Ponderosa pine –** NA **Piñon juniper/juniper savannah** – X **Grassland/shrubland** – X **Developed** – X **Burned –** NA
Is T&E habitat present? **If applicable, list species known or suspected of using the site for breeding or foraging.**	No threatened and endangered (T&E) species nesting habitat is present at the site. However, the area is within the foraging range of the Mexican spotted owl.
Provide list of neighboring/ contiguous/upgradient sites, include 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 sites.
Surface Water Erosion Potential Information Surface water erosion potential is based on site observations	Run-on to sites occurs from storm water. Runoff from sites may infiltrate the surface and subsurface media and move as sheet flow or through small drainage channels into Cañon de Valle.

G4-2.0 PART B—SITE VISIT DOCUMENTATION

Site ID	AOCs 14-001(g), C-14-001, C-14-004, C-14-005, C-14-007, C-14-008, and C-14-009; SWMUs 14-002(c), 14-003, 14-006, 14-007, 14-009, and 14-010)
Dates of Site Visits	10/21/2011 and 7/27/2016
Site Visits Conducted by	John Branch; Randall Ryti, Kent Rich, Richard Mirenda, Tracy McFarland, Joe English, Steven Noe

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)** = Medium
Field Notes on the GIS Vegetation Class to Assist in Verifying the Arcview Information	The majority of the sites are located on the mesa top just south of R-Site Road. Vegetation from the ponderosa pine zone and piñon/juniper zone is established throughout the locations; there are also limited amounts of secondary successional grass and shrub species in the areas resulting from disturbances associated with the Q-site firing areas and erosion.
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.**	Yes. The sites contain terrestrial biota such as reptiles, mammals, insects, birds, and plants. The quality of habitat at the sites is sustainable for native plant and animal species present in the 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)	The areas on the mesa top have minimal potential for erosion because of their physical geographical location and the amount of vegetation located within the site. The terminal point of the surface water is the bottom of Cañon de Valle.
Are there any off-site transport pathways (surface water, air, or groundwater) **(yes/no/uncertain)?** **Provide explanation.**	The potential for surface water off-site transport pathways is very minimal because of the physical geographical location and the amount of vegetation located within the sites. Groundwater is located greater than 1000 ft below the surface.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities; review historical aerial photos where appropriate.)**	The sites located on the mesa top have moderate physical disturbances present. The area is moderately developed, containing roads, buildings, fences, and firing site–related structures.
Are there obvious ecological effects (yes/ no/uncertain)? **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	No. The only obvious ecological effects are the result of the minimal development in the area.

No Exposure/Transport Pathways:

If there are no complete exposure pathways to ecological receptors on-site 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 Site Characterization:

Do existing or proposed data provide information on the nature and extent of contamination (yes/ no/uncertain)? **Provide explanation (consider whether the maximum value was captured by existing sample data).**	Yes. The sampling approach in the approved work plans (LANL 2006, 091698; NMED 2007, 095478; LANL 2011, 207481) included sampling to determine the nature and extent of contamination within TA-14.
Do existing or proposed data for the site address potential transport pathways of site contamination (yes/ no/uncertain)? **Provide explanation (consider whether other sites should be aggregated to characterize potential ecological risk).**	Yes. Data from samples collected within the SWMUs and AOCs address potential transport pathways and characterize the potential ecological risk. The results indicate that the nature and extent of contamination at the sites have been defined.

Additional Field Notes:

Provide additional field notes on the site setting and potential ecological receptors.

AOC 14-001(g): Site is deferred. Sampling was in the drainages only.

SWMU 14-002(c): Noted shrubs (currents), forbs, and grasses.

SWMU 14-003: Former burning ground. Clean up in 1996−1997. Ponderosa pine, forbs, grasses were noted.

SWMU 14-006: Former sump/drainline/outfall. Large ponderosa pine and shrubs are evident. Runoff from AOC 14-001(g) is possible farther down the same drainage. Polycyclic aromatic hydrocarbons (PAHs) were detected and were likely from the decaying asphalt parking lot.

SWMU 14-007: Former sump/drainline/leach field/outfall. Inactive for many decades and large ponderosa pine are evident along with grass and forb understory.

SWMU 14-009: Drainages were sampled from this site. Some PAHs were detected, and there is an asphalt parking area upstream of the site and asphalt noted near the top. Ponderosa pine and shrubs were noted in the drainage.

SWMU 14-010: Former sump and drainline. Drainage was sampled and ponderosa pine and shrubs were noted.

AOC C-14-001: Former magazine; habitat has been naturalized.

AOC C-14-004: Former building; only evidence was a pile of bricks. Some asphalt pieces were noted. Ponderosa pines were nearby the former site location.

AOC C-14-005: Former building. Forbs and grasses were noted.

AOC C-14-007: Large ponderosa pine – about 5 m tall was noted.

AOC C-14-008: Former magazine; removed by burning. Site has become naturalized – ponderosa pine, shrubs, forbs, and grasses were noted.

AOC C-14-009: Former magazine. Noted piñon, shrubs (oaks), and grasses/forbs.

G4-3.0 PART C—ECOLOGICAL PATHWAYS CONCEPTUAL EXPOSURE MODEL

Provide answers to Questions A to V to develop the Ecological Pathways Conceptual Exposure Model

Question A:

Could soil contaminants reach receptors through vapors?

- **Volatility of the hazardous substance (volatile chemicals generally have Henry's law constant >10^{-5} atm-m^3/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Volatile organic compounds (VOCs) were detected in soil and tuff. Most of the detected concentrations were below or similar to the estimated quantitation limits.

Question B:

Could the soil contaminants reach receptors through fugitive dust carried in air?

- **Soil contamination would have to be on the actual surface of the soil to become available for dust.**
- **In the case of dust exposures to burrowing animals, the contamination would have to occur in the depth interval where these burrows occur.**

Answer (likely/unlikely/uncertain): Likely

Provide explanation: Some chemicals of potential concern (COPCs) were detected in the surface interval.

Question C:

Can contaminated soil be transported to aquatic ecological communities (use SOP 2.01 run-off score and terminal point of surface water runoff to help answer this question)?

- **If the SOP 2.01 run-off score* for each SWMU and/or AOC included in the site is equal to zero, this suggests that erosion at the site is not a transport pathway. (*Note that the runoff score is not the entire erosion potential score; rather, it is a subtotal of this score with a maximum value of 46 points.)**
- **If erosion is a transport pathway, evaluate the terminal point to see whether aquatic receptors could be affected by contamination from this site.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: No aquatic communities are present in TA-14 or in close proximity.

Question D:

Is contaminated groundwater potentially available to biological receptors through seeps, springs, or shallow groundwater?

- **Known or suspected presence of contaminants in groundwater.**
- **The potential exists 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 greater than 1000 ft. There are no seeps, springs, or shallow groundwater in TA-14.

Question E:

Is infiltration/percolation from contaminated subsurface material a viable transport and exposure pathway?

- **The potential exists for contaminants to migrate to groundwater.**
- **The potential exists 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 greater than 1000 ft. There are no seeps, springs, or shallow groundwater in TA-14.

Question F:

Might erosion or mass wasting events be a potential release mechanism for contaminants from subsurface materials or perched aquifers to the surface?

- **This question is only applicable to release sites located on or near the mesa edge.**
- **Consider the erodability of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Most sites are not located near the main canyon edge, so mass wasting is not relevant. There is minimal evidence of erosion at the sites.

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: 2

Terrestrial Animals: 2

Provide explanation: VOCs were detected but 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: 3

Terrestrial Animals: 3

Provide explanation: Surface soil contamination is present.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soils?

- **Contaminants in bulk soil may partition into soil solution, making them available to roots.**
- **Exposure of terrestrial plants to contaminants is 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: Surface soil contamination is present.

Question J:

Could contaminants interact with receptors through food-web transport from surficial soils?

- **The chemicals may bioaccumulate in animals.**
- **Animals may ingest contaminated food items.**

Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Terrestrial Animals: 3

Provide explanation: COPCs are present in the surface soil.

Question K:

Could contaminants interact with receptors through the incidental ingestion of surficial soils?

- **Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil, or groom 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 soils?

- **Significant exposure through dermal contact would generally be limited to organic contaminants that are lipophilic and can cross epidermal barriers.**

Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Terrestrial Animals: 2

Provide explanation: Low to moderate concentrations of 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: 2

Terrestrial Animals: 2

Provide explanation: Some gamma-emitting radionuclides were identified as COPCs.

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 aquatic habitat is present.

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 aquatic habitat is present.

Question P:

Could contaminants interact with receptors through the ingestion of water and suspended sediments?

- **If sediments are present in an area that is only periodically inundated with water, terrestrial receptors may incidentally ingest sediments.**
- **Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.**

Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):

Terrestrial Animals: 0

Provide explanation: No aquatic habitat is present.

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 aquatic habitat is present.

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 aquatic habitat is present.

Question S:

Could contaminants bioconcentrate in free-floating aquatic plants, 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 aquatic habitat is present.

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 aquatic habitat is present.

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 aquatic habitat is present.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

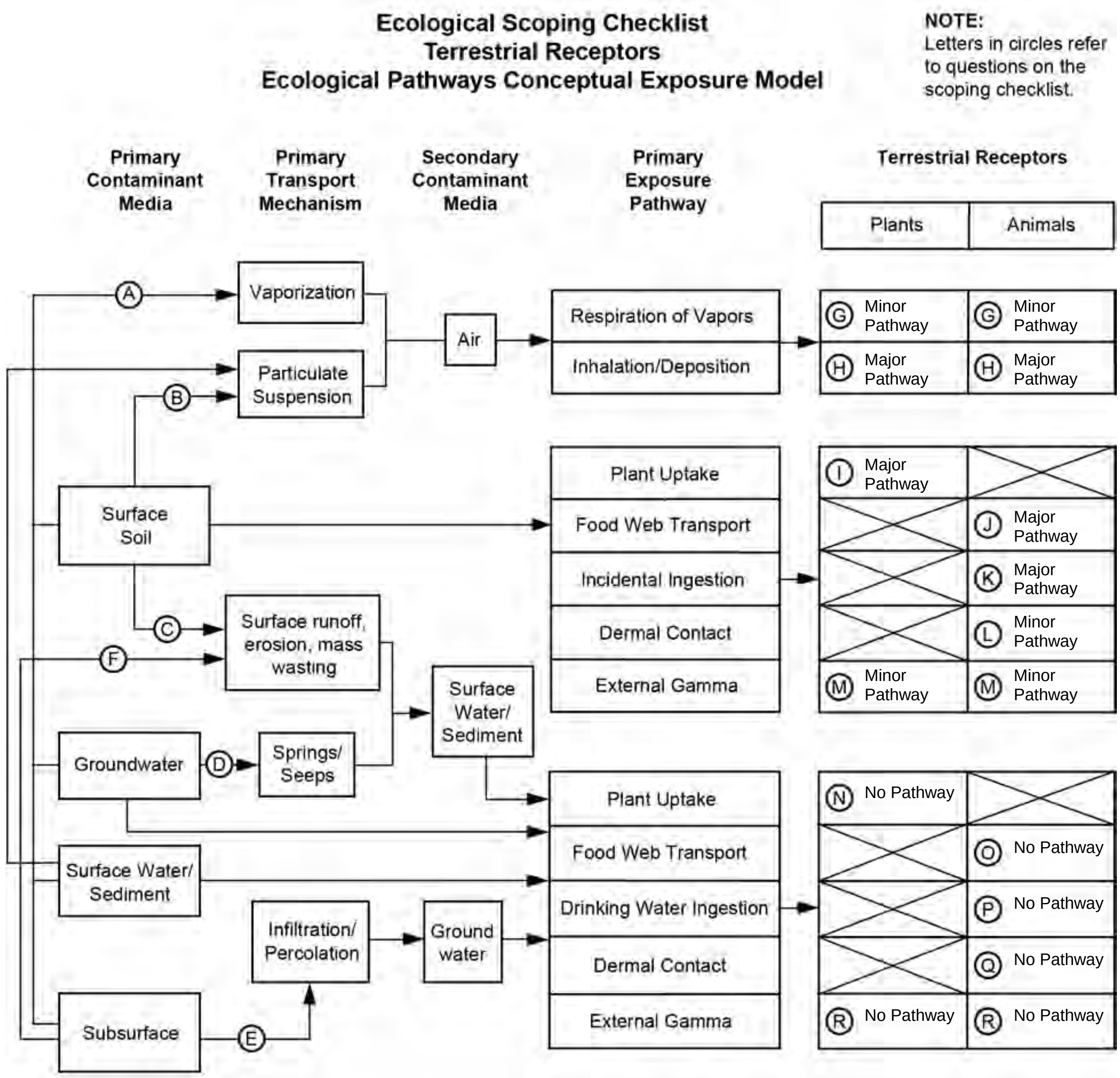
- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation; therefore, external irradiation is typically more important for sediment-dwelling organisms.**

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 aquatic habitat is present.

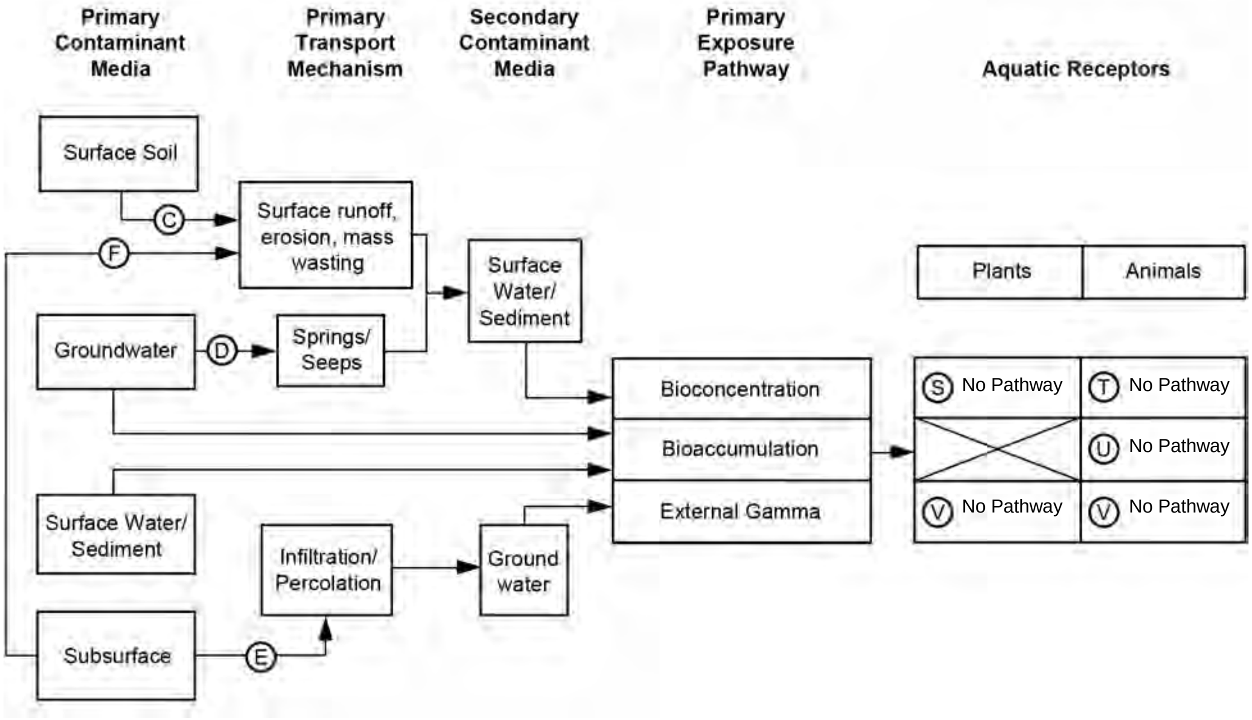


Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model

NOTE:
Letters in circles refer to questions on the scoping checklist.

Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model

NOTE:
Letters in circles refer to questions on the scoping checklist.



SIGNATURES AND CERTIFICATION

Checklist completed by:

Name (printed): Randall Ryti

Name (signature): Randall Ryti

Organization: Neptune and Company, Inc.

Date completed: August 5, 2016

Checklist reviewed by:

Name (printed): Richard Mirenda

Name (signature): Richard Mirenda

Organization: Los Alamos National Laboratory

Date reviewed: 10/16/16

G4-4.0 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 New Mexico Environment Department 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 2006. "Investigation Work Plan for Cañon de Valle Aggregate Area," Los Alamos National Laboratory document LA-UR-06-4960, Los Alamos, New Mexico. (LANL 2006, 091698)

LANL (Los Alamos National Laboratory), April 2011. "Field Implementation Plan for Cañon de Valle Aggregate Area Investigation, TA-14," Los Alamos National Laboratory document LA-UR-11-6344, Los Alamos, New Mexico. (LANL 2011, 207481)

NMED (New Mexico Environment Department), February 9, 2007. "Approval with Modifications for the Investigation Work Plan for Cañon de Valle Aggregate Area," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED HWB), Santa Fe, New Mexico. (NMED 2007, 095478)

Appendix H

Site Photographs

Figure H-1 **Weathered asphalt parking area adjacent to Solid Waste Management Unit (SWMU) 14-006 sump and upgradient of SWMU 14-006 outfall, looking east**

Figure H-2 Weathered asphalt on slope below SWMU 14-006 sump, looking east

Figure H-3 Asphalt debris on SWMU 14-009 hillslope, looking southwest

Figure H-4 Weathered asphalt on edge of mesa above SWMU 14-009 hillslope, looking southwest

Figure H-5 **Weathered asphalt at top of SWMU 14-009 hillslope, looking southwest**