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Date: April 30, 2009
Refer To: EP2009-0100

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Subject: Submittal of the Investigation Work Plan and the Historical Investigation Report for Lower Sandia Canyon Aggregate Area

Dear Mr. Bearzi:

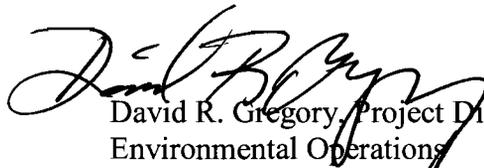
Enclosed please find two hard copies with electronic files of the Investigation Work Plan for Lower Sandia Canyon Aggregate Area and the Historical Investigation Report for Lower Sandia Canyon Aggregate Area. The Lower Sandia Canyon Aggregate Area includes a total of 82 solid waste management units and areas of concern located in Technical Area 53 (TA-53), TA-72, and former TA-20. Of these 82 sites, 54 have been previously investigated and/or remediated and have been approved for no further action. Site descriptions, previous investigations, and analytical results for the remaining 28 sites are included in the historical investigation report. Proposed investigation activities at the 28 sites are discussed in the investigation work plan.

If you have any questions, please contact Kent Rich at (505) 665-4272 (krich@lanl.gov) or Suzy Schulman at (505) 606-1962 (sschulman@doeal.gov).

Sincerely,


Michael J. Graham, Associate Director
Environmental Programs
Los Alamos National Laboratory

Sincerely,


David R. Gregory, Project Director
Environmental Operations
Los Alamos Site Office

Enclosures: 1) Two hard copies with electronic files - Investigation Work Plan for Lower Sandia Canyon Aggregate Area (LA-UR-09-2076)
2) Two hard copies with electronic files - Historical Investigation Report for Lower Sandia Canyon Aggregate Area (LA-UR-09-2077)

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LA-UR-09-2076
April 2009
EP2009-0100

Investigation Work Plan for Lower Sandia Canyon Aggregate Area

Prepared by the Environmental Programs Directorate

Los Alamos National Laboratory, operated by Los Alamos National Security, LLC, for the U.S. Department of Energy under Contract No. DE-AC52-06NA25396, has prepared this document pursuant to the Compliance Order on Consent, signed March 1, 2005. The Compliance Order on Consent contains requirements for the investigation and cleanup, including corrective action, of contamination at Los Alamos National Laboratory. The U.S. government has rights to use, reproduce, and distribute this document. The public may copy and use this document without charge, provided that this notice and any statement of authorship are reproduced on all copies.

Investigation Work Plan for Lower Sandia Canyon Aggregate Area

April 2009

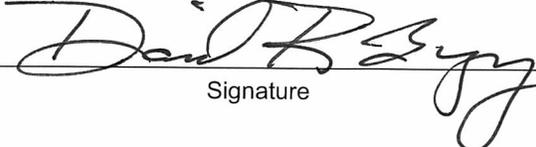
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EXECUTIVE SUMMARY

The Lower Sandia Canyon Aggregate Area includes a total of 82 solid waste management units (SWMUs) and areas of concern (AOCs) located in Technical Area 53 (TA-53), TA-72, and former TA-20 at Los Alamos National Laboratory. Of these 82 sites, 54 have been previously investigated and/or remediated and have been approved for no further action. For the remaining 28 sites requiring investigation, 11 are located in former TA-20, 16 are in TA-53, and 1 is in TA-72. This investigation work plan identifies and describes the activities needed to complete the investigation of the remaining 28 SWMUs and AOCs. Details of previous investigations and analytical results for the 28 sites included in this work plan are provided in the historical investigation report for Lower Sandia Canyon Aggregate Area.

The objective of this work plan is to evaluate the historical data and, based on that evaluation, to propose additional sampling as necessary to define the nature and extent of contamination associated with these remaining SWMUs and AOCs within the Lower Sandia Canyon Aggregate Area.

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Appendix A	Acronyms and Abbreviations, Metric Conversion Table, and Data Qualifier Definitions
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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 40 mi² of the Pajarito Plateau, which consists of a series of fingerlike mesas separated by deep canyons containing perennial and intermittent streams running from west to east. Mesa tops range in elevation from approximately 6200 to 7800 ft above mean sea level. The Lower Sandia Canyon Aggregate Area with respect to the Laboratory technical areas (TAs) is shown in Figure 1.0-1.

The Laboratory's Environmental Programs (EP) Directorate, which includes the former Environmental Restoration Project, is participating in a national effort by DOE to reduce risk to human health and the environment at its facilities. The goal of EP Directorate is to ensure that past operations do not threaten human or environmental health and safety in and around Los Alamos County, New Mexico. To achieve this goal, EP is currently investigating sites potentially contaminated by past Laboratory operations. The sites under investigation are designated as either solid waste management units (SWMUs) or areas of concern (AOCs).

The SWMUs and AOCs addressed in this investigation work plan are potentially contaminated with both hazardous and radioactive components. 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 5400.5, "Radiation Protection of the Public and the Environment," and DOE Order 435.1, "Radioactive Waste Management." Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with DOE policy.

Corrective actions at the Laboratory are subject to the March 1, 2005, Compliance Order on Consent (the Consent Order). This work plan describes work activities that will be executed and completed in accordance with the Consent Order.

1.1 Work Plan Overview

The Lower Sandia Canyon Aggregate Area includes a total of 82 SWMUs and AOCs located in TA-53 and TA-72 at Los Alamos National Laboratory (Plate 1). These SWMUs and AOCs include those associated with former TA-20, which is no longer an active TA and which was located within TA-53 and TA-72. Historical details of previous investigations and data for these sites are provided in the historical investigation report (HIR) for the Lower Sandia Canyon Aggregate Area (LANL 2009, 105078). Of the 82 sites, 54 have been investigated and/or remediated and approved for no further action (NFA) status (NFA-approval documents are referenced in Table 1.1-1); these 54 sites are not discussed further in this work plan. For the remaining 28 sites requiring investigation, 11 are located in former TA-20, 16 are in TA-53, and 1 is in TA-72. This work plan addresses these 28 sites using the information from previous field investigations or corrective actions to evaluate current conditions at each site. Plate 1 shows the locations of the sites under investigation in the Lower Sandia Canyon Aggregate Area.

Section 2 of this investigation work plan presents the general site information, operational history, and the preliminary conceptual site model of the Lower Sandia Canyon Aggregate Area sites. General site conditions are presented in section 3. Section 4 presents summaries of previous investigations and data collected and describes the scope of proposed activities for each site. The sites within the Lower Sandia Canyon Aggregate Area are widespread; therefore, they are organized by TA. Each TA subsection

includes background information on operational history, summary of releases, current site use, and status of the sites in the TAs. Section 5 presents investigation methods for proposed field activities. Ongoing monitoring and sampling programs in the Lower Sandia Canyon Aggregate Area are presented in section 6. Section 7 is an overview of the anticipated schedule of the investigation and reporting activities. The references cited in this report and the map data sources are provided in section 8. Appendix A of this work plan includes a list of acronyms and abbreviations, a glossary, and metric conversion table and the data qualifier definitions table. Appendix B describes the management of investigation-derived waste (IDW).

1.2 Work Plan Objectives

The objective of the investigation activities described in this work plan is to finalize determination of nature and extent of releases from the 28 sites.

To help accomplish this objective, this work plan

- presents historical and background information on the sites;
- describes the rationale for proposed data collection activities; and
- identifies and proposes appropriate methods and protocols for collecting, analyzing, and evaluating data to characterize these sites.

2.0 BACKGROUND

2.1 General Site Information

Former TA-20, a historical Laboratory TA, was located near the west end of Sandia Canyon and the SWMUs and AOCs associated with it are now contained within TA-53 and TA-72 (Plate 1). The TA-20 site consisted of a series of firing areas spaced along a small road heading west from NM 4, the only access route (LANL 1994, 034756, pp. 2-1–2-5). TA-20 was used from 1945 to 1948 to test initiators (devices used to generate neutrons needed to initiate nuclear chain reactions) and to conduct implosion studies.

TA-53 is located in the northeast portion of the Laboratory on Mesita de los Alamos, which is the mesa bounded by Los Alamos Canyon to the north and Sandia Canyon to the south (Plate 1). TA-53 is the location of the Los Alamos Neutron Science Center (LANSCE). The primary component of LANSCE is a 0.5-mi-long linear proton accelerator that produces subatomic particles for experimental physics activities and isotope production. TA-53 also contains office buildings, laboratories, and other facilities associated with the operation of the accelerator.

The portion of TA-72 within the Lower Sandia Canyon Aggregate Area consists of the eastern portion of Sandia Canyon within the Laboratory boundary. TA-72 is in the eastern portion of the Laboratory and is bounded by TA-05 and San Ildefonso Pueblo to the south, TA-74 to the north, TA-53 to the west, and Bandelier National Monument to the east (Figure 1.0-1). The majority of TA-72 is vacant land that serves as a safety and security buffer. The primary active operations at TA-72 occur within Lower Sandia Canyon and consist of a small-arms firing range used by the Laboratory's security force for training purposes since 1966. In addition, two Laboratory water supply wells (Pajarito Wells 1 and 3 [PM-1 and PM-3, respectively]), each with associated facilities (chlorinator and pump station), are located within TA-72. The portion of TA-72 within lower Sandia Canyon also encompasses much of the location of former TA-20.

2.2 Operational History

TA-20 was established during the Manhattan Project, beginning in 1944, to test initiators using both implosion and impaction methods. Implosion testing involved placing test devices inside metal shapes that were then imploded using high explosives (HE). After implosion, the devices were recovered for study. Impaction tests were conducted by firing test devices from a smooth-bore Navy gun into an earth-filled recovery bin or by firing devices from a 20-mm gun into a target. Test measurements were taken as the devices impacted the recovery bin or targets. A number of buildings and gun-firing sites, a firing pit, and magazines for munitions storage were developed in support of the testing program (LANL 1996, 054466). Initiator tests were conducted until late 1945, when the work was transferred to TA-33. TA-20 was then briefly used to conduct other types of implosion tests (LANL 1994, 034756, pp. 2-1–2-4).

In 1946, an intensive radiation monitoring and cleanup effort was performed at TA-20 and included the removal and disposal of items such as soil and gloves. In 1948, all experimental operations at TA-20 ceased, and the area was largely decommissioned to make way for a new road through the canyon (East Jemez Road, also known as the "Truck Route"). Decommissioning activities included dismantling and removing structures and a site cleanup that netted 60 to 70 lb of HE. Some of the structures deactivated in 1948 were not destroyed until 1960, when they were burned after they had been monitored for HE, radiation, and toxic materials. Periodic follow-up searches for HE continued until 1973, when the Laboratory Safety Group declared the area safe and removed fencing and warning signs. In 1985, a radiation survey of the remaining TA-20 structures (mainly underground structures including manholes, pull boxes, and footings) was conducted, and most of the structures were removed at that time (LANL 1994, 034756, p. 2-4).

TA-53 was originally developed as the Los Alamos Meson Physics Facility (LAMPF). Construction of LAMPF began in 1967, and the facility became fully operational in 1974. The facility was renamed LANSCE to reflect the programs currently carried out at TA-53. LANSCE programs and activities are housed in a large complex (approximately 400 buildings), including the building housing the linear accelerator itself, experimental areas and laboratories, and experimental support operations and advanced technology programs. LANSCE is presently used for research in condensed-matter science and engineering, accelerator science, fundamental nuclear physics, and radiography (LANL 1996, 054466).

TA-72 is currently used as an active small-arms firing and training range by the Laboratory's security force. The firing range is located in Sandia Canyon at the west end of TA-72 and has been operational since 1966. It includes a 175-ft × 250-ft firing range surrounded by earthen berms, an adjacent skeet-shooting range, a tactical training range, and administrative buildings. The drainage channel and flood plain of Sandia Canyon run through the middle of the firing range. Structures at this site include an office building (former guard station 72-8), range house (72-9), scoring area (72-10), firing station (72-11), weapons-cleaning area (72-12), storage buildings (72-13 and 72-14), and canopies 3 and 4 (72-15 and 72-16) (LANL 1990, 007514). Lead is present within the firing range because bullets are scattered at the base of the berms and cliffs, and lead shot from skeet shooting is visible on the ground (LANL 1994, 034756, pp. 2-9, 5-22).

In 1995, as part of a voluntary corrective action (VCA) conducted at SWMU 00-016 (an inactive small arms firing range), NMED concurred with the Laboratory's request to move lead-contaminated soil (in the form of lead bullet casings) to the active AOC 72-001 small-arms firing range (DOE 1995, 046257). During the second phase of the VCA implemented at SWMU 00-016 in 1996 and 1997, lead was removed from soil stockpiled from berms at the former firing range using dry sieving. Approximately 4660 yd³ of fine soil from SWMU 00-016 was transported to TA-72 and placed on the berms located

along the north side of the AOC 72-001 firing range and along the berm that was located between and north of canopies 3 and 4 (LANL 1997, 056737).

2.3 Conceptual Site Model

The sampling proposed in this plan uses a conceptual site model to predict areas of potential contamination and allow for adequate characterization of these areas. A conceptual site model describes potential contaminant sources, transport mechanisms, and receptors.

2.3.1 Potential Contaminant Sources

Releases at sites within Lower Sandia Canyon Aggregate Area may have occurred as a result of waste disposal, air emissions, or effluent discharges. Previous sampling results indicate contamination from inorganic chemicals, organic chemicals, and radionuclides (LANL 2009, 105078). Additional sampling is needed to determine the nature and extent of contamination.

Potential contaminant sources originally present in former TA-20 include landfills used to dispose of materials associated with firings sites, debris from tests at firing sites and gun sites, and discharges from septic systems. Most of these sources presumably were removed during cleanup activities associated with construction of the new access road to the Los Alamos townsite (Buckland 1948, 006001). These cleanup activities included excavation and removal of landfills and removal of firing site structures. Therefore, the original sources of contamination associated with TA-20 operations have likely been removed. The potential exists, however, for residual contaminated environmental media to be present (e.g., soil, sediment, and tuff).

Potential contaminant sources associated with TA-53 are waste and material storage areas, storage tanks, a waste disposal pit, and an outfall. Although there are no ongoing releases from any of these sources, past releases may have resulted in contamination of environmental media, which represents a potential source for potential contaminant migration.

Potential contaminant sources at TA-72 include spent projectiles from small arms firing. Lead in the form of spent bullets is the primary contaminant source and are present in backstops, berms, and throughout the range area. As noted in section 2.2, lead-contaminated soil from another firing range was also brought on site for use in constructing the berms.

2.3.2 Potential Contaminant Transport Mechanisms

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.

2.3.3 Potential Receptors and Pathways

Potential receptors may include

- Laboratory workers and
- plants and animals both on-site and in areas immediately surrounding the sites.

Laboratory workers could potentially be exposed to contaminants in soil, tuff, and sediment by direct contact, ingestion, or inhalation. Ecological receptors may also be exposed to soil and sediment contaminants.

2.3.4 Cleanup Standards

As specified in Section VII.B.1 of the Consent Order, screening levels will be used as soil cleanup levels unless they are determined to be impracticable or unless values do not exist for the current and reasonably foreseeable future land use. As described in section 3.3.1, the current and reasonably foreseeable land use for all SWMUs and AOCs being investigated is industrial. Soil screening levels (SSLs) for an industrial scenario are presented in Table 2.3-1 for previously detected inorganic and organic chemicals. The screening action levels (SAL) for the industrial scenario are also provided in Table 2.3-1 for previously detected radionuclides. Because none of the SWMUs and AOCs in the aggregate area is accessible to the public for recreational use, recreational SSLs are not considered as cleanup levels.

2.4 Data Overview

Data evaluated in this work plan include historical data collected from 1995 through 2006, as part of Resource Conservation and Recovery Act (RCRA) facility investigations (RFIs) and other corrective actions. In the Sample Management Database, all data records include a vintage code field denoting how and where samples were submitted for analyses. The data vintage is considered when the quality of historical data is evaluated. All historical data evaluated in this report are validated or revalidated by current quality control (QC) metrics.

Analytical samples described in this work plan have undergone analyses at both on- and off-site laboratories. Because analytical practices and documentation of analyses vary in quality and completeness, analytical data presented are of either screening-level or decision-level data. Screening-level data are appropriate for applications that only require determination of gross contamination areas and/or for site characterization. Screening-level data are also used to specify areas where samples should be collected. Decision-level data are used to quantify the nature and extent of releases and to perform risk assessments. Decision-level data presented in this work plan have been validated for such use and provide supporting information for the investigation activities proposed in the work plan.

Inorganic chemical and radionuclide data from previous investigations are compared with background values (BVs) and fallout values (FVs) (LANL 1998, 059730, p. 6-2). Fallout radionuclides in soil greater than a depth of 6 in. or in rock and organic chemicals are evaluated based on detection status.

This work plan summarizes the available decision-level data to determine whether the nature and extent of contamination are defined for each site. In addition, this work plan proposes sampling activities and analytical suites for those sites at which the nature and extent of contamination have not been defined. The data collected during this investigation, along with existing decision-level data, will be used to define nature and extent and perform risk screening. In some cases, previous sampling locations are being

resampled because previous results may no longer be representative of current conditions. In these cases, only the current data will be used to define nature and extent and to perform risk screening.

3.0 SITE CONDITIONS

3.1 Surface Conditions

3.1.1 Soil

Soil on the Pajarito Plateau was initially mapped and described by Nyhan et al. (1978, 005702). The soil on the slopes between the mesa tops and canyon floors was mapped as mostly steep rock outcrops consisting of approximately 90% bedrock 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).

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

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

3.1.2 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.

Sandia Canyon has a relatively small drainage area (5.5 mi²) that heads on the western Pajarito Plateau at TA-03 at an elevation of approximately 7450 ft above sea level (asl). The canyon extends east/southeast from TA-03 to the Rio Grande for a distance of approximately 10 mi. The canyon contains a stream that is continuous in the upper canyon from effluent discharges from the Laboratory sanitary

wastewater treatment plant and from cooling tower discharges. The middle and lower parts of the canyon, including the part in the Lower Sandia Canyon Aggregate Area, contain a stream that is ephemeral from natural runoff. The Sandia Canyon watershed has no named tributaries on Laboratory property (LANL 1999, 064617, p. 3-2).

During summer thunderstorms and spring snowmelt, runoff from Mesita de los Alamos flows into storm drains, down hillsides, and into Sandia Canyon. Surface-water runoff and erosion of contaminated surface soil from sites in TA-53 may lead to contamination of sediments and surface water in Sandia Canyon. Surface water may also access subsurface contaminants exposed by soil erosion.

3.1.3 Land Use

Currently, land use of the Lower Sandia Canyon Aggregate Area is industrial. TA-53, which comprises much of the mesa-top portion of the aggregate area, is highly developed with major experimental facilities and numerous office and laboratory buildings, utilities, parking lots, roads, and other paved areas. The eastern end of Mesita de los Alamos, east of the TA-53 facilities, is undeveloped.

The TA-72 firing range is the main developed area in the canyon-bottom portion of the aggregate area. The firing range contains various structures associated with the training activities conducted at that site. Other structures in the canyon bottom include two municipal supply well pump houses and a vehicle inspection station at the east end of TA-72. A portion of the east end of TA-72 are accessible to the public for recreational use. None of the publically accessible area, however, contains any Lower Sandia Canyon Aggregate Area SWMUs or AOCs.

3.2 Subsurface Conditions

3.2.1 Anticipated Stratigraphic Units

The stratigraphy of the Lower Sandia Canyon 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 2005 hydrogeologic synthesis report (Collins et al. 2005, 092028).

The bedrock at or near the surface of the mesa top is the Bandelier Tuff. There are approximately 1200 ft of volcanic and sedimentary materials between the mesa top and the regional aquifer. The distance from the canyon bottom to the regional aquifer is approximately 900 ft. The stratigraphic units underlying the Lower Sandia Canyon Aggregate Area from the surface to the regional aquifer are described briefly in the following sections. The descriptions begin with the oldest (deepest) and proceed to the youngest (topmost). These descriptions are taken from a 1999 Laboratory report (LANL 1999, 064617) and use the following definitions for sections of Sandia Canyon:

- upper Sandia Canyon extends from the head of the canyon at TA-3 to the western edge of TA-53 where East Jemez Road enters the canyon from the west,
- middle Sandia Canyon extends from the west end of TA-53 to the structures at the firing range in TA-72, and
- lower Sandia Canyon extends from the structures at TA-72 to the eastern Laboratory boundary at NM 4.

Figure 3.2-1 presents the generalized stratigraphy described below.

3.2.1.1 Santa Fe Group

In the general area of Sandia Canyon, the Santa Fe Group was penetrated by water supply wells PM-1 and PM-3, both located in lower Sandia Canyon. Based on borehole lithological and geophysical logs, Purtymun (1995, 045344, p. 4) informally divided the Santa Fe Group into three formations, which include (in ascending order) the Tesuque Formation, the Chamita Formation, and a coarse-grained upper facies.

The Tesuque and Chamita Formations are terrestrial sedimentary deposits that filled the Española Basin of the Rio Grande during subsidence in late Tertiary period. The coarse-grained upper facies of the Santa Fe Group was deposited in a late Miocene trough 3 to 4 mi (4.8 to 6.4 km) wide and 7 to 8 mi (11 to 13 km) long that extended northeastward beneath the Pajarito Plateau (see Figure 2-4 of the hydrogeologic work plan [LANL 1996, 055430]). This trough is filled with up to 1500 ft (approximately 450 m) of gravels, cobbles, and boulders derived from the Jemez volcanic field and with volcanic, metamorphic, and sedimentary rocks derived from highlands to the north and east. The trough is partly coincident with low-gravity anomalies that Ferguson et al. (1995, 056018) interpreted as a sediment-filled graben on the western side of the Española Basin of the Rio Grande rift. The eastern side of this trough crosses Cañada del Buey near NM 4. The western margin of the trough is not well constrained but may be located in the western portion of the Laboratory.

Tesuque Formation

In PM-3, the Tesuque Formation primarily consists of poorly consolidated, light pinkish brown, silty sandstone, siltstone, and claystone (Cooper et al. 1965, 008582). The sandstones are predominately fine-to-medium-grained, and the sand grains are subrounded to well-rounded.

Chamita Formation

The Chamita Formation is similar in appearance to the Tesuque Formation but reportedly contains a larger proportion of volcanic and granitic clasts in its gravel layers (Galusha and Blick 1971, 021526) and Paleozoic limestone cobbles in its conglomerate layers (Dethier and Manley 1985, 021506). The Chamita Formation contains lithologically distinct quartzitic gravels (Galusha and Blick 1971, 021526, p. 71). Upper layers of the Chamita Formation may contain cobbles of Jemez volcanic rocks, primarily andesites and dacites. However, because of similarities of appearance, obvious time overlaps, and interfingering relations, differentiation of the Chamita Formation from the coarse-grained upper facies of the Santa Fe Group is often difficult, particularly in borehole investigations. The Chamita Formation was reported to be absent in PM-3 (Purtymun 1995, 045344, pp. 275–277). The coarse-grained upper facies of the Santa Fe Group may be a facies variation of the Chamita Formation.

Coarse-Grained Upper Facies of the Santa Fe Group

The coarse-grained upper facies of the Santa Fe Group is composed of a mixture of volcanic debris from the Sierra de los Valles and arkosic and granitic debris from the highlands to the north and east of the Pajarito Plateau. This distinctive group of coarse-grained sediment at the top of the Santa Fe Group is the “Chaquehui Formation” (Purtymun 1995, 045344, p. 6). The name “Chaquehui Formation” as related to Santa Fe Group sediment is a potentially confusing designation because the type section of the “Chaquehui Formation” in Chaquehui Canyon is much younger than the coarse-grained upper facies of the Santa Fe Group identified in boreholes on the Pajarito Plateau. The Chaquehui Formation constitutes quartzite clast-bearing maar deposits of the Cerros del Rio volcanic field. In PM-3, the upper coarse-grained facies consists of medium- to coarse-grained sandstone, conglomerate, and siltstone (Purtymun 1967, 011829, p. 9). Because of the high permeability characteristics of this facies, it is an important

aquifer zone for the development of high-yield, low-drawdown municipal and industrial water supply wells on the Pajarito Plateau.

The deep boreholes in lower Sandia Canyon and in lower Pajarito Canyon encountered basaltic lava flows that are interbedded with the sedimentary deposits of the upper Santa Fe Group. These basalts range in thickness from 30 ft to 480 ft (9.1 m to 146 m). They generally are described as dark gray and dense, but red vesicular zones are also present (Cooper et al. 1965, 008582, p. 60; Purtymun 1967, 011829, p. 9; Purtymun 1995, 045344, p. 263).

3.2.1.2 Puye Formation, Tschicoma Formation, and Cerros del Rio Basalts

The Puye Formation is mostly a fanglomerate deposit generally consisting of poorly sorted boulders, cobbles, and coarse sands. At PM-3, the clasts are composed of dacite, rhyolite, and fragments of basalt and pumice (Purtymun 1967, 011829, p. 8). At well TW-8 (located in Mortandad Canyon), the fanglomerate consists predominately of fine- to coarse-grained sands and interbedded clay, silt, and gravel (Baltz et al. 1963, 008402). The lower fanglomerate includes more than 95 ft (29 m) of light tan to light gray tuff and tuffaceous sand.

The lower Puye Formation includes coarse sand and boulder deposits interpreted to represent an axial facies deposit of the ancestral Rio Grande as described by Manley (1976, 057673) and Dethier (1997, 049843). The axial facies deposit was previously (informally) called the "Totavi Lentil" (1964, 092516). At PM-3 this deposit is composed of gravel and boulders of dacite, rhyolite, and quartzite (Purtymun 1967, 011829, p. 9). The thickness of the axial facies deposit varies from 40 ft (12 m) at PM-4 (located in Cañada del Buey) to 70 ft (21 m) at PM-2 (located in Pajarito Canyon) and PM-5 (located on Mesita del Buey) (Purtymun 1995, 045344, pp. 275–277). The axial facies deposit interfingers with the fanglomerates of the Puye Formation and basaltic rocks of the Cerros del Rio volcanic field in White Rock Canyon.

At PM-2, PM-3, PM-4, and PM-5, a sequence of brown and gray basaltic lava flows split the Puye Formation into the main lower part and a thin upper part (Purtymun 1995, 045344, pp. 275–277). Similar basalts were penetrated in the Puye Formation by other deep boreholes in the area. These basalts are present beneath the Guaje Pumice Bed at PM-2 and PM-4, although variable thickness of fanglomerate facies may be present above the basalts. The basalts are stratigraphically equivalent to the basaltic rocks of the Cerros del Rio volcanic field and probably represent an extension of that volcanic field beneath the Pajarito Plateau.

Dacitic volcanic rocks, presumably representing the distal edge of a Tschicoma Formation lava flow, were encountered beneath the Bandelier Tuff in borehole SHB-1 (located west of TA-55). The dacite flow appears to occupy a similar stratigraphic position within the Puye Formation, as do the basalts. Similar dacite flows may underlie the upper and middle sections of Sandia Canyon. However, several deep boreholes drilled to 750 ft (225 m) at TA-46 did not encounter either the dacite or the basalt flows in the upper Puye Formation (Purtymun 1995, 045344, p. 209). This finding may indicate the volcanic flows in the Puye Formation do not extend laterally beneath the entire Pajarito Plateau.

The top of the regional zone of saturation beneath the Pajarito Plateau is usually encountered within the fanglomerate facies of the Puye Formation and the associated interbedded basalts. The regional zone of saturation initially was encountered beneath Sandia Canyon at a depth of 722 ft (220 m) in PM-1, 740 ft (225 m) in PM-3, and recently at a depth of 805 ft (245 m) in regional well R-12 (located in lower Sandia Canyon). A possible intermediate perched zone was encountered at a depth of 450 ft (140 m) in basalts within the Puye Formation during the drilling of PM-1. A perched intermediate zone of saturation was encountered from a depth of 443 ft to 519 ft in the lower part of the basaltic rocks of the Cerros del Rio

volcanic field and in the underlying old alluvium in well R-12 (Purtymun 1995, 045344; Broxton et al. 1998, 059665).

3.2.1.3 Otowi Member of the Bandelier Tuff

The Otowi Member is a nonwelded, poorly consolidated ignimbrite sheet composed of stacked ash-flow units. These units are composed of pumice lapilli supported by a matrix of ash and crystal fragments. The Otowi Member varies in reported thickness from 184 ft (56 m) in borehole SHB-1 to 465 ft (142 m) in borehole EGH-LA-1 (located in Mortandad Canyon). The deposits of the Otowi Member beneath upper Sandia Canyon and middle Mortandad Canyon (near well TW-8 and borehole EGH-LA-1) are among the thickest on the Pajarito Plateau from deposition in a pre-Bandelier Tuff paleovalley (see Figure 5 in Broxton and Reneau 1996, 055429, p. 330). The paleovalley containing the thick Otowi Member sediments continues southward across middle Cañada del Buey and Pajarito Canyon.

The Otowi Member outcrops east of the Laboratory boundary and is known to exist in the subsurface beneath the canyons from drill-hole data. The Otowi Member is 320 ft (98 m) thick at PM-4, 140 ft (43 m) thick at PM-3, and 120 ft (37 m) thick at PM-1. The Otowi Member thins eastward against a north-trending basaltic highland that crosses Sandia Canyon and Cañada del Buey near NM 4. The Otowi Member is absent in the lower off-site Sandia Canyon and Cañada del Buey where it either was not deposited or was removed by erosion before the Tshirege Member was deposited.

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. The Guaje Pumice Bed typically is 30 ft to 35 ft (9.1 m to 10.7 m) thick beneath the Pajarito Plateau (27 ft [8 m] at PM-2). Beneath lower Sandia Canyon the Guaje Pumice Bed thickens from west to east and is 20 ft (6 m) thick in PM-3 and 45 ft (13.7 m) thick in PM-1 (Purtymun 1995, 045344, pp. 275–276).

3.2.1.4 Tephra and Volcaniclastic Sediment of the Cerro Toledo Interval

Tephra and volcaniclastic sediment of the Cerro Toledo interval are an informal name given to a complex sequence of epiclastic sediment and tephra of mixed provenance (Broxton and Reneau 1995, 049726, p. 11). This unit includes well-stratified tuffaceous sandstones and siltstones, primary ash-fall and pumice-fall deposits, and dacite-rich gravel and boulder deposits. The Cerro Toledo deposits, which vary in thickness from 0 to more than 100 ft (30 m), were probably deposited episodically with unevenly distributed local deposits. Some sediment was deposited in drainage channels developed on top of the Otowi Member before deposition of the Tshirege Member. Other blanket-type fallout deposits were deposited across the plateau, including on paleotopographic drainage divides. Erosion and possible redeposition of the Cerro Toledo interval sediment and possibly the underlying Otowi Member occurred in places before deposition of the Tshirege Qbt 1 unit, which may have contributed to locally variable thickness. The Cerro Toledo interval is approximately 140 ft (43 m) thick in borehole SHB-1 (Gardner et al. 1993, 012582, p. 9) and approximately 80 ft (24 m) thick in borehole 35-2028 located in Ten Site Canyon (Laughlin et al. 1993, 054424, p. 2-3).

The Cerro Toledo interval crops out along the steep south-facing walls of lower Sandia Canyon near supply well PM-1 where dacite-rich gravels occur between the Tshirege and Otowi Members (Reneau and McDonald 1996, 055538, p. 38). These and other similar deposits indicate the presence of a pre-Tshirege paleodrainage that likely trends northwest to southeast, oblique to Sandia Canyon (Broxton and Reneau 1996, 055429, p. 329).

3.2.1.5 Tshirege Member of the Bandelier Tuff

The Tshirege Member is a multiple-flow ignimbrite sheet that underlies the alluvium on the floor of upper and middle Sandia Canyon and forms the prominent cliffs and mesas adjacent to the canyon. The Tshirege Member includes a number of subunits that can be recognized based on differences in physical and weathering properties. This work plan follows the nomenclature of Broxton and Reneau (1995, 049726, p. 8), which was adopted for use as a standard by the former Environmental Restoration Project. Both Purtymun and Kennedy (1971, 004798) and Rogers (1995, 054419) applied different systems of stratigraphic nomenclature to subunits of the Tshirege Member.

Tsankawi Pumice Bed

The Tsankawi Pumice Bed (Qbtt) is the basal pumice outfall deposit of the Tshirege Member. The pumice bed is typically 1 ft to 3 ft thick in this part of the Laboratory. It is composed of angular to subangular clast-supported pumice lapilli up to 2.4 in. in diameter. Qbtt is exposed on the south-facing canyon wall of lower Sandia Canyon near well PM-1.

Tshirege Member Unit 1g

Tshirege Member unit 1g (Qbt 1g) is the lowermost unit in the thick ignimbrite sheet that makes up most of the Tshirege Member. Qbt 1g is a porous, nonwelded, poorly sorted, vitric ignimbrite. It is poorly indurated but nonetheless forms steep cliffs because a resistant bench near the top of the unit forms a protective cap over the softer underlying tuff. Qbt 1g underlies much of middle and lower Sandia Canyon and outcrops as lower parts of cliff walls in middle and lower Sandia Canyon.

Tshirege Member Unit 1v

Tshirege Member unit 1v (Qbt 1v) is a series of cliff- and slope-forming outcrops composed of porous, nonwelded, devitrified ignimbrite. The base of the unit is a thin, horizontal zone of preferential weathering that marks the abrupt transition from vitric tuffs below to devitrified tuffs above. This feature forms a mappable marker horizon on canyon walls in portions of upper and middle Sandia Canyon. The lower part of Qbt 1v is a resistant orange-brown colonnade tuff (Qbt 1v-c) that forms a distinctive low cliff characterized by columnar jointing. The colonnade tuff is overlain by a distinctive white band of slope-forming tuffs. Qbt 1v is exposed in the canyon wall in middle and lower Sandia Canyon and is present beneath the canyon floor west of TA-53.

Tshirege Member Unit 2

Unit 2 of the Tshirege Member of the Bandelier Tuff (Qbt 2) forms a distinctive, medium-brown, vertical cliff-forming unit that stands out in marked contrast to the slope-forming, lighter colored tuffs above and below. This unit is devitrified, relatively highly welded, and forms the steep, narrow canyon walls of middle and upper Sandia Canyon and underlies the canyon floor at the head of Sandia Canyon. Qbt 2 forms a resistant caprock on mesa tops surrounding lower Sandia Canyon and is the caprock at the east end of Mesita del los Alamos.

Tshirege Member Unit 3

Unit 3 of the Tshirege Member of the Bandelier Tuff (Qbt 3) is a nonwelded to partially welded, devitrified ignimbrite. The basal part of Qbt 3 consists of a soft, nonwelded tuff that forms a broad, gently sloping bench on the top of Qbt 2 in canyon wall exposures and on the broad canyon floor in upper Sandia

Canyon. The upper part of Qbt 3 is a partially welded tuff that forms the caprock on mesas adjacent to upper and middle Sandia Canyon. This unit is more densely welded to the west and locally contains apparent horizontal bedding and/or fracturing.

3.2.1.6 Alluvium

Alluvium of Pleistocene and Holocene age rests unconformably on the Bandelier Tuff in Sandia Canyon west of NM 4. The alluvium overlies the Cerro Toledo interval in the lower Sandia Canyon near observation well SCO-2. East of NM 4 and through White Rock, the stream channel in the canyons is often located directly on basalts of the Cerros del Rio volcanic field, with relatively minor alluvium present. The alluvium in the canyon is derived from weathering of the Bandelier Tuff, which forms the steep walls on the sides of the canyon. The alluvium also contains sediment derived from eolian sources and fallout pumice deposits. In the upper parts of the canyon, the alluvium is thin and consists of gravels, sand, silt, and clay (Devaurs and Purtymun 1985, 007415, p. 11). The sand consists mainly of fine- to coarse-grained crystals of quartz and sanidine. The gravel fraction of the alluvium is composed mostly of low-density tuff clasts that are soft and relatively easily pulverized, and dark, resistant, angular-to-subangular volcanic clasts that are present in the tuff as lithic fragments, and which remain in the alluvium after tuff weathering (Reneau and McDonald 1996, 055538, p. 46).

The alluvium is relatively thin in the upper and middle parts of the canyon but generally widens and thickens downstream. In lower Sandia Canyon, the Cerro Toledo interval outcrops on the north side of the canyon near wells R-12 and PM-1. Large boulders of Tschicoma Formation dacite are present within the Cerro Toledo interval at this location. The alluvium downstream from these outcrops may contain some reworked boulders and sediment from this unit.

The thickest part of the alluvium may be in middle Sandia Canyon or in lower Sandia Canyon near wells PM-3 and SCO-1. The alluvium is approximately 18 ft (5.5 m) thick at wells SCO-1 and SCO-2. The alluvium in Sandia Canyon thins eastward until the stream channel rests directly on basalt bedrock east of NM 4. The location of the base of the alluvium may be difficult to determine in the lower canyon near wells R-12 and PM-1 where the Cerro Toledo interval subcrops beneath the alluvium.

3.2.2 Hydrogeology

The hydrogeology of the Pajarito Plateau is generally separable in terms of mesas and canyons forming the plateau. Mesas are generally devoid of water, both on the surface and within the rock forming the mesa. Canyons range from wet to relatively dry; the wettest canyons contain continuous streams and contain perennial groundwater in the canyon-bottom alluvium. Dry canyons have only occasional stream flow and may lack alluvial groundwater. Intermediate perched groundwater has been found at certain locations on the plateau at depths ranging between 100 and 400 ft. The regional aquifer is found at depths of about 600 to 1200 ft.

The hydrogeologic conceptual site model for the Laboratory (Collins et al. 2005, 092028) 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.

3.2.2.1 Groundwater

In the Los Alamos area, groundwater occurs as (1) water in shallow alluvium in some of the larger canyons, (2) intermediate perched groundwater (a perched groundwater body lies above a less

permeable layer and is separated from the underlying aquifer by an unsaturated zone), and (3) the regional aquifer. 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 locations of the existing wells within the vicinity of the Lower Sandia Canyon Aggregate Area are shown in 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 is finer grained, consisting of clay, silt, sand, and gravel derived from the Bandelier Tuff.

In contrast to the underlying volcanic tuff and sediment, alluvium is relatively permeable. Ephemeral runoff in some canyons infiltrates the alluvium until downward movement is impeded by the less permeable tuff and sediment, which results in the buildup of a shallow alluvial groundwater body. Depletion by evapotranspiration and movement into the underlying rock limits 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).

In Sandia Canyon, the infiltration of water near the eastern limit of surface flow recharges alluvial groundwater that generally accumulates in the lower part of the alluvial deposits, most often perching on or within shallow bedrock units. The thickest, most persistent perched alluvial groundwater occurs in middle Sandia Canyon, between alluvial wells SCA-2 and SCA-5 (Plate 1). The region between these two alluvial wells is identified by water-level measurements as contributing to alluvial groundwater loss to bedrock units beneath the canyon floor. The western boundary of the main zone of bedrock infiltration is uncertain, but it possibly extends to the area between gaging stations D123.6 and D123.8 (Plate 1) (LANL 2007, 098938, p. 5).

Perched Intermediate Waters

Observations of perched intermediate water are rare on the Pajarito Plateau. Perched intermediate waters are thought to form mainly at horizons where medium properties change dramatically, such as at paleosol horizons containing clay or caliche. It is not known whether perched intermediate water bodies are isolated or connected and to what degree they may influence travel times and pathways for contaminants in the vadose zone.

In Sandia Canyon, a thin zone of perched intermediate groundwater occurs within the Puye Formation atop the Cerros del Rio basalt between wells SCC-1 and SCC-4 (Plate 1). This perched system appears to thicken westwards, and it probably is recharged by percolation of moisture from the overlying rocks (LANL 2007, 098938, p. 6).

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 along the western margin of the plateau and about 600 ft at the eastern margin. The location of wells and generalized water-level contours on top of the regional aquifer are described in the annual General Facility Information report (LANL 2008, 101932). The regional aquifer is typically separated from the alluvial groundwater and intermediate perched zone groundwater by 350 to 620 ft of tuff, basalt, and sediments (LANL 1993, 023249).

The regional aquifer is a complex, heterogeneous system that includes confined and unconfined zones. The degree of hydraulic communication between these zones is thought to be spatially variable. The shallow portion of the regional aquifer (near the water table) is predominantly under phreatic (unconfined) conditions and has limited thickness (approximately 30 to 50 m [98 to 164 ft]). Groundwater flow and contaminant transport directions in this zone generally follow the gradient of the regional water table; the flow is generally east/southeastward. The direction and gradient of flow at the regional water table are predominantly controlled by areas of recharge (e.g., the Sierra de los Valles and variably within some Pajarito Plateau canyons) and discharge (White Rock Canyon springs and the Rio Grande). The deep portion of the regional aquifer is predominantly under confined conditions, and it is stressed by Pajarito Plateau water-supply pumping. The pumping probably has a small impact on the flow directions in the phreatic zone because of poor hydraulic communication (LANL 2007, 098938, p. 7).

4.0 SITE DESCRIPTIONS AND PROPOSED INVESTIGATION ACTIVITIES

The following sections present site descriptions, summaries of previous investigation activities, proposed sampling activities, and proposed remedial activities. Table 4.0-1 summarizes the investigation strategy for each SWMU or AOC and identifies analytical methods for the site characterization activities proposed in this work plan.

Many of the sites in the Lower Sandia Canyon Aggregate Area were previously investigated during a 1995 RFI (LANL 1995, 054466) and/or other previous corrective actions. The decision-level data for these sites were evaluated to determine whether nature and extent had been defined. At some sites, RFI samples were collected only at one depth at each location. For these sites, vertical extent is not defined, and additional samples will be collected at deeper depths from RFI sampling locations. Sampling depths were selected so deeper samples will probably be collected in media that have not been impacted by potential releases. Lateral extent was evaluated based on frequency of detection and concentration trends with distance from contaminant sources. At sites where lateral extent does not appear to have been defined, step-out samples are proposed at greater distances from source areas than the original RFI samples. The number of samples and step-out distances were selected based on the distribution of contaminants detected in the RFI samples and the expected extent of contamination.

For most sites, the analytical suites are also being expanded beyond those used in the RFI. The RFI had limited analysis of organic constituents; therefore, VOCs and SVOCs have been added for samples from the TA-20 landfills and septic systems and the TA-53 storage areas where they were not previously analyzed. Anion analysis (i.e., cyanide, nitrate, and perchlorate) was not performed during the RFI, and these analytes have been added to those sites where there is a potential for their past use or disposal. RFI samples from many of the TA-20 sites were analyzed for uranium, with frequent detections slightly above background. Samples from these sites will be analyzed for isotopic uranium to provide better data with which to evaluate background.

At several sites [SWMU 20-001(c) and AOCs 20-003(c) and 20-004], RFI samples appear to have been collected at the wrong locations or sampling locations could not be confirmed, and the RFI data cannot be used to evaluate nature and extent. These sites will be resampled using the original RFI sampling

approach, with additional sampling depths as needed to ensure vertical extent can be determined and with additional analyses as described above.

The Lower Sandia Canyon Aggregate Area has been disturbed as a result of many years of new construction and demolition of former structures. Before sampling is conducted, geodetic and, in some cases, geophysical surveys will be used to verify specific SWMU and AOC boundaries. The sampling locations proposed in this work plan may be adjusted as a result of these surveys; however, the overall sampling strategy will remain the same.

4.1 TA-20

The former TA-20 was located in the canyon bottom near the west end of Sandia Canyon. The SWMUs and AOCs associated with former TA-20 are located partly within TA-53 and TA-72. Sites to be investigated within the Lower Sandia Canyon Aggregate Area at former TA-20 include three inactive landfills, six former firing sites, and two former septic systems.

Samples collected for TA-20 during previous investigations and corrective actions and analyses requested are presented in Table 4.1-1. Decision-level data for inorganic chemicals, organic chemicals, and radionuclides are presented in Tables 4.1-2, 4.1-3, and 4.1-4, respectively. These tables present inorganic chemicals detected above BVs or having detection limits above BVs, detected organic chemicals, and radionuclides detected or detected above BVs/FVs. All laboratory analytical data (both decision-level and screening-level) are also provided in Appendix B of the HIR (LANL 2009, 105078). Figures 4.1-1 to 4.1-28 include base maps; maps showing inorganic chemicals detected above BVs, detected organic chemicals, and radionuclides detected or detected above BVs/FVs; and maps showing the proposed sampling locations for TA-20 sites.

4.1.1 SWMU 20-001(a), Landfill

4.1.1.1 Site Description

SWMU 20-001(a) is a former landfill used to bury scrap metal, some of which may have been contaminated from firing-site activities conducted at former TA-20. This SWMU is located next to East Jemez Road and slightly west of the currently active small-arms firing range at TA-72 (Figure 4.1-1). The landfill was removed in 1948, before East Jemez Road was constructed. A 1948 memorandum describing cleanup efforts in Sandia Canyon notes that three burial grounds were excavated and that the ground "checked negative" after removal (Buckland 1948, 006001). SWMU 20-001(a) is presumed to be one of the three burial grounds referred to in the memorandum. Little is known about the actual dimensions of the landfill; however, a 1965 memorandum states the landfill was approximately 5 ft deep (Russo 1965, 005984).

4.1.1.2 Previous Investigations

In 1986, geophysical surveys were conducted in an attempt to find evidence of the landfill site. Its location was not positively established at that time. This area was included in a DOE Headquarters Environmental Survey in 1987 (DOE 1988, 008609, pp. 4-177–4-180). The DOE report notes that the landfill site was located across East Jemez Road from the present location of the TA-72 small-arms firing range and that an approximately 5-ft-deep depression, was observed at the end of an unimproved road. This depression was not noted during the 1986 geophysical survey (LANL 1994, 034756, p. 5-5).

A Phase I RFI was conducted during 1995 (LANL 1996, 054466). During the 1995 RFI, the former location of SWMU 20-001(a) and the surrounding area were gridded (200 ft × 300 ft), and a geophysical survey was conducted. A backhoe was used to excavate portions (two trenches) of the site that showed anomalies in the geophysical survey. A field radiological survey was conducted before excavation, and no radiation levels above local background were detected (LANL 1996, 054466, p. 5-3). The north trench excavation exposed small pieces of wood debris, a 3-ft-long section of a pole, and a metal power-pole anchor. Excavation of the south trench produced no evidence of previous disturbance. Soil samples were collected from seven locations at the north trench and one location at the south trench (LANL 1996, 054466, p. 5-7). At each location, a sample was collected from a depth of 10 to 11 ft and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 4.1-1.

Decision-level data from the 1995 RFI are presented in Tables 4.1-2, 4.1-3, and 4.1-4, which show inorganic chemicals detected above BVs or having detection limits above BVs, organic chemicals detected, and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs, organic chemicals detected, and radionuclides detected or detected above BVs/FVs are shown in Figures 4.1-2, 4.1-3, and 4.1-4, respectively.

Uranium was the only inorganic chemical detected above BV and was detected above BV for soil in all eight samples and slightly above the maximum background concentration for soil (3.6 mg/kg; LANL 1998, 059730) in six samples. Mercury, silver, and thallium were not detected above BVs for soil but had detection limits above BVs. Tetryl (2,4,6-trinitrophenyl-N-methylnitramine) was the only organic chemical detected and was detected in one sample (0.65 mg/kg). Cesium-137 and strontium-90 were each detected in one sample at depths greater than 0.5 ft below ground surface (bgs), and europium-152 was detected at depths greater than 0.5 ft bgs in four samples.

4.1.1.3 Proposed Activities

The nature and vertical extent of contamination have not been defined at this site. Sixteen subsurface soil/tuff samples will be collected from the eight 1995 RFI sampling locations and analyzed for additional analytes beyond those from the RFI to define the nature of contamination and at greater depths to define vertical extent (Figure 4.1-5). The samples will be collected at the original RFI sampling depth (10 to 11 ft bgs) and at 14 to 15 ft bgs at each location. Data from the upper sampling depth will be used to replace the RFI results, which had a limited analytical suite. All samples will be analyzed for target analyte list (TAL) metals, cyanide, nitrate, perchlorate, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), explosive compounds, isotopic uranium, strontium-90, and gamma-emitting radionuclides. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.1.2 SWMU 20-001(b), Landfill

4.1.2.1 Site Description

SWMU 20-001(b) is a former landfill located in the central portion of Sandia Canyon next to East Jemez Road (Figure 4.1-6). Together with SWMU 20-002(c) and AOC 20-003(c), SWMU 20-001(b) comprises Consolidated Unit 20-001(b)-00. The site is believed to have been excavated with a bulldozer and had been used to dispose of a number of gun barrels (Russo 1965, 005984). The landfill was excavated and its contents removed in a 1948 cleanup effort (LANL 1994, 034756, pp. 5-1–5-3). A 1948 memorandum describing cleanup efforts in Sandia Canyon notes that three burial grounds were excavated and that the

ground “checked negative” after removal (Buckland 1948, 006001). SWMU 20-001(b) is presumed to be one of the three burial grounds referred to in the memorandum.

4.1.2.2 Previous Investigations

In 1986, a geophysical survey of the site was conducted to find evidence of the former landfill. Several anomalies, possibly indicating past disposal activity, were noted (Weston 1989, 005439). In 1989, a radiological survey of the area found only background radiation levels (LANL 1994, 034756, pp. 5-1–5-3).

A Phase I RFI was conducted during 1995, at which time an area approximately 150 ft × 200 ft was gridded and a geophysical survey conducted (LANL 1996, 054466). Where geophysical anomalies were evident from the survey, three trenches were excavated. The east trench excavation exposed a 4-ft-long piece of electrical conduit and some rope. Excavation of the north trench exposed structural steel shapes and angles, the Navy gun foundation, and wood debris. The southern trench exposed inactive utility lines and a 6-ft-long pipe wrench. Soil samples were collected from seven locations in each trench (LANL 1996, 054466, pp. 5-8–5-12). One sample was collected at each location at depth intervals ranging from 1.0 to 2.0 ft, 6.0 to 7.0 ft, 8.0 to 9.0 ft, 9.0 to 10.0 ft and 10.0 to 11.0 ft and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, and strontium-90. The samples collected in 1995 and analyses requested are presented in Table 4.1-1.

Decision-level data from the 1995 RFI are presented in Tables 4.1-2 and 4.1-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and the results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 4.1-7 and 4.1-8, respectively.

Cadmium, copper, iron, silver, and uranium were detected above BVs. Cadmium was detected above BV for soil but below the maximum background concentration for soil (2.6 mg/kg; LANL 1998, 059730) in two samples. Copper was detected above the BV for soil and the maximum background concentration for soil (16 mg/kg; LANL 1998, 059730) in one sample. Iron was detected above the BV for soil but below the maximum background concentration for soil (36000 mg/kg; LANL 1998, 059730) in one sample. Silver was detected above BV for soil in one sample. Total uranium was detected above soil BV in all 21 samples and above the maximum background concentration for soil (3.6 mg/kg) in 20 of these samples. Antimony was not detected above BV but had detection limits above BV. HE was not detected. Cesium-137 and sodium-22 were each detected in one sample at depths greater than 0.5 ft bgs. Uranium-238 was detected slightly above BV in one sample.

4.1.2.3 Proposed Activities

The nature and vertical extent of contamination has not been defined at this site. Sixteen subsurface soil/tuff samples will be collected from eight of the 1995 RFI sampling locations and analyzed for additional analytes beyond those from the RFI to define nature of contamination and at greater depths to define vertical extent (Figure 4.1-9). Three samples will be collected from each of the two long (easternmost) trenches. Samples will be collected from the RFI sampling locations at the ends and middle of each trench (locations 20-01014, 20-01017, 20-01020, 20-01026, 20-01023, and 20-01027). Two samples will be collected from the short (western) RFI trench. Samples will be collected from the RFI sampling locations at the ends of the trench (locations 20-01028 and 20-01034). At each of these locations, samples will be collected from the deepest RFI sampling interval (10 to 11 ft bgs) and from 14 to 15 ft bgs. Data from the upper sampling depth will be used to replace the RFI results, which had a limited analytical suite. All samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, VOCs,

SVOCs, explosive compounds, isotopic uranium, and gamma-emitting radionuclides. Samples will not be analyzed for strontium-90 because it was not detected in the RFI samples. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.1.3 SWMU 20-001(c), Landfill

4.1.3.1 Site Description

SWMU 20-001(c) is a former landfill and, together with SWMUs 20-002(a) and 20-002(b), comprises Consolidated Unit 20-001(c)-00. This landfill was located on the far west end of former TA-20, just north of East Jemez Road (Figure 4.1-10). This site is believed to have been used to dispose of a number of 3- to 5-in. bore guns cut into sections and buried in a trench (Russo 1965, 005984). The site was excavated and its contents were removed in a 1948 cleanup effort (LANL 1994, 034756, pp. 5-1–5-3). A 1948 memorandum describing cleanup efforts in Sandia Canyon notes three burial grounds were excavated and the ground “checked negative” after removal (Buckland 1948, 006001). SWMU 20-001(c) is presumed to be one of the three burial grounds referred to in the memorandum.

4.1.3.2 Previous Investigations

A Phase I RFI was conducted at SWMU 20-001(c) in 1995 (LANL 1996, 054466). During the RFI, samples were collected at 21 locations. Subsurface samples were collected from a depth of 10 to 11 ft at each location, and a surface sample (0.0 to 0.5 ft) was collected at one location. All samples were analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, and strontium-90 (Table 4.1-1). The RFI report stated that the 1995 sampling for SWMU 20-001(c) was not conducted in the proper location (LANL 1996, 054466, p. 5-15) but did not elaborate on the reasons.

The 1995 sampling locations for SWMU 20-001(c) are incorrect; therefore, it is uncertain whether the results of the 1995 RFI samples are representative of current contamination conditions at this site. Because the locations associated with these sampling results could not be confirmed as being correct, these results are not decision-level data and are not presented.

4.1.3.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. The former landfill location and surrounding area, as identified in the RFI work plan (LANL 1994, 034756, p. 5-2), will be gridded and a geophysical survey conducted over this area to determine the location of the former landfill. A backhoe will be used to excavate trenches or test pits at anomalies identified in the geophysical survey. If waste is uncovered, it will be removed. Samples will be collected from two depths at the bottom of any excavation (1–2 ft and 4–5 ft below the bottom of the excavation). If no anomalies are identified, samples will be collected at 10 locations from two depths (10 to 11 ft and 14 to 15 bgs) within the geophysical survey boundary (Figure 4.1-11). If tuff is encountered before the proposed sampling intervals, soil samples will be collected above the soil/tuff interface and tuff samples will be collected from 2 to 3 ft below the soil/tuff interface. Samples collected at SWMU 20-001(c) will be analyzed for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, strontium-90, and gamma-emitting radionuclides. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.1.4 SWMU 20-002(a), Former Firing Pit

4.1.4.1 Site Description

SWMU 20-002(a) is the location of a former firing pit (structure 20-6) used from 1945 to 1948 to conduct initiator tests. Together with SWMUs 20-001(c) and 20-002(b), SWMU 20-002(a) comprises Consolidated Unit 20-001(c)-00. The firing pit was located on the far west end of former TA-20, south of East Jemez Road (Figure 4.1-10). The steel-lined pit was constructed following the failure of the Dumbo [a contained firing vessel, see description of SWMU 20-002(b)]. The firing pit had interior dimensions of 14 ft 8 in. × 14 ft 8 in. × 12 ft deep. The walls and floor of the pit consisted of 0.75-in.-thick steel plate backed by 12-in. × 12-in. timbers. The pit was covered by a steel framework overlain by a mat of 0.25-in.-diameter steel rods spaced 1 in. apart. According to a 1947 report, the framework and mat, presumably installed to contain shot debris, failed after the first few shots (LASL 1947, 005581). Laboratory facility engineering records indicate the pit was removed in April 1948. A memorandum dated April 20, 1948, describing cleanup efforts in Sandia Canyon notes that one “cage” was excavated and that the “interior checked negative after clearing” (Buckland 1948, 006001). The SWMU 20-002(a) firing pit is presumed to be the “cage” referred to in the memorandum.

4.1.4.2 Previous Investigations

In 1985, environmental samples were collected from this site for the Los Alamos Site Characterization Program and analyzed for HE, uranium, beryllium, and gross-alpha and -beta radioactivity. Only one sample indicated the presence of uranium slightly above background levels used at that time (10.16 mg/kg versus 3 to 7 mg/kg) (LANL 1994, 034756, p. 5-20).

In 1995, a Phase I RFI was conducted at SWMU 20-002(a) (LANL 1996, 054466). The site was gridded and field surveyed for radiological contamination; the survey results were used to determine the sampling locations. Soil samples were collected at 11 locations within an approximate 100-ft radius of the firing pit. At each location, a surface sample (0.0 to 0.5 ft) and subsurface sample (2.5 to 3.0 ft) were collected and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 4.1-1.

Decision-level data from the 1995 RFI are presented in Table 4.1-2, which shows inorganic chemicals detected above BVs and having detection limits above BVs. Sampling locations and the results for inorganic chemicals above background are shown in Figure 4.1-12.

Inorganic chemicals detected above BVs are copper, lead, and uranium. Copper was detected above BV for soil and the maximum background concentration for soil (16 mg/kg) in three samples. Lead was detected above BV for soil and the maximum background concentration for soil (28 mg/kg; LANL 1998, 059730) in one sample. Uranium was detected above BV for soil in 16 samples and above the maximum background concentration for soil (3.6 mg/kg) in one sample. Mercury, silver, and thallium were not detected above BVs but had detection limits above BVs. HE was not detected, and radionuclides were not detected or detected above BVs/FVs.

4.1.4.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Twenty-seven samples will be collected from nine locations and analyzed for additional analytes beyond those from the RFI to define the nature of contamination and at step-out locations and greater depths to define lateral and vertical extent (Figure 4.1-11). Three samples will be collected at each of four new step-out locations around the site to define lateral and vertical extent. Three samples will be collected at each of five previous RFI locations

(locations 20-01056, 20-01061, 20-01063, 20-01065, and 20-01066) to define vertical extent. At each location, samples will be collected at 0 to 1 ft, 2 to 3 ft, and 4 to 5 ft bgs. Data from the upper two sampling depths will be used to replace the RFI results, which had a limited analytical suite. All samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, and isotopic uranium. Samples will not be analyzed for strontium-90 or gamma-emitting radionuclides because these were not detected in the RFI samples. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.1.5 SWMU 20-002(b), Former Steel Tanks (Firing Site)

4.1.5.1 Site Description

SWMU 20-002(b) is the site of two former 5-ft-diameter cylindrical steel containment vessels known as Dumbos (Figure 4.1-10). Together with SWMUs 20-001(c) and 20-002(a), SWMU 20-002(b) comprises Consolidated Unit 20-001(c)-00. The Dumbos were designed to contain explosives tests to recover explosive fragments. The Dumbo containment units were mounted on a firing pad at each end of a concrete platform (structure 20-7) near the west end of former TA-20. Other structures associated with this site are a manhole (structure 20-4) and platform and hoist (structure 20-8). One Dumbo unit was used only once because of the difficulty of opening the containment vessel after the shot was fired within the vessel, and the second Dumbo unit was never used. The two Dumbos were constructed in 1945 and 1946 and were removed in 1948 (LANL 1994, 034756, pp. 5-13–5-15). Laboratory facility engineering records document that the firing pads and the platform were removed in April 1948.

4.1.5.2 Previous Investigations

A 1946 Laboratory memorandum states the two Dumbos were surveyed for radioactivity. The used Dumbo showed activity of 3000 to 5000 counts per minute (cpm) on the rim and greater than 20,000 cpm on the interior; no contamination was found on the unused Dumbo (Littlejohn 1946, 005997).

In 1985, radiation surveys and soil sampling were performed at this site as part of the Los Alamos Site Characterization Program. The surveys showed background radiation levels and the soil samples showed no uranium concentrations above background levels (LANL 1994, 034756, p. 5-20).

In 1995, a Phase I RFI was conducted at SWMU 20-002(b) (LANL 1996, 054466). The site was gridded and field surveyed for radiological contamination; the survey results were used to determine the soil sampling locations. Soil samples were collected at 11 locations within an approximate 100-ft radius of the firing pad. At each location, a surface sample (0.0 to 0.5 ft) and subsurface sample (2.5 to 3.0 ft) were collected and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 4.1-1.

Decision-level data from the 1995 RFI are presented in Tables 4.1-2 and 4.1-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 4.1-12 and 4.1-13, respectively.

Inorganic chemicals detected above BVs are mercury and uranium. Mercury was detected slightly above BV for soil and the maximum background concentration for soil (0.1 mg/kg; LANL 1995, 059730) in one sample. Uranium was detected above BV for soil in 19 samples and above the maximum background concentration for soil (3.6 mg/kg) in 7 samples. Antimony, cadmium, silver and thallium were not detected

above BVs but had detection limits above BVs. No HE was detected. Europium-152 was detected in four samples and ruthenium-106 was detected in one sample; neither radionuclide has a BV or FV.

4.1.5.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Twenty-one samples will be collected from seven locations and analyzed for additional analytes beyond those from the RFI to define the nature of contamination and at step-out locations and greater depths to define lateral and vertical extent (Figure 4.1-11). Three samples will be collected at each of two new step-out locations around the site to define lateral and vertical extent. Three samples will be collected at each of five previous RFI locations (locations 20-01067, 20-01069, 20-01071, 20-01074, and 20-01076) to define vertical extent. At each location, samples will be collected at 0 to 1 ft, 2 to 3 ft, and 4 to 5 ft bgs. Data from the upper two sampling depths will be used to replace the RFI results, which had a limited analytical suite. All samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, isotopic uranium, and gamma-emitting radionuclides. Samples will not be analyzed for strontium-90 because it was not detected in the RFI samples. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.1.6 SWMU 20-002(c), Former Firing Point

4.1.6.1 Site Description

SWMU 20-002(c) is a former firing point located near the southwest edge of TA-53 close to the boundary of TA-72 (Figure 4.1-6). This firing point was used for tests with explosive charges of up to 50 lb. Together with SWMU 20-001(b) and AOC 20-003(c), SWMU 20-002(c) comprises Consolidated Unit 20-001(b)-00. The firing point is depicted in engineering drawing ENG-C 1778, Revision 1, as a pad bordered on three sides by an earthen berm (LASL 1951, 024345). Engineering records show that the structure associated with this firing point (structure 20-9) was removed in April 1948. A memorandum dated April 20, 1948, describing cleanup efforts in Sandia Canyon notes seven "shot areas" were excavated and the "ground checked negative after removal" (Buckland 1948, 006001). It is likely that the SWMU 20-002(c) firing point is one of the seven shot areas. The north side of this site is currently covered by the road embankment for East Jemez Road.

4.1.6.2 Previous Investigations

A Phase I RFI was conducted in 1995 (LANL 1996, 054466). During the RFI, a 200-ft × 200-ft-grid field radiological survey was conducted at this site. Surface radiation readings were measured and recorded at 20-ft intervals (LANL 1996, 054466, p. 5-3). The radiological survey showed little variation across the site, except for higher readings along the drainage that transects the site (LANL 1996, 054466, p. 5-30). Samples were collected from eight locations within an approximate 100-ft radius of the firing point (Figure 4.1-6). At each location, a surface sample (0.0 to 0.5 ft) and two subsurface samples (2.5 to 3.0 ft and 4.5 to 5.0 ft) were collected and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 4.1-1.

Decision-level data from the 1995 RFI are presented in Tables 4.1-2 and 4.1-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 4.1-14 and 4.1-8, respectively.

Inorganic chemicals detected above BVs are chromium, lead, mercury, silver, thallium, uranium, and zinc. Chromium was detected above BV for soil in 12 samples and above the maximum background concentration for soil (36.5 mg/kg; LANL 1998, 059730) in 9 samples. Lead was detected above BV for soil but below the maximum background concentration for soil (28 mg/kg) in one sample. Mercury was detected above BV for soil and the maximum background concentration for soil (0.1 mg/kg) in seven samples. Silver was detected slightly above BV for soil in one sample. Thallium was detected above BV for soil and the maximum background concentration for soil (1 mg/kg; LANL 1998, 059730) in three samples. Uranium was detected above BV for soil in 22 samples and above the maximum background concentration for soil (3.6 mg/kg) in 9 samples. Zinc was detected above BV for soil but below the maximum background concentration for soil (75.5 mg/kg; LANL 1998, 059730) in nine samples. Antimony and cadmium were not detected above BVs but detection limits were above BVs. No HE was detected. Cesium-137 was detected in two subsurface samples, and strontium-90 was detected in four subsurface samples.

4.1.6.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Twenty-four samples will be collected from eight locations and analyzed for additional analytes beyond those from the RFI to define the nature of contamination and at step-out locations and greater depths to define lateral and vertical extent (Figure 4.1-15). Three samples will be collected at each of four new step-out locations around the site to define lateral and vertical extent. Three samples will be collected at each of four previous RFI locations (locations 20-01145, 20-01146, 20-01149, and 20-01151) to define vertical extent. At each location, samples will be collected at 0 to 1 ft, 4 to 5 ft, and 8 to 9 ft bgs. Data from the upper two sampling depths will be used to replace the RFI results, which had a limited analytical suite. All samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, isotopic uranium, strontium-90, and gamma-emitting radionuclides. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.1.7 SWMU 20-002(d), Former Firing Point

4.1.7.1 Site Description

SWMU 20-002(d) is a former firing point located near a manhole (structure 20-3) in the central part of former TA-20 (Figure 4.1-16). Fewer than 10 implosion shots were fired near structure 20-3 (LANL 1994, 034756, p. 5-15). One of these shots, containing 500 lb of Composition B, did not completely detonate. A 1962 Laboratory memorandum describes two cleanup efforts related to this incident: one conducted immediately after the incident and a second that was part of the 1948 Sandia Canyon cleanup conducted before the construction of East Jemez Road (Courtright 1962, 005971). Other historical documents indicate small pieces of HE were found and removed from this site at various times, including in July 1966, July 1967, and June 1969 (Drake and Courtright 1966, 005985; Drake and Courtright 1967, 005986; Drake and Courtright 1969, 005987). No HE was found during inspections in April 1971, May 1973, and June 1975.

4.1.7.2 Previous Investigations

In 1985, environmental samples were collected from this site for the Los Alamos Site Characterization Program. Two soil samples indicated the presence of uranium above established background levels at that time (52.48 and 33.25 mg/kg versus 3 to 7 mg/kg) (LANL 1994, 034756, p. 5-22).

In 1995, a Phase I RFI was conducted at SWMU 20-002(d) (LANL 1996, 054466). Samples were collected from eight locations within a 50-ft radius of the former firing point (Table 4.1-4). At each location, a surface sample (0.0 to 0.5 ft) and two subsurface samples (2.5 to 3.0 ft and 4.5 to 5.0 ft) were collected and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 4.1-1.

Decision-level data from the 1995 RFI are presented in Tables 4.1-2 and 4.1-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 4.1-17 and 4.1-18, respectively. The sampling coordinates for samples collected at location 20-01093 could not be verified. Therefore, the results for these samples are not decision-level data and are not presented in Tables 4.1-2 and 4.1-4 and Figures 4.1-17 and 4.1-18. The results for the surface sample collected at this location included the highest detected concentrations of copper and beryllium.

Inorganic chemicals detected above BVs are beryllium, copper, thallium, uranium, and zinc. Beryllium was detected above BV for soil in three samples and above the maximum background concentration for soil (3.95 mg/kg; LANL 1998, 059730) in two samples. Copper was detected above BV for soil in five samples and above the maximum background concentration for soil (16 mg/kg) in four samples. Thallium was detected above BV for soil and the maximum background concentration for soil (1 mg/kg) in one sample. Uranium was detected above BV for soil in 20 samples and above the maximum background concentration for soil (3.6 mg/kg) in 5 samples. Zinc was detected above BV for soil but below the maximum background concentration (75.5 mg/kg) in two samples. Antimony, cadmium, mercury, and silver were not detected above BVs but had detection limits above BV. HE was not detected. Cesium-137 was detected in one subsurface sample. Strontium-90 was detected above the soil FV in two surface samples and was also detected in four subsurface samples. Uranium-234 was detected above BV for soil in five samples, uranium-235 was detected above BV for soil in eight samples, and uranium-238 was detected above BV for soil in three samples.

4.1.7.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Twenty-four samples will be collected from eight locations and analyzed for additional analytes beyond those from the RFI to define nature of contamination and at step-out locations and greater depths to define lateral and vertical extent (Figure 4.1-19). Three samples will be collected at each of four new step-out locations around the site to define lateral and vertical extent. Three samples will be collected at each of four previous RFI locations (locations 20-01086, 20-01087, 20-01089, and 20-01092) to define vertical extent. At each location, samples will be collected at 0 to 1 ft, 4 to 5 ft, and 8 to 9 ft bgs. Data from the upper two sampling depths will be used to replace the RFI results, which had a limited analytical suite. All samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, isotopic uranium, strontium-90, and gamma-emitting radionuclides. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.1.8 AOC 20-003(b), Former 20-mm Gun-Firing Site

4.1.8.1 Site Description

AOC 20-003(b) is a former 20-mm gun-firing site that consisted of two buildings constructed in 1945 and located near the canyon wall (Figure 4.1-20). Building 20-44 was a 16 ft × 16-ft × 8-ft-high wood-frame building equipped with concrete gun mounts. Adjacent control building 20-13 had approximately the same

dimensions. The site was used to conduct initiator timing tests, which consisted of firing projectiles from a 20-mm gun into steel plates set against the canyon walls. In 1948, the 20-mm gun was relocated to TA-04. A site visit in 1993 confirmed that all surface structures and the steel plates had been removed and that some concrete foundations remained (LANL 1994, 034756, p. 5-16).

4.1.8.2 Previous Investigations

In 1985, the area around the gun site was investigated as part of the Los Alamos Site Characterization Program. A radiation survey and soil sampling were conducted. The radiation survey showed no readings above background. Soil samples showed uranium levels within background. The survey and sampling, however, were performed near the gun-mount building rather than at the projectile-impact areas (LANL 1994, 034756, p. 5-22).

In 1995, a Phase I RFI was conducted at AOC 20-003(b) (LANL 1996, 054466). An 80-ft × 140-ft grid was established at the site, and surface radiation readings were measured to help determine sampling locations. Radiological readings were consistent across the site, with no areas exhibiting elevated readings. A total of nine soil and tuff samples were collected from six locations in the drainage channel downgradient of the projectile impact area. Surface samples (0.0 to 1.0 ft) were collected at each of three locations and one subsurface sample (2.0 to 3.0 ft or 5.0 to 5.5 ft) was collected at all six locations for a total of three surface and six subsurface samples. All samples were analyzed for gamma-emitting radionuclides, metals, and strontium-90. The samples collected in 1995 and analyses requested are presented in Table 4.1-1.

Decision-level data from the 1995 RFI are presented in Tables 4.1-2 and 4.1-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and the results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 4.1-21 and 4.1-22, respectively.

Lead was detected above BV for soil and the maximum background concentration for soil (28 mg/kg) in one sample. Selenium was not detected above BV for Qbt 2 but had detection limits above BV for Qbt 2. Uranium-235 was detected above BV for soil and Qbt 2 in three samples.

4.1.8.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Twelve samples will be collected from six locations and analyzed for additional analytes beyond those from the RFI to define the nature of contamination and farther downgradient of the RFI locations to define lateral and vertical extent (Figure 4.1-23). The original RFI sampling locations will not be resampled because these locations appear to have eroded since the RFI. Therefore, the original RFI data will not be used to define extent of contamination at this site. Instead, two samples will be collected at each of six locations downgradient of the site. Samples will be located in the historical drainage channel from the site rather than in the current drainage that appears to have developed as a result of increased runoff from Mesita de los Alamos after development of TA-53. Sampling locations will be identified based on a geomorphologic survey of the drainage, and samples will be collected at locations of sediment accumulation at 2.0 to 3.0 ft and 8.0 to 9.0 ft bgs at each location. If the soil/tuff interface is contacted above 8.0 ft bgs, the deeper sample will be collected at the soil/tuff interface. All samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, and isotopic uranium. Samples will not be analyzed for strontium-90 or gamma-emitting radionuclides because these radionuclides were not detected in the RFI samples. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.1.9 AOC 20-003(c), Former U.S. Navy Gun Site

4.1.9.1 Site Description

AOC 20-003(c) is the site of a former U.S. Navy gun mount that was located approximately 90 ft north of East Jemez Road in Sandia Canyon (Figure 4.1-6). Together with SWMUs 20-001(b) and 20-002(c), AOC 20-003(c) comprises Consolidated Unit 20-001(b)-00. The former gun site was used between 1945 and 1948. A 10-ft × 10-ft concrete pad with a steel plate surface (structure 20-16) was used as a mount for the gun. Engineering drawing ENG-C 1778 shows a 30-ft-long earth-bermed timber frame filled with tamped earth (structure 20-10) located near the gun and on the slope at the toe of the canyon wall (LASL 1951, 024345). At the end nearest the gun, the timber frame was 12 ft wide and 10 ft high, and at the far end it was 20 ft wide and 5 ft high. The gun was fired into the earth-filled bin so the projectile could be recovered. Laboratory engineering records show that in April 1948 structures 20-10 and 20-16 were removed and that structure 20-28, a conduit manhole, was left in place. The disposition of the soil that filled the frame is not known (LANL 1994, 034756, pp. 5-16–5-17).

4.1.9.2 Previous Investigations

In 1985, the area around the gun mount pad (structure 20-16) was investigated under the Los Alamos Characterization Program. Radiation surveys revealed no readings higher than background and soil samples showed uranium levels within the normal background range (LANL 1994, 034756, p. 5-22).

In 1995, a Phase I RFI was conducted at AOC 20-003(c) (LANL 1996, 054466). The gun mount consisted of a soil-covered concrete pad with anchor bolts and included conduit and electrical wire debris. Samples were collected at eight locations. At each location, a surface sample (0.0 to 0.5 ft) and two subsurface samples (2.5 to 3.0 ft and 4.5 to 5.0 ft) were collected and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 4.1-1. The data from the 1995 RFI were reviewed and revalidated during preparation of the HIR (LANL 2009, 105078). The locations of the 1995 samples were not provided in the 1996 RFI report (LANL 1996, 054466) and could not be verified from available records during the HIR data review. Therefore, the results for these samples are not decision-level data and are not presented in Tables 4.1-2 through 4.1-4 or in the figures summarizing results.

In 1995, a VCA was conducted at AOC 20-003(c) (LANL 1996, 053775). The top 4 ft of the 6-ft-thick concrete pad, conduits, the manhole (structure 20-28), and miscellaneous metal debris were removed. Approximately 21.5 yd³ of concrete debris was disposed of at the Los Alamos County landfill. The remaining portion of the concrete pad that was not removed was covered with 5 to 6 ft of soil. No confirmation samples were collected during the VCA (LANL 1996, 053775, pp. 1–2).

4.1.9.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Twelve samples will be collected from four locations around the former location of the timber structure (structure 20-10) into which the gun was fired to define nature and extent (Figure 4.1-15). Soil samples will be collected from 0 to 1.0 ft bgs and 0 to 1 ft above the soil/tuff interface and tuff samples will be collected 2 to 3 ft below the soil/tuff interface at each location to ensure that native material is sampled. All samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, explosive compounds, isotopic uranium, strontium-90, and gamma-emitting radionuclides. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

In addition to these samples, three of the previous RFI sampling locations for SWMU 20-001(b) being resampled (locations 20-01014, 20-01017, and 20-01020) are next to or downslope from structure 20-10 (Figure 4.1-9). The results from these samples will also be used to define nature and extent for AOC 20-003(c).

4.1.10 AOC 20-004, Septic System

4.1.10.1 Site Description

AOC 20-004, a former septic system (septic tank and drainlines) located next to the current TA-72 small-arms firing range (Figure 4.1-24). This septic system was constructed in 1952 to serve the guardhouse (structure 20-47, now designated as 72-8) at former TA-20. The 540-gal.-capacity tank (structure 20-49) was a single-tank chamber made of 6-in. reinforced concrete, with inside dimensions of 6 ft × 6 ft × 5 ft (LASL 1951, 026066). The inlet drainline to the septic tank consisted of 6-in.-diameter vitrified clay pipe and was approximately 100 ft long. It is not clear from engineering drawings whether the system discharged to daylight. The tank ceased to be used after 1957, when the guard shack was abandoned, but was returned to service in 1966 when the TA-72 firing range opened. In 1989, the tank was collapsed and filled in. Interviews with site personnel state that the tank and associated drainlines were removed during a construction project in the early 1990s. This tank was registered with the New Mexico Environmental Improvement Division (NMEID) as an Unpermitted Individual Liquid Waste System (Registration Number LA-10). The NMEID registration states no leach bed was associated with the tank (LANL 1994, 034756, pp. 5-62–5-64).

4.1.10.2 Previous Investigations

In 1995, a Phase I RFI was conducted at AOC 20-004 (LANL 1996, 054466). A geophysical survey was conducted to help locate the tank. Survey data showed no subsurface anomalies, indicating the tank had been removed. Three surface (0.0 to 0.5 ft) and six subsurface (1.0 to 1.3 ft or 2.5 to 3.0 ft) samples were collected from nine locations at the former location of the septic tank and analyzed for metals, VOCs, and SVOCs (LANL 1996, 054466, p. 5-60). The samples collected in 1995 and analyses requested are presented in Table 4.1-1.

No inorganic chemicals were detected above BVs. Antimony, cadmium, and mercury were not detected above BVs for soil but had detection limits above BVs. Benzoic acid and butylbenzylphthalate were each detected in one sample.

Based on a review of engineering drawing ENG-C45621 (LANL 1989, 104234), the AOC 20-004 septic tank was actually located approximately 50 ft south-southeast of the location sampled during the 1995 RFI. Therefore, the 1995 RFI samples were not collected near the location of the former septic tank, as intended, but were collected near the active sanitary wastewater drainline associated with TA-72. Because these samples were not collected at the correct location, they are not decision-level data and are not presented in Tables 4.1-2 through 4.1-4 or in the figures summarizing results.

4.1.10.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Twelve samples will be collected from six locations. Sampling locations will be targeted at the former locations of the septic tank and inlet and outlet drainlines to define nature and extent (Figure 4.1-25). Samples will be collected from one location beneath the former tank location, one location next to the inlet side of the former tank, one location beneath the outlet drainline, and three locations around the discharge end of the outlet drainline.

At each location, samples will be collected at depths of 0 to 1 ft and 3 to 4 ft beneath the bottom of the septic tank and drainline, if this depth can be determined, or at depths of 7 to 8 ft and 10 to 11 ft bgs. All samples will be analyzed for TAL metals, cyanide, nitrate, VOCs, and SVOCs. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.1.11 SWMU 20-005, Septic System

4.1.11.1 Site Description

SWMU 20-005 is a former septic system (septic tank and drainlines) that was located south of East Jemez Road in the central portion of the aggregate area (Figure 4.1-26). The system served a toilet, restroom sink, and darkroom sink in building 20-1. The system was constructed in 1945, and its use was discontinued in 1948. Engineering drawings show the tank (structure 20-27) as having 6-in.-thick concrete walls with interior dimensions of 3 ft × 6 ft × 5 ft high and a capacity of 540 gal. (LASL 1951, 024343). The discharge point of the tank is not known. The septic system could not be located during a 1985 program conducted by the Laboratory to remove existing structures from Sandia Canyon. Although the tank could not be located, a pit-like depression was noted in the tuff in the area where the tank was believed to have been located. According to the 1985 report, excavation surrounding the area of the “pit” turned up no evidence of the tank or associated drainlines (LANL 1994, 034756, pp. 5-64–5-65).

4.1.11.2 Previous Investigations

In 1985, a soil sample was collected from the pit-like depression where the tank is believed to have been located. No radioactivity was detected in this sample (LANL 1994, 034756, pp. 5-64–5-65). A Phase I RFI of SWMU 20-005 was conducted during 1995 (LANL 1996, 054466). As part of the RFI, a geophysical survey was conducted to help locate the tank. Survey data indicated no subsurface anomalies, confirming that the tank had been removed. Nine subsurface samples (4.5 to 5.0 ft) were collected from nine locations in the drainage downgradient of the former location of the septic tank and analyzed for metals and cyanide (LANL 1996, 054466, pp. 5-63–5-64). Samples collected in 1995 and analyses requested are presented in Table 4.1-1.

Decision-level data from the 1995 RFI are presented in Table 4.1-2 which shows inorganic chemicals detected above BVs or having detection limits above BVs. Sampling locations and results for inorganic chemicals detected above BVs are shown in Figure 4.1-27.

Lead was detected above BV for soil but below the maximum background concentration for soil (28 mg/kg) in one sample. Antimony, cadmium, and cyanide were not detected above BVs but had detection limits above BVs in all samples.

4.1.11.3 Proposed Activities

The extent of metals contamination has been defined at this site. However, eight samples will be collected from four locations and analyzed for additional analytes not included in the RFI to define the nature and extent of other contaminants. Samples will be collected at the location of the septic tank (i.e., where the depression has been observed), which had not been sampled before, and at the previous and deeper depths at three previous RFI locations to define lateral and vertical extent (Figure 4.1-28). Two samples will be collected from the location of the former septic tank at depths of 6 to 7 ft and 9 to 10 ft bgs. Two samples will be collected at each of three previous RFI locations (locations 20-01135, 20-01138, and 20-01143). At each location, samples will be collected at 4 to 5 ft and 9 to 10 ft bgs. Data from the upper sampling depth will be used to replace the RFI results, which had a limited analytical suite.

All samples will be analyzed for TAL metals, cyanide, nitrate, VOCs, and SVOCs. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.2 TA-53

TA-53 is located on Mesita de los Alamos, north of the lower portion of Sandia Canyon. Sites within the Lower Sandia Canyon Aggregate Area to be investigated at TA-53 include five storage areas, a former waste disposal pit, five underground storage tanks, two spill sites, and an outfall.

Samples collected at TA-53 during previous investigations and corrective actions and the analyses requested are presented in Table 4.2-1. Decision-level data are presented in Tables 4.2-2, 4.2-3, and 4.2-4, for inorganic chemicals, organic chemicals, and radionuclides, respectively. These tables present inorganic chemicals detected above BVs or having detection limits above BVs, detected organic chemicals, and radionuclides detected or detected above BVs/FVs. All laboratory analytical data (both decision- and screening-level) are provided in Appendix B of the HIR (LANL 2009, 105078). Figures 4.2-1 to 4.2-26 include base maps; maps showing inorganic chemicals detected above BVs, detected organic chemicals, and radionuclides detected or detected above BVs/FVs; and maps showing the proposed sampling locations for the TA-53 sites.

4.2.1 SWMU 53-001(a), Former Waste Storage Area

4.2.1.1 Site Description

SWMU 53-001(a) is an outdoor storage area located on the north side of the TA-53 equipment test laboratory, building 53-2 (Figure 4.2-1). This storage area consists of a covered concrete pad currently serving as a drum storage area for building 53-2. Nonpolychlorinated biphenyl (non-PCB) dielectric oil is currently stored on the concrete pad. This area was also formerly used as a satellite accumulation area. The pad is surrounded by a concrete curb to provide secondary containment. A drain valve located in the northwest corner of the curbed area was previously used to release accumulated rainwater but is now plugged. The storage area is believed to have been first used in 1968 when operations at building 53-2 began. A 1989 photograph of the area shows the site to look much as it does today (LANL 1989, 020502). In 1992, the site was no longer used as a satellite accumulation area. A Laboratory listing of waste-accumulation areas dated April 1993 notes the satellite accumulation area on the north side of building 53-2 was removed (LANL 1993, 029415). The site was inspected during preparation of the RFI work plan in 1993, and no evidence of staining or releases was noted (LANL 1994, 034756, p. 5-38).

4.2.1.2 Previous Investigations

Previous investigations at SWMU 53-001(a) include a Phase I RFI conducted during 1995 and 1997 (LANL 1996, 054466; LANL 1997, 056647). In 1995, two surface soil samples (0.0 to 0.5 ft) were collected at each of four locations along the northern side of the storage pad to determine if releases had occurred (LANL 1996, 054466, p. 5-43). One sample from each location was analyzed for metals, pesticides/PCBs, total petroleum hydrocarbons (TPH), and VOCs, and the other sample was analyzed for SVOCs (LANL 1996, 054466, p. 5-45). In 1997, one surface (0.0 to 0.5 ft) and two subsurface (0.5 to 1.0 ft and 1.0 to 1.5 ft) samples were collected at one of the 1995 sampling locations and analyzed for pesticides/PCBs. Five surface (0.0 to 0.5 ft) and one subsurface (1.0 to 1.5 ft) samples were collected at six additional locations in a drainage downgradient of the site and analyzed for PCBs (LANL 1997, 056505).

Based on the results of the Phase I RFI, a VCA was conducted during 1997 to remove PCB-contaminated soil. Approximately 10 yd³ of soil was excavated. Following soil removal, 22 confirmation samples were collected from 16 locations. Ten of these sampling locations were just outside the boundary of the excavation, and six were at the bottom of the excavation (LANL 1997, 056505, p. 11). The sampling depth intervals were 0.0 to 0.5 ft, 0.5 to 0.8 ft, 0.7 to 1.2 ft, 0.8 to 1.2 ft, 2.5 to 3.0 ft, and 5.5 to 6.0 ft. All confirmation samples were analyzed for PCBs.

The samples collected in 1995 and 1997 and the analyses requested are presented in Table 4.2-1. During the VCA, soil at the locations of four RFI samples (53-01054, 53-01518, 53-01519, and 53-01520) was excavated. Based on the results of the VCA confirmation samples, additional soil was removed at location 53-01526, including removal of the location of sample 0253-97-0080. Following this additional soil removal, a new confirmation sample (0253-97-0111) was collected at location 53-01526.

Decision-level data from the 1995 and 1997 RFI and VCA sampling events are presented in Tables 4.2-2 and 4.2-3, which show inorganic chemicals detected above BVs or having detection limits above BVs and detected organic chemicals, respectively. Several sampling locations were excavated during the VCA and these results are no longer indicative of site conditions. These sampling locations are identified by shading in Tables 4.2-1 through 4.2-3. Sampling locations and results for inorganic chemicals detected above BVs and detected organics are shown in Figures 4.2-2 and 4.2-3, respectively.

Inorganic chemicals detected above BVs during the 1995 investigation were copper, lead, and mercury. Copper was detected above BV for soil and slightly above the maximum background concentration for soil (16 mg/kg) in one sample. Lead was detected slightly above BV for soil and less than the maximum background concentration for soil (28 mg/kg) in one sample. Mercury was detected slightly above BV for soil and the maximum background concentration for soil (0.1 mg/kg) in two samples. Silver and thallium were not detected above BVs but had detection limits above BVs. Aroclor-1260 was detected in two samples. Alpha-chlordane, dieldrin, endosulfan II, and endrin aldehyde were each detected in one sample. TPH was detected in four samples. Aroclor-1260 was detected in seven of the nine 1997 RFI samples.

Aroclor-1260 was detected in four of the VCA confirmation samples. One of the samples exceeded the 1 mg/kg cleanup target (2.1 mg/kg in sample 0253-97-0080 at location 53-01526). Further soil removal was conducted at this location, and two additional confirmation samples were collected.

4.2.1.3 Proposed Activities

The lateral and vertical extent of PCB, metal, and pesticide contamination have not been defined at this site. Twenty-one samples will be collected at 10 locations (Figure 4.2-4). Three samples will be collected east of the easternmost RFI sampling location where PCBs were detected (location 53-01522) to define the lateral extent of PCBs to the east (proposed location M1a-10). Samples will be collected at depth intervals of 0 to 1 ft, 2 to 3, and 4 to 5 ft bgs and analyzed for PCBs only. Two samples will be collected at the previous RFI sampling location, where metals were detected above BVs and where PCBs and pesticides were also detected (location 53-01054), to define vertical extent of metals, PCBs, and pesticides (this location was excavated during the VCA). Samples will be collected at depths of 2 to 3 ft and 4 to 5 ft below the bottom of the VCA excavation (i.e., the fill/tuff interface) and analyzed for TAL metals, PCBs, and pesticides. Two samples will be collected at the previous RFI sampling location where mercury was detected above BV (location 53-01052) to define the vertical extent of mercury. These samples will be collected at depths of 2 to 3 ft bgs and 4 to 5 ft bgs and analyzed for TAL metals. Fourteen samples will be collected at two previous RFI sampling locations and five previous VCA confirmation sampling locations where PCBs were detected (locations 53-01053, 53-01522, 53-01523,

53-01526, 53-01531, 53-01533, and 53-01541) to define vertical extent of PCBs. Some of these sampling locations were excavated during the VCA. Samples will be collected at depth intervals of 1 to 2 and 3 to 4 ft below previous sampling depths (if not excavated) or 1 to 2 and 3 to 4 ft below the depth of the VCA excavation (if excavated). The depth of the excavation will be determined during sampling by identifying the depth to the fill/tuff interface. These samples will be analyzed for PCBs only. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.2.2 SWMU 53-001(b), Waste Storage Area

4.2.2.1 Site Description

SWMU 53-001(b) is an outdoor storage area located on a concrete pad that rests on the asphalt parking lot on the south side of the TA-53 equipment test laboratory, building 53-2 (Figure 4.2-1). Before 1990, this area consisted of drum racks used to store drums of products and wastes associated with maintenance activities conducted in building 53-2. Wastes included spent trichloroethene (TCE), Freon, other solvents, and acidic waste. Engineering drawings show the storage area was constructed in 1971 (LASL 1971, 023260). A photograph taken in 1989 shows the storage area contained drums, some of which were product and some of which were marked with hazardous waste labels. In addition, the photograph identifies no staining, suggesting no spills or leakage occurred (LANL 1989, 020516). In 1990, the drum racks were removed and replaced with four lockable flammable-material storage cabinets. The site was inspected during preparation of the RFI work plan in 1993, and again no evidence of staining or releases was noted (LANL 1994, 034756, p. 5-40). The Laboratory's current waste-site database indicates this storage location also contained a less-than-90-d storage area that was removed (i.e., taken out of service) in 1998. The site currently contains flammable-material storage cabinets, which are used for product storage but not for waste storage.

4.2.2.2 Previous Investigations

A Phase I RFI was conducted at SWMU 53-001(b) in 1995 to determine whether contaminants were present in the drainage channel downgradient of this site (LANL 1996, 054466). This drainage channel collects surface runoff from the parking lot upon which the storage area is located. Five surface samples (0.0 to 0.3 ft, 0.0 to 0.7 ft, and 0.0 to 1.0 ft) and two subsurface samples (0.3 to 0.7 ft and 1.0 to 1.5 ft) were collected from two locations in the drainage channel (LANL 1996, 054466, p. 5-49). One surface sample from each location and one subsurface sample were analyzed for metals, PCBs, TPH, and VOCs. Two surface samples from one location and one surface sample and one subsurface sample from the other location were analyzed for SVOCs. The samples collected in 1995 and analyses requested are presented in Table 4.2-1.

Decision-level data from the 1995 RFI are presented in Tables 4.2-2 and 4.2-3, which show inorganic chemicals detected above BVs or having detection limits above BVs and detected organic chemicals, respectively. Sampling locations and results for inorganic chemicals detected above BVs and detected organics are shown in Figures 4.2-2 and 4.2-5, respectively.

Inorganic chemicals detected above BVs are cadmium, copper, lead, and zinc. Cadmium was detected above soil BVs but less than the maximum background concentration for soil (2.6 mg/kg) at two locations. Copper and lead were each detected above soil BVs and the maximum background concentrations for soil (16 mg/kg and 28 mg/kg, respectively) at one location. Zinc was detected above soil BV at two locations and above the maximum background concentration for soil (75.5 mg/kg) at one location. Antimony and mercury were not detected above BVs but had detection limits above BVs for three samples. SVOCs, VOCs, and PCBs were not detected. TPH was detected in three samples.

4.2.2.3 Proposed Activities

The lateral extent of metal contamination has not been defined at this site. Four samples will be collected at two locations farther downslope from the previous RFI sampling locations in the same drainage to define lateral extent of metals (Figure 4.2-4). Samples will be collected at depth intervals of 0 to 1 ft and 2 to 3 ft bgs and analyzed for TAL metals. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.2.3 SWMU 53-005, Former Waste Disposal Pit

4.2.3.1 Site Description

SWMU 53-005 is an inactive disposal pit located southeast of the TA-53 equipment test laboratory, building 53-2 (Figure 4.2-1). This pit measured approximately 8 ft × 8 ft × 6 ft deep and was excavated directly into the tuff. The pit was constructed in approximately 1970 and used until 1986. Historical engineering drawings indicate that solvent wastes (TCE and Freon) and acidic wastes were piped from the building 53-2 equipment test laboratory to the pit (LASL 1971, 023260). Other wastes may also have been dumped into the pit. The 1986 working draft of the Comprehensive Environmental Assessment and Response Program report describes the pit as being full of a thick brownish liquid and notes the presence of a metal grate over the pit (DOE 1986, 008657, p. TA53-3). The 1990 SWMU report states that the pit contents were removed in 1986 and the sides of the pit scraped clean. The contents of the pit were sampled during the 1986 removal, but sampling data were not reported and could not be located. The 1990 SWMU report also notes that the liquid in the pit contained 4–5 ppm PCBs (LANL 1990, 007514). Equipment maintained in building 53-2 and the wastes discharged to the pit may also have contained radioactive activation products. The reported location of the disposal pit is currently vegetated and undeveloped.

4.2.3.2 Previous Investigations

A Phase I RFI was conducted at the disposal pit during 1995 to determine whether contaminants were present (LANL 1996, 054466). A reconnaissance-type geophysical survey was conducted at the general location of the pit to identify sampling locations. The location of the pit was not found. Additional historical research was conducted to better identify the location of the pit. The 1996 RFI report notes an expanded geophysical survey was conducted, and the location of the pit was identified (LANL 1996, 054466, p. 5-57). The location of the pit was not documented in the RFI report, however, and associated documentation cannot be located.

4.2.3.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. A phased investigation is proposed to first locate the former disposal pit and then to collect samples. A surface geophysical survey (ground-penetrating radar [GPR] and conductivity) will be conducted at the area east of building 53-2 where engineering drawings indicate the pit was located. The survey will be conducted to locate anomalies that would indicate where the pit was excavated into the tuff. If the geophysical survey fails to locate the pit, a passive soil gas survey using EMFLUX samplers will be performed at the area east of building 53-2. This survey will be conducted to locate potential residual VOC contamination associated with solvents contained in the wastes placed in the pit.

If geophysical or soil gas surveys identify the location of the former disposal pit, boreholes will be drilled through and around the pit location to collect samples. A test pit or pits may be excavated to confirm the

location of the former disposal pit before drilling begins. One borehole will be advanced through the bottom of the pit and samples collected at depth intervals of 8 to 9 ft and 14 to 15 ft bgs. The top interval will be extended if fill is still encountered at this depth to ensure that the sample is collected from native tuff. The bottom sampling interval may be extended if field screening indicates the presence of contamination. Two boreholes will be advanced downgradient of the pit location, and samples will be collected at depth intervals of 2 to 3 ft, 5 to 6 ft, and 14 to 15 ft bgs. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, PCBs, and gamma-emitting radionuclides.

If the geophysical and soil gas surveys do not identify the location of the former disposal pit, samples will be collected downgradient of the general area of the pit to define lateral and vertical extent. Three boreholes will be advanced and samples will be collected at depth intervals of 2 to 3 ft, 5 to 6 ft, and 14 to 15 ft bgs. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, PCBs, and gamma-emitting radionuclides.

Two samples will also be collected from one location beneath the waste line that previously carried wastes from building 53-2 to the disposal pit. Samples will be collected at depth intervals of 0 to 1 ft and 2 to 3 ft beneath the waste line at the location where the waste line exits the building. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, PCBs, and gamma-emitting radionuclides.

If the pit location is identified, a total of 10 samples will be collected from four locations. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites. Proposed sampling locations are shown in Figure 4.2-4.

4.2.4 SWMUs 53-006(b) and 53-006(c), Underground Storage Tanks

4.2.4.1 Site Description

SWMUs 53-006(b) and 53-006(c) are two identical steel underground tanks (structures 53-68 and 53-69, respectively), located west of building 53-3, Sector M (Figure 4.2-6). Together with AOC 53-006(a), SWMUs 53-006(b) and 53-006(c) comprise Consolidated Unit 53-006(b)-99. Each tank is approximately 6 ft in diameter × 12 ft long, with a capacity of approximately 2500 gal. The tanks are installed next to each other and are approximately 18 ft belowgrade. The tanks were formerly used to store radioactive liquid waste (RLW) generated in building 53-3 during operation of the LANSCE accelerator. Most of this RLW consisted of tritiated deionized water collected in floor drains along the length of the accelerator tunnel. The tanks received the wastewater from the floor drains and from a sink, shower, and clothes washer in building 53-502 (LANL 1994, 034756, p. 6-12). Waste flowed into the tanks through a buried 4-in.-diameter drainline. Structures 53-68 and 53-69 functioned primarily as holding tanks to allow short-lived activation products to decay before discharging the RLW to the TA-53 surface impoundments [Consolidated Unit 53-002(a)-99]. The tanks were installed in 1973 and operated until 1999 when the new TA-53 RLW system became operational.

In 2000, both tanks were emptied, high-pressure washed, and double-rinsed. The drainlines to the tanks were cut and capped, isolating the tanks. A video camera and light source were placed in the tanks to observe conditions inside the tanks. No cracks, fractures, holes, or other integrity issues were observed (LANL 2001, 070268).

The location of the two tanks is currently within the locked, fenced nuclear facility boundary associated with structure 53-59 [AOC 53-006(a)], an underground tank formerly used to store spent ion-exchange resin. AOC 53-006(a) was approved for NFA by the U.S. Environmental Protection Agency (EPA) (2005, 088464) and is regulated by DOE as a Category 2 nuclear facility and nuclear environmental site.

4.2.4.2 Previous Investigations

In March 1999, samples were collected beneath the waste lines connected to the tanks when the lines were exposed, cut, and capped to bypass the tanks and route the RLW lines to the new TA-53 RLW system. Samples were collected at two depths at each of three locations beneath the waste lines and analyzed for VOCs, SVOCs, metals, cyanide, isotopic uranium, isotopic plutonium, strontium-90, tritium, and gamma-emitting radionuclides. The samples collected in 1999 and analyses requested are presented in Table 4.2-1.

Decision-level data from the 1999 sampling event are presented in Tables 4.2-2, 4.2-3, and 4.2-4, which show inorganic chemicals detected above BVs, detected organic chemicals, and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for detected organic chemicals and radionuclides detected or detected above BVs/FVs are shown in Figures 4.2-7 and 4.2-8, respectively.

No inorganic chemicals were detected above BVs. Antimony, cyanide, and selenium were not detected above soil or Qbt 2 BVs but had detection limits above BVs. Benzene and bis(2-ethylhexyl)phthalate were the only organic chemicals detected. Benzene and bis(2-ethylhexyl)phthalate were detected in three and four samples, respectively. Radionuclides detected and having no BVs/FVs were europium-152, strontium-90, and tritium. Europium-152 and tritium were each detected in one sample and strontium-90 was detected in two samples.

4.2.4.3 Proposed Activities

No sampling is currently proposed for SWMUs 53-006(b) and 53-006(c) because of the difficulty of conducting intrusive activities within a nuclear environmental site and in proximity to an operating facility. The inspection of the interior of the tanks conducted when they were taken out of service indicates previous leakage from the tanks was unlikely. The objective of additional sampling, therefore, would be to verify leaks had not occurred. Given the low likelihood of such releases, this sampling is proposed to be delayed until deactivation of the nearby facilities and removal of the tanks.

4.2.5 SWMUs 53-006(d) and 53-006(e), Underground Storage Tanks

4.2.5.1 Site Description

SWMUs 53-006(d) and 53-006(e) (structures 53-144 and 53-145, respectively) comprise the two compartments of an inactive underground tank associated with the RLW system at TA-53. SWMUs 53-006(d) and 53-006(e) also comprise Consolidated Unit 53-006(d)-99. This tank, located directly south of building 53-622 (Figure 4.2-9), measures approximately 20 ft long × 12 ft wide × 10 ft high. The tank is approximately 10 ft belowgrade and constructed of 1-ft-thick reinforced concrete with a 1-ft-thick reinforced concrete divider wall between the two compartments. SWMUs 53-006(d) and 53-006(e) were used to store RLW generated in the Weapons Neutron Research facility. Wastes received by these tank compartments included drainage from floor drains in the beam line, target, and experimental areas in building 53-7; drainage from beneath a contaminated deionized water pump stand in building 53-8; drainage from contaminated floor drains and sink drains in building 53-30; drainage from the deionized water system in building 53-30; and discharges from an equipment room floor drain in building 53-368 (LANL 1994, 034756, p. 6-12). A buried 4-in.-diameter waste line conveyed RLW to the tank. The tank compartments were used primarily as holding areas to allow short-lived activation products to decay before RLW was discharged to the TA-53 surface impoundments [Consolidated Unit

53-002(a)-99]. The tank was installed in 1977 and operated until 1999 when the new TA-53 RLW system became operational.

In 2000, both tank compartments were emptied, high-pressure washed, and double-rinsed. The drainlines to the tank were cut and capped, isolating the tank. A video camera and light source were placed in the tank to observe conditions inside the tank. No cracks, fractures, holes, or other integrity issues were observed (LANL 2001, 070268). Facility staff reported that the tanks were backfilled with sand following decontamination. The pumps and piping formerly at the surface have been removed, and the tank is currently located beneath a recent addition to building 53-30 housing experimental equipment and is inaccessible.

4.2.5.2 Previous Investigations

In March 1999, the waste lines connected to the tanks were exposed, cut, and capped to bypass the tanks and reroute the lines to the new TA-53 RLW system. During these activities, samples were collected at two depths at each of two locations beneath the waste lines. Samples were analyzed for VOCs, SVOCs, metals, cyanide, isotopic uranium, isotopic plutonium, strontium-90, tritium, and gamma-emitting radionuclides. The samples collected and analyses requested are presented in Table 4.2-1.

Decision-level data from the 1999 sampling event are presented in Tables 4.2-2, 4.2-3, and 4.2-4, which show inorganic chemicals detected above BVs or having detection limits above BVs, detected organic chemicals, and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for detected organic chemicals and radionuclides detected or detected above BVs/FVs are shown in Figures 4.2-10 and 4.2-11, respectively.

No inorganic chemicals were detected above BVs. Antimony, total cyanide, mercury, and selenium were not detected above soil or Qbt 2 BVs but had detection limits above BVs. Bis(2-ethylhexyl)phthalate, 2-butanone, and di-n-butylphthalate were detected in two, two, and one samples, respectively. Strontium-90 was detected in two samples.

4.2.5.3 Proposed Activities

No sampling is currently proposed for SWMUs 53-006(d) and 53-006(e) because of the difficulty of conducting intrusive activities in close proximity to an operating facility. The inspection of the interior of the tank conducted when it was taken out of service indicates previous leakage from the tank was unlikely. The objective of additional sampling, therefore, would be to verify that leaks had not occurred. Given the current inaccessibility of the tank and low likelihood of such releases, this sampling is proposed to be delayed until deactivation of the nearby facilities and removal of the tank.

4.2.6 SWMU 53-006(f), Underground Storage Tank

4.2.6.1 Site Description

SWMU 53-006(f) is an inactive 3000-gal. storage tank located beneath the D Wing basement floor of building 53-1, an office, and laboratory (Figure 4.2-12). This tank was used from 1972 to 1996 to store neutralized RLW generated in building 53-1 radiochemistry laboratories. The storage tank received treated waste from the wall-mounted neutralization treatment tank [SWMU 53-007(a) discussed in section 4.2.7]. When sufficient wastes accumulated in the storage tank, the contents were removed for further treatment or disposal by pumping to a tank truck located on a transfer pad outside the southwest corner of building 53-1. The transfer pad had a spill-collection sump that drained back into the storage

tank. The sump drain could be plugged to prevent rain water from entering the RLW system (Santa Fe Engineering Ltd. 1993, 031756; LANL 1994, 034756). Although the storage tank was intended only to manage radioactive waste, an unintended mercury spill in one of the radiochemistry laboratories in building 53-1 entered the neutralization tank, which drained into this storage tank. As a result, the contents of the storage tank were sampled and found to contain hazardous wastes (LANL 1999, 063459). The contents were subsequently removed, and the storage tank was decontaminated by steam cleaning. The tank was taken out of service in August 1996. The storage tank is currently empty, and all piping into and out of the tank has been cut and capped. The access doors into the tank are locked, and a spill-containment berm has been placed around the tank to prevent any spills inside the building from entering the tank.

4.2.6.2 Previous Investigations

No previous investigations have been conducted at SWMU 53-006(f), and there are no analytical results for this site.

4.2.6.3 Proposed Activities

No sampling is currently proposed at the location of the SWMU 53-006(f) waste tank itself because of the limited accessibility to the tank for sampling and the difficulty of conducting intrusive activities within an operating facility. The inspection of the interior of the tank conducted when it was taken out of service indicates previous leakage from the tank was unlikely. The objective of additional sampling, therefore, would be to verify releases had not occurred. Given the low likelihood of such releases, this sampling is proposed to be delayed until deactivation of building 53-1 and removal of the tank.

Samples will be collected around the waste transfer pad outside of building 53-1 to determine whether contaminants are present in soil next to the pad. Samples will be collected from three locations next to the pad at depth intervals of 0 to 1 ft, 2 to 3 ft, and 8 to 9 ft bgs. Samples will be analyzed for TAL metals, cyanide, nitrate, VOCs, SVOCs, and gamma-emitting radionuclides. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites. Proposed sampling locations are shown in Figure 4.2-13.

4.2.7 SWMU 53-007(a), Aboveground Neutralization Tank

4.2.7.1 Site Description

SWMU 53-007(a) is an inactive 50-gal. aboveground tank mounted on a wall in the D Wing basement of an office and laboratory building (53-1) at TA-53 (Figure 4.2-12). This tank was used from 1972 to 1996 to neutralize RLW generated in the radiochemistry laboratories in building 53-1. The sources of these wastes were cup drains, an emergency eye wash/shower drain, and a floor sink drain. The wastes were collected in the tank where they were neutralized with sodium hydroxide. After neutralization, the treated wastes were drained to an underground tank located beneath the basement floor [SWMU 53-006(f)]. The neutralization tank was intended only to manage radioactive waste. However, a 1990 RCRA inspection by NMED identified the potential for SWMU 53-007(a) to have received mercury from an unintentional spill in one of the radiochemistry laboratories in building 53-1. As a result, the contents of the neutralization tank were sampled and found to contain hazardous wastes (LANL 1999, 063459). The contents were subsequently removed, and the tank was decontaminated by steam cleaning. The neutralization tank is currently empty and all piping into and out of the tank has been cut and capped.

4.2.7.2 Previous Investigations

No previous investigations have been conducted at SWMU 53-007(a), and there are no analytical results for this site.

4.2.7.3 Proposed Activities

No sampling is currently proposed for SWMU 53-007(a) because of the difficulty of conducting intrusive activities within an operating facility. Inspection of the tank indicates previous leakage from the tank was unlikely. The objective of additional sampling, therefore, would be to verify leaks had not occurred. Given the low likelihood of such releases, this sampling is proposed to be delayed until deactivation of building 53-1 and removal of the tank.

4.2.8 AOC 53-008, Storage Area

4.2.8.1 Site Description

AOC 53-008 is an unpaved open area (referred to as a “Boneyard”) used to store used materials and equipment associated with experiments conducted at TA-53. This storage area, approximately 3 to 4 acres in size, is irregularly shaped and located north, east, and south of the former TA-53 surface impoundments [Consolidated Unit 53-002(a)-99] (Figure 4.2-14). Most of the storage area is vegetated with grasses, shrubs, and juniper trees; several dirt trails also run through it. Materials shown to be present at the site in 1989 photographs include vacuum pumps, metal ducting, concrete shielding blocks, empty overpack drums, and drums containing steel bearings (LANL 1989, 020616; LANL 1989, 020614; LANL 1989, 020615). This site was inspected in September 1993 during preparation of the RFI work plan and found to contain shielding blocks (magnetite concrete and steel), concrete, steel, other metallic debris, and other miscellaneous items. No hazardous materials or chemicals were observed, with the exception of lead stored in a shed (structure 53-621) at the south end of the site (LANL 1994, 034756, p. 5-44).

This area has been used for storage from approximately 1972 to the present; currently, much of the material previously stored at the site has been removed.

4.2.8.2 Previous Investigations

A Phase I RFI was conducted at AOC 53-008 during 1995 to determine whether contaminants were present at the site (LANL 1996, 054466). The Phase I RFI included conducting a radiation survey of the site, followed by collection of 11 surface samples (0.0 to 0.5 ft) at locations determined by the results of the radiation survey (LANL 1997, 056384). All samples were submitted for laboratory analysis of metals and gamma-emitting radionuclides. In 1998, three additional surface samples (0.0 to 0.2 ft) were collected within the boundary of AOC 53-008 at the location of the proposed new TA-53 Radioactive Liquid Waste Treatment Facility (RLWTF) and analyzed for metals, gross-alpha and -beta radioactivity, and gamma-emitting radionuclides. Samples collected in 1995 and 1998 and the analyses requested are presented in Table 4.2-1.

Decision-level data from the 1995 and 1998 sampling events are presented in Tables 4.2-2 and 4.2-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs/FV, respectively. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 4.2-15 and 4.2-16, respectively.

Antimony, cadmium, and lead were detected above BVs. Antimony was detected above soil BV in two samples and above the maximum background concentration for soil (1 mg/kg; LANL 1998, 059730) in one sample. Cadmium was detected above soil BV but below the maximum background concentration for soil (2.6 mg/kg) in one sample. Lead was detected above soil BV and the maximum background concentration for soil (28 mg/kg) in one sample. Mercury was not detected above BV but had detection limits above BV for 11 samples. Cesium-134 and cobalt-60 were detected and have no BV/FV. Cesium-134 was detected in one sample, and cobalt-60 was detected in two samples.

Sampling within the boundary of AOC 53-008 and in the main drainage downstream from AOC 53-008 was also conducted during the investigation and cleanup of Consolidated Unit 53-002(a)-99, located next to AOC 53-008 (LANL 2004, 085221). Samples were collected at the head of the drainage east of the impoundments during 1999 and 2002. This drainage receives runoff from AOC 53-008 in addition to previously having received discharges from the impoundments. In 2001 and 2002, samples were also collected farther down the drainage to the confluence with Los Alamos Canyon. Sediment samples were collected from three reaches in this drainage. A more detailed description of this sampling and the analytical results are presented in section 3.8 of the HIR (LANL 2009, 105078). Based on the results of this sampling, the investigation and cleanup report for Consolidated Unit 53-002(a)-99 concluded that the nature and extent of contamination at the head of the drainage and down the drainage had been defined (LANL 2004, 085221, p. 19).

4.2.8.3 Proposed Activities

Nature and extent of contamination have not been defined at this site. Thirty-four samples will be collected from 17 locations (Figure 4.2-17). The 10 previous 1995 RFI sampling locations will be resampled at the previous depth and at a greater depth and samples analyzed for an expanded analytical suite to define nature and vertical extent. (Structures associated with the new RLWTF and a storage building are now located at one of the 1995 RFI and the three 1998 sampling locations, and these cannot be resampled.) Samples will be collected from depth intervals of 0 to 1 ft and 2 to 3 ft bgs. Data from the upper sampling depth will be used to replace the RFI results, which had a limited analytical suite. In addition, samples will be collected at seven additional locations on the mesa top at areas where it appears materials had been previously stored. Samples will be collected from depth intervals of 0 to 1 ft and 2 to 3 ft bgs. All samples will be analyzed for TAL metals, cyanide, VOCs, SVOCs, PCBs, and gamma-emitting radionuclides. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

The nature and extent of contamination down the main drainage from this site have been defined by the sampling performed during cleanup of the adjacent surface impoundments (LANL 2004, 085221, p. 19), and no additional drainage sampling is proposed.

4.2.9 AOC 53-009, Former Storage Area

4.2.9.1 Site Description

AOC 53-009 is an unpaved area where liquid scintillation oil used in experiments conducted at TA-53 was previously stored. This area is located north of the inactive TA-53 surface impoundments [Consolidated Unit 53-002(a)-99] (Figure 4.2-18). The date of operation of this storage area is not known. The 1990 SWMU report describes this storage area as an earth-bermed area containing three aboveground-storage tanks (LANL 1990, 007514). The three tanks and earthen containment berm, which appears to be approximately 2 ft high, are shown in a 1989 photograph (LANL 1989, 020608). This photograph also shows twenty-five 55-gal. drums within the containment berm. Another photograph taken on the same

day shows soil staining near one of the tanks (LANL 1989, 020609). This earthen-bermed area was later replaced with two steel containment structures (structures 53-1071 and 53-1072), each of which measured 30 ft × 60 ft × 3 ft high. Both containment structures were lined with 0.125-in.-thick butyl rubber to prevent the release of spills. This storage area was inspected in 1993 during preparation of the RFI work plan (LANL 1994, 034756, p. 6-33). At that time, three aboveground tanks, each containing 30,000 gal. liquid scintillation oil, were present in the western containment structure (53-1071). The scintillation liquid was mineral-oil based containing a small fraction of pseudocumene (1,2,4-trimethylbenzene). In addition, thirty 55-gal. drums were present. The drums also contained liquid scintillation oil. These drums were covered with a canvas tarp. Four empty tanks and 141 55-gal. drums of liquid scintillation oil were present in the eastern containment structure (53-1072). These drums were also covered with a canvas tarp. At the time this area was inspected, no staining was observed. Laboratory facility engineering records state that structure 53-1071 was removed in March 2003, and structure 53-1072 was removed in November 1998.

4.2.9.2 Previous Investigations

In September 2006, two subsurface samples were collected at the location of structure 53-1071 as part of closeout activities for removal of this structure. Samples were submitted for analysis of VOCs, SVOCs, and TPH-diesel range organics (DRO). These samples were collected using EP procedures and submitted for analysis through the Laboratory's Sample Management Office (SMO). Samples collected and the analyses requested are presented in Table 4.2-1.

Decision-level data from the 2006 sampling event are presented in Table 4.2-3, which shows detected organic chemicals. Sampling locations and results for detected organic chemicals are shown in Figure 4.2-19.

TPH-DRO was detected in one sample. No other organic chemicals were detected.

4.2.9.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Eighteen samples will be collected from nine locations (Figure 4.2-20) within and outside the former storage area to define lateral extent, and the previous analytical suite will be expanded to define nature of contamination. Samples will be collected from two locations within the footprint of each former containment structure (53-1071 and 53-1072), one location between the two former containment structures, and two locations outside each former containment structure. Samples will be collected at depth intervals of 0 to 1 ft and 2 to 3 ft bgs and analyzed for VOCs, SVOCs, and PCBs. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.2.10 AOC 53-010, Former Storage Area

4.2.10.1 Site Description

AOC 53-010 is an unpaved former storage area used to store scintillation liquid in tanks and drums. This former storage area is located approximately 150 ft southeast of building 53-1031 (Figure 4.2-21). The storage area measured 30 ft × 35 ft and was surrounded by 2-ft-high soil berms. The bottom and sidewalls of the storage area were lined with a reinforced, welded geomembrane that was covered with soil. The 1990 SWMU report notes this site was used in 1989 and 1990 to store scintillation liquid in two 3000-gal. tanks and eighteen 55-gal. drums (LANL 1990, 007514). The scintillation liquid was mineral-oil based and contained a small fraction of pseudocumene (1,2,4-trimethylbenzene). A 1989 photograph

shows two tanks labeled “mineral oil” and approximately 12 drums (LANL 1989, 020636). The tanks and drums were removed in 1990 when the site was closed. Two small areas of stained soil were also removed at that time. The storage area was inspected in 1993 during preparation of the RFI work plan. The cover soil at the top of the berms had been eroded in some places, exposing the membrane liner and causing deterioration. Several circular indentations caused by drum storage were noted in the soil (LANL 1994, 034756, p.5-48). However, no evidence of staining was noted during the inspection. At present, the site is partially vegetated.

4.2.10.2 Previous Investigations

A Phase I RFI was conducted at AOC 53-010 during 1995 (LANL 1996, 054466). The Phase I RFI included collecting six surface samples (0.0 to 0.2 ft and 0.0 to 0.3 ft) from above the liner within the bermed area. These samples were submitted for laboratory analysis of SVOCs and TPH (ICF Kaiser Engineers 1995, 056781, p. 1).

Based on the results of the Phase I RFI sampling, a VCA was conducted in 1995 (LANL 1996, 053776) to remove the cover soil from above the membrane liner, remove the membrane liner, inspect the soil beneath the liner for evidence of staining (none was found), collect six confirmation samples of soil from beneath the liner (0.0 to 0.08 ft and 0.0 to 0.5 ft), remove the soil berms, and regrade and reseed the site. Confirmation samples were submitted for laboratory analysis of VOCs (LANL 1996, 053776, pp. 5-6). The samples collected and analyses requested are presented in Table 4.2-1.

Decision-level data from the 1995 sampling events are presented in Table 4.2-3, which shows detected organic chemicals.

TPH was detected in all six the 1995 RFI soil samples at concentrations ranging from 7.93 to 5100 mg/kg. No SVOCs were detected. During the VCA, these sampling locations, which were all above the membrane liner, were excavated (these samples are indicated by shading in Table 4.2-3). These results, therefore, are no longer representative of site conditions and are not shown in a figure. No organic chemicals were detected in the 1995 VCA confirmation samples.

4.2.10.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Twelve samples will be collected from six locations (Figure 4.2-22). The analytical suite from the VCA will be expanded to define nature of contamination and samples will be collected at greater depths to define vertical extent. The six previous 1995 VCA confirmation sampling locations will be resampled, and samples will be collected at 0 to 1 ft and 3 to 4 ft bgs or at the soil/tuff interface if this is shallower than 3 ft. Data from the upper sampling depth will be used to replace the RFI results, which had a limited analytical suite. The samples will be analyzed for VOCs, SVOCs, and PCBs. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.2.11 AOC 53-012(e), Drainline and Outfall

4.2.11.1 Site Description

AOC 53-012(e) is a drainline and former outfall associated with the TA-53 equipment test laboratory (building 53-2). The drainline runs southwest under an asphalt parking lot approximately 140 ft from the southwest corner of building 53-2 and then changes direction, running northwest approximately 50 ft to the associated outfall near the edge of Sandia Canyon (Figure 4.2-1). The drainline received discharges

from 12 trench drains, 2 sink drains, and a floor drain in building 53-2. The primary source of wastewater was blowdown from the building 53-2 cooling tower, which was discharged to one of the trench drains. Historically, chemicals added to the cooling water included sodium molybdate and hydroxyethylidene diphosphonic acid as corrosion inhibitors; 1-bromo-3-chloro-5,5-dimethylhydantoin as a microbicide; and sodium bisulfite as an oxygen scavenger. The trench drains also received equipment-flushing and floor-washing wastewater (LANL 1994, 034756, pp. 5-74–5-76). Discharges to this outfall began in approximately 1968, when building 53-2 went into service. This outfall was included in the Laboratory's National Pollutant Discharge Elimination System (NPDES) permit as Outfall 03A114. Discharges to this outfall ceased, and the outfall was removed from the NPDES permit on July 11, 1995. The drainline is still in place, but the outfall has been plugged.

4.2.11.2 Previous Investigations

A Phase I RFI was conducted at AOC 53-012(e) during 1995 (LANL 1996, 054466). The Phase I RFI included a geomorphic survey conducted downstream of the outfall to identify sediment catchments. Two surface samples (0.0 to 0.3 ft and 0.0 to 0.7 ft) were collected at each of three locations in the sediment catchments (LANL 1995, 054466, p. 5-66). One sample from each location was submitted for analysis of TAL metals, VOCs, pesticides/PCBs, and TPH. The other sample from each location was submitted for analysis of SVOCs (LANL 1995, 054466, p. 5-67). The samples collected and analyses requested are presented in Table 4.2-1.

Decision-level data from the 1995 RFI are presented in Tables 4.2-2 and 4.2-3, which shows inorganic chemicals detected above BVs or having detection limits above BVs and detected organic chemicals, respectively. Sampling locations and results for inorganic chemicals detected above BVs and detected organic chemicals are shown in Figures 4.2-2 and 4.2-5, respectively.

Inorganic chemicals detected above BVs were antimony, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. Antimony was detected above BVs for soil and the maximum background concentration for soil (1 mg/kg) in three samples. Cadmium was detected above BV for soil but below the maximum background concentration for soil (2.6 mg/kg) in three samples. Chromium was detected above BV for soil but below the maximum background concentration for soil (36.5 mg/kg) in one sample. Copper was detected above BV for soil and the maximum background concentration for soil (16 mg/kg) in three samples. Lead was detected above BV for soil and the maximum background concentration for soil (28 mg/kg) in two samples. Mercury was detected in one sample above BV for soil and the maximum background concentration for soil (0.1 mg/kg). Nickel was detected above BV for soil but less than the maximum background concentration for soil (29 mg/kg) in one sample. Silver was detected above BV for soil in one sample. Zinc was detected above BV for soil and the maximum concentration for soil (75.5 mg/kg) in three samples. Thallium was not detected above BV for soil but had detection limits above BV for three samples.

Organic chemicals detected were Aroclor-1248, Aroclor-1254, Aroclor-1260, alpha-chlordane, gamma-chlordane, dieldrin, endosulfan II, endrin aldehyde, and TPH. Aroclor-1248 was detected in three samples, Aroclor-1254 was detected in one sample, and Aroclor-1260 was detected in two samples. Alpha-chlordane, gamma-chlordane, and dieldrin were detected in one sample each. Endosulfan II was detected in three samples and endrin aldehyde was detected in two samples. TPH was detected in three samples.

4.2.11.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Twelve samples will be collected at six locations (Figure 4.2-4). The three previous 1995 RFI sampling locations will be resampled at greater depths to define the vertical extent of inorganic and organic chemicals previously detected in surface samples at these locations. Samples will be collected at depth intervals of 1 to 2 ft and 3 to 4 ft bgs or at the soil/tuff interface if this is shallower than 4 ft. Two additional locations will be sampled farther downslope from the RFI sampling locations to define lateral extent. Samples will be collected at depth intervals of 0 to 1 ft and 3 to 4 ft bgs or at the soil/tuff interface if this is shallower than 4 ft. Two samples will also be collected at one location beneath the drainline that runs from building 53-2 to the outfall. Samples will be collected at the elbow in the drainline at depth intervals of 0 to 1 ft and 2 to 3 ft below the bottom of the line. All samples will be analyzed for TAL metals, cyanide, VOCs, SVOCs, PCBs, pesticides, and gamma-emitting radionuclides. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites.

4.2.12 AOC 53-013, Lead Spill Site

4.2.12.1 Site Description

AOC 53-013 is a lead spill site located near the east end of TA-53, northeast of buildings 53-10 and 53-315, which are part of the LANSCE accelerator facility (Figure 4.2-23). Lead shot is present within two fenced areas, approximately 50 ft × 80 ft and 60 ft × 180 ft, that are used for storage and as a staging area for equipment used in beam experiments. The lead shot was used as radiation shielding for experiments conducted in building 53-10. The shot ranges from 1.5 mm to 4 mm in diameter and is mixed into the sandy soil present at the site. Previously, some of the shot was visible on the ground surface. The shot was spilled at the site during assembly of components containing the shot and was also released from defective containers (ICF Kaiser Engineers 1995, 058172, p. 2). The dates the shot was spilled onto the ground surface are not known but could date as far back as the late 1960s or the early 1970s, when accelerator operations began. This site was not originally identified in the 1990 SWMU report (LANL 1990, 007514) but was discovered after the Operable Unit (OU) 1100 RFI work plan had been prepared (LANL 1994, 034756). Both areas are presently fenced and locked, and the westernmost area is posted as a radiological control area.

4.2.12.2 Previous Investigations

In July 1995, after this site was discovered, a sample of soil containing visible lead shot was collected to characterize the concentrations of lead present and analyzed for total lead and toxicity characteristic leaching procedure (TCLP) lead using an on-site laboratory. A portion of the sample was sieved to determine the amount of lead in different size fractions. The concentration of lead was 110,000 mg/kg for the total (unsieved) sample, 72,400 mg/kg for the fraction less than 1.7 mm, and 210,200 mg/kg for the fraction between 1.7 mm and 4 mm. The TCLP results were 129 mg/L in the total sample, 168 mg/L for the size fraction less than 1.7 mm, and 155 mg/L for the size fraction between 1.7 mm and 4 mm (ICF Kaiser Engineers 1995, 058172, p. 2).

Soil outside the areas of visible lead contamination was also sampled in 1995 as part of planning activities for a VCA. Ten soil samples for screening were collected inside and outside the storage areas (ICF Kaiser Engineers 1995, 058172, p. 3). These samples were screened for lead using x-ray fluorescence (XRF), and lead was detected in one sample collected near the entrance to the southern storage area. No other investigations have been conducted at this site and, although a VCA plan was prepared (ICF Kaiser Engineers 1995, 058172), the VCA was not implemented.

There are no decision-level data for this site.

4.2.12.3 Proposed Activities

The nature and extent of contamination have not been defined for this site. Activities proposed include field screening with XRF to identify areas of lead contamination, removing soil containing lead to levels below the industrial SSL (800 mg/kg), and conducting sampling to define the nature and extent of residual lead contamination.

A field-screening survey using XRF will be performed within the two storage areas to identify areas of elevated lead contamination. A grid will be established at approximately 20-ft centers inside and immediately outside the storage areas, except for the east and north sides against the rock walls. As needed, grid points will be moved if the soil surface is inaccessible because of stored materials. Surface (0 to 0.5 ft) samples will be collected at each grid point and screened for lead using XRF. Screening samples will also be collected at locations having visible lead contamination (i.e., where lead shot is visible). After the initial screening, stored materials may be moved to allow previously inaccessible areas to be screened. Soil having lead above the 800 mg/kg industrial SSL will be removed. Following soil removal, 20 samples will be collected at 10 locations in each of the two areas to define nature and extent. Sampling locations will include sites where soil was excavated (if any) as well as step-out locations outside the storage area fence. Samples will be collected at depth intervals of 0 to 1 ft and 2 to 3 ft bgs (or 0 to 1 ft and 2 to 3 ft below the bottoms of excavations) and analyzed for TAL metals. Table 4.0-1 provides a summary of the proposed sampling locations, depths, and analytical suites. Proposed field screening locations are shown in Figure 4.2-24. Sampling locations will be determined based on the results of the field screening.

4.2.13 AOC 53-014, Lead Spill Site

4.2.13.1 Site Description

AOC 53-014, a lead spill site, is located at a paved storage area in TA-53 west of building 53-18 (Figure 4.2-25). The lead shot was spilled on the paved surface, and stormwater washed the lead into an asphalt channel that joins a drainage below an NPDES-permitted outfall (03A113). The lead shot was observed at a number of locations in the channel but was not seen below a large catchment approximately 50 ft below the canyon rim (ICF Kaiser Engineers 1995, 058172, pp. 4–5). This site was not originally identified in the 1990 SWMU report (LANL 1990, 007514) but was discovered only after the OU 1100 RFI work plan (LANL 1994, 034756) had been prepared.

4.2.13.2 Previous Investigations

In August 1995, sediment in the channel was sampled as part of planning activities for a VCA. Fifteen sediment samples were collected in the drainage below the extent of visible lead contamination (ICF Kaiser Engineers 1995, 058172, p. 5) and screened for lead using XRF; no lead was detected.

In 1997, a VCA was conducted at AOC 53-014. The VCA included removing all lead shot from the paved area, the asphalt channel, and the drainage below NPDES Outfall 03A113 (LANL 1997, 062913). To minimize impacts to the drainage, visible lead was picked up by hand, and sediment was sieved to remove lead. After the lead was removed, five surface sediment samples (0 to 0.5 ft) were collected from the drainage as confirmatory samples. These samples were submitted for analysis of lead. Samples collected and analyses requested are presented in Table 4.2-1.

Decision-level data from the 1997 VCA are presented in Table 4.2-2, which shows inorganic chemicals detected above BVs or having detection limits above BVs. Sampling locations and results for inorganic chemicals detected above BVs are shown in Figure 4.2-26.

Lead was detected slightly above the BV for sediment, but less than the maximum background concentration for sediment (25.6 mg/kg; LANL 1998, 059730), in two samples.

4.2.13.3 Proposed Activities

The nature and extent of lead contamination at this site were defined by the 1997 VCA confirmation sampling, which showed all results less than BVs or the maximum background concentration. Therefore, no additional sampling is proposed.

4.2.14 SWMU 53-015, Wastewater Treatment Facility

4.2.14.1 Site Description

SWMU 53-015 is the current RLW management system for TA-53. This system was constructed just east of the former wastewater impoundments (Consolidated Unit 53-002[a]-99) (Figure 4.2-14) to replace the former TA-53 RLW system, which included underground tanks [SWMUs 53-006(b-e)] and a surface impoundment [SWMU 53-002(b)]. This system consists of two lift stations, three 30,000-gal. double-walled tanks in an underground vault, two evaporation basins, and underground double-walled piping. SWMU 53-015 also includes some of the existing underground piping from the former RLW system. SWMU 53-015 began operation in October 1999 and therefore was not originally identified in the 1990 SWMU report (LANL 1990, 007514) or in the 1994 RFI work plan for OU 1100 (LANL 1994, 034756).

In October 1999, the Laboratory and DOE agreed with NMED to notify NMED of the existence of this system as a new SWMU, with the understanding it not be subject to a compliance schedule for corrective actions in Module VIII of the Laboratory's Hazardous Waste Facility Permit. SWMU 53-015 is listed in Module VIII for tracking purposes only. The Laboratory and DOE agreed with NMED that when this system ceases operation, it will be evaluated to determine whether releases have occurred (DOE 1999, 098985).

4.2.14.2 Previous Investigations

No previous investigations have been conducted at SWMU 53-015, and there are no analytical results for this site.

4.2.14.3 Proposed Activities

Because this site is listed in Module VIII for tracking purposes only and is not currently subject to corrective action requirement, no investigation activities are proposed (DOE 1999, 098985).

4.3 TA-72

TA-72 is located in the canyon bottom near the east end of Sandia Canyon. The only site remaining to be investigated at TA-72 is the active small-arms firing and training range used by the Laboratory's security force.

Samples collected for TA-72 and analyses requested for decision-level data are presented in Table 4.3-1. Decision-level data are presented in Table 4.3-2. All laboratory analytical data (both decision-level and screening-level) are provided in Appendix B of the HIR (LANL 2009, 105078).

4.3.1 AOC 72-001, Firing Range

4.3.1.1 Site Description

AOC 72-001 consists of an active small arms firing and training range used by the Laboratory's security force. The firing range is located in Sandia Canyon at the west end of TA-72 (Figure 4.1-24) and has been operational since 1966. It includes a 175-ft × 250-ft firing range surrounded by earthen berms, an adjacent skeet-shooting range, and administrative buildings. The drainage channel and flood plain of Sandia Canyon run through the middle of the firing range. Structures at this site include an office building (building 72-8, a former guard station), range house (building 72-9), scoring area (building 72-10), firing station (building 72-11), weapons-cleaning area (building 72-12), storage buildings (72-13 and 72-14), and canopies 3 and 4 (buildings 72-15 and 72-16) (LANL 1990, 007514). Lead is present within the firing range because bullets are scattered at the base of the berms and cliffs, and lead shot from skeet shooting is visible on the ground (LANL 1994, 034756. pp. 2-9, 5-22).

In 1995, as part of a VCA conducted at SWMU 00-016 (an inactive small-arms firing range), NMED concurred with the Laboratory's request to move lead-contaminated soil from the inactive range to the active AOC 72-001 firing range (DOE 1995, 046257). During the second phase of the VCA implemented at SWMU 00-016 in 1996 and 1997, lead was removed from soil stockpiled from berms at the former firing range using dry sieving. Approximately 4660 yd³ of soil from SWMU 00-016 was transported to TA-72 and placed on the berms located along the north side of the AOC 72-001 firing range and along the berm located between, and north of, canopies 3 and 4 (LANL 1997, 056737).

4.3.1.2 Previous Investigations

A Phase I RFI was conducted at AOC 72-001 in 1995 (LANL 1996, 054466). After a geomorphic survey was performed to locate sediment catchments downstream of the small-arms firing range, seven surface sediment samples (0.0 to 1.0 ft) were collected from seven locations (LANL 1996, 054466, pp. 5-40–5-41). Surface radiological screening was performed before the start of intrusive activities; screening results showed no radioactivity above local background. HE spot tests and gross-radiation screening were performed on each sediment sample to be submitted for laboratory analysis. No HE was detected and no radiation levels above local background were detected. Samples were analyzed for TAL metals. The samples collected and analyses requested are presented in Table 4.3-1.

Decision-level data from the 1995 RFI are presented in Table 4.3-2, which shows inorganic chemicals detected above BVs or having detection limits above BVs. Sampling locations and results for inorganic chemicals detected above BVs are shown in Figure 4.3-1.

Selenium was detected above BV for sediment in one sample. Mercury, silver and thallium were not detected above BVs for sediment but had detection limits above BVs for all seven samples. Lead was not detected above BV for sediment in any samples.

4.3.1.3 Proposed Activities

The nature and extent of contamination have not been defined at this site. Nature and extent cannot be determined at this time, however, because this site is an active small-arms firing range. The continued

use of the site by the Laboratory's security force makes determination of nature and extent impractical (i.e., site conditions are continually changing as the site is used). It is therefore proposed that full characterization of this active firing range be delayed until operations cease. At that time, the nature and extent of contamination at AOC 72-001 will be determined and any necessary corrective actions identified and implemented.

5.0 INVESTIGATION METHODS

A summary of investigation methods to be implemented is presented in Table 5.0-1. The standard operating procedures (SOPs) used to implement these methods are available at <http://www.lanl.gov/environment/all/qa.shtml>.

Summaries of the field-investigation methods are provided below. Additional procedures may be added as necessary to describe and document quality-affecting activities.

Chemical analyses will be performed in accordance with the analytical statement of work (LANL 2000, 071233). Accredited contract analytical laboratories will use the most recent EPA- and industry-accepted extraction and analytical methods for analyses of samples.

5.1 Field Surveys

The following sections describe the field surveys to be conducted at the Lower Sandia Canyon Aggregate Area sites.

5.1.1 Geodetic Surveys

Geodetic surveys will be conducted at selected sites by a land surveyor in accordance with the latest version of EP-ERSS-SOP-5028, Coordinating and Evaluating Geodetic Surveys, to locate historical structures and to document field activities such as sampling and excavation locations. The surveyors will use a Trimble GeoXT hand-held global-positioning system (GPS) or equivalent for the surveys. The coordinate values will be expressed in the New Mexico State Plane Coordinate System (transverse mercator), Central Zone, North American Datum 1983. Elevations will be reported as per the National Geodetic Vertical Datum of 1929. All GPS equipment used will meet the accuracy requirements specified in the SOP.

5.1.2 Geophysical Surveys

Geophysical surveys will be performed at selected sites to identify anomalies that would indicate the location of former waste disposal sites. These sites are one of the former TA-20 landfills and the former waste pit near building 53-2. Geophysical methods employed will include terrain conductivity (EM-31 or equivalent), high-sensitivity metal detection (EM-61 or equivalent), and/or GPR.

Terrain conductivity and high-sensitivity metal detection data will be recorded at approximately 2-ft intervals along lines spaced approximately 20 ft apart. Higher resolution coverage (as needed) will be completed in selected targeted areas using 5-ft line spacing. Line and station separation may vary depending upon surface obstructions. Geodetic coordinates will be recorded at 1-s intervals using an integrated GPS. A base station free from cultural interference will be occupied at the beginning and end of each survey day to calibrate the instrument and to perform system functional tests. During these tests, battery, phasing, and sensitivity checks will be performed.

The GPR survey will be performed using a digital subsurface interface radar system. After initial field tests are conducted to determine maximum penetration and sufficient resolution, an appropriate transducer will be selected to perform the survey. Different transducers may be used in an attempt to provide greater penetration depths. Data will be digitally recorded, displayed, and analyzed during acquisition to allow real-time interpretation. Line locations will be selected based on electromagnetic anomaly location and surface obstructions.

5.1.3 Passive Soil-Gas Surveys

If geophysical survey results do not establish the location of the former waste pit at building 53-2 (SWMU 53-005), a passive soil-gas survey will be performed using EMFLUX passive soil gas samplers. Samplers will be installed on a regular grid with a spacing of 25 ft in shallow (e.g., 4 in.) holes and the holes will be sealed per the manufacturer's instructions. After 3 d, the samplers will be retrieved and submitted to a laboratory for analysis by thermal desorption gas chromatography/mass spectrometry using EPA SW-846 Method 8260B.

5.1.4 XRF Survey

A survey of the lead shot spill areas at AOC 53-013 will be conducted using a field XRF to identify areas of elevated lead concentrations. The survey will be conducted using an instrument having sufficient sensitivity (i.e., 100 mg/kg or less) to identify areas contaminated above the 800 mg/kg industrial SSL. The instrument will be operated in accordance with the manufacturer's instructions, including collection and preparation of samples and analysis of standard samples. The survey will initially be performed on a regular grid having a spacing of 20 ft. Sampling locations may be moved, as necessary, because of surface obstructions. Based on the results of the initial survey, a finer grid may be surveyed if necessary to delineate areas requiring excavation.

5.2 Field Screening

Because sampling is primarily being conducted to finalize nature and extent based on previous investigations, field screening will be conducted mainly for health and safety purposes. The Laboratory's proposed field-screening approach will be to (1) visually examine all samples for evidence of contamination, (2) screen for organic vapors, and (3) screen for radioactivity. The field-screening methods are discussed below.

5.2.1 Volatile Organic Compounds

Based on the previous RFI and VCA results, significant VOC contamination is not expected to be encountered, and VOC screening will mainly be conducted for health and safety purposes. The exception to this is SWMU 53-005 where solvent-contaminated liquid wastes may have been placed in a disposal pit. At SWMU 53-005, field screening for VOCs will be used to guide the depth of boreholes during drilling.

Screening will be conducted using a photoionization detector (PID) capable of measuring quantities as low as 1 ppm. Vapor screening of soils, sediments, and subsurface core for VOCs will be conducted using a PID equipped with an 11.7 electron volt lamp. All samples will be screened for VOCs in headspace gas in accordance with SOP-06.33, Headspace Vapor Screening with a Photo Ionization Detector.

The PID will be calibrated daily to the manufacturer's standard for instrument operation, and the daily calibration results will be documented in the field logbooks. All instrument background checks, background ranges, and calibration procedures will be documented daily in the field logbooks in accordance with EP-ERSS-SOP-5181, "Notebook Documentation for Waste and Environmental Services Technical Field Activities."

5.2.2 Radioactivity

Field screening for radioactivity will be primarily conducted for health and safety purposes, although elevated field-screening results may be used to guide field sampling. Radiological screening will target gross-alpha, -beta, and -gamma radiation. Field screening for alpha, beta, and gamma radiation will be conducted within 6 in. from the core material using appropriate field instruments as determined by the Laboratory's Health Physics Operations Group. Instruments will be calibrated in accordance with the Health Physics Operations Group procedures or equivalent procedures. All instrument calibration activities will be documented daily in the field logbooks in accordance with EP-ERSS-SOP-5181, "Notebook Documentation for Waste and Environmental Services Technical Field Activities."

5.3 Sample Collection

All samples will be placed in appropriate containers in accordance with EP-ERSS-SOP 5056, Sample Container and Preservation. Quality assurance (QA)/QC samples will include field duplicate samples, rinsate blanks, and trip blanks. These samples will be collected following the current version of EP-ERSS-SOP 5059, Field Quality Control Samples, and will comply with a frequency of 10% of total samples collected for field duplicates and rinsate blanks. Trip blanks will be supplied and will remain with analytical samples when samples are collected for VOC analysis. QA/QC samples are used to monitor the validity of the sample collection procedures.

Specific methods for collection of surface, subsurface, and sediment samples are described below.

5.3.1 Surface Samples

Surface and shallow subsurface soil and sediment samples will be collected in accordance with SOP-06.09, Spade and Scoop Method for the Collection of Soil Samples. Stainless-steel shovels, spades, scoops, and bowls will be used for ease of decontamination. Decontamination will be completed using a dry decontamination method with disposable paper towels and an over-the-counter cleaner, such as Fantastik or an equivalent. If the surface location is at bedrock, an axe or hammer and chisel will be used to collect samples.

5.3.2 Subsurface Samples

Subsurface samples will be collected using hand-or hollow-stem auger methods, depending on the depth of the samples and the material being sampled. A brief description of these methods is provided below.

5.3.2.1 Hand Auger

Hand augers may be used to bore shallow holes (e.g., 0 to 10 ft). The hand auger is advanced by turning or pounding the auger into the soil until the barrel is filled. The auger is removed and the sample is dumped out into a clean bowl. Hand-auger samples will be collected in accordance with SOP-06.10, Hand Auger and Thin-Wall Tube Sampler.

5.3.2.2 Hollow-Stem Auger

Hollow-stem augers will be used to collect subsurface samples where hand augering is impractical because of the sampling depth or the material being sampled. The hollow-stem auger consists of a hollow-steel shaft with a continuous spiraled steel flight welded onto the exterior of the stem. The stem is connected to an auger bit; when the auger is rotated, it transports cuttings to the surface. The hollow stem of the auger allows insertion of drill rods, split-spoon core barrels, Shelby tubes, and other samplers through the center of the auger so samples may be retrieved during drilling operations.

During sampling, the auger will be advanced to just above the desired sampling interval. The sample will be collected by driving a split-spoon sampler into undisturbed soil/tuff to the desired depth. Samples will be collected in accordance with SOP-06.26, Core Barrel Sampling for Subsurface Earth Materials. Immediately after sampling, boreholes will be abandoned using bentonite chips or a bentonite/concrete mixture. All borehole cuttings will be managed as IDW, as described in Appendix B of this work plan. Borehole abandonment information will be provided in the Lower Sandia Canyon Aggregate Area investigation report.

Field documentation will include detailed borehole logs for each borehole drilled. The borehole logs will document the matrix material in detail and will include the results of all field screening; fractures and matrix samples will be assigned unique identifiers. All field documentation will be completed in accordance with the current version of SOP-12.01, Field Logging, Handling, and Documentation of Borehole Materials.

5.3.3 Sediment Samples

Sediment samples will be collected from areas of sediment accumulation that include sediment judged to be representative of the historical period of Laboratory operations. The locations will be selected by the field geologist based on geomorphic relationships in areas likely to have been affected by discharges from Laboratory operations. Guidance for identifying such areas is contained in EP-ERSS-SOP-5027, "Geomorphic Characterization." Preliminary sediment sampling locations are shown in section 4 figures. Because sediment systems are dynamic and subject to redistribution by runoff events, however, some locations may need to be adjusted at the time this work plan is implemented. In the course of collecting sediment samples, it may be determined that the selected location is not appropriate because of conditions observed during sampling (e.g., the sediment is much shallower than anticipated, the sediment is predominantly coarse-grained, or the sediment shows evidence of being older than the target age). Sediment sampling locations may be adjusted as appropriate. Any changes to sediment sampling locations will be documented in the investigation report as deviations from this work plan.

5.3.4 Test Pit Samples

Excavations or test pits will be completed using a track excavator or backhoe to locate the former landfill [SWMU 20-001(c)] and possibly the former waste disposal pit (SWMU 53-005). Excavated soil will be staged a minimum of 3 ft from the edge of the excavation, and excavations deeper than 4 ft bgs will be appropriately benched for worker safety and for access and egress, if necessary. After field screening, confirmation sampling, and any necessary overexcavation work are completed, the excavations and/or trenches will be backfilled. The soil removed from the excavation will be returned to the excavation provided sampling shows industrial SSLs are not exceeded. Otherwise, the excavations will be backfilled with clean fill material.

5.4 Laboratory Methods

Analytical suites vary by site as indicated in Table 4.0-1. All analytical suites are presented in the statement of work for analytical laboratories (LANL 2000, 071233). The specific analytical methods to be used are specified in Table 4.0-1. Sample collection and analysis will be coordinated with the SMO.

5.5 Health and Safety

The field investigations described in this investigation work plan will comply with all applicable requirements pertaining to worker health and safety. An integrated work document and a site-specific health and safety plan will be in place before fieldwork is performed.

5.6 Equipment Decontamination

Equipment for drilling and sampling will be decontaminated before and after drilling and sampling activities (as well as between drilling boreholes) to minimize the potential for cross-contamination. Dry decontamination methods are preferred and will be given priority because they do not generate liquid wastes. Residual material adhering to the equipment will be removed using dry decontamination methods, including wire-brushing and scraping, as described in EP-ERSS-SOP-5061, "Field Decontamination of Equipment." Dry decontamination of sampling equipment may include use of a nonphosphate detergent such as Fantastik on a paper towel and the equipment is wiped so that no liquid waste is generated.

If dry decontamination methods are not effective, equipment may be decontaminated by steam-cleaning or hot water pressure-washing, as described in EP-ERSS-SOP-5061. Wet decontamination methods will be conducted on a high-density polyethylene liner on a temporary decontamination pad. Cleaning solutions and wash water will be collected and contained for proper disposal. Decontamination solutions will be sampled and analyzed to determine the final disposition of the wastewater and the effectiveness of the decontamination procedures.

5.7 Investigation-Derived Waste

IDW generated during field-investigation activities may include, but are not limited to, drill cuttings; contaminated soil; contaminated personal protective equipment (PPE), sampling supplies, and plastic; fluids from the decontamination of PPE and sampling equipment; and all other waste that has potentially come into contact with contamination.

All IDW generated during field-investigation activities will be managed in accordance with applicable SOPs. These SOPs incorporate the requirements of all applicable EPA and NMED regulations, DOE orders, and Laboratory implementation requirements. Appendix B presents the IDW management plan.

5.8 Soil Excavation and Removal

If soil at AOC 53-013 is found to be contaminated with lead above the industrial SSL, it will be excavated and removed from the site. Excavation at AOC 53-013 is expected to be accomplished using a combination of heavy equipment and hand tools, depending on the extent of the contaminated areas. A backhoe may be used to remove large areas of soil, whereas hand tools may be used to remove small, discrete areas. Field screening for lead using XRF will be performed to guide removal activities. The excavated material will also be field screened for radiological and VOC contamination for health and safety purposes. Neither radiological nor VOC contamination is driving the removal action at AOC 53-013,

and, therefore, the field-screening results are not expected to be useful in directing removal actions or assisting in waste segregation.

The results of the initial XRF survey described in section 5.1.4 will be used to plan removal activities and to make an initial waste determination. Excavated soil will be placed in 20-yd³ rolloff bins or other appropriate containers. These containers may be staged on-site or moved for storage elsewhere. Transportation of these wastes will be based on the initial waste determination and will be done in accordance with all applicable requirements. A final waste determination will be made based on data from direct sampling of the excavated materials. The plan for managing the IDW is described in Appendix B of this work plan.

Following completion of soil removal, confirmation samples will be collected as described in section 4.2.12. If the results of the confirmation samples indicate that the soil cleanup level has been attained, the excavation will be backfilled with clean soil. Otherwise, additional soil will be removed and confirmation samples collected.

6.0 MONITORING PROGRAMS

Groundwater, sediment, and surface water monitoring is occurring within the Lower Sandia Canyon Aggregate Area as part of other environmental activities. This monitoring is described briefly below.

6.1 Groundwater

Section IV.B.5.b.iii of the Consent Order requires monitoring and sampling of all monitoring wells in Sandia Canyon. Alluvial monitoring and observation wells in Sandia Canyon include SCA-1, SCA-2, SCA-3, SCA-4, SCA-5, SCO-1, and SCO-2. Of these, all but one alluvial monitoring well (SCA-1) are located within the Lower Sandia Canyon Aggregate Area (Plate 1); SCA-1 is located within the upper portion of Sandia Canyon. All these wells are monitored as part of the latest version of the Interim Facility-Wide Groundwater Monitoring Plan (IFGMP) (LANL 2008, 101897). Regional wells R-10, R-10a, and R-11 are screened and monitored as described in the IFGMP.

In addition, an investigation of chromium contamination in groundwater in Sandia and Mortandad Canyons is currently ongoing as part of an interim measure required under the Consent Order. Groundwater characterization is currently being performed in accordance with the "Work Plan for Geochemical Characterization and Drilling for Fate and Transport of Contaminants Originating in Sandia Canyon" (LANL 2007, 099607).

6.2 Sediment and Surface Water

Monitoring of surface water and sediment in Sandia Canyon is being performed under the NPDES Multi-Sector General Permit (MSGP) and Federal Facility Compliance Agreement/Administrative Order (FFCA/AO). Monitoring under the MSGP and FFCA/AO is performed using site-monitoring areas (SMAs), which monitor stormwater runoff from individual SWMUs and AOCs or groups of SWMUs and AOCs, and by gaging stations, which monitor runoff in stream channels. SWMUs and AOCs in the Lower Sandia Canyon Aggregate Area subject to SMA monitoring under the MSGP and FFCA/AO are SWMUs 20-002(a) and 20-002(c) and AOCs 20-003(c), 53-008, 53-014, and 72-001. Gaging stations within the Lower Sandia Canyon Aggregate Area are E124, located above AOC 72-001, and E125, located at the lower end of the canyon above NM 4. The monitoring requirements for each SMA and gaging station are contained in a Storm Water Pollution Prevention Plan (SWPPP) for SWMUs and AOCs

and Storm Water Monitoring Plan, which is updated annually and submitted to EPA. The SWPPP also contains the SMA and gauge station monitoring results.

Monitoring of stormwater is also required under the individual NPDES permit for discharge of stormwater from SWMUs and AOCs issued by EPA in February 2009. In the Lower Sandia Canyon Aggregate Area, SMA monitoring under the new individual permit must be conducted at SWMUs 20-002(a), 20-002(c), 20-002(d), 20-005, 53-001(a), and 53-001(b), and at AOCs 20-003(c), 53-008, 53-012(e), 53-014, and 72-001.

7.0 SCHEDULE

The scheduled notice date for NMED to approve this investigation work plan is August 13, 2009. Preparation of investigation activities is scheduled to start by November 9, 2009. Fieldwork is expected to start April 12, 2010, and will take approximately 6 months to complete. Fieldwork is scheduled to be completed by October 29, 2010. The investigation report will be delivered to NMED on or before March 31, 2011.

8.0 REFERENCES AND MAP DATA SOURCES

8.1 References

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

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

- Abeele, W.V., M.L. Wheeler, and B.W. Burton, October 1981. "Geohydrology of Bandelier Tuff," Los Alamos National Laboratory report LA-8962-MS, Los Alamos, New Mexico. (Abeele et al. 1981, 006273)
- Baltz, E.H., J.H. Abrahams, Jr., and W.D. Purtymun, March 1963. "Preliminary Report on the Geology and Hydrology of Mortandad Canyon near Los Alamos, New Mexico, with Reference to Disposal of Liquid Low-Level Radioactive Waste," U.S. Geological Survey Open File Report, Albuquerque, New Mexico. (Baltz et al. 1963, 008402)
- Broxton, D., R. Warren, A. Crowder, M. Everett, R. Gilkeson, P. Longmire, and J. Marin, September 1998. "Interim Completion Report for Characterization Well R-12," Los Alamos National Laboratory document LA-UR-98-3976, Los Alamos, New Mexico. (Broxton et al. 1998, 059665)
- Broxton, D.E., and S.L. Reneau, August 1995. "Stratigraphic Nomenclature of the Bandelier Tuff for the Environmental Restoration Project at Los Alamos National Laboratory," Los Alamos National Laboratory report LA-13010-MS, Los Alamos, New Mexico. (Broxton and Reneau 1995, 049726)

- Broxton, D.E., and S.L. Reneau, 1996. "Buried Early Pleistocene Landscapes Beneath the Pajarito Plateau, Northern New Mexico," *New Mexico Geological Society Guidebook: 47th Field Conference, Jemez Mountains Region, New Mexico*, pp. 325-334. (Broxton and Reneau 1996, 055429)
- Buckland, C., April 20, 1948. "Sandia Canyon—Clearing for Future Public Road, Picnic Area," Los Alamos Scientific Laboratory memorandum to R.J. Westcott from C. Buckland, Los Alamos, New Mexico. (Buckland 1948, 006001)
- Collins, K.A., A.M. Simmons, B.A. Robinson, and C.I. Nylander (Eds.), December 2005. "Los Alamos National Laboratory's Hydrogeologic Studies of the Pajarito Plateau: A Synthesis of Hydrogeologic Workplan Activities (1998–2004)," Los Alamos National Laboratory report LA-14263-MS, Los Alamos, New Mexico. (Collins et al. 2005, 092028)
- Cooper, J.B., W.D. Purtymun, and E.C. John, July 1965. "Records of Water-Supply Wells Guaje Canyon 6, Pajarito Mesa 1, and Pajarito Mesa 2, Los Alamos, New Mexico, Basic Data Report," U.S. Geological Survey, Albuquerque, New Mexico. (Cooper et al. 1965, 008582)
- Courtright, W.C., September 28, 1962. "Inspection for Possible Explosive Contamination of TA-20, Sandia Canyon Site, and TA-27, Gamma Site," Los Alamos Scientific Laboratory memorandum to R. Reider from W.C. Courtright (H-3), Los Alamos, New Mexico. (Courtright 1962, 005971)
- Dethier, D.P., 1997. "Geology of White Rock Quadrangle, Los Alamos and Santa Fe Counties, New Mexico," Map 73, New Mexico Bureau of Mines and Mineral Resources. (Dethier 1997, 049843)
- Dethier, D.P., and K. Manley, 1985. "Geologic Map of the Chili Quadrangle, Rio Arriba County, New Mexico," Map MF-1814, U.S. Geological Survey Miscellaneous Field Studies, Washington, D.C. (Dethier and Manley 1985, 021506)
- Devaurs, M., and W.D. Purtymun, 1985. "Hydrologic Characteristics of the Alluvial Aquifers in Mortandad, Cañada del Buey, and Pajarito Canyons," Los Alamos National Laboratory document LA-UR-85-4002, Los Alamos, New Mexico. (Devaurs and Purtymun 1985, 007415)
- DOE (U.S. Department of Energy), October 29, 1986. "Los Alamos Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment," draft, Los Alamos, New Mexico. (DOE 1986, 008657)
- DOE (U.S. Department of Energy), January 1998. "Environmental Survey Preliminary Report, Los Alamos National Laboratory, Los Alamos, New Mexico," report no. DOE/EH/OEV-12P, DE91-002506, Environment, Safety and Health, Office of Environmental Audit, Washington, D.C. (DOE 1988, 008609)
- DOE (U.S. Department of Energy), 1995. "NMED-HRMB Request for Information Prior to Decision Concerning SWMU 0-016: Movement of Lead Contaminated Soil to TA-72," U.S. Department of Energy memorandum and attachment to J. Jansen (EM/ER) from T. Taylor (DOE ER Program Manager), Los Alamos, New Mexico. (DOE 1995, 046257)

- DOE (U.S. Department of Energy), October 12, 1999. "Status Report of Activities at the TA-53 New Radioactive Liquid Waste Treatment Facility (RLWTF) Plant and Notification of a New Solid Waste Management Unit (SWMU) at Los Alamos National Laboratory (LANL)," U.S. Department of Energy letter to R.S. Dinwiddie (NMED-HRMB) from H.L. Plum (DOE-LAAO), Los Alamos, New Mexico. (DOE 1999, 098985)
- Drake, R.W., and W.C. Courtwright, July 7, 1966. "Annual Inspection of TA-20 and TA-27 for Loose Explosives," Los Alamos Scientific Laboratory memorandum to R. Reider from R.W. Drake (GMX-DO) and W.C. Courtwright (H-3), Los Alamos, New Mexico. (Drake and Courtwright 1966, 005985)
- Drake, R.W., and W.C. Courtwright, July 11, 1967. "Annual Inspection of TA-20 and TA-27 for Loose Explosives," Los Alamos Scientific Laboratory memorandum to R. Reider from R.W. Drake (GMX-DO) and W.C. Courtwright (H-3), Los Alamos, New Mexico. (Drake and Courtwright 1967, 005986)
- Drake, R.W., and W.C. Courtwright, June 6, 1969. "Inspection of TA-20 and TA-27 for Loose Explosives," Los Alamos Scientific Laboratory memorandum to R. Reider from R.W. Drake (GMX-DO) and W.C. Courtwright (H-3), Los Alamos, New Mexico. (Drake and Courtwright 1969, 005987)
- EPA (U.S. Environmental Protection Agency), January 21, 2005. "EPA's Prior Decisions on SWMU/AOC Sites at Los Alamos National Laboratory (LANL)," U.S. Environmental Protection Agency letter to J. Bearzi (NMED-HRMB) from L.F. King (EPA Federal Facilities Section Chief), Dallas, Texas. (EPA 2005, 088464)
- Ferguson, J.F., W.S. Baldrige, L.W. Braile, S. Biehler, B. Gilpin, and G.R. Jiracek, 1995. "Structure of the Española Basin, Rio Grande Rift, New Mexico, from Stage Seismic and Gravity Data," New Mexico Geological Society Guidebook: 46th Field Conference, Geology of the Santa Fe Region, pp. 105-110. (Ferguson et al. 1995, 056018)
- Galusha, T., and J.C. Blick, April 1971. "Stratigraphy of the Santa Fe Group, New Mexico," *Bulletin of the American Museum of Natural History*, Vol. 144, No. 1, pp. 1-128. (Galusha and Blick 1971, 021526)
- Gardner, J.N., T. Kolbe, and S. Chang, January 1993. "Geology, Drilling, and Some Hydrologic Aspects of Seismic Hazards Program Core Holes, Los Alamos National Laboratory, New Mexico," Los Alamos National Laboratory report LA-12460-MS, Los Alamos, New Mexico. (Gardner et al. 1993, 012582)
- Griggs, R.L., and J.D. Hem, 1964. "Geology and Ground-Water Resources of the Los Alamos Area, New Mexico," U.S. Geological Survey Water Supply Paper 1753, Washington, D.C. (Griggs and Hem 1964, 092516)
- ICF Kaiser Engineers, August 9, 1995. "Los Alamos National Laboratory, Voluntary Corrective Action Plan for Aggregate TAs -53 and -20 Group 6," report prepared for Los Alamos National Laboratory, Los Alamos, New Mexico. (ICF Kaiser Engineers 1995, 056781)

- ICF Kaiser Engineers, September 6, 1995. "Los Alamos National Laboratory, Voluntary Corrective Action Plan for TA-53 Lead Shot Sites I and II," report prepared for Los Alamos National Laboratory, Los Alamos, New Mexico. (ICF Kaiser Engineers 1995, 058172)
- LANL (Los Alamos National Laboratory), June 19, 1989. "53-5-2b, Satellite Hazardous Storage, South of MPF-2," Polaroid photograph No. 16, Los Alamos, New Mexico. (LANL 1989, 020516)
- LANL (Los Alamos National Laboratory), June 19, 1989. "Drum Storage, 53-5-2a, North Side MPF-2," Polaroid photograph No. 2, Los Alamos, New Mexico. (LANL 1989, 020502)
- LANL (Los Alamos National Laboratory), June 21, 1989. "53-5-384, 30 ft North of MPF 384, Contents Unknown," Polaroid photograph No. 136, Los Alamos, New Mexico. (LANL 1989, 020636)
- LANL (Los Alamos National Laboratory), June 21, 1989. "Area of Wet Soil Resulting from Leak or Spill from Tank A (South End)," Polaroid photograph No. 109, Los Alamos, New Mexico. (LANL 1989, 020609)
- LANL (Los Alamos National Laboratory), June 21, 1989. "Pumps Containing <1 ppm PCBs, Boneyard Area," Polaroid photograph No. 114, Los Alamos, New Mexico. (LANL 1989, 020614)
- LANL (Los Alamos National Laboratory), June 21, 1989. "53-5-166 (Boneyard), Approx. 100 Drums Poss. Containing New Steel Bearings " Polaroid photograph No. 116, Los Alamos, New Mexico. (LANL 1989, 020616)
- LANL (Los Alamos National Laboratory), June 21, 1989. "53-5-166, Rad Tape, 55 gal Overpack and Regular Drums Marked Acid Flush (Contaminated Mat.), Boneyard Area," Polaroid photograph No. 115, Los Alamos, New Mexico. (LANL 1989, 020615)
- LANL (Los Alamos National Laboratory), June 21, 1989. "53-7-A, B, C, Also: 25 - 55 gal Drums in Foreground with Unknown Contents," Polaroid photograph No. 108, Los Alamos, New Mexico. (LANL 1989, 020608)
- LANL (Los Alamos National Laboratory), November 6, 1989. "Septic Tank and Leach Field, Firing Range, TA-0, Civil: Site Plan, Bldg ULR-1267, Revision 2," Engineering Drawing ENG-C-45621, Los Alamos, New Mexico. (LANL 1989, 104234)
- LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Vol. IV of IV (TA-51 through TA-74), Los Alamos National Laboratory document LA-UR-90-3400, Los Alamos, New Mexico. (LANL 1990, 007514)
- LANL (Los Alamos National Laboratory), April 28, 1993. "Los Alamos National Laboratory HWTS System [Hazardous Waste Tracking System]," No. RHWTS0002, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1993, 029415)
- LANL (Los Alamos National Laboratory), August 1993. "Environmental Surveillance at Los Alamos During 1991," Los Alamos National Laboratory report LA-12572-ENV, Los Alamos, New Mexico. (LANL 1993, 023249)

- LANL (Los Alamos National Laboratory), May 1994. "RFI Work Plan for Operable Unit 1100," Los Alamos National Laboratory document LA-UR-94-1097, Los Alamos, New Mexico. (LANL 1994, 034756)
- LANL (Los Alamos National Laboratory), March 1996. "RFI Report for Potential Release Sites at TAs-20, -53, and -72 (located in former Operable Unit 1100), Field Unit 2," Environmental Restoration Project, Los Alamos National Laboratory document LA-UR-96-906, Los Alamos, New Mexico. (LANL 1996, 054466)
- LANL (Los Alamos National Laboratory), December 6, 1996. "Hydrogeologic Workplan," Draft Revision 1.0, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1996, 055430)
- LANL (Los Alamos National Laboratory), January 1996. "Voluntary Corrective Action Completion Report for Potential Release Sites 20-003(c) and 53-010, Revision 1," Los Alamos National Laboratory document LA-UR-96-1089, Los Alamos, New Mexico. (LANL 1996, 053775)
- LANL (Los Alamos National Laboratory), January 1996. "Voluntary Corrective Action Completion Report for Potential Release Site 16-016(f), Former Surface Disposal Area, Revision 1," Los Alamos National Laboratory document LA-UR-96-190, Los Alamos, New Mexico. (LANL 1996, 053776)
- LANL (Los Alamos National Laboratory), August 1997. "Voluntary Corrective Action Plan for Potential Release Site 53-001(a), Storage Area," Los Alamos National Laboratory document LA-UR-97-3719, Los Alamos, New Mexico. (LANL 1997, 056647)
- LANL (Los Alamos National Laboratory), August 1997. "Voluntary Corrective Action Completion Plan for Potential Release Site 53-008, Boneyard," draft, Los Alamos National Laboratory document, Los Alamos National Laboratory document LA-UR-09-2465, Los Alamos, New Mexico. (LANL 1997, 056384)
- LANL (Los Alamos National Laboratory), September 1997. "VCA Report for PRS 0-016," Los Alamos National Laboratory document LA-UR-97-2745, Los Alamos, New Mexico. (LANL 1997, 056737)
- LANL (Los Alamos National Laboratory), September 1997. "Voluntary Corrective Action Completion Report for Potential Release Site 53-014, Lead Shot Site," Los Alamos National Laboratory document LA-UR-97-3846, Los Alamos, New Mexico. (LANL 1997, 062913)
- LANL (Los Alamos National Laboratory), September 1997. "Voluntary Corrective Action Completion Report for Potential Release Site 53-001(a), Storage Area," draft, Los Alamos National Laboratory document, Los Alamos National Laboratory document LA-UR-09-2464, Los Alamos, New Mexico. (LANL 1997, 056505)
- LANL (Los Alamos National Laboratory), September 22, 1998. "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 059730)
- LANL (Los Alamos National Laboratory), June 24, 1999. "Presentation Summary of TA-53-1 (MPF-1) Sump and Tank, PRSs 53-007(a)/53-006(f)," Los Alamos National Laboratory letter (EM/ER:99-150) to J.P. Bearzi (NMED-HRMB) from J. Canepa (LANL) and T.J. Taylor (DOE-LAAO), Los Alamos, New Mexico. (LANL 1999, 063459)

- LANL (Los Alamos National Laboratory), September 1999. "Work Plan for Sandia Canyon and Cañada del Buey," Los Alamos National Laboratory document LA-UR-99-3610, Los Alamos, New Mexico. (LANL 1999, 064617)
- LANL (Los Alamos National Laboratory), December 2000. "University of California, Los Alamos National Laboratory (LANL), I8980SOW0-8S, Statement of Work for Analytical Laboratories," Rev. 1, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2000, 071233)
- LANL (Los Alamos National Laboratory), March 27, 2001. "Sludge Sample Analyses Data from TA-53, Area A, PRS (Potential Release Site) 53-006(b) and (c), and Weapons Neutron Research (WNR) Facility PRSs 53-006(d) and (e), Supplement to the October 8, 1999 New Mexico Environment Department (NMED) Notice of Deficiency (NOD) Response," Los Alamos National Laboratory letter (ER2001-0166) to J. Young (NMED-HWB) from J. Canepa (LANL) and T.J. Taylor (DOE-LAAO), Los Alamos, New Mexico. (LANL 2001, 070268)
- LANL (Los Alamos National Laboratory), January 2004. "Investigation and Remediation Report for Consolidated SWMU 53-002(a)-99, Inactive Wastewater Impoundments, and AOC 53-008, Storage Area, at Technical Area 53," Los Alamos National Laboratory document LA-UR-03-9119, Los Alamos, New Mexico. (LANL 2004, 085221)
- LANL (Los Alamos National Laboratory), May 2005. "Derivation and Use of Radionuclide Screening Action Levels, Revision 1," Los Alamos National Laboratory document LA-UR-05-1849, Los Alamos, New Mexico. (LANL 2005, 088493)
- LANL (Los Alamos National Laboratory), September 2007. "Fate and Transport Modeling Report for Chromium Contamination from Sandia Canyon," Los Alamos National Laboratory document LA-UR-07-6018, Los Alamos, New Mexico. (LANL 2007, 098938)
- LANL (Los Alamos National Laboratory), November 2007. "Work Plan for Geochemical Characterization and Drilling for Fate and Transport of Contaminants Originating in Sandia Canyon," Los Alamos National Laboratory document LA-UR-07-7579, Los Alamos, New Mexico. (LANL 2007, 099607)
- LANL (Los Alamos National Laboratory), March 2008. "2008 General Facility Information," Los Alamos National Laboratory document LA-UR-08-1538, Los Alamos, New Mexico. (LANL 2008, 101932)
- LANL (Los Alamos National Laboratory), May 2008. "2008 Interim Facility-Wide Groundwater Monitoring Plan," Los Alamos National Laboratory document LA-UR-08-3273, Los Alamos, New Mexico. (LANL 2008, 101897)
- LANL (Los Alamos National Laboratory), April 2009. "Historical Investigation Report for Lower Sandia Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-09-2077, Los Alamos, New Mexico. (LANL 2009, 105078)
- LASL (Los Alamos Scientific Laboratory), September 11, 1947. "A Technical Maintenance Group Report on General Background Data Concerning the Los Alamos Scientific Laboratory Required for Planning Purposes," Los Alamos Scientific Laboratory report LAB-A-5, Los Alamos, New Mexico. (LASL 1947, 005581)

- LASL (Los Alamos Scientific Laboratory), February 19, 1951. "TA-20, Plans, Sections, Details, Gun Mount SAN-16 and Bin SAN-10, Hutment, Revision 1," Engineering Drawing ENG-C-1776, sheet number 3, Los Alamos, New Mexico. (LASL 1951, 024343)
- LASL (Los Alamos Scientific Laboratory), February 19, 1951. "TA-20, Revised Site Plan and Topographic Layout, Revision 1," Engineering Drawing ENG-C-1778, Los Alamos, New Mexico. (LASL 1951, 024345)
- LASL (Los Alamos Scientific Laboratory), August 6, 1951. "Additions and Alterations, TA-20 to (Station 104) SAN-47, South Mesa Access Road, Septic Tank, Plumbing, and Stack Details, Guardhouse Building SAN-47," Engineering Drawing ENG-C-15104, sheet number 5 of 7, Los Alamos, New Mexico. (LASL 1951, 026066)
- LASL (Los Alamos Scientific Laboratory), April 2, 1971. "Los Alamos Meson Physics Facility Trichloroethylene and Freon Waste System Modifications, Revision 1," Engineering Drawing ENG-C-50165, sheet number 1 of 1, Los Alamos, New Mexico. (LASL 1971, 023260)
- Laughlin, A.W., G. WoldeGabriel, and D.P. Dethier, October 29, 1993. "Volcanic Stratigraphy of the Pajarito Plateau," Preliminary Report FY93, Los Alamos Scientific Laboratory, Los Alamos, New Mexico. (Laughlin et al. 1993, 054424)
- Littlejohn, G.J., November 26, 1946. "Monitoring of Sandia Equipment," Los Alamos Scientific Laboratory memorandum to L.H. Hempelmann from G.J. Littlejohn, Los Alamos, New Mexico. (Littlejohn 1946, 005997)
- Manley, K., 1976. "The Late Cenozoic History of the Española Basin, New Mexico," University of Colorado, Boulder, Colorado. (Manley 1976, 057673)
- NMED (New Mexico Environment Department), December 23, 1998. "Approval: Class III Permit Modification to Remove Ninety-nine (99) Solid Waste Management Units from the Department of Energy/Los Alamos National Laboratory RCRA Permit NM 0890010515," New Mexico Environment Department letter to T. Taylor (DOE-LAAO) and J.C. Browne (LANL Director) from E. Kelley (NMED-HRMB), Santa Fe, New Mexico. (NMED 1998, 063042)
- NMED (New Mexico Environment Department), June 2006. "Technical Background Document for Development of Soil Screening Levels, Revision 4.0, Volume 1, Tier 1: Soil Screening Guidance Technical Background Document," New Mexico Environment Department, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico. (NMED 2006, 092513)
- NMED (New Mexico Environment Department), September 13, 2006. "Certificates of Completion for Solid Waste Management Units 53-002(a) and 53-002(b), Technical Area 53," 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 2006, 095421)
- NMED (New Mexico Environment Department), October 2006. "New Mexico Environment Department TPH Screening Guidelines," Santa Fe, New Mexico. (NMED 2006, 094614)

- NMED (New Mexico Environment Department), March 23, 2007. "Approval of Class 3 Permit Modification for No Further Action of 20 Solid Waste Management Units," New Mexico Environment Department letter to D. Glenn (DOE LASO) and R. Watkins (LANL) from C. Padilla (NMED), Santa Fe, New Mexico. (NMED 2007, 095495)
- Nyhan, J.W., L.W. Hacker, T.E. Calhoun, and D.L. Young, June 1978. "Soil Survey of Los Alamos County, New Mexico," Los Alamos Scientific Laboratory report LA-6779-MS, Los Alamos, New Mexico. (Nyhan et al. 1978, 005702)
- Purtymun, W.D. (Los Alamos Scientific Laboratory), June 1967. "Record of Water-Supply Well PM-3, Los Alamos, New Mexico," Los Alamos Scientific Laboratory, Los Alamos, New Mexico. (Purtymun 1967, 011829)
- Purtymun, W.D., December 1975. "Geohydrology of the Pajarito Plateau with Reference to Quality of Water, 1949-1972," Informal Report, Los Alamos Scientific Laboratory document LA-UR-02-4726, Los Alamos, New Mexico. (Purtymun 1975, 011787)
- Purtymun, W.D., January 1984. "Hydrologic Characteristics of the Main Aquifer in the Los Alamos Area: Development of Ground Water Supplies," Los Alamos National Laboratory report LA-9957-MS, Los Alamos, New Mexico. (Purtymun 1984, 006513)
- Purtymun, W.D., January 1995. "Geologic and Hydrologic Records of Observation Wells, Test Holes, Test Wells, Supply Wells, Springs, and Surface Water Stations in the Los Alamos Area," Los Alamos National Laboratory report LA-12883-MS, Los Alamos, New Mexico. (Purtymun 1995, 045344)
- Purtymun, W.D., J.R. Buchholz, and T.E. Hakonson, 1977. "Chemical Quality of Effluents and Their Influence on Water Quality in a Shallow Aquifer," *Journal of Environmental Quality*, Vol. 6, No. 1, pp. 29-32. (Purtymun et al. 1977, 011846)
- Purtymun, W.D., and W.R. Kennedy, May 1971. "Geology and Hydrology of Mesita del Buey," Los Alamos Scientific Laboratory report LA-4660, Los Alamos, New Mexico. (Purtymun and Kennedy 1971, 004798)
- Reneau, S.L., and E.V. McDonald, September 12–15, 1996. "Landscape History and Processes on the Pajarito Plateau, Northern New Mexico," in *Rocky Mountain Cell, Friends of the Pleistocene Field Trip Guidebook*, Los Alamos National Laboratory document LA-UR-96-3035, Los Alamos, New Mexico. (Reneau and McDonald 1996, 055538)
- Rogers, M.A., 1995. "Geologic Map of the Los Alamos National Laboratory Reservation," Mara, Inc., Los Alamos, New Mexico. (Rogers 1995, 054419)
- Russo, S.E., April 21, 1965. "Probable Burial Areas: Former Sandia Canyon Site, TA-20," Los Alamos Scientific Laboratory memorandum to R. Reider (H-3) from S.E. Russo (ENG-3), Los Alamos, New Mexico. (Russo 1965, 005984)

Santa Fe Engineering Ltd., November 1993. "Wastewater Stream Characterization for TA-53-1, 40, 70, 415, 416, 420, 421, 428, 450, 452, 454, 515, 524, 526, 605, 733, 809, 813, 815 and 845 at Los Alamos National Laboratory, Environmental Study, Characterization Report #29," report prepared for Los Alamos National Laboratory, Santa Fe, New Mexico. (Santa Fe Engineering, Ltd. 1993, 031756)

Stoker, A.K., March 31, 1993. "Direct Testimony of Alan K. Stoker on Behalf of Petitioners before the New Mexico Water Quality Control Commission," Los Alamos, New Mexico. (Stoker 1993, 056021)

Weston (Roy F. Weston, Inc.), November 1986. "Surface Geophysical Investigation Utilizing Magnetometry at Sandia Canyon Site 1-4, TA-20, Pajarito Canyon, TA-18, and Area N, TA-15, Los Alamos National Laboratory, Los Alamos, New Mexico," draft, Los Alamos, New Mexico. (Weston 1989, 005439)

8.2 Map Data Sources

ENVIRONMENTAL FEATURE DATA. Aggregate Areas; Los Alamos National Laboratory, ENV Environmental Remediation & Surveillance Program, ER2005-0496; 1:2,500 Scale Data; 22 September 2005. Canyon Reaches; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program, ER2002-0592; 1:24,000 Scale Data; Unknown publication date. Groundwater Monitoring Well Locations; Environmental Surveillance Report, Los Alamos National Laboratory Report LA-14341-ENV, 2006. Digital version of well locations obtained from GIS project file PMR07007. Hypsography, Elevation Contours; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; 1991.

SOLID WASTE MANAGEMENT UNITS (SWMU), AREAS OF CONCERN (AOC) AND CONSOLIDATED UNITS. Potential Release Sites; Los Alamos National Laboratory, Waste and Environmental Services Division, Environmental Data and Analysis Group, EP2008-0407; 1:2,500 Scale Data; 14 July 2008. Modifications to SWMU and AOC feature boundaries resulting from the HIR and IWP to be processed through GIS change control process. Storm Water Multi-Sector General Permit (MSGP) Gage Stations; Los Alamos National Laboratory, Waste & Environmental Services Division, Environmental Data and Analysis Group; Unpublished data, Project 08-0030; 17 October 2008.

INFRASTRUCTURE & CULTURAL FEATURE DATA. Geographic Names Information for the Extended LANL Site; Los Alamos National Laboratory, Environment and Remediation Support Services Division, edition 2007-0A, EP2007-0293; 1:2,500 Scale Data; 18 May 2007.

INDUSTRIAL WASTE. Primary Industrial Waste Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. US Atomic Energy Commission, Drawing LAM-J-M-3 Sheet 52 (ENG-C61753), Los Alamos Meson Physics Facility Experimental Building Phase I, Underground Contaminated Waste Systems; March 1978. Los Alamos National Laboratory, drawing ENG-C52075 Sheet M2, TA-53 Radioactive Liquid Waste Tank Project, Mech. Lift Station No. 943 & 944 Partial Plan; 30 May 2000. US Department of Energy, drawing LA-UA-M-23.3 Sheet 54 (ENG-C44249), Radioactive Liquid Waste Collection System Improvements, TA-53 MPF-297 Loading Station Plan & Details; October 1982.

ROADS. Paved Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Paved Parking; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 12 August 2002; as published 15 October 2008. Dirt Road Arcs; Los Alamos National Laboratory, KSL

Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Security and Industrial Fences and Gates; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Storm Drain Line Distribution System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008.

STRUCTURES. Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Structures; County of Los Alamos, Information Services; as published 29 October 2007. Former structures of the TA-20 technical area, Los Alamos Scientific Laboratory drawing ENG-R138, Structure Location Plan TA-20 Sandia Canyon Site, 31 March 1950. Primary Landscape Features; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Division; 04 June 2008.

UTILITIES. Communication Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 08 August 2002; as published 15 October 2008. Primary Electric Grid; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Primary Gas Distribution Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Sewer Line System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Water Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008.

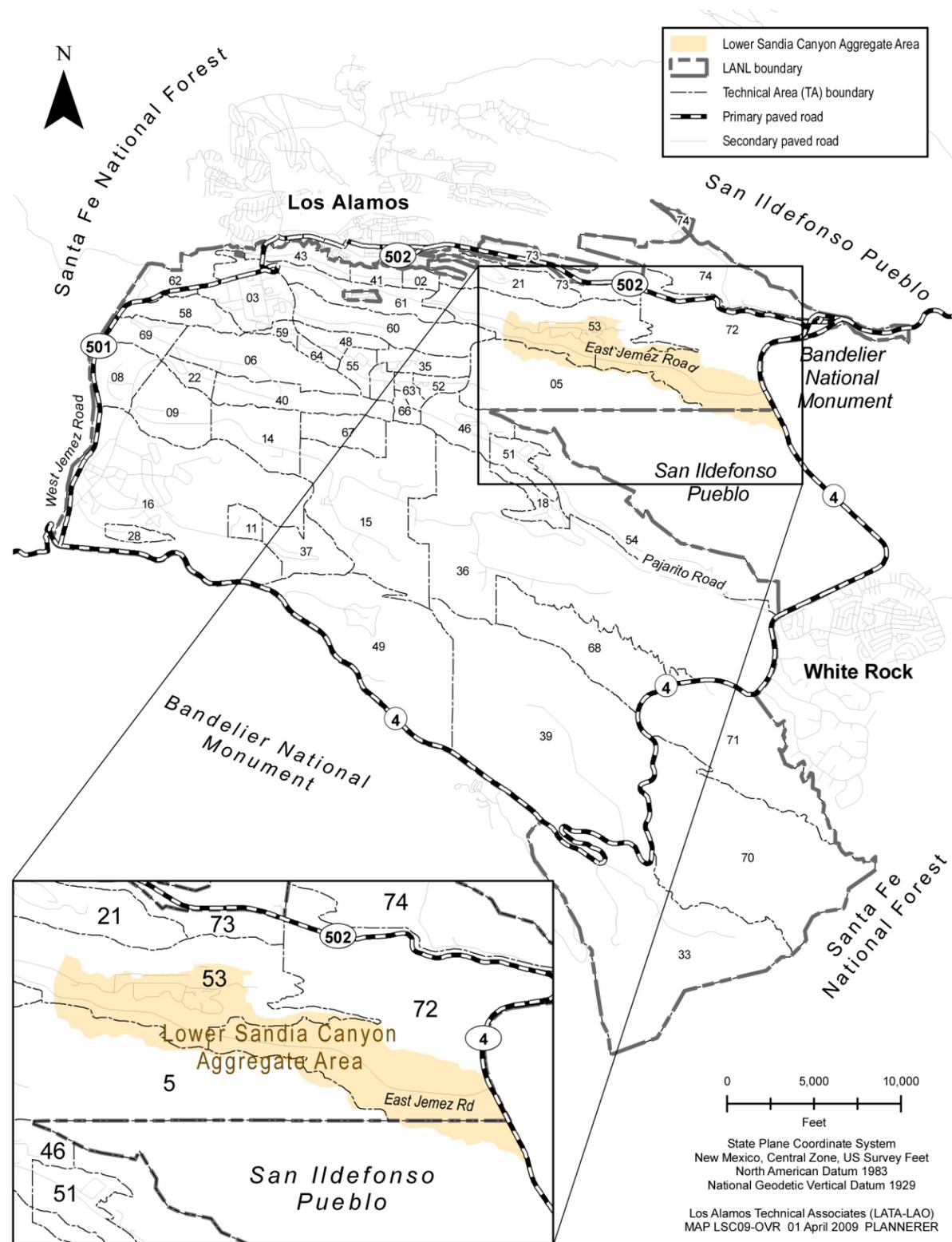


Figure 1.0-1 Lower Sandia Canyon Aggregate Area with respect to Laboratory TAs and surrounding land holdings

Bandelier Tuff	Tshirege Member	Qbt 4	Ash-Flow Units
		Qbt 3	
		Qbt 2	
		Qbt 1v	
		Qbt 1g	
Cerro Toledo Interval		Tsankawi Pumice Bed	
Cerro Toledo Interval		Volcaniclastic Sediments and Ash-Falls	
Bandelier Tuff	Otowi member	Ash-Flow Units	
		Guaje Pumice Bed	
Puye Formation	Fanglomerate	Fanglomerate Facies includes sand, gravel, conglomerate, and tuffaceous sediments	
	Basalt and Andesite	Cerros del Rio Basalts intercalated within the Puye Formation, includes up to four interlayered basaltic flows. Andesites of the Tschicoma Formation present in western part of plateau	
	Fanglomerate	Fanglomerate Facies includes sand, gravel, conglomerate, and tuffaceous sediments; includes "Old Alluvium"	
	Axial facies deposits of the ancestral Rio Grande	Totavi Lentil	
Santa Fe Group	Coarse Sediments	Coarse-Grained Upper Facies (formerly called the "Chaquehui Formation" by Purtymun 1995, 045344)	
	Basalt		
	Coarse Sediments		
	Basalt		
	Coarse Sediments		
	Basalt		
	Coarse Sediments		
Arkosic clastic sedimentary deposits	Undivided Santa Fe Group (includes Chamita[?] and Tesuque Formations)		

Note: Source: LANL 1999, 064617. Modified by NWI 03/21/08.

Figure 3.2-1 Generalized stratigraphy of bedrock units

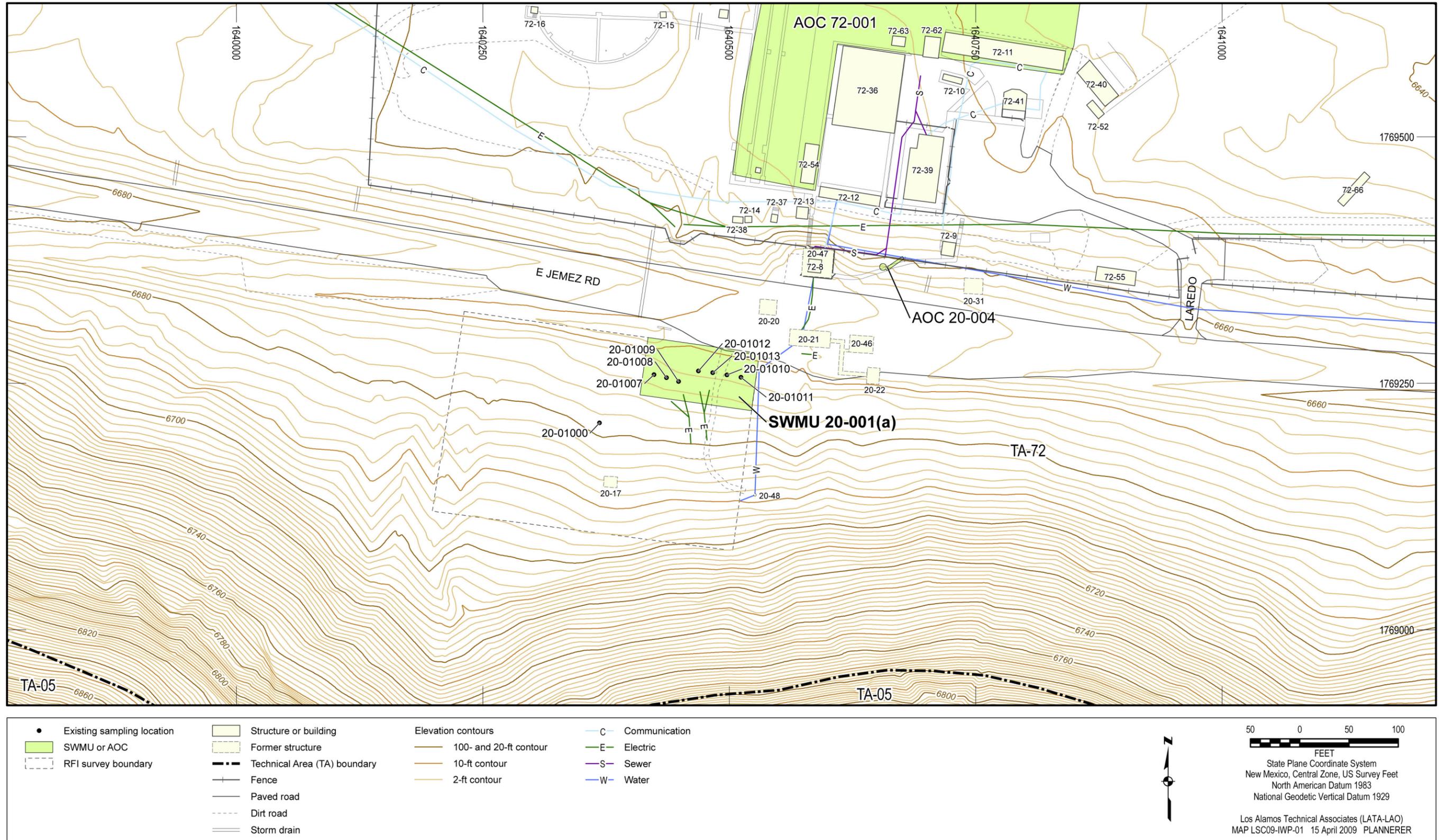


Figure 4.1-1 Site features and historical sampling locations for SWMU 20-001(a)

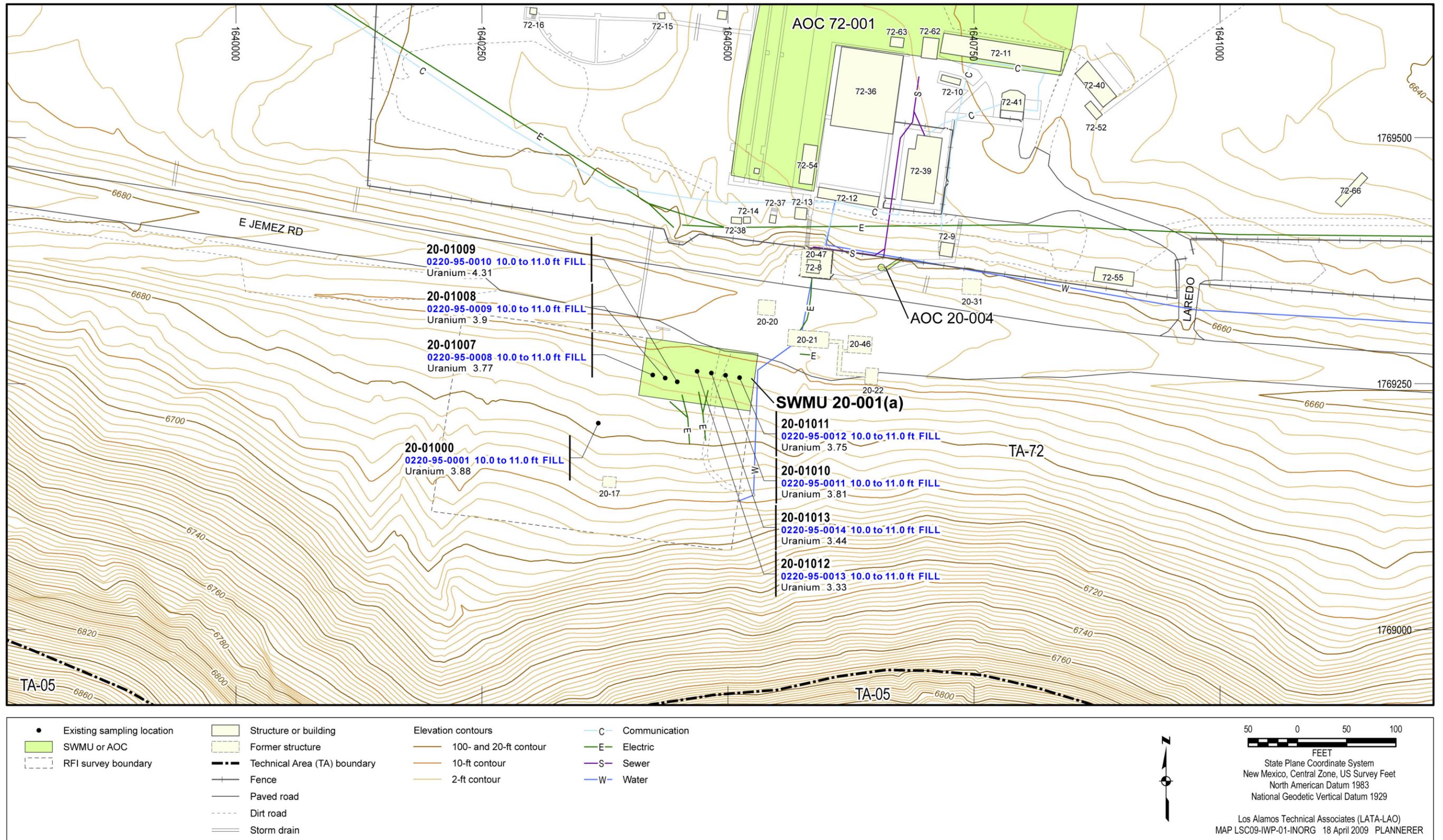


Figure 4.1-2 Inorganic chemicals detected above BVs at SWMU 20-001(a)

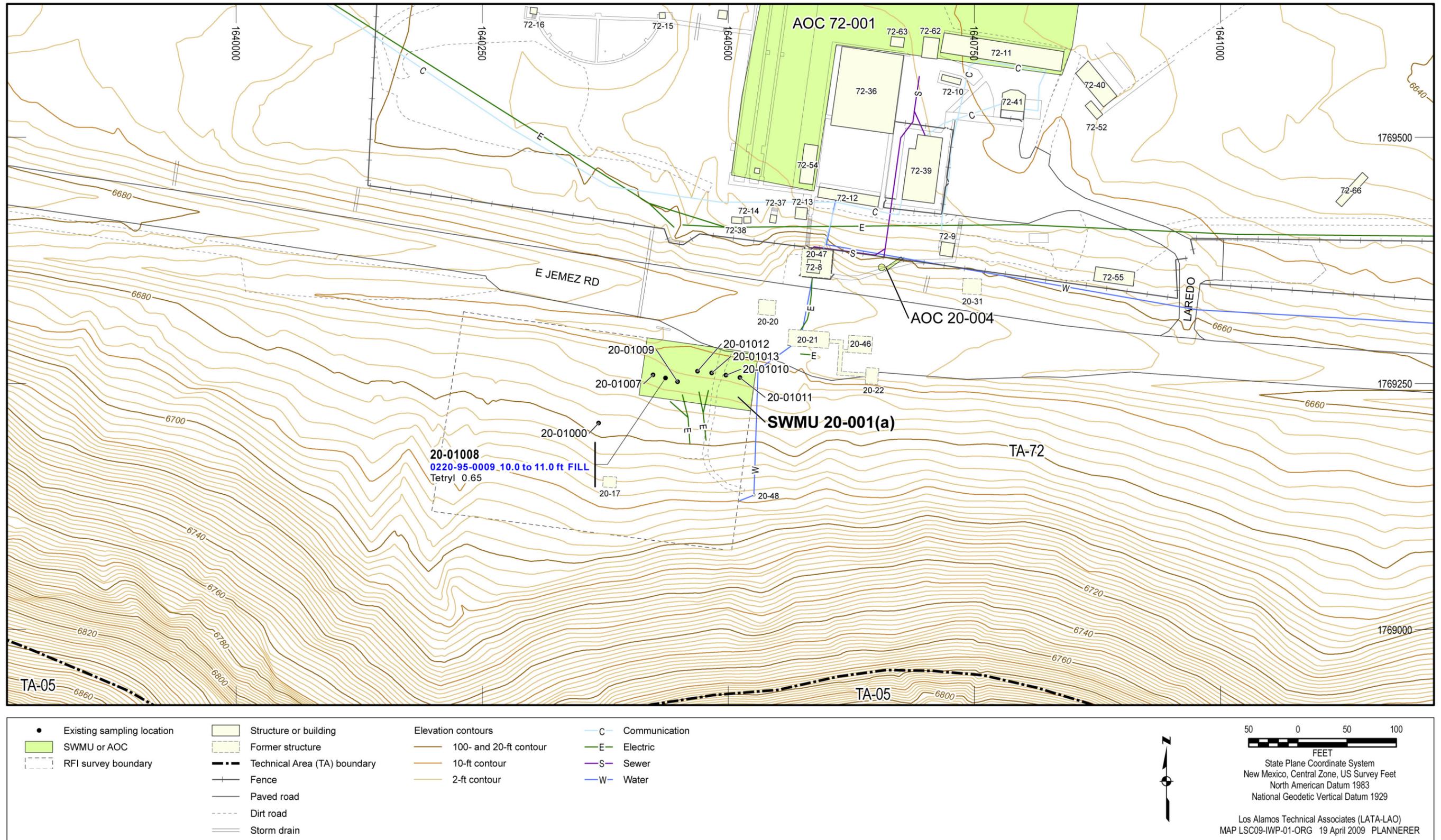


Figure 4.1-3 Organic chemicals detected at SWMU 20-001(a)

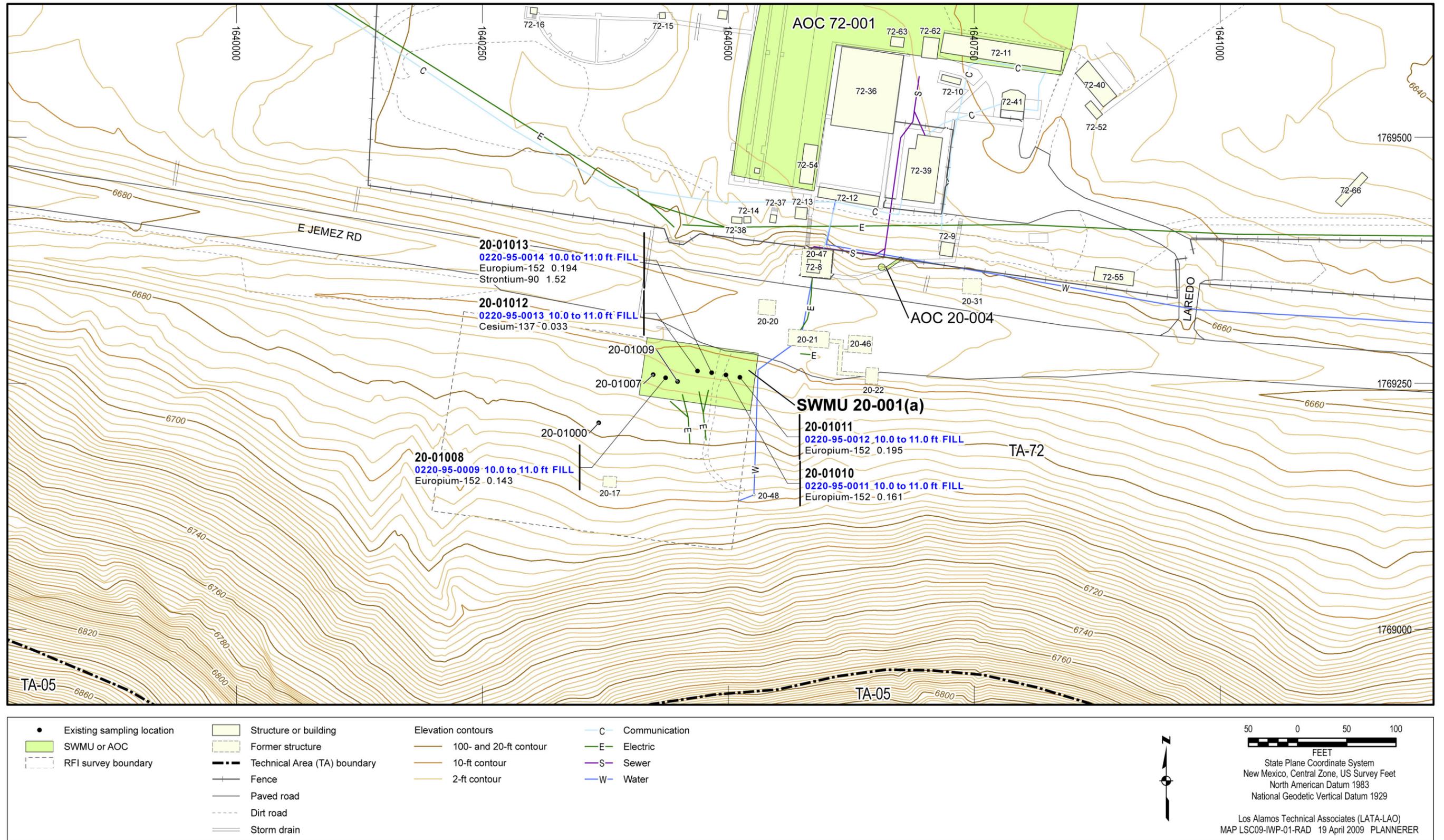


Figure 4.1-4 Radionuclides detected or detected above BVs/FVs at SWMU 20-001(a)

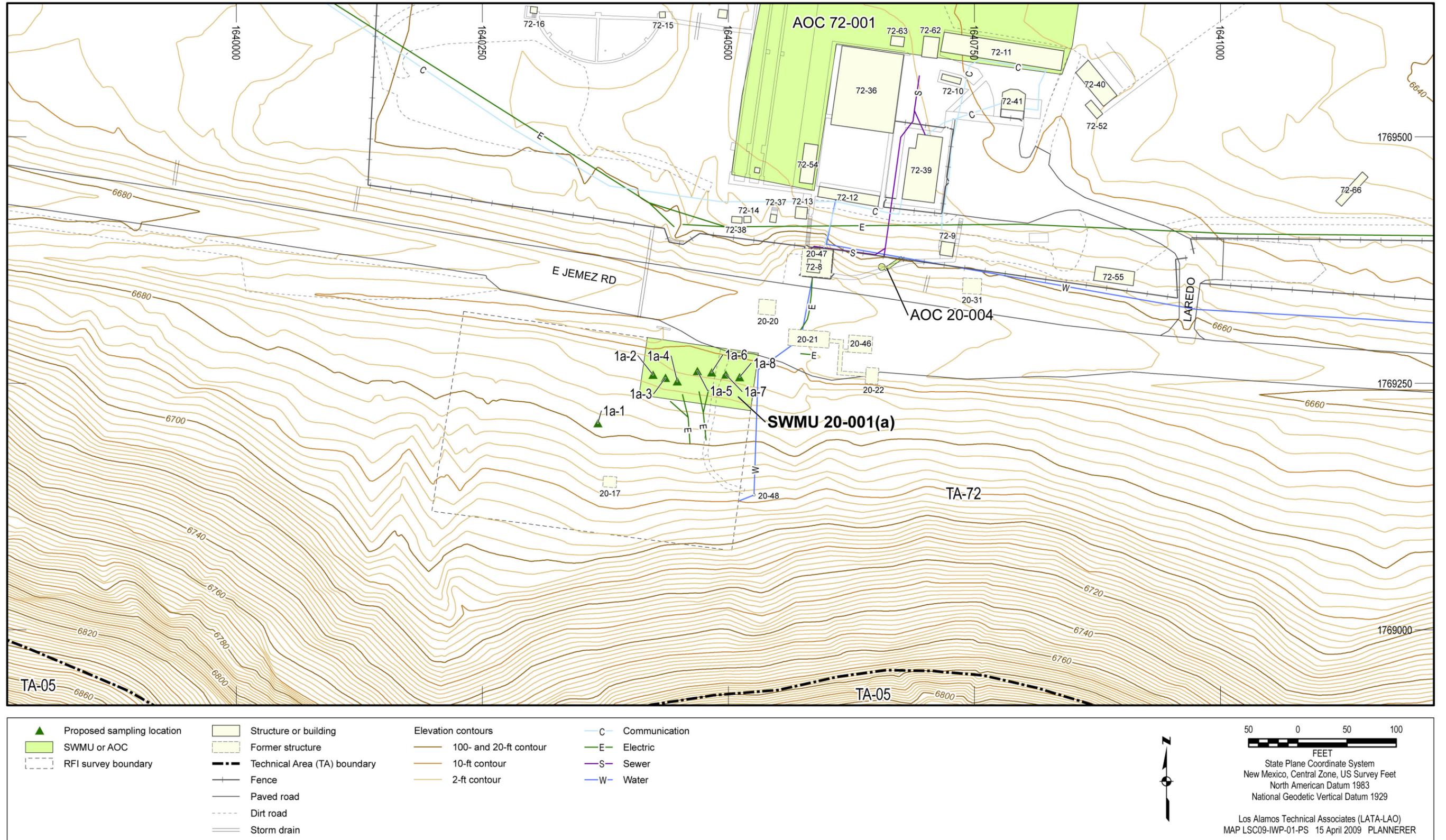


Figure 4.1-5 Proposed sampling locations at SWMU 20-001(a)

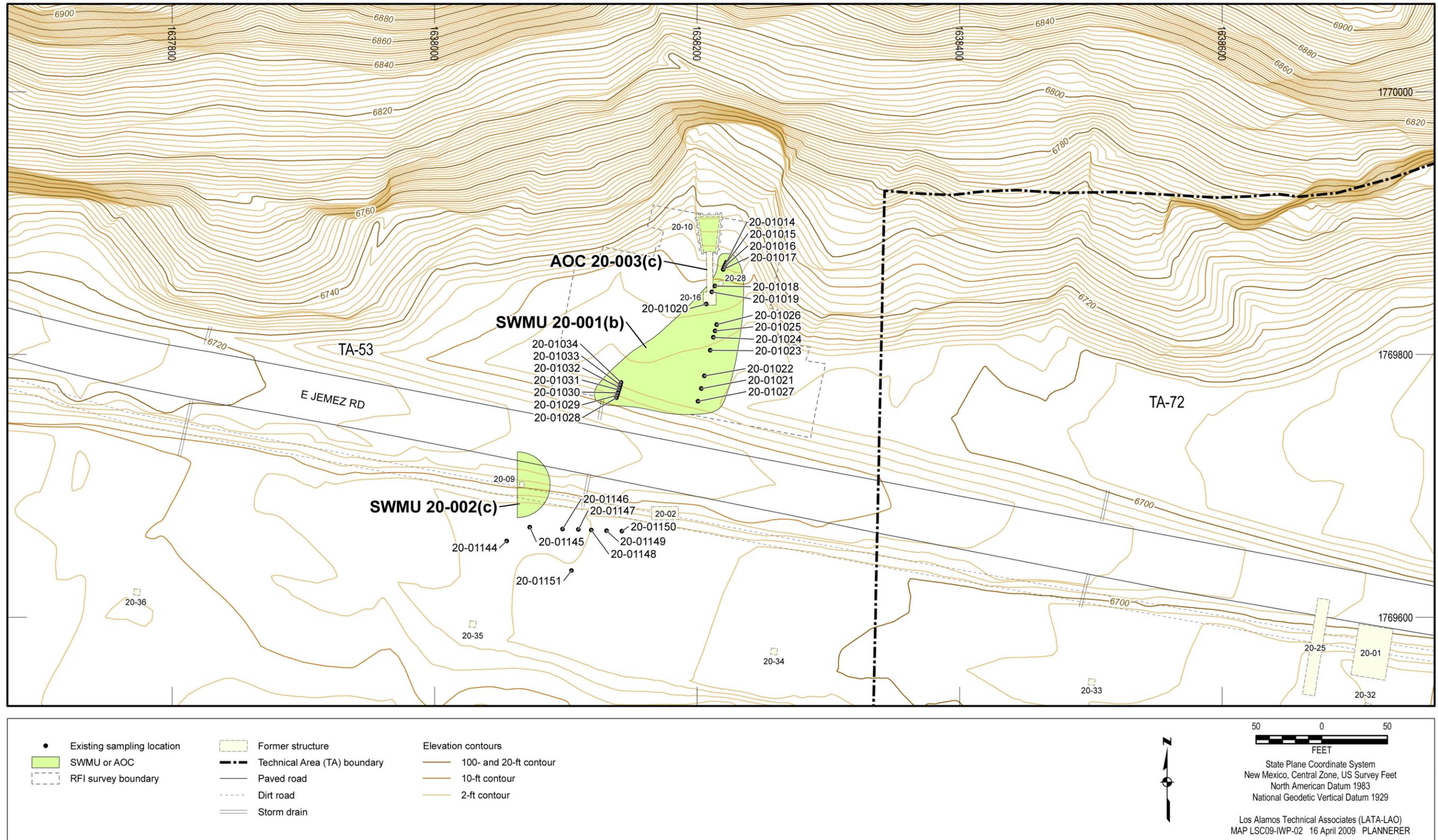


Figure 4.1-6 Site features and historical sampling locations for SWMUs 20-001(b) and 20-002(c) and AOC 20-003(c)

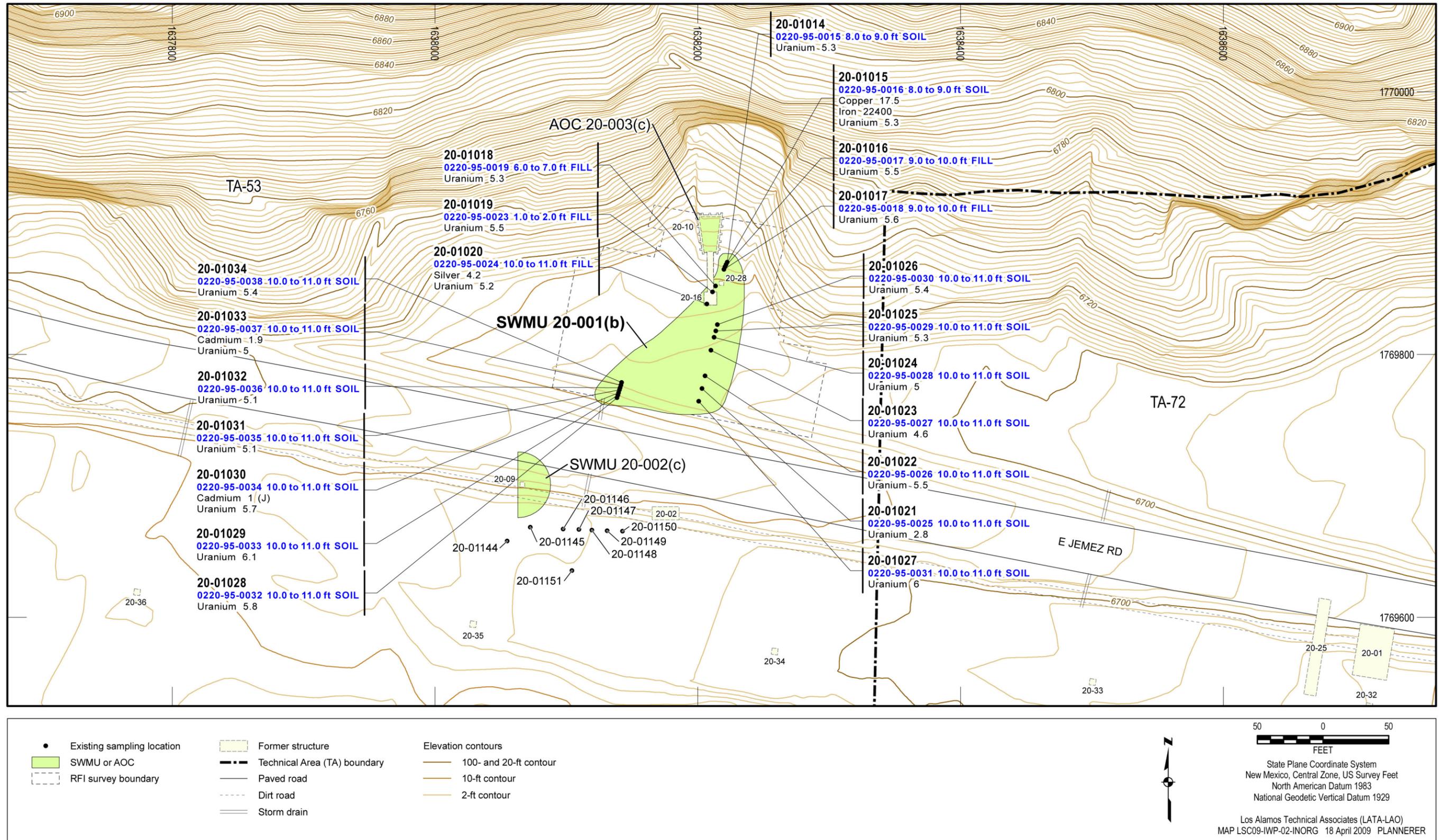


Figure 4.1-7 Inorganic chemicals detected above BVs at SWMU 20-001(b)

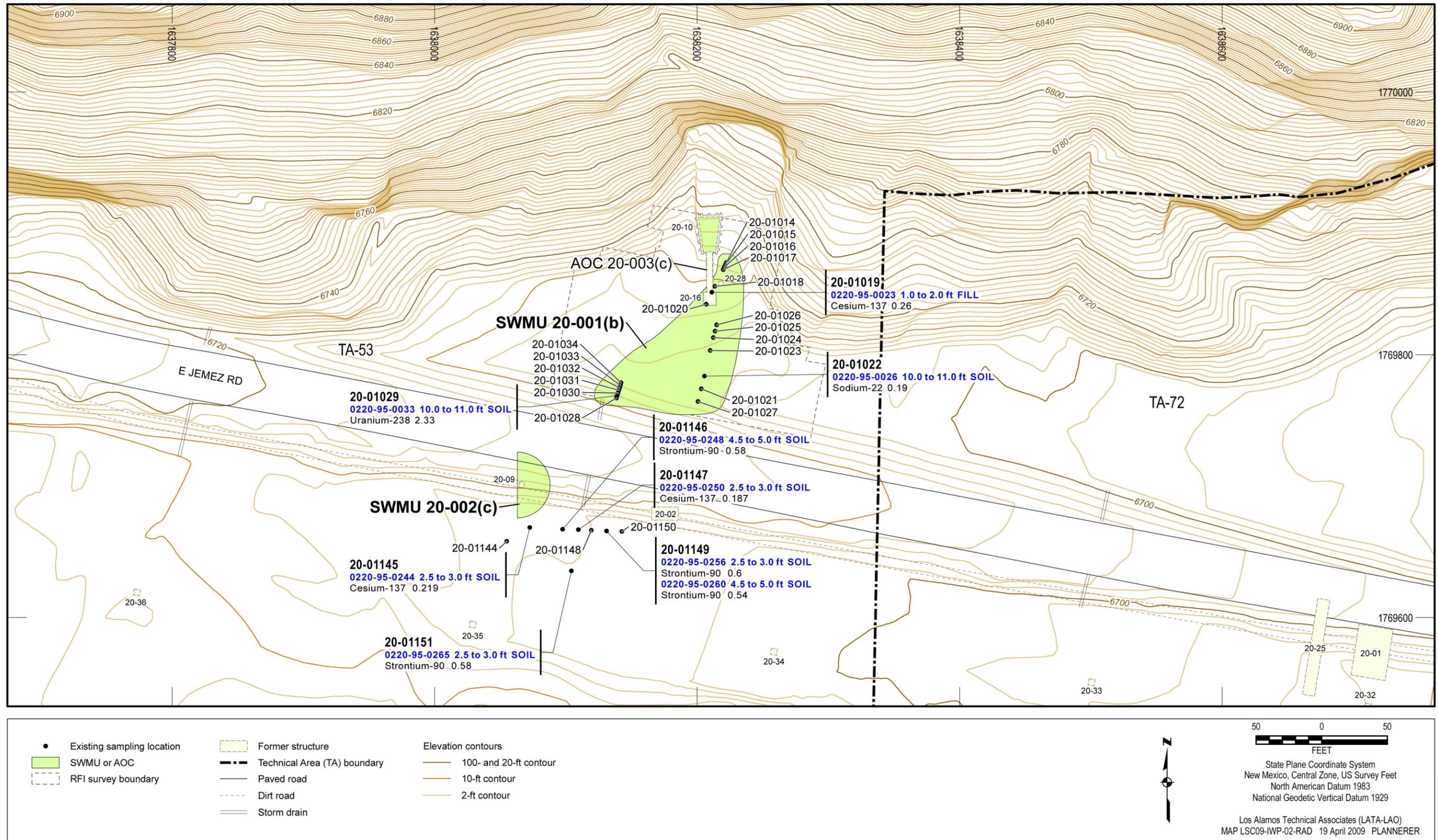


Figure 4.1-8 Radionuclides detected or detected above BVs/FVs at SWMUs 20-001(b) and 20-002(c)

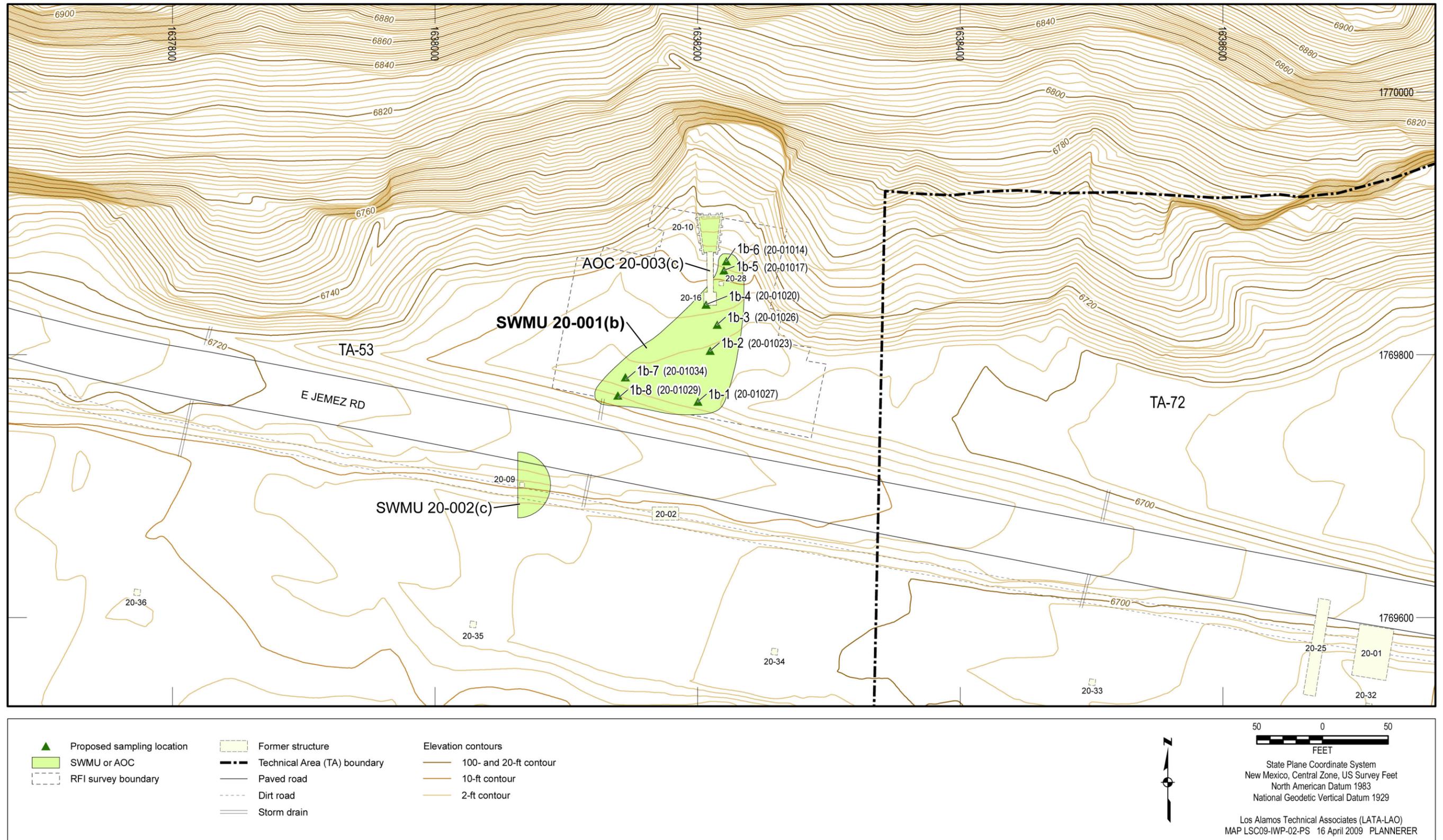


Figure 4.1-9 Proposed sampling locations at SWMU 20-001(b)

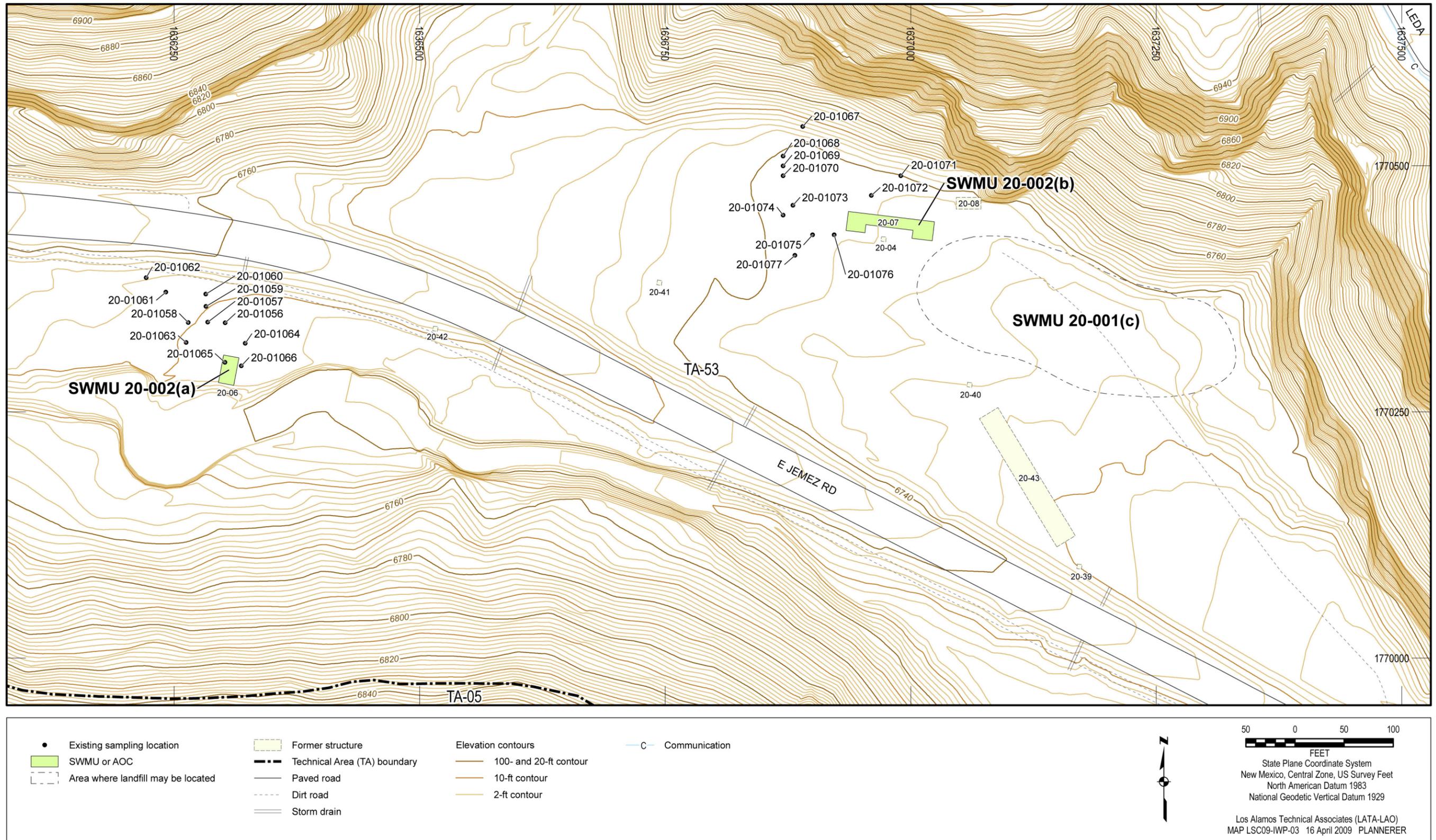


Figure 4.1-10 Site features and historical sampling locations for SWMUs 20-001(c), 20-002(a), and 20-002(b)

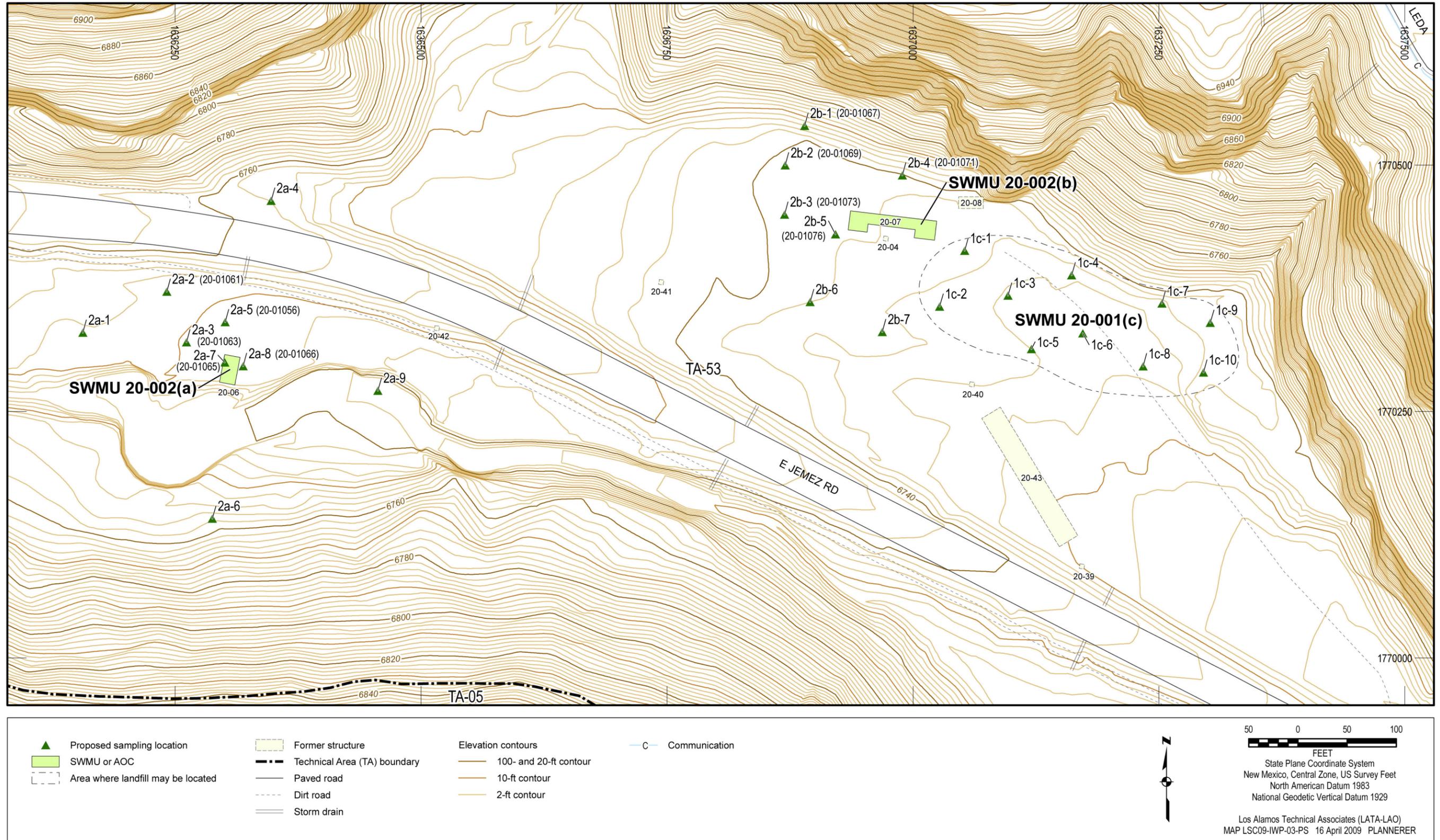


Figure 4.1-11 Proposed sampling locations at SWMUs 20-001(c), 20-002(a), and 20-002(b)

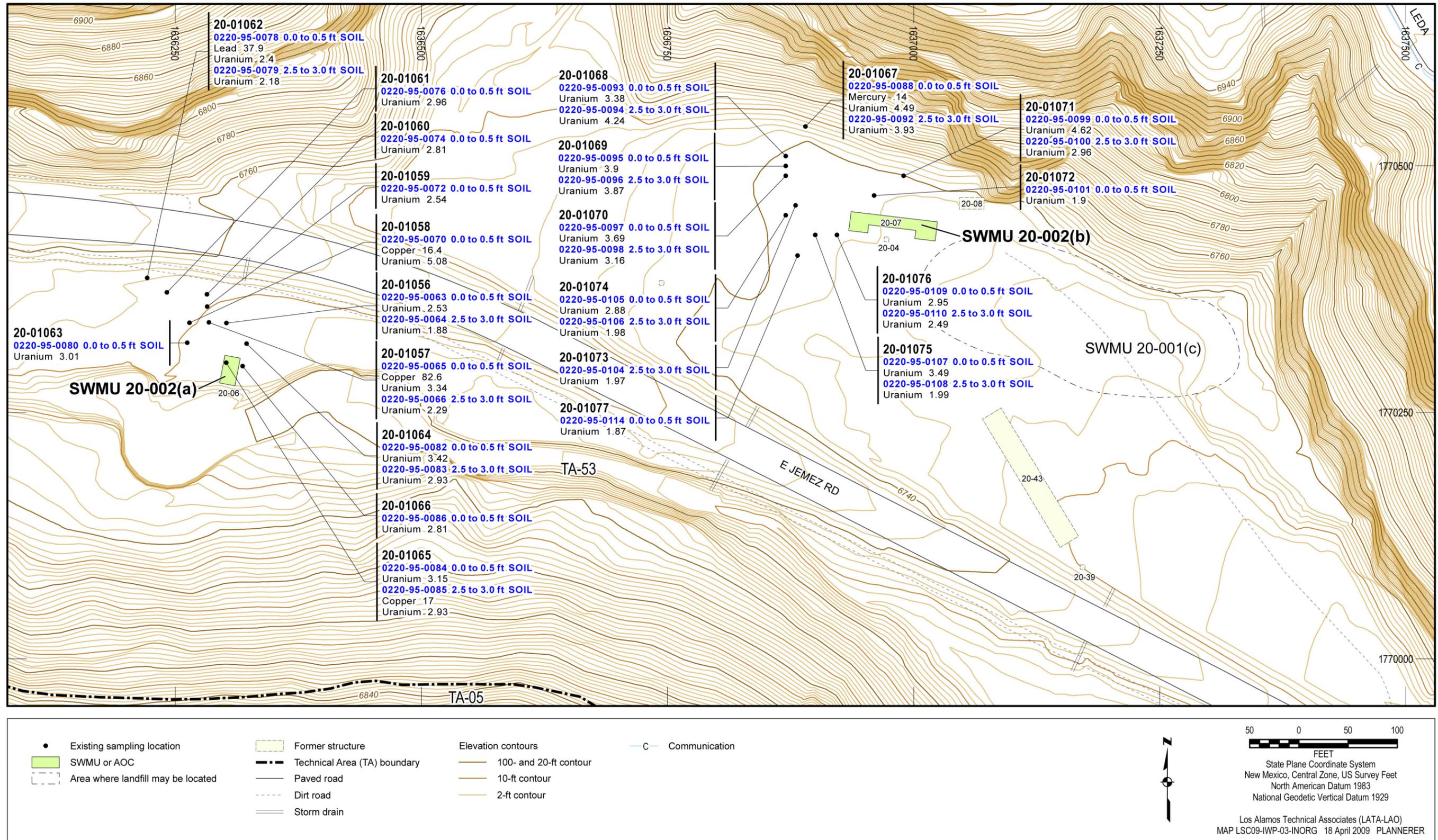


Figure 4.1-12 Inorganic chemicals detected above BVs at SWMUs 20-002(a) and 20-002(b)

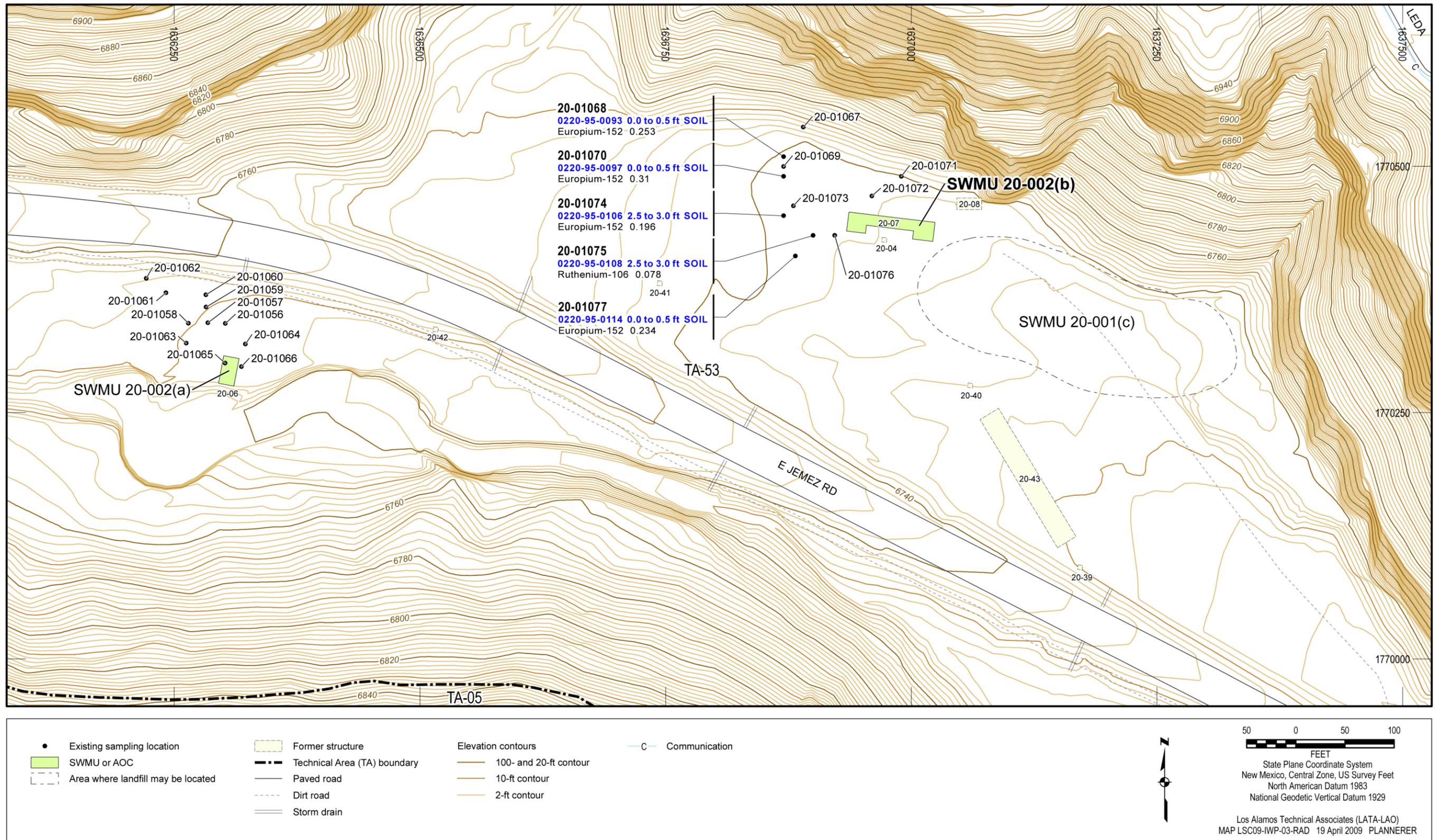


Figure 4.1-13 Radionuclides detected or detected above BVs/FVs at SWMU 20-002(b)

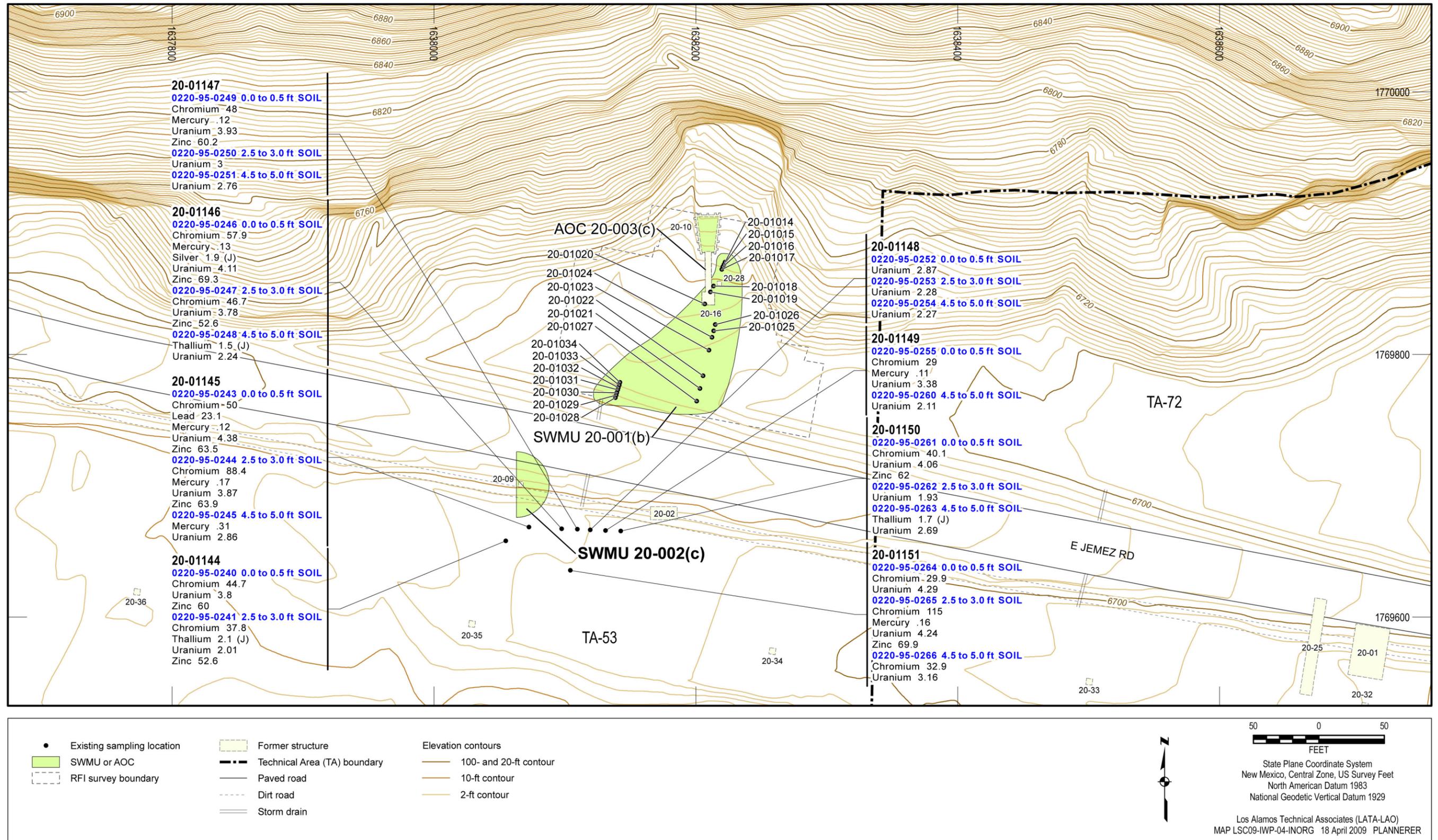


Figure 4.1-14 Inorganic chemicals detected above BVs at SWMU 20-002(c)

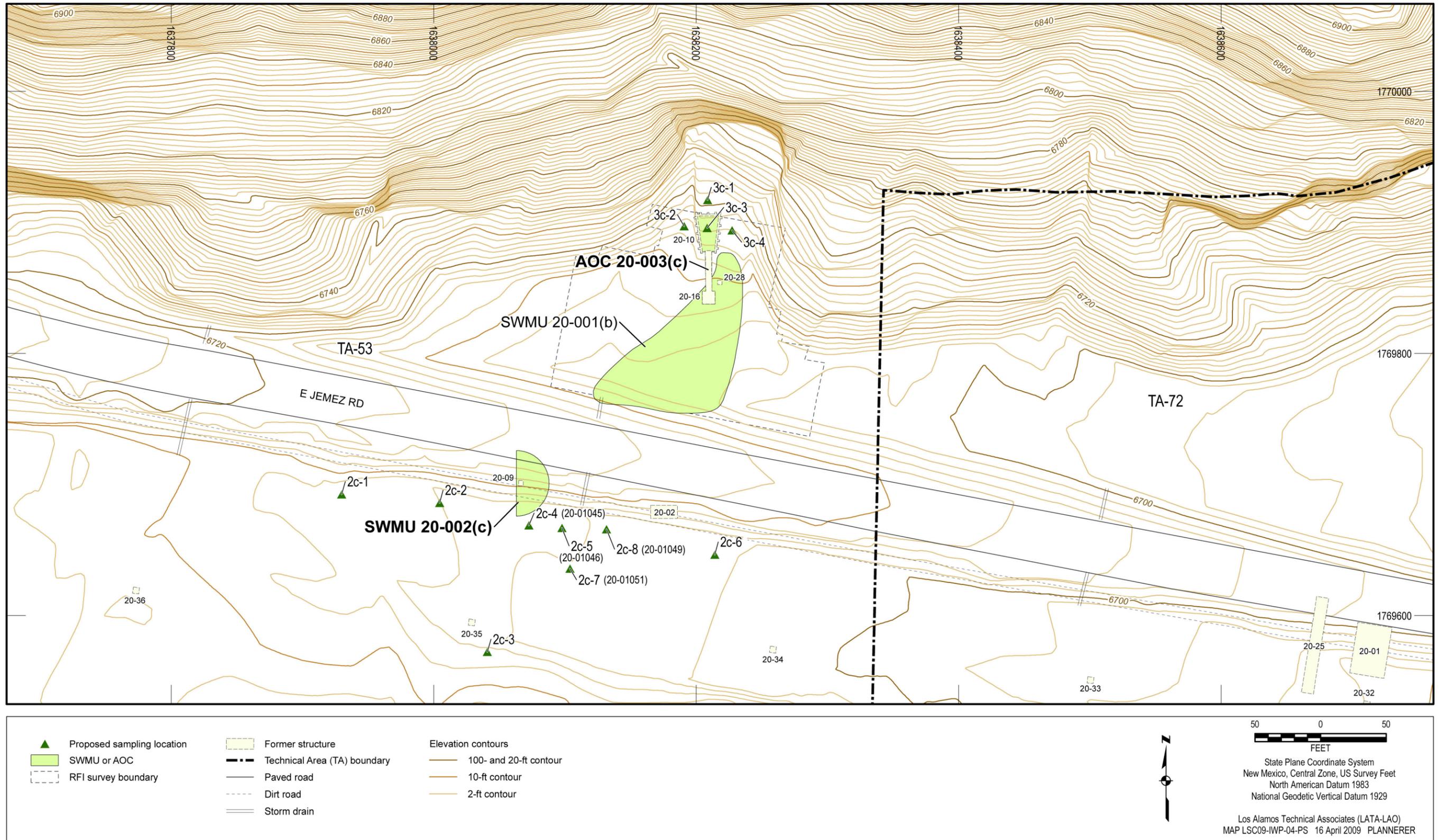


Figure 4.1-15 Proposed sampling locations at SWMU 20-002(c) and AOC 20-003(c)

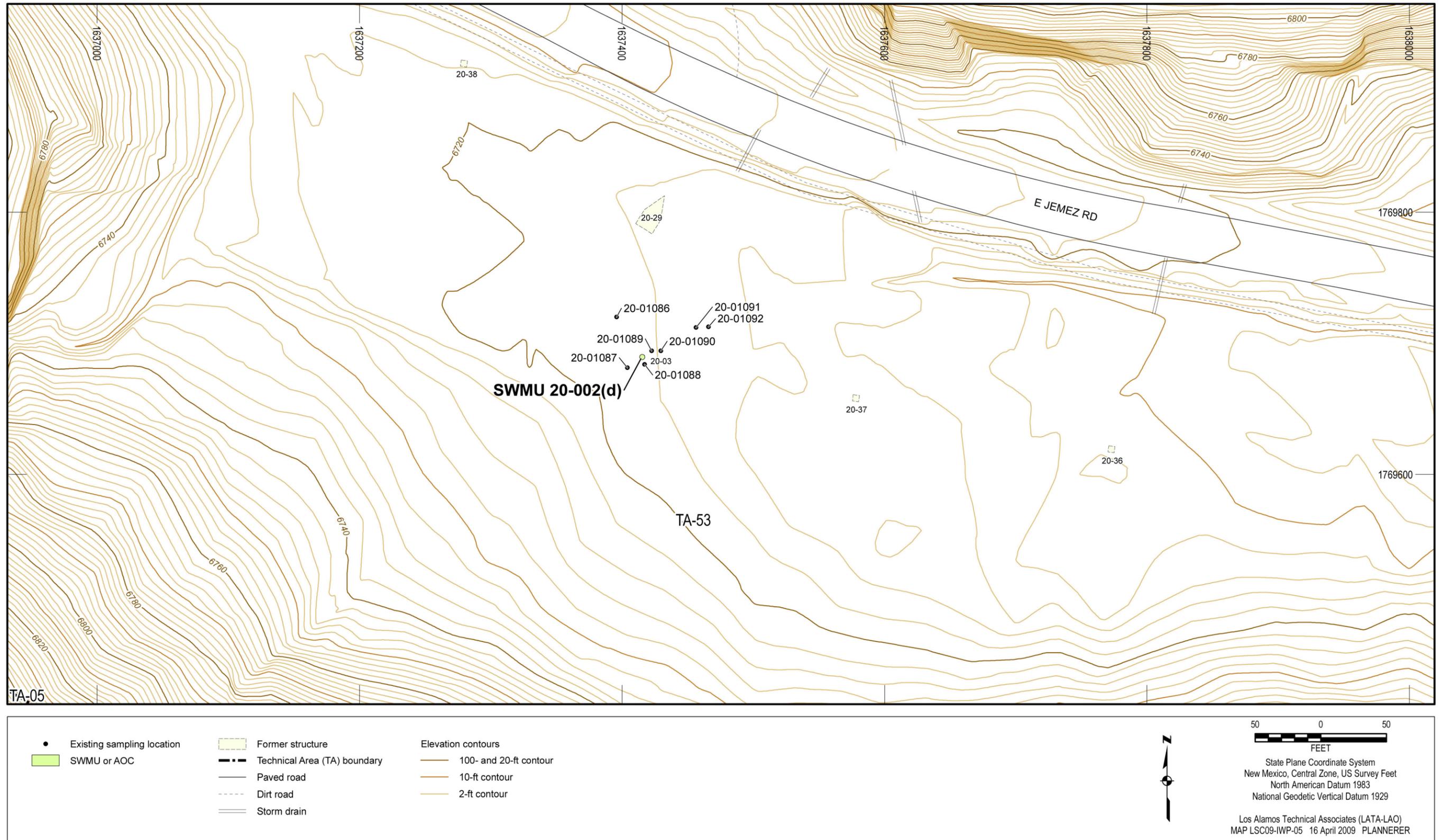


Figure 4.1-16 Site features and historical sampling locations for SWMU 20-002(d)

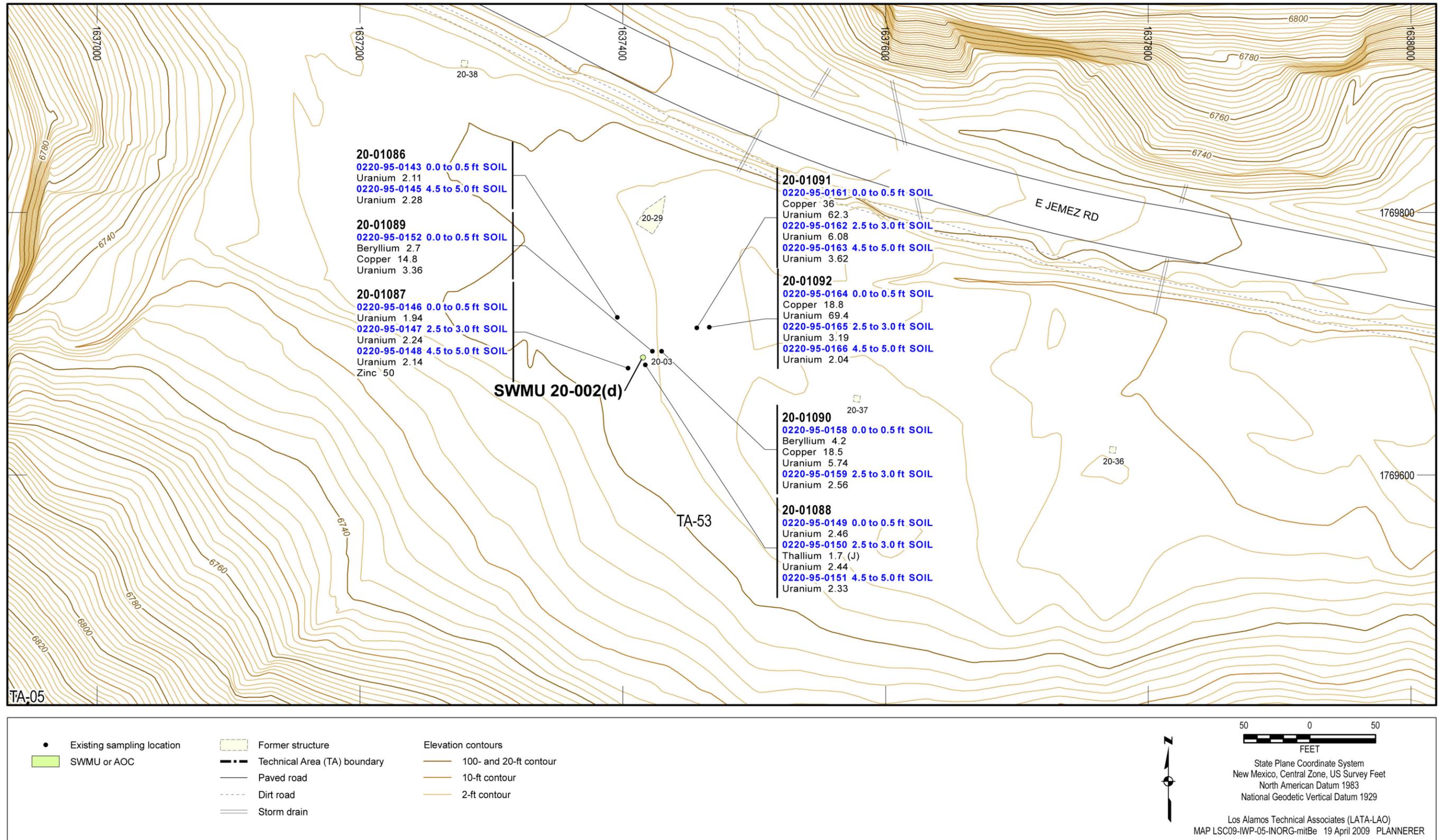


Figure 4.1-17 Inorganic chemicals detected above BVs at SWMU 20-002(d)

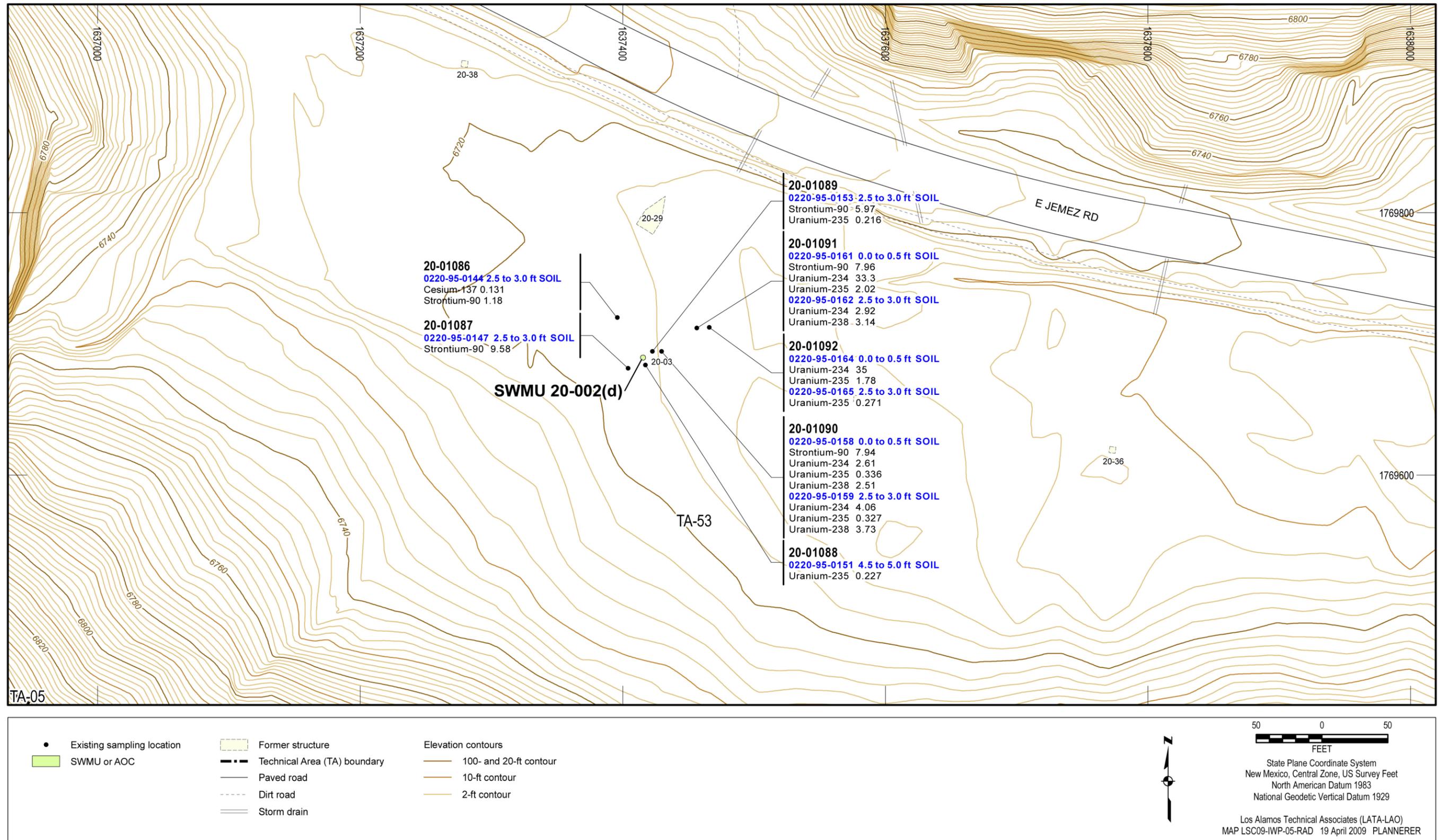


Figure 4.1-18 Radionuclides detected or detected above BVs/FVs at SWMU 20-002(d)

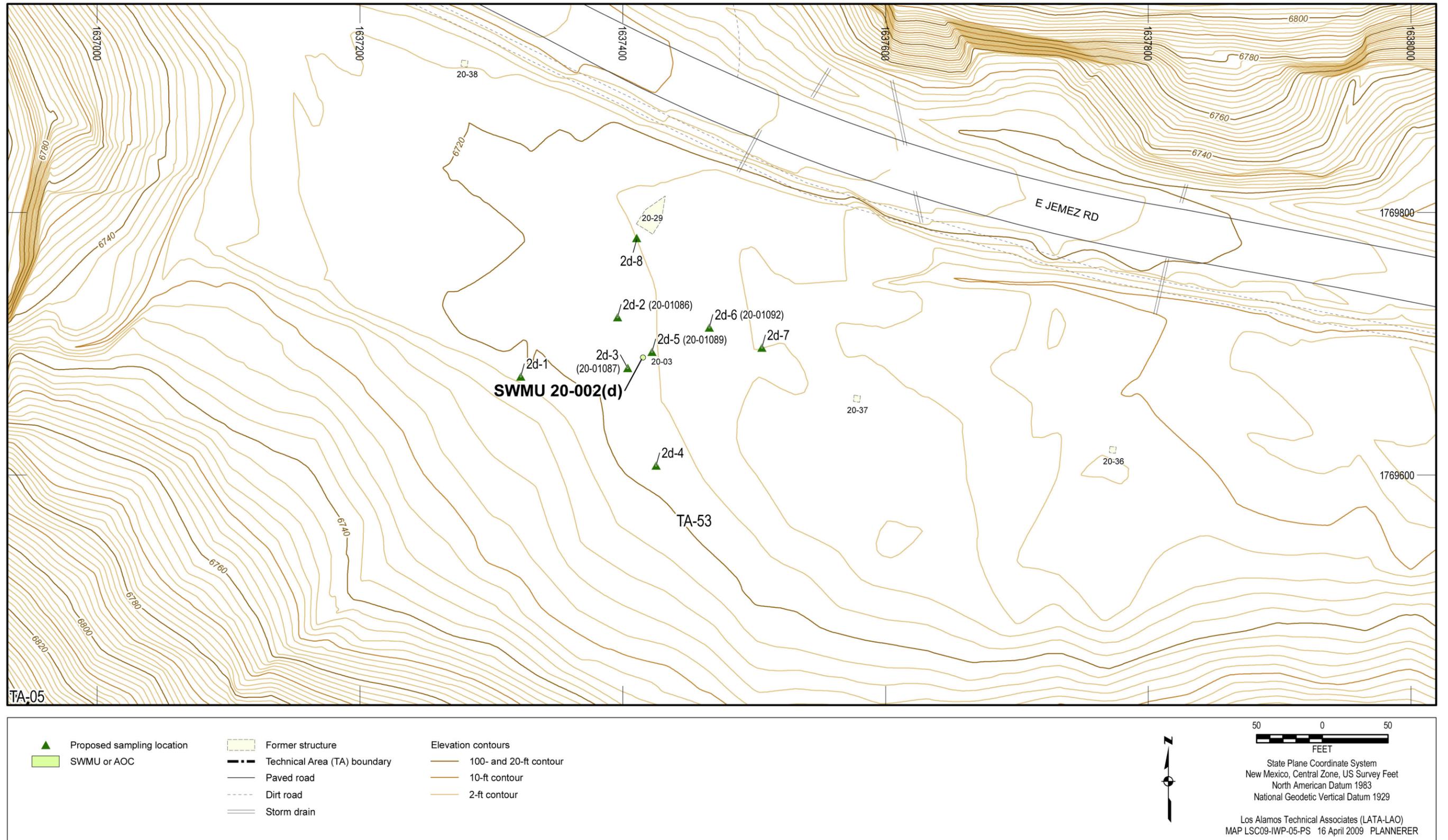


Figure 4.1-19 Proposed sampling locations at SWMU 20-002(d)

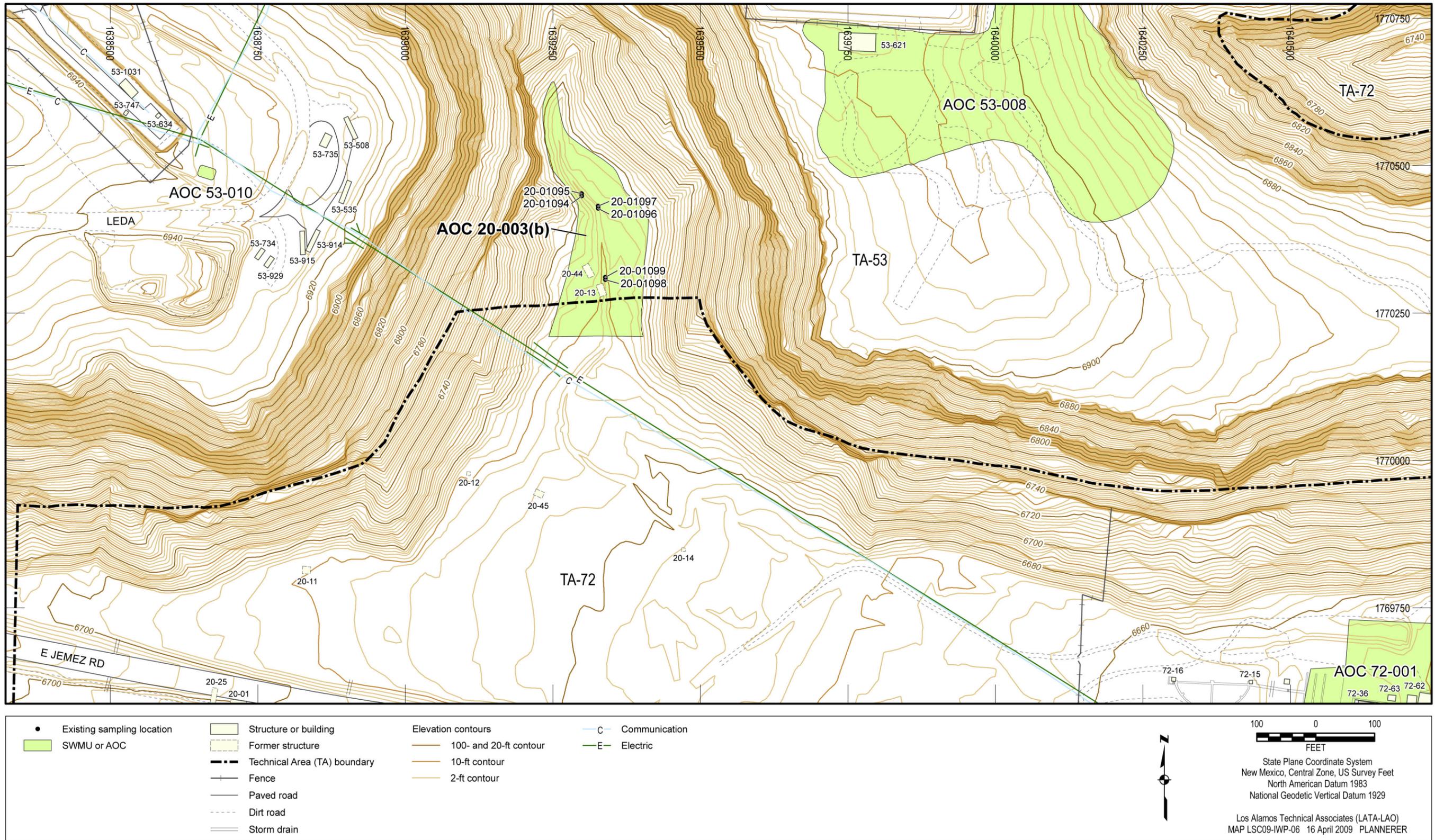


Figure 4.1-20 Site features and historical sampling locations for AOC 20-003(b)

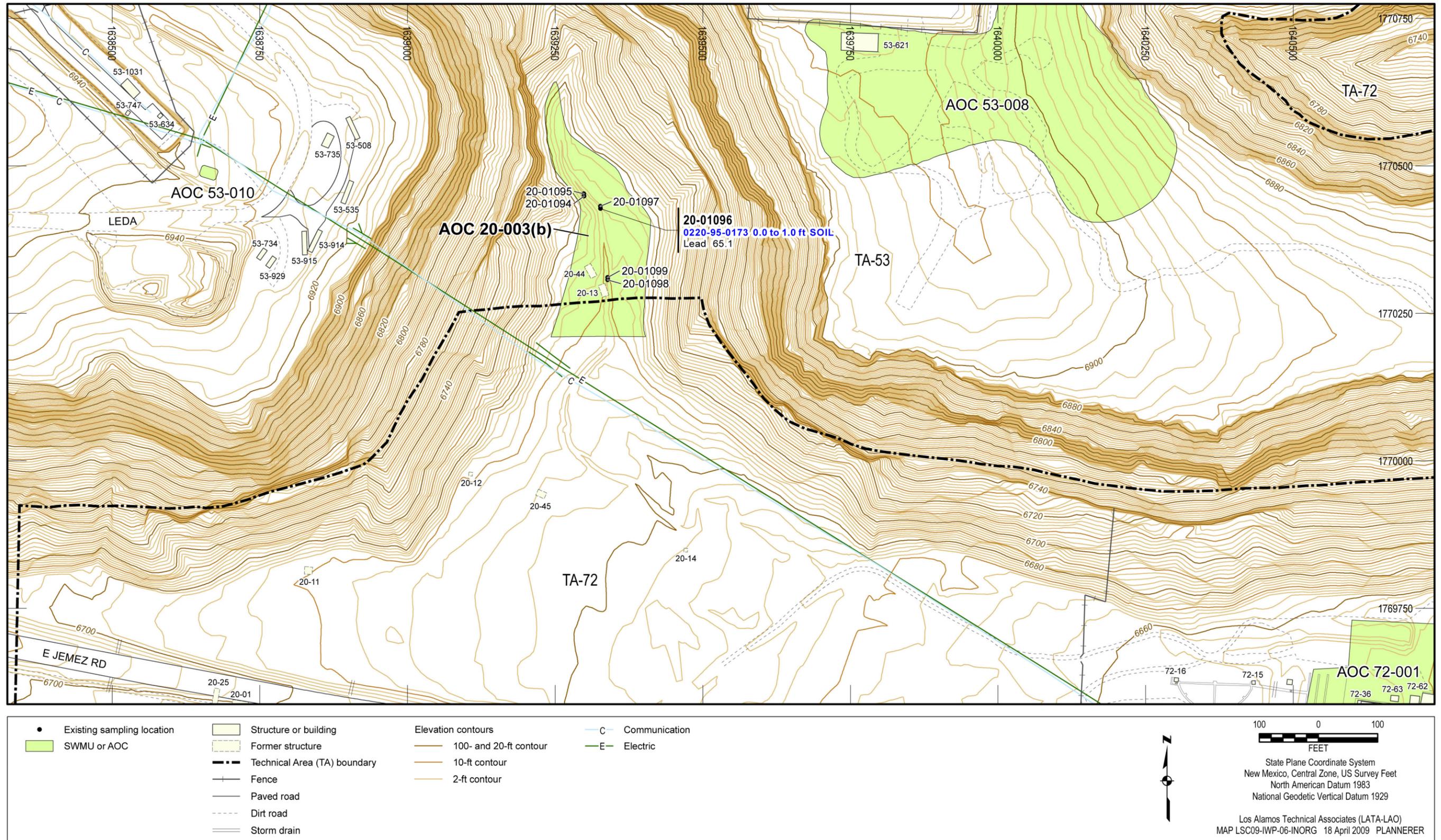


Figure 4.1-21 Inorganic chemicals detected above BVs at AOC 20-003(b)

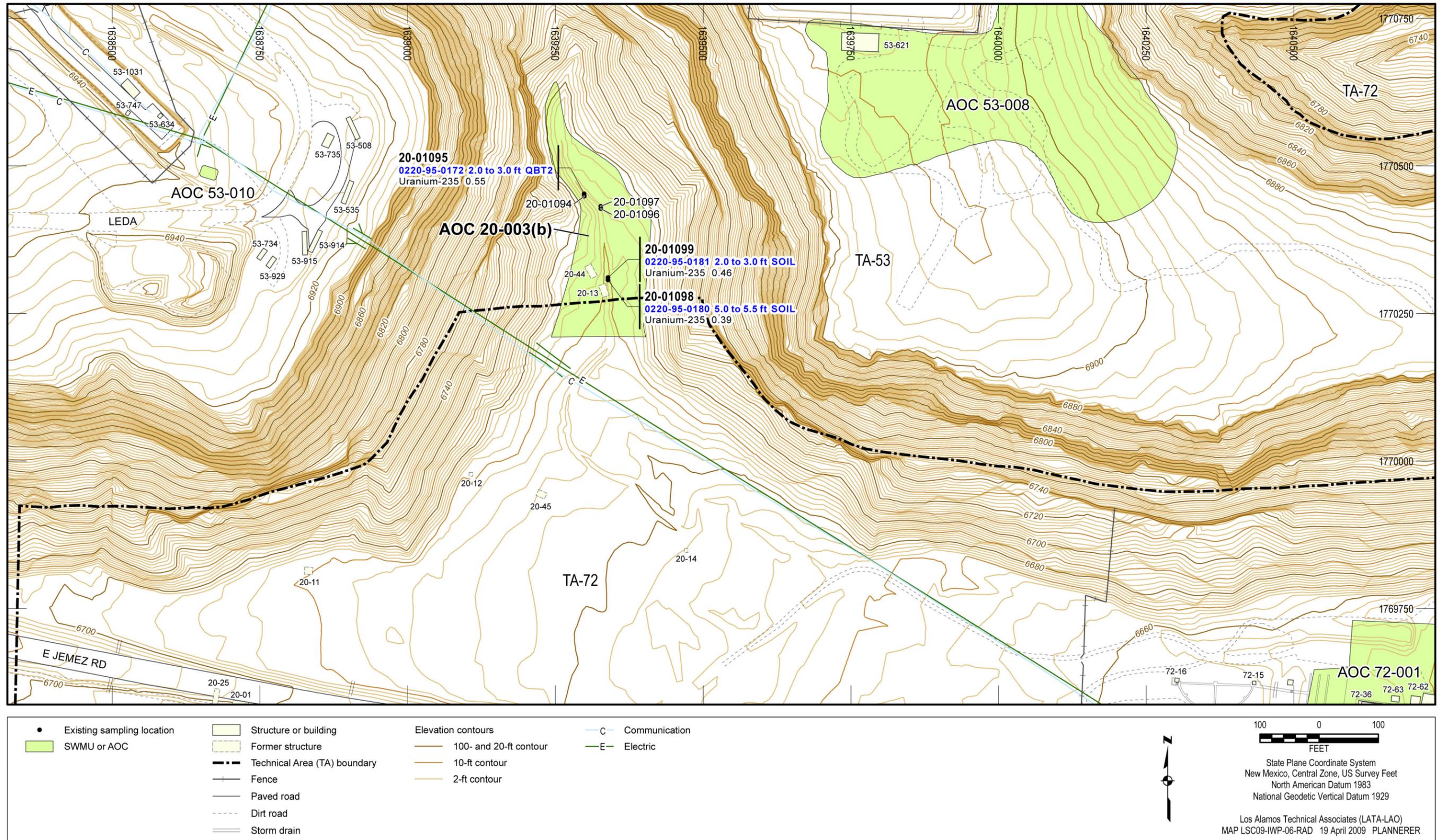


Figure 4.1-22 Radionuclides detected or detected above BVs/FVs at AOC 20-003(b)

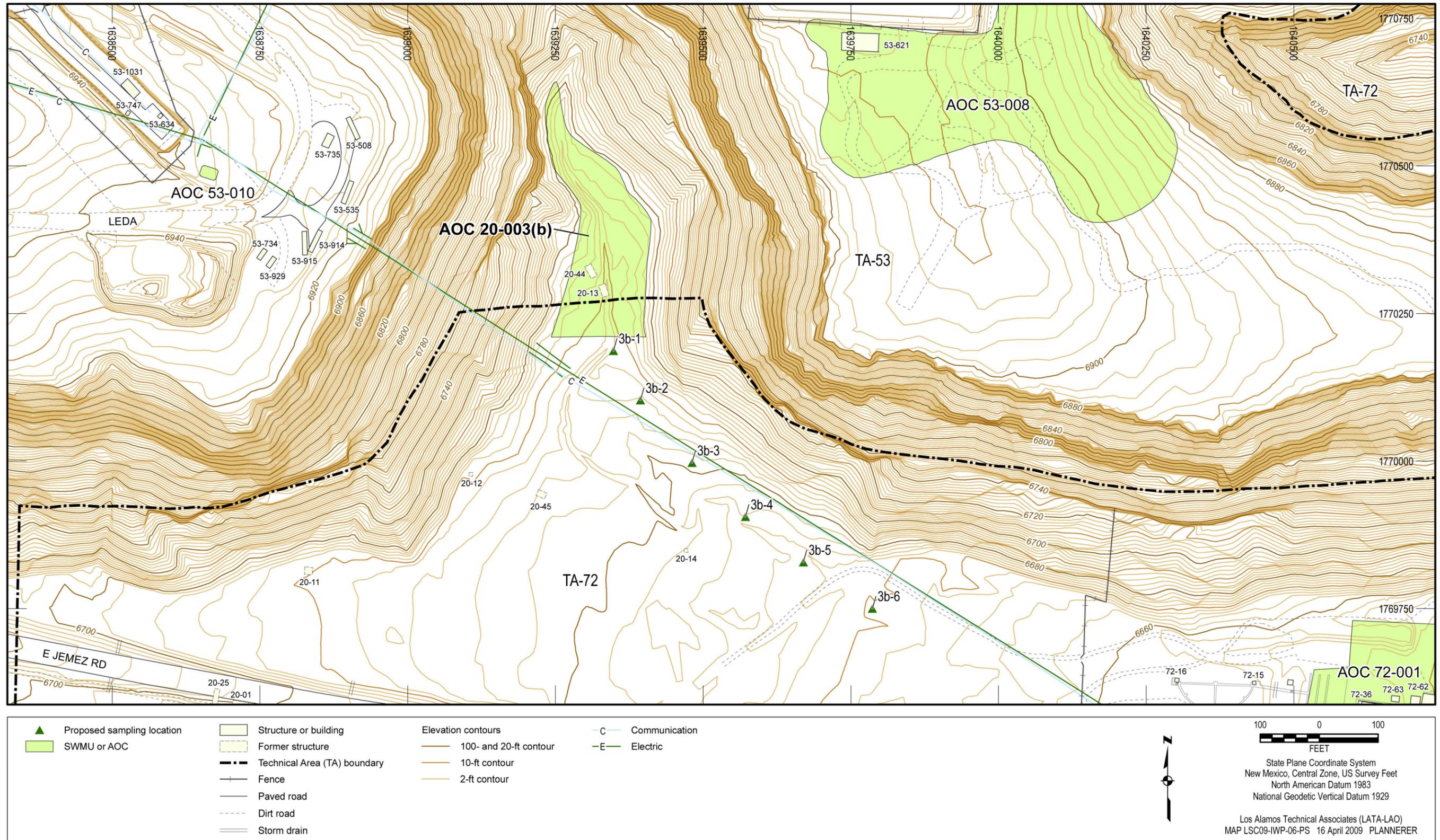


Figure 4.1-23 Proposed sampling locations at AOC 20-003(b)

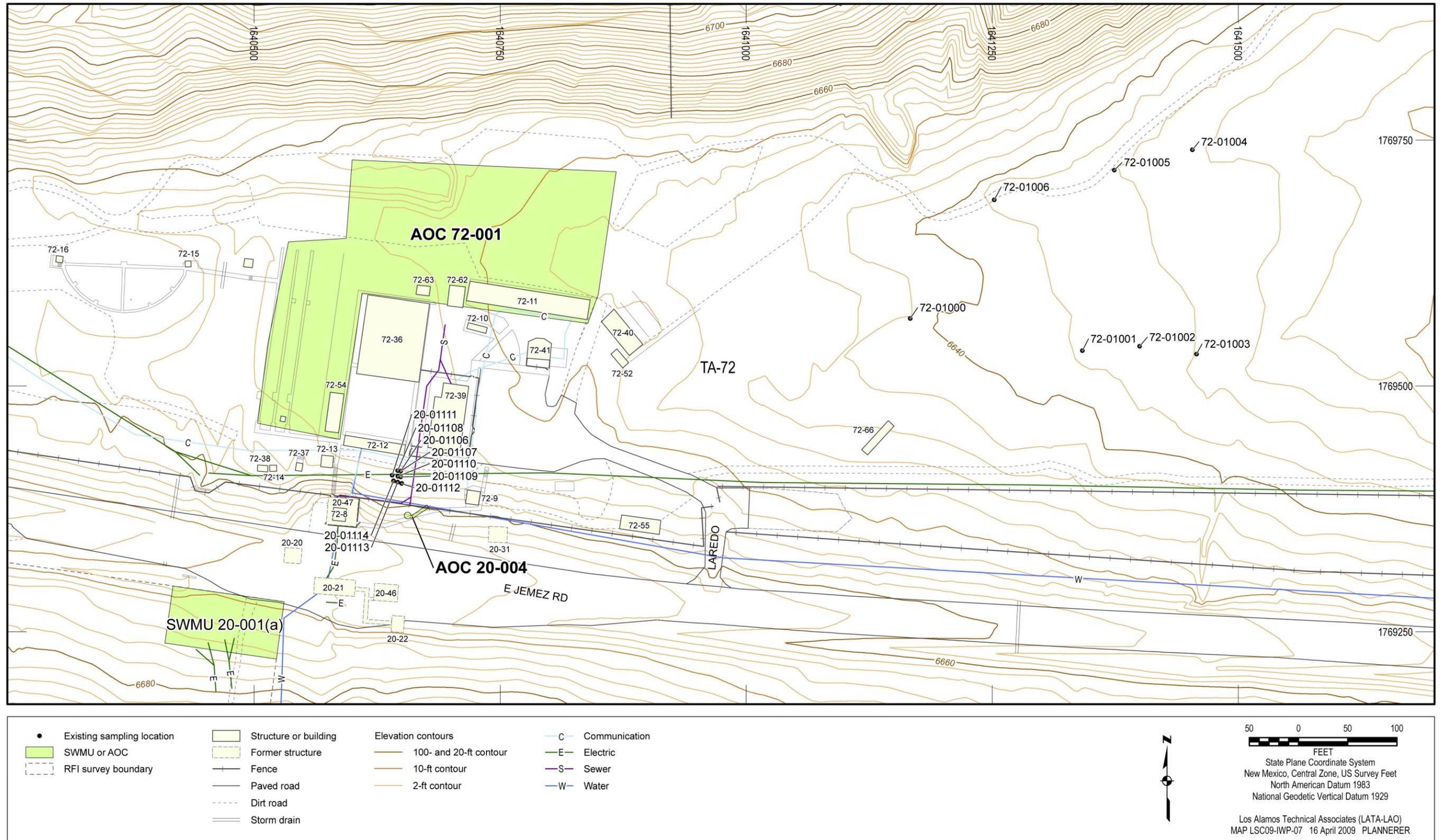


Figure 4.1-24 Site features and historical sampling locations for AOCs 20-004 and 72-001

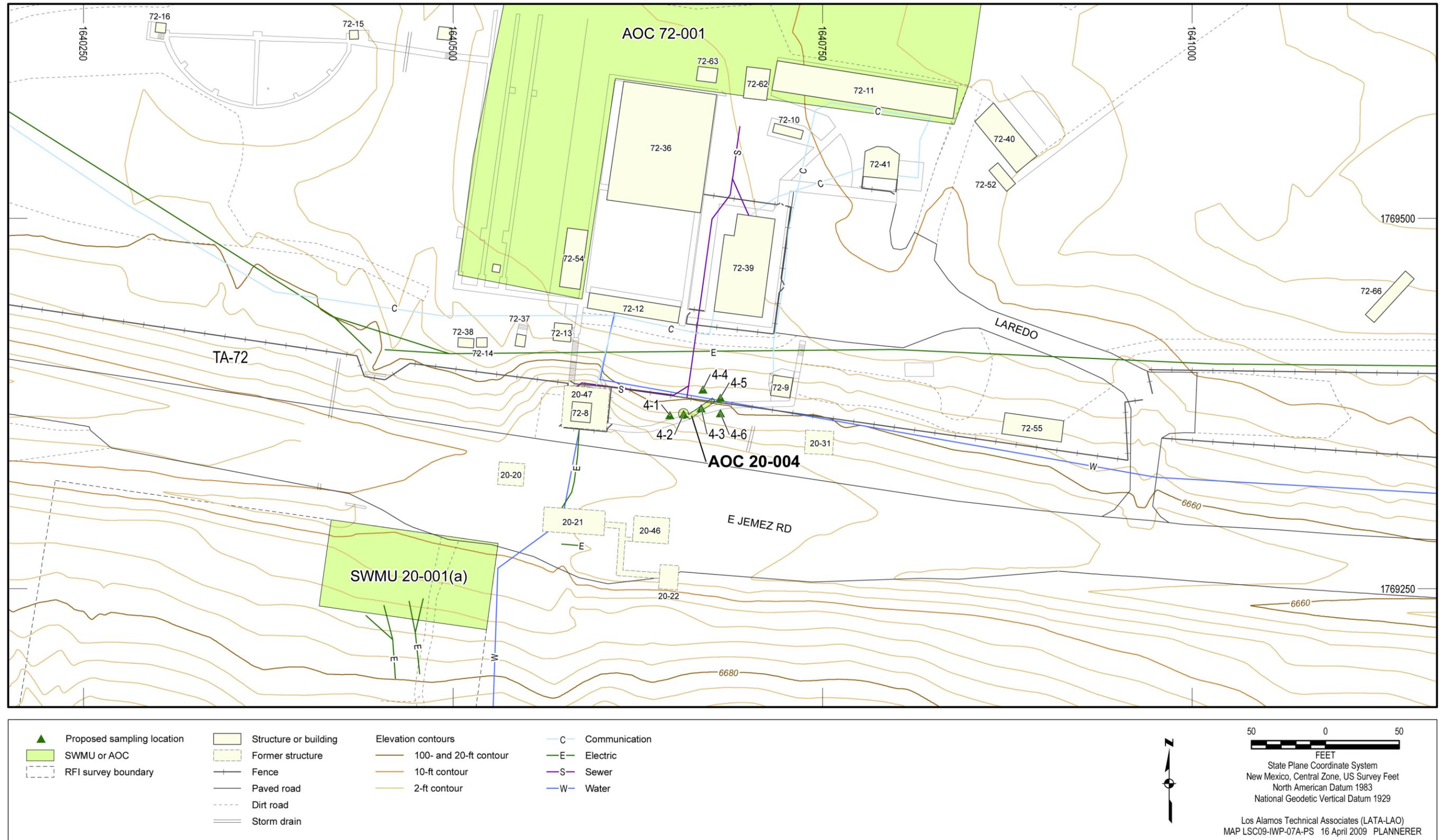


Figure 4.1-25 Proposed location sampling locations at AOC 20-004

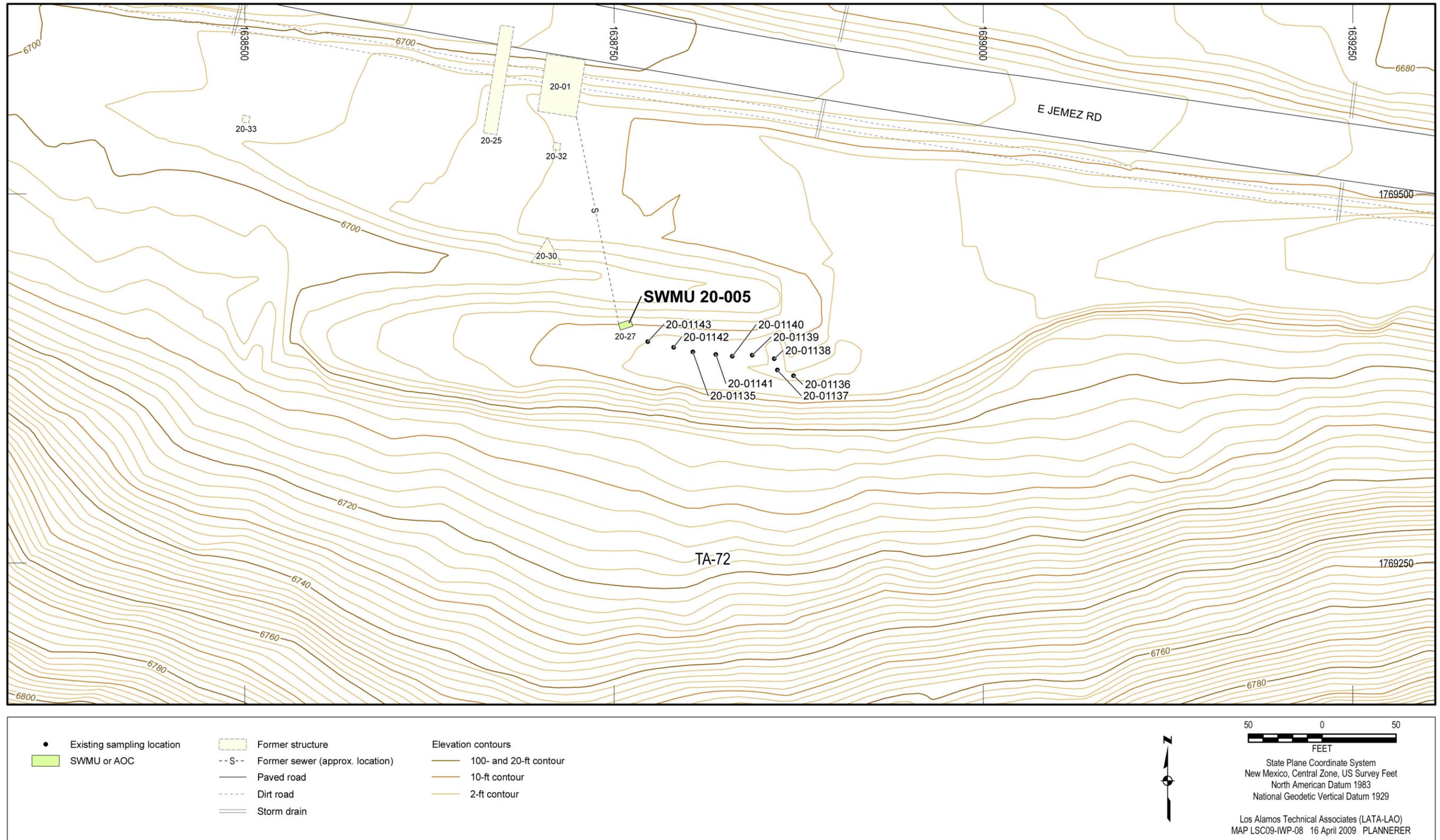


Figure 4.1-26 Site features and historical sampling locations for SWMU 20-005

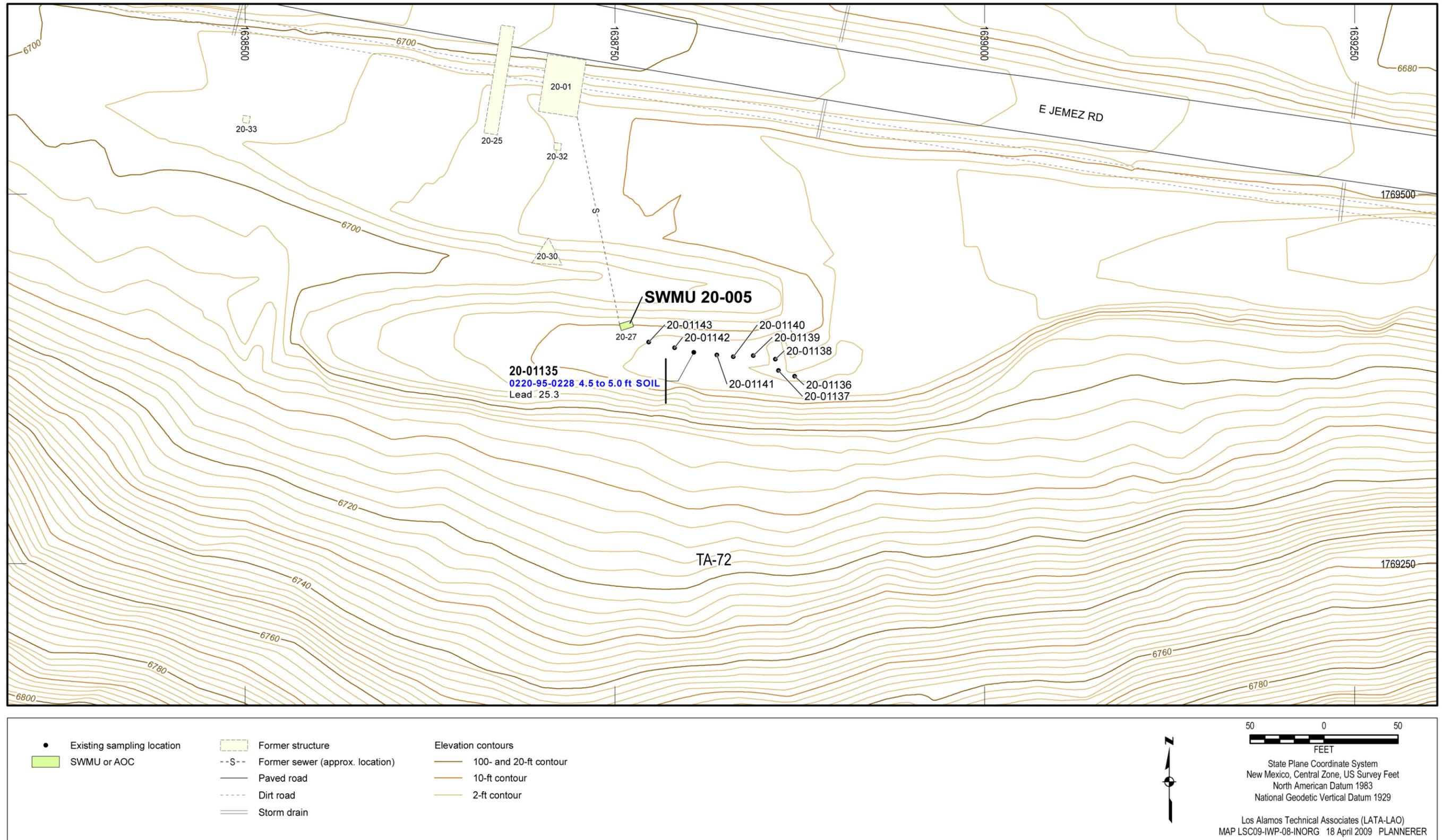


Figure 4.1-27 Inorganic chemicals detected above BVs at SWMU 20-005

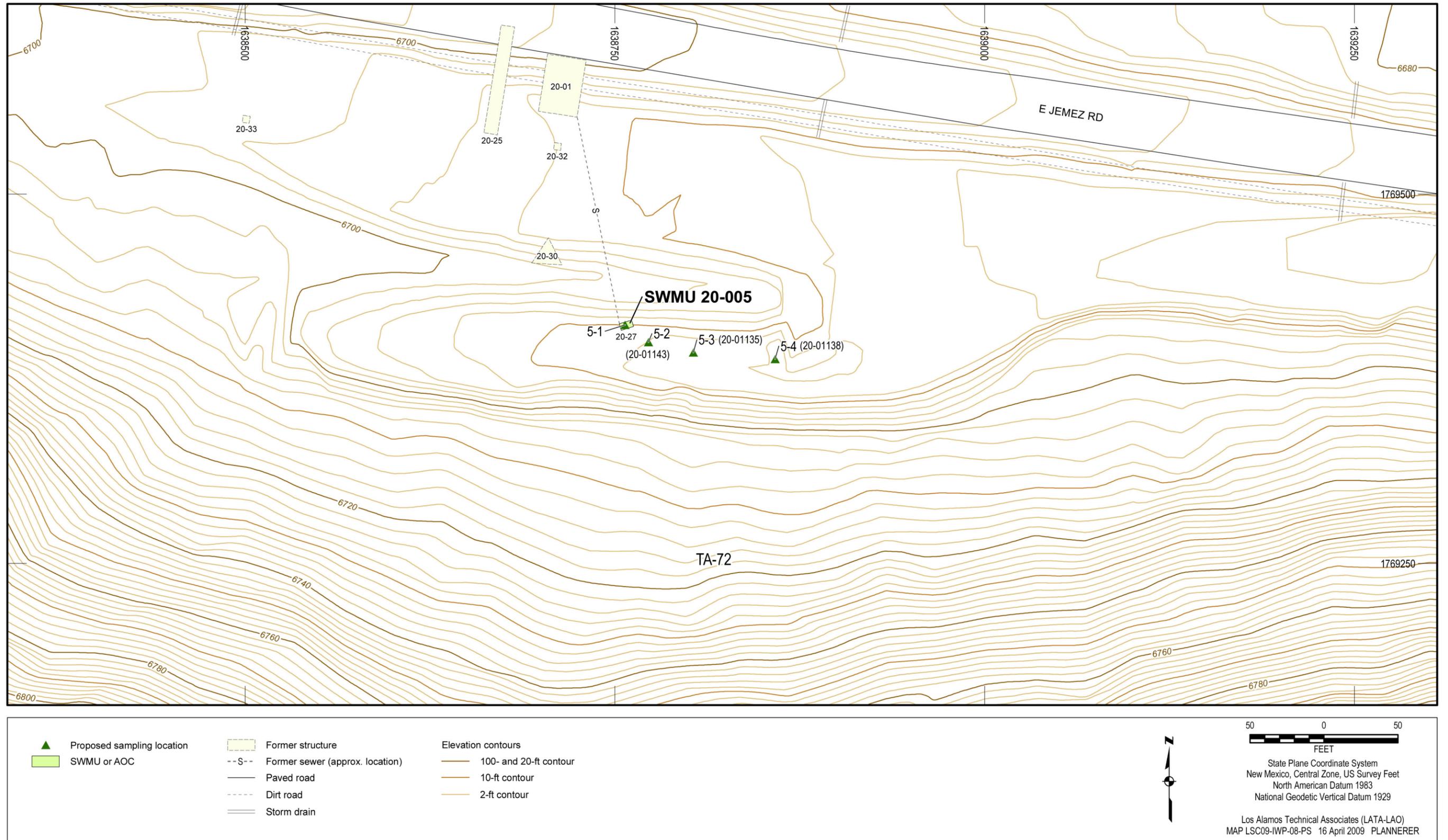


Figure 4.1-28 Proposed sampling locations at SWMU 20-005

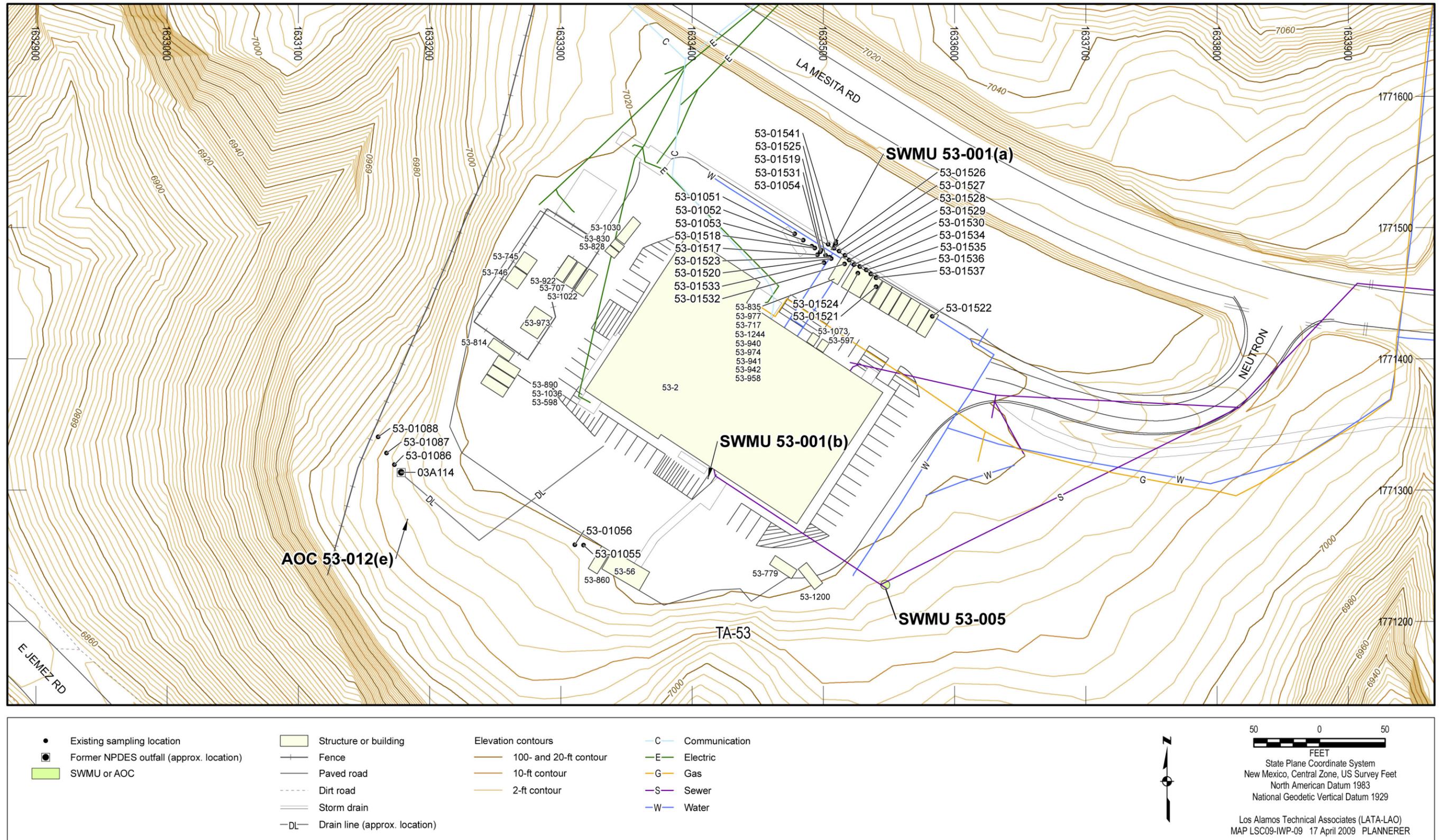


Figure 4.2-1 Site features and historical sampling locations for SWMUs 53-001(a), 53-001(b), and 53-005 and AOC 53-012(e)

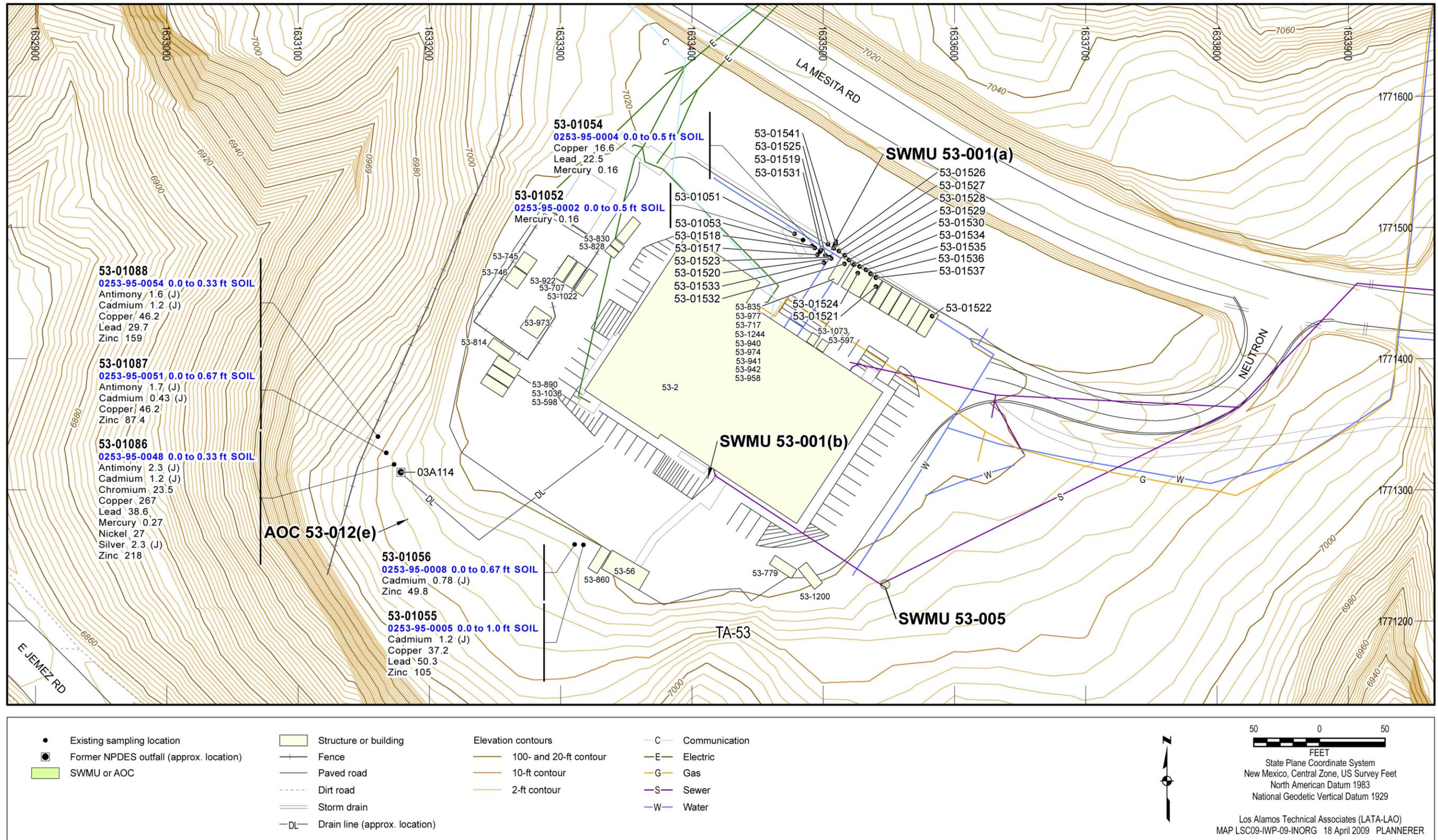


Figure 4.2-2 Inorganic chemicals detected above BVs at SWMUs 53-001(a), 53-001(b), and 53-005 and AOC 53-012(e)

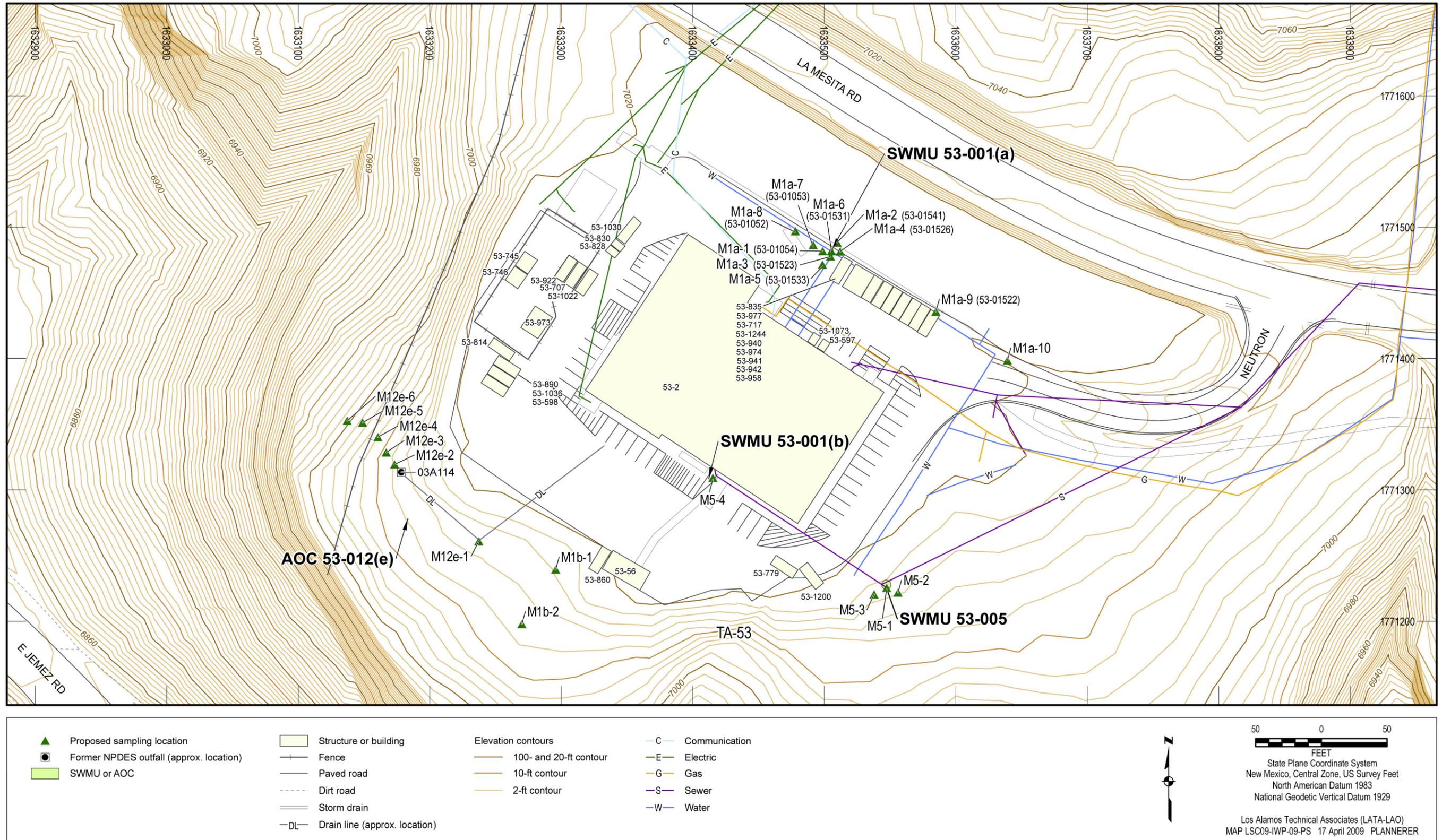


Figure 4.2-4 Proposed sampling locations at SWMUs 53-001(a), 53-001(b), and 53-005 and AOC 53-012(e)

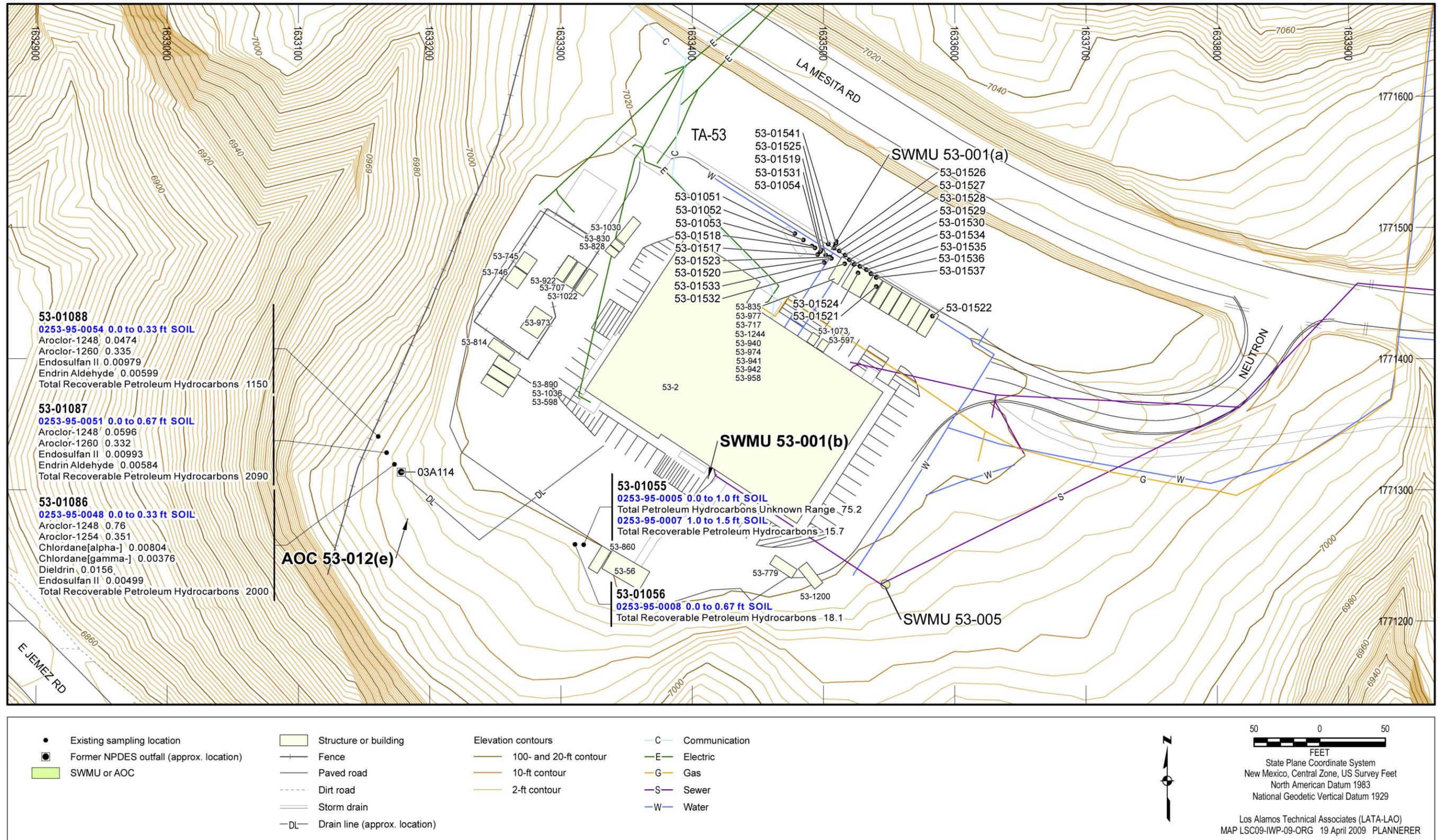


Figure 4.2-5 Organic chemicals detected at SWMUs 53-001(b) and AOC 53-012(e)

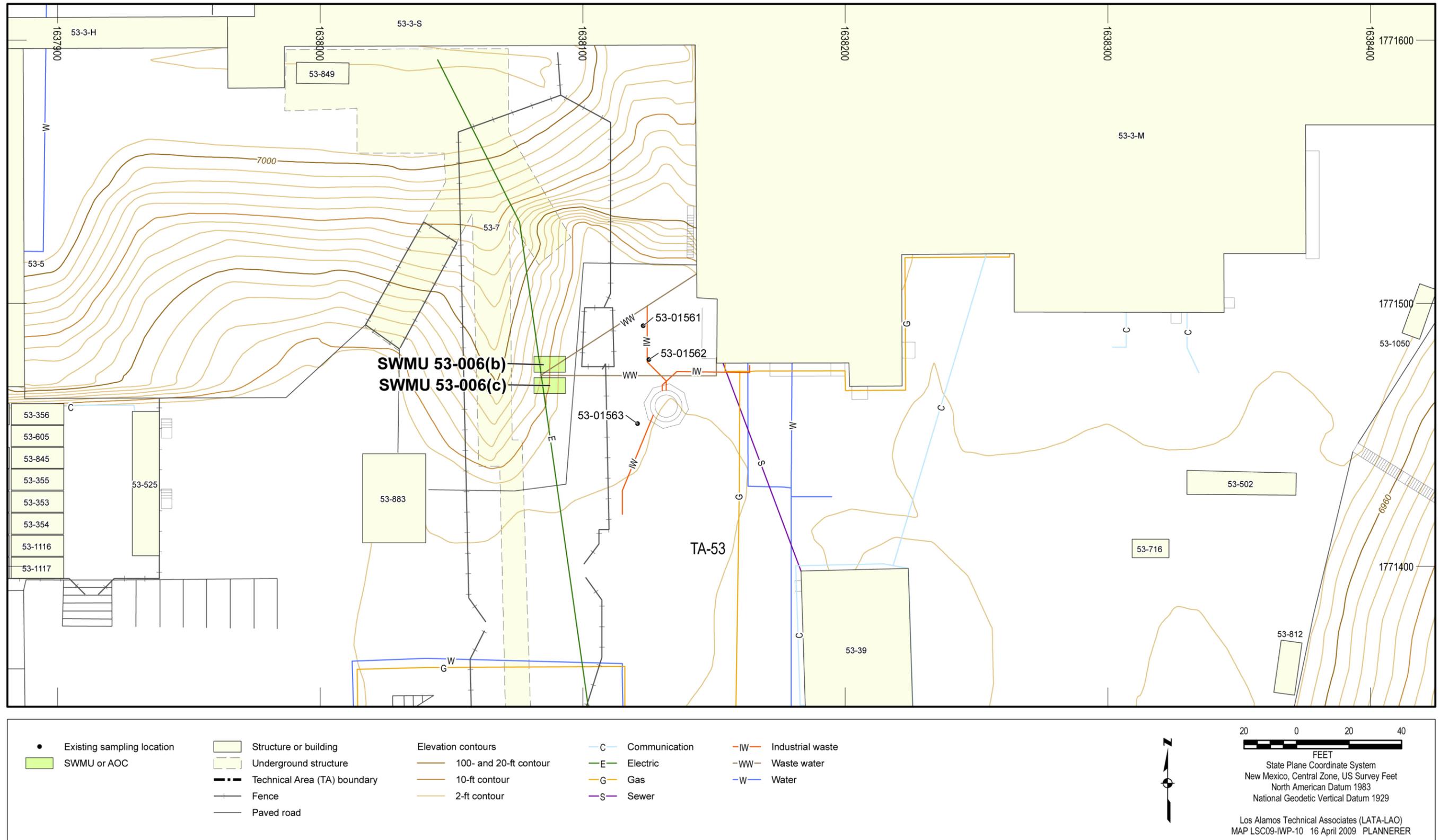


Figure 4.2-6 Site features and historical sampling locations for SWMUs 53-006(b) and 53-006(c)

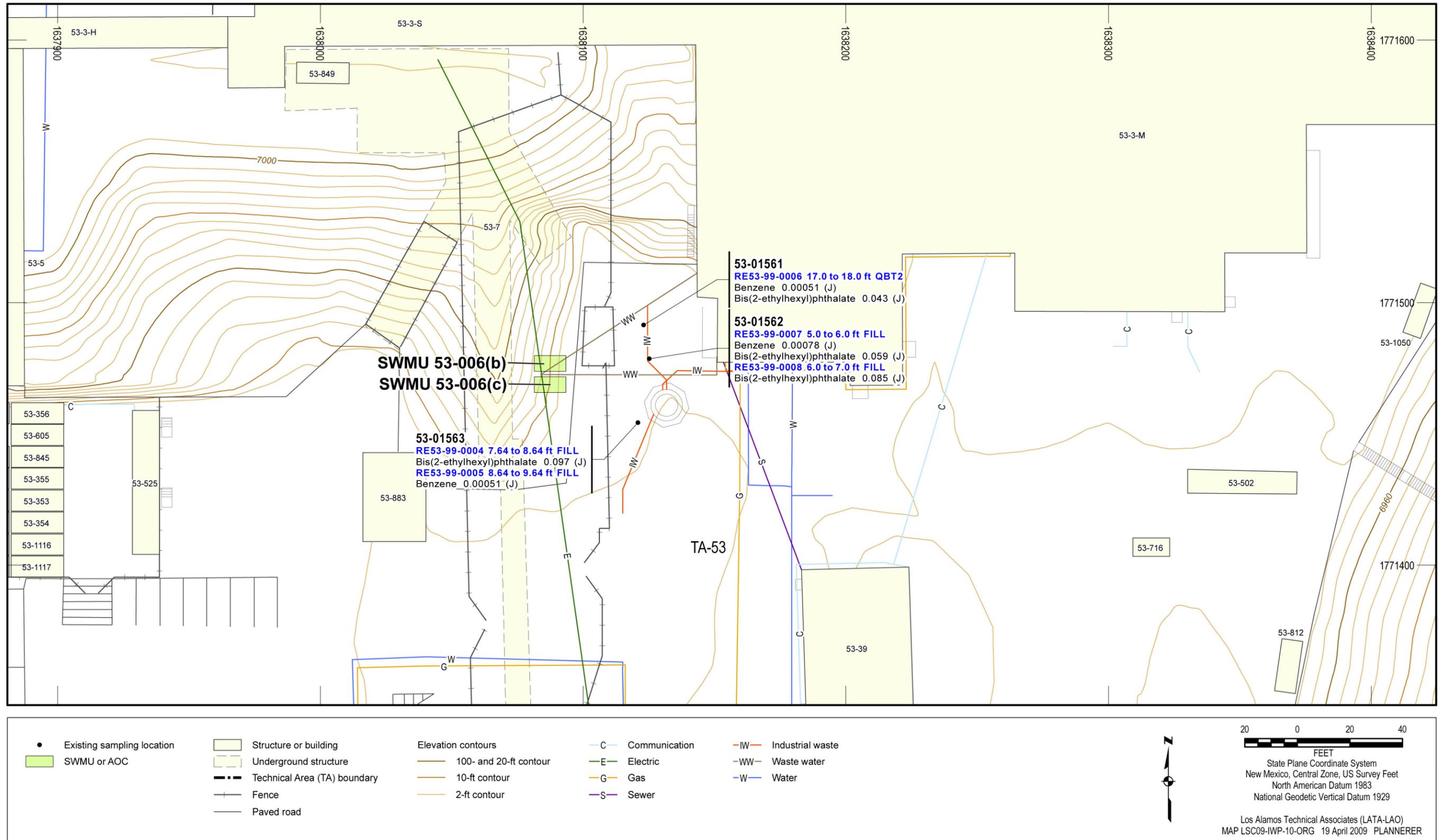


Figure 4.2-7 Organic chemicals detected at SWMUs 53-006(b) and 53-006(c)

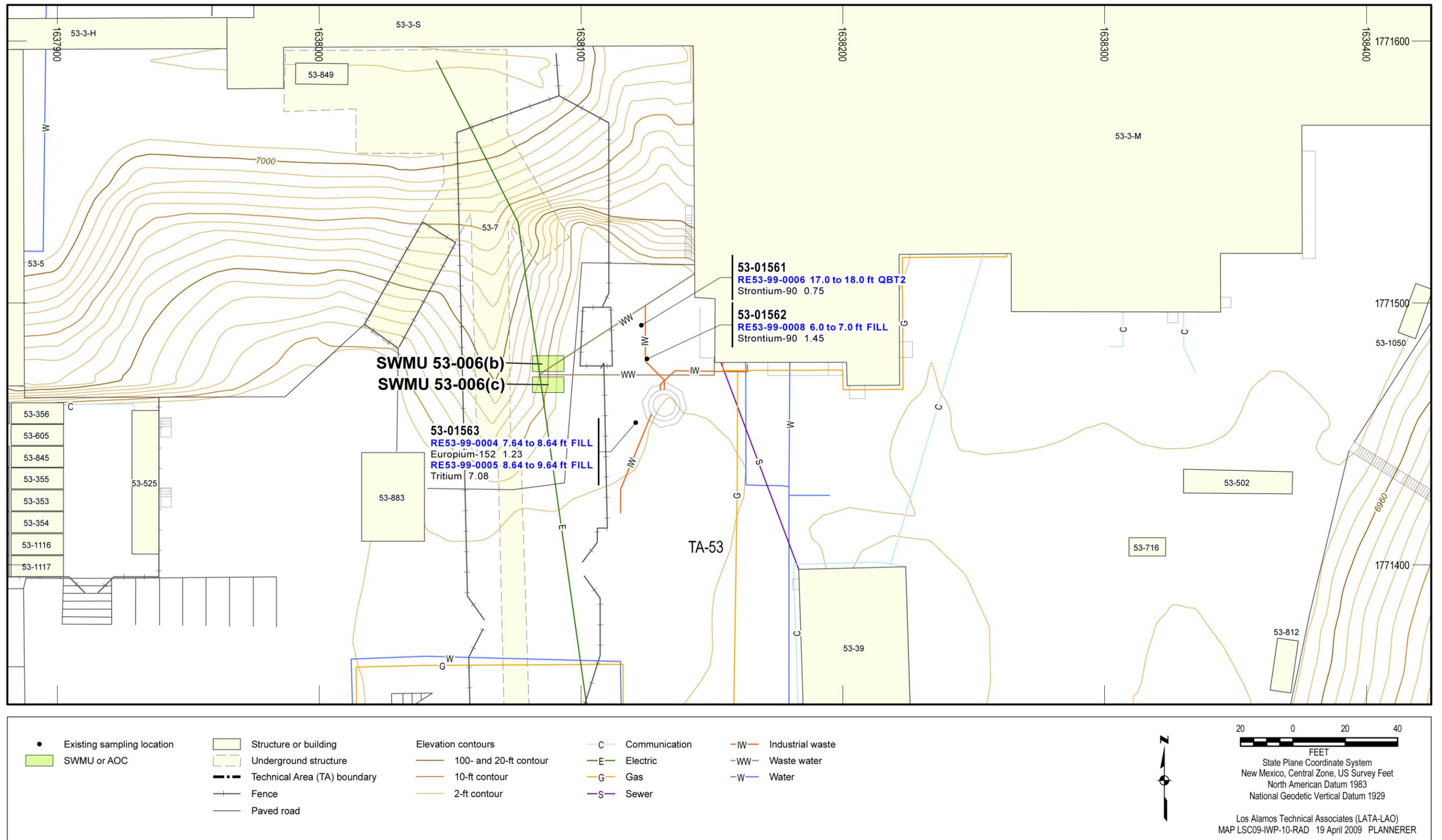


Figure 4.2-8 Radionuclides detected or detected above BVs/FVs at SWMUs 53-006(b) and 53-006(c)

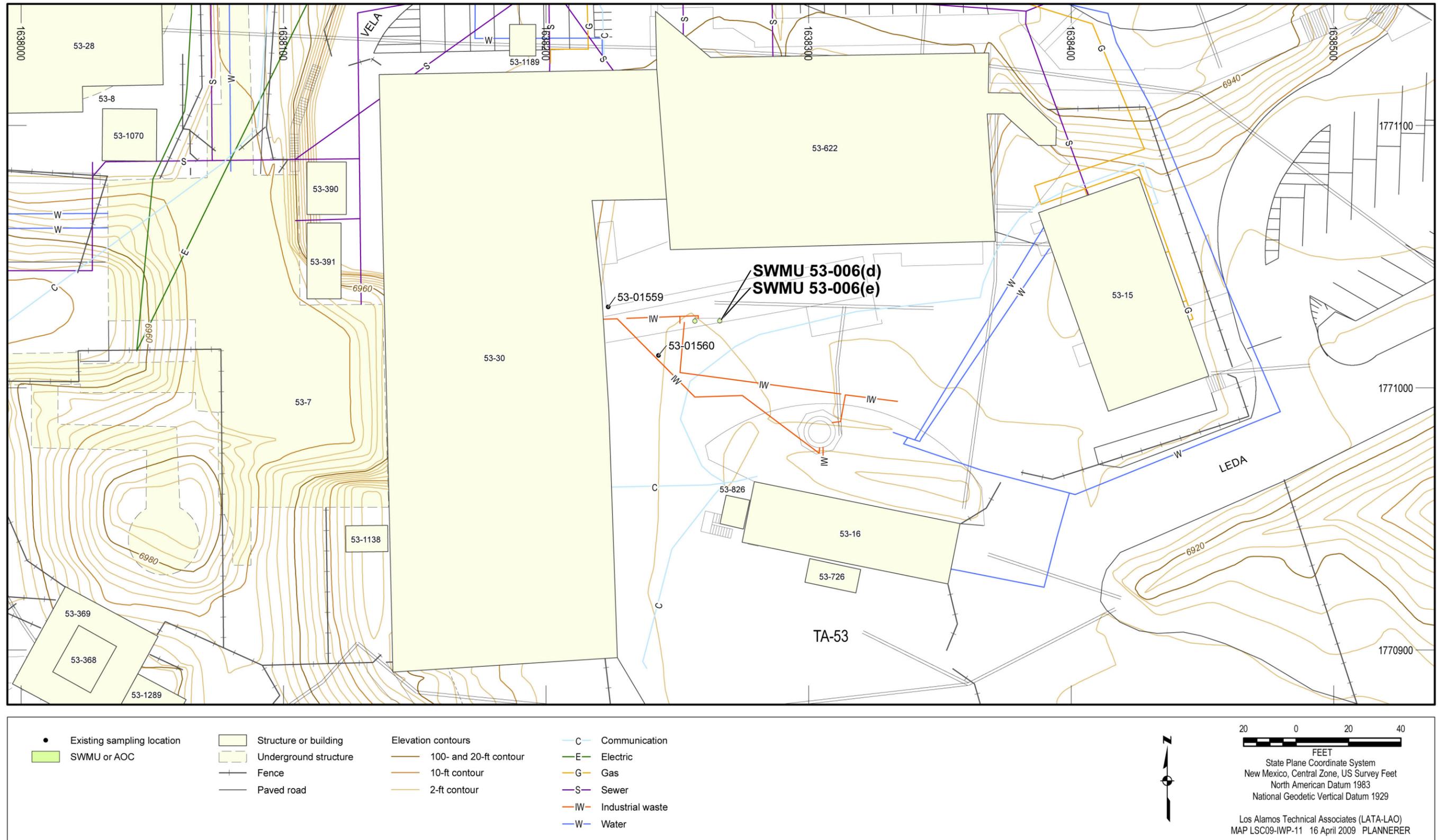


Figure 4.2-9 Site features and historical sampling locations for SWMUs 53-006(d) and 53-006(e)

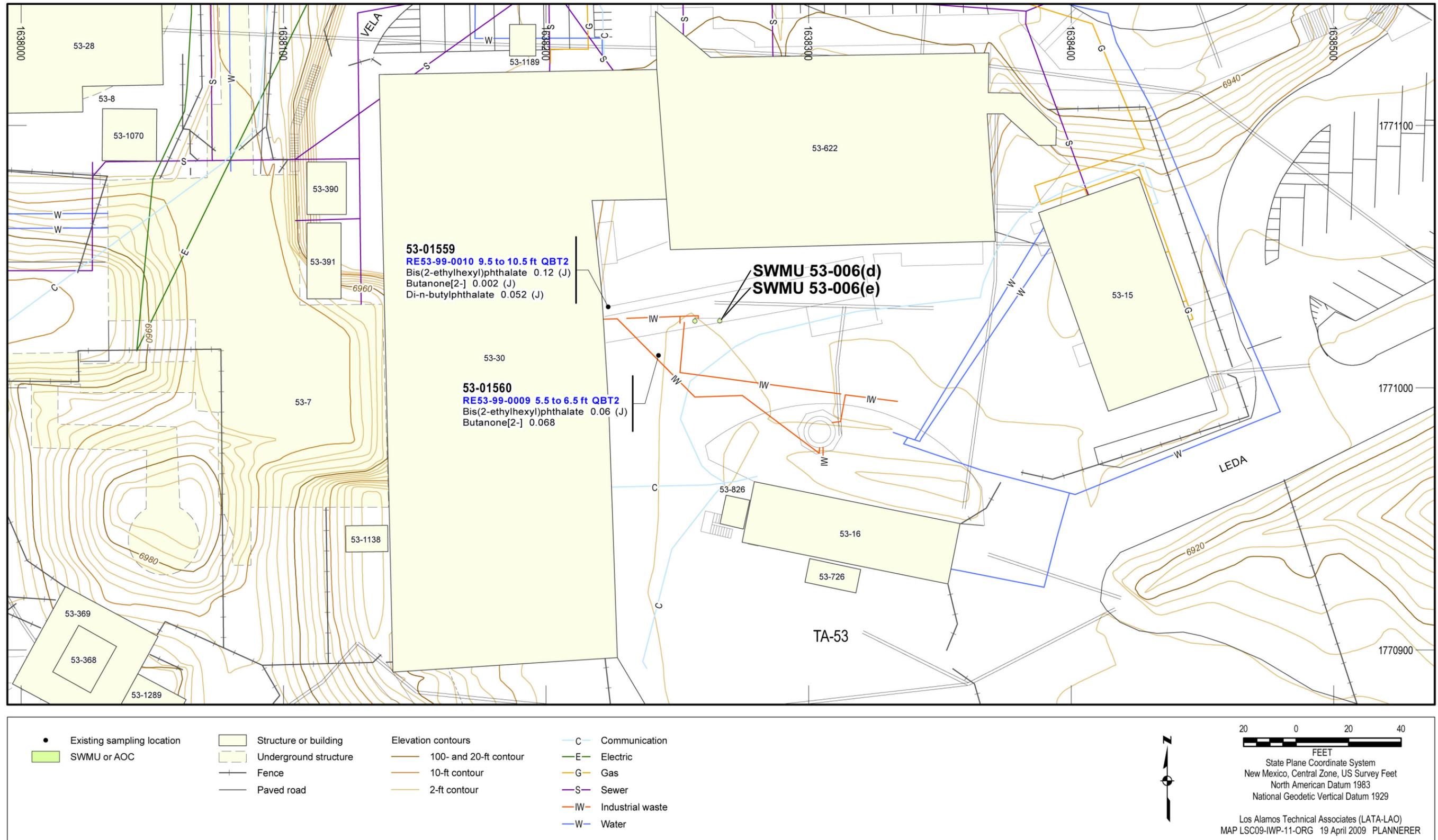


Figure 4.2-10 Organic chemicals detected at SWMUs 53-006(d) and 53-006(e)

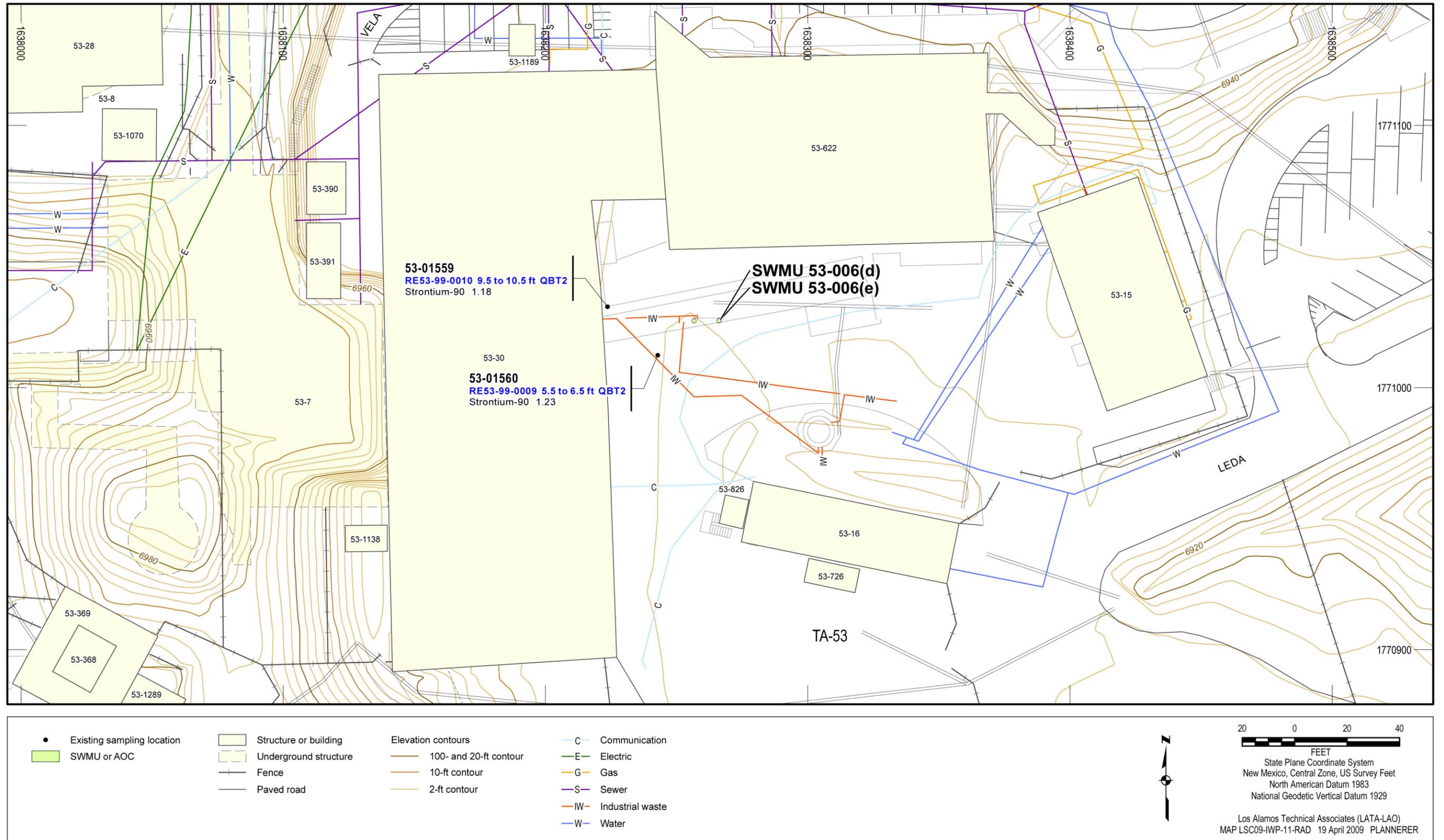


Figure 4.2-11 Radionuclides detected or detected above BVs/FVs at SWMUs 53-006(d) and 53-006(e)

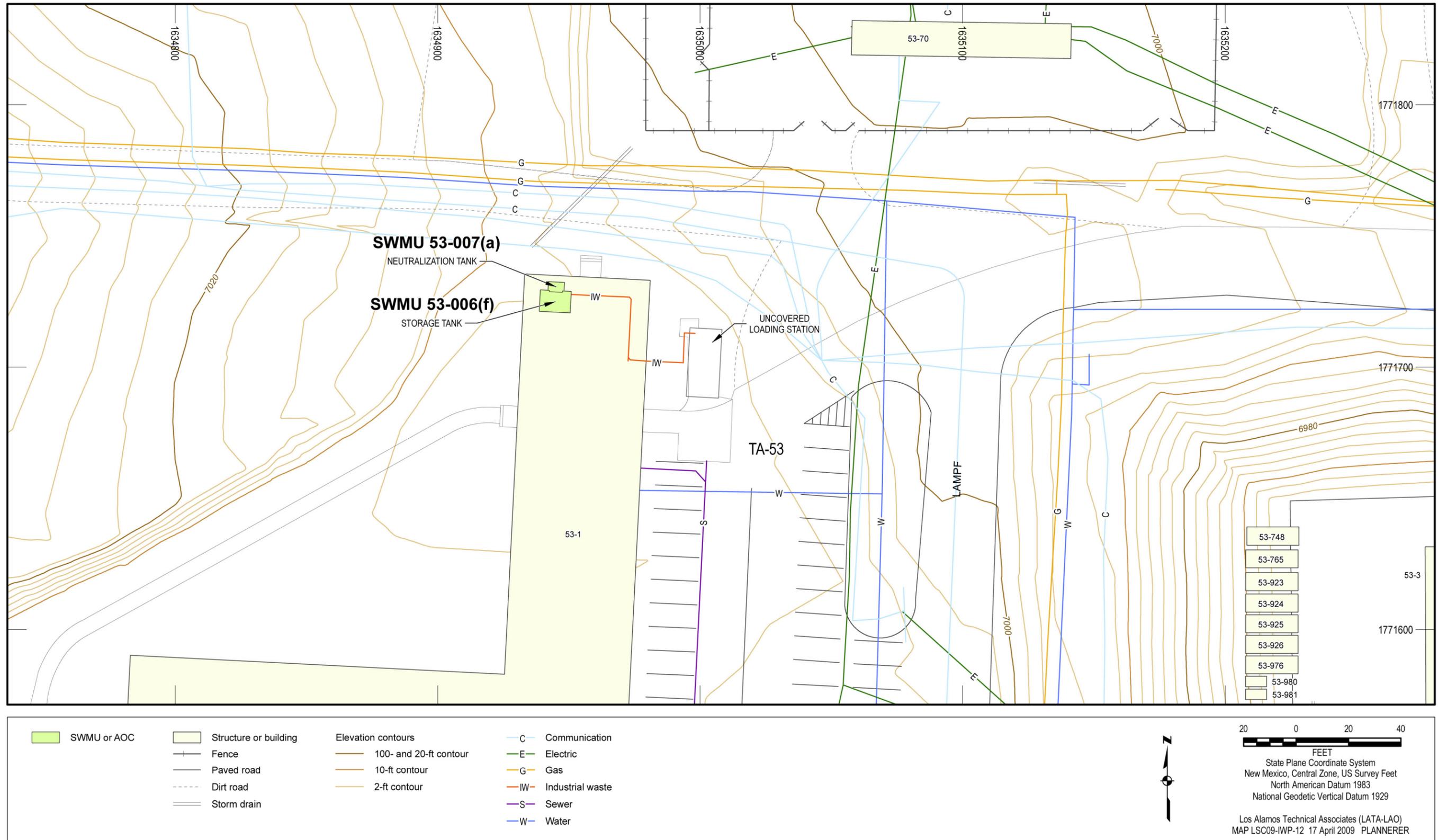


Figure 4.2-12 Site features and historical sampling locations for SWMUs 53-006(f) and 53-007(a)

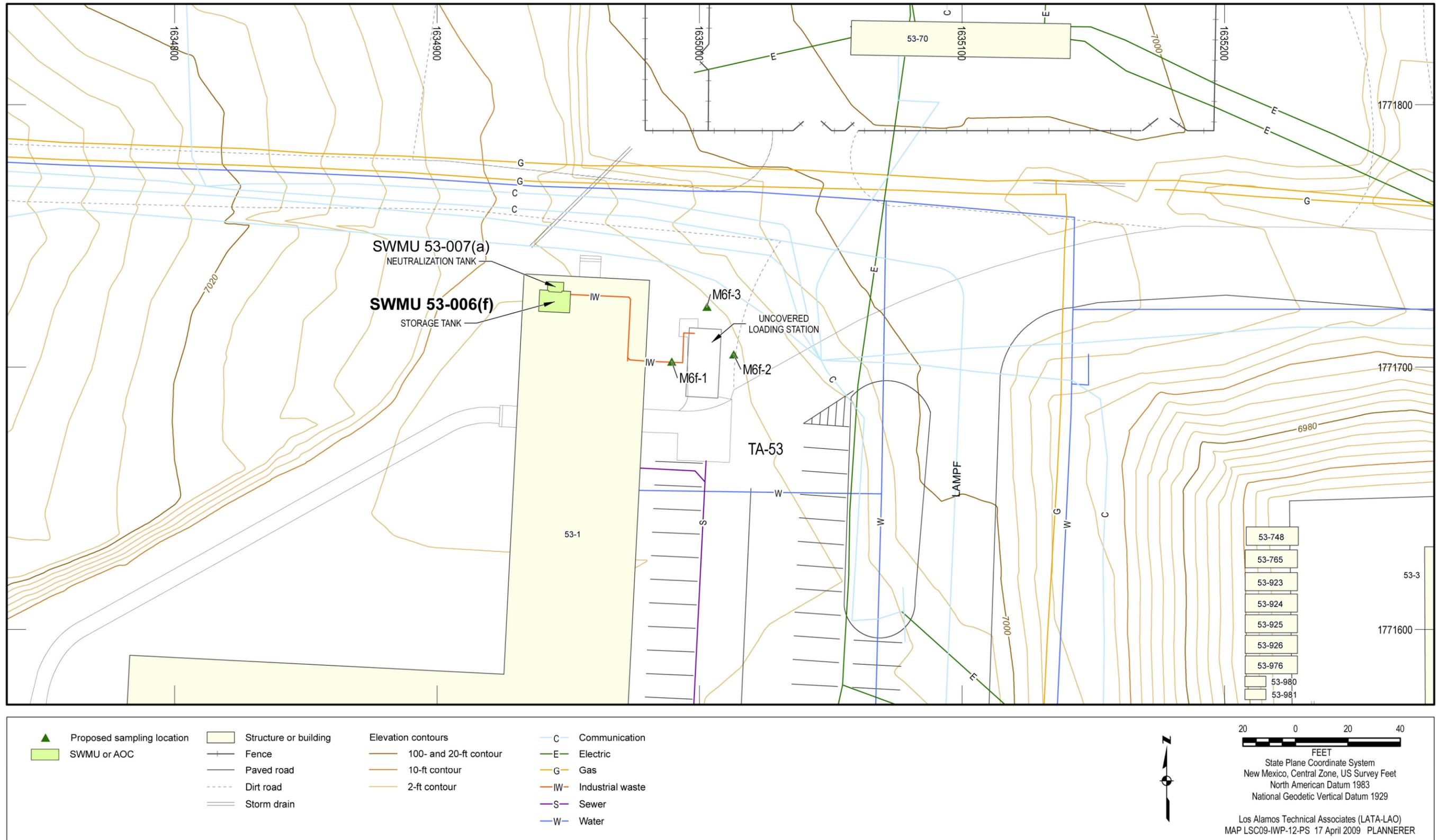


Figure 4.2-13 Proposed sampling locations at SWMU 53-006(f)

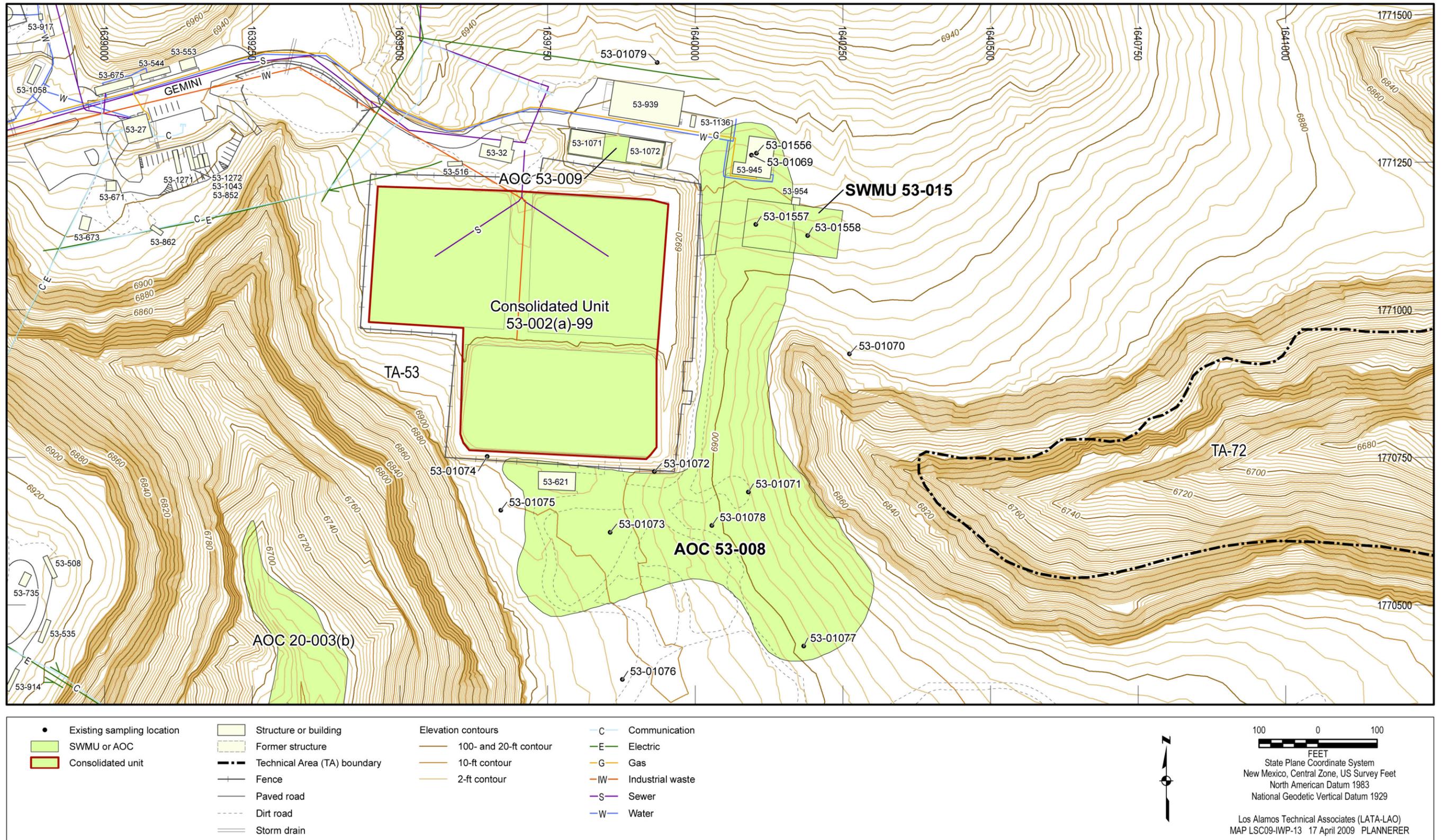


Figure 4.2-14 Site features and historical sampling locations for SWMU 53-015 and AOC 53-008

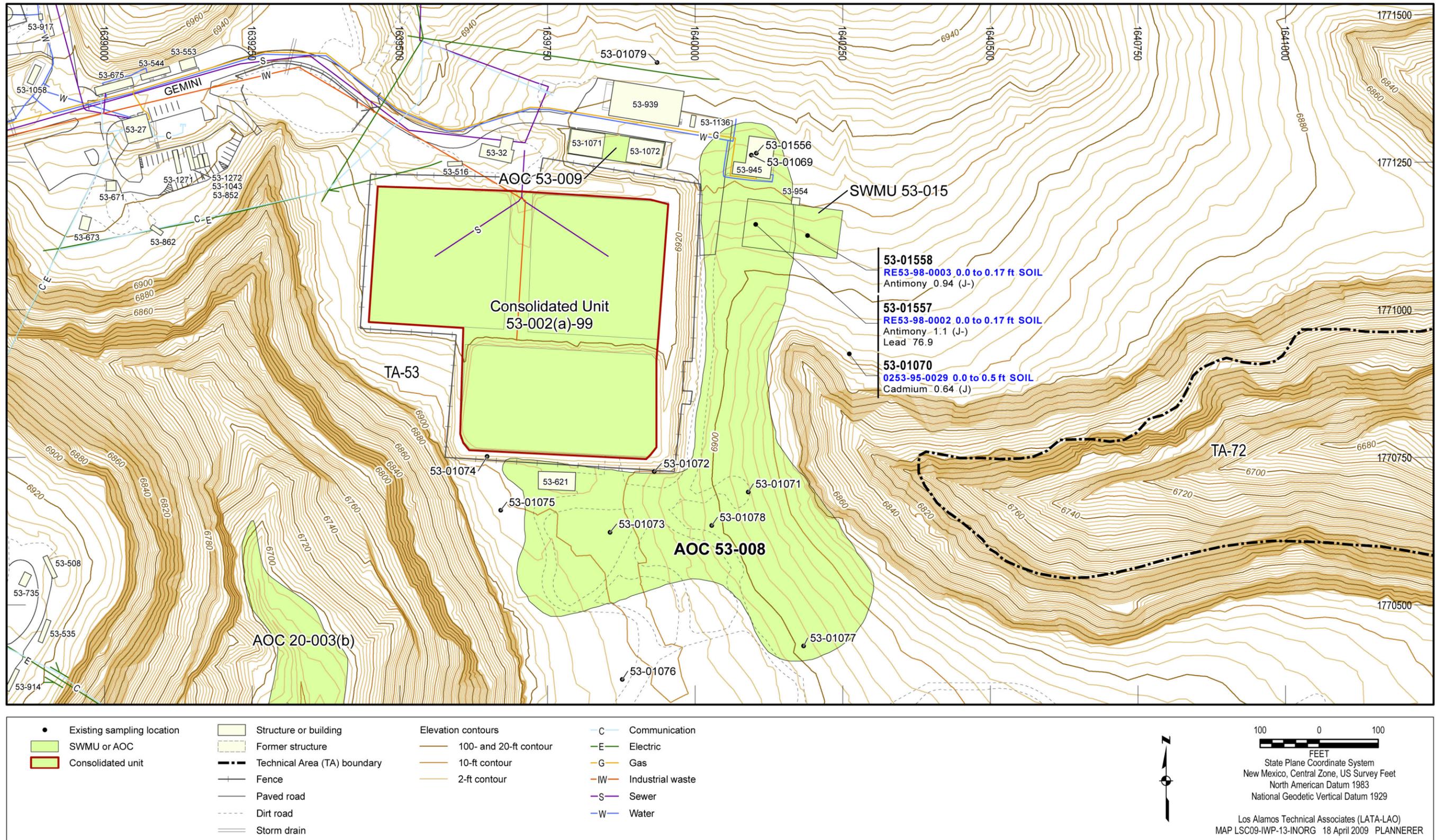


Figure 4.2-15 Inorganic chemicals detected above BVs at AOC 53-008

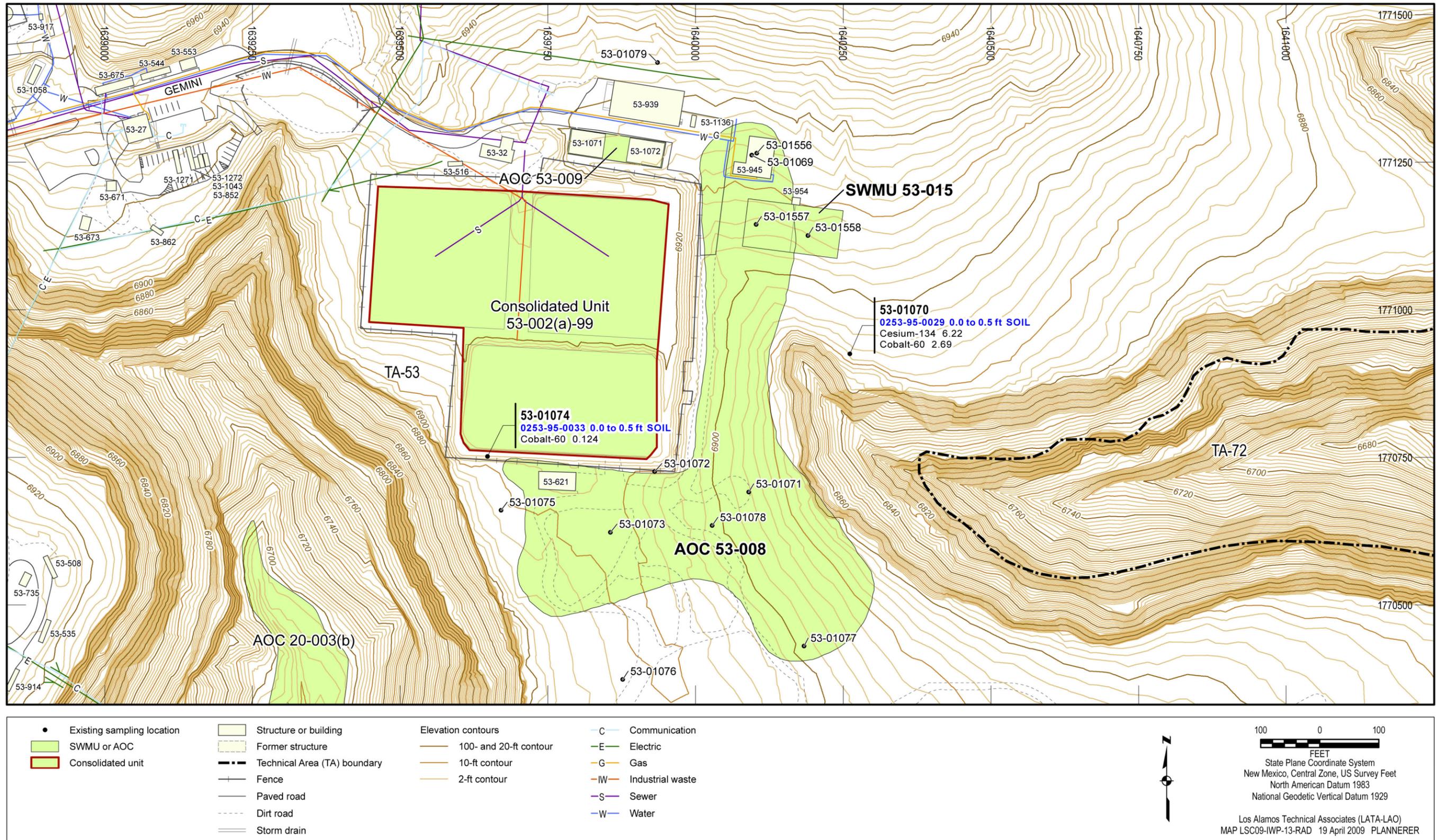


Figure 4.2-16 Radionuclides detected or detected above BVs/FVs for AOC 53-008

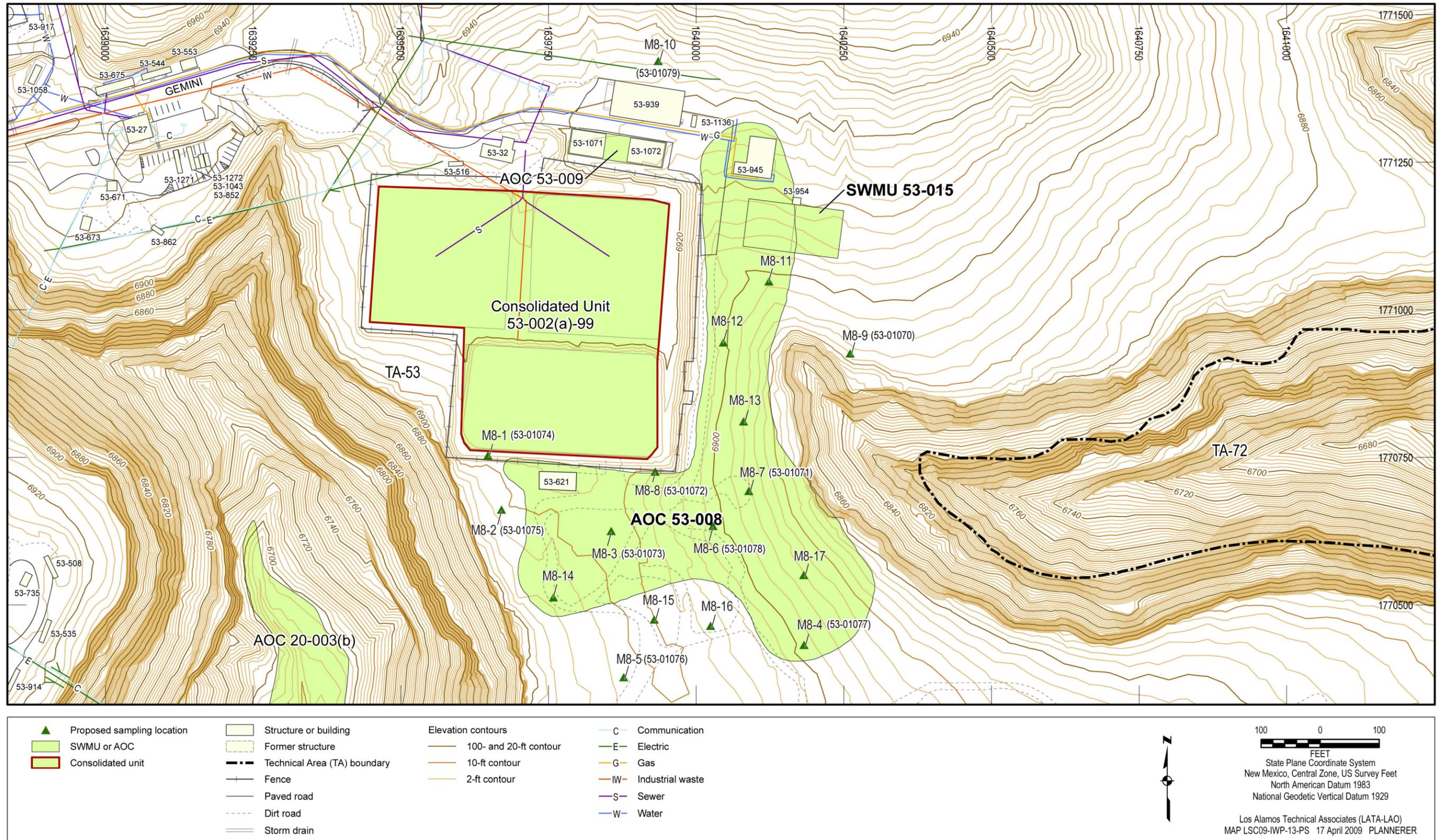


Figure 4.2-17 Proposed sampling locations for AOC 53-008

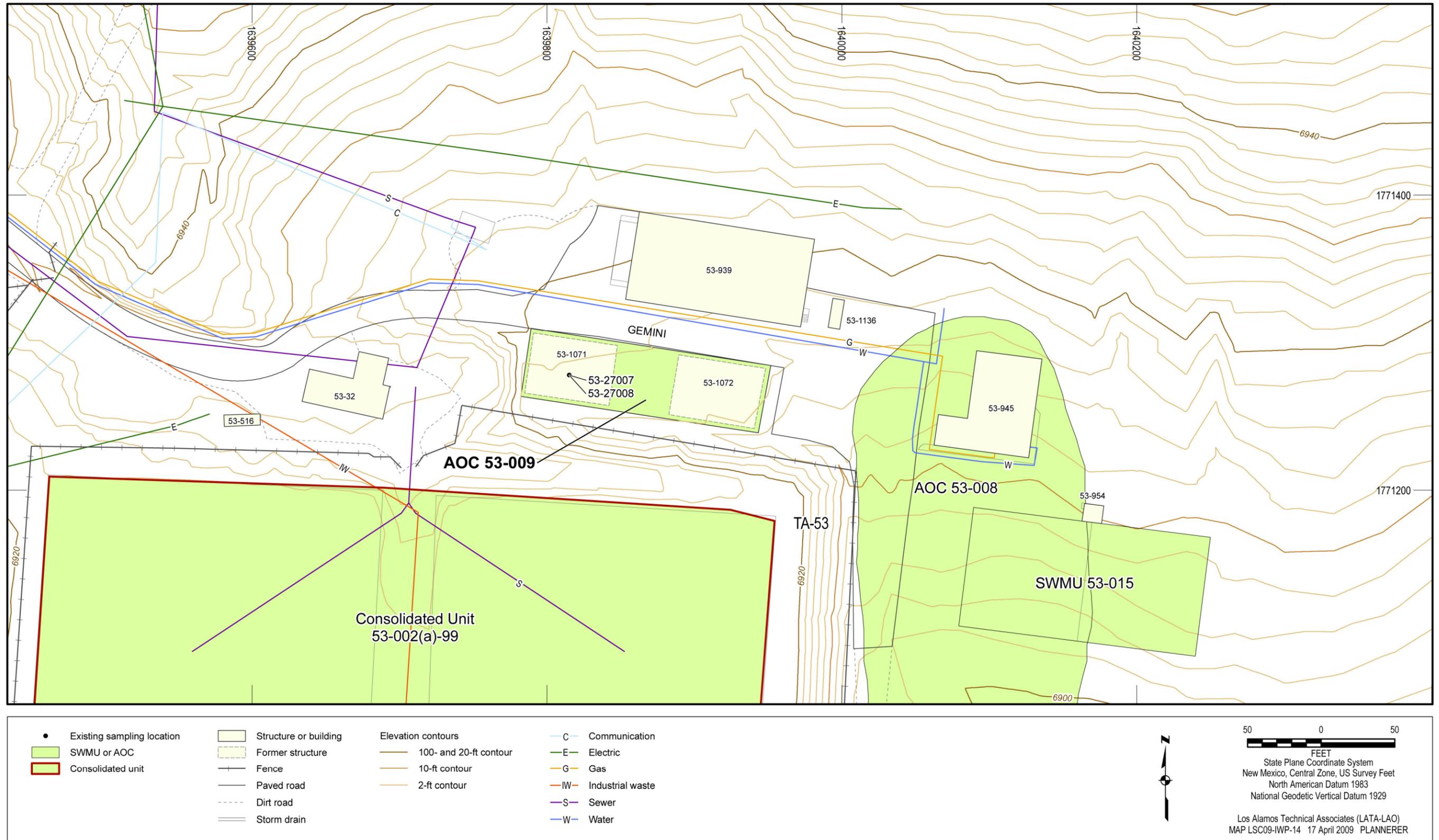


Figure 4.2-18 Site features and historical sampling locations for AOC 53-009

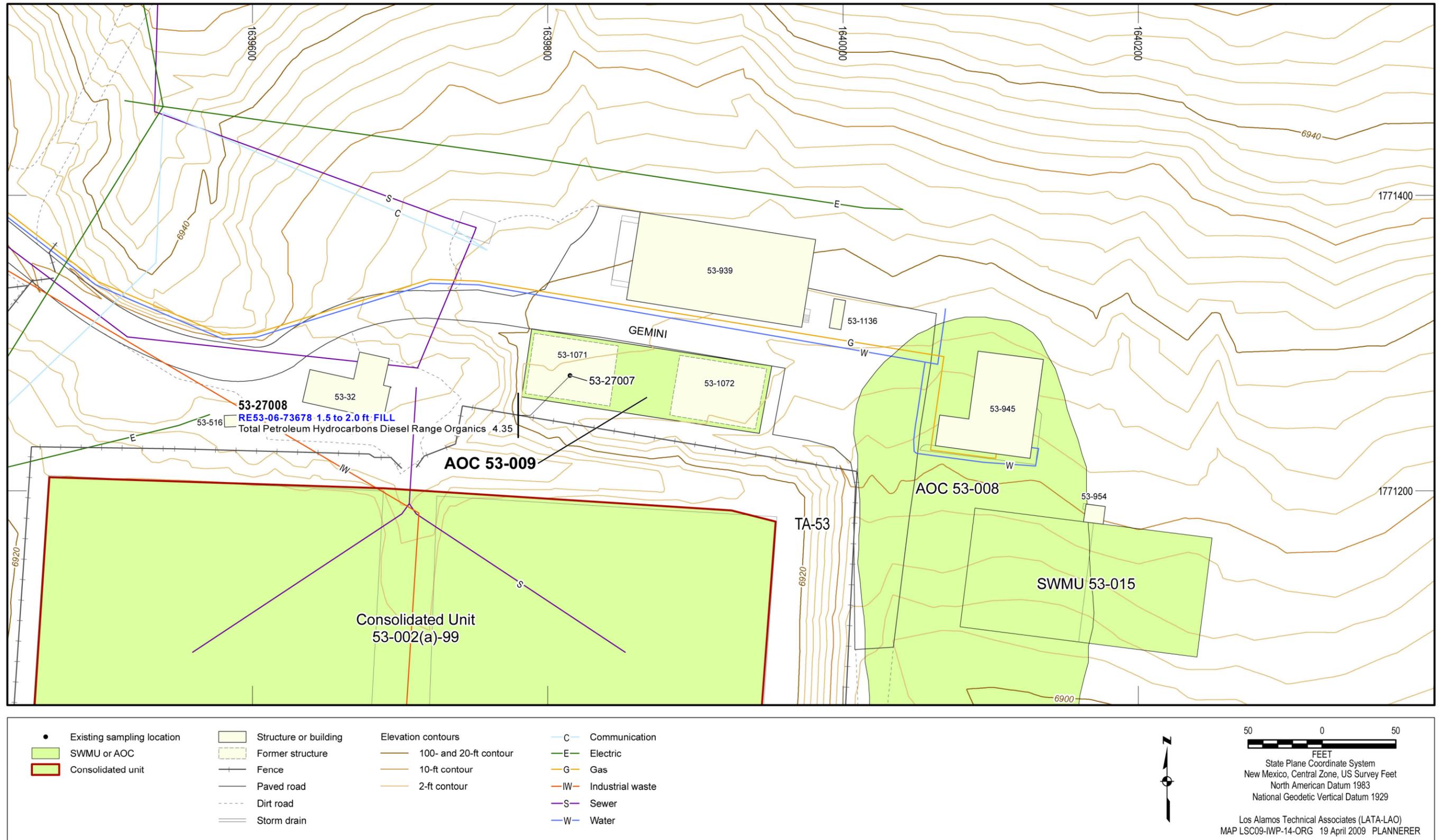


Figure 4.2-19 Organic chemicals detected at AOC 53-009

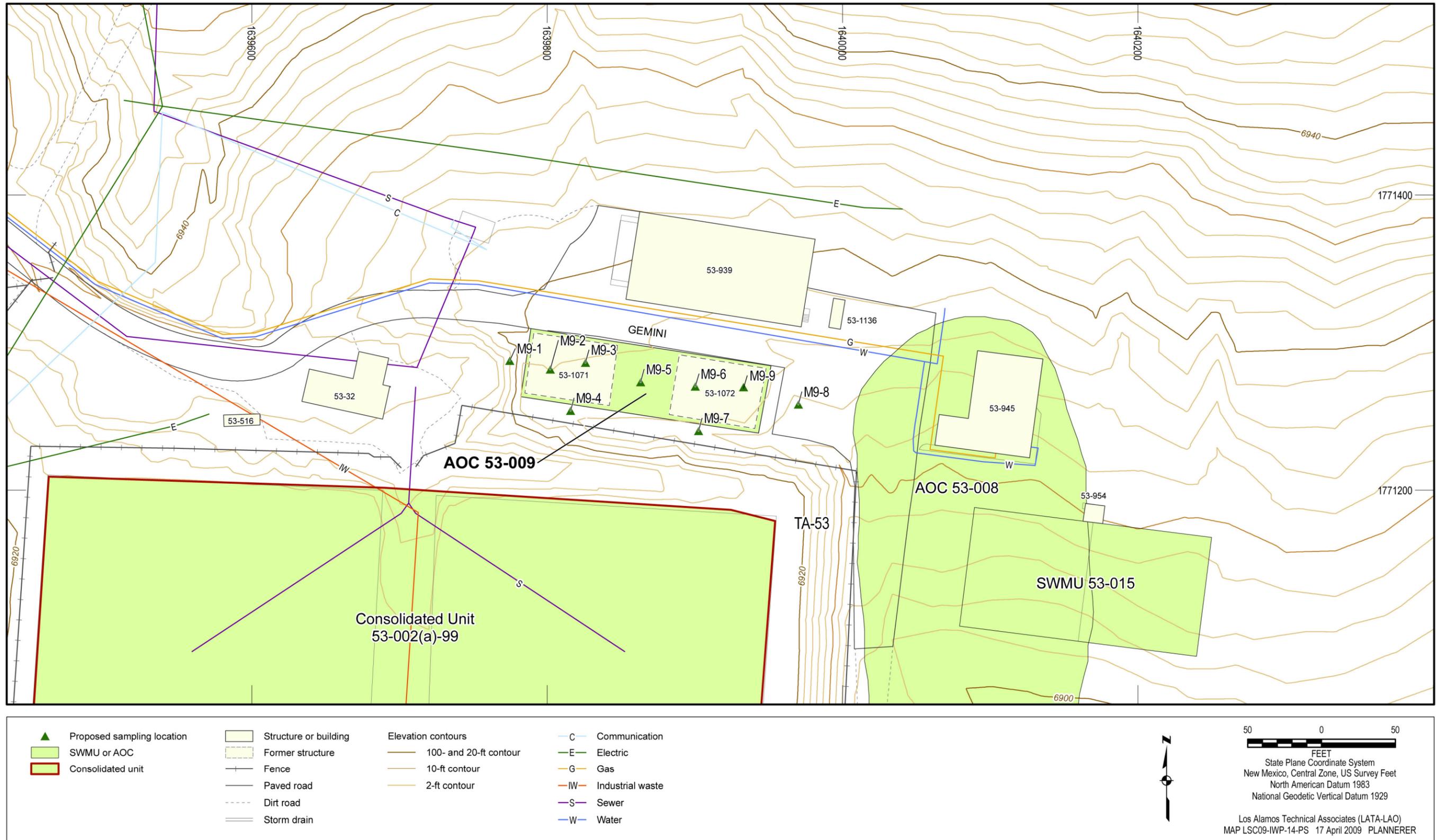


Figure 4.2-20 Proposed sampling locations for AOC 53-009

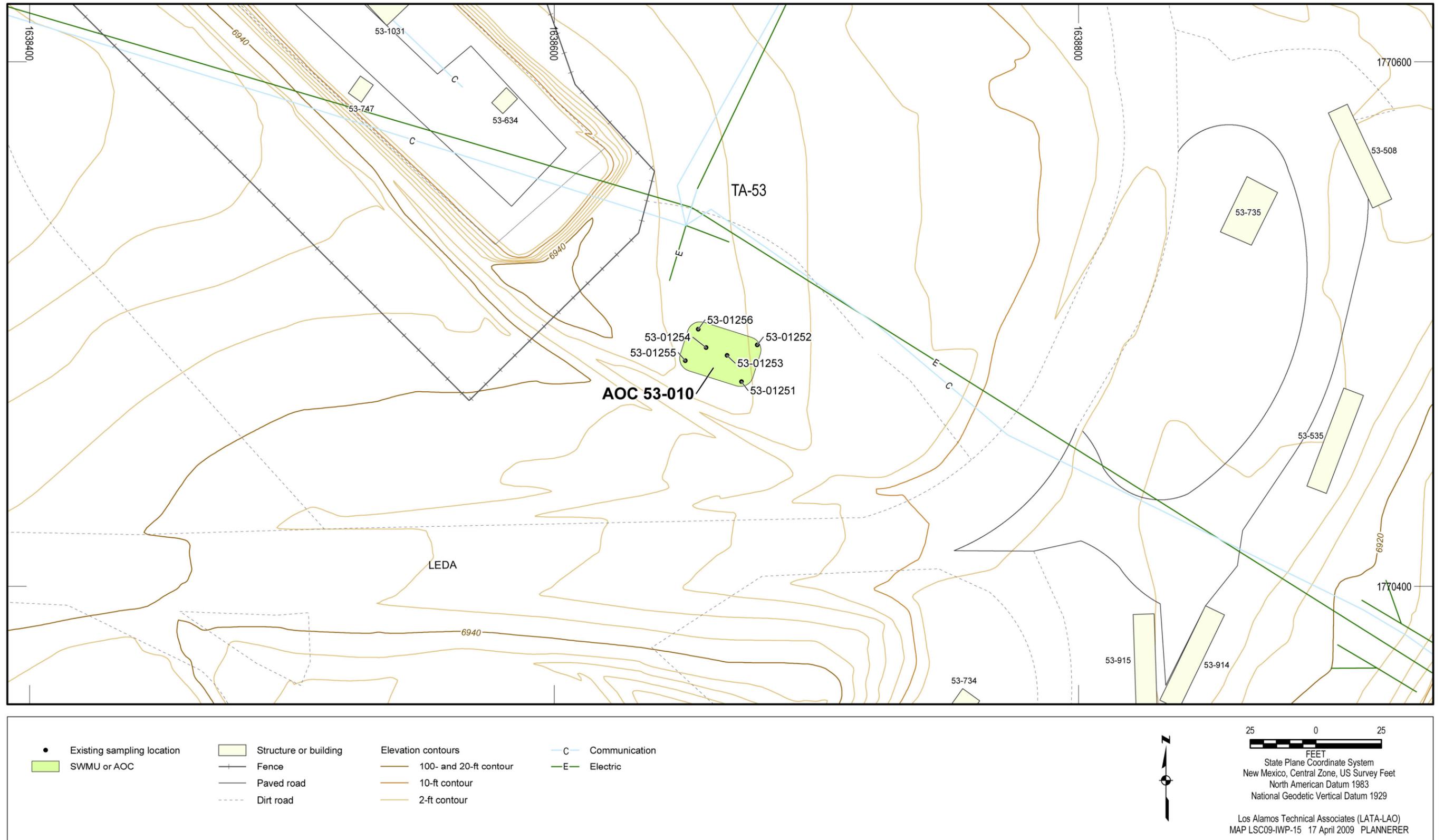


Figure 4.2-21 Site features and historical sampling locations for AOC 53-010

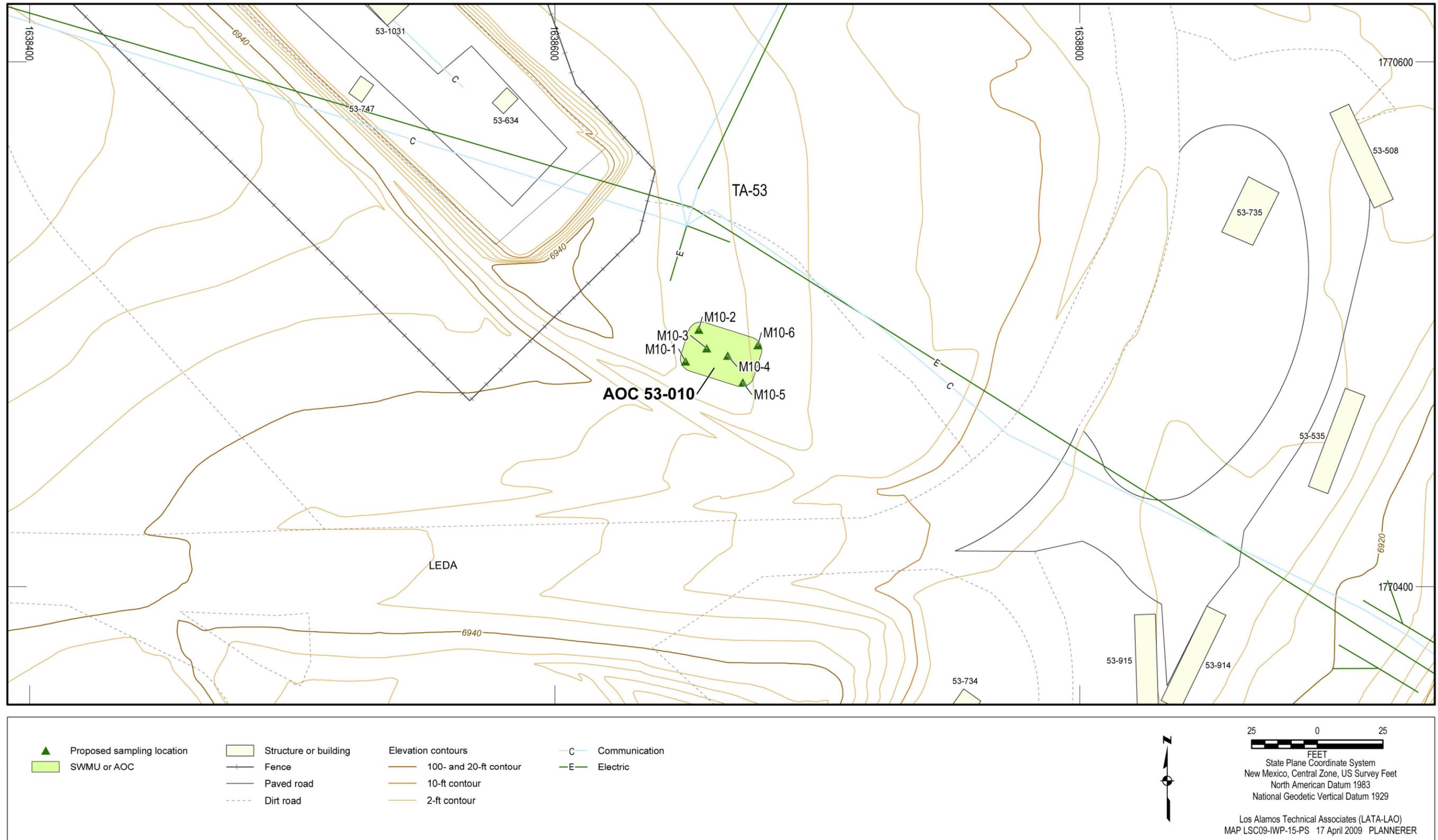


Figure 4.2-22 Proposed sampling locations for AOC 53-010

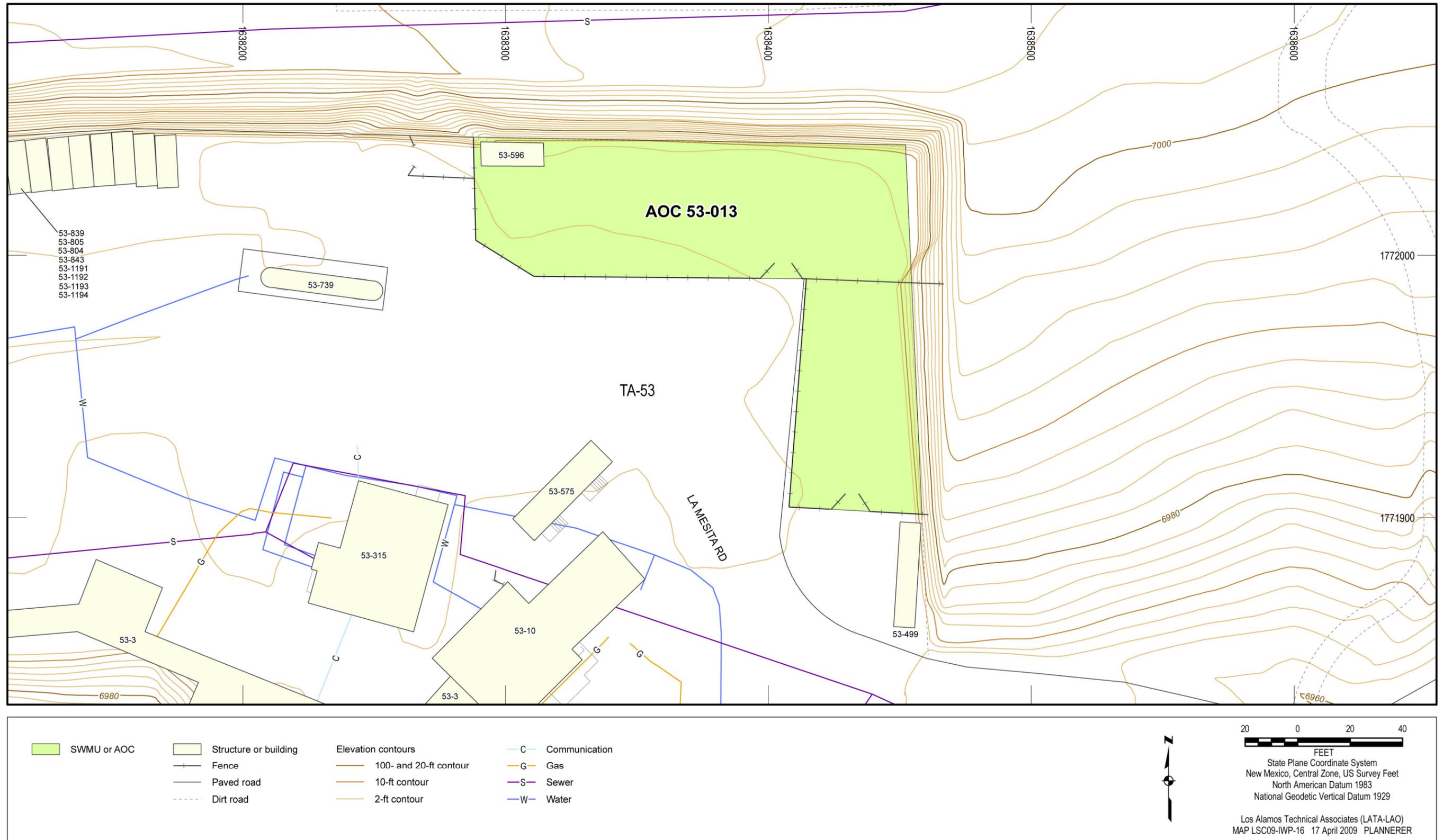


Figure 4.2-23 Site features and historical sampling locations for AOC 53-013

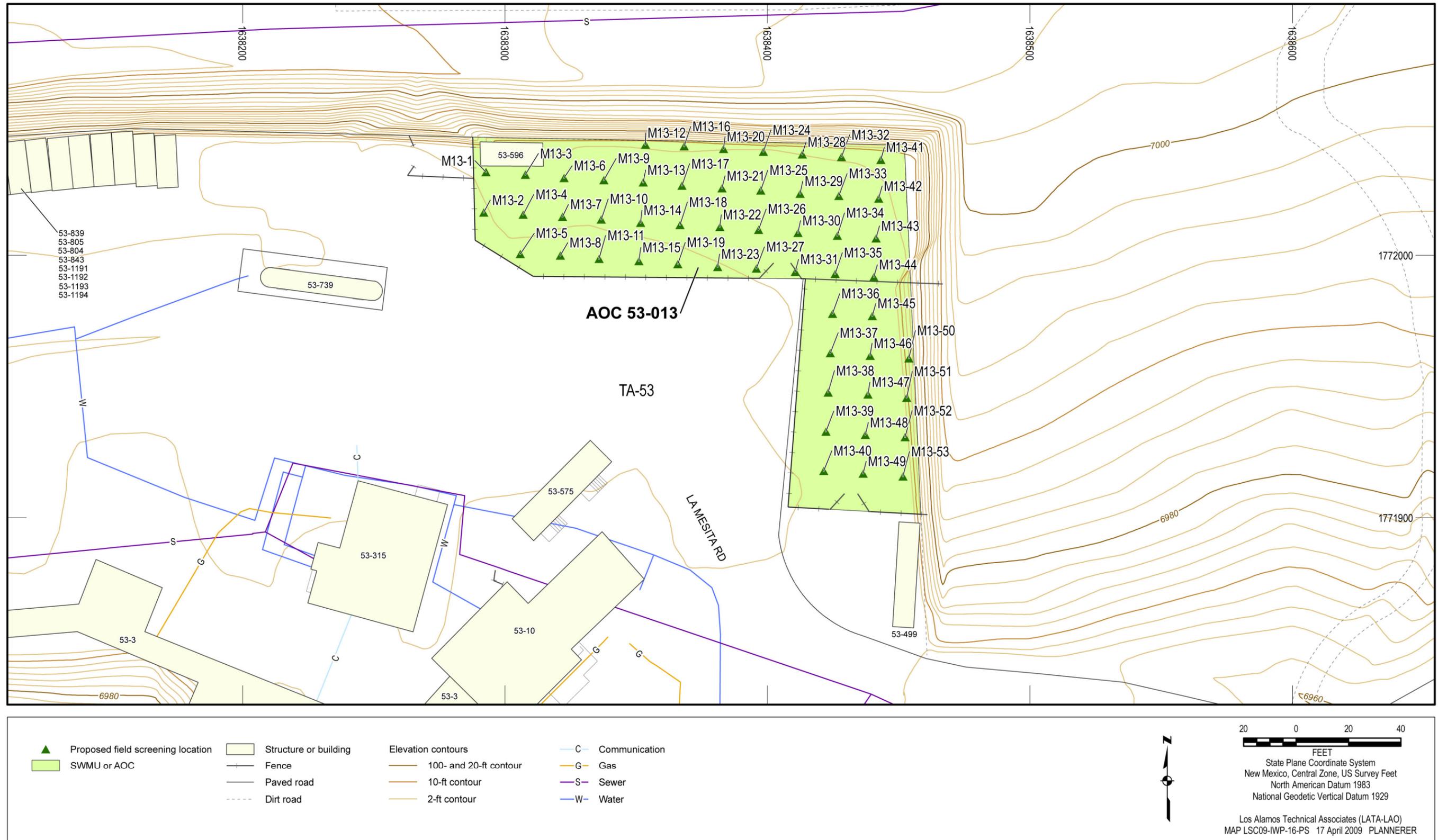


Figure 4.2-24 Proposed sampling locations for AOC 53-013

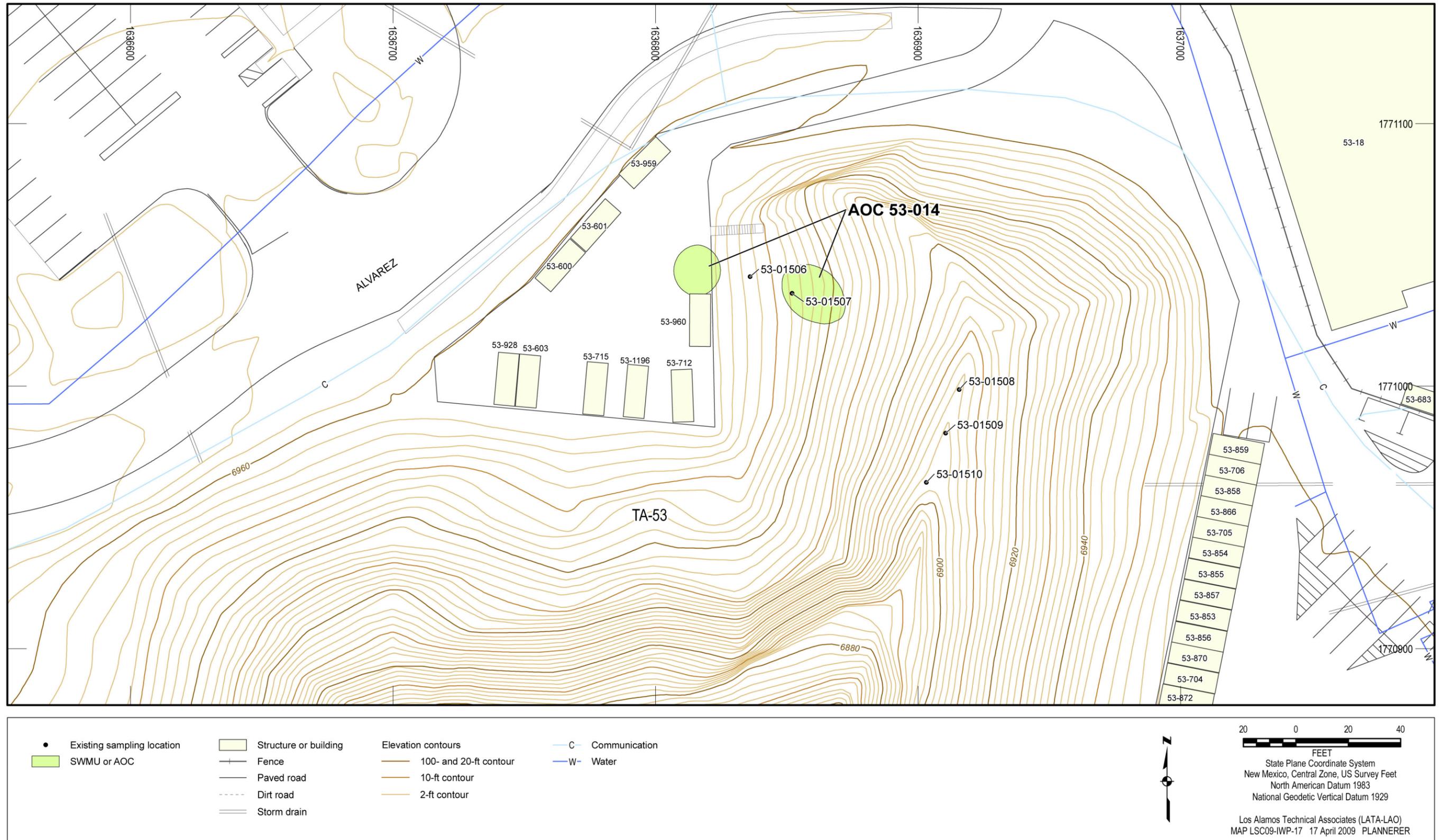


Figure 4.2-25 Site features and historical sampling locations for AOC 53-014

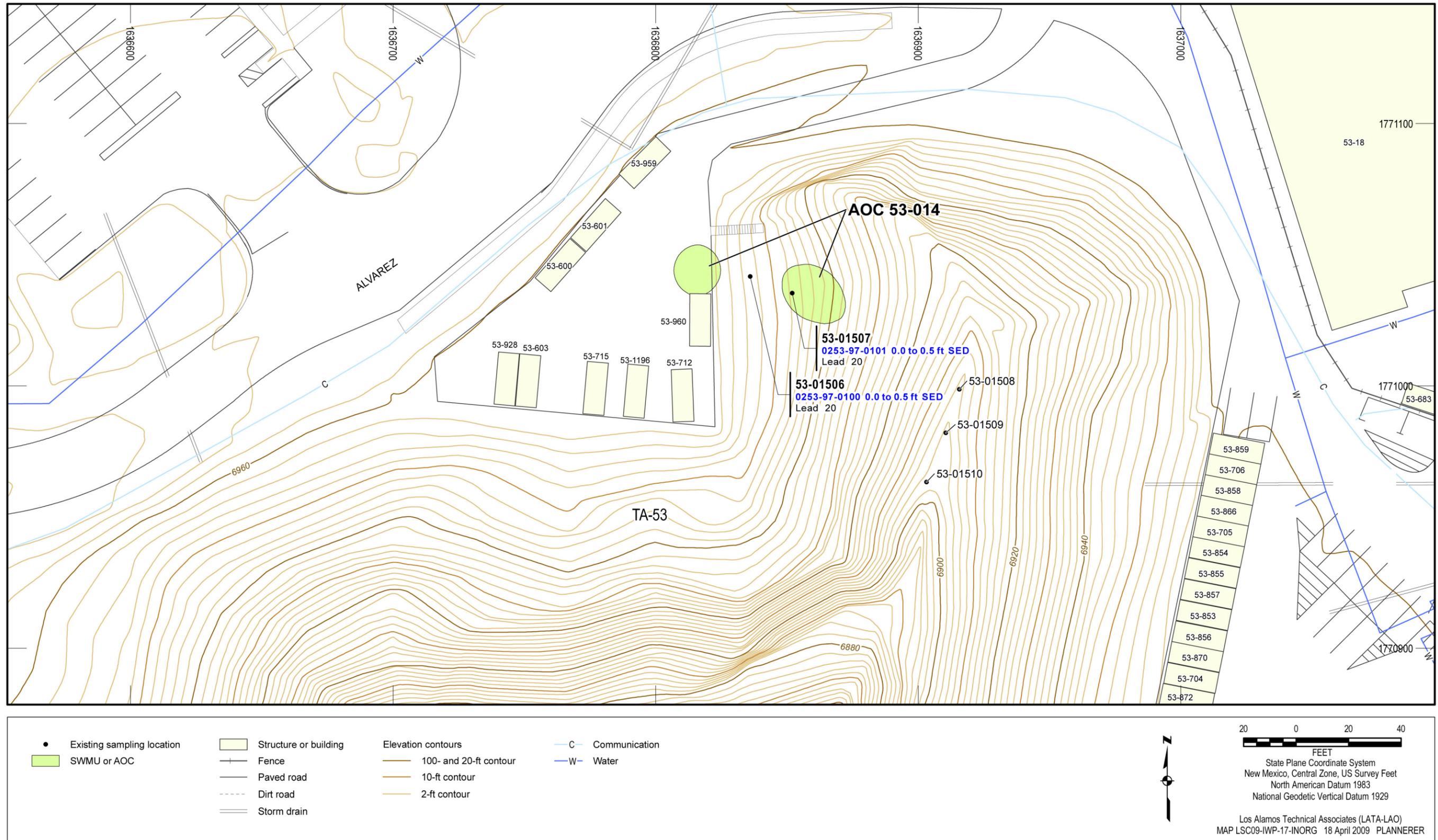


Figure 4.2-26 Inorganic chemicals detected above BVs at AOC 53-014

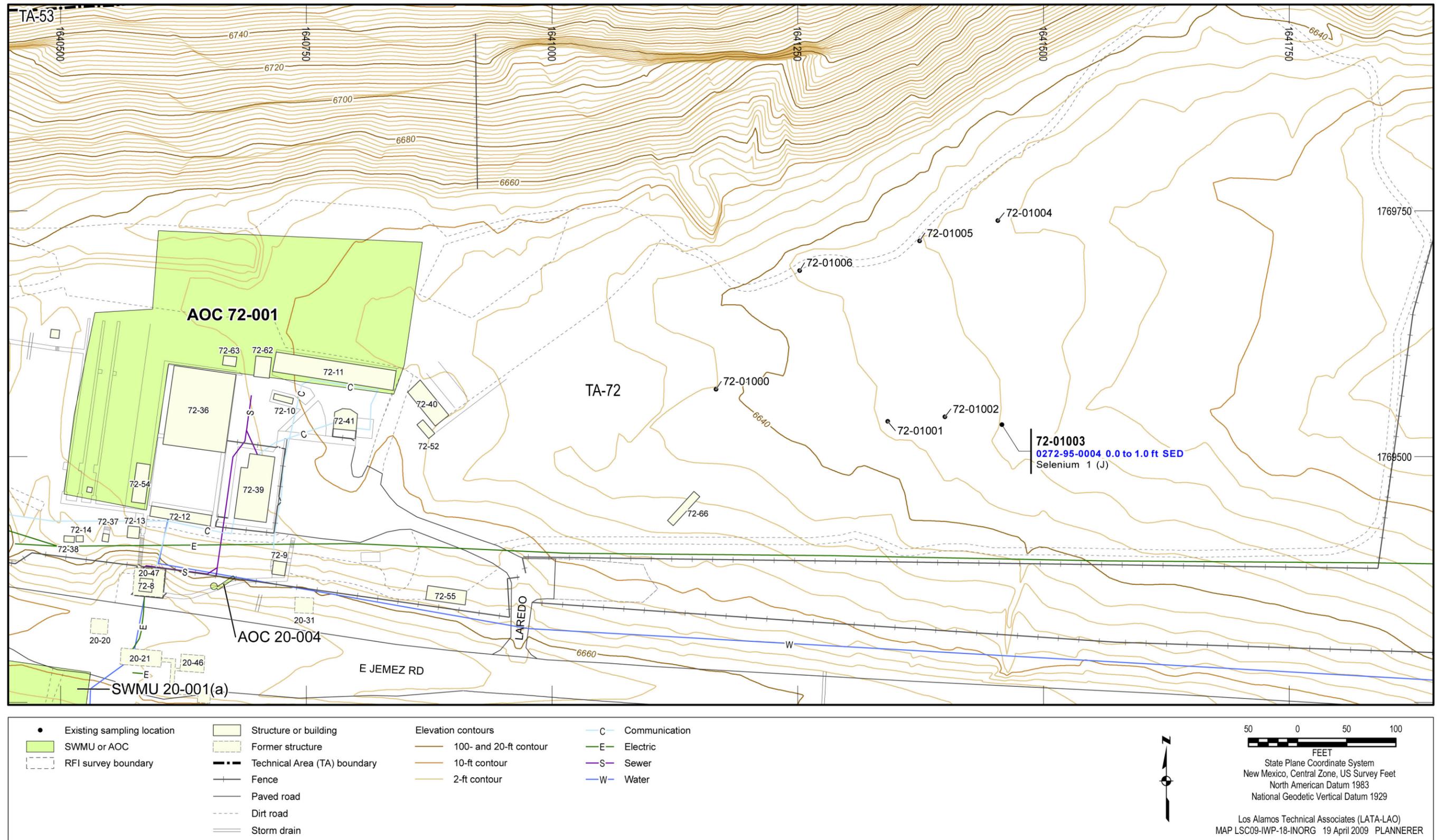


Figure 4.3-1 Inorganic chemicals detected above BVs at AOC 72-001

**Table 1.1-1
Status of SWMUs and AOCs in Lower Sandia Canyon Aggregate Area**

Consolidated Unit	Site ID	Brief Description	Site Status	Reference
Former TA-20				
	SWMU 20-001(a)	Landfill	Under Investigation	Work plan section 4.1.1
20-001(b)-00	SWMU 20-001(b)	Landfill	Under Investigation	Work plan section 4.1.2
	SWMU 20-002(c)	Former firing point	Under Investigation	Work plan section 4.1.6
	AOC 20-003(c)	Former U.S. Navy gun site	Under Investigation	Work plan section 4.1.9
20-001(c)-00	SWMU 20-001(c)	Landfill	Under Investigation	Work plan section 4.1.3
	SWMU 20-002(a)	Former firing pit	Under Investigation	Work plan section 4.1.4
	SWMU 20-002(b)	Former steel tanks (firing site)	Under Investigation	Work plan section 4.1.5
	SWMU 20-002(d)	Former firing site	Under Investigation	Work plan section 4.1.7
	SWMU 20-003(a)	Soil contamination associated with former firing site control building	Removed from Module VIII Hazardous Waste Facility Permit (HWFP) 04/22/07	NMED 2007, 095495
	AOC 20-003(b)	Former 20-mm gun firing site	Under Investigation	Work plan section 4.1.8
	AOC 20-003(d)	Firing site	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 20-004	Septic system	Under Investigation	Work plan section 4.1.10
	SWMU 20-005	Septic system	Under Investigation	Work plan section 4.1.11
	AOC C-20-001	Former storage building	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-20-002	Former storage building	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-20-003	Former building	NFA Approved, 01/21/05	EPA 2005, 088464
TA-53				
	SWMU 53-001(a)	Storage area	Under Investigation	Work plan section 4.2.1
	SWMU 53-001(b)	Storage area	Under Investigation	Work plan section 4.2.2
	AOC 53-001(c)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(d)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(e)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(f)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(g)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464

Table 1.1-1 (continued)

Consolidated Unit	Site ID	Brief Description	Site Status	Reference
	AOC 53-001(h)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(i)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(j)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(k)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(l)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(m)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(n)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(o)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
53-002(a)-99	SWMU 53-002(a)	Former surface impoundments	Corrective Action Complete with Controls, 09/13/06	NMED 2006, 095421
	SWMU 53-002(b)	Former surface impoundment	Corrective Action Complete with Controls, 09/13/06	NMED 2006, 095421
	AOC 53-003	Sanitary waste holding tank	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-004	Bead blaster	NFA Approved, 01/21/05	EPA 2005, 088464
	SWMU 53-005	Former waste disposal pit	Under Investigation	Work plan section 4.2.3
53-006(b)-99	AOC 53-006(a)	Underground Tank	NFA Approved, 01/21/05	EPA 2005, 088464
	SWMU 53-006(b)	Underground storage tank	Under Investigation	Work plan section 4.2.4
	SWMU 53-006(c)	Underground storage tank	Under Investigation	Work plan section 4.2.4
53-006(d)-99	SWMU 53-006(d)	Underground storage tank	Under Investigation	Work plan section 4.2.5
	SWMU 53-006(e)	Underground storage tank	Under Investigation	Work plan section 4.2.5
	SWMU 53-006(f)	Underground storage tanks	Under Investigation	Work plan section 4.2.6
	SWMU 53-007(a)	Aboveground treatment tank	Under Investigation	Work plan section 4.2.7
	SWMU 53-007(b)	Aboveground storage tanks	Removed from Module VIII HWFP, 12/23/98	NMED 1998, 063042
	AOC 53-008	Storage area	Under Investigation	Work plan section 4.2.8
	AOC 53-009	Former storage area	Under Investigation	Work plan section 4.2.9
	AOC 53-010	Former storage area	Under Investigation	Work plan section 4.2.10
	AOC 53-011(a)	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464

Table 1.1-1 (continued)

Consolidated Unit	Site ID	Brief Description	Site Status	Reference
	AOC 53-011(b)	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-011(c)	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-011(d)	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-011(e)	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-012(d)	Outfall	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-012(e)	Drainline and outfall	Under Investigation	Work plan section 4.2.11
	AOC 53-012(f)	Outfall	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-012(g)	Outfall	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-012(h)	Outfall	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-013	Lead spill site	Under Investigation	Work plan section 4.2.12
	AOC 53-014	Lead spill site	Under Investigation	Work plan section 4.2.13
	SWMU 53-015	Wastewater treatment facility	Not subject to corrective actions	DOE 1999, 098985
	AOC C-53-001	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-002	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-003	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-004	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-005	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-006	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-007	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-008	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-009	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-010	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-011	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464

Table 1.1-1 (continued)

Consolidated Unit	Site ID	Brief Description	Site Status	Reference
	AOC C-53-012	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-013	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-014	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-015	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-016	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-018	One-time spill	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-019	One-time spill	NFA Approved, 01/21/05	EPA 2005, 088464
TA-72				
	AOC 72-001	Small arms firing range	Under Investigation	Work plan section 4.3.1
	AOC 72-002	Suspected mortar impact area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 72-003(a)	Septic system	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 72-003(b)	Septic system	NFA Approved, 01/21/05	EPA 2005, 088464

Note: Shading denotes NFA approved or complete with controls.

**Table 2.3-1
Industrial SSLs and SALs**

Chemical	Industrial SSL ^a (inorganic and organic chemicals) or Industrial SAL ^b (radionuclides)
Inorganic Chemicals (mg/kg)	
Antimony	454
Beryllium	2250
Cadmium	564
Chromium	14000 ^c
Copper	45400
Cyanide (total)	13700
Iron	100000
Lead	800
Mercury	310 ^c
Nickel	22700
Selenium	5680
Silver	5680
Thallium	74.9
Uranium	3100 ^c
Zinc	100000
Organic Chemicals (mg/kg)	
Aroclor-1248	8.26
Aroclor-1254	8.26
Aroclor-1260	8.26
Benzene	25.8
Benzoic acid	2500000 ^c
Bis(2-ethylhexyl)phthalate	1370
Butanone[2-]	48700
Butylbenzylphthalate	9100 ^c
Chlordane[alpha-]	71.9 ^d
Chlordane[gamma-]	71.9 ^d
Dieldrin	1.2
Di-n-butylphthalate	68400
Endosulfan II	4100
Endrin Aldehyde	205 ^e
TPH-DRO	1120 ^f
TPH Unknown Range	200 ^f
Tetryl	2500 ^c

Table 2.3-1 (continued)

Chemical	Industrial SSL ^a (inorganic and organic chemicals) or Industrial SAL ^b (radionuclides)
Radionuclides (pCi/g)	
Cesium-134	9.7
Cesium-137	23
Cobalt-60	5.1
Europium-152	11
Ruthenium-106	83
Sodium-22	6.5
Strontium-90	1900
Tritium	440000
Uranium-234	1500
Uranium-235	87
Uranium-238	430

^a SSLs from NMED 2006, 092513, unless otherwise noted.

^b SALs from LANL 2005, 088493.

^c SSL is from the EPA Regional Screening Table (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/pdf/composite_sl_table_run_12SEP2008.pdf)

^d SSL is for chlordane.

^e SSL is for endrin, which is surrogate for endrin aldehyde.

^f SSL from NMED 2006, 094614.

**Table 4.0-1
Summary of Proposed Samples and Analyses**

Site	Sampling Justification	Number of Locations and Samples	Depth (ft) ^a	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Pesticides (EPA SW-846:8081A)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Strontium-90 (EPA 905.0)	Gamma Spectroscopy
TA-20																
SWMU 20-001(a)	Resample previous 8 RFI locations at previous sampling depth and deeper depth and with additional analytes not included in RFI to define nature and vertical extent (Figure 4.1-5).	8 locations, 16 samples	10–11, 14–15	Soil, tuff	X ^b	X	X	X	X	X	X	— ^c	—	X	X	X
SWMU 20-001(b)	Resample 8 previous RFI locations at previous sampling depth and deeper depth and with additional analytes not included in RFI to define nature and vertical extent (Figure 4.1-9).	8 locations, 16 samples	10–11, 14–15	Soil, tuff	X	X	X	X	X	X	X	—	—	X	—	X
SWMU 20-001(c)	If geophysical anomalies are identified, collect samples from the bottom of any excavations/trenches from 2 depths. If no anomalies are identified, collect samples at 10 locations within geophysical survey boundary (Figure 4.1-11).	10 locations, 20 samples	1–2 and 4–5 below bottom of excavation or 10–11, 14–15 ^d	Soil, tuff	X	X	X	X	X	X	X	—	—	X	X	X
SWMU 20-002(a)	Collect samples from 3 depths at 4 new step-out locations around site to define extent (Figure 4.1-11)	4 locations, 12 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	—	—	X	—	—	X	—	—
	Resample 5 previous RFI sample locations at previous sampling depths and additional depth and with additional analytes not included in RFI to define nature and vertical extent (Figure 4.1-11).	5 locations, 15 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	—	—	X	—	—	X	—	—
SWMU 20-002(b)	Collect samples from 3 depths at 2 new step-out locations around site to define extent (Figure 4.1-11).	2 locations, 6 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	—	—	X	—	—	X	—	X
	Resample 5 previous RFI sample locations at previous sampling depths and additional depth and with additional analytes not included in RFI to define nature and vertical extent (Figure 4.1-11).	5 locations, 15 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	—	—	X	—	—	X	—	X
SWMU 20-002(c)	Collect samples from 3 depths at 4 new step-out locations around site to define extent. (Figure 4.1-15)	4 locations, 12 samples	0–1, 4–5, 8–9	Soil, tuff	X	X	X	X	—	—	X	—	—	X	X	X
	Resample 4 previous RFI sample locations at 2 previous sampling depths and additional depth and with additional analytes not included in RFI to define nature and vertical extent (Figure 4.1-15).	4 locations, 12 samples	0–1, 4–5, 8–9	Soil, tuff	X	X	X	X	—	—	X	—	—	X	X	X
SWMU 20-002(d)	Collect samples from 3 depths at 4 new step-out locations around site to define extent (Figure 4.1-19).	4 locations, 12 samples	0–1, 4–5, 8–9	Soil, tuff	X	X	X	X	—	—	X	—	—	X	X	X
	Resample 4 previous RFI sample locations at 2 previous sampling depths and additional depth and with additional analytes not included in RFI to define nature and vertical extent (Figure 4.1-19).	4 locations, 12 samples	0–1, 4–5, 8–9	Soil, tuff	X	X	X	X	—	—	X	—	—	X	X	X

Table 4.0-1 (continued)

Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Pesticides (EPA SW-846:8081A)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Strontium-90 (EPA 905.0)	Gamma Spectroscopy
AOC 20-003(b)	Collect samples from 2 depths at 6 new locations downstream from site in historical drainage with additional analytes not included in RFI to define nature and lateral extent (Figure 4.1-23)	6 locations, 12 samples	2-3, 8-9 (or at soil/tuff interface if less than 8 ft)	Soil, tuff	X	X	X	X	—	—	—	—	—	X	—	—
AOC 20-003(c)	Collect samples from 3 depths at 4 new locations at and around structure 20-10 to define extent (Figure 4.1-15).	4 locations, 12 samples	0-1, at soil/tuff interface, 2-3 ft below soil/tuff interface	Soil, tuff	X	X	X	X	—	—	X	—	—	X	X	X
AOC 20-004	Target sampling at former locations of septic tank and drain lines. Collect samples from 2 depths at 6 new locations within and adjacent to former tank location, along former drain line, and around discharge end of former drain line to define extent (Figure 4.1-25).	6 locations, 12 samples	0-1, 3-4 beneath former drain line and septic tank if structure depths are determined or 7-8, 10-11	Soil, tuff	X	X	X	—	X	X	—	—	—	—	—	—
SWMU 20-005	New sample at location of septic tank to determine if release occurred (Figure 4.1-28).	1 location, 2 samples	6-7, 9-10	Soil, tuff	X	X	X	—	X	X	—	—	—	—	—	—
	Resample 3 previous RFI sample locations at previous sampling depth and additional depth and with additional analytes not included in RFI to define nature and extent (Figure 4.1-28).	3 locations, 6 samples	4-5, 9-10	Soil, tuff	X	X	X	—	X	X	—	—	—	—	—	—
TA-53																
SWMU 53-001(a)	Collect samples at 3 depths at 1 new location to the east to define lateral extent of PCBs in drainage (Figure 4.2-4).	1 location, 3 samples	0-1, 2-3, 4-5	Soil, tuff	—	—	—	—	—	—	—	—	X	—	—	—
	Resample previous RFI location where metals were detected above BV and pesticides and PCBs were detected at deeper depths to define vertical extent (Figure 4.2-4).	1 location, 2 samples	2-3, 4-5 beneath VCA excavation	Soil, tuff	X	—	—	—	—	—	—	X	X	—	—	—
	Resample previous RFI location where mercury was detected above BV at deeper depths to define vertical extent. (Figure 4.2-4)	1 location, 2 samples	2-3, 4-5	Soil, tuff	X	—	—	—	—	—	—	—	—	—	—	—
	Resample 2 previous RFI locations and 5 previous VCA confirmation locations where PCBs were detected at deeper depths to define vertical extent (Figure 4.2-4).	7 locations, 14 samples	1-2 and 3-4 beneath previous sampling depth or beneath VCA excavation.	Soil, tuff	—	—	—	—	—	—	—	—	—	X	—	—
SWMU 53-001(b)	Collect samples at 2 depths at 2 new locations in drainage down slope from previous RFI samples to define lateral extent of metals (Figure 4.2-4).	2 locations, 4 samples	0-1, 2-3	Soil, tuff	X	—	—	—	—	—	—	—	—	—	—	—

Table 4.0-1 (continued)

Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Pesticides (EPA SW-846:8081A)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Strontium-90 (EPA 905.0)	Gamma Spectroscopy
SWMU 53-005	Collect samples at 3 depths at 2 new locations downgradient of the former disposal pit excavation to define nature and extent (Figure 4.2-4).	2 locations, 6 samples	2-3, 5-6, 14-15 ^d	Soil, tuff	X	X	X	X	X	X	—	—	X	—	—	X
	Collect samples at 2 depths at one new location beneath the bottom of the pit excavation to define vertical extent (Figure 4.2-4).	1 location, 2 samples	8-9 ^e , 14-15 ^f	Tuff	X	X	X	X	X	X	—	—	X	—	—	X
	Collect samples at 2 depths at one new location beneath the former waste line to define vertical extent (Figure 4.2-4)	1 location, 2 samples	0-1, 2-3 below line	Soil, tuff	X	X	X	X	X	X	—	—	X	—	—	X
SWMUs 53-006(b,c) ^g	No sampling currently proposed; sampling delayed until deactivation.	n/a ^h	n/a	n/a	—	—	—	—	—	—	—	—	—	—	—	—
SWMUs 53-006(d,e) ⁱ	No sampling currently proposed; sampling delayed until deactivation.	n/a	n/a	n/a	—	—	—	—	—	—	—	—	—	—	—	—
SWMU 53-006(f)	Collect samples at 3 depths at 3 new locations around waste transfer pad to determine if releases have occurred. Sampling around tank delayed until deactivation (Figure 4.2-13).	3 locations, 9 samples	0-1, 2-3, 8-9	Soil, tuff	X	X	X	—	X	X	—	—	—	—	—	X
SWMU 53-007(a)	No sampling currently proposed; sampling delayed until deactivation.	n/a	n/a	n/a	—	—	—	—	—	—	—	—	—	—	—	—
AOC 53-008	Resample 10 RFI sample locations at previous sampling depth and deeper depth and with additional analytes not included in RFI to define nature and vertical extent (Figure 4.2-17).	10 locations, 20 samples	0-1, 2-3	Soil, tuff	X	X	—	—	X	X	—	—	X	—	—	X
	Collect samples at 2 depths at 7 new locations to define lateral and vertical extent (Figure 4.2-17).	7 locations, 14 samples	0-1, 2-3	Soil, tuff	X	X	—	—	X	X	—	—	X	—	—	X
AOC 53-009	Collect samples at 2 depths at 9 new locations within and outside former containment areas to define nature and lateral and vertical extent (Figure 4.2-20).	9 locations, 18 samples	0-1, 2-3	Soil, tuff	—	—	—	—	X	X	—	—	X	—	—	—
AOC 53-010	Collect samples at 6 previous confirmation sample locations at previous sampling depth and deeper depth and with additional analytes to define nature and vertical extent (Figure 4.2-22).	6 locations, 12 samples	0-1, 3-4 (or at soil/tuff interface)	Soil, tuff	—	—	—	—	X	X	—	—	X	—	—	—
AOC 53-012(e)	Resample 3 previous RFI sample locations at deeper depths to define vertical extent (Figure 4.2-4).	3 locations, 6 samples	1-2, 3-4 (or at soil/tuff interface)	Soil, tuff	X	X	—	—	X	X	—	X	X	—	—	X
	Collect samples at 2 depths at 2 new locations down slope of previous RFI samples to define lateral extent (Figure 4.2-4).	2 locations, 4 samples	0-1, 3-4 (or at soil/tuff interface)	Soil, tuff	X	X	—	—	X	X	—	X	X	—	—	X
	Collect samples at 2 depths at 1 new location beneath elbow in drain line to characterize potential release (Figure 4.2-4).	1 location, 2 samples	0-1 and 2-3 below line	Soil, tuff	X	X	—	—	X	X	—	X	X	—	—	X

Table 4.0-1 (continued)

Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Pesticides (EPA SW-846:8081A)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Strontium-90 (EPA 905.0)	Gamma Spectroscopy
AOC 53-013	Collect samples at 2 depths at 10 new locations inside and around outside of each fenced area to define nature and extent (Figure 4.2-24).	20 locations, 40 samples	0–1, 2–3 or 0–1 and 2-3 below excavation	Soil, tuff	X	—	—	—	—	—	—	—	—	—	—	—
AOC 53-014	No samples proposed; nature and extent defined.	n/a	n/a	n/a	—	—	—	—	—	—	—	—	—	—	—	—
SWMU 53-015	No samples proposed. Site not currently subject to corrective action requirements.	n/a	n/a	n/a	—	—	—	—	—	—	—	—	—	—	—	—
TA-72																
AOC 72-001	No samples currently proposed. Delay sampling until firing range is no longer active.	n/a	n/a	n/a	—	—	—	—	—	—	—	—	—	—	—	—

^a Depth is below ground surface unless otherwise noted.

^b X = Analysis proposed.

^c — = Analysis will not be performed.

^d If depth to tuff is less than proposed sampling depths, soil sample will be collected above soil/tuff interface and tuff sample will be collected 2–3 ft below soil/tuff interface.

^e If depth to tuff is greater than sampling interval, upper sample will be collected 0–1 ft below fill/tuff interface.

^f Lower sampling depth may be greater if field screening indicates presence of contamination at 14–15 ft.

^g SWMUs 53-006(b) and 53-006(c) are addressed together because of their proximate locations.

^h n/a = Not applicable.

ⁱ SWMUs 53-006(d) and 53-006(f) are addressed together because of their proximate locations.

**Table 4.1-1
Summary of Historical Samples Collected and Analyses Requested at Former TA-20**

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
SWMU 20-001(a)												
0220-95-0001	20-01000	10.0–11.0	Fill	297 ^a	295	297	296	297	— ^b	297	—	—
0220-95-0008	20-01007	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0009	20-01008	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0010	20-01009	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0011	20-01010	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0012	20-01011	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0013	20-01012	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0014	20-01013	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
SWMU 20-001(b)												
0220-95-0015	20-01014	8.0–9.0	Soil	360	358	360	359, 360	360	—	—	—	—
0220-95-0016	20-01015	8.0–9.0	Soil	360	358	360	359, 360	360	—	—	—	—
0220-95-0017	20-01016	9.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0018	20-01017	9.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0019	20-01018	6.0–7.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0023	20-01019	1.0–2.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0024	20-01020	10.0–11.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0025	20-01021	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0026	20-01022	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0027	20-01023	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0028	20-01024	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0029	20-01025	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0030	20-01026	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0031	20-01027	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0032	20-01028	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0033	20-01029	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0034	20-01030	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0035	20-01031	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0036	20-01032	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0037	20-01033	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0038	20-01034	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
SWMU 20-001(c)												
0220-95-0039	20-01035	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0040	20-01036	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0041	20-01037	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0042	20-01038	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0045	20-01039	0.0–0.5	Soil	360	358	360	359, 360	360	—	—	—	—
0220-95-0043	20-01039	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0047	20-01040	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0048	20-01041	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0049	20-01042	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0050	20-01043	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0051	20-01044	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0052	20-01045	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0053	20-01046	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0054	20-01047	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0055	20-01048	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0056	20-01049	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0057	20-01050	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0058	20-01051	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0059	20-01052	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0060	20-01053	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0061	20-01054	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0062	20-01055	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
SWMU 20-002(a)												
0220-95-0063	20-01056	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0064	20-01056	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0065	20-01057	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0066	20-01057	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0070	20-01058	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0071	20-01058	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0072	20-01059	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0073	20-01059	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0074	20-01060	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0075	20-01060	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0076	20-01061	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0077	20-01061	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0078	20-01062	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0079	20-01062	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0080	20-01063	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0081	20-01063	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0082	20-01064	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0083	20-01064	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0084	20-01065	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0085	20-01065	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0086	20-01066	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0087	20-01066	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
SWMU 20-002(b)												
0220-95-0088	20-01067	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0092	20-01067	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0093	20-01068	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0094	20-01068	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0095	20-01069	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0096	20-01069	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0097	20-01070	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0098	20-01070	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0099	20-01071	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0100	20-01071	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0101	20-01072	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0102	20-01072	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0103	20-01073	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0104	20-01073	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0105	20-01074	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0106	20-01074	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0107	20-01075	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0108	20-01075	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0109	20-01076	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0110	20-01076	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0114	20-01077	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0115	20-01077	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
SWMU 20-002(c)												
0220-95-0240	20-01144	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0241	20-01144	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0242	20-01144	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0243	20-01145	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0244	20-01145	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0245	20-01145	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0246	20-01146	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0247	20-01146	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0248	20-01146	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0249	20-01147	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0250	20-01147	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0251	20-01147	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0252	20-01148	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0253	20-01148	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0254	20-01148	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0255	20-01149	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0256	20-01149	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0260	20-01149	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0261	20-01150	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0262	20-01150	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0263	20-01150	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0264	20-01151	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0265	20-01151	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0266	20-01151	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
SWMU 20-002(d)												
0220-95-0143	20-01086	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0144	20-01086	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0145	20-01086	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0146	20-01087	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0147	20-01087	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0148	20-01087	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0149	20-01088	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0150	20-01088	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0151	20-01088	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0152	20-01089	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0153	20-01089	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0154	20-01089	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0158	20-01090	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0159	20-01090	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0160	20-01090	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0161	20-01091	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0162	20-01091	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0163	20-01091	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0164	20-01092	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0165	20-01092	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0166	20-01092	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0167	20-01093	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0168	20-01093	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0169	20-01093	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
AOC 20-003(b)												
0220-95-0170	20-01094	0.0–1.0	Soil	463	—	—	462	463	—	—	—	—
0220-95-0171	20-01094	5.0–5.5	Qbt 2	463	—	—	462	463	—	—	—	—
0220-95-0172	20-01095	2.0–3.0	Qbt 2	463	—	—	462	463	—	—	—	—
0220-95-0173	20-01096	0.0–1.0	Soil	463	—	—	462	463	—	—	—	—
0220-95-0174	20-01096	5.0–5.5	Soil	463	—	—	462	463	—	—	—	—
0220-95-0175	20-01097	2.0–3.0	Soil	463	—	—	462	463	—	—	—	—
0220-95-0176	20-01098	0.0–1.0	Soil	463	—	—	462	463	—	—	—	—
0220-95-0180	20-01098	5.0–5.5	Soil	463	—	—	462	463	—	—	—	—
0220-95-0181	20-01099	2.0–3.0	Soil	463	—	—	462	463	—	—	—	—
AOC 20-003(c)												
0220-95-0116	20-01078	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0117	20-01078	2.5–3.0	Soil	293	292	293	291	293	—	293	—	—
0220-95-0118	20-01078	4.5–5.0	Qbt 2	293	292	293	291	293	—	293	—	—
0220-95-0119	20-01079	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0120	20-01079	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0121	20-01079	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0122	20-01080	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0123	20-01080	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0124	20-01080	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0125	20-01081	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0126	20-01081	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0127	20-01081	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0128	20-01082	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0129	20-01082	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0130	20-01082	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0131	20-01083	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0132	20-01083	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0136	20-01083	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0137	20-01084	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0138	20-01084	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0139	20-01084	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0140	20-01085	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0141	20-01085	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0142	20-01085	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
AOC 20-004												
0220-95-0194	20-01106	0.0–0.5	Soil	—	—	—	362	—	361	—	361	—
0220-95-0195	20-01107	2.5–3.0	Soil	—	—	—	362	—	361	—	361	—
0220-95-0196	20-01108	2.5–3.0	Soil	—	—	—	362	—	361	—	361	—
0220-95-0197	20-01109	0.0–0.5	Soil	—	—	—	362	—	361	—	361	—
0220-95-0198	20-01110	1.0–1.33	Soil	—	—	—	362	—	361	—	361	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0199	20-01111	2.5–2.83	Soil	—	—	—	362	—	361	—	361	—
0220-95-0200	20-01112	0.0–0.5	Soil	—	—	—	362	—	361	—	361	—
0220-95-0201	20-01113	1.0–1.33	Soil	—	—	—	362	—	361	—	361	—
0220-95-0202	20-01114	2.5–3.0	Soil	—	—	—	362	—	361	—	361	—
SWMU 20-005												
0220-95-0228	20-01135	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0232	20-01136	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0233	20-01137	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0234	20-01138	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0235	20-01139	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0236	20-01140	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0237	20-01141	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0238	20-01142	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0239	20-01143	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430

^a Request number.

^b — = Analysis not requested.

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**Table 4.1-2
Inorganic Chemicals Detected above BVs at Former TA-20**

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV^a				0.83	1.83	0.4	6120	19.3	14.7	0.5	21500	22.3	0.1	1.52	1	0.73	1.82	48.8
Qbt 2, 3, 4 BV^a				0.5	1.21	1.63	2200	7.14	4.66	0.5	14500	11.2	0.1	0.3	1	1.1	2.4	63.5
SWMU 20-001(a)																		
0220-95-0001	20-01000	10.0–11.0	Fill	— ^b	—	—	—	—	—	NA ^c	—	—	0.11 (U)	—	1.6 (U)	1.3 (U)	3.88	—
0220-95-0008	20-01007	10.0–11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.2 (U)	3.77	—
0220-95-0009	20-01008	10.0–11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.2 (U)	3.9	—
0220-95-0010	20-01009	10.0–11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	4.31	—
0220-95-0011	20-01010	10.0–11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.3 (U)	3.81	—
0220-95-0012	20-01011	10.0–11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	3.75	—
0220-95-0013	20-01012	10.0–11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.3 (U)	3.33	—
0220-95-0014	20-01013	10.0–11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	3.44	—
SWMU 20-001(b)																		
0220-95-0015	20-01014	8.0–9.0	Soil	5.6 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	—	—	5.3	—
0220-95-0016	20-01015	8.0–9.0	Soil	5.6 (U)	—	0.74 (U)	—	—	17.5	NA	22400	—	—	—	—	—	5.3	—
0220-95-0017	20-01016	9.0–10.0	Fill	5.4 (U)	—	0.71 (U)	—	—	—	NA	—	—	—	—	—	—	5.5	—
0220-95-0018	20-01017	9.0–10.0	Fill	5.4 (U)	—	0.71 (U)	—	—	—	NA	—	—	—	—	—	—	5.6	—
0220-95-0019	20-01018	6.0–7.0	Fill	5.4 (U)	—	0.72 (U)	—	—	—	NA	—	—	—	—	—	—	5.3	—
0220-95-0023	20-01019	1.0–2.0	Fill	5.9 (U)	—	0.78 (U)	—	—	—	NA	—	—	—	—	—	—	5.5	—
0220-95-0024	20-01020	10.0–11.0	Fill	5.8 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	4.2	—	5.2	—
0220-95-0025	20-01021	10.0–11.0	Soil	5.7 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	—	—	2.8	—
0220-95-0026	20-01022	10.0–11.0	Soil	6.2 (U)	—	0.81 (U)	—	—	—	NA	—	—	—	—	—	—	5.5	—
0220-95-0027	20-01023	10.0–11.0	Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	—	NA	NA	NA	4.6	NA
0220-95-0028	20-01024	10.0–11.0	Soil	5.6 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	—	—	5	—
0220-95-0029	20-01025	10.0–11.0	Soil	5.6 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	—	—	5.3	—
0220-95-0030	20-01026	10.0–11.0	Soil	5.6 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	—	—	5.4	—
0220-95-0031	20-01027	10.0–11.0	Soil	6.1 (U)	—	0.8 (U)	—	—	—	NA	—	—	—	—	—	—	6	—
0220-95-0032	20-01028	10.0–11.0	Soil	6.3 (U)	—	0.83 (U)	—	—	—	NA	—	—	—	—	—	—	5.8	—
0220-95-0033	20-01029	10.0–11.0	Soil	6.4 (U)	—	84 (U)	—	—	—	NA	—	—	—	—	—	—	6.1	—
0220-95-0034	20-01030	10.0–11.0	Soil	6.2 (U)	—	1 (J)	—	—	—	NA	—	—	—	—	—	—	5.7	—
0220-95-0035	20-01031	10.0–11.0	Soil	6 (U)	—	0.79 (U)	—	—	—	NA	—	—	—	—	—	—	5.1	—
0220-95-0036	20-01032	10.0–11.0	Soil	6.1 (U)	—	0.8 (U)	—	—	—	NA	—	—	—	—	—	—	5.1	—
0220-95-0037	20-01033	10.0–11.0	Soil	6.1 (U)	—	1.9	—	—	—	NA	—	—	—	—	—	—	5	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV^a				0.83	1.83	0.4	6120	19.3	14.7	0.5	21500	22.3	0.1	1.52	1	0.73	1.82	48.8
Qbt 2, 3, 4 BV^a				0.5	1.21	1.63	2200	7.14	4.66	0.5	14500	11.2	0.1	0.3	1	1.1	2.4	63.5
0220-95-0038	20-01034	10.0–11.0	Soil	6.1 (U)	—	0.81 (U)	—	—	—	NA	—	—	—	—	—	—	5.4	—
SWMU 20-002(a)																		
0220-95-0063	20-01056	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	0.11 (U)	—	1.4 (U)	1.4 (U)	2.53	—
0220-95-0064	20-01056	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.4 (U)	1.4 (U)	1.88	—
0220-95-0065	20-01057	0.0–0.5	Soil	—	—	—	—	—	82.6	NA	—	—	0.11 (U)	—	1.4 (U)	1.4 (U)	3.34	—
0220-95-0066	20-01057	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	0.11 (U)	—	1.4 (U)	1.4 (U)	2.29	—
0220-95-0070	20-01058	0.0–0.5	Soil	—	—	—	—	—	16.4	NA	—	—	—	—	1.4 (U)	1.4 (U)	5.08	—
0220-95-0071	20-01058	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.6 (U)	—	—
0220-95-0072	20-01059	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.4 (U)	1.4 (U)	2.54	—
0220-95-0073	20-01059	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.3 (U)	—	—
0220-95-0074	20-01060	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.3 (U)	2.81	—
0220-95-0075	20-01060	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.3 (U)	—	—
0220-95-0076	20-01061	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.4 (U)	2.96	—
0220-95-0077	20-01061	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.3 (U)	—	—
0220-95-0078	20-01062	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	37.9	—	—	1.3 (U)	1.3 (U)	2.4	—
0220-95-0079	20-01062	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	0.11 (U)	—	1.6 (U)	1.6 (U)	2.18	—
0220-95-0080	20-01063	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.4 (U)	3.01	—
0220-95-0081	20-01063	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	0.11 (U)	—	1.3 (U)	1.4 (U)	—	—
0220-95-0082	20-01064	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.4 (U)	1.4 (U)	3.42	—
0220-95-0083	20-01064	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	0.11 (U)	—	1.4 (U)	1.4 (U)	2.93	—
0220-95-0084	20-01065	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.3 (U)	3.15	—
0220-95-0085	20-01065	2.5–3.0	Soil	—	—	—	—	—	17	NA	—	—	—	—	1.4 (U)	1.4 (U)	2.93	—
0220-95-0086	20-01066	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.4 (U)	1.4 (U)	2.81	—
0220-95-0087	20-01066	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.4 (U)	—	—
SWMU 20-002(b)																		
0220-95-0088	20-01067	0.0–0.5	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	0.14	—	1.7 (U)	1.4 (U)	4.49	—
0220-95-0092	20-01067	2.5–3.0	Soil	5.3 (U)	—	0.8 (U)	—	—	—	NA	—	—	—	—	1.8 (U)	1.5 (U)	3.93	—
0220-95-0093	20-01068	0.0–0.5	Soil	5.2 (U)	—	0.79 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.4 (U)	3.38	—
0220-95-0094	20-01068	2.5–3.0	Soil	5.5 (U)	—	0.83 (U)	—	—	—	NA	—	—	0.12 (U)	—	1.8 (U)	1.5 (U)	4.24	—
0220-95-0095	20-01069	0.0–0.5	Soil	5.9 (U)	—	0.89 (U)	—	—	—	NA	—	—	0.12 (U)	—	2 (U)	1.6 (U)	3.9	—
0220-95-0096	20-01069	2.5–3.0	Soil	5.6 (U)	—	0.84 (U)	—	—	—	NA	—	—	—	—	1.9 (U)	1.5 (U)	3.87	—
0220-95-0097	20-01070	0.0–0.5	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	3.69	—
0220-95-0098	20-01070	2.5–3.0	Soil	4.9 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	3.16	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV^a				0.83	1.83	0.4	6120	19.3	14.7	0.5	21500	22.3	0.1	1.52	1	0.73	1.82	48.8
Qbt 2, 3, 4 BV^a				0.5	1.21	1.63	2200	7.14	4.66	0.5	14500	11.2	0.1	0.3	1	1.1	2.4	63.5
0220-95-0099	20-01071	0.0-0.5	Soil	5.3 (U)	—	0.79 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.4 (U)	4.62	—
0220-95-0100	20-01071	2.5-3.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.96	—
0220-95-0101	20-01072	0.0-0.5	Soil	4.9 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	1.9	—
0220-95-0102	20-01072	2.5-3.0	Soil	4.8 (U)	—	0.72 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	—	—
0220-95-0103	20-01073	0.0-0.5	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	—	—
0220-95-0104	20-01073	2.5-3.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	1.97	—
0220-95-0105	20-01074	0.0-0.5	Soil	5.1 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.88	—
0220-95-0106	20-01074	2.5-3.0	Soil	5.6 (U)	—	0.85 (U)	—	—	—	NA	—	—	—	—	1.9 (U)	1.5 (U)	1.98	—
0220-95-0107	20-01075	0.0-0.5	Soil	5.6 (U)	—	0.83 (U)	—	—	—	NA	—	—	—	—	1.9 (U)	1.5 (U)	3.49	—
0220-95-0108	20-01075	2.5-3.0	Soil	5.3 (U)	—	0.79 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.5 (U)	1.99	—
0220-95-0109	20-01076	0.0-0.5	Soil	5.2 (UJ)	—	0.78 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.95	—
0220-95-0110	20-01076	2.5-3.0	Soil	5.4 (UJ)	—	0.81 (U)	—	—	—	NA	—	—	0.12 (U)	—	1.8 (U)	1.5 (U)	2.49	—
0220-95-0114	20-01077	0.0-0.5	Soil	4.9 (UJ)	—	0.74 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	1.87	—
0220-95-0115	20-01077	2.5-3.0	Soil	5.1 (UJ)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	—	—
SWMU 20-002(c)																		
0220-95-0240	20-01144	0.0-0.5	Soil	5.1 (U)	—	0.77 (U)	—	44.7	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	3.8	60
0220-95-0241	20-01144	2.5-3.0	Soil	7.1 (U)	—	1.1 (U)	—	37.8	—	NA	—	—	0.15 (U)	—	2.4 (U)	2.1 (J)	2.01	52.6
0220-95-0242	20-01144	4.5-5.0	Soil	4.9 (U)	—	0.73 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	—	—
0220-95-0243	20-01145	0.0-0.5	Soil	5.3 (U)	—	0.79 (U)	—	50	—	NA	—	23.1	0.12	—	1.8 (U)	1.4 (U)	4.38	63.5
0220-95-0244	20-01145	2.5-3.0	Soil	5.4 (U)	—	0.81 (U)	—	88.4	—	NA	—	—	0.17	—	1.8 (U)	1.5 (U)	3.87	63.9
0220-95-0245	20-01145	4.5-5.0	Soil	4.9 (U)	—	0.73 (U)	—	—	—	NA	—	—	0.31	—	1.6 (U)	1.3 (U)	2.86	—
0220-95-0246	20-01146	0.0-0.5	Soil	5.1 (U)	—	0.77 (U)	—	57.9	—	NA	—	—	0.13	—	1.9 (J)	1.4 (U)	4.11	69.3
0220-95-0247	20-01146	2.5-3.0	Soil	5.2 (U)	—	0.78 (U)	—	46.7	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	3.78	52.6
0220-95-0248	20-01146	4.5-5.0	Soil	4.8 (U)	—	0.72 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.5 (J)	2.24	—
0220-95-0249	20-01147	0.0-0.5	Soil	5.1 (U)	—	0.76 (U)	—	48	—	NA	—	—	0.12	—	1.7 (U)	1.4 (U)	3.93	60.2
0220-95-0250	20-01147	2.5-3.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	3	—
0220-95-0251	20-01147	4.5-5.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.76	—
0220-95-0252	20-01148	0.0-0.5	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.87	—
0220-95-0253	20-01148	2.5-3.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.28	—
0220-95-0254	20-01148	4.5-5.0	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	2.27	—
0220-95-0255	20-01149	0.0-0.5	Soil	4.9 (U)	—	0.74 (U)	—	29	—	NA	—	—	0.11	—	1.6 (U)	1.4 (U)	3.38	—
0220-95-0256	20-01149	2.5-3.0	Soil	4.8 (U)	—	0.73 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	—	—
0220-95-0260	20-01149	4.5-5.0	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	2.11	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV^a				0.83	1.83	0.4	6120	19.3	14.7	0.5	21500	22.3	0.1	1.52	1	0.73	1.82	48.8
Qbt 2, 3, 4 BV^a				0.5	1.21	1.63	2200	7.14	4.66	0.5	14500	11.2	0.1	0.3	1	1.1	2.4	63.5
0220-95-0261	20-01150	0.0-0.5	Soil	5.1 (U)	—	0.76 (U)	—	40.1	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	4.06	62
0220-95-0262	20-01150	2.5-3.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	1.93	—
0220-95-0263	20-01150	4.5-5.0	Soil	5.2 (U)	—	0.78 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.7 (J)	2.69	—
0220-95-0264	20-01151	0.0-0.5	Soil	5.4 (U)	—	0.81 (U)	—	29.9	—	NA	—	—	0.12 (U)	—	1.8 (U)	1.5 (U)	4.29	—
0220-95-0265	20-01151	2.5-3.0	Soil	5.4 (U)	—	0.8 (U)	—	115	—	NA	—	—	0.16	—	1.8 (U)	1.5 (U)	4.24	69.9
0220-95-0266	20-01151	4.5-5.0	Soil	5.1 (U)	—	0.76 (U)	—	32.9	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	3.16	—
SWMU 20-002(d)																		
0220-95-0143	20-01086	0.0-0.5	Soil	4.9 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.11	—
0220-95-0144	20-01086	2.5-3.0	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	—	—
0220-95-0145	20-01086	4.5-5.0	Soil	5.1 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.28	—
0220-95-0146	20-01087	0.0-0.5	Soil	5.2 (U)	—	0.78 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	1.94	—
0220-95-0147	20-01087	2.5-3.0	Soil	5.4 (U)	—	0.81 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.5 (U)	2.24	—
0220-95-0148	20-01087	4.5-5.0	Soil	5.3 (U)	—	0.79 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.5 (U)	2.14	50
0220-95-0149	20-01088	0.0-0.5	Soil	5.1 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.46	—
0220-95-0150	20-01088	2.5-3.0	Soil	5.2 (U)	—	0.79 (U)	—	—	—	NA	—	—	—	—	1.8 (U)	1.7 (J)	2.44	—
0220-95-0151	20-01088	4.5-5.0	Soil	5.3 (U)	—	0.79 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.5 (U)	2.33	—
0220-95-0152	20-01089	0.0-0.5	Soil	5.2 (U)	2.7	0.78 (U)	—	—	14.8	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	3.36	—
0220-95-0153	20-01089	2.5-3.0	Soil	5 (U)	—	0.74 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	—	—
0220-95-0154	20-01089	4.5-5.0	Soil	4.9 (U)	—	0.73 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	—	—
0220-95-0158	20-01090	0.0-0.5	Soil	5 (U)	4.2	0.75 (U)	—	—	18.5	NA	—	—	—	—	1.7 (U)	1.4 (U)	5.74	—
0220-95-0159	20-01090	2.5-3.0	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.56	—
0220-95-0160	20-01090	4.5-5.0	Soil	4.9 (U)	—	0.74 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.6 (U)	1.4 (U)	—	—
0220-95-0161	20-01091	0.0-0.5	Soil	5.1 (U)	—	0.77 (U)	—	—	36	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	62.3	—
0220-95-0162	20-01091	2.5-3.0	Soil	5.2 (U)	—	0.78 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	6.08	—
0220-95-0163	20-01091	4.5-5.0	Soil	5 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	3.62	—
0220-95-0164	20-01092	0.0-0.5	Soil	5 (U)	—	0.76 (U)	—	—	18.8	NA	—	—	—	—	1.7 (U)	1.4 (U)	69.4	—
0220-95-0165	20-01092	2.5-3.0	Soil	5 (U)	—	0.76 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	3.19	—
0220-95-0166	20-01092	4.5-5.0	Soil	5.1 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.04	—
AOC 20-003(b)																		
0220-95-0171	20-01094	5.0-5.5	Qbt 2	—	—	—	—	—	—	NA	—	—	—	0.38 (U)	—	—	NA	—
0220-95-0172	20-01095	2.0-3.0	Qbt 2	—	—	—	—	—	—	NA	—	—	—	0.37 (U)	—	—	NA	—
0220-95-0173	20-01096	0.0-1.0	Soil	—	—	—	—	—	—	NA	—	65.1	—	—	—	—	NA	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV^a				0.83	1.83	0.4	6120	19.3	14.7	0.5	21500	22.3	0.1	1.52	1	0.73	1.82	48.8
Qbt 2, 3, 4 BV^a				0.5	1.21	1.63	2200	7.14	4.66	0.5	14500	11.2	0.1	0.3	1	1.1	2.4	63.5
SWMU 20-005																		
0220-95-0228	20-01135	4.5-5.0	Soil	5.5 (U)	—	0.73 (U)	—	—	—	0.52 (U)	—	25.3	—	—	—	—	NA	—
0220-95-0232	20-01136	4.5-5.0	Soil	5.8 (U)	—	0.77 (U)	—	—	—	0.55 (U)	—	—	—	—	—	—	NA	—
0220-95-0233	20-01137	4.5-5.0	Soil	6 (U)	—	NA	—	—	—	0.57 (U)	—	—	—	—	—	—	NA	—
0220-95-0234	20-01138	4.5-5.0	Soil	6.1 (U)	—	0.81 (U)	—	—	—	0.58 (U)	—	—	—	—	—	—	NA	—
0220-95-0235	20-01139	4.5-5.0	Soil	6.3 (U)	—	0.83 (U)	—	—	—	0.59 (U)	—	—	—	—	—	—	NA	—
0220-95-0236	20-01140	4.5-5.0	Soil	6 (U)	—	0.79 (U)	—	—	—	0.57 (U)	—	—	—	—	—	—	NA	—
0220-95-0237	20-01141	4.5-5.0	Soil	5.7 (U)	—	0.76 (U)	—	—	—	0.54 (U)	—	—	—	—	—	—	NA	—
0220-95-0238	20-01142	4.5-5.0	Soil	5.5 (U)	—	0.73 (U)	—	—	—	0.52 (U)	—	—	—	—	—	—	NA	—
0220-95-0239	20-01143	4.5-5.0	Soil	5.7 (U)	—	0.75 (U)	—	—	—	0.53 (U)	—	—	—	—	—	—	NA	—

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

^a BVs from LANL 1998, 059730.

^b — = Result was not detected or was below the BV.

^c NA = Not analyzed.

**Table 4.1-3
Organic Chemicals Detected at Former TA-20**

Sample ID	Location ID	Depth (ft bgs)	Media	Benzoic Acid	Butylbenzylphthalate	Tetryl
SWMU 20-001(a)						
0220-95-0009	20-01008	10.0–11.0	Fill	NA*	NA	0.65

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.
*NA = Sample not analyzed for this chemical.

**Table 4.1-4
Radionuclides Detected or Detected above BVs/FVs at Former TA-20**

Sample ID	Location ID	Depth (ft bgs)	Media	Cesium-137	Europium-152	Ruthenium-106	Sodium-22	Strontium-90	Uranium-234	Uranium-235	Uranium-238
Soil BV/FV^a				1.65	na ^b	na	na	1.31	2.59	0.20	2.29
Qbt 2, 3, 4 BV/FV^a				na	na	na	na	na	1.98	0.09	1.93
SWMU 20-001(a)											
0220-95-0009	20-01008	10.0–11.0	Fill	— ^c	0.143	—	—	—	—	—	—
0220-95-0011	20-01010	10.0–11.0	Fill	—	0.161	—	—	—	—	—	—
0220-95-0012	20-01011	10.0–11.0	Fill	—	0.195	—	—	—	—	—	—
0220-95-0013	20-01012	10.0–11.0	Fill	0.033	—	—	—	—	—	—	—
0220-95-0014	20-01013	10.0–11.0	Fill	—	0.194	—	—	1.52	—	—	—
SWMU 20-001(b)											
0220-95-0023	20-01019	1.0–2.0	Fill	0.26	NA ^d	—	—	—	—	—	—
0220-95-0026	20-01022	10.0–11.0	Soil	—	NA	—	0.19	—	—	—	—
0220-95-0033	20-01029	10.0–11.0	Soil	—	NA	—	—	—	—	—	2.33
SWMU 20-002(b)											
0220-95-0093	20-01068	0.0–0.50	Soil	—	0.253	—	—	—	—	—	—
0220-95-0097	20-01070	0.0–0.50	Soil	—	0.31	—	—	—	—	—	—
0220-95-0106	20-01074	2.50–3.0	Soil	—	0.196	—	—	—	—	—	—
0220-95-0108	20-01075	2.50–3.0	Soil	—	—	0.078	—	—	—	—	—
0220-95-0114	20-01077	0.0–0.50	Soil	—	0.234	—	—	—	—	—	—
SWMU 20-002(c)											
0220-95-0244	20-01145	2.50–3.0	Soil	0.219	—	—	—	—	—	—	—
0220-95-0248	20-01146	4.50–5.0	Soil	—	—	—	—	0.58	—	—	—
0220-95-0250	20-01147	2.50–3.0	Soil	0.187	—	—	—	—	—	—	—
0220-95-0256	20-01149	2.50–3.0	Soil	—	—	—	—	0.6	—	—	—

Table 4.1-4 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Cesium-137	Europium-152	Ruthenium-106	Sodium-22	Strontium-90	Uranium-234	Uranium-235	Uranium-238
Soil BV/FV^a				1.65	na^b	na	na	1.31	2.59	0.20	2.29
Qbt 2, 3, 4 BV/FV^a				na	na	na	na	na	1.98	0.09	1.93
0220-95-0260	20-01149	4.50–5.0	Soil	—	—	—	—	0.54	—	—	—
0220-95-0265	20-01151	2.50–3.0	Soil	—	—	—	—	0.58	—	—	—
SWMU 20-002(d)											
0220-95-0144	20-01086	2.50–3.0	Soil	0.131	NA	NA	NA	1.18	—	—	—
0220-95-0147	20-01087	2.50–3.0	Soil	NA	NA	NA	NA	9.58	—	—	—
0220-95-0151	20-01088	4.50–5.0	Soil	NA	NA	NA	NA	—	—	0.227	—
0220-95-0153	20-01089	2.50–3.0	Soil	NA	NA	NA	NA	5.97	—	0.216	—
0220-95-0158	20-01090	0.0–0.50	Soil	—	NA	NA	NA	7.94	2.61	0.336	2.51
0220-95-0159	20-01090	2.50–3.0	Soil	NA	NA	NA	NA	—	4.06	0.327	3.73
0220-95-0161	20-01091	0.0–0.50	Soil	—	NA	NA	NA	7.96	33.3	2.02	—
0220-95-0162	20-01091	2.50–3.0	Soil	NA	NA	NA	NA	—	2.92	—	3.14
0220-95-0164	20-01092	0.0–0.50	Soil	—	NA	NA	NA	—	35	1.78	—
0220-95-0165	20-01092	2.50–3.0	Soil	NA	NA	NA	NA	—	—	0.271	—
AOC 20-003(b)											
0220-95-0172	20-01095	2.0–3.0	Qbt 2	—	NA	—	—	—	NA	0.55	NA
0220-95-0180	20-01098	5.0–5.50	Soil	—	NA	—	—	—	NA	0.39	NA
0220-95-0181	20-01099	2.0–3.0	Soil	—	NA	—	—	—	NA	0.46	NA

Note: Units are pCi/g.

^a BVs/FVs from LANL 1998, 059730.

^b na = Not available.

^c — = Result was not detected or was below the BV/FV.

^d NA = Sample was not analyzed for this radionuclide.

**Table 4.2-1
Summary of Historical Samples Collected and Analyses Requested at TA-53**

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Gross Alpha/Beta Radioactivity	Tritium	Isotopic Plutonium	Isotopic Uranium	Metals	PCBs	Pesticides/PCBs	Strontium-90	SVOCs	TPH	TPH-DRO	Uranium	VOCs	Cyanide
SWMU 53-001(a)																		
0253-95-0001	53-01051	0.0-0.5	Soil	— ^a	—	—	—	—	185 ^b	—	184	—	—	184	—	—	184	—
0253-95-0375	53-01051	0.0-0.5	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0002	53-01052	0.0-0.5	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0376	53-01052	0.0-0.5	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0003	53-01053	0.0-0.5	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0377	53-01053	0.0-0.5	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0004	53-01054	0.0-0.5	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0378	53-01054	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-97-0040	53-01054	0.0-0.5	Soil	—	—	—	—	—	—	—	3367R	—	—	—	—	—	—	—
0253-97-0041	53-01054	0.5-1.0	Soil	—	—	—	—	—	—	—	3367R	—	—	—	—	—	—	—
0253-97-0042	53-01054	1.0-1.5	Soil	—	—	—	—	—	—	—	3367R	—	—	—	—	—	—	—
0253-97-0070	53-01517	1.0-1.5	Qbt 3	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0071	53-01518	0.0-0.5	Soil	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0072	53-01519	0.0-0.5	Soil	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0074	53-01520	0.0-0.5	Soil	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0075	53-01521	0.0-0.5	Soil	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0076	53-01522	0.0-0.5	Soil	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0077	53-01523	0.67-1.17	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0078	53-01524	0.67-1.17	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0079	53-01525	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0080	53-01526	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0111	53-01526	2.5-3.0	Qbt 3	—	—	—	—	—	—	3730R	—	—	—	—	—	—	—	—
0253-97-0081	53-01527	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0082	53-01528	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0083	53-01529	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0084	53-01530	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0086	53-01531	0.0-0.5	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0087	53-01531	2.5-3.0	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0088	53-01531	5.5-6.0	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0089	53-01532	0.0-0.5	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0090	53-01532	2.5-3.0	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0091	53-01532	5.5-6.0	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—

Table 4.2-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Gross Alpha/Beta Radioactivity	Tritium	Isotopic Plutonium	Isotopic Uranium	Metals	PCBs	Pesticides/PCBs	Strontium-90	SVOCs	TPH	TPH-DRO	Uranium	VOCs	Cyanide
0253-97-0092	53-01533	0.5–0.83	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0093	53-01533	0.83–1.25	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0105	53-01534	0.0–0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0106	53-01535	0.0–0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0107	53-01536	0.0–0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0108	53-01537	0.0–0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0112	53-01541	0.0–0.5	Soil	—	—	—	—	—	—	3730R	—	—	—	—	—	—	—	—
SWMU 53-001(b)																		
0253-95-0390	53-01055	0.0–0.33	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0391	53-01055	0.0–0.66	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0005	53-01055	0.0–1.0	Soil	—	—	—	—	—	211	210	—	—	—	210	—	—	210	—
0253-95-0007	53-01055	1.0–1.5	Soil	—	—	—	—	—	211	210	—	—	—	210	—	—	210	—
0253-95-0392	53-01056	0.0–0.33	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0008	53-01056	0.0–0.67	Soil	—	—	—	—	—	211	210	—	—	—	210	—	—	210	—
0253-95-0393	53-01056	0.33–0.66	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
SWMUs 53-006(b,c)																		
RE53-99-0003	53-01561	15.0–15.5	Soil	5529R	—	5529R	5529R	5529R	5528R	—	—	5529R	5527R	—	—	—	5527R	5528R
RE53-99-0006	53-01561	17.0–18.0	Qbt 2	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
RE53-99-0007	53-01562	5.0–6.0	Fill	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
RE53-99-0008	53-01562	6.0–7.0	Fill	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
RE53-99-0004	53-01563	7.64–8.64	Fill	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
RE53-99-0005	53-01563	8.64–9.64	Fill	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
SWMUs 53-006(d,e)																		
RE53-99-0001	53-01559	7.5–8.5	Soil	5409R	—	5409R	5409R	5409R	5408R	—	—	5409R	5407R	—	—	—	5407R	5408R
RE53-99-0010	53-01559	9.5–10.5	Qbt 2	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
RE53-99-0002	53-01560	3.5–4.5	Soil	5409R	—	5409R	5409R	5409R	5408R	—	—	5409R	5407R	—	—	—	5407R	5408R
RE53-99-0009	53-01560	5.5–6.5	Qbt 2	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
AOC 53-008																		
0253-95-0028	53-01069	0.0–0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0029	53-01070	0.0–0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0030	53-01071	0.0–0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0031	53-01072	0.0–0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0032	53-01073	0.0–0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0033	53-01074	0.0–0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—

Table 4.2-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Gross Alpha/Beta Radioactivity	Tritium	Isotopic Plutonium	Isotopic Uranium	Metals	PCBs	Pesticides/PCBs	Strontium-90	SVOCs	TPH	TPH-DRO	Uranium	VOCs	Cyanide
0253-95-0034	53-01075	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0035	53-01076	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0036	53-01077	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0037	53-01078	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0038	53-01079	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
RE53-98-0001	53-01556	0.0-0.17	Soil	5011R	5011R	—	—	—	5010R	—	—	—	—	—	—	—	—	—
RE53-98-0002	53-01557	0.0-0.17	Soil	5011R	5011R	—	—	—	5010R	—	—	—	—	—	—	—	—	—
RE53-98-0003	53-01558	0.0-0.17	Soil	5011R	5011R	—	—	—	5010R	—	—	—	—	—	—	—	—	—
AOC 53-009																		
RE53-06-73677	53-27007	2.0-2.5	Fill	—	—	—	—	—	—	—	—	—	6242S	—	6242S	—	6242S	—
RE53-06-73678	53-27008	1.5-2.0	Fill	—	—	—	—	—	—	—	—	—	6242S	—	6242S	—	6242S	—
AOC 53-010																		
0253-95-0039	53-01080	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
0253-95-0043	53-01081	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
0253-95-0044	53-01082	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
0253-95-0045	53-01083	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
0253-95-0046	53-01084	0.0-0.17	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
0253-95-0047	53-01085	0.0-0.17	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
VCXX-95-0069	53-01251	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
VCXX-95-0070	53-01252	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
VCXX-95-0071	53-01253	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
VCXX-95-0072	53-01254	0.0-0.08	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
VCXX-95-0073	53-01255	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
VCXX-95-0074	53-01256	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
SWMU 53-012(e)																		
0253-95-0048	53-01086	0.0-0.33	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0387	53-01086	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0388	53-01087	0.0-0.66	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0051	53-01087	0.0-0.67	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0054	53-01088	0.0-0.33	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0389	53-01088	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
AOC 53-014																		
0253-97-0100	53-01506	0.0-0.5	Sed	—	—	—	—	—	2969	—	—	—	—	—	—	—	—	—
0253-97-0101	53-01507	0.0-0.5	Sed	—	—	—	—	—	2969	—	—	—	—	—	—	—	—	—

Table 4.2-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Gross Alpha/Beta Radioactivity	Tritium	Isotopic Plutonium	Isotopic Uranium	Metals	PCBs	Pesticides/PCBs	Strontium-90	SVOCs	TPH	TPH-DRO	Uranium	VOCs	Cyanide
0253-97-0102	53-01508	0.0-0.5	Sed	—	—	—	—	—	2969	—	—	—	—	—	—	—	—	—
0253-97-0103	53-01509	0.0-0.5	Sed	—	—	—	—	—	2969	—	—	—	—	—	—	—	—	—
0253-97-0104	53-01510	0.0-0.5	Sed	—	—	—	—	—	2969	—	—	—	—	—	—	—	—	—

Note: Shading indicates samples were excavated during VCA.

^a — = Analysis not requested.

^b Request number.

**Table 4.2-2
Inorganic Chemicals Detected above BVs at TA-53**

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Soil BV^a				0.83	0.4	6120	19.3	14.7	0.5	22.3	0.1	15.4	1.52	1	0.73	48.8
Sediment BV^a				0.83	0.4	4420	10.5	11.2	0.82	19.7	0.1	9.38	0.3	1	0.73	60.2
Qbt 2, 3, 4 BV^a				0.5	1.63	2200	7.14	4.66	0.5	11.2	0.1	6.58	0.3	1	1.1	63.5
SWMU 53-001(a)																
0253-95-0001	53-01051	0.0–0.5	Soil	— ^b	—	—	—	—	NA ^c	—	0.12 (U)	—	—	1.5 (U)	1.5 (U)	—
0253-95-0002	53-01052	0.0–0.5	Soil	—	—	—	—	—	NA	—	0.16	—	—	1.5 (U)	1.5 (U)	—
0253-95-0003	53-01053	0.0–0.5	Soil	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.5 (U)	—
0253-95-0004	53-01054	0.0–0.5	Soil	—	—	—	—	16.6	NA	22.5	0.16	—	—	1.5 (U)	1.6 (U)	—
SWMU 53-001(b)																
0253-95-0005	53-01055	0.0–1.0	Soil	6 (U)	1.2 (J)	—	—	37.2	NA	50.3	0.23 (U)	—	—	—	—	105
0253-95-0007	53-01055	1.0–1.5	Soil	5.8 (U)	0.7 (U)	—	—	—	NA	—	0.23 (U)	—	—	—	—	—
0253-95-0008	53-01056	0.0–0.67	Soil	6.1 (U)	0.78 (J)	—	—	—	NA	—	0.25 (U)	—	—	—	—	49.8
SWMUs 53-006(b,c)																
RE53-99-0003	53-01561	15.0–15.5	Soil	—	—	—	—	—	0.52 (U)	—	—	—	—	—	—	—
RE53-99-0006	53-01561	17.0–18.0	Qbt 2	0.54 (UJ)	—	—	—	—	0.54 (U)	—	—	—	0.43 (UJ)	—	—	—
RE53-99-0007	53-01562	5.0–6.0	Fill	—	—	—	—	—	0.53 (U)	—	—	—	—	—	—	—
RE53-99-0008	53-01562	6.0–7.0	Fill	—	—	—	—	—	0.53 (U)	—	—	—	—	—	—	—
RE53-99-0004	53-01563	7.6–8.6	Fill	—	—	—	—	—	0.52 (U)	—	—	—	—	—	—	—
RE53-99-0005	53-01563	8.6–9.6	Fill	—	—	—	—	—	0.52 (U)	—	—	—	—	—	—	—
SWMUs 53-006(d,e)																
RE53-99-0001	53-01559	7.5–8.5	Soil	—	—	—	—	—	0.52 (U)	—	—	—	—	—	—	—
RE53-99-0010	53-01559	9.5–10.5	Qbt 2	—	—	—	—	—	0.6 (U)	—	0.12 (U)	—	0.48 (UJ)	—	—	—
RE53-99-0002	53-01560	3.5–4.5	Soil	0.85 (UJ)	—	—	—	—	0.53 (U)	—	0.11 (U)	—	—	—	—	—
RE53-99-0009	53-01560	5.5–6.5	Qbt 2	0.58 (UJ)	—	—	—	—	0.58 (U)	—	0.12 (U)	—	0.47 (UJ)	—	—	—
AOC 53-008																
0253-95-0028	53-01069	0.0–0.5	Soil	5 (U)	0.61 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—
0253-95-0029	53-01070	0.0–0.5	Soil	5.3 (U)	0.64 (J)	—	—	—	NA	—	0.17 (U)	—	—	—	—	—
0253-95-0030	53-01071	0.0–0.5	Soil	5.3 (U)	0.64 (U)	—	—	—	NA	—	0.22 (U)	—	—	—	—	—
0253-95-0031	53-01072	0.0–0.5	Soil	5.3 (U)	0.64 (U)	—	—	—	NA	—	0.22 (U)	—	—	—	—	—
0253-95-0032	53-01073	0.0–0.5	Soil	5.1 (U)	0.62 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—
0253-95-0033	53-01074	0.0–0.5	Soil	5 (U)	0.6 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—
0253-95-0034	53-01075	0.0–0.5	Soil	5.1 (U)	0.61 (U)	—	—	—	NA	—	0.2 (U)	—	—	—	—	—
0253-95-0035	53-01076	0.0–0.5	Soil	5 (U)	0.6 (U)	—	—	—	NA	—	0.19 (U)	—	—	—	—	—
0253-95-0036	53-01077	0.0–0.5	Soil	5.1 (U)	0.61 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—

Table 4.2-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Soil BV^a				0.83	0.4	6120	19.3	14.7	0.5	22.3	0.1	15.4	1.52	1	0.73	48.8
Sediment BV^a				0.83	0.4	4420	10.5	11.2	0.82	19.7	0.1	9.38	0.3	1	0.73	60.2
Qbt 2, 3, 4 BV^a				0.5	1.63	2200	7.14	4.66	0.5	11.2	0.1	6.58	0.3	1	1.1	63.5
0253-95-0037	53-01078	0.0–0.5	Soil	5.4 (U)	0.65 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—
0253-95-0038	53-01079	0.0–0.5	Soil	5.3 (U)	0.63 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—
RE53-98-0002	53-01557	0.0–0.17	Soil	1.1 (J-)	—	—	—	—	NA	76.9	—	—	—	—	—	—
RE53-98-0003	53-01558	0.0–0.17	Soil	0.94 (J-)	—	—	—	—	NA	—	—	—	—	—	—	—
SWMU 53-012(e)																
0253-95-0048	53-01086	0.0–0.33	Soil	2.3 (J)	1.2 (J)	—	23.5	267	NA	38.6	0.27	27	—	2.3 (J)	1.7 (U)	218
0253-95-0051	53-01087	0.0–0.67	Soil	1.7 (J)	0.43 (J)	—	—	46.2	NA	—	0.11 (U)	—	—	1.5 (U)	1.5 (U)	87.4
0253-95-0054	53-01088	0.0–0.33	Soil	1.6 (J)	1.2 (J)	—	—	46.2	NA	29.7	0.11 (U)	—	—	1.5 (U)	1.5 (U)	159
AOC 53-014																
0253-97-0100	53-01506	0.0–0.5	Sed	NA	NA	NA	NA	NA	NA	20	NA	NA	NA	NA	NA	NA
0253-97-0101	53-01507	0.0–0.5	Sed	NA	NA	NA	NA	NA	NA	20	NA	NA	NA	NA	NA	NA

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A. Shading indicates samples were excavated during VCA.

^a BVs from LANL 1998, 059730.

^b — = Result was not detected or was below the BV.

^c NA = Not analyzed.

**Table 4.2-3
Organic Chemicals Detected at TA-53**

Sample ID	Location ID	Depth (ft)	Media	Aroclor-1248	Aroclor-1254	Aroclor-1260	Benzene	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Chlordane[alpha-]	Chlordane[gamma-]	Dieldrin	Di-n-butylphthalate	Endosulfan II	Endrin Aldehyde	TPH-DRO	TPH Unknown Range	Total Recoverable Petroleum Hydrocarbons
SWMU 53-001(a)																		
0253-95-0001	53-01051	0.0–0.5	Soil	— ^a	—	—	—	NA ^b	—	—	—	—	NA	—	—	NA	458	NA
0253-95-0002	53-01052	0.0–0.5	Soil	—	—	—	—	NA	—	—	—	—	NA	—	—	NA	249	NA
0253-95-0003	53-01053	0.0–0.5	Soil	—	—	0.0778	—	NA	—	—	—	—	NA	—	—	NA	180	NA
0253-95-0004	53-01054	0.0–0.5	Soil	—	—	3.25	—	NA	—	0.00284	—	0.0141	NA	0.104	0.0722	NA	0.222	NA
0253-97-0040	53-01054	0.0–0.5	Soil	—	—	3.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0041	53-01054	0.5–1.0	Soil	—	—	3.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0042	53-01054	1.0–1.5	Soil	—	—	0.44	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0071	53-01518	0.0–0.5	Soil	—	—	0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0072	53-01519	0.0–0.5	Soil	—	—	0.42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0076	53-01522	0.0–0.5	Soil	—	—	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0077	53-01523	0.67–1.17	Soil	—	—	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0080	53-01526	0.0–0.5	Soil	—	—	2.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0111	53-01526	2.5–3.0	Qbt 3	—	—	0.094	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0086	53-01531	0.0–0.5	Qbt 3	—	—	0.065 (J-)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0092	53-01533	0.5–0.83	Soil	—	—	0.018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0112	53-01541	0.0–0.5	Soil	—	—	0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SWMU 53-001(b)																		
0253-95-0005	53-01055	0.0–1.0	Soil	—	—	—	—	NA	—	NA	NA	NA	NA	NA	NA	NA	75.2	NA
0253-95-0007	53-01055	1.0–1.5	Soil	—	—	—	—	NA	—	NA	NA	NA	NA	NA	NA	NA	NA	15.7
0253-95-0008	53-01056	0.0–0.67	Soil	—	—	—	—	NA	—	NA	NA	NA	NA	NA	NA	NA	NA	18.1
SWMUs 53-006(b,c)																		
RE53-99-0006	53-01561	17.0–18.0	Qbt 2	NA	NA	NA	0.00051 (J)	0.043 (J)	—	NA	NA	NA	—	NA	NA	NA	NA	NA
RE53-99-0007	53-01562	5.0–6.0	Fill	NA	NA	NA	0.00078 (J)	0.059 (J)	—	NA	NA	NA	—	NA	NA	NA	NA	NA
RE53-99-0008	53-01562	6.0–7.0	Fill	NA	NA	NA	—	0.085 (J)	—	NA	NA	NA	—	NA	NA	NA	NA	NA
RE53-99-0004	53-01563	7.6–8.6	Fill	NA	NA	NA	—	0.097 (J)	—	NA	NA	NA	—	NA	NA	NA	NA	NA
RE53-99-0005	53-01563	8.6–9.6	Fill	NA	NA	NA	0.00051 (J)	—	—	NA	NA	NA	—	NA	NA	NA	NA	NA
SWMUs 53-006(d,e)																		
RE53-99-0010	53-01559	9.5–10.5	Qbt 2	NA	NA	NA	—	0.12 (J)	0.002 (J)	NA	NA	NA	0.052 (J)	NA	NA	NA	NA	NA
RE53-99-0009	53-01560	5.5–6.5	Qbt 2	NA	NA	NA	—	0.06 (J)	0.068	NA	NA	NA	—	NA	NA	NA	NA	NA

Table 4.2-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aroclor-1248	Aroclor-1254	Aroclor-1260	Benzene	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Chlordane[alpha-]	Chlordane[gamma-]	Dieldrin	Di-n-butylphthalate	Endosulfan II	Endrin Aldehyde	TPH-DRO	TPH Unknown Range	Total Recoverable Petroleum Hydrocarbons
AOC 53-009																		
RE53-06-73678	53-27008	1.5–2.0	Fill	NA	NA	NA	—	NA	—	NA	NA	NA	NA	NA	NA	4.35	NA	NA
AOC 53-010																		
0253-95-0039	53-01080	0.0–0.33	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	10.3 (J)
0253-95-0043	53-01081	0.0–0.33	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	13.2
0253-95-0044	53-01082	0.0–0.33	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	7.93 (J)
0253-95-0045	53-01083	0.0–0.33	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	3440
0253-95-0046	53-01084	0.0–0.17	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	3520
0253-95-0047	53-01085	0.0–0.17	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	5100
SWMU 53-012(e)																		
0253-95-0048	53-01086	0.0–0.33	Soil	0.76	0.351	—	—	NA	—	0.00804	0.00376	0.0156	NA	0.00499	—	NA	NA	2000
0253-95-0051	53-01087	0.0–0.67	Soil	0.0596	—	0.332	—	NA	—	—	—	—	NA	0.00993	0.00584	NA	NA	2090
0253-95-0054	53-01088	0.0–0.33	Soil	0.0474	—	0.335	—	NA	—	—	—	—	NA	0.00979	0.00599	NA	NA	1150

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A. Shading indicates samples were excavated during VCA.

^a — = Result was not detected.

^b NA = Not analyzed.

**Table 4.2-4
Radionuclides Detected or Detected above BVs/FVs at TA-53**

Sample ID	Location ID	Depth (ft)	Media	Cesium-134	Cobalt-60	Europium-152	Gross Alpha	Gross Beta	Gross Gamma	Strontium-90	Tritium
Soil BV/FV^a				na ^b	na	na	na	na	na	1.31	na
Qbt 2, 3, 4 BV/FV^a				na	na	na	na	na	na	na	na
SWMUs 53-006(b,c)											
RE53-99-0006	53-01561	17.0–18.0	Qbt 2	— ^c	—	—	NA ^d	NA	NA	0.75	—
RE53-99-0008	53-01562	6.0–7.0	Fill	—	—	—	NA	NA	NA	1.45	—
RE53-99-0004	53-01563	7.6–8.6	Fill	—	—	1.23	NA	NA	NA	—	—
RE53-99-0005	53-01563	8.6–9.6	Fill	—	—	—	NA	NA	NA	—	7.08
SWMUs 53-006(d,e)											
RE53-99-0010	53-01559	9.5–10.5	Qbt 2	—	—	—	NA	NA	NA	1.18	—
RE53-99-0009	53-01560	5.5–6.5	Qbt 2	—	—	—	NA	NA	NA	1.23	—
AOC 53-008											
0253-95-0029	53-01070	0.0–0.5	Soil	6.22	2.69	NA	NA	NA	NA	NA	NA
0253-95-0033	53-01074	0.0–0.5	Soil	—	0.124	NA	NA	NA	NA	NA	NA

Note: Units are pCi/g.

^a BVs/FVs from LANL 1998, 059730.

^b na = Not available.

^c — = Result was not detected or was below the BV/FV.

^d NA = Sample was not analyzed for this radionuclide.

**Table 4.3-1
Summary of Historical Samples
Collected and Analyses Requested at TA-72**

Sample ID	Location ID	Depth (ft)	Media	Metals
0272-95-0001	72-01000	0.0–1.0	Sed	265*
0272-95-0002	72-01001	0.0–1.0	Sed	265
0272-95-0003	72-01002	0.0–1.0	Sed	265
0272-95-0004	72-01003	0.0–1.0	Sed	265
0272-95-0005	72-01004	0.0–1.0	Sed	265
0272-95-0009	72-01005	0.0–1.0	Sed	265
0272-95-0010	72-01006	0.0–1.0	Sed	265

*Request number.

**Table 4.3-2
Inorganic Chemicals Detected above BVs at TA-72**

Sample ID	Location ID	Depth (ft)	Media	Mercury	Selenium	Silver	Thallium
Sediment BV^a				0.1	0.3	1	0.73
0272-95-0001	72-01000	0.0–1.0	Sed	— ^b	0.97 (U)	1.3 (U)	1.3 (U)
0272-95-0002	72-01001	0.0–1.0	Sed	—	0.99 (U)	1.3 (U)	1.3 (U)
0272-95-0003	72-01002	0.0–1.0	Sed	—	0.98 (U)	1.3 (U)	1.3 (U)
0272-95-0004	72-01003	0.0–1.0	Sed	—	1.0 (J)	1.3 (U)	1.3 (U)
0272-95-0005	72-01004	0.0–1.0	Sed	—	0.99 (U)	1.3 (U)	1.4 (U)
0272-95-0009	72-01005	0.0–1.0	Sed	0.11 (U)	1.0 (U)	1.3 (U)	1.4 (U)
0272-95-0010	72-01006	0.0–1.0	Sed	—	0.98 (U)	1.3 (U)	1.3 (U)

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

^a BVs from LANL 1998, 059730.

^b — = Result was not detected or was below the BV.

**Table 5.0-1
Summary of Investigation Methods**

Method	Summary
Locating Utilities	Excavation/Soil Disturbance Permits will be obtained from the Industrial Hygiene and Safety–Operational Support Division. Underground utilities will be located and the excavation permits secured before the readiness and planning review and any field activities at the Lower Sandia Canyon Aggregate Area are undertaken.
Spade-and-Scoop Collection of Soil Samples	This method will be used to collect surface (i.e., 0–6 in.) soil or fill samples. A hole will be dug to the desired depth, as prescribed in the work plan, and a discrete grab sample collected. The sample will be homogenized in a decontaminated stainless-steel bowl before it is transferred to the appropriate sample containers.
Hand Auger Collection of Soil Samples	This method will typically be used for sampling soil or sediment at depths of less than 10–15 ft but may in some cases be used for collecting samples of weathered or nonwelded tuff. The method involves hand-turning a stainless-steel bucket auger (typically 3–4 in. inside diameter), creating a vertical hole which can be advanced to the desired sample depth. When the desired depth is reached, the auger is decontaminated before advancing the hole through the sample depth. The sample material is transferred from the auger bucket to a stainless-steel sampling bowl before filling the various required sample containers.
Split-Spoon Core-Barrel Sampling	The split-spoon core barrel is a cylindrical barrel split lengthwise so that the two halves can be separated to expose the core sample. The stainless-steel core barrel (3-in.-inner-diameter and 5 ft long) is pushed directly into the subsurface media with a hollow-stem auger drilling rig. A continuous length of core is extracted with the core barrel. Once it is extracted, the section of core will be screened for radioactivity and organic vapors, photographed, and described in a lithologic log. If it is located within a targeted sample interval, a portion of the core will be collected for fixed laboratory analysis.
Field Logging, Handling, and Documentation of Borehole Materials	Upon reaching the surface, core barrels will be immediately opened for field screening, logging, and sampling. Logging of borehole materials includes run number, core recovery in feet, depth interval (in 5-ft increments), field-screening results, lithological and structural description, and a photograph. Once the core material is logged, selected samples will be taken from discrete intervals of the core. All borehole material not sampled will be managed as IDW.
Geophysical Surveys	Geophysical surveys will be performed at selected sites to identify anomalies that would indicate the location of former waste disposal sites. Geophysical methods employed will include terrain conductivity (EM-31 or equivalent), high-sensitivity metal detection (EM-61 or equivalent), and GPR. The area to be surveyed will be gridded as specified in the work plan and data will be digitally recorded. Geodetic coordinates will be recorded at 1-s intervals using an integrated GPS.
Passive Soil Gas Surveys	If necessary, a passive soil-gas survey will be performed using EMFLUX passive soil gas samplers. Samplers will be installed on a regular grid with a spacing of 25 ft. Samplers will be installed in shallow (e.g., 4 in.) holes and the holes will be sealed per the manufacturer's instructions. After 3 d, the samplers will be retrieved and submitted to a laboratory for analysis by thermal desorption gas chromatography/mass spectrometry using EPA SW-846 Method 8260B.
Headspace Vapor Screening	All soil and tuff samples will be field screened for VOCs by placing a portion of the sample in a glass jar. The jar will be sealed with foil and gently shaken and allowed to equilibrate for approximately 5 min. The sample will then be screened by inserting a PID probe equipped with an 11.7-eV lamp into the container. The results will be recorded in units of ppm.

Table 5.0-1 (continued)

Method	Summary
XRF Screening	Soil samples will be screened in the field using XRF to delineate areas of inorganic chemical contamination. The XRF used will have a detection limit equal to approximately 10 to 20% of the soil screening level. Samples will be collected and analyzed in accordance with the XRF manufacturer's instructions, including analysis of standards and other QA/QC samples.
Handling, Packaging, and Shipping of Samples	Samples will be sealed and labeled before being packed in ice. Sample and transport containers will be examined to ensure they are free of external contamination. Samples will be packaged to minimize the possibility of breakage during transport. After environmental samples are collected, packaged, and preserved, they will be transported to the SMO. A split of each sample will be sent to an SMO-approved radiation-screening laboratory under chain of custody (COC). Once radiation-screening results are received, the SMO will send the corresponding analytical samples to fixed laboratories for full analysis.
Containers and Preservation of Samples	Specific requirements/processes for sample containers, preservation techniques, and holding times are based on EPA guidance for environmental sampling, preservation, and QA. Specific requirements for each sample will be printed in the SCLs provided by the SMO (size and type of container, preservatives, etc.). All samples will be preserved by placing them in insulated containers with ice to maintain a temperature of 4°C.
Sample Control and Field Documentation	The collection, screening, and transport of samples will be documented on standard forms generated by the SMO. These forms include sample collection logs (SCLs), COC forms, and sample container labels. Collection logs will be completed at the time the samples are collected and signed by the sampler and a reviewer who verifies that the logs are complete and accurate. Corresponding labels will be initialed and applied to each sample container, and custody seals will be placed around container lids or openings. The COC forms will be completed and assigned to verify that the samples are not left unattended.
Coordinating and Evaluating Geodetic Surveys	Geodetic surveys will focus on obtaining survey data of acceptable quality to use during project investigations. Geodetic surveys will be conducted with a Trimble 5700 DGPS. The survey data will conform to Laboratory Information Architecture project standards IA-CB02, "GIS Horizontal Spatial Reference System," and IA-D802, "Geospatial Positioning Accuracy Standard for A/E/C/ and Facility Management." All coordinates will be expressed as State Plane Coordinate System, North American Datum 83, New Mexico Central Zone, U.S. survey ft. All elevation data will be reported relative to the National Geodetic Vertical Datum of 1983.
Management, Characterization, and Storage of IDW	The IDW will be managed, characterized, and stored in accordance with an approved waste characterization strategy form that documents site history, field activities, and characterization approach for each waste stream managed. Waste characterization will comply with on-site or off-site waste acceptance criteria, as appropriate. All stored IDW will be marked with appropriate signs and labels. Each waste-generated container will be individually labeled with waste classification, item ID, and radioactivity (if applicable) immediately following containerization. All waste will be segregated by classification and compatibility to prevent cross-contamination.
Field Quality Control Samples	Field QC samples will be collected as follows. Field duplicate samples and equipment blanks will be collected at a frequency of 10%. Field duplicates and equipment blanks will be collected at the same time as a regular sample and submitted for the same analyses. Trip blanks will be collected whenever samples were collected for VOC analysis. Trip blanks will be collected at a frequency of one sample per day when VOC samples are collected. Trip-blank containers will consist of certified clean sand that are opened and kept with the other sample containers during the sampling process.
Field Decontamination of Equipment	Dry decontamination will be the preferred method at the Lower Sandia Canyon Aggregate Area to minimize generating liquid waste. Dry decontamination will include using a wire brush or other tool to remove soil or other material adhering to the sampling equipment, followed by applying a commercial cleaning agent (i.e., Fantastik) and paper wipes.

Appendix A

*Acronyms and Abbreviations,
Metric Conversion Table, and Data Qualifier Definitions*

A-1.0 ACRONYMS AND ABBREVIATIONS

AK	acceptable knowledge
AOC	area of concern
asl	above sea level
bgs	below ground surface
BV	background value
COC	chain of custody
cpm	counts per minute
DB	4-(2,4-dichlorophenoxy)butyric acid
DDE	dichlorophenyltrichloroethylene
DDT	dichlorodiphenyltrichloroethane
DOE	Department of Energy (U.S.)
DRO	diesel range organics
EP	Environmental Programs Directorate
FV	fallout value
GPR	ground-penetrating radar
GPS	global-positioning system
FFCA/AO	Federal Facility Compliance Agreement/Administrative Order
HE	high explosives
HIC	high-integrity container
HIR	historical investigation report
IDW	investigation-derived waste
HWFP	Hazardous Waste Facility Permit
LAMPF	Los Alamos Meson Physics Facility
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LASL	Los Alamos Scientific Laboratory (Laboratory's name before January 1, 1981)
MSGP	Multi-Sector General Permit
MLLW	mixed low-level waste
NDA	no detectable activity
NFA	no further action
NMED	New Mexico Environment Department
NMEID	New Mexico Environmental Improvement Division (NMED's name before 1991)

NMHW	New Mexico Hazardous Waste Act
NMSA	New Mexico Statutes Annotated
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyls
PID	photoionization detector
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
RLW	radioactive liquid waste
RLWTF	Radioactive Liquid Waste Treatment Facility
RPF	Records Processing Facility
SAL	screening action level
SAP	sampling and analysis plan
SCL	sample collection log
SMA	site-monitoring area
SMO	Sample Management Office
SOP	standard operating procedure
SSL	soil screening level
SWPPP	Storm Water Pollution Prevention Plan
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
TAL	target analyte list [EPA]
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TPH	total petroleum hydrocarbons
VCA	voluntary corrective action
VOC	volatile organic compound
WAC	waste acceptance criteria

WCSF waste characterization strategy form

XRF x-ray fluorescence

A-2.0 METRIC CONVERSION TABLE

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

A-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

Management Plan for Investigation-Derived Waste

B-1.0 INTRODUCTION

This appendix describes how investigation-derived waste (IDW) generated during the Lower Sandia Canyon Aggregate Area investigation will be managed by Los Alamos National Laboratory (the Laboratory). IDW may include, but is not limited to, drill cuttings, excavated media, excavated man-made debris, contact waste, decontamination fluids, and all other waste that has potentially come into contact with contamination.

B-2.0 IDW

All IDW generated during investigation activities will be managed in accordance with the current version of standard operating procedure (SOP) EP-ERSS-SOP-5022, Characterization and Management of Environmental Restoration (ER) Project Waste (available at http://www.lanl.gov/environment/all/docs/qa/ep_qa/EP-ERSS-SOP-5022.pdf). This SOP incorporates the requirements of all applicable U.S. Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED) regulations, U.S. Department of Energy (DOE) orders, and Laboratory requirements.

The most recent version of the Laboratory's Hazardous Waste Minimization Report will be implemented during the investigation to minimize waste generation. The Hazardous Waste Minimization Report is updated annually as a requirement of Module VIII of the Laboratory's Hazardous Waste Facility Permit.

A waste characterization strategy form (WCSF) will be prepared and approved per requirements of EP-ERSS-SOP-5022, Characterization and Management of Environmental Restoration Project (ER) Waste. The WCSF will provide detailed information on IDW characterization methods, management, containerization, and potential volumes. IDW characterization is completed through review of sampling data and/or documentation or by direct sampling of the IDW or the media investigated (e.g., surface soil, subsurface soil, etc.). Waste characterization may include a review of historical information and process knowledge to identify whether listed hazardous waste may be present (i.e., due diligence reviews). If low levels of listed hazardous waste are identified, a "contained in" determination may be submitted for approval to NMED. Data currently available for the aggregate area do not identify polychlorinated biphenyl (PCB) concentrations greater than 1 mg/kg. However, if this investigation identifies PCB concentrations greater than 1 mg/kg, the Laboratory may submit a request to EPA (with a copy to NMED) to manage the waste as PCB remediation waste.

Considerable amounts of material may potentially be excavated during the remediation of Area of Concern (AOC) 53-013 and investigation of Solid Waste Management Units (SWMUs) 20-001(c) and 53-005. To facilitate the staging and segregation of these materials, the Laboratory may submit area of contamination designation requests for these sites to the NMED for approval. The need for area of contamination designations for these sites will be evaluated based on the results of preliminary field-screening activities. The request will specify the boundaries of the proposed areas of contamination and describe the activities to be conducted within the boundaries.

Wastes will be containerized and placed in clearly marked and appropriately constructed waste accumulation areas. Waste accumulation area postings, regulated storage duration, and inspection requirements will be based on the type of IDW and its classification. Container and storage requirements will be detailed in the WCSF and approved before the waste is generated. Table B-2.0-1 summarizes how waste is expected to be managed.

The waste streams anticipated to be generated during work plan implementation are described below.

B-2.1 Drill Cuttings

This waste stream consists of soil and rock chips generated by the drilling of boreholes with the intent to sample. Drill cuttings may or may not include residues of drilling additives (e.g., foam) used to promote borehole integrity. Drill cuttings include excess core sample not submitted for analysis and any returned samples sent for analysis. Drill cuttings will be containerized in 20 yd³ rolloff containers, 55-gal. drums, B-12 containers, or other appropriate containers at the point of generation. If drilling is conducted within the boundary of an area of contamination, the drill cuttings will be managed within those boundaries. If drilling occurs outside area of contamination boundaries, the initial management of cuttings will rely on the data from previous investigations and/or process knowledge. They will be managed in secure, designated areas appropriate to the type of waste. If new analytical data changes the expected waste category, the waste will be managed in accumulation areas appropriate to the final waste determination.

Cuttings will be land applied if they meet the criteria in the NMED-approved Notice of Intent (NOI) Decision Tree for Land Application of Investigation Derived Waste Solids from Construction of Wells and Boreholes. This waste stream will be characterized based either on direct sampling of the waste or on the results from core samples collected during drilling. If directly sampled, the following analyses will be performed: volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), explosive compounds (if screening indicates the presence of explosives), radionuclides, total metals, and, if needed, toxicity characteristic metals. If process knowledge, odors, or staining indicates the cuttings may be contaminated with petroleum products, the materials will also be analyzed for total petroleum hydrocarbons (TPH) and PCBs. Other constituents may be analyzed as necessary to meet the waste acceptance criteria (WAC) for a receiving facility. The Laboratory expects most cuttings will be land applied or disposed of as a low-level waste (LLW) at Technical Area 54 (TA-54), Area G.

B-2.2 Excavated Environmental Media

Layback and overburden spoils (including environmental media mixed with buried debris) will consist of soil and rock removed from within or next to (e.g., from benching to stabilize a trench) areas within the SWMU and AOC that are to be excavated. Excavations are expected to be limited to trenches and/or test pits for investigation of SWMUs 20-001(c) and 53-003. This material will be field screened for radioactivity and VOCs during the excavation process. If contamination is not detected during screening, the spoils will be stored either in rolloff bins other suitable containers or on the ground surface with appropriate best management practices. If field screening indicates the potential for contamination, the layback and overburden spoils will be placed in rolloff bins or other suitable containers. The spoils will remain within the area of contamination boundary of the SWMU or AOC from which they were excavated, awaiting analytical results. Samples of the spoils will be collected as the spoils are excavated and composited, if appropriate (one composite sample for every 20–50 yd³, depending on the homogeneity of spoils). The samples will be analyzed for VOCs; target analyte list (TAL) metals; explosive compounds, if screening indicates the presence of explosives; radionuclides; and toxicity characteristic metals, as needed. Other constituents may be analyzed as necessary to meet the WAC for a receiving facility. If process knowledge, odors, or staining indicates the soils may be contaminated with petroleum products, the materials will also be analyzed for TPH and PCBs. If the spoils are determined to be suitable for reuse (i.e., meets industrial cleanup standards as determined using NMED's and DOE's soil screening guidance), the Laboratory will segregate any man-made debris from the soil, if practical, and use the soil to backfill the excavations. If the spoils do not meet industrial cleanup standards, they will be treated/disposed of at an authorized facility appropriate for the waste regulatory classification. Based on existing data, the Laboratory expects spoils that cannot be reused to be designated as industrial waste or LLW.

B-2.3 Excavated Man-made Debris

Excavated man-made debris may be generated during excavation of test pits at SWMUs 20-001(c) and 53-005 and during remediation of AOC 53-013. Debris will be segregated as it is excavated, to the extent practical, based on factors such as the type and size of debris, the type of alternative treatment technology that would be used to treat the debris, field screening, process knowledge, and/or staining or odors. Where practicable, this waste stream will be characterized by direct sampling of the waste (e.g., concrete). Direct samples will be analyzed for VOCs, SVOCs, explosive compounds (if field screening indicates the presence of explosives), radionuclides, total metals, and, if needed, toxicity characteristic metals. Other constituents may be analyzed as necessary to meet the WAC for a receiving facility or if process knowledge or visual observations indicate other contaminants may be present (e.g., PCBs or asbestos). For debris that is difficult to characterize; acceptable knowledge (AK) will be used whenever possible, supplemented by sampling as needed. Sampling methods will often have to be identified on a case-by-case basis by qualified sampling personnel, and all decisions will be documented in the field activity notebook.

Waste minimization will be implemented, where practicable, through segregation of waste materials. Nonhazardous materials that can be shown to meet no detectable activity (NDA) for radionuclides or that can be decontaminated to meet NDA will be recycled, if practicable.

The types of debris expected to be excavated from each SWMU or AOC are identified in sections B-2.3.1 through B-2.3.3. If necessary, up to three separate area of contamination designations will be requested.

B-2.3.1 Excavated Waste from SWMU 20-001(c)

Trenches and/or test pits may be excavated at SWMU 20-001(c) to investigate anomalies identified during geophysical surveys. Based on the previous investigations of the other former landfills in Sandia Canyon [SWMUs 20-001(a) and (b)], significant amounts of debris are not expected to be encountered. Small amounts of debris associated with former firing sites (e.g., concrete, cables, wood) may be encountered. This material will initially be placed in containers (e.g., rolloff bins) within the boundaries of an area of contamination. The Laboratory expects most of this waste to be designated as industrial waste that will be disposed of at an authorized off-site treatment/disposal facility or as LLW that will be disposed of at TA-54, Area G.

B-2.3.2 Excavated Waste from SWMU 53-005

Trenches and/or test pits may be excavated at SWMU 53-005 to verify the location of a former liquid waste disposal pit. Debris is not expected to be encountered at this site. It is possible, however, debris such as old waste piping may be encountered. If any debris is encountered, it will initially be placed in containers (e.g., drums or rolloff bins) within the boundaries of an area of contamination. The Laboratory expects most of this waste to be designated as industrial waste that will be disposed of at an authorized off-site treatment/disposal facility or as LLW that will be disposed of at TA-54, Area G.

B-2.3.3 Excavated Waste from AOC 53-013

Debris expected to be encountered at AOC 53-013 consists of lead shot spilled at the site. The lead shot is expected to be mixed with soil. To the extent practicable, sieving or other physical separation methods will be used to separate the lead shot from the soil. The soil and shot will be segregate and placed in containers (e.g., drums, rolloff bins) within the boundaries of the area of contamination. The soil will be managed as described in Section B-2.2. If practical, the shot will be reused by the Laboratory for

radiological shielding. If reuse is not possible, the shot will be managed as hazardous waste or mixed LLW, depending on the results of radiological characterization.

B-2.4 Contact Waste

The contact waste stream consists of potentially contaminated materials that “contacted” waste during sampling and excavation. This waste stream consists primarily of, but is not limited to, personal protective equipment (PPE) such as gloves; decontamination wastes such as paper wipes; and disposable sampling supplies. Characterization of this waste stream will use AK of the waste materials, the methods of generation, and analysis of the material contacted (e.g., drill cuttings, soil,). Contact waste generated within an area of contamination will initially be placed in containers and managed within the area. If contact waste is generated at a location that is not within the area of contamination, the initial management of waste will rely on the data from previous investigations and/or process knowledge. They will be managed in secure, designated areas appropriate to the type of the waste. If new analytical data changes the expected waste category, the waste will be managed in accumulation areas appropriate to the final waste determination. The Laboratory expects most of the contact waste to be designated as nonhazardous, nonradioactive waste that will be disposed of at an authorized facility or as LLW that will be disposed of at TA-54, Area G.

B-2.5 Decontamination Fluids

The decontamination fluids waste stream will consist of liquid wastes from decontamination activities (i.e., decontamination solutions and rinse waters). Consistent with waste minimization practices, the Laboratory employs dry decontamination methods to the extent possible. If dry decontamination cannot be performed, liquid decontamination wastes will be collected in containers at the point of generation. The decontamination fluids will be characterized through AK of the waste materials, the levels of contamination measured in the environmental media (e.g., the results of the associated drill cuttings), and, if necessary, direct sampling of the containerized waste. If directly sampled, the following analyses will be performed: VOCs, SVOCs, radionuclides, total metals, and, if needed, toxicity characteristic metals. The Laboratory expects most of these wastes to be nonhazardous liquid waste or radioactive liquid waste that will be sent to one of the Laboratory’s wastewater treatment facilities whose WAC allow the waste to be received.

**Table B-2.0-1
Summary of Estimated IDW Generation and Management**

Waste Stream	Expected Waste Type	Expected Disposition
Drill Cuttings	Nonhazardous or LLW	Land application or disposal at TA-54, Area G
Excavated Environmental Media	Nonhazardous or LLW	Reused as fill at the excavation location or disposed of at an approved off-site disposal facility or on-site at TA-54, Area G
Excavated Man-made Debris	Industrial, hazardous, LLW, or mixed LLW	Disposal at an approved off-site facility or on-site at TA-54, Area G, recycled, or reused
Contact Waste	Nonhazardous or LLW	Disposal at an approved off-site solid waste disposal facility or on-site at TA-54, Area G
Decontamination Fluids	Nonhazardous or LLW	Treatment at an on-site wastewater treatment facility

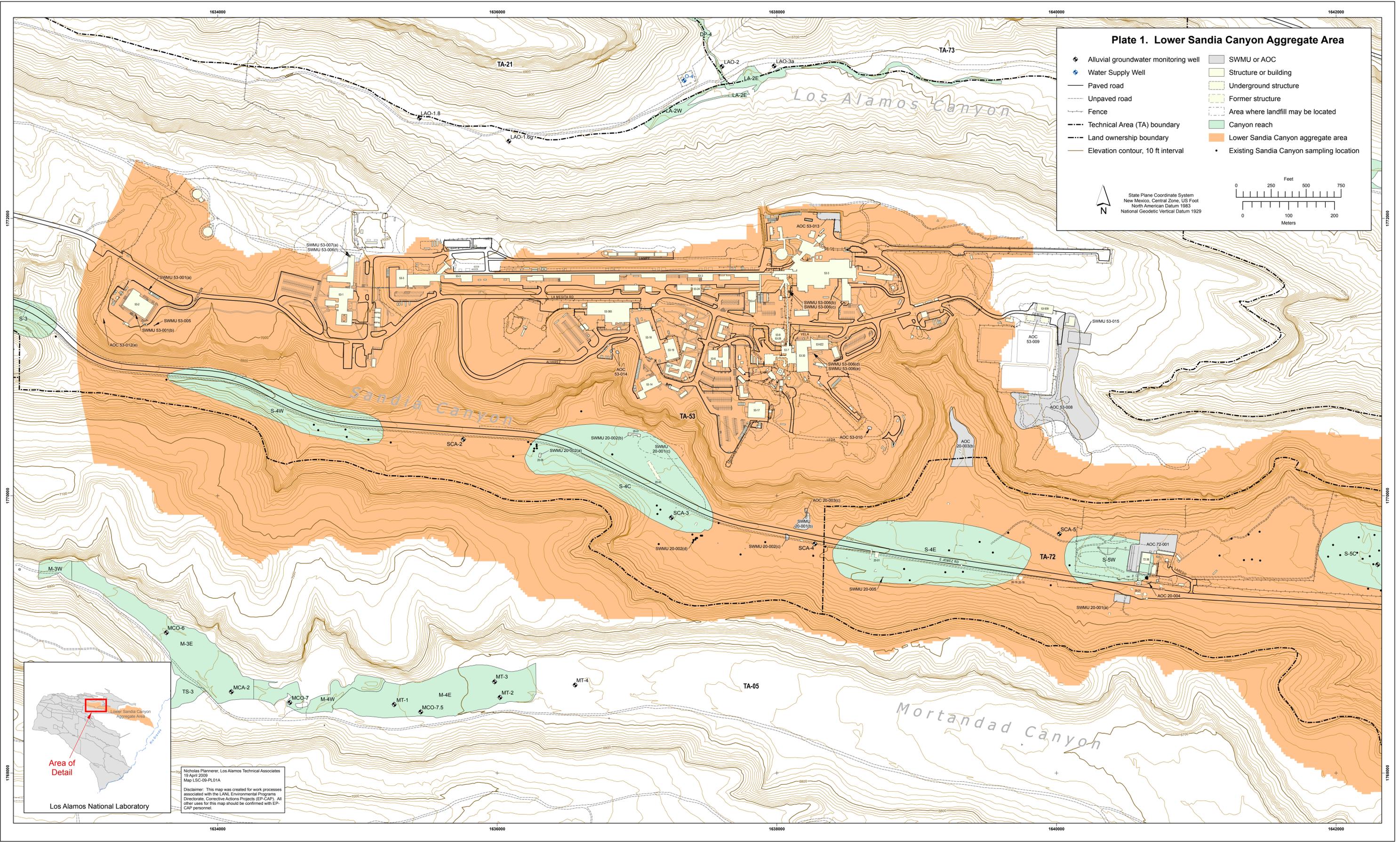


Plate 1. Lower Sandia Canyon Aggregate Area

◆ Alluvial groundwater monitoring well	■ SWMU or AOC
◆ Water Supply Well	■ Structure or building
— Paved road	■ Underground structure
- - - Unpaved road	■ Former structure
— Fence	■ Area where landfill may be located
- - - Technical Area (TA) boundary	■ Canyon reach
- - - Land ownership boundary	■ Lower Sandia Canyon aggregate area
— Elevation contour, 10 ft interval	• Existing Sandia Canyon sampling location

State Plane Coordinate System
New Mexico, Central Zone, US Foot
North American Datum 1983
National Geodetic Vertical Datum 1929

0 250 500 750 Feet
0 100 200 Meters



Nicholas Plannerer, Los Alamos Technical Associates
19 April 2009
Map LSC-09-PL01A

Disclaimer: This map was created for work processes associated with the LANL Environmental Programs Directorate, Corrective Actions Projects (EP-CAP). All other uses for this map should be confirmed with EP-CAP personnel.

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Historical Investigation Report for Lower Sandia Canyon Aggregate Area

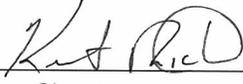
Prepared by the Environmental Programs Directorate

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Historical Investigation Report for Lower Sandia Canyon Aggregate Area

April 2009

Responsible project leader:

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Printed Name	Signature	Title	Organization	Date

Responsible LANS representative:

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Responsible DOE representative:

David R. Gregory		Project Director	DOE-LASO	4/30/09
Printed Name	Signature	Title	Organization	Date

EXECUTIVE SUMMARY

The Lower Sandia Canyon Aggregate Area includes a total of 82 solid waste management units and areas of concern located in Technical Area 53 (TA-53), TA-72, and former TA-20 at Los Alamos National Laboratory. Of these 82 sites, 54 have been previously investigated and/or remediated and have been approved for no further action. For the remaining 28 sites requiring investigation, 11 are located in former TA-20, 16 are in TA-53, and 1 is in TA-72. This historical investigation report provides site descriptions, summarizes previous investigations, and presents analytical results. The background information and supporting data form the basis for the proposed sampling design necessary to complete the site investigations as presented in the Lower Sandia Canyon Aggregate Area investigation work plan.

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Appendixes

Appendix A	Acronyms and Abbreviations, Metric Conversion Table, and Data Qualifier Definitions
Appendix B	Analytical Suites and Results (on CD included with this document)

Plate

Plate 1	Lower Sandia Canyon Aggregate Area
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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 40 mi² of the Pajarito Plateau, which consists of a series of finger-like mesas separated by deep canyons containing perennial and intermittent streams running from west to east. Mesa tops range in elevation from approximately 6200 to 7800 ft. The location of Lower Sandia Canyon Aggregate Area with respect to the Laboratory technical areas (TAs) is shown in Figure 1.0-1.

The Laboratory's Environmental Programs (EP) Directorate, which includes the former Environmental Restoration Project, is participating in a national effort by DOE to reduce risk to human health and the environment at its facilities. The goal of EP Directorate is to ensure that past operations do not threaten human or environmental health and safety in and around Los Alamos County, New Mexico. To achieve this goal, EP is currently investigating sites potentially contaminated by past Laboratory operations. The sites under investigation are designated as either solid waste management units (SWMUs) or areas of concern (AOCs).

This historical investigation report (HIR) describes operational histories, previous investigations, and analytical data for SWMUs and AOCs in Technical Area 53 (TA-53), TA-72, and former TA-20 within the Lower Sandia Canyon Aggregate Area. The sites addressed in this HIR are potentially contaminated with hazardous and/or radioactive chemicals. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to the New Mexico Environment Department (NMED) in accordance with DOE policy.

Corrective actions at the Laboratory are subject to the March 1, 2005, Compliance Order on Consent (the Consent Order). The Consent Order was issued pursuant to the New Mexico Hazardous Waste Act (NMHWA), New Mexico Statutes Annotated (NMSA) 1978, § 74-4-10, and the New Mexico Solid Waste Act, NMSA 1978, § 74-9-36(D). NMED has authority under the NMHWA over cleanup of hazardous wastes and hazardous constituents.

1.1 Historical Investigation Report Overview

The Lower Sandia Canyon Aggregate Area includes a total of 82 SWMUs and AOCs, 54 of which have been previously investigated and/or remediated and have been approved for no further action (NFA). For the remaining 28 sites requiring investigation, 11 are located in former TA-20, 16 are in TA-53, and 1 is in TA-72. Table 1.1-1 provides a summary of the 82 sites within the aggregate area and their regulatory status. For NFA sites, only brief descriptions and the reference to the approval document are provided in this HIR and only in Table 1.1-1.

The purpose of this HIR is to provide supporting information for the activities necessary to complete the investigations as presented in the Lower Sandia Canyon Aggregate Area investigation work plan (LANL 2009, 105078). The SWMUs and AOCs are presented in this document on the basis of their regulatory status.

Sections 2 to 4 of this HIR provide site descriptions and operational histories, summarize previous investigations, and present analytical data for site(s) under investigation in TA-53, TA-72, and former TA-20, respectively. For each site, the location, historical operations, and current status are described first, followed by descriptions of historical investigations with dates and activities conducted. The results

of analytical data obtained from previous investigation are summarized. Plate 1 shows the locations of the sites under investigation in the Lower Sandia Canyon Aggregate Area.

Appendix A includes a list of acronyms and abbreviations, a metric conversion table, and a table for data qualifier definitions. Appendix B presents decision-level and screening-level data from past investigations (included on CD).

1.2 Data Overview

Data evaluated in this report include historical data collected from 1995 through 2006, as part of a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) and other corrective actions. In EP Directorate's database, all data records include a vintage code field denoting how and where samples were submitted for analyses. All historical data evaluated in this report are validated or revalidated by current quality control metrics.

Analytical samples described in this report have undergone analyses at both on-site and off-site laboratories. Because analytical practices and documentation of analyses vary in quality and completeness, analytical data presented are of either screening-level or decision-level quality. Screening-level data are appropriate for applications that only require determination of gross contamination areas and/or for site characterization. Screening-level data are also often used to specify areas where additional data should be collected. Decision-level data are used to quantify the nature and extent of releases and to perform risk assessments. Decision-level data presented in this report have been validated for such use. The decision-level data provide supporting information for the investigation activities proposed in the work plan.

Inorganic chemical and radionuclide data from previous investigations were compared with background values (BVs) and fallout values (FVs) (LANL 1998, 059730, p. 6-2). Fallout radionuclides in soil greater than a depth of 6 in. or in rock and organic chemicals are evaluated based on detection status.

2.0 SITES UNDER INVESTIGATION IN FORMER TA-20

Former TA-20 was located near the west end of Sandia Canyon and the SWMUs and AOCs associated with former TA-20 are now contained within TA-53 and TA-72. The site consisted of a series of firing areas that were spaced along a small road heading west from NM 4 (LANL 1994, 034756, pp. 2-1–2-5).

TA-20 was established during the Manhattan Project to test initiators (devices that generate neutrons to initiate nuclear explosions). Initiators were tested using both implosion and impaction methods. Implosion testing involved placing test devices inside metal spheres that were then imploded using high explosives (HE). After implosion, the devices were recovered for study. Implosion tests were conducted at several firing sites in TA-20, two of which had containment vessels or structures to assist with recovery of the test devices. Impaction tests were conducted by firing test devices from a smooth-bore Navy gun into an earth-filled recovery bin or by firing devices from a 20-mm gun into a target. Test measurements were taken as the devices impacted the recovery bin or targets. Initiator tests were conducted until late 1945, when the work was transferred to TA-33. TA-20 was then used briefly to conduct other types of implosion tests (LANL 1994, 034756, pp. 2-1–2-4).

In 1946, an intensive radiation monitoring and cleanup effort was performed at TA-20. Soil contaminated with polonium was removed from firing areas, from a cave where radioactive materials had been stored, and from disposal pits. Polonium-210 was used in initiator tests but has only a 138-d half-life and would no longer be present at the site. Other contaminated items, including rubber gloves, were also found and

removed for disposal at TA-21. Two structures were also removed: a storage building (20-18) and a “cut-off shack” (structure 20-17) (LANL 1994, 034756, p. 2-4). A radiological survey of the cut-off shack in 1946 identified two “highly contaminated” pieces of equipment in the building (Buckland 1946, 005998).

Beginning in 1948, TA-20 was largely decommissioned to make way for a new road through the canyon (East Jemez Road, also known as the “Truck Route”). Decommissioning activities included dismantling and removing structures, and a site cleanup that netted 60 to 70 lb of HE. Some of the structures deactivated in 1948 were not destroyed until 1960, when they were burned after being monitored for HE, radiation, and toxic materials. Periodic follow-up searches for HE continued until 1973, when the Laboratory Safety Group declared the area safe and removed fencing and warning signs. In 1985, a radiation survey of the remaining structures in former TA-20 (mainly underground structures including manholes, pull boxes, and footings) was conducted, and most of the structures were removed at that time (LANL 1994, 034756, p. 2-4).

A summary of the historical samples collected and the laboratory analyses requested for TA-20 samples is presented in Table 2.0-1. Inorganic chemicals detected above BVs or having detection limits above BVs are presented in Table 2.0-2. Organic chemicals detected are presented in Table 2.0-3, and radionuclides detected or detected above BVs/FVs are presented in Table 2.0-4. All laboratory analytical data are provided in Appendix B.

2.1 SWMU 20-001(a), Landfill

2.1.1 Description and History

SWMU 20-001(a) is a former landfill used to bury scrap metal, some of which may have been contaminated from firing site activities conducted at former TA-20. This SWMU is adjacent to East Jemez Road and slightly west of the currently active small-arms firing range at TA-72 (Figure 2.1-1). The landfill was removed in 1948 before East Jemez Road was constructed. A 1948 memorandum describing cleanup efforts in Sandia Canyon notes that three burial grounds were excavated and that the ground “checked negative” after removal (Buckland 1948, 006001). SWMU 20-001(a) is presumed to be one of the three burial grounds referred to in the memorandum. Little is known about the actual dimensions of the landfill; however, a 1965 memorandum states the landfill was approximately 5 ft deep (Russo 1965, 005984).

2.1.2 Previous Investigations

In 1986, geophysical surveys were conducted in an attempt to find evidence of the landfill site. Its location was not positively established at that time. This area was included in a DOE Headquarters Environmental Survey in 1987 (DOE 1988, 008609, pp. 4-177–4-180). The DOE report notes that the landfill site was located across East Jemez Road from the present location of the TA-72 small-arms firing range and that a depression, approximately 5 ft deep, was observed at the end of an unimproved road. This depression was not noted during the 1986 geophysical survey (LANL 1994, 034756, p. 5-5).

A Phase I RFI was conducted during 1995. During the 1995 RFI, the former location of SWMU 20-001(a) and the surrounding area was gridded (200 ft × 300 ft) and a geophysical survey was conducted. A backhoe was used to excavate portions (two trenches) of the site that showed anomalies in the geophysical survey. A field radiological survey was conducted before excavating, and no radiation levels above local background were detected (LANL 1996, 054466, p. 5-3). The north trench excavation exposed small pieces of wood debris, a 3-ft-long section of a pole, and a metal power-pole anchor. Excavation of the south trench produced no evidence of previous disturbance. Soil samples were

collected from seven locations at the north trench and one location at the south trench (LANL 1996, 054466, p. 5-7). At each location, a sample was collected from a depth of 10 to 11 ft and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 2.0-1.

2.1.3 Analytical Results

During the 1995 investigation, total uranium was detected above the soil BV in all eight samples. The maximum concentration was approximately 2.5 times the BV. No other inorganic chemicals were detected above BVs, but mercury, silver, and thallium had detection limits above BVs. The only organic chemical detected was the explosive tetryl (2,4,6-trinitrophenyl-N-methylnitramine), which was detected at 0.65 mg/kg in one sample. Three radionuclides were detected: cesium-137 was detected in one sample (0.033 pCi/g), europium-152 in four samples (up to 0.195 pCi/g), and strontium-90 in one sample (1.52 pCi/g).

Analytical data from the 1995 sampling event are presented in Tables 2.0-2, 2.0-3, and 2.0-4, which show inorganic chemicals detected above BVs or having detection limits above BVs, organic chemicals detected, and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs, organic chemicals detected, and radionuclides detected or detected above BVs/FVs are shown in Figures 2.1-2, 2.1-3, and 2.1-4, respectively.

2.2 SWMU 20-001(b), Landfill

2.2.1 Description and History

SWMU 20-001(b) is a former landfill located in the central portion of Sandia Canyon next to East Jemez Road (Figure 2.2-1). Together with SWMU 20-002(c) and AOC 20-003(c), SWMU 20-001(b) comprises Consolidated Unit 20-001(b)-00. The site is believed to have been excavated using a bulldozer and had been used to dispose of a number of gun barrels (Russo 1965, 005984). The landfill was excavated and its contents removed in a 1948 cleanup effort (LANL 1994, 034756, pp. 5-1–5-3). A 1948 memorandum describing cleanup efforts in Sandia Canyon notes that three burial grounds were excavated and that the ground “checked negative” after removal (Buckland 1948, 006001). SWMU 20-001(b) is presumed to be one of the three burial grounds referred to in the memorandum.

2.2.2 Previous Investigations

In 1986, a geophysical survey of the site was conducted to find evidence of the former landfill. Several anomalies possibly indicating past disposal activity were noted (Weston 1989, 005439). In 1989, a radiological survey of the area found only background radiation levels (LANL 1994, 034756, pp. 5-1–5-3).

A Phase I RFI was conducted during 1995, at which time an area approximately 150 ft × 200 ft was gridded and a geophysical survey conducted. Where geophysical anomalies were evident from the survey, three trenches were excavated. The east trench excavation exposed a 4-ft-long piece of electrical conduit and some rope. Excavation of the north trench exposed structural steel shapes and angles, the Navy gun foundation, and wood debris. The southern trench exposed inactive utility lines and a 6-ft-long pipe wrench. Soil samples were collected from seven locations in each trench (LANL 1996, 054466, pp. 5-8–5-12). One sample was collected at each location at depth intervals ranging from 1.0 to 2.0 ft, 6.0 to 7.0 ft, 8.0 to 9.0 ft, 9.0 to 10.0 ft and 10.0 to 11.0 ft and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, and strontium-90. The samples collected in 1995 and analyses requested are presented in Table 2.0-1.

2.2.3 Analytical Results

Inorganic chemicals detected above BVs during the 1995 investigation were cadmium, copper, iron, silver, and uranium. Cadmium was detected above BV in two samples, with a maximum concentration approximately 5 times its BV. Copper, iron, and silver were each detected above BVs in just one sample, with copper and iron only slightly above BVs, and silver approximately 4 times BV. Uranium was detected above BV in all 21 samples. The maximum concentration was approximately 3.5 times BV. Antimony was not detected above BV but had detection limits above BV. No organic chemicals were detected. Radionuclides detected above BVs/FVs or detected and not having a BV or FV were cesium-137, sodium-22, and uranium-238. Cesium-137 was detected in one sample taken at 1.0 to 2.0 ft at 0.26 pCi/g. Sodium-22 does not have a BV and was detected in one sample at 0.19 pCi/g. Uranium-238 was detected in one sample slightly above its BV.

Analytical data from the 1995 sampling event are presented in Tables 2.0-2 and 2.0-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 2.2-2 and 2.2-3, respectively.

2.3 SWMU 20-001(c), Landfill

2.3.1 Description and History

SWMU 20-001(c) is a former landfill and, together with SWMUs 20-002(a) and 20-002(b), comprises Consolidated Unit 20-001(c)-00. This landfill was located on the far west end of former TA-20, just north of East Jemez Road (Figure 2.3-1). This site is believed to have been used to dispose of a number of 3- to 5-in. base guns cut into sections and buried in a trench (Russo 1965, 005984). The site was excavated and its contents were removed in a 1948 cleanup (LANL 1994, 034756, pp. 5-1–5-3). A 1948 memorandum describing cleanup efforts in Sandia Canyon notes three burial grounds were excavated and the ground “checked negative” after removal (Buckland 1948, 006001). SWMU 20-001(c) is presumed to be one of the three burial grounds referred to in the memorandum.

2.3.2 Previous Investigations

A Phase I RFI was conducted at SWMU 20-001(c) in 1995. During the RFI, samples were collected at 21 locations. Subsurface samples were collected from a depth of 10 to 11 ft at each location, and a surface sample was collected at one location. All samples were analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, and strontium-90. The RFI report stated that the 1995 sampling for SWMU 20-001(c) was not conducted in the proper location (LANL 1996, 054466, p. 5-15) but did not elaborate on the reasons.

2.3.3 Analytical Results

The 1995 sampling locations for SWMU 20-001(c) are incorrect; therefore, it is uncertain whether the results of the 1995 RFI sampling are representative of contamination conditions at this site. Because the locations associated with these sampling results could not be confirmed as being correct, these results are not decision-level data and are not presented in this HIR.

2.4 SWMU 20-002(a), Former Firing Pit

2.4.1 Description and History

SWMU 20-002(a) is the location of a former firing pit (structure 20-6) used from 1945 to 1948 to conduct initiator tests. Together with SWMUs 20-001(c) and 20-002(b), SWMU 20-002(a) comprises Consolidated Unit 20-001(c)-00. The firing pit was located on the far west end of former TA-20, south of East Jemez Road (Figure 2.3-1). The steel-lined pit was constructed following the failure of the Dumbo [a contained firing vessel, see description of SWMU 20-002(b)]. The firing pit had interior dimensions of 14 ft 8 in. × 14 ft 8 in. × 12 ft deep. The walls and floor of the pit consisted of 0.75-in.-thick steel plate backed by 12-in. × 12-in. timbers. The pit was covered by a steel framework overlain by a mat of 0.25-in.-diameter steel rods spaced 1 in. apart. According to a 1947 report, the framework and mat, presumably installed to contain shot debris, failed after the first few shots (LASL 1947, 005581, p. 13). Laboratory facility engineering records indicate the pit was removed in April 1948. A memorandum dated April 20, 1948, describing cleanup efforts in Sandia Canyon notes that one “cage” was excavated and that the “interior checked negative after clearing” (Buckland 1948, 006001). The SWMU 20-002(a) firing pit is presumed to be the “cage” referred to in the memorandum.

2.4.2 Previous Investigations

In 1985, environmental samples were collected from this site for the Los Alamos Site Characterization Program. The samples were analyzed for HE, uranium, beryllium, and gross-alpha and gross-beta radioactivity. As reported in the RFI work plan, only one sample indicated the presence of uranium slightly above the background levels in use at that time (10.16 mg/kg versus 3 mg/kg to 7 mg/kg) (LANL 1994, 034756, p. 5-20).

In 1995, a Phase I RFI was conducted at SWMU 20-002(a) (LANL 1996, 054466). The site was gridded and field surveyed for radiological contamination; the survey results were used to determine the sampling locations. Soil samples were collected at 11 locations within an approximate 100-ft radius of the firing pit. At each location, a surface sample (0.0 to 0.5 ft) and subsurface sample (2.5 to 3.0 ft) were collected and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 2.0-1.

2.4.3 Analytical Results

Inorganic chemicals detected above BVs during the 1995 investigation were copper, lead, and uranium. Copper was detected above BV in three samples up to approximately 5.5 times BV. Lead was detected above BV in one sample at approximately 2 times BV. Uranium was detected above BV in 16 samples, with a maximum concentration approximately 3 times BV. Mercury, silver, and thallium were not detected above BVs but had detection limits above their BVs. No organic chemicals were detected, and no radionuclides were detected above BVs/FVs.

Analytical data from the 1995 sampling event are presented in Table 2.0-2, which shows inorganic chemicals detected above BVs. Sampling locations and results for inorganic chemicals detected above BVs are shown in Figure 2.4-1.

2.5 SWMU 20-002(b), Former Steel Tanks (Firing Site)

2.5.1 Description and History

SWMU 20-002(b) is the site of two former 5-ft-diameter cylindrical steel containment vessels known as Dumbos. Together with SWMUs 20-001(c) and 20-002(a), SWMU 20-002(b) comprises Consolidated Unit 20-001(c)-00. The Dumbos were designed to contain explosives tests to recover explosive fragments. The Dumbo containment units were mounted on a firing pad at each end of a concrete platform (structure 20-7) near the west end of former TA-20 (Figure 2.3-1). Other structures associated with this site are a manhole (structure 20-4) and platform and hoist (structure 20-8). One Dumbo unit was used only once because of the difficulty of opening the containment vessel after the shot was fired within the vessel, and the second Dumbo unit was never used. The two Dumbos were constructed in 1945 and 1946 and were removed in 1948 (LANL 1994, 034756, pp. 5-13–5-15). Laboratory facility engineering records document that the firing pads and platform were removed in April 1948.

2.5.2 Previous Investigations

A 1946 Laboratory memorandum states the two Dumbos were surveyed for radioactivity. The used Dumbo showed activity of 3000 to 5000 counts per minute (cpm) on the rim and greater than 20,000 cpm on the interior; there was no contamination on the unused Dumbo (Littlejohn 1946, 005997).

In 1985, radiation surveys and soil sampling were performed at this site as part of the Los Alamos Site Characterization Program. The surveys showed background radiation levels, and the soil samples showed no uranium concentrations above background levels (LANL 1994, 034756, p. 5-20).

In 1995, a Phase I RFI was conducted at SWMU 20-002(b) (LANL 1996, 054466). The site was gridded and field-surveyed for radiological contamination; the survey results were used to determine the soil sampling locations. Soil samples were collected at 11 locations within an approximate 100-ft radius of the firing pad. At each location, a surface sample (0.0 to 0.5 ft) and subsurface sample (2.5 to 3.0 ft) were collected and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 2.0-1.

2.5.3 Analytical Results

Inorganic chemicals detected above BVs in the 1995 investigation were mercury and uranium. Mercury was detected slightly above BV in one sample. Uranium was detected above BV in 19 samples, with a maximum concentration approximately 2.5 times BV. Antimony, cadmium, silver, and thallium were not detected above BVs but had detection limits above BVs. No organic chemicals were detected.

Radionuclides detected and not having BVs/FVs were europium-152 and ruthenium-106. Europium-152 was detected in four samples with a maximum activity of 0.31 pCi/g. Ruthenium-106 was detected in one sample at 0.078 pCi/g.

Analytical data from the 1995 sampling event are presented in Tables 2.0-2 and 2.0-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 2.4-1 and 2.5-1, respectively.

2.6 SWMU 20-002(c), Former Firing Point

2.6.1 Description and History

SWMU 20-002(c) is a former firing point located near the southwest edge of TA-53 close to the boundary of TA-72 (Figure 2.2-1). This firing point was used for tests with explosive charges of up to 50 lb. Together with SWMU 20-001(b) and AOC 20-003(c), SWMU 20-002(c) comprises Consolidated Unit 20-001(b)-00. The firing point is depicted in engineering drawing ENG-C 1778, Revision 1, as a pad bordered on three sides by an earthen berm (LASL 1951, 024345). Engineering records show that the structure associated with this firing point (structure 20-9) was removed in April 1948. A memorandum dated April 20, 1948, describing cleanup efforts in Sandia Canyon notes seven "shot areas" were excavated and the "ground checked negative after removal" (Buckland 1948, 006001). It is likely that the SWMU 20-002(c) firing point is one of the seven shot areas. The north side of this site is currently covered by the road embankment for East Jemez Road.

2.6.2 Previous Investigations

A Phase I RFI was conducted in 1995 (LANL 1996, 054466). During the RFI, a 200-ft²-grid field radiological survey was conducted at this site. Surface radiation readings were measured and recorded at 20-ft intervals (LANL 1996, 054466, p. 5-3). The radiological survey showed little variation across the site, except for higher readings along the drainage that transects the site (LANL 1996, 054466, p. 5-30). Samples were collected from eight locations within an approximate 100-ft radius of the firing point (Figure 2.2-1). At each location, a surface sample (0.0 to 0.5 ft) and two subsurface samples (2.5 to 3.0 ft and 4.5 to 5.0 ft) were collected and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 2.0-1.

2.6.3 Analytical Results

Inorganic chemicals detected above BVs in the 1995 investigation were chromium, lead, mercury, silver, thallium, uranium, and zinc. Chromium was detected above BV in 12 samples, with a maximum concentration of 6 times BV. Lead was detected slightly above BV in one sample. Mercury was detected above BV in seven samples, with a maximum concentration of 3 times BV. Silver was detected above BV in one sample at approximately 2 times BV. Thallium was detected above BV in three samples, with a maximum concentration of 3 times BV. Uranium was detected above BV in 22 samples, with a maximum concentration approximately 2.5 times BV. Zinc was detected slightly above BV in nine samples. Antimony and cadmium were not detected above BVs but had detection limits above BVs. No organic chemicals were detected. Fallout radionuclides detected at greater than 0.5 ft were cesium-137 and strontium-90. Cesium-137 was detected in two samples at a maximum activity of 0.219 pCi/g, and strontium-90 was detected in four samples at a maximum activity of 0.6 pCi/g.

Analytical data from the 1995 sampling event are presented in Tables 2.0-2 and 2.0-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 2.6-1 and 2.2-3, respectively.

2.7 SWMU 20-002(d), Former Firing Point

2.7.1 Description and History

SWMU 20-002(d) is a former firing point located near a manhole (structure 20-3) in the central part of former TA-20 (Figure 2.7-1). Fewer than 10 implosion shots were fired near structure 20-3 (LANL 1994, 034756, p. 5-15). One of these shots, containing 500 lb of Composition B, did not completely detonate. A 1962 Laboratory memorandum describes two cleanup efforts related to this incident: one conducted immediately after the incident and a second that was part of the 1948 Sandia Canyon cleanup conducted before the construction of East Jemez Road (Courtright 1962, 005971). Other historical documents indicate small pieces of HE were found and removed from this site at various times, including in July 1966, July 1967, and June 1969 (Drake and Courtright 1966, 005985; Drake and Courtright 1967, 005986; Drake and Courtright 1969, 005987). No HE was found during inspections in April 1971, May 1973, and June 1975.

2.7.2 Previous Investigations

In 1985, environmental samples were collected from this site for the Los Alamos Site Characterization Program. Two soil samples indicated the presence of uranium above the background levels in use at that time (52.48 mg/kg and 33.25 mg/kg versus 3 mg/kg to 7 mg/kg) (LANL 1994, 034756, p. 5-22).

In 1995, a Phase I RFI was conducted at SWMU 20-002(d) (LANL 1996, 054466). Samples were collected from eight locations within a 50-ft radius of the former firing point. At each location, a surface sample (0.0 to 0.5 ft) and two subsurface samples (2.5 to 3.0 ft and 4.5 to 5.0 ft) were collected and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 2.0-1.

2.7.3 Analytical Results

Inorganic chemicals detected above BVs during the 1995 investigation were beryllium, copper, thallium, uranium, and zinc. Beryllium was detected above BV in three samples, with a maximum concentration 3.5 times BV. Copper was detected above BV in five samples, with a maximum concentration approximately 5 times BV. Thallium was detected in one sample at approximately 2.5 times BV. Uranium was detected above BV in 20 samples. The maximum concentration was 38 times BV. Zinc was detected slightly above BV in two samples. Antimony, cadmium, and silver were not detected above BVs but had detection limits above BVs. No organic chemicals were detected. Radionuclides detected above BVs and fallout radionuclides detected at greater than 0.5 ft were cesium-137, strontium-90, uranium-234, uranium-235, and uranium-238. Cesium-137 was detected in one sample at 0.131 pCi/g. Strontium-90 was detected in six samples with a maximum activity of 9.28 pCi/g. Uranium-234 was detected above BV in five samples with a maximum concentration approximately 14 times BV. Uranium-235 was detected above BV in eight samples with a maximum concentration 10 times BV. Uranium-238 was detected less than 2 times BV in three samples.

Analytical data from the 1995 sampling event are presented in Tables 2.0-2 and 2.0-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 2.7-2 and 2.7-3, respectively. The sample coordinates for the samples collected at location 20-01093 could not be verified. Therefore, the results for these samples are not decision-level data and are not presented in Tables 2.0-2

and 2.0-4 and Figures 2.7-2 and 2.7-3. The results for the surface sample collected at this location included the highest detected concentrations of copper and beryllium.

2.8 AOC 20-003(b), Former 20-mm Gun Firing Site

2.8.1 Description and History

AOC 20-003(b) is a former 20-mm gun-firing site that consisted of two buildings built in 1945 and located near the canyon wall (Figure 2.8-1). Building 20-44 was a 16 ft × 16 ft × 8 ft high wood-frame building equipped with concrete gun mounts. Adjacent control building 20-13 had approximately the same dimensions. The site was used to conduct initiator timing tests, which consisted of firing projectiles from a 20-mm gun into steel plates set against the canyon walls. In 1948, the 20-mm gun was relocated to TA-04. A site visit in 1993 confirmed that all surface structures and the steel plates had been removed and that some concrete foundations remained (LANL 1994, 034756, p. 5-16).

2.8.2 Previous Investigations

In 1985, the area around the gun site was investigated as part of the Los Alamos Site Characterization Program. A radiation survey and soil sampling were conducted. The radiation survey showed no readings above background. Soil samples showed uranium levels within background. The survey and sampling were performed near the gun-mount building rather than at the projectile impact areas (LANL 1994, 034756, p. 5-22).

In 1995, a Phase I RFI was conducted at AOC 20-003(b) (LANL 1996, 054466). An 80 ft × 140-ft grid was established at the site and surface radiation readings were measured to help determine sampling locations. Radiological readings were consistent across the site, with no areas exhibiting elevated readings. A total of nine soil and tuff samples were collected from six locations in the drainage channel downgradient of the projectile impact area. Surface samples (0.0 to 1.0 ft) were collected at each of three locations and one subsurface sample (2.0 to 3.0 ft or 5.0 to 5.5 ft) was collected at all six locations for a total of three surface and six subsurface samples. All samples were analyzed for gamma-emitting radionuclides, metals, and strontium-90. The samples collected in 1995 and analyses requested are presented in Table 2.0-1.

2.8.3 Analytical Results

Lead was the only inorganic chemical detected above BV during the 1995 investigation. Lead was detected in one sample at 3 times BV. Selenium was not detected above BV but had detection limits above BV. Uranium-235 was detected above BV in three samples with a maximum activity 6 times BV. No other radionuclides were detected or detected above BVs/FVs.

Analytical data from the 1995 sampling event are presented in Tables 2.0-2 and 2.0-4, which show inorganic chemicals detected above BVs or having detection limits above BVs and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 2.8-2 and 2.8-3, respectively.

2.9 AOC 20-003(c), Former U.S. Navy Gun Site

2.9.1 Description and History

AOC 20-003(c) is the site of a former U.S. Navy gun mount that was located approximately 90 ft north of East Jemez Road in Sandia Canyon (Figure 2.2-1). Together with SWMUs 20-001(b) and 20-002(c), AOC 20-003(c) comprises Consolidated Unit 20-001(b)-00. The former gun site was used between 1945 and 1948. A 10-ft × 10-ft concrete pad with a steel plate surface (structure 20-16) was used as a mount for the gun. Engineering drawing ENG-C 1778 shows a 30-ft-long earth-bermed timber frame filled with tamped earth (structure 20-10) located near the gun and on the slope at the toe of the canyon wall (LASL 1951, 024354). At the end nearest the gun, the timber frame was 12 ft wide and 10 ft high, and at the far end it was 20 ft wide and 5 ft high. The gun was fired into the earth-filled bin so the projectile could be recovered. Laboratory engineering records show that in April 1948 structures 20-10 and 20-16 were removed and that structure 20-28, a conduit manhole, was left in place. The disposition of the soil that filled the frame is not known (LANL 1994, 034756, pp. 5-16–5-17).

2.9.2 Previous Investigations

In 1985, the area around the gun mount pad (structure 20-16) was investigated under the Los Alamos Characterization Program. Radiation surveys revealed no readings higher than background and soil samples showed uranium levels within the background range (LANL 1994, 034756, p. 5-22).

In 1995, a Phase I RFI was conducted at AOC 20-003(c) (LANL 1996, 054466). The gun mount consisted of a soil-covered concrete pad with anchor bolts and included conduit and electrical wire debris. Samples were collected at eight locations. At each location, a surface sample (0.0 to 0.5 ft) and two subsurface samples (2.5 to 3.0 ft and 4.5 to 5.0 ft) were collected and analyzed for gamma-emitting radionuclides, HE, isotopic uranium, metals, strontium-90, and uranium. The samples collected in 1995 and analyses requested are presented in Table 2.0-1.

In 1995, a voluntary corrective action (VCA) was conducted at AOC 20-003(c). The top 4 ft of the 6-ft-thick concrete pad, conduits, the manhole (structure 20-28), and miscellaneous metal debris were removed. Approximately 21.5 yd³ of concrete debris was disposed of at the Los Alamos County landfill. The remaining portion of the concrete pad that was not removed was covered with 5 to 6 ft of soil. No confirmation samples were collected during the VCA (LANL 1996, 053775, pp. 1–2).

2.9.3 Analytical Results

The locations of the 1995 samples were not provided in the 1996 RFI report (LANL 1996, 054466). Available sampling location coordinate data for the 1995 RFI samples do not associate these samples with TA-20. Because the locations associated with these sampling results could not be confirmed, these results are not decision-level data and are not presented in this HIR.

The seven samples collected from the northernmost trench during the 1995 RFI of SWMU 20-001(b) were adjacent to the former structures associated with AOC 20-003(c) (structures 20-10, 20-16, and 20-28) (see section 2.2). Copper, iron, and uranium were the only inorganic chemicals detected above BVs in these samples. Copper and iron were each detected slightly above BVs in one sample. Uranium was detected above BV in all seven samples, with a maximum concentration approximately 4 times BV. No organic chemicals were detected. Cesium-137 was the only radionuclide detected or detected above BVs/FVs and was detected in one sample at 0.26 pCi/g.

2.10 AOC 20-004, Septic System

2.10.1 Description and History

AOC 20-004, a former septic system (septic tank and drainlines), was located next to the current TA-72 small-arms firing range (Figure 2.10-1). This septic system was constructed in 1952 to serve the guardhouse (structure 20-47, now designated as 72-8) at former TA-20. The 540-gal.-capacity tank (structure 20-49) was a single-tank chamber made of 6-in. reinforced concrete, with inside dimensions of 6 ft × 6 ft × 5 ft (LASL 1951, 026066). The inlet drainline to the septic tank consisted of 6-in.-diameter vitrified clay pipe and was approximately 100 ft long. It is not clear from engineering drawings whether the system discharged to daylight. The tank ceased to be used after 1957, when the guard shack was abandoned, but was returned to service in 1966 when the TA-72 firing range opened. In 1989, the tank was collapsed and filled in. Interviews with site personnel state that the tank and associated drainlines were removed during a construction project in the early 1990s. This tank was registered with the New Mexico Environmental Improvement Division (NMEID) as an Unpermitted Individual Liquid Waste System (Registration Number LA-10). The NMEID registration states no leach bed was associated with the tank (LANL 1994, 034756, pp. 5-62–5-64).

2.10.2 Previous Investigations

In 1995, a Phase I RFI was conducted at AOC 20-004 (LANL 1996, 054466). A geophysical survey was conducted to help locate the tank. Survey data showed no subsurface anomalies, indicating the tank had been removed. Three surface (0.0 to 0.5 ft) and six subsurface (1.0 to 1.3 ft or 2.5 to 3.0 ft) samples were collected from nine locations at the former location of the septic tank and analyzed for metals, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs) (LANL 1996, 054466, p. 5-60). The samples collected in 1995 and analyses requested are presented in Table 2.0-1.

2.10.3 Analytical Results

No inorganic chemicals were detected above BVs during the 1995 investigation. Antimony, cadmium, and mercury were not detected above BVs but had detection limits above BV. Two organic chemicals, benzoic acid and butylbenzylphthalate, were detected. Each chemical was detected in one sample at concentrations less than 0.1 mg/kg.

Based on a review of engineering drawing ENG-C45621 (LANL 1989, 104234), the AOC 20-004 septic tank was actually located approximately 50 ft south/southeast of the location sampled during the 1995 RFI. Therefore, the 1995 RFI samples were not collected near the location of the former septic tank, as intended but were collected near the active sanitary wastewater drainline associated with TA-72. Because these samples were not collected at the correct location, they are not decision-level data and are not presented in Tables 2.0-2 through 2.0-4 or in figures summarizing results.

2.11 SWMU 20-005, Septic System

2.11.1 Description and History

SWMU 20-005 is a former septic system (septic tank and drainlines) that was located south of East Jemez Road in the central portion of the aggregate area (Figure 2.11-1). The system served a toilet, restroom sink, and darkroom sink in building 20-1. The system was constructed in 1945, and its use was discontinued in 1948. Engineering drawings show the tank (structure 20-27) as having 6-in.-thick concrete walls with interior dimensions of 3 ft × 6 ft × 5 ft high and a capacity of 540 gal. (LASL 1951, 024343). The

discharge point of the tank is not known. The septic system could not be located during a 1985 program conducted by the Laboratory to remove existing structures from Sandia Canyon. Although the tank could not be located, a pit-like depression was noted in the tuff in the area where the tank was believed to have been located. According to the 1985 report, excavation surrounding the area of the "pit" turned up no evidence of the tank or associated drainlines (LANL 1994, 034756, pp. 5-64–5-65).

2.11.2 Previous Investigations

In 1985, a soil sample was collected from the pit-like depression where the tank is believed to have been located. No radioactivity was detected in this sample (LANL 1994, 034756, pp. 5-64–5-65). A Phase I RFI of SWMU 20-005 was conducted during 1995. As part of the RFI, a geophysical survey was conducted to help locate the tank. Survey data indicated no subsurface anomalies, confirming that the tank had been removed. Nine subsurface samples (4.5 to 5.0 ft) were collected from nine locations in the drainage downgradient of the former location of the septic tank and analyzed for metals and cyanide (LANL 1996, 054466, pp. 5-63–5-64). Samples collected in 1995 and analyses requested are presented in Table 2.0-1.

2.11.3 Analytical Results

The only inorganic chemical detected above BVs during the 1995 investigation was lead, which was detected slightly above BV in one sample. Antimony, cadmium, and total cyanide were not detected above BVs but had detection limits above BVs.

Analytical data from the 1995 sampling event are presented in Table 2.0-2, which shows inorganic chemicals detected above BVs or having detection limits above BVs. Sampling locations and results for inorganic chemicals detected above BVs are shown in Figure 2.11-2.

3.0 SITES UNDER INVESTIGATION IN TA-53

TA-53 is located in the northeast portion of the Laboratory on Mesita de los Alamos, which is the mesa bounded by Los Alamos Canyon to the north and Sandia Canyon to the south. TA-53 is the location of the Los Alamos Neutron Science Center (LANSCE). The primary component of LANSCE is a 0.5-mi-long linear proton accelerator that produces subatomic particles for experimental physics activities and isotope production. TA-53 also contains office buildings, laboratories, and other facilities associated with operation of the accelerator. Construction of the accelerator began in 1967. Before 1967, the area occupied by TA-53 was undeveloped.

Laboratory analyses requested for TA-53 samples are presented in Table 3.0-1. Decision-level data for TA-53 are provided in Tables 3.0-2 to 3.0-4. All laboratory analytical data are provided in Appendix B.

3.1 SWMU 53-001(a), Storage Area

3.1.1 Description and History

SWMU 53-001(a) is an outdoor storage area located on the north side of the TA-53 equipment test laboratory, building 53-2 (Figure 3.1-1). This storage area consists of a covered concrete pad currently serving as a drum storage area for building 53-2. Nonpolychlorinated biphenyl (non-PCB) dielectric oil is currently stored on the concrete pad. This area was also formerly used as a satellite accumulation area. The pad is surrounded by a concrete curb to provide secondary containment. A drain valve located in the northwest corner of the curbed area was formerly used to release accumulated rainwater but is now plugged. The storage area is believed to have been first used in 1968 when operations at building 53-2

began. A 1989 photograph of the area shows the site to look much as it does today (LANL 1989, 020502). Use of the site as a satellite accumulation area ceased in 1992. A Laboratory listing of waste-accumulation areas dated April 1993 notes the satellite accumulation area on the north side of building 53-2 was removed (LANL 1993, 029415). The site was inspected during preparation of the RFI work plan in 1993, and no evidence of staining or releases was noted (LANL 1994, 034756, p. 5-38).

3.1.2 Previous Investigations

Previous investigations at SWMU 53-001(a) include a Phase I RFI conducted during 1995 and 1997 (LANL 1996, 054466; LANL 1997, 056647). In 1995, two surface soil samples (0.0 to 0.5 ft) were collected at each of four locations along the northern side of the storage pad to determine if releases had occurred (LANL 1996, 054466, p. 5-43). One sample from each location was analyzed for metals, pesticides/PCBs, total petroleum hydrocarbons (TPHs), and VOCs, and the other sample was analyzed for SVOCs (LANL 1996, 054466, p. 5-45). In 1997, one surface (0.0 to 0.5 ft) and two subsurface (0.5 to 1.0 ft and 1.0 to 1.5 ft) samples were collected at one of the 1995 sampling locations and analyzed for pesticides/PCBs. Five surface (0.0 to 0.5 ft) and one subsurface (1.0 to 1.5 ft) samples were collected at six additional locations in a drainage downgradient of the site and analyzed for PCBs (LANL 1997, 056505, p. 1).

Based on the results of the Phase I RFI, a VCA was conducted during 1997 to remove PCB-contaminated soil. Approximately 10 yd³ of soil was excavated. Following soil removal, 22 confirmation samples were collected from 16 locations. Ten of these sampling locations were just outside the boundary of the excavation, and six were at the bottom of the excavation (LANL 1997, 056505, p. 11). The sampling depth intervals were 0.0 to 0.5 ft, 0.5 to 0.8 ft, 0.7 to 1.2 ft, 0.8 to 1.2 ft, 2.5 to 3.0 ft, and 5.5 to 6.0 ft. All confirmation samples were analyzed for PCBs.

The samples collected in 1995 and 1997 and analyses requested are presented in Table 3.0-1. During the VCA, soil at the locations of four RFI samples (53-01054, 53-01518, 53-01519, and 53-01520) was excavated. Based on the results of the VCA confirmation samples, additional soil was removed at location 53-01526, including removal of the location of sample 0253-97-0080. Following this additional soil removal, a new confirmation sample (0253-97-0111) was collected at this location.

3.1.3 Analytical Results

Inorganic chemicals detected above BVs during the 1995 investigation were copper, lead, and mercury. Copper and lead were each detected slightly above BVs in one sample, and mercury was detected slightly above BV in two samples. Silver and thallium were not detected above BVs but had detection limits above BVs. Aroclor-1260 was detected in two samples, with a maximum concentration of 3.25 mg/kg. The pesticides alpha-chlordane, dieldrin, endosulfan II, and endrin aldehyde were each detected in one sample at concentrations ranging from 0.00284 mg/kg to 0.104 mg/kg. TPH was detected in four samples with a maximum concentration of 458 mg/kg.

Aroclor-1260, the only organic chemical detected during the 1997 investigation sampling, was detected in six samples with a maximum concentration of 3.9 mg/kg.

Aroclor-1260 was also the only organic chemical detected during the 1997 confirmation sampling in five confirmation samples, with a maximum concentration of 0.15 mg/kg.

Analytical data from the 1995 and 1997 sampling events are presented in Tables 3.0-2 and 3.0-3, which show inorganic chemicals detected above BVs and having detection limits above BVs and detected organic chemicals, respectively. Sampling locations and results for inorganic chemicals detected above

BV and detected organics are shown in Figures 3.1-2 and 3.1-3, respectively. The results for those samples excavated during the VCA are not representative of current site conditions and are identified by shading in the tables. The data for excavated samples are not presented in the figures but are provided in Appendix B.

3.2 SWMU 53-001(b), Storage Area

3.2.1 Description and History

SWMU 53-001(b) is an outdoor storage area located on a concrete pad that rests on the asphalt parking lot on the south side of the TA-53 equipment test laboratory, building 53-2 (Figure 3.1-1). Before 1990, this area consisted of drum racks used to store drums of products and wastes associated with maintenance activities conducted in building 53-2. Wastes included spent trichloroethene (TCE), Freon, other solvents, and acidic waste. Engineering drawings show the storage area was constructed in 1971 (LASL 1971, 023260). A photograph taken in 1989 shows the storage area contained drums, some of which were product and some of which were marked with hazardous waste labels. In addition, the photograph identifies no staining, suggesting no spills or leakage occurred (LANL 1989, 020516). In 1990, the drum racks were removed and replaced with four lockable flammable-material storage cabinets. The site was inspected during preparation of the RFI work plan in 1993, and again no evidence of staining or releases was noted (LANL 1994, 034756, p. 5-40). The Laboratory's current waste-site database indicates this storage location also contained a less-than-90-d storage area that was removed (i.e., taken out of service) in 1998. The site currently contains flammable-material storage cabinets, which are used for product storage but not for waste storage.

3.2.2 Previous Investigations

A Phase I RFI was conducted at SWMU 53-001(b) in 1995 to determine whether contaminants were present in the drainage channel downgradient of this site. This drainage channel collects surface runoff from the parking lot upon which the storage area is located. Five surface samples (0.0 to 0.3 ft, 0.0 to 0.7 ft, and 0.0 to 1.0 ft) and two subsurface samples (0.3 to 0.7 ft and 1.0 to 1.5 ft) were collected from two locations in the drainage channel (LANL 1996, 054466, p. 5-49). One surface sample from each location and one subsurface sample were analyzed for metals, PCBs, TPH, and VOCs. Two surface samples from one location and one surface sample and one subsurface sample from the other location were analyzed for SVOCs. The samples collected in 1995 and analyses requested are presented in Table 3.0-1.

3.2.3 Analytical Results

Inorganic chemicals detected above BVs during the 1995 investigation were cadmium, copper, lead, and zinc. Cadmium was detected above BV at two locations with a maximum concentration 3 times BV. Copper and lead were each detected above BVs at one location at approximately 2.5 times BV. Zinc was detected above BV at two locations with a maximum concentration 2 times BV. Antimony and mercury were not detected above BVs but had detection limits above BVs. TPH was the only organic chemical detected and was detected in three samples with a maximum concentration of 75.2 mg/kg.

Analytical data from the 1995 sampling event are presented in Tables 3.0-2 and 3.0-3, which show inorganic chemicals detected above BVs and having detection limits above BVs and detected organic chemicals, respectively. Sampling locations and results for inorganic chemicals detected above BVs and detected organic chemicals are shown in Figures 3.1-2 and 3.2-1, respectively.

3.3 SWMU 53-005, Former Waste Disposal Pit

3.3.1 Description and History

SWMU 53-005 is an inactive disposal pit located southeast of the TA-53 equipment test laboratory, building 53-2 (Figure 3.1-1). This pit measured approximately 8 ft × 8 ft × 6 ft deep and was excavated directly into the tuff. The pit was constructed in approximately 1970 and used until 1986. Historical engineering drawings indicate that solvent wastes (TCE and Freon) and acidic wastes were piped from the building 53-2 equipment test laboratory to the pit (LASL 1971, 023260). Other wastes may also have been dumped into the pit. The 1986 working draft of the Comprehensive Environmental Assessment and Response Program report describes the pit as being full of a thick brownish liquid and notes the presence of a metal grate over the pit (DOE 1986, 008657, p. TA53-3). The 1990 SWMU report states that the pit contents were removed in 1986 and the sides of the pit scraped clean. The contents of the pit were sampled during the 1986 removal, but sampling data were not reported and could not be located. The 1990 SWMU report notes that the liquid in the pit contained 4–5 ppm PCBs (LANL 1990, 007514). Equipment maintained in building 53-2 and the wastes discharged to the pit may also have contained radioactive activation products. The reported location of the disposal pit is currently vegetated and undeveloped.

3.3.2 Previous Investigations

A Phase I RFI was conducted at the disposal pit during 1995 to determine whether contaminants were present (LANL 1996, 054466). A reconnaissance-type geophysical survey was conducted at the general location of the pit to identify sampling locations. The location of the pit was not found. Additional historical research was conducted to better identify the location of the pit. The 1996 RFI report notes an expanded geophysical survey was conducted and the location of the pit was identified (LANL 1996, 054466, p. 5-57). The location of the pit was not documented in the RFI report, however, and associated documentation cannot be located.

3.3.3 Analytical Results

No previous sampling has been performed at SWMU 53-005.

3.4 SWMUs 53-006(b) and 53-006(c), Underground Storage Tanks

3.4.1 Description and History

SWMUs 53-006(b) and 53-006(c) are two identical steel underground tanks (structures 53-68 and 53-69, respectively), located west of building 53-3, Sector M (Figure 3.4-1). Together with AOC 53-006(a), SWMUs 53-006(b) and 53-006(c) comprise Consolidated Unit 53-006(b)-99. Each tank is approximately 6 ft in diameter × 12 ft long, with a capacity of approximately 2500 gal. The tanks are installed next to each other and are approximately 18 ft belowgrade. The tanks were formerly used to store radioactive liquid waste (RLW), which was generated in building 53-3 during operation of the LANSCE accelerator. Most of this RLW consisted of tritiated deionized water collected in floor drains along the length of the accelerator tunnel. The tanks received the wastewater from the floor drains and from a sink, shower, and clothes washer in building 53-502 (LANL 1994, 034756, p. 6-12). Waste flowed into the tanks through a buried 4-in.-diameter drainline. Structures 53-68 and 53-69 functioned primarily as holding tanks to allow short-lived activation products to decay before discharging the RLW to the TA-53 surface impoundments [Consolidated Unit 53-002(a)-99]. The tanks were installed in 1973 and operated until 1999 when the new TA-53 RLW system became operational.

In 2000, both tanks were emptied, high-pressure washed, and double-rinsed. The drainlines to the tanks were cut and capped, isolating the tanks. A video camera and light source were placed in the tanks to observe conditions inside the tanks. No cracks, fractures, holes, or other integrity issues were observed (LANL 2001, 070268).

The location of the two tanks is currently within the locked, fenced nuclear facility boundary associated with structure 53-59 (AOC 53-006[a]), an underground tank formerly used to store spent ion-exchange resin. AOC 53-006(a) was approved for NFA by the U.S. Environmental Protection Agency (EPA 2005, 088464) and is regulated by DOE as a Category 2 nuclear facility and nuclear environmental site.

3.4.2 Previous Investigations

In March 1999, samples were collected beneath the waste lines connected to the tanks when the lines were exposed, cut, and capped to bypass the tanks and route the RLW lines to the new TA-53 RLW system. Samples were collected at two depths at each of three locations beneath the waste lines. Samples were analyzed for VOCs, SVOCs, metals, cyanide, isotopic uranium, isotopic plutonium, strontium-90, tritium, and gamma-emitting radionuclides. The samples collected in 1999 and analyses requested are presented in Table 3.0-1.

The contents of the tanks were also sampled in accordance with a sampling and analysis plan (SAP) approved by NMED (2000, 064821). In March 2000, the contents of the tanks were removed and transferred to a high-integrity container (HIC). The material in the HIC was allowed to settle, and the liquid was removed from the HIC for treatment. The liquid was sampled to verify that it met the waste acceptance criteria (WAC) of the treatment facility. In March 2000, a sample of the sludge remaining after the liquid had been removed was collected and analyzed for VOCs, SVOCs, toxicity characteristic leaching procedure (TCLP) metals, and PCBs. The sample volume was insufficient to also analyze for total metals.

3.4.3 Analytical Results

No inorganic chemicals were detected above BVs during the 1999 sampling. Antimony, total cyanide, and selenium were not detected above BVs but had detection limits above BVs. Benzene and bis(2-ethylhexyl)phthalate were the only organic chemicals detected. Benzene was detected in three samples at a maximum concentration of 0.00078 mg/kg, and bis(2-ethylhexyl)phthalate was detected in four samples at a maximum concentration of 0.097 mg/kg. Radionuclides detected and having no BVs/FVs were europium-152, strontium-90, and tritium. Europium-152 and tritium were each detected in one sample at 1.23 pCi/g and 7.08 pCi/g, respectively. Strontium-90 was detected in two samples at a maximum activity of 1.45 pCi/g.

Analytical data from the 1999 sampling event are presented in Tables 3.0-2, 3.0-3, and 3.0-4, which show inorganic chemicals having detection limits above BVs, detected organic chemicals, and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for detected organic chemicals and radionuclides detected or detected above BVs/FVs are shown in Figures 3.4-2 and 3.4-3, respectively.

The results of the tank sludge sampling were reported to NMED in March 2001 (LANL 2001, 070268). No organic chemicals were detected in the sludge associated with SWMUs 53-006(b) and 53-006(c). The only TCLP metals detected were barium (0.338 mg/L), cadmium (0.151 mg/L), and lead (0.187 mg/L), which were detected below TCLP regulatory levels. Because these data were collected for waste characterization purposes, they are not included with the environmental data presented in Appendix B.

3.5 SWMUs 53-006(d) and 53-006(e), Underground Storage Tanks

3.5.1 Description and History

SWMUs 53-006(d) and 53-006(e) (structures 53-144 and 53-145, respectively) comprise the two compartments of an inactive underground tank associated with the RLW system at TA-53. SWMUs 53-006(d) and 53-006(e) also comprise Consolidated Unit 53-006(d)-99. This tank, located directly south of building 53-622 (Figure 3.5-1), measures approximately 20 ft long × 12 ft wide × 10 ft high. The tank is approximately 10 ft belowgrade and constructed of 1-ft-thick reinforced concrete with a 1-ft-thick reinforced concrete divider wall between the two compartments. SWMUs 53-006(d) and 53-006(e) were used to store RLW generated in the Weapons Neutron Research facility. Wastes received by these tank compartments included drainage from floor drains in the beam line, target, and experimental areas in building 53-7; drainage from beneath a contaminated deionized water pump stand in building 53-8; drainage from contaminated floor drains and sink drains in building 53-30; drainage from the deionized water system in building 53-30; and discharges from an equipment room floor drain in building 53-368 (LANL 1994, 034756, p. 6-12). A buried 4-in. waste line conveyed RLW to the tank. The tank compartments were used primarily as holding areas to allow short-lived activation products to decay before discharging the RLW to the TA-53 surface impoundments [Consolidated Unit 53-002(a)-99]. The tank was installed in 1977 and operated until 1999 when the new TA-53 RLW system became operational.

In 2000, both tank compartments were emptied, high-pressure washed, and double-rinsed. The drainlines to the tank were cut and capped, isolating the tank. A video camera and light source were placed in the tank to observe conditions inside the tank. No cracks, fractures, holes, or other integrity issues were observed (LANL 2001, 070268). Facility staff reported that the tanks were backfilled with sand following decontamination. The pumps and piping formerly at the surface have been removed, and the tank is currently located beneath a recent addition to building 53-30 housing experimental equipment and is inaccessible.

3.5.2 Previous Investigations

In March 1999, the waste lines connected to the tanks were exposed, cut, and capped to bypass the tanks and reroute the lines to the new TA-53 RLW system. During these activities, samples were collected at two depths at each of two locations beneath the waste lines. Samples were analyzed for VOCs, SVOCs, metals, cyanide, isotopic uranium, isotopic plutonium, strontium-90, tritium, and gamma-emitting radionuclides. The samples collected and analyses requested are presented in Table 3.0-1.

The contents of the tanks were also sampled in accordance with a SAP approved by NMED (2000, 064821). In February 2000, the contents of the tanks were removed and transferred to an HIC. The material in the HIC was allowed to settle, and the liquid was removed from the HIC for treatment. The liquid was sampled to verify that it met the waste acceptance criteria of the treatment facility. In March 2000, a sample of the sludge remaining after the liquid had been removed was collected and analyzed for VOCs, SVOCs, target analyte list (TAL) metals, and PCBs. Because of the low solids content of the sample, it was analyzed as a liquid instead of as a sludge, as requested. An additional sample having higher solids content was collected in April 2000 and analyzed for SVOCs, TAL metals, TCLP metals, and PCBs.

3.5.3 Analytical Results

No inorganic chemicals were detected above BVs during the 1999 sampling. Antimony, total cyanide, mercury, and selenium were not detected above BV but had detection limits above BVs. Bis(2-ethylhexyl)phthalate, 2-butanone, and di-n-butylphthalate were the only organic chemicals detected. Bis(2-ethylhexyl)phthalate and 2-butanone were each detected in two samples at maximum concentrations of 0.12 mg/kg and 0.068 mg/kg, respectively. Di-n-butylphthalate was detected in one sample at 0.052 mg/kg. Strontium-90 was the only radionuclide detected and was detected in two samples at a maximum activity of 1.23 pCi/g.

Analytical data from the 1999 sampling event are presented in Tables 3.0-2, 3.0-3, and 3.0-4, which show inorganic chemicals having detection limits above BVs, detected organic chemicals, and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for detected organics and radionuclides detected or detected above BVs/FVs are shown in Figures 3.5-2 and 3.5-3, respectively.

The results of the tank sludge sampling were reported to NMED in March 2001 (LANL 2001, 070268). Organic chemicals detected in the sludge associated with SWMUs 53-006(d) and 53-006(e) were bis(2-ethylhexyl)phthalate (9.78 mg/kg), four polycyclic aromatic hydrocarbons (PAHs) (2.79 mg/kg to 4.9 mg/kg), ethylbenzene (0.084 mg/kg), methylene chloride (0.0081 mg/kg), and Aroclor-1254 (0.731 mg/kg). Twenty metals were detected, with iron having the highest concentration (26,400 mg/kg). The only TCLP metals detected were barium (2.60 mg/L) and chromium (0.011 mg/kg), which were detected below TCLP regulatory levels. Because these data were collected for waste characterization purposes, they are not included with the environmental data presented in Appendix B.

3.6 SWMU 53-006(f), Underground Storage Tank

3.6.1 Description and History

SWMU 53-006(f) is an inactive 3000-gal. storage tank located beneath the D Wing basement floor of building (53-1), an office, and laboratory (Figure 3.6-1). This tank was used from 1972 to 1996 to store neutralized RLW generated in building 53-1 radiochemistry laboratories. The storage tank received treated waste from an aboveground neutralization treatment tank [SWMU 52-007(a) discussed in section 3.7.1]. When sufficient wastes accumulated in the storage tank, the contents were removed for further treatment or disposal by pumping to a tank truck located on a transfer pad outside the southwest corner of building 53-1. The transfer pad had a spill-collection sump that drained back into the storage tank. The sump drain could be plugged to prevent rainwater from entering the RLW system (Santa Fe Engineering Ltd. 1993, 031756; LANL 1994, 034756, p. 6-2). Although the storage tank was intended only to manage radioactive waste, an unintended mercury spill in one of the radiochemistry laboratories in building 53-1 entered the neutralization tank, which drained into this storage tank. As a result, the contents of the storage tank were sampled and found to contain hazardous wastes (LANL 1999, 063459). The contents were subsequently removed, and the storage tank was decontaminated by steam cleaning. The storage tank was taken out of service in August 1996. The tank is currently empty, and all piping into and out of the tank has been cut and capped. The access doors into the tank are locked, and a spill-containment berm has been placed around the tank to prevent any spills inside the building from entering the tank.

3.6.2 Previous Investigations

No previous investigations have been conducted at SWMU 53-006(f).

3.6.3 Analytical Results

There are no analytical results for SWMU 53-006(f).

3.7 SWMU 53-007(a), Aboveground Neutralization Tank

3.7.1 Description and History

SWMU 53-007(a) is an inactive 50-gal. aboveground tank located in the D Wing basement of an office and laboratory building (53-1) at TA-53 (Figure 3.6-1). This tank was used from 1972 to 1996 to neutralize RLW generated in the radiochemistry laboratories in building 53-1. The sources of these wastes were cup drains, an emergency eye wash/shower drain, and a floor sink drain. The wastes were collected in the tank where they were neutralized with sodium hydroxide. After neutralization, the treated wastes were drained to an underground tank located beneath the basement floor [SWMU 53-006(f)]. The neutralization tank was intended only to manage radioactive waste. However, a 1990 RCRA inspection by NMED identified the potential for SWMU 53-007(a) to have received mercury from an unintentional spill in one of the radiochemistry laboratories in building 53-1. As a result, the contents of the neutralization tank were sampled and found to contain hazardous wastes (LANL 1999, 063459). The contents were subsequently removed, and the tank was decontaminated by steam cleaning. The neutralization tank is currently empty, and all piping into and out of the tank has been cut and capped.

3.7.2 Previous Investigations

No previous investigations have been conducted at SWMU 53-007(a).

3.7.3 Analytical Results

There are no analytical results for SWMU 53-007(a).

3.8 AOC 53-008, Storage Area

3.8.1 Description and History

AOC 53-008 is an unpaved open area (referred to as a "Boneyard") used to store used materials and equipment associated with experiments conducted at TA-53. This storage area, approximately 3 to 4 acres in size, is irregularly shaped and located north, east, and south of the former TA-53 surface impoundments [Consolidated Unit 53-002(a)-99] (Figure 3.8-1). Most of the storage area is vegetated with grasses, shrubs, and juniper trees; several dirt trails also run through it. Materials shown to be present at the site in 1989 photographs include vacuum pumps, metal ducting, concrete shielding blocks, empty overpack drums, and drums containing steel bearings (LANL 1989, 020616; LANL 1989, 020614; LANL 1989, 020615). This site was inspected in September 1993 during preparation of the RFI work plan and found to contain shielding blocks (magnetite concrete and steel), concrete, steel, other metallic debris, and other miscellaneous items. No hazardous materials or chemicals were observed, with the exception of lead stored in a shed (structure 53-621) at the south end of the site (LANL 1994, 034756, p. 5-44).

This area has been used for storage from approximately 1972 to the present; currently, much of the material that was previously stored at the site has been removed.

3.8.2 Previous Investigations

A Phase I RFI was conducted at AOC 53-008 during 1995 to determine whether contaminants were present at the site (LANL 1996, 054466). The Phase I RFI included conducting a radiation survey of the site, followed by collection of 11 surface samples (0.0 to 0.5 ft) at locations determined by the results of the radiation survey (LANL 1997, 056384). All samples were submitted for laboratory analysis of metals and gamma-emitting radionuclides. In 1998, three additional surface samples (0.0 to 0.2 ft) were collected within the boundary of AOC 53-008 at the location of the proposed new TA-53 radioactive liquid waste treatment facility (RLWTF) and analyzed for metals, gross-alpha-beta radioactivity, and gamma-emitting radionuclides. Samples collected in 1995 and 1998 and the analyses requested are presented in Table 3.0-1.

Investigation and cleanup activities were conducted at the former surface impoundments [Consolidated Unit 53-002(a)-99] located east of AOC 53-008 from 1999 to 2002 (LANL 2004, 085221). Some of the sampling performed to characterize potential releases from the impoundments was conducted on the mesa top within the boundary of AOC 53-008. Specifically, samples were collected at the head of the drainage east of the impoundments. Five surface samples (0.0–0.25 ft, 0.0–0.3 ft, and 0.0–0.5 ft) and six subsurface samples (0.3–0.8 ft, 1.0–2.0 ft, 4.0–5.0 ft, 14.0–15.0 ft, 28.9–30.0 ft, and 49.0–50.0 ft) were collected at seven locations. Samples were analyzed for various analytes, including metals, SVOCs, VOCs, PCBs, gamma-emitting radionuclides, isotopic plutonium, isotopic uranium, strontium-90, and tritium. The samples collected and analyses requested are presented in Table 3.8-1, and sampling locations are shown in Figure 3.8-2.

In 2001 and 2002, samples were also collected farther down the drainage, which receives runoff from AOC 53-008 in addition to previously having received discharges from the impoundments. Twenty-one surface samples and 26 shallow subsurface samples (1.7-ft maximum sample depth) were collected at 28 locations. These samples were analyzed for various analytes, including metals, hexavalent chromium, herbicides, PAHs, PCBs, pesticides, SVOCs, VOCs, americium-241, gamma-emitting radionuclides, tritium, isotopic plutonium, isotopic uranium, and strontium-90. Samples collected and analyses requested are presented in Table 3.8-1, and sampling locations are shown in Figure 3.8-2.

3.8.3 Analytical Results

RFI Sampling

Cadmium was the only inorganic chemical detected above BV in one sample during the 1995 RFI sampling. Antimony and mercury were not detected above BVs but had detection limits above BVs. Cesium-134 and cobalt-60 were the only radionuclides detected and have no BVs/FVs. Cesium-134 was detected in one sample at 6.22 pCi/g, and cobalt-60 was detected in two samples at a maximum activity of 2.69 pCi/g.

Antimony and lead were the only inorganic chemicals detected above BVs during the 1998 sampling. Antimony was detected slightly above BV in two samples. Lead was detected in one sample at approximately 3.5 times BV. No radionuclides were detected.

Analytical data from the 1995 and 1998 sampling events are presented in Tables 3.0-2 and 3.0-4, which show inorganic chemicals detected above BVs and having detection limits above BVs and radionuclides detected or detected above BVs/FVs, respectively. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 3.8-3 and 3.8-4, respectively.

Sampling at Head of Drainage

Aluminum, arsenic, barium, calcium, chromium, copper, magnesium, selenium, and zinc were detected above BVs in samples collected at the head of the drainage during the impoundments investigation. Aluminum, arsenic, barium, chromium, copper, and magnesium were detected at less than 3 times BV in one sample. Zinc was detected in one sample slightly above BV, and calcium was detected in two samples less than 2 times BV. Selenium was detected in three samples with a maximum concentration 2.5 times BV.

Benzyl alcohol, bis(2-ethylhexyl)phthalate, dichlorodifluoroethane, and phenol were the only organic chemicals detected in the samples collected at the head of the drainage. Each was detected in only one sample and at a maximum concentration of 0.063 mg/kg.

Cesium-134, cobalt-60, sodium-22, strontium-90, and tritium were the only radionuclides detected or detected above FV. Cesium-134, which has no FV, was detected in two samples at a maximum activity of 0.71 pCi/g. Cobalt-60, which has no FV, was detected in five samples with a maximum activity of 3.7 pCi/g. Sodium-22, which has no FV, was detected in one sample at 0.28 pCi/g. Strontium-90 was detected above its FV in three surface samples, with a maximum activity of 4.98 pCi/g. Strontium-90 was also detected in three subsurface samples at a maximum activity of 2.08 pCi/g.

Analytical data from the sampling performed at the head of the drainage in 1999 and 2002 are presented in Tables 3.8-2, 3.8-3, and 3.8-4, which show inorganic chemicals detected above BVs and having detection limits above BVs, detected organic chemicals, and radionuclides detected or detected above BVs/FVs, respectively. .

Drainage Reach Sampling

Antimony, copper, lead, and selenium were the only inorganic chemicals detected above BVs in the reach sampling. Antimony was detected in one sample at approximately 10 times BV. Lead was detected at approximately 3 times BV or less in 11 samples. Selenium was detected slightly above BV in six samples.

Organic chemicals detected in the reach samples were acetone (4 samples); Aroclor-1254 (21 samples); Aroclor-1260 (5 samples); benzoic acid (2 samples); benzyl alcohol (1 sample); bromomethane (1 sample); 2-chlorotoluene (1 sample); 2,4,-D ([2,4-dichlorophenoxyacetic acid] 1 sample); dalapon (1 sample); 2,4,DB ([4-(2,4-dichlorophenoxy)butyric acid] 1 sample); 4,4'-DDE ([4,4'-dichlorophenyltrichloroethylene] 5 samples); 4,4'-DDT ([4,4'-dichlorodiphenyltrichloroethane] 3 samples); 1,2-dichlorobenzene (2 samples); 1,3-dichlorobenzene (3 samples); 1,4-dichlorobenzene (5 samples); dichlorofluoromethane (1 sample); cis/trans-1,2-dichlorethene (1 sample); fluoranthene (1 sample); hexachlorobenzene (1 sample); 4-isopropyltoluene (4 samples); tetrachloroethene (1 sample); toluene (14 samples); trichloroethene (4 samples); trichlorotrifluoroethane (1 sample); and total xylene (2 samples). All detected concentrations were less than 1 mg/kg, and most were near or below the estimated quantitation limit.

Americium-241, cesium-134, cesium-137, and cobalt-60 were the only radionuclides detected or detected above FVs in the reach samples. Americium-241 was detected in two samples at a maximum activity of 0.163 pCi/g. Cesium-134 was detected in 25 samples with a maximum activity of 1.95 pCi/g. Cesium-137 was detected in two samples at a maximum activity of 1.02 pCi/g. Cobalt-60 was detected in 25 samples with a maximum activity of 5.83 pCi/g.

Analytical data from the sampling performed in the drainage reaches in 2001 and 2002 are presented in Tables 3.8-2, 3.8-3, and 3.8-4, which show inorganic chemicals detected above BVs and having detection

limits above BVs, detected organic chemicals, and radionuclides detected or detected above BVs/FVs, respectively.

3.9 AOC 53-009, Former Storage Area

3.9.1 Description and History

AOC 53-009 is an unpaved area formerly used to store liquid scintillation oil used in experiments conducted at TA-53. This area is located north of the inactive TA-53 surface impoundments [Consolidated Unit 53-002(a)-99] (Figure 3.9-1). The date this storage area started operation is not known. The 1990 SWMU report describes this storage area as an earth-bermed area containing three aboveground-storage tanks (LANL 1990, 007514). The three tanks and earthen containment berm, which appears to be approximately 2 ft high, are shown in a 1989 photograph (LANL 1989, 020608). This photograph also shows twenty-five 55-gal. drums within the containment berm. Another photograph taken on the same day shows soil staining near one of the tanks (LANL 1989, 020609). This earthen-bermed area was later replaced with two steel containment structures (structures 53-1071 and 53-1072), each of which measured 30 ft × 60 ft × 3 ft high. Both containment structures were lined with 0.125-in.-thick butyl rubber to prevent the release of spills. This storage area was inspected in 1993 during preparation of the RFI work plan (LANL 1994, 034756, p. 6-33). At that time, three aboveground tanks, each containing 30,000 gal. liquid scintillation oil, were present in the western containment (structure 53-1071). The scintillation liquid was mineral-oil based and contained a small fraction of pseudocumene (1,2,4-trimethylbenzene). In addition, thirty 55-gal. drums were present. The drums also contained liquid scintillation oil. These drums were covered with a canvas tarp. Four empty tanks and 141 55-gal. drums of liquid scintillation oil, were present in the eastern containment (structure 53-1072). These drums were also covered with a canvas tarp. At the time this area was inspected, no staining was observed. Laboratory facility engineering records state that structure 53-1071 was removed in March 2003, and structure 53-1072 was removed in November 1998.

3.9.2 Previous Investigations

In September 2006, two subsurface samples were collected at the location of structure 53-1071 as part of closeout activities for removal of this structure. Samples were submitted for analysis of VOCs, SVOCs, and TPH-diesel range organics (DRO). These samples were collected using EP procedures and submitted for analysis through the Sample Management Office (SMO). Samples collected and analyses requested are presented in Table 3.0-1.

3.9.3 Analytical Results

The only organic chemical detected during the 2006 sampling was TPH-DRO, which was detected in one sample at 4.35 mg/kg. No VOCs or SVOCs were detected.

Analytical data from the 2006 sampling event are presented in Table 3.0-3. Sampling locations and results for detected organic chemicals are shown in Figure 3.9-2.

3.10 AOC 53-010, Former Storage Area

3.10.1 Description and History

AOC 53-010 is an unpaved former storage area used to store scintillation liquid in tanks and drums. This former storage area is located approximately 150 ft southeast of building 53-1031 (Figure 3.10-1). The

storage area measured 30 ft × 35 ft and was surrounded by 2-ft-high soil berms. The bottom and sidewalls of the storage area were lined with a reinforced welded geomembrane, which was covered with soil. The 1990 SWMU report notes this site was used in 1989 and 1990 to store scintillation liquid in two 3000-gal. tanks and eighteen 55-gal. drums (LANL 1990, 007514). The scintillation liquid was mineral-oil based and contained a small fraction of pseudocumene (1,2,4-trimethylbenzene). A 1989 photograph shows two tanks labeled “mineral oil” and approximately 12 drums (LANL 1989, 020636). The tanks and drums were removed in 1990 when the site was closed. Two small areas of stained soil were also removed at that time. The storage area was inspected in 1993 during preparation of the RFI work plan. The cover soil at the top of the berms had been eroded in some places, exposing the membrane liner and causing deterioration. Several circular indentations caused by drum storage were noted in the soil (LANL 1994, 034756, p.5-48). However, no evidence of staining was noted during the inspection. At present, the site is partially vegetated.

3.10.2 Previous Investigations

A Phase I RFI was conducted at AOC 53-010 during 1995 (LANL 1996, 054466). The Phase I RFI included collecting six surface samples (0.0 to 0.2 ft and 0.0 to 0.3 ft) from above the liner within the bermed area. These samples were submitted for laboratory analysis of SVOCs and TPH (ICF Kaiser Engineers 1995, 056781, p. 1).

Based on the results of the Phase I RFI sampling, a VCA was conducted in 1995 (LANL 1996, 053776). VCA activities included removing the cover soil from above the membrane liner, removing the membrane liner, inspecting the soil beneath the liner for evidence of staining (none was found), collecting six confirmation samples of soil from beneath the liner (0.0 to 0.08 ft and 0.0 to 0.5 ft), removing the soil berms, and regrading and reseeding the site. Confirmation samples were submitted for laboratory analysis of VOCs (LANL 1996, 053776, pp. 5–6). The samples collected and analyses requested are presented in Table 3.0-1.

3.10.3 Analytical Results

TPH was detected in the 1995 RFI soil samples at concentrations ranging from 7.93 to 5100 mg/kg (Table 3.0-3). No SVOCs were detected. During the VCA, these sample locations, which are all above the membrane liner, were excavated (these samples are indicated by shading in Table 3.0-3). These results, therefore, are no longer representative of site conditions. No organic chemicals were detected in the 1995 VCA confirmation samples.

3.11 AOC 53-012(e), Drainline and Outfall

3.11.1 Description and History

AOC 53-012(e) is a drainline and former outfall associated with the TA-53 equipment test laboratory (building 53-2). The drainline runs southwest under an asphalt parking lot approximately 140 ft from the southwest corner of building 53-2 and then changes direction, running northwest approximately 50 ft to the associated outfall near the edge of Sandia Canyon (Figure 3.1-1). The drainline received discharges from 12 trench drains, 2 sink drains, and a floor drain in building 53-2. The primary source of wastewater was blowdown from the building 53-2 cooling tower, which was discharged to one of the trench drains. Historically, chemicals added to the cooling water included sodium molybdate and hydroxyethylidene diphosphonic acid as corrosion inhibitors; 1-bromo-3-chloro-5,5-dimethylhydantoin as a microbicide; and sodium bisulfite as an oxygen scavenger. The trench drains also received equipment-flushing and floor-washing wastewater (LANL 1994, 034756, pp. 5-74–5-76). Discharges to this outfall began in

approximately 1968, when building 53-2 went into service. This outfall was included in the Laboratory's National Pollutant Discharge Elimination System (NPDES) permit as outfall 03A114. Discharges to this outfall ceased, and the outfall was removed from the NPDES permit on July 11, 1995. The drainline is still in place, but the outfall has been plugged.

3.11.2 Previous Investigations

A Phase I RFI was conducted at AOC 53-012(e) during 1995 (LANL 1996, 054466). The Phase I RFI included a geomorphic survey conducted downstream of the outfall to identify sediment catchments. Two surface samples (0.0 to 0.3 ft and 0.0 to 0.7 ft) were collected at each of three locations in the sediment catchments (LANL 1995, 054466, p. 5-66). One sample from each location was submitted for analysis of TAL metals, VOCs, pesticides/PCBs, and TPH. The other sample from each location was submitted for analysis of SVOCs (LANL 1995, 054466, p. 5-67). The samples collected and analyses requested are presented in Table 3.0-1.

3.11.3 Analytical Results

Inorganic chemicals detected above BVs during the 1995 investigation were antimony, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. Antimony and cadmium were each detected in three samples at a maximum concentration of 3 times BV. Chromium was detected in one sample slightly above BV. Copper was detected in three samples at a maximum concentration of 18 times BV. Lead was detected in two samples at less than 2 times BV. Mercury was detected in one sample at approximately 3 times BV. Nickel was detected in one sample at less than 2 times BV. Silver was detected in one sample at approximately 2.5 times BV. Zinc was detected in three samples with a maximum concentration of 4.5 times BV. Thallium was not detected above BV but had detection limits above BV.

Organic chemicals detected were Aroclor-1248, Aroclor-1254, Aroclor-1260, alpha-chlordane, gamma-chlordane, dieldrin, endosulfan II, endrin aldehyde, and TPH. Aroclor-1248 was detected in three samples at a maximum concentration of 0.76 mg/kg. Aroclor-1254 was detected in one sample at 0.351 mg/kg. Aroclor-1260 was detected in two samples at a maximum concentration of 0.335 mg/kg. Alpha-chlordane, gamma-chlordane, and dieldrin were detected in one sample each at 0.00804 mg/kg, 0.00376 mg/kg, and 0.0156 mg/kg, respectively. Endosulfan II was detected in three samples at a maximum concentration of 0.00993 mg/kg. Endrin aldehyde was detected in two samples at a maximum concentration of 0.00599 mg/kg. TPH was detected in three samples at a maximum concentration of 2090 mg/kg.

Analytical data from the 1995 Phase I RFI sampling are presented in Tables 3.0-2 and 3.0-3, which show inorganic chemicals detected above BVs and having detection limits above BVs and detected organic chemicals, respectively. Sampling locations and results for inorganic chemicals detected above BVs and detected organic chemicals are shown in Figures 3.1-2 and 3.2-1, respectively.

3.12 AOC 53-013, Lead Spill Site

3.12.1 Description and History

AOC 53-013 is a lead spill site located near the east end of TA-53, northeast of buildings 53-10 and 53-315, which are part of the LANSCE accelerator facility (Figure 3.12-1). Lead shot is present within two fenced areas approximately 50 ft × 80 ft and 60 ft × 180 ft, that are used for storage and as a staging area for equipment used in beam experiments. The lead shot was used as radiation shielding for experiments conducted in building 53-10. The shot ranges from 1.5 mm to 4 mm in diameter and is mixed into the sandy soil present at the site. Previously, some of the shot was visible on the ground surface. The shot

was spilled at the site during assembly of components containing the shot and was also released from defective containers (ICF Kaiser Engineers 1995, 058172, p. 2). The dates the shot was spilled onto the ground surface are not known but could date as far back as the late 1960s or the early 1970s, when accelerator operations began. This site was not originally identified in the 1990 SWMU report (LANL 1990, 007514) but was discovered after the Operable Unit (OU) 1100 RFI work plan had been prepared (LANL 1994, 034756). Both areas are presently fenced and locked, and the westernmost area is posted as a radiological control area.

3.12.2 Previous Investigations

In July 1995, after this site was discovered, a sample of soil containing visible lead shot was collected to characterize the concentrations of lead present. This sample was analyzed for total lead and TCLP lead using an on-site laboratory. A portion of the sample was sieved to determine the amount of lead in different size fractions.

Soil outside the areas of visible lead contamination was also sampled in 1995 as part of planning activities for a VCA. Ten soil samples for screening were collected inside and outside the storage areas (ICF Kaiser Engineers 1995, 058172, p. 3). These samples were screened for lead using x-ray fluorescence (XRF), and lead was detected in one sample collected near the entrance to the southern storage area. No other investigations have been conducted at this site and, although a VCA plan was prepared (ICF Kaiser Engineers 1995, 058172), the VCA was not implemented.

3.12.3 Analytical Results

The concentration of lead in the soil sample collected in July 1995 for laboratory analysis was 110,000 mg/kg for the total (unsieved) sample, 72,400 mg/kg for the fraction less than 1.7 mm, and 210,200 mg/kg for the fraction between 1.7 mm and 4 mm. The TCLP results were 129 mg/L in the total sample, 168 mg/L for the size fraction less than 1.7 mm, and 155 mg/L for the size fraction between 1.7 mm and 4 mm (ICF Kaiser Engineers 1995, 058172, p. 2).

3.13 AOC 53-014, Lead Spill Site

3.13.1 Description and History

AOC 53-014, a lead spill site, is located at a paved storage area in TA-53 west of building 53-18. The lead shot was spilled on the paved surface, and stormwater washed the lead into an asphalt channel that joins a drainage below an NPDES-permitted outfall (03A113) (Figure 3.13-1). The lead shot was observed at a number of locations in the channel but was not detected below a large catchment approximately 50 ft below the canyon rim (ICF Kaiser Engineers 1995, 058172, pp. 4–5). This site was not originally identified in the 1990 SWMU report (LANL 1990, 007514) but was discovered only after the OU 1100 RFI work plan (LANL 1994, 034756) had been prepared.

3.13.2 Previous Investigations

In August 1995, sediment in the channel was sampled as part of planning activities for a VCA. Fifteen sediment samples were collected in the drainage below the extent of visible lead contamination (ICF Kaiser Engineers 1995, 058172, p. 5). These samples were screened for lead using XRF, and no lead was detected.

In 1997, a VCA was conducted at AOC 53-014. The VCA included removing all lead shot from the paved area, the asphalt channel, and the drainage below NPDES Outfall 03A113 (LANL 1997, 062913). To minimize impacts to the drainage, visible lead was picked up by hand, and sediment was sieved to remove lead. After the lead was removed, five surface sediment samples were collected from the drainage as confirmatory samples (Figure 3.13-1). These samples were submitted for analysis of lead. Samples collected and analyses requested are presented in Table 3.0-1.

3.13.3 Analytical Results

Lead was detected slightly above BV in two of the 1997 VCA confirmation samples.

Analytical data from the 1997 VCA confirmation samples are presented in Table 3.0-2, which shows inorganic chemicals detected above BVs. Sampling locations and results for inorganic chemicals detected above BVs are shown in Figure 3.13-2.

3.14 SWMU 53-015, Wastewater Treatment Facility

3.14.1 Description and History

SWMU 53-015 is the current RLW management system for TA-53. This system was constructed just east of the former wastewater impoundments (Consolidated Unit 53-002[a]-99) (Figure 3.8-1) to replace the former TA-53 RLW system, which included underground tanks [SWMUs 53-006(b-e)] and a surface impoundment [SWMU 53-002(b)]. This system consists of two lift stations, three 30,000-gal. double-walled tanks in an underground vault, two evaporation basins, and underground double-walled piping. SWMU 53-015 also includes some of the existing underground piping from the former RLW system. SWMU 53-015 began operation in October 1999.

Because SWMU 53-015 did not begin operation until 1999, it was not originally identified in the 1990 SWMU report (LANL 1990, 007514) or in the 1994 RFI work plan for OU 1100 (LANL 1994, 034756).

In October 1999, the Laboratory and DOE agreed with NMED to notify NMED of the existence of this system as a new SWMU, with the understanding it not be subject to a compliance schedule for corrective actions in Module VIII of the Laboratory's Hazardous Waste Facility Permit. SWMU 53-015 is listed in Module VIII for tracking purposes only. The Laboratory and DOE agreed with NMED that when this system ceases operation, it will be evaluated to determine whether releases have occurred (DOE 1999, 098985).

3.14.2 Previous Investigations

No previous investigations have been conducted at SWMU 53-015.

3.14.3 Analytical Results

There are no analytical results for SWMU 53-015.

4.0 SITES UNDER INVESTIGATION IN TA-72

The portion of TA-72 within the Lower Sandia Canyon Aggregate Area consists of the eastern portion of Sandia Canyon within the Laboratory boundary. TA-72 is in the eastern portion of the Laboratory, bounded by TA-05 and San Ildefonso Pueblo to the south, TA-74 to the north, TA-53 to the west, and

Bandelier National Monument to the east. The majority of TA-72 is vacant land that serves as a safety and security buffer. The primary active operations at TA-72 occur within the lower portion of Sandia Canyon and consist of a small-arms firing range used by the Laboratory's security force for training purposes. This range has been in use since 1966. Two Laboratory water-supply wells (Pajarito Wells 1 and 3), each with associated facilities (chlorinator and pump station), are located within TA-72.

Laboratory analyses requested for TA-72 samples are presented in Table 4.0-1. Decision-level data for TA-72 are provided in Table 4.0-2. All laboratory analytical data are provided in Appendix B.

4.1 AOC 72-001, Small Arms Firing Range

4.1.1 Description and History

AOC 72-001 consists of an active small arms firing and training range used by the Laboratory's security force. The firing range is located in Sandia Canyon at the west end of TA-72 (Figure 2.10-1) and has been operational since 1966. It includes a 175-ft × 250-ft firing range surrounded by earthen berms, an adjacent skeet-shooting range, and administrative buildings. The drainage channel and flood plain of Sandia Canyon run through the middle of the firing range. Structures at this site include an office building (building 72-8, a former guard station), range house (building 72-9), scoring area (building 72-10), firing station (building 72-11), weapons cleaning area (building 72-12), storage buildings (72-13 and 72-14), and canopies 3 and 4 (buildings 72-15 and 72-16) (LANL 1990, 007514). Lead is present within the firing range because bullets are scattered at the base of the berms and cliffs, and lead shot from skeet shooting is visible on the ground (LANL 1994, 034756. pp. 2-9, 5-22).

In 1995, as part of a VCA conducted at SWMU 00-016 (an inactive small-arms firing range), NMED concurred with the Laboratory's request to move lead-contaminated soil from the inactive range to the active AOC 72-001 firing range (DOE 1995, 046257). During the second phase of the VCA implemented at SWMU 00-016 in 1996 and 1997, lead was removed from soil stockpiled from berms at the former firing range using dry sieving. Approximately 4660 yd³ of soil from SWMU 00-016 was transported to TA-72 and placed on the berms located along the north side of the AOC 72-001 firing range and along the berm located between, and north of, canopies 3 and 4 (LANL 1997, 056737).

4.1.2 Previous Investigations

A Phase I RFI was conducted at AOC 72-001 in 1995. After a geomorphic survey was performed to locate sediment catchments downstream of the small-arms firing range, seven surface sediment samples (0.0 to 1.0 ft) were collected from seven locations (LANL 1996, 054466, pp. 5-40–5-41). Surface radiological screening was performed before the start of intrusive activities; screening results showed no radioactivity above local background. HE spot tests and gross-radiation screening were performed on each sediment sample to be submitted for laboratory analysis. No HE was detected and no radiation levels above local background were detected. Samples were analyzed for TAL metals. The samples collected in 1995 and analyses requested are presented in Table 4.0-1.

4.1.3 Analytical Results

Selenium was the only inorganic chemical detected above BV in the 1995 investigation. Selenium was detected in one sample at approximately 3 times BV. Mercury, silver, and thallium were not detected above BVs but had detection limits above BVs.

Analytical data from the 1995 Phase I RFI sampling are presented in Table 4.0-2, which shows inorganic chemicals detected above BVs or having detection limits above BVs. Sampling locations and results for inorganic chemicals detected above BV are shown in Figure 4.1-1.

5.0 REFERENCES AND MAP DATA SOURCES

5.1 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. This information is also included in text citations. ER IDs are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

Buckland, C., November 5, 1946. "Sandia Canyon," Los Alamos Scientific Laboratory memorandum to D.P. MacMillan from C. Buckland, Los Alamos, New Mexico. (Buckland 1946, 005998)

Buckland, C., April 20, 1948. "Sandia Canyon—Clearing for Future Public Road, Picnic Area," Los Alamos Scientific Laboratory memorandum to R.J. Westcott from C. Buckland, Los Alamos, New Mexico. (Buckland 1948, 006001)

Courtright, W.C., September 28, 1962. "Inspection for Possible Explosive Contamination of TA-20, Sandia Canyon Site, and TA-27, Gamma Site," Los Alamos Scientific Laboratory memorandum to R. Reider from W.C. Courtright (H-3), Los Alamos, New Mexico. (Courtright 1962, 005971)

DOE (U.S. Department of Energy), October 29, 1986. "Los Alamos Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment," draft, Los Alamos, New Mexico. (DOE 1986, 008657)

DOE (U.S. Department of Energy), January 1998. "Environmental Survey Preliminary Report, Los Alamos National Laboratory, Los Alamos, New Mexico," report no. DOE/EH/OEV-12P, DE91-002506, Environment, Safety and Health, Office of Environmental Audit, Washington, D.C. (DOE 1988, 008609)

DOE (U.S. Department of Energy), 1995. "NMED-HRMB Request for Information Prior to Decision Concerning SWMU 0-016: Movement of Lead Contaminated Soil to TA-72," U.S. Department of Energy memorandum and attachment to J. Jansen (EM/ER) from T. Taylor (DOE ER Program Manager), Los Alamos, New Mexico. (DOE 1995, 046257)

DOE (U.S. Department of Energy), October 12, 1999. "Status Report of Activities at the TA-53 New Radioactive Liquid Waste Treatment Facility (RLWTF) Plant and Notification of a New Solid Waste Management Unit (SWMU) at Los Alamos National Laboratory (LANL)," U.S. Department of Energy letter to R.S. Dinwiddie (NMED-HRMB) from H.L. Plum (DOE-LAAO), Los Alamos, New Mexico. (DOE 1999, 098985)

Drake, R.W., and W.C. Courtwright, July 7, 1966. "Annual Inspection of TA-20 and TA-27 for Loose Explosives," Los Alamos Scientific Laboratory memorandum to R. Reider from R.W. Drake (GMX-DO) and W.C. Courtwright (H-3), Los Alamos, New Mexico. (Drake and Courtwright 1966, 005985)

Drake, R.W., and W.C. Courtwright, July 11, 1967. "Annual Inspection of TA-20 and TA-27 for Loose Explosives," Los Alamos Scientific Laboratory memorandum to R. Reider from R.W. Drake (GMX-DO) and W.C. Courtwright (H-3), Los Alamos, New Mexico. (Drake and Courtwright 1967, 005986)

Drake, R.W., and W.C. Courtwright, June 6, 1969. "Inspection of TA-20 and TA-27 for Loose Explosives," Los Alamos Scientific Laboratory memorandum to R. Reider from R.W. Drake (GMX-DO) and W.C. Courtwright (H-3), Los Alamos, New Mexico. (Drake and Courtwright 1969, 005987)

EPA (U.S. Environmental Protection Agency), January 21, 2005. "EPA's Prior Decisions on SWMU/AOC Sites at Los Alamos National Laboratory (LANL)," U.S. Environmental Protection Agency letter to J. Bearzi (NMED-HRMB) from L.F. King (EPA Federal Facilities Section Chief), Dallas, Texas. (EPA 2005, 088464)

ICF Kaiser Engineers, August 9, 1995. "Los Alamos National Laboratory, Voluntary Corrective Action Plan for Aggregate TAs -53 and -20 Group 6," report prepared for Los Alamos National Laboratory, Los Alamos, New Mexico. (ICF Kaiser Engineers 1995, 056781)

ICF Kaiser Engineers, September 6, 1995. "Los Alamos National Laboratory, Voluntary Corrective Action Plan for TA-53 Lead Shot Sites I and II," report prepared for Los Alamos National Laboratory, Los Alamos, New Mexico. (ICF Kaiser Engineers 1995, 058172)

LANL (Los Alamos National Laboratory), June 19, 1989. "Drum Storage, 53-5-2a, North Side MPF-2," Polaroid photograph No. 2, Los Alamos, New Mexico. (LANL 1989, 020502)

LANL (Los Alamos National Laboratory), June 19, 1989. "53-5-2b, Satellite Hazardous Storage, South of MPF-2," Polaroid photograph No. 16, Los Alamos, New Mexico. (LANL 1989, 020516)

LANL (Los Alamos National Laboratory), June 21, 1989. "Pumps Containing <1 ppm PCBs, Boneyard Area," Polaroid photograph No. 114, Los Alamos, New Mexico. (LANL 1989, 020614)

LANL (Los Alamos National Laboratory), June 21, 1989. "53-5-166, Rad Tape, 55 gal Overpack and Regular Drums Marked Acid Flush (Contaminated Mat.), Boneyard Area," Polaroid photograph No. 115, Los Alamos, New Mexico. (LANL 1989, 020615)

LANL (Los Alamos National Laboratory), June 21, 1989. "53-5-166 (Boneyard), Approx. 100 Drums Poss. Containing New Steel Bearings " Polaroid photograph No. 116, Los Alamos, New Mexico. (LANL 1989, 020616)

LANL (Los Alamos National Laboratory), June 21, 1989. "53-5-384, 30 ft North of MPF 384, Contents Unknown," Polaroid photograph No. 136, Los Alamos, New Mexico. (LANL 1989, 020636)

- LANL (Los Alamos National Laboratory), June 21, 1989. "Area of Wet Soil Resulting from Leak or Spill from Tank A (South End)," Polaroid photograph No. 109, Los Alamos, New Mexico. (LANL 1989, 020609)
- LANL (Los Alamos National Laboratory), June 21, 1989. "53-7-A, B, C, Also: 25 - 55 gal Drums in Foreground with Unknown Contents," Polaroid photograph No. 108, Los Alamos, New Mexico. (LANL 1989, 020608)
- LANL (Los Alamos National Laboratory), November 6, 1989. "Septic Tank and Leach Field, Firing Range, TA-0, Civil: Site Plan, Bldg ULR-1267, Revision 2," Engineering Drawing ENG-C-45621, Los Alamos, New Mexico. (LANL 1989, 104234)
- LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Vol. IV of IV (TA-51 through TA-74), Los Alamos National Laboratory document LA-UR-90-3400, Los Alamos, New Mexico. (LANL 1990, 007514)
- LANL (Los Alamos National Laboratory), April 28, 1993. "Los Alamos National Laboratory HWTS System [Hazardous Waste Tracking System]," No. RHWTS0002, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1993, 029415)
- LANL (Los Alamos National Laboratory), May 1994. "RFI Work Plan for Operable Unit 1100," Los Alamos National Laboratory document LA-UR-94-1097, Los Alamos, New Mexico. (LANL 1994, 034756)
- LANL (Los Alamos National Laboratory), March 1996. "RFI Report for Potential Release Sites at TAs-20, -53, and -72 (located in former Operable Unit 1100), Field Unit 2," Environmental Restoration Project, Los Alamos National Laboratory document LA-UR-96-906, Los Alamos, New Mexico. (LANL 1996, 054466)
- LANL (Los Alamos National Laboratory), January 1996. "Voluntary Corrective Action Completion Report for Potential Release Site 16-016(f), Former Surface Disposal Area, Revision 1," Los Alamos National Laboratory document LA-UR-96-190, Los Alamos, New Mexico. (LANL 1996, 053776)
- LANL (Los Alamos National Laboratory), January 1996. "Voluntary Corrective Action Completion Report for Potential Release Sites 20-003(c) and 53-010, Revision 1," Los Alamos National Laboratory document LA-UR-96-1089, Los Alamos, New Mexico. (LANL 1996, 053775)
- LANL (Los Alamos National Laboratory), August 1997. "Voluntary Corrective Action Plan for Potential Release Site 53-001(a), Storage Area," Los Alamos National Laboratory document LA-UR-97-3719, Los Alamos, New Mexico. (LANL 1997, 056647)
- LANL (Los Alamos National Laboratory), August 1997. "Voluntary Corrective Action Completion Plan for Potential Release Site 53-008, Boneyard," draft, Los Alamos National Laboratory document, Los Alamos National Laboratory document LA-UR-09-2465, Los Alamos, New Mexico. (LANL 1997, 056384)
- LANL (Los Alamos National Laboratory), September 1997. "VCA Report for PRS 0-016," Los Alamos National Laboratory document LA-UR-97-2745, Los Alamos, New Mexico. (LANL 1997, 056737)

- LANL (Los Alamos National Laboratory), September 1997. "Voluntary Corrective Action Completion Report for Potential Release Site 53-014, Lead Shot Site," Los Alamos National Laboratory document LA-UR-97-3846, Los Alamos, New Mexico. (LANL 1997, 062913)
- LANL (Los Alamos National Laboratory), September 1997. "Voluntary Corrective Action Completion Report for Potential Release Site 53-001(a), Storage Area," draft, Los Alamos National Laboratory document, Los Alamos National Laboratory document LA-UR-09-2464, Los Alamos, New Mexico. (LANL 1997, 056505)
- LANL (Los Alamos National Laboratory), September 22, 1998. "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 059730)
- LANL (Los Alamos National Laboratory), June 24, 1999. "Presentation Summary of TA-53-1 (MPF-1) Sump and Tank, PRSs 53-007(a)/53-006(f)," Los Alamos National Laboratory letter (EM/ER:99-150) to J.P. Bearzi (NMED-HRMB) from J. Canepa (LANL) and T.J. Taylor (DOE-LAAO), Los Alamos, New Mexico. (LANL 1999, 063459)
- LANL (Los Alamos National Laboratory), March 27, 2001. "Sludge Sample Analyses Data from TA-53, Area A, PRS (Potential Release Site) 53-006(b) and (c), and Weapons Neutron Research (WNR) Facility PRSs 53-006(d) and (e), Supplement to the October 8, 1999 New Mexico Environment Department (NMED) Notice of Deficiency (NOD) Response," Los Alamos National Laboratory letter (ER2001-0166) to J. Young (NMED-HWB) from J. Canepa (LANL) and T.J. Taylor (DOE-LAAO), Los Alamos, New Mexico. (LANL 2001, 070268)
- LANL (Los Alamos National Laboratory), January 2004. "Investigation and Remediation Report for Consolidated SWMU 53-002(a)-99, Inactive Wastewater Impoundments, and AOC 53-008, Storage Area, at Technical Area 53," Los Alamos National Laboratory document LA-UR-03-9119, Los Alamos, New Mexico. (LANL 2004, 085221)
- LANL (Los Alamos National Laboratory), May 2005. "Derivation and Use of Radionuclide Screening Action Levels, Revision 1," Los Alamos National Laboratory document LA-UR-05-1849, Los Alamos, New Mexico. (LANL 2005, 088493)
- LANL (Los Alamos National Laboratory), April 2009. "Historical Investigation Report for Lower Sandia Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-09-2077, Los Alamos, New Mexico. (LANL 2009, 105078)
- LASL (Los Alamos Scientific Laboratory), September 11, 1947. "A Technical Maintenance Group Report on General Background Data Concerning the Los Alamos Scientific Laboratory Required for Planning Purposes," Los Alamos Scientific Laboratory report LAB-A-5, Los Alamos, New Mexico. (LASL 1947, 005581)
- LASL (Los Alamos Scientific Laboratory), February 19, 1951. "Sandia Canyon, TA-20, 20-mm Hutments, Location, Floor Plan, Foundation Plan, Revision 1," Engineering Drawing ENG-C-1788, Los Alamos, New Mexico. (LASL 1951, 024354)

- LASL (Los Alamos Scientific Laboratory), February 19, 1951. "TA-20, Revised Site Plan and Topographic Layout, Revision 1," Engineering Drawing ENG-C-1778, Los Alamos, New Mexico. (LASL 1951, 024345)
- LASL (Los Alamos Scientific Laboratory), February 19, 1951. "TA-20, Plans, Sections, Details, Gun Mount SAN-16 and Bin SAN-10, Hutment, Revision 1," Engineering Drawing ENG-C-1776, sheet number 3, Los Alamos, New Mexico. (LASL 1951, 024343)
- LASL (Los Alamos Scientific Laboratory), August 6, 1951. "Additions and Alterations, TA-20 to (Station 104) SAN-47, South Mesa Access Road, Septic Tank, Plumbing, and Stack Details, Guardhouse Building SAN-47," Engineering Drawing ENG-C-15104, sheet number 5 of 7, Los Alamos, New Mexico. (LASL 1951, 026066)
- LASL (Los Alamos Scientific Laboratory), April 2, 1971. "Los Alamos Meson Physics Facility Trichloroethylene and Freon Waste System Modifications, Revision 1," Engineering Drawing ENG-C-50165, sheet number 1 of 1, Los Alamos, New Mexico. (LASL 1971, 023260)
- Littlejohn, G.J., November 26, 1946. "Monitoring of Sandia Equipment," Los Alamos Scientific Laboratory memorandum to L.H. Hempelmann from G.J. Littlejohn, Los Alamos, New Mexico. (Littlejohn 1946, 005997)
- NMED (New Mexico Environment Department), December 23, 1998. "Approval: Class III Permit Modification to Remove Ninety-nine (99) Solid Waste Management Units from the Department of Energy/Los Alamos National Laboratory RCRA Permit NM 0890010515," New Mexico Environment Department letter to T. Taylor (DOE-LAAO) and J.C. Browne (LANL Director) from E. Kelley (NMED-HRMB), Santa Fe, New Mexico. (NMED 1998, 063042)
- NMED (New Mexico Environment Department), August 8, 2000. "Approval of TA-53 WP/SAP and SAP Addendum [PRs 53-002(a,b) and 53-006(a-e)]," New Mexico Environment Department letter to J. Browne (LANL Director) and D.A. Gurule (DOE-LAAO) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2000, 064821)
- NMED (New Mexico Environment Department), June 2006. "Technical Background Document for Development of Soil Screening Levels, Revision 4.0, Volume 1, Tier 1: Soil Screening Guidance Technical Background Document," New Mexico Environment Department, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico. (NMED 2006, 092513)
- NMED (New Mexico Environment Department), September 13, 2006. "Certificates of Completion for Solid Waste Management Units 53-002(a) and 53-002(b), Technical Area 53," 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 2006, 095421)
- NMED (New Mexico Environment Department), October 2006. "New Mexico Environment Department TPH Screening Guidelines," Santa Fe, New Mexico. (NMED 2006, 094614)

NMED (New Mexico Environment Department), March 23, 2007. "Approval of Class 3 Permit Modification for No Further Action of 20 Solid Waste Management Units," New Mexico Environment Department letter to D. Glenn (DOE LASO) and R. Watkins (LANL) from C. Padilla (NMED), Santa Fe, New Mexico. (NMED 2007, 095495)

Russo, S.E., April 21, 1965. "Probable Burial Areas: Former Sandia Canyon Site, TA-20," Los Alamos Scientific Laboratory memorandum to R. Reider (H-3) from S.E. Russo (ENG-3), Los Alamos, New Mexico. (Russo 1965, 005984)

Santa Fe Engineering Ltd., November 1993. "Wastewater Stream Characterization for TA-53-1, 40, 70, 415, 416, 420, 421, 428, 450, 452, 454, 515, 524, 526, 605, 733, 809, 813, 815 and 845 at Los Alamos National Laboratory, Environmental Study, Characterization Report #29," report prepared for Los Alamos National Laboratory, Santa Fe, New Mexico. (Santa Fe Engineering, Ltd. 1993, 031756)

Weston (Roy F. Weston, Inc.), November 1986. "Surface Geophysical Investigation Utilizing Magnetometry at Sandia Canyon Site 1-4, TA-20, Pajarito Canyon, TA-18, and Area N, TA-15, Los Alamos National Laboratory, Los Alamos, New Mexico," draft, Los Alamos, New Mexico. (Weston 1989, 005439)

5.2 Map Data Sources

ENVIRONMENTAL FEATURE DATA. Aggregate Areas; Los Alamos National Laboratory, ENV Environmental Remediation & Surveillance Program, ER2005-0496; 1:2,500 Scale Data; 22 September 2005. Canyon Reaches; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program, ER2002-0592; 1:24,000 Scale Data; Unknown publication date. Groundwater Monitoring Well Locations; Environmental Surveillance Report, Los Alamos National Laboratory Report LA-14341-ENV, 2006. Digital version of well locations obtained from GIS project file PMR07007. Hypsography, Elevation Contours; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; 1991.

SOLID WASTE MANAGEMENT UNITS (SWMU), AREAS OF CONCERN (AOC) AND CONSOLIDATED UNITS. Potential Release Sites; Los Alamos National Laboratory, Waste and Environmental Services Division, Environmental Data and Analysis Group, EP2008-0407; 1:2,500 Scale Data; 14 July 2008. Modifications to SWMU and AOC feature boundaries resulting from the HIR and IWP to be processed through GIS change control process. Storm Water Multi-Sector General Permit (MSGP) Gage Stations; Los Alamos National Laboratory, Waste & Environmental Services Division, Environmental Data and Analysis Group; Unpublished data, Project 08-0030; 17 October 2008.

INFRASTRUCTURE & CULTURAL FEATURE DATA. Geographic Names Information for the Extended LANL Site; Los Alamos National Laboratory, Environment and Remediation Support Services Division, edition 2007-0A, EP2007-0293; 1:2,500 Scale Data; 18 May 2007.

INDUSTRIAL WASTE. Primary Industrial Waste Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. US Atomic Energy Commission, Drawing LAM-J-M-3 Sheet 52 (ENG-C61753), Los Alamos Meson Physics Facility Experimental Building Phase I, Underground Contaminated Waste Systems; March 1978. Los Alamos National Laboratory, drawing ENG-C52075 Sheet M2, TA-53 Radioactive Liquid Waste Tank Project, Mech. Lift Station No. 943 & 944 Partial Plan; 30 May 2000.

US Department of Energy, drawing LA-UA-M-23.3 Sheet 54 (ENG-C44249), Radioactive Liquid Waste Collection System Improvements, TA-53 MPF-297 Loading Station Plan & Details; October 1982.

ROADS. Paved Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Paved Parking; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 12 August 2002; as published 15 October 2008. Dirt Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Security and Industrial Fences and Gates; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Storm Drain Line Distribution System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008.

STRUCTURES. Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Structures; County of Los Alamos, Information Services; as published 29 October 2007. Former structures of the TA-20 technical area, Los Alamos Scientific Laboratory drawing ENG-R138, Structure Location Plan TA-20 Sandia Canyon Site, 31 March 1950. Primary Landscape Features; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Division; 04 June 2008.

UTILITIES. Communication Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 08 August 2002; as published 15 October 2008. Primary Electric Grid; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Primary Gas Distribution Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Sewer Line System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008. Water Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 October 2008.

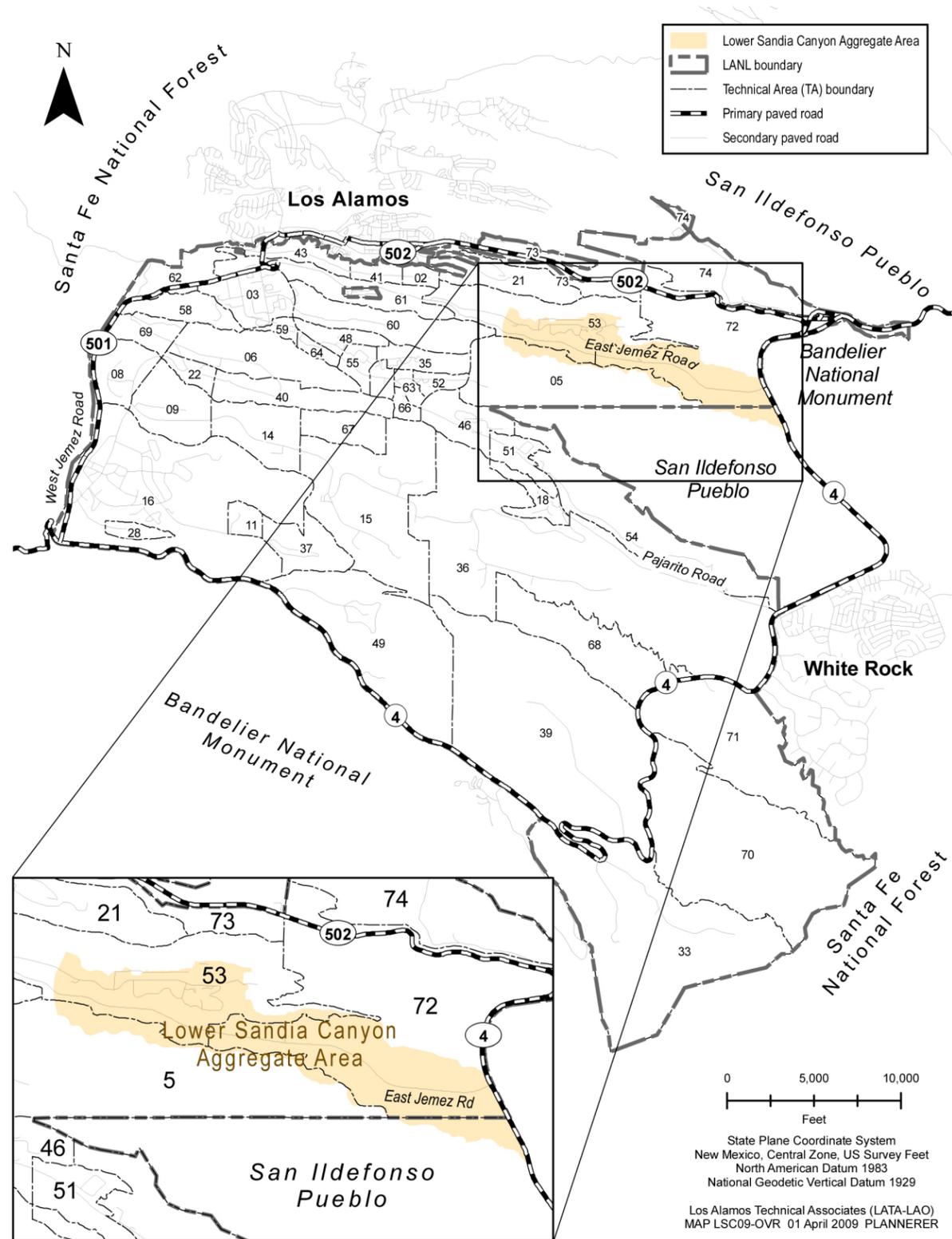


Figure 1.0-1 Lower Sandia Canyon Aggregate Area with respect to Laboratory TAs and surrounding land holdings

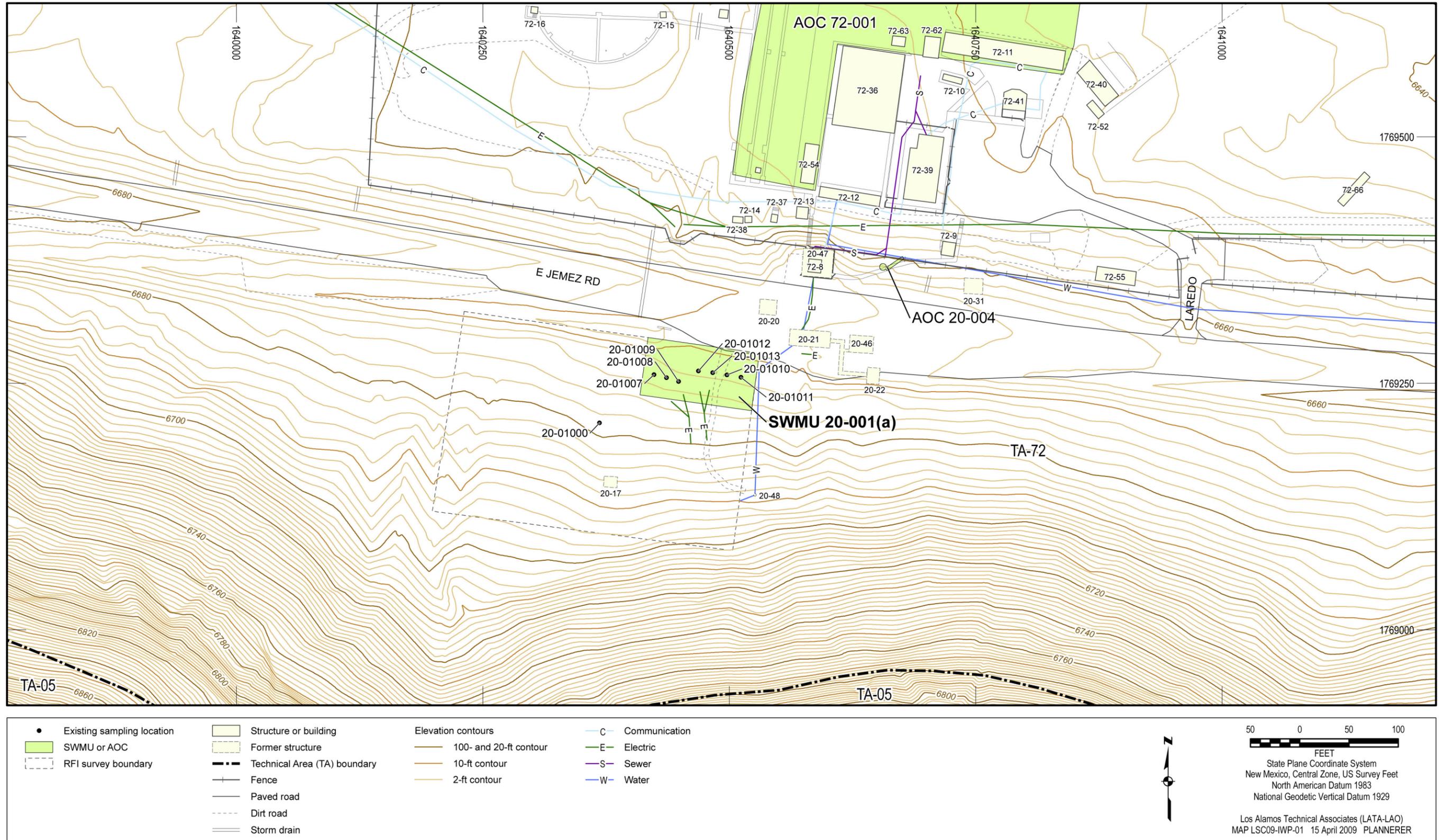


Figure 2.1-1 Site features and historical sampling locations for SWMU 20-001(a)

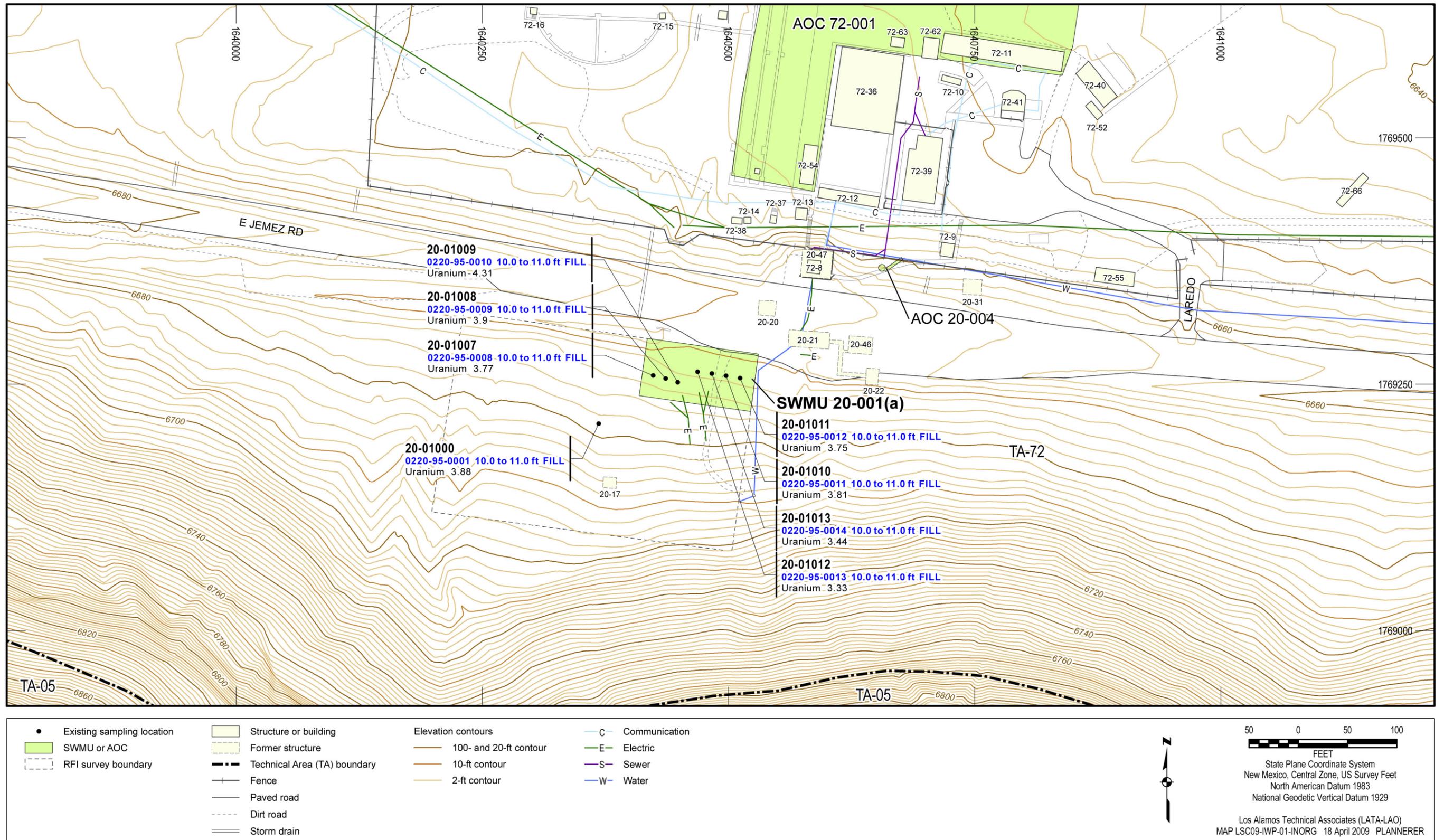


Figure 2.1-2 Inorganic chemicals detected above BVs at SWMU 20-001(a)

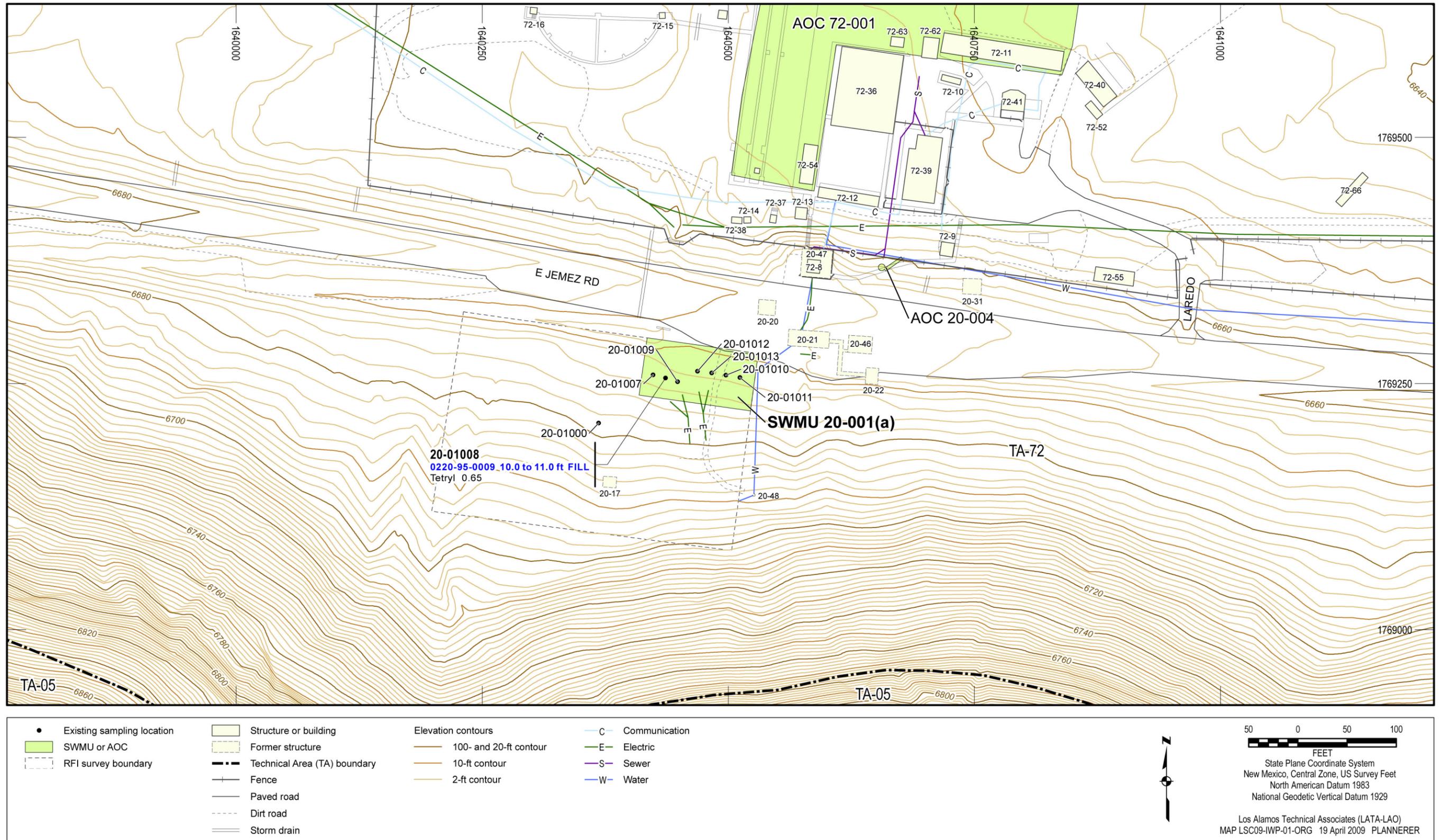


Figure 2.1-3 Organic chemicals detected at SWMU 20-001(a)

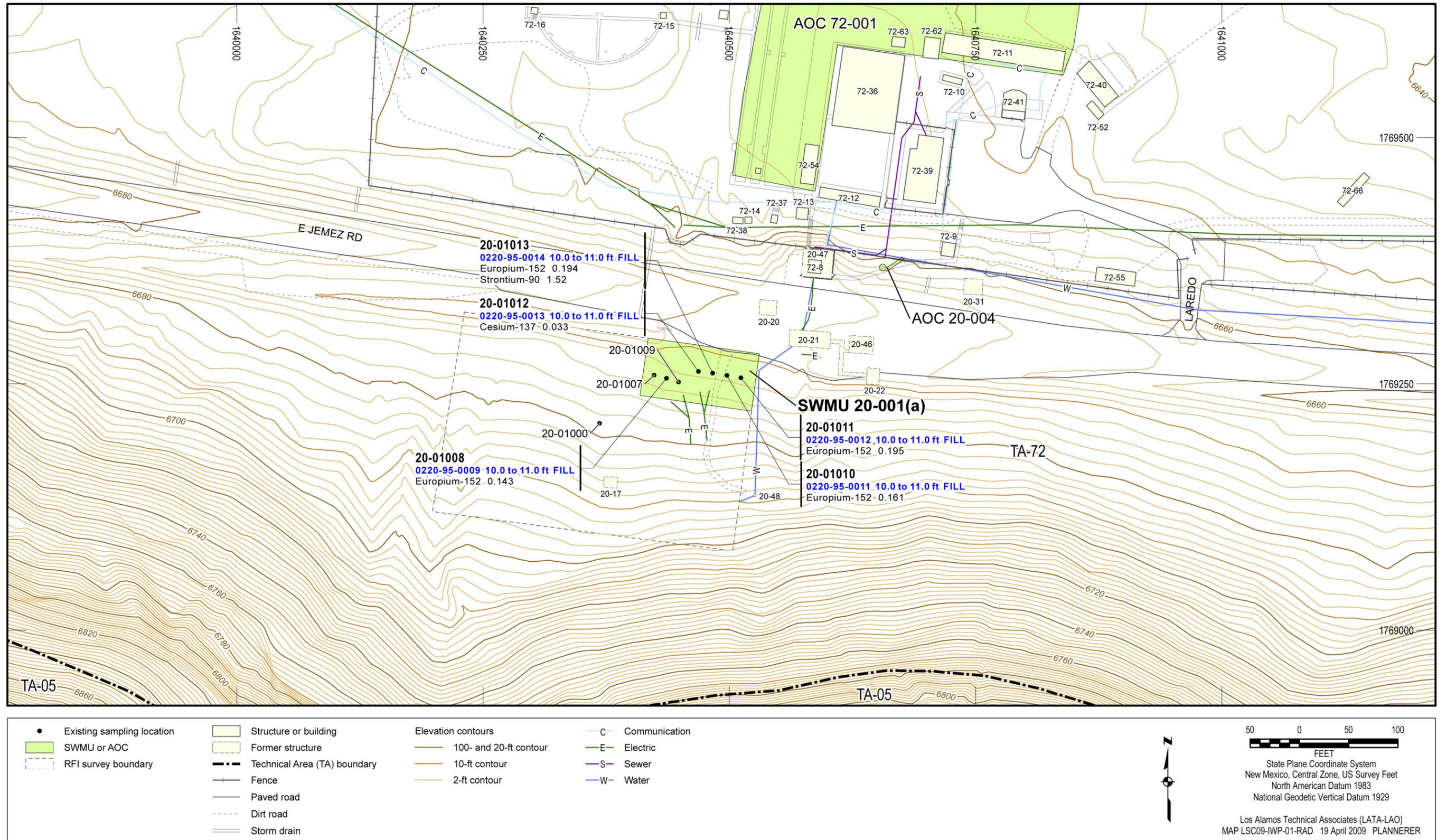


Figure 2.1-4 Radionuclides detected or detected above BVs/FVs at SWMU 20-001(a)

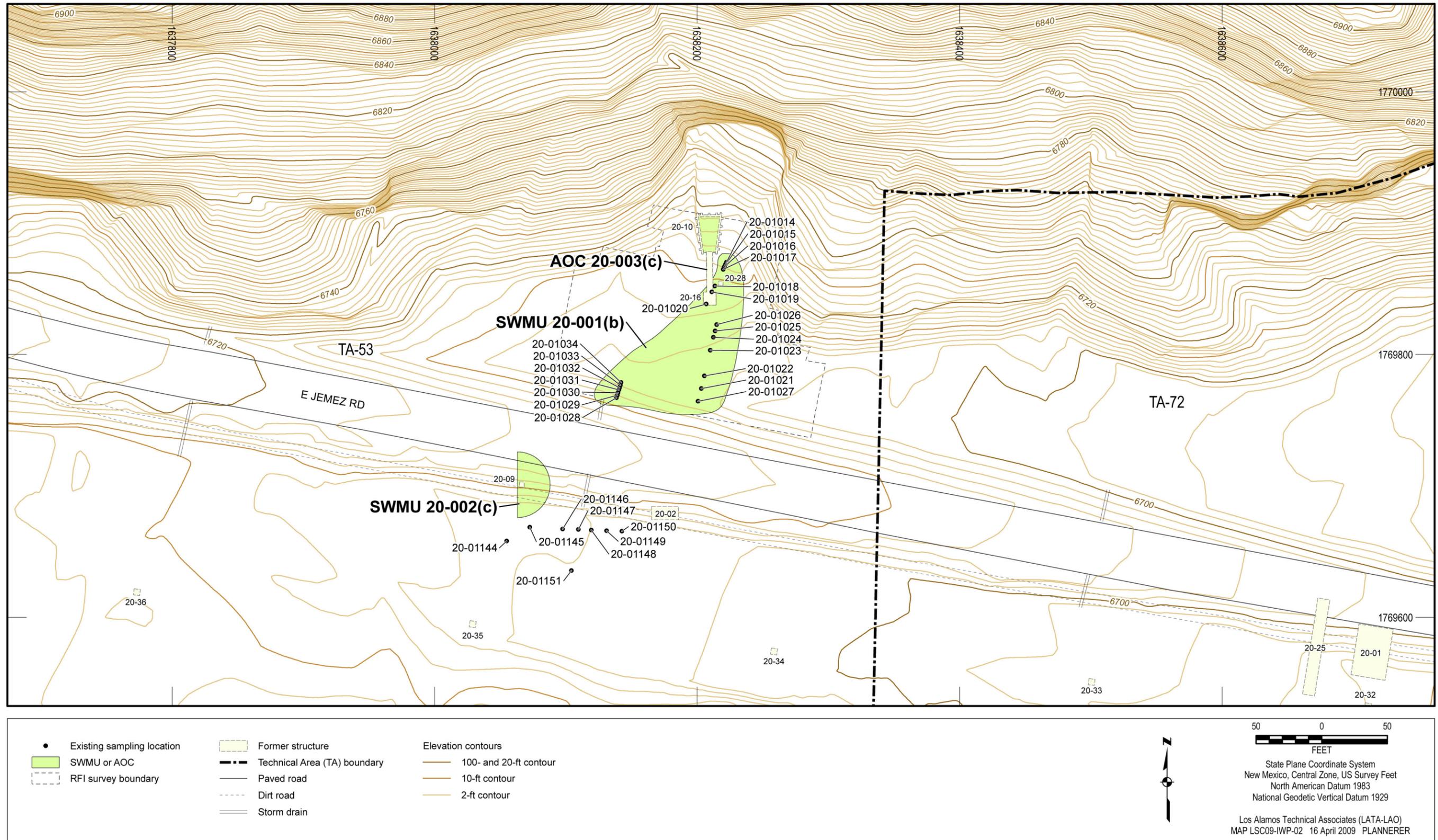


Figure 2.2-1 Site features and historical sampling locations for SWMUs 20-001(b) and 20-002(c) and AOC 20-003(c)

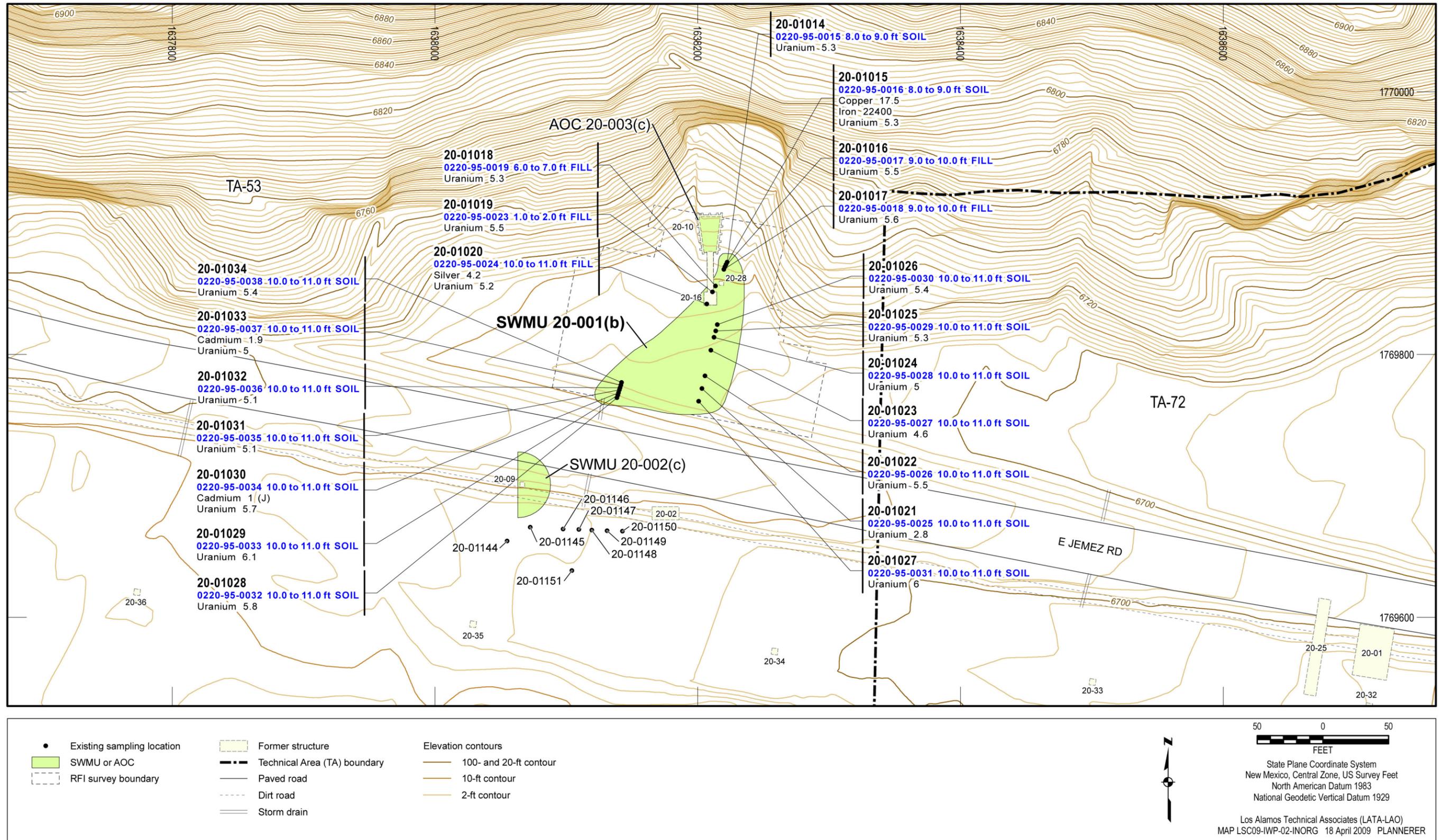


Figure 2.2-2 Inorganic chemicals detected above BVs at SWMU 20-001(b)

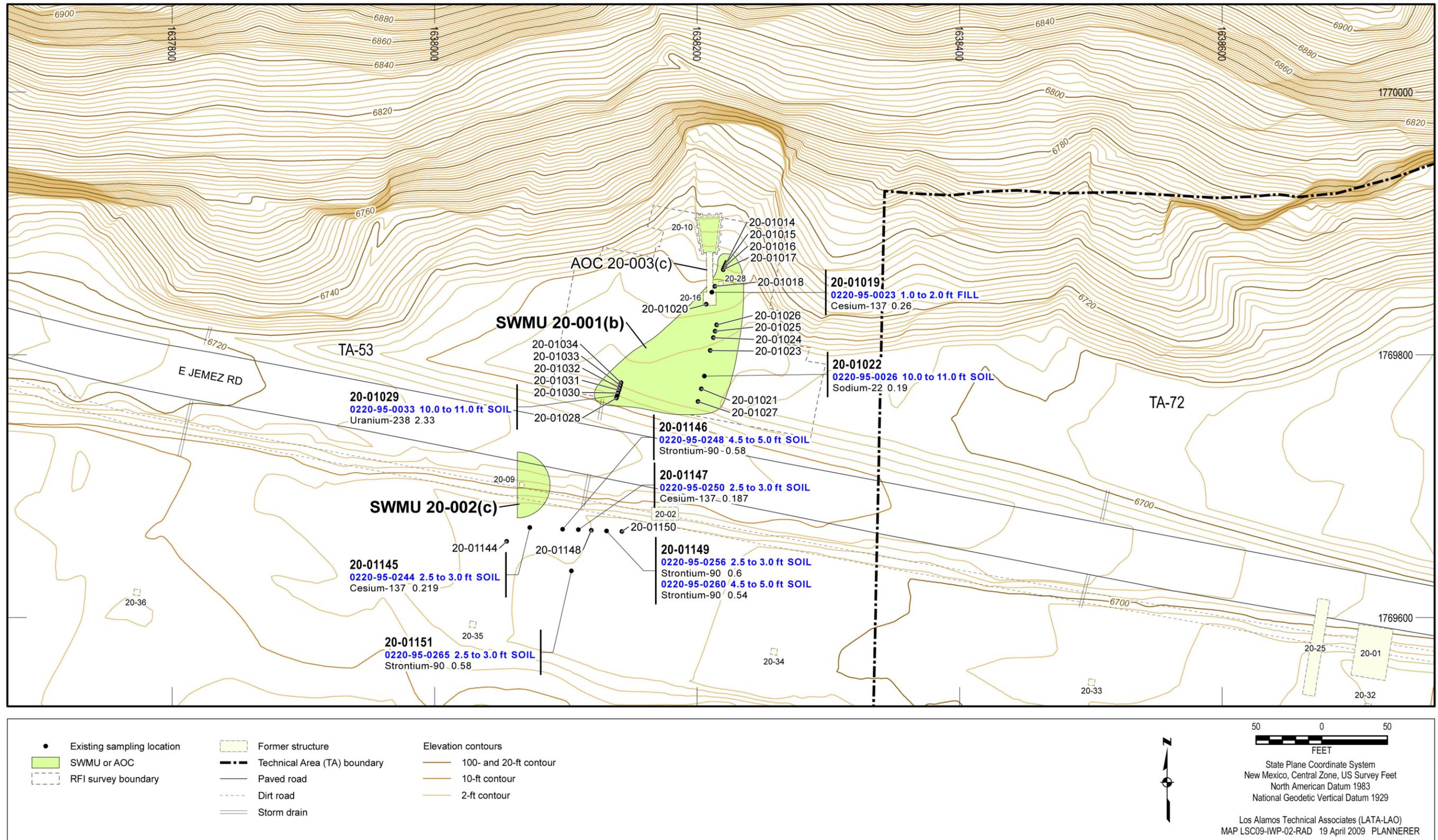


Figure 2.2-3 Radionuclides detected or detected above BVs/FVs at SWMUs 20-001(b) and 20-002(c)

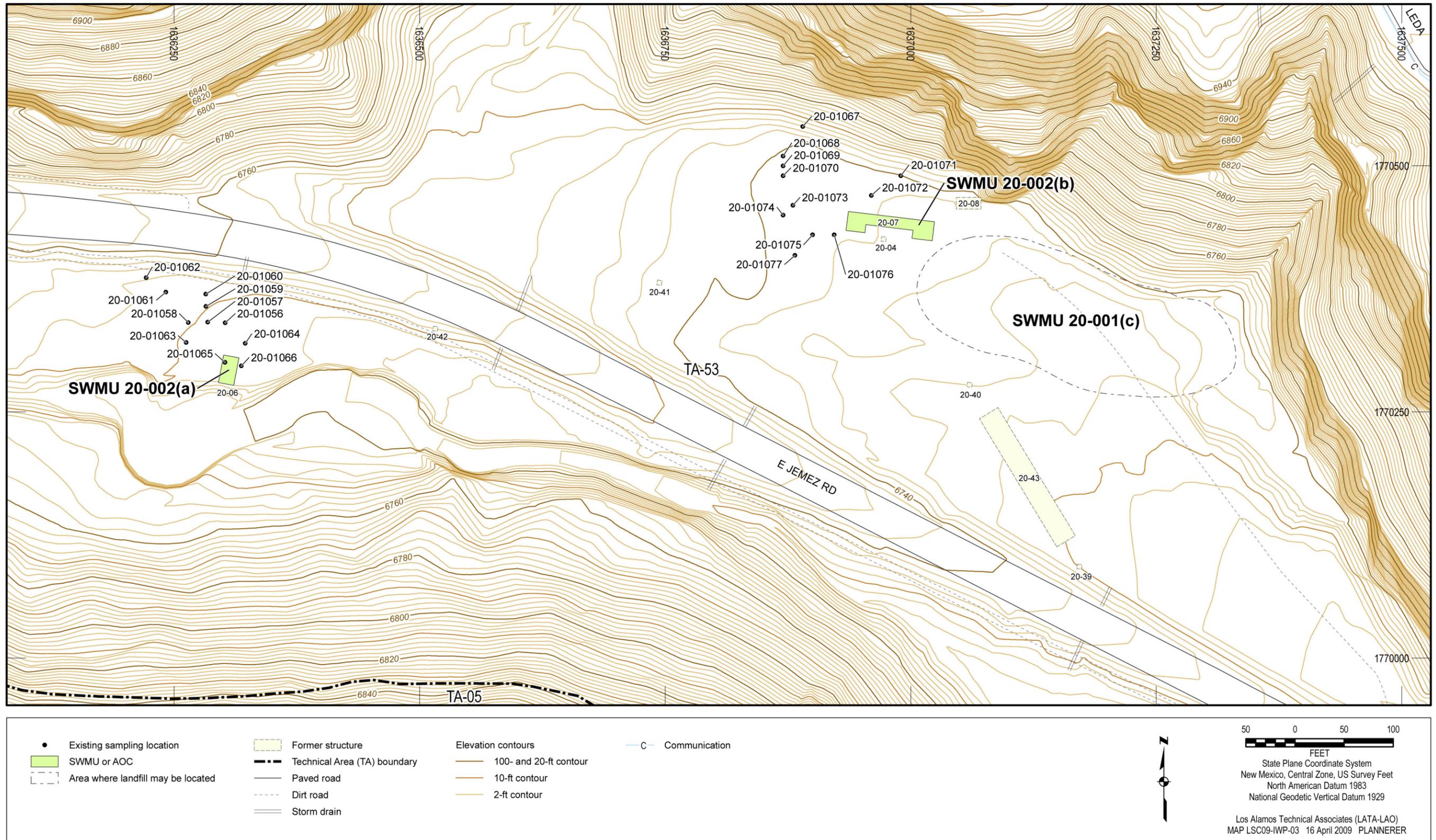


Figure 2.3-1 Site features and historical sampling locations for SWMUs 20-001(c), 20-002(a), and 20-002(b)

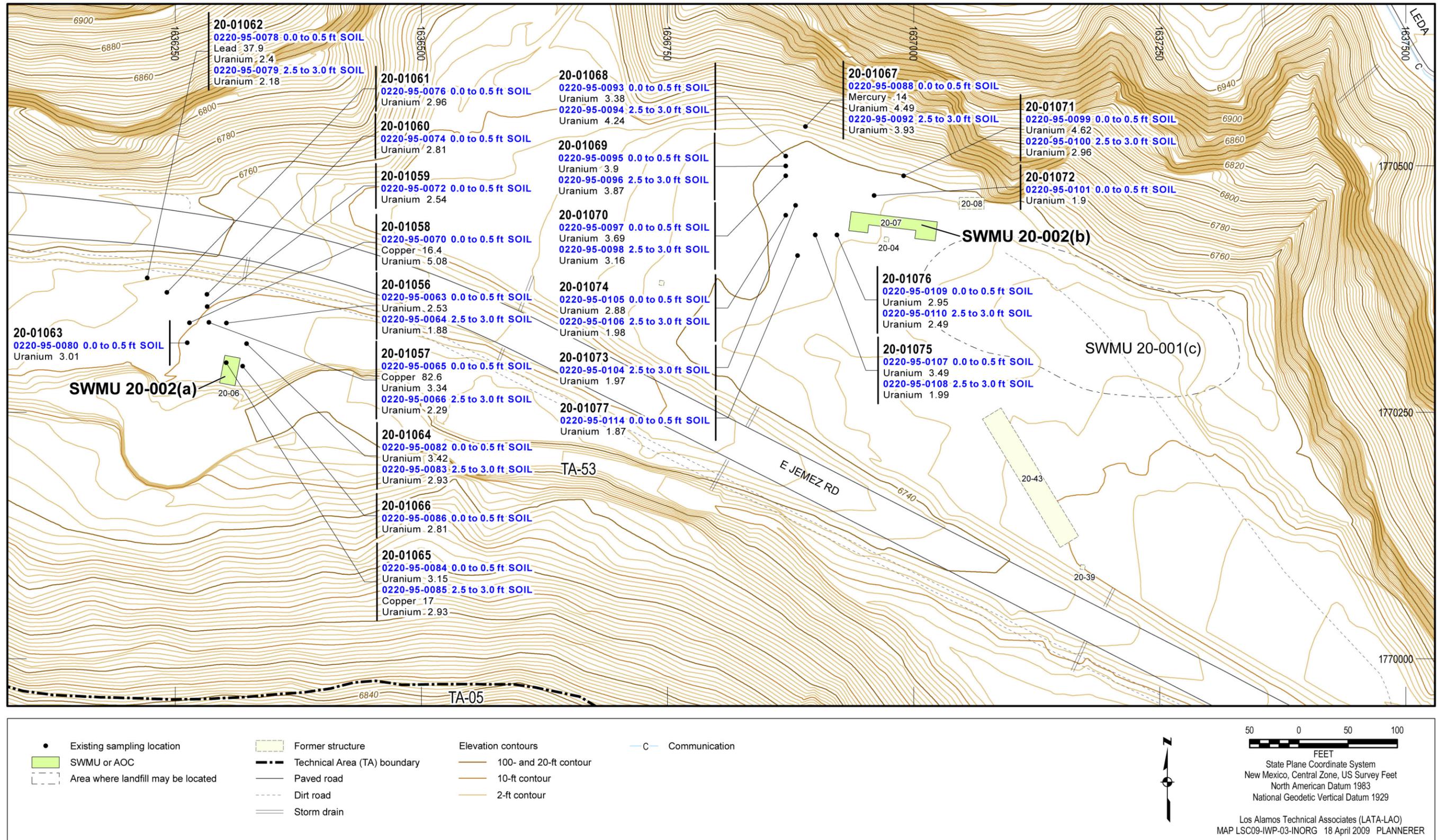


Figure 2.4-1 Inorganic chemicals detected above BVs at SWMUs 20-002(a) and 20-002(b)

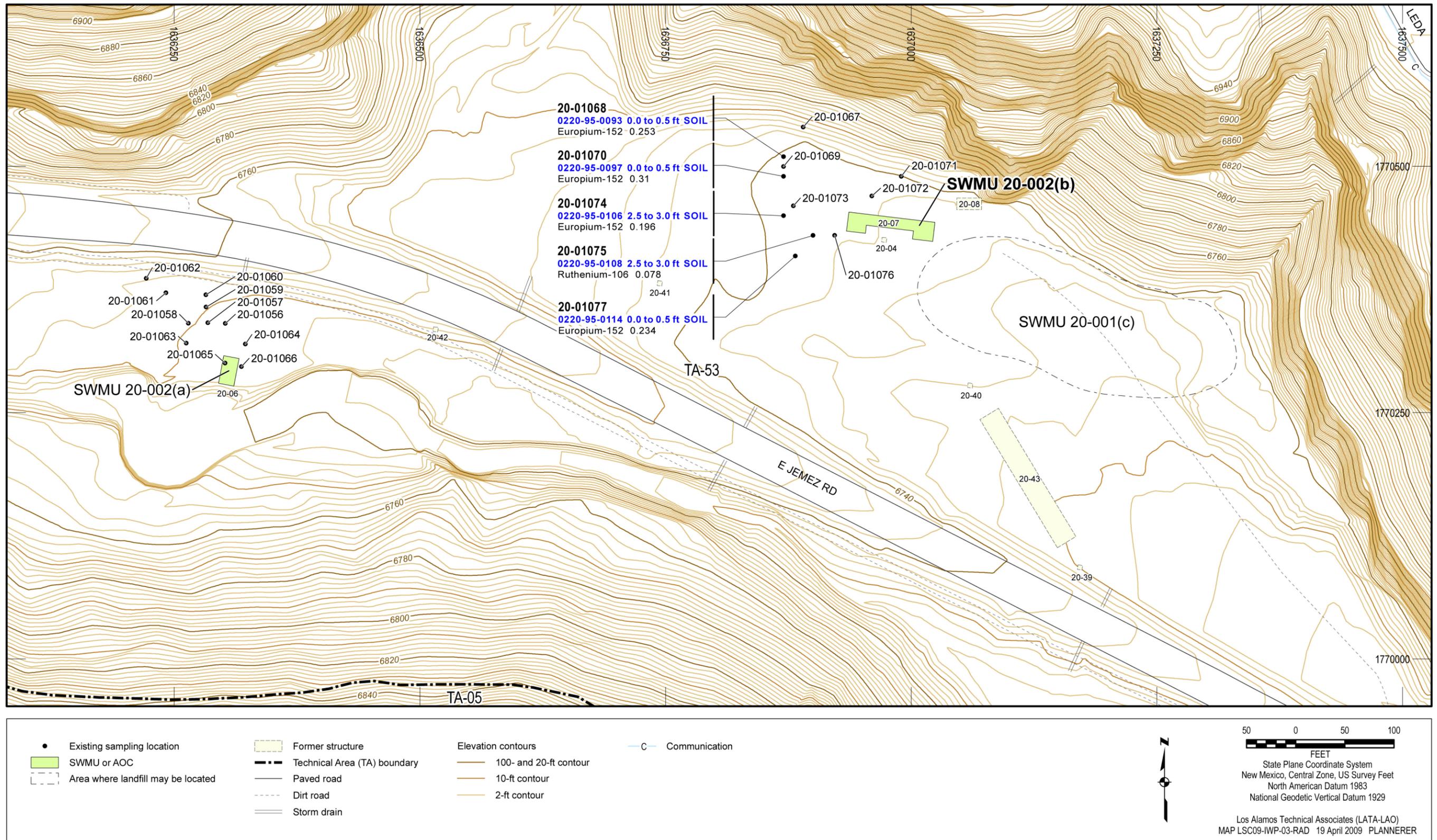


Figure 2.5-1 Radionuclides detected or detected above BVs/FVs at SWMU 20-002(b)

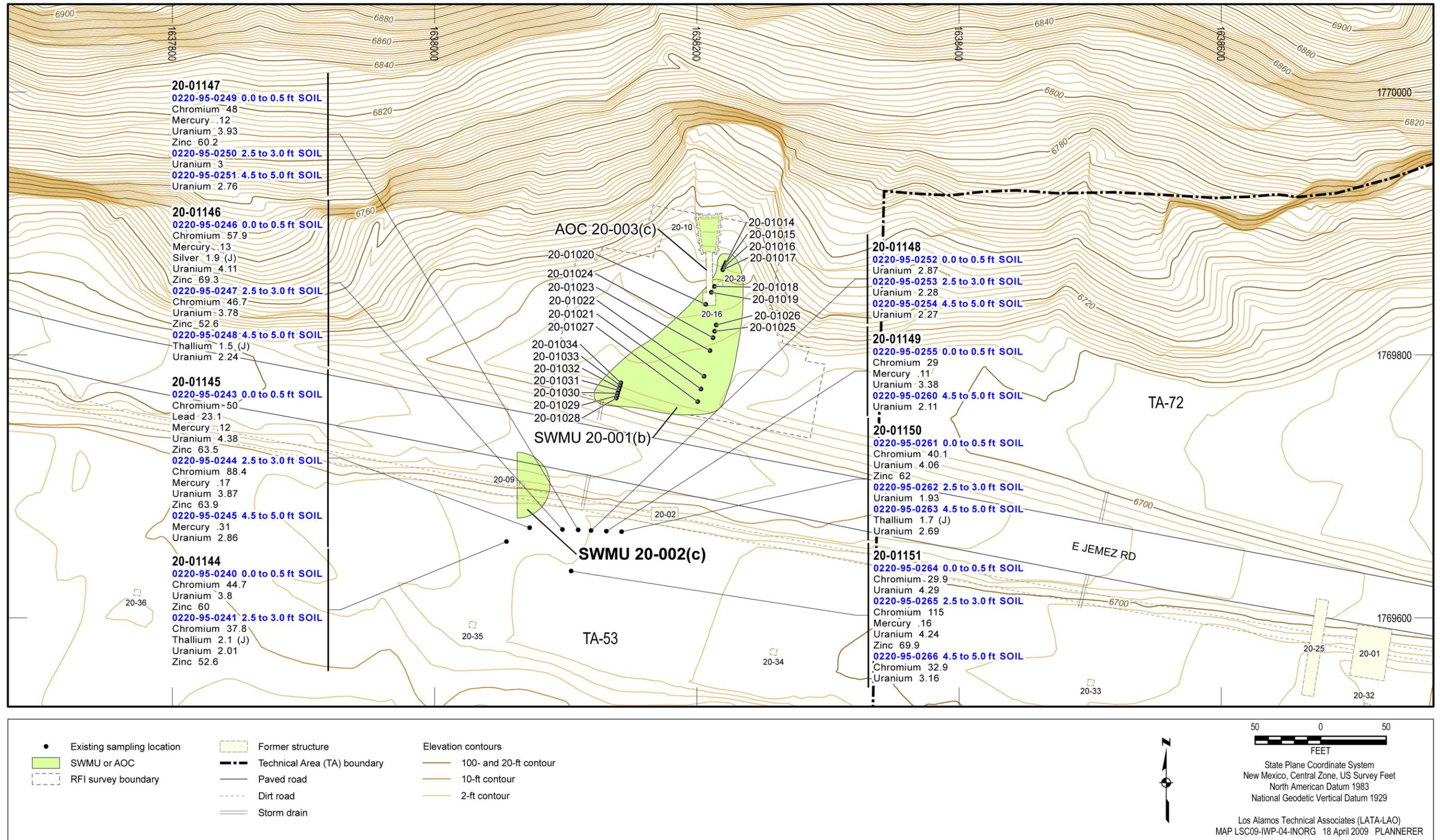


Figure 2.6-1 Inorganic chemicals detected above BVs at SWMU 20-002(c)

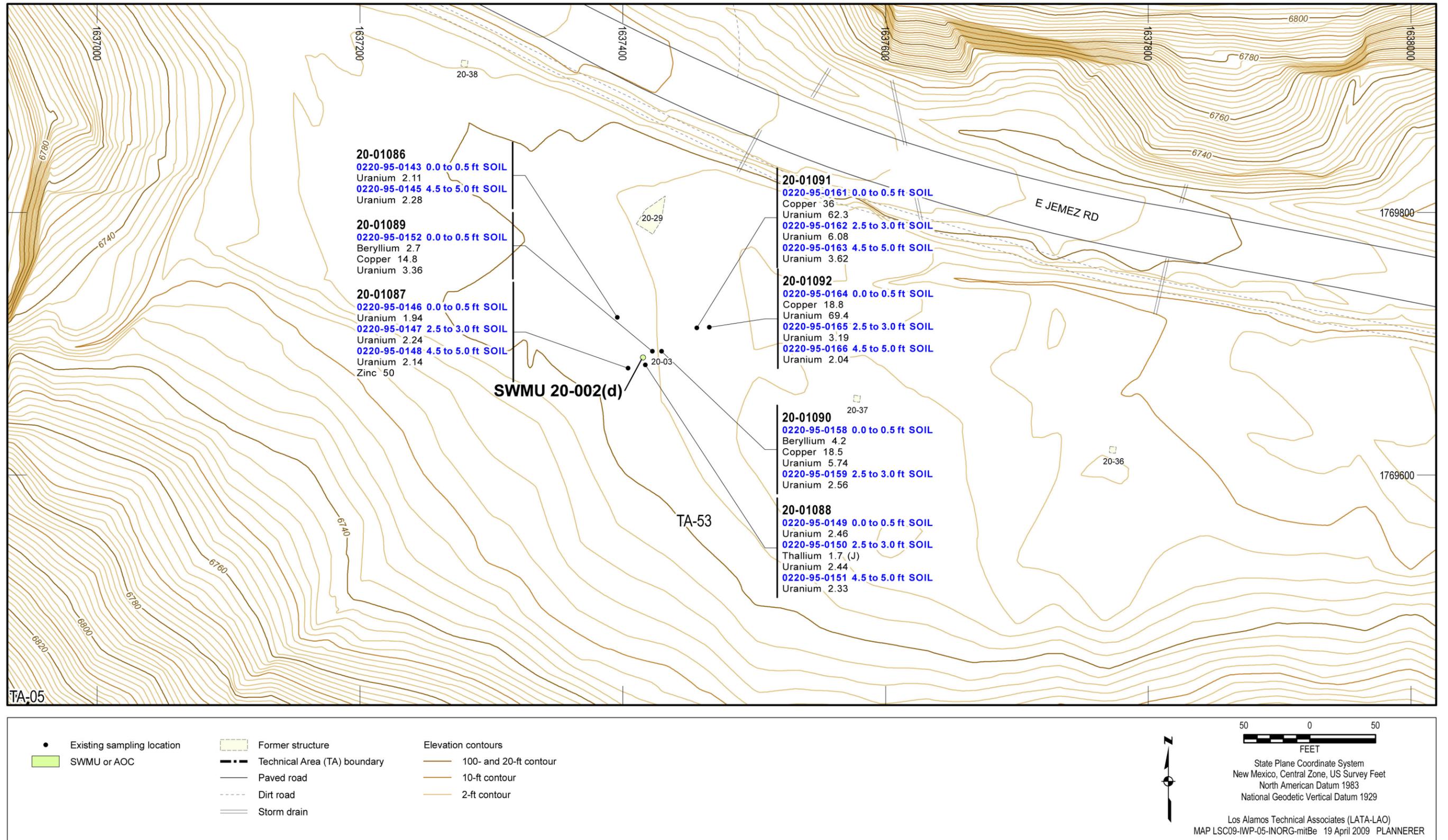


Figure 2.7-2 Inorganic chemicals detected above BVs at SWMU 20-002(d)

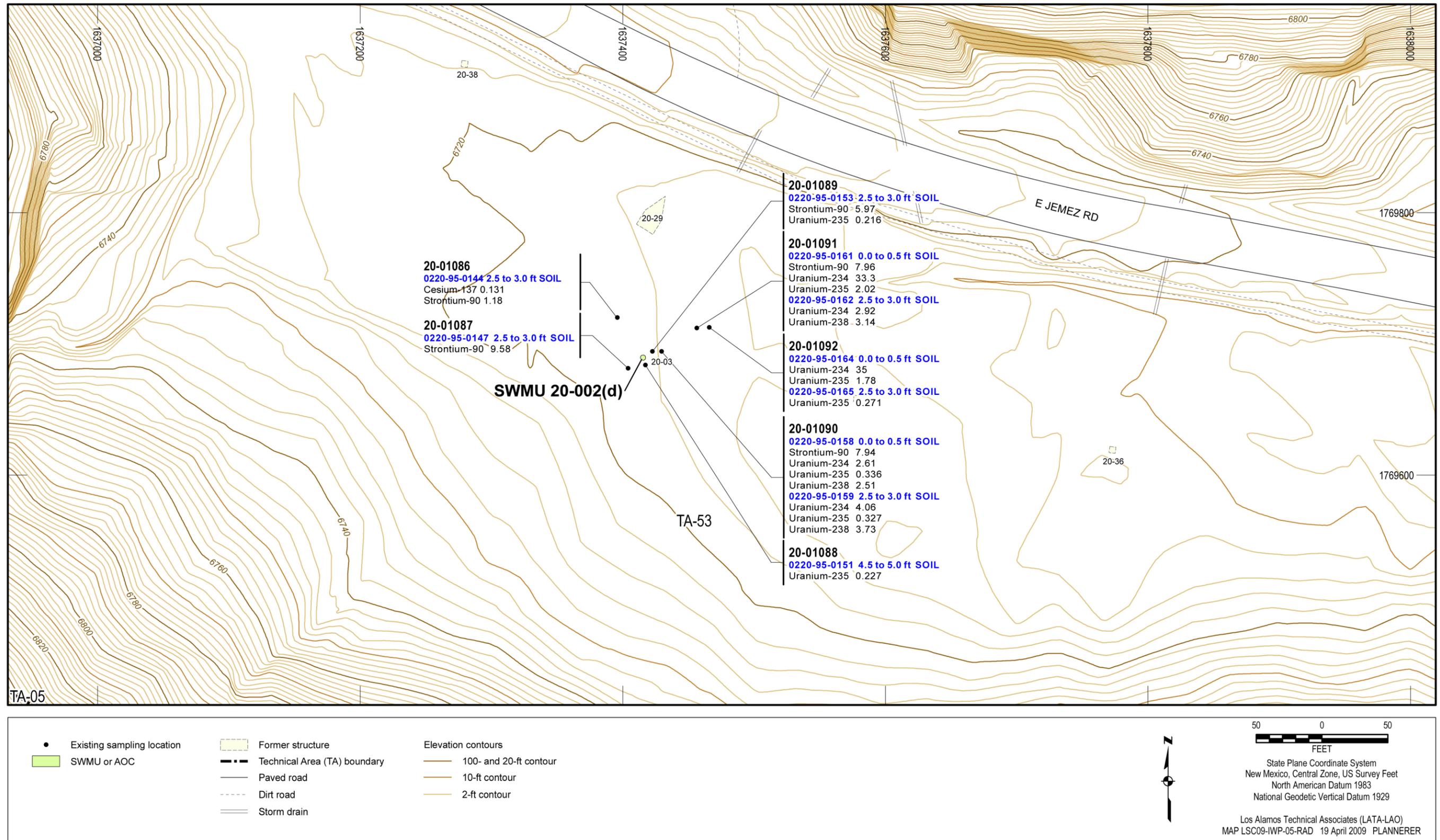


Figure 2.7-3 Radionuclides detected or detected above BVs/FVs at SWMU 20-002(d)

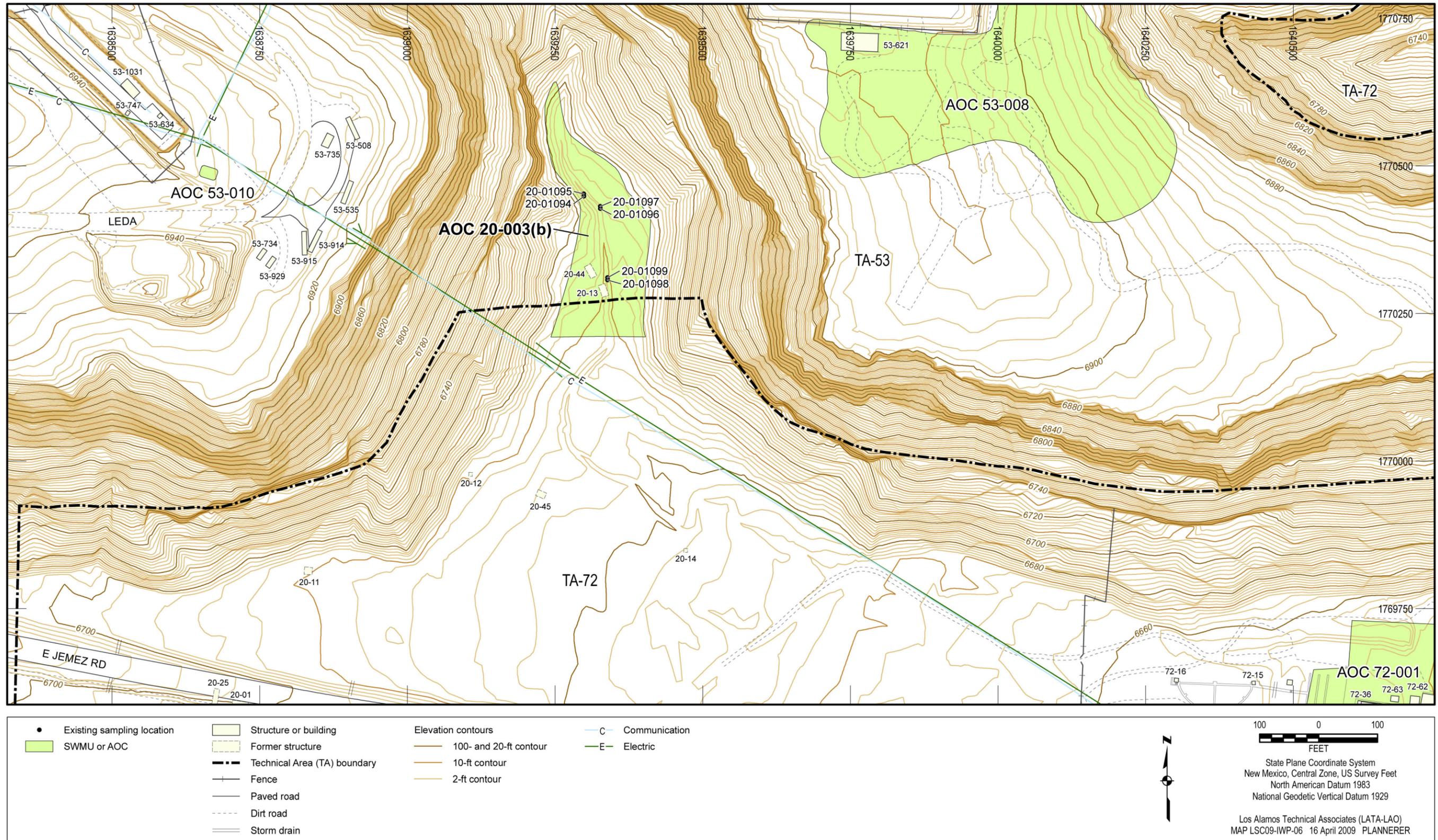


Figure 2.8-1 Site features and historical sampling locations for AOC 20-003(b)

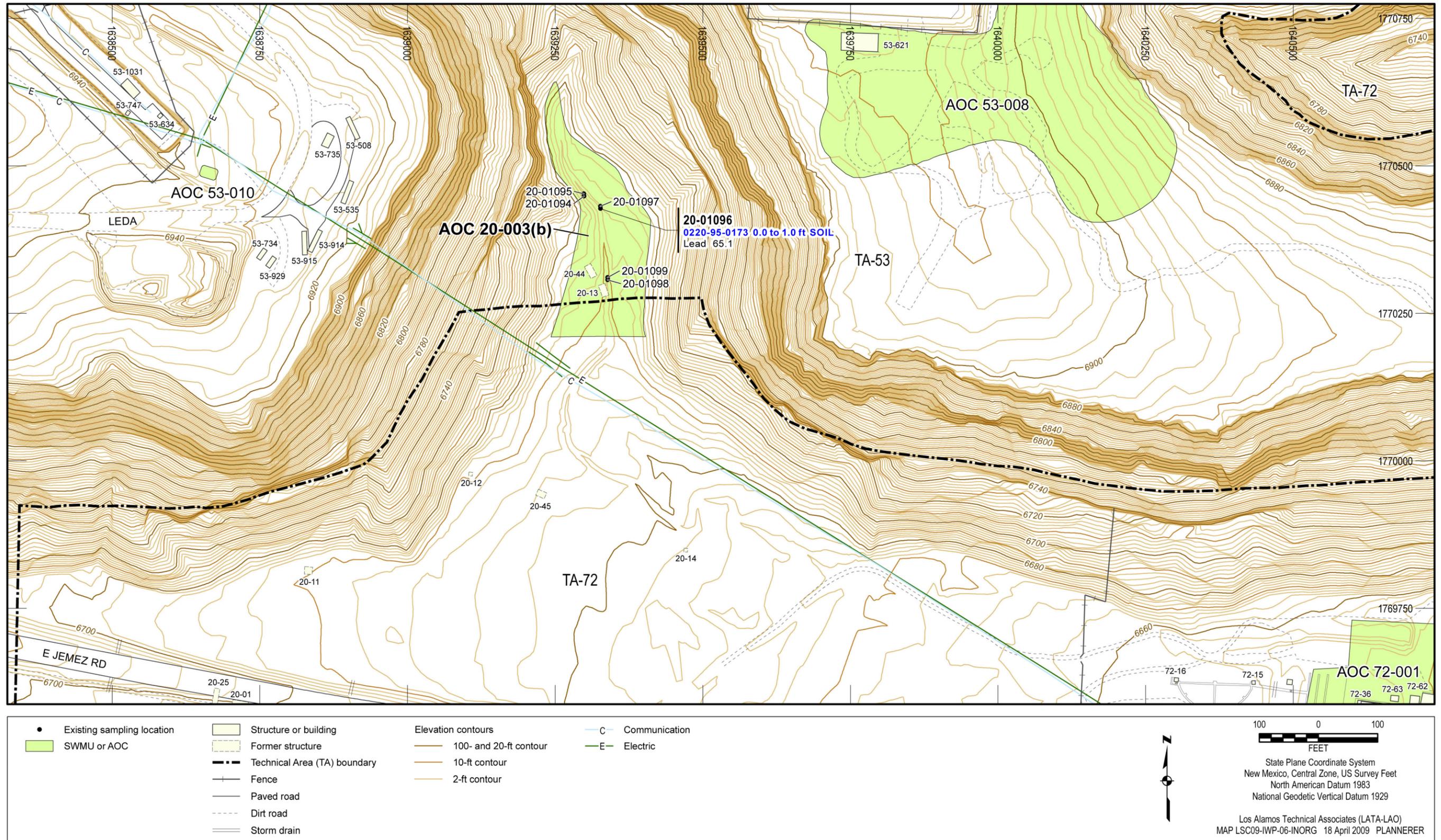


Figure 2.8-2 Inorganic chemicals detected above BVs at AOC 20-003(b)

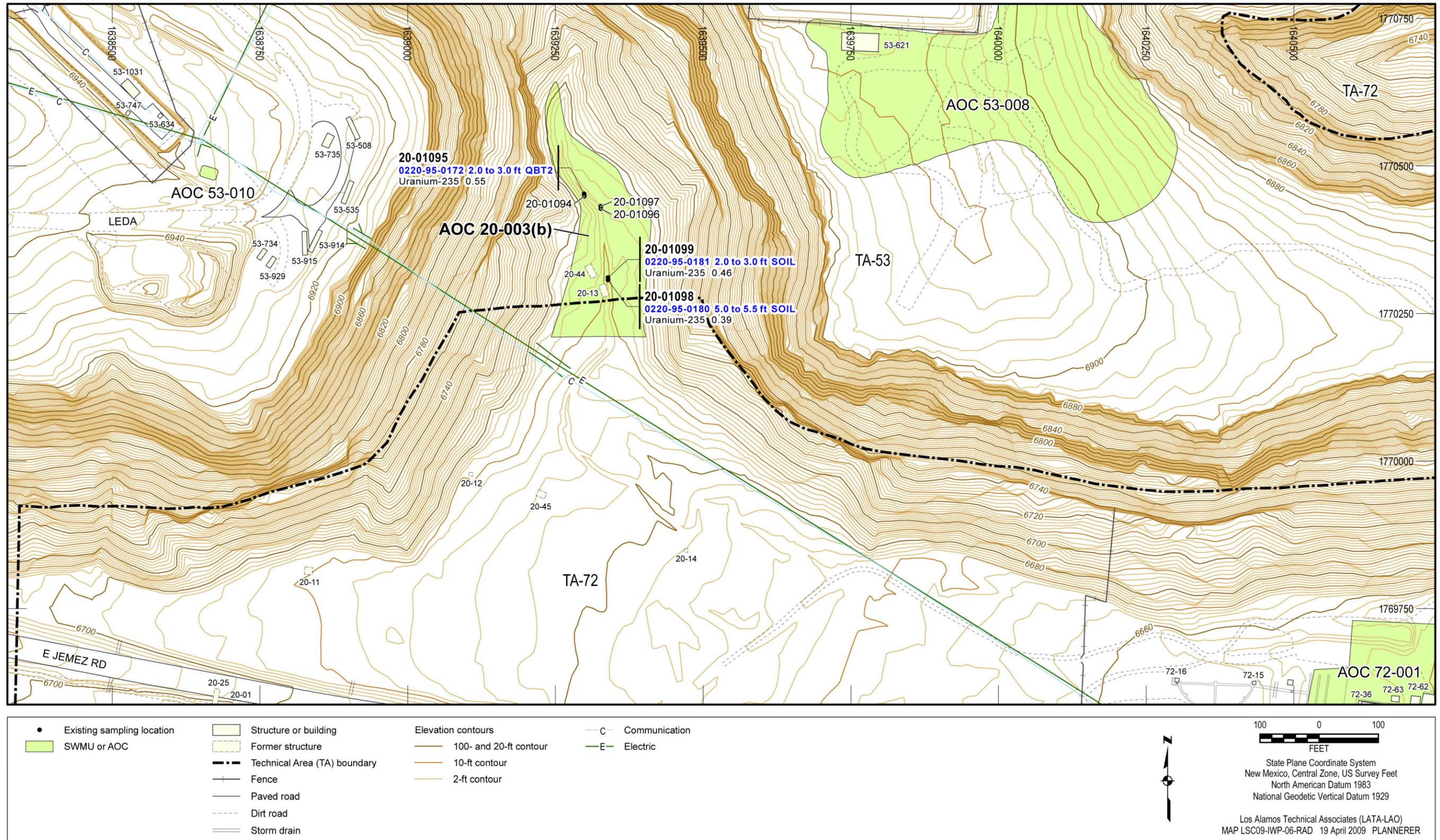


Figure 2.8-3 Radionuclides detected or detected above BVs/FVs at AOC 20-003(b)

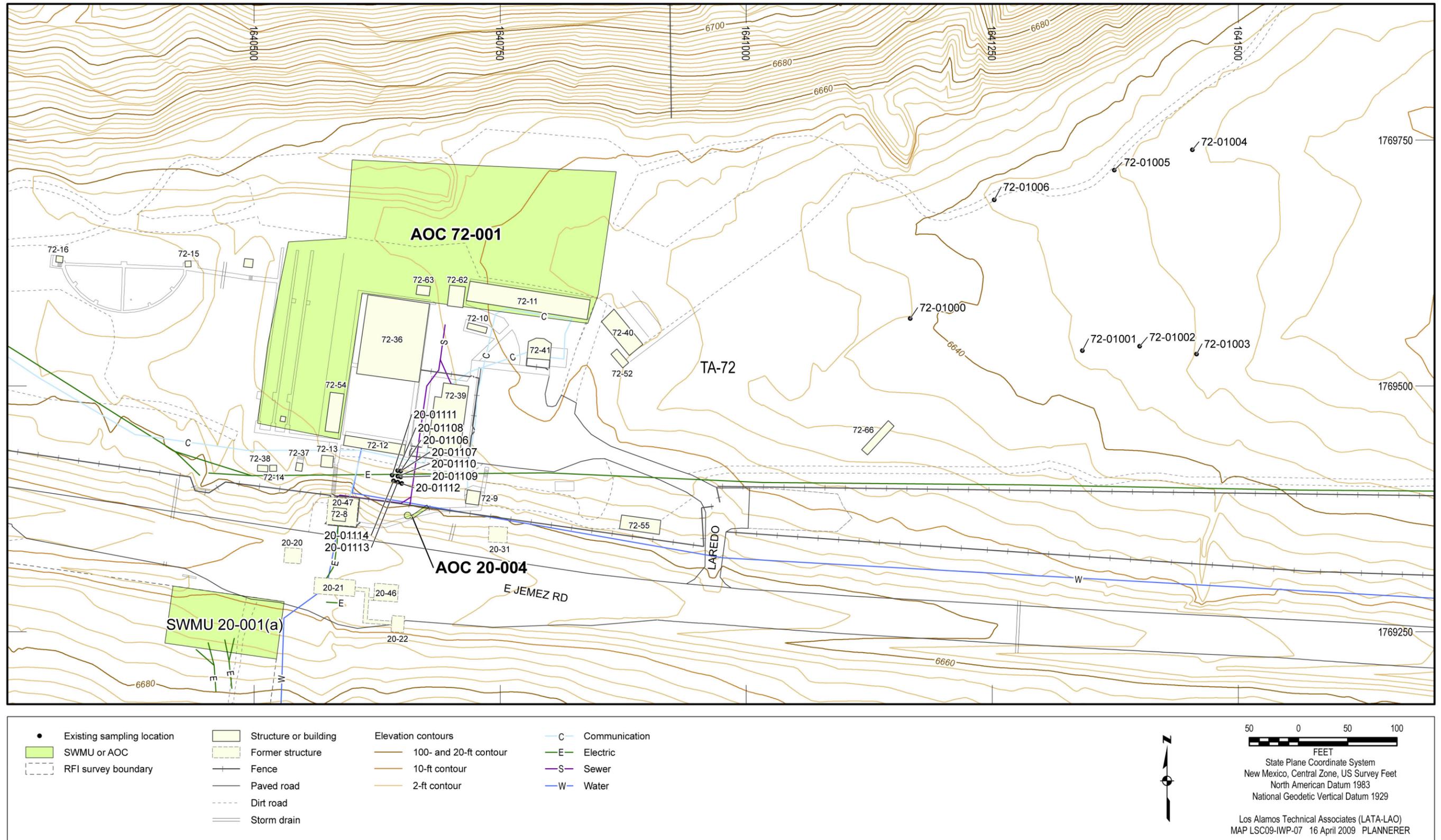


Figure 2.10-1 Site features and historical sampling locations for AOCs 20-004 and 72-001

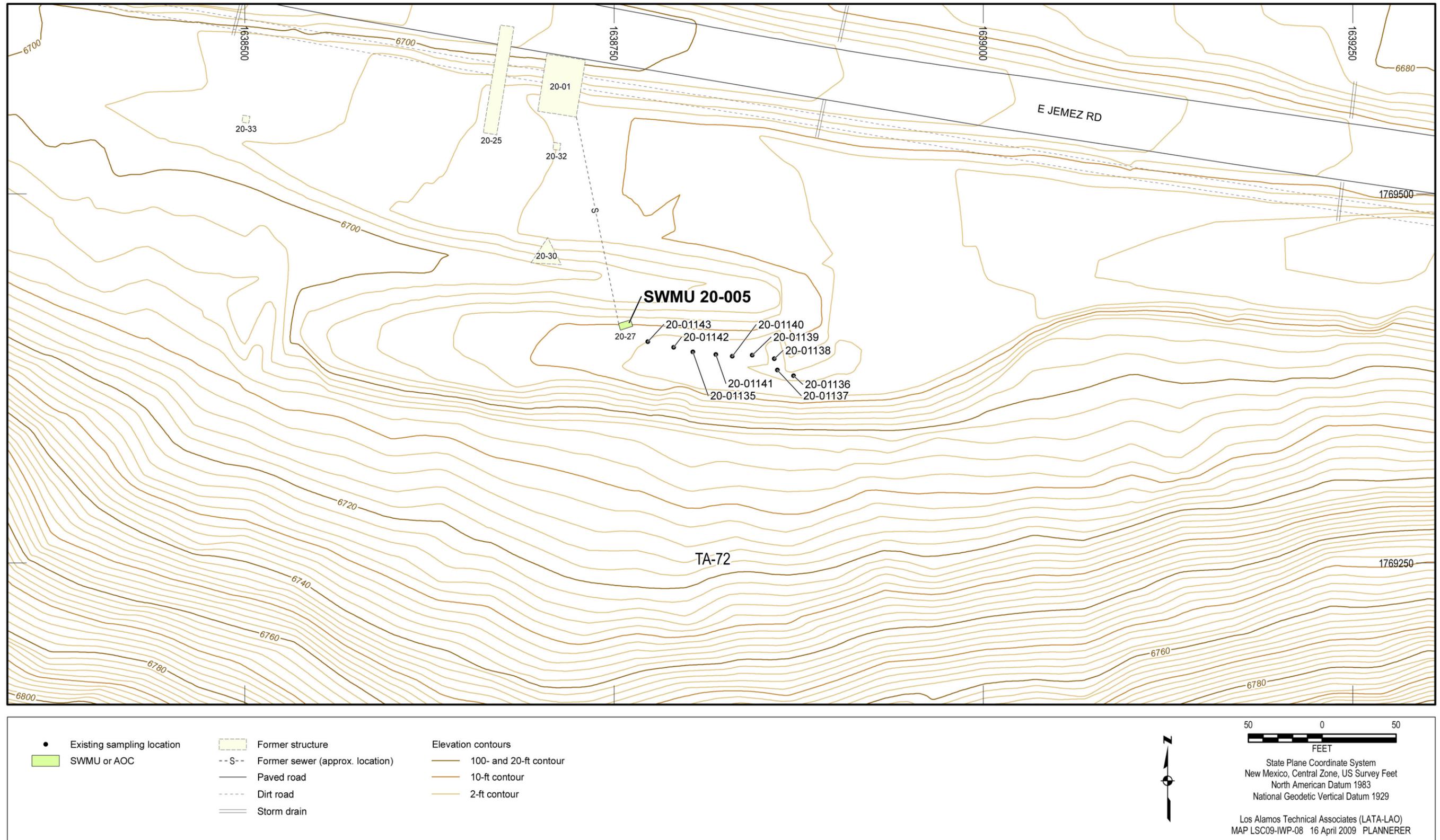


Figure 2.11-1 Site features and historical sampling locations for SWMU 20-005

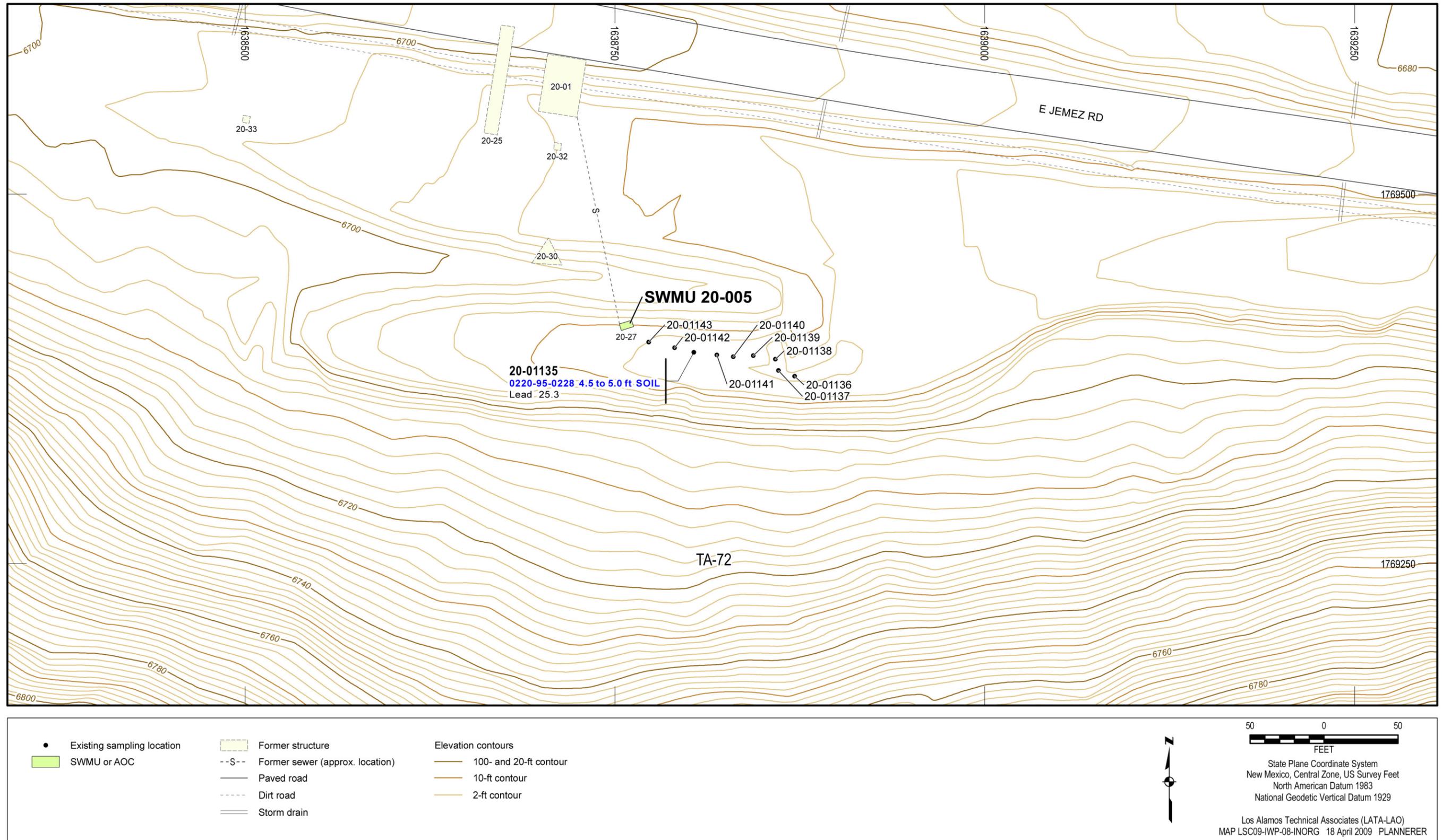


Figure 2.11-2 Inorganic chemicals detected above BVs at SWMU 20-005

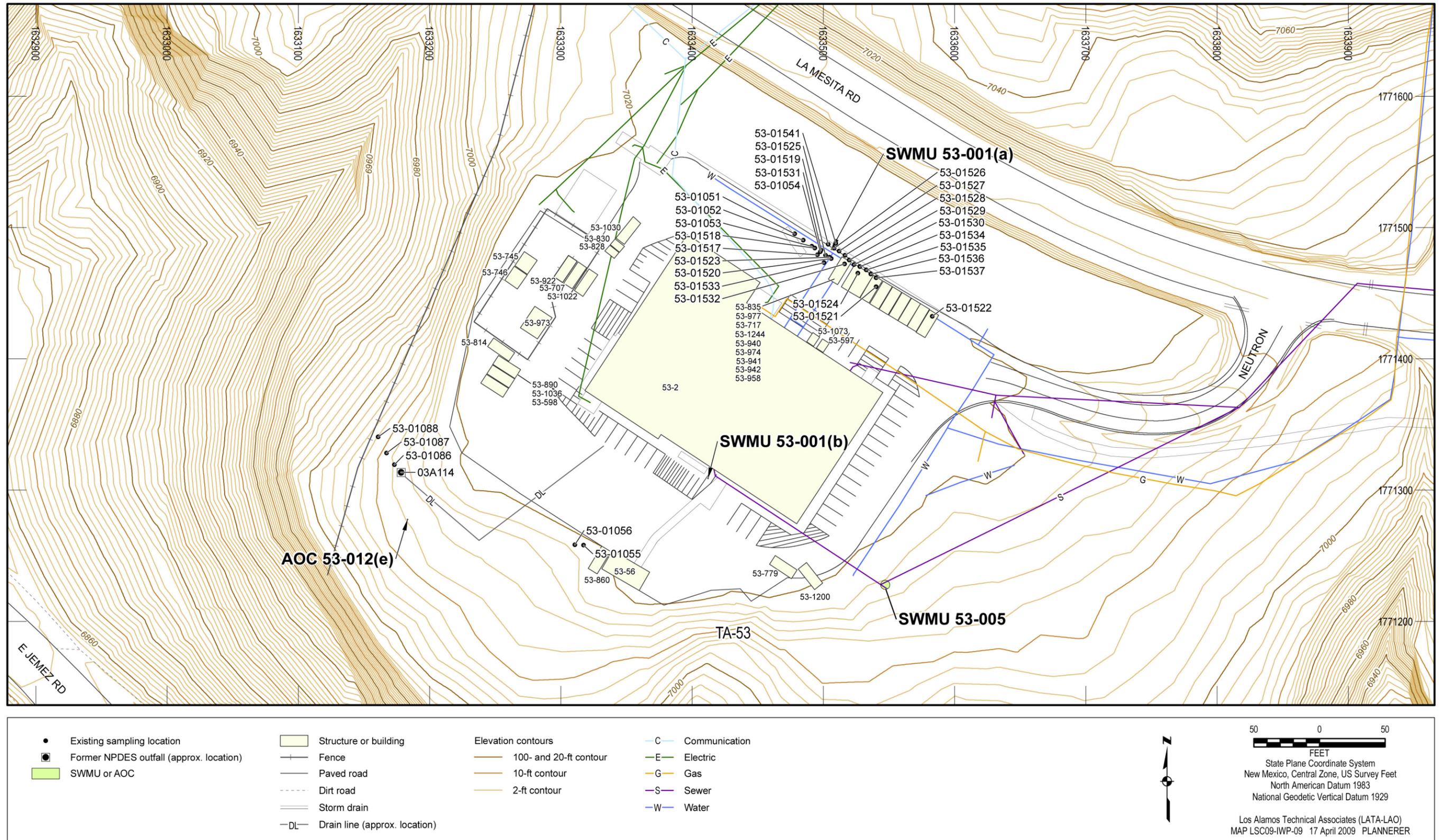


Figure 3.1-1 Site features and historical sampling locations for SWMUs 53-001(a), 53-001(b), and 53-005 and AOC 53-012(e)

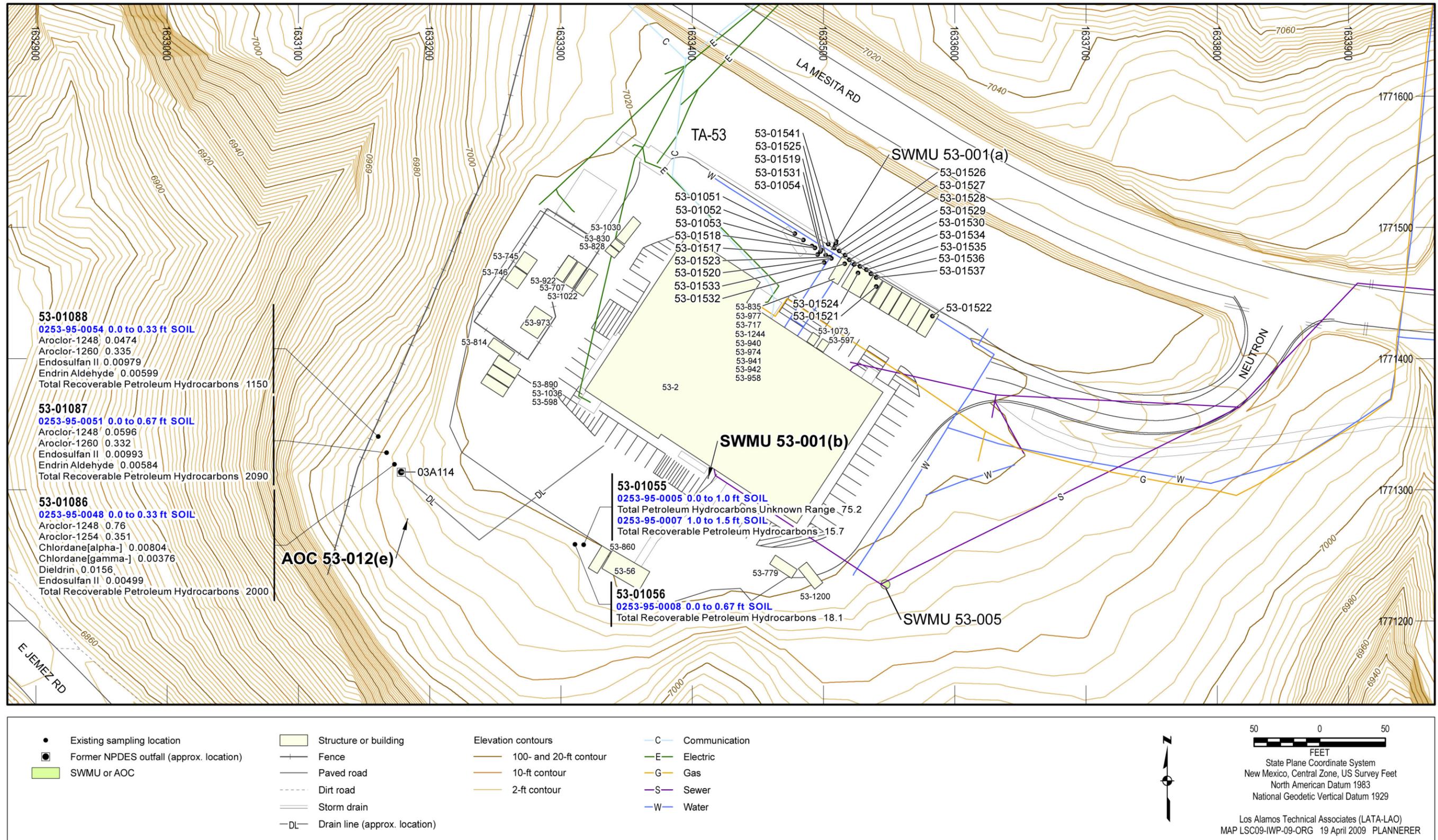


Figure 3.2-1 Organic chemicals detected at SWMUs 53-001(b) and AOC 53-012(e)

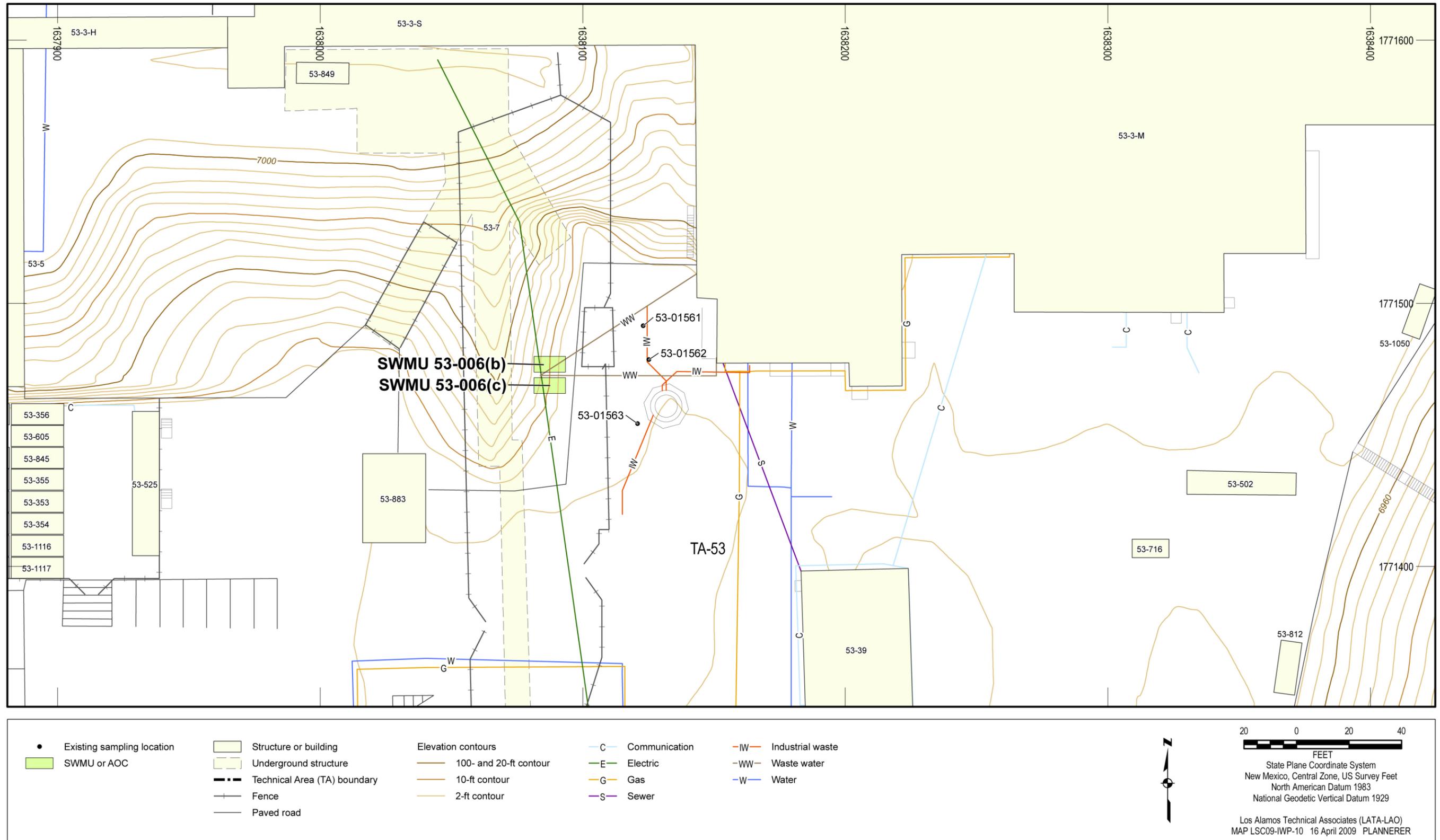


Figure 3.4-1 Site features and historical sampling locations for SWMUs 53-006(b) and 53-006(c)

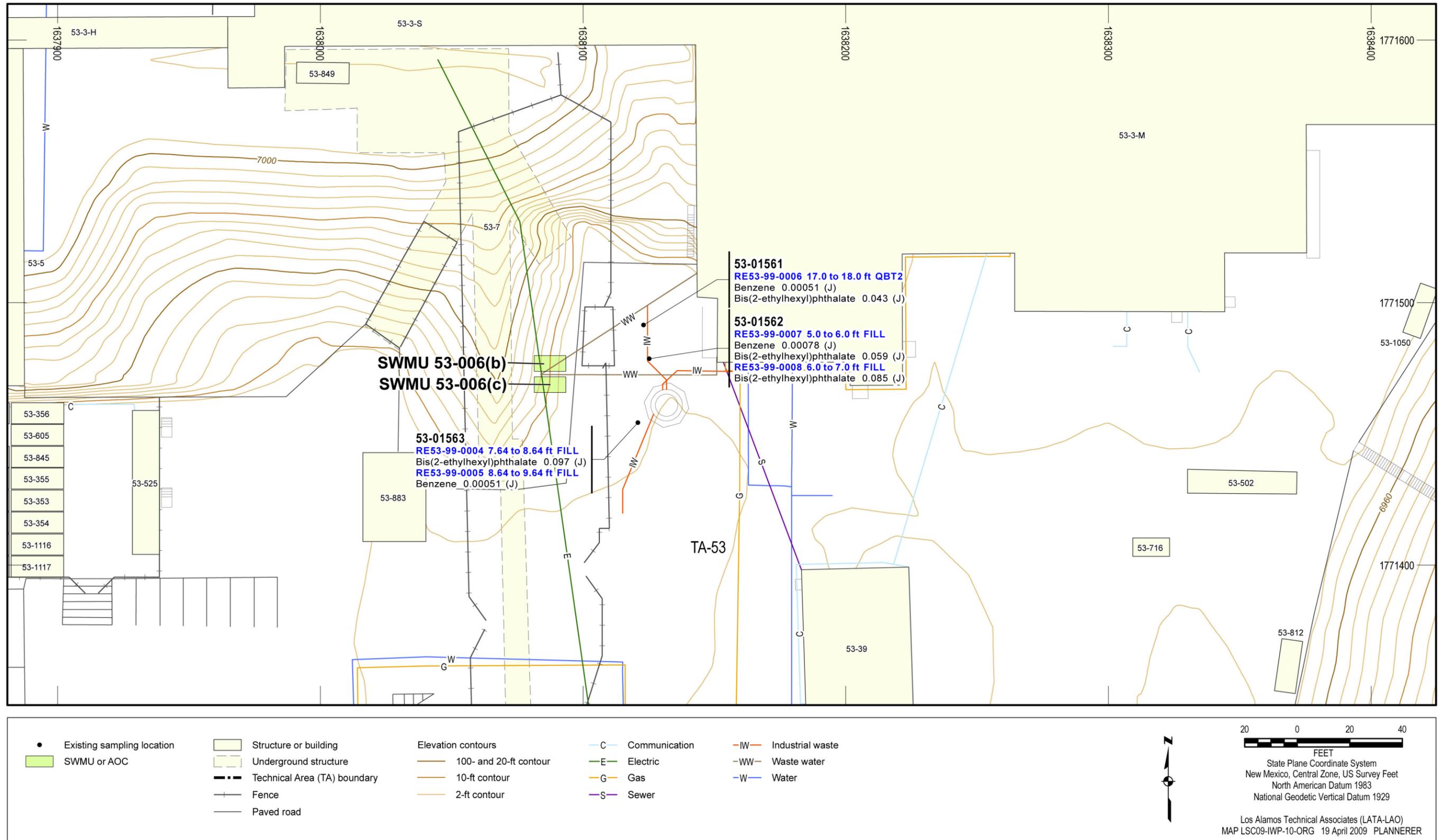


Figure 3.4-2 Organic chemicals detected at SWMUs 53-006(b) and 53-006(c)

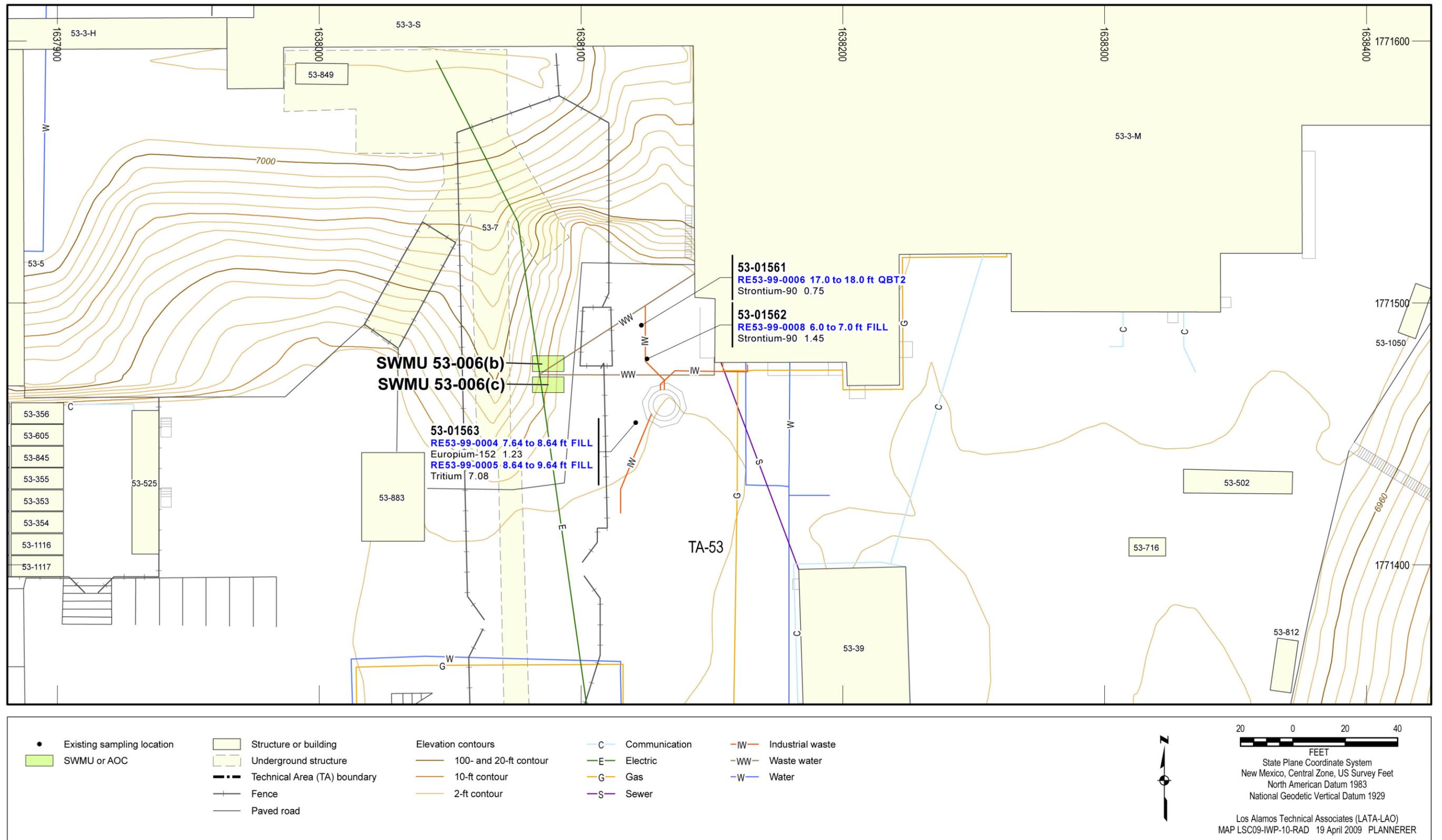


Figure 3.4-3 Radionuclides detected or detected above BVs/FVs at SWMUs 53-006(b) and 53-006(c)

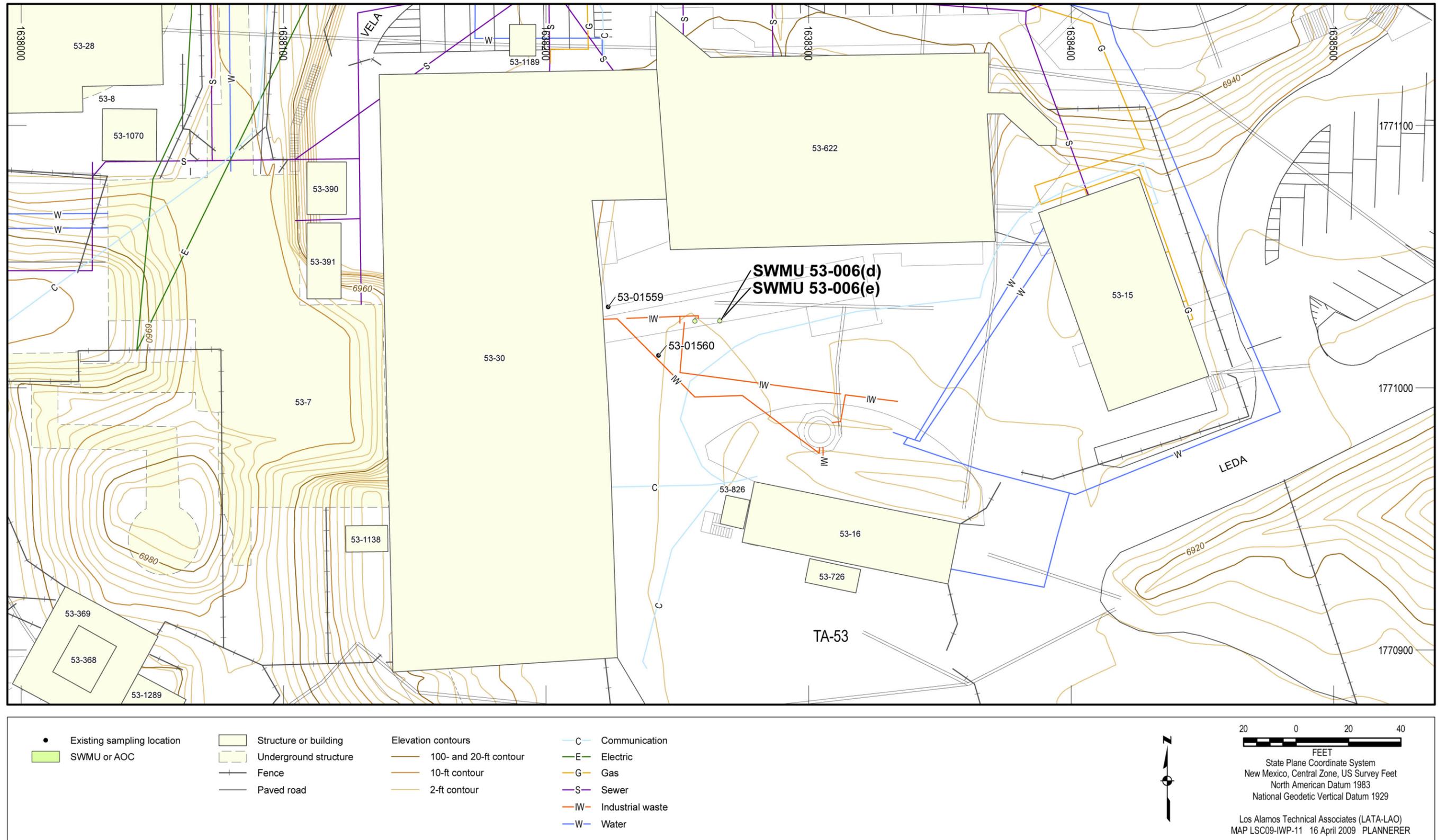


Figure 3.5-1 Site features and historical sampling locations for SWMUs 53-006(d) and 53-006(e)

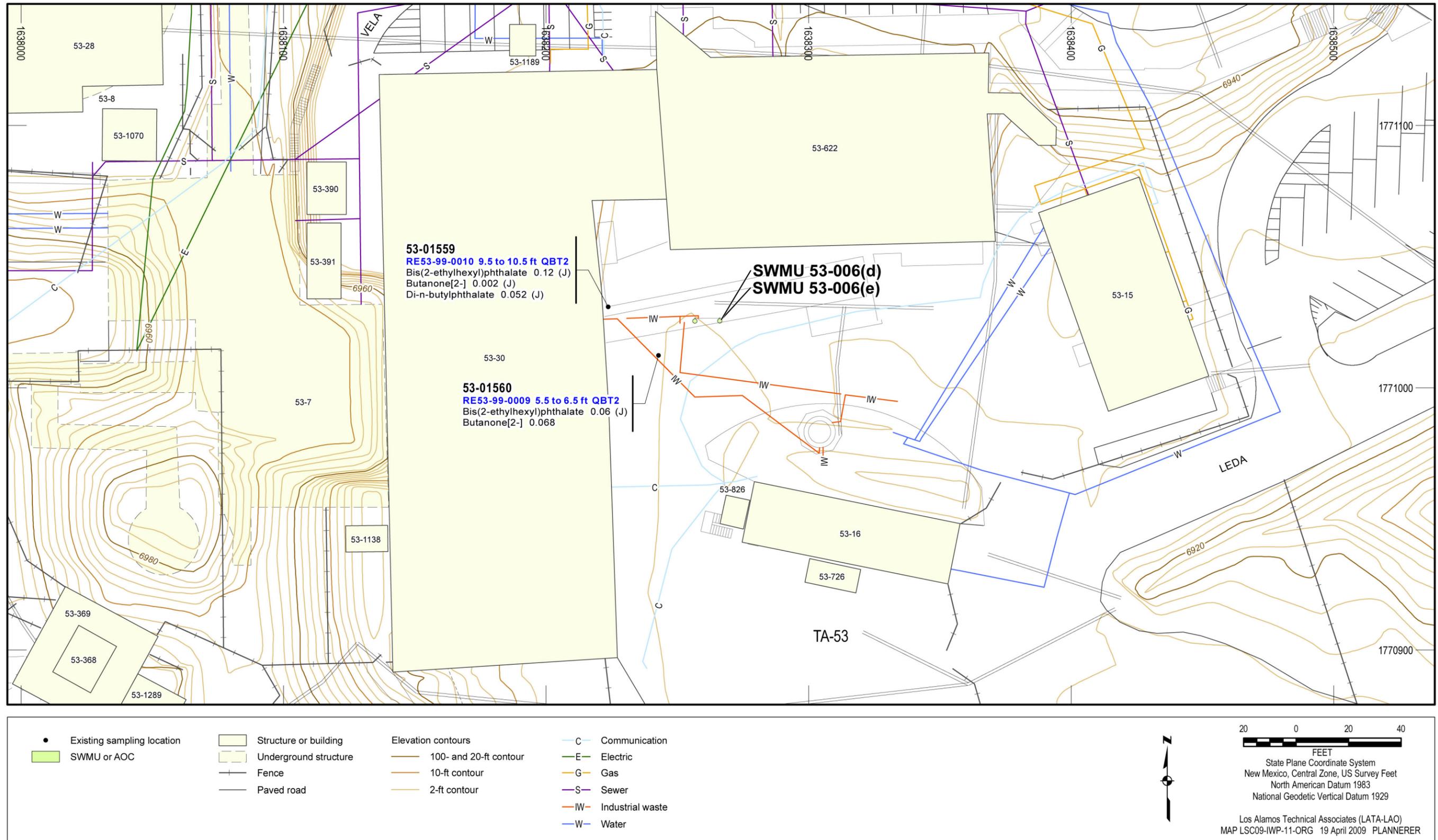


Figure 3.5-2 Organic chemicals detected at SWMUs 53-006(d) and 53-006(e)

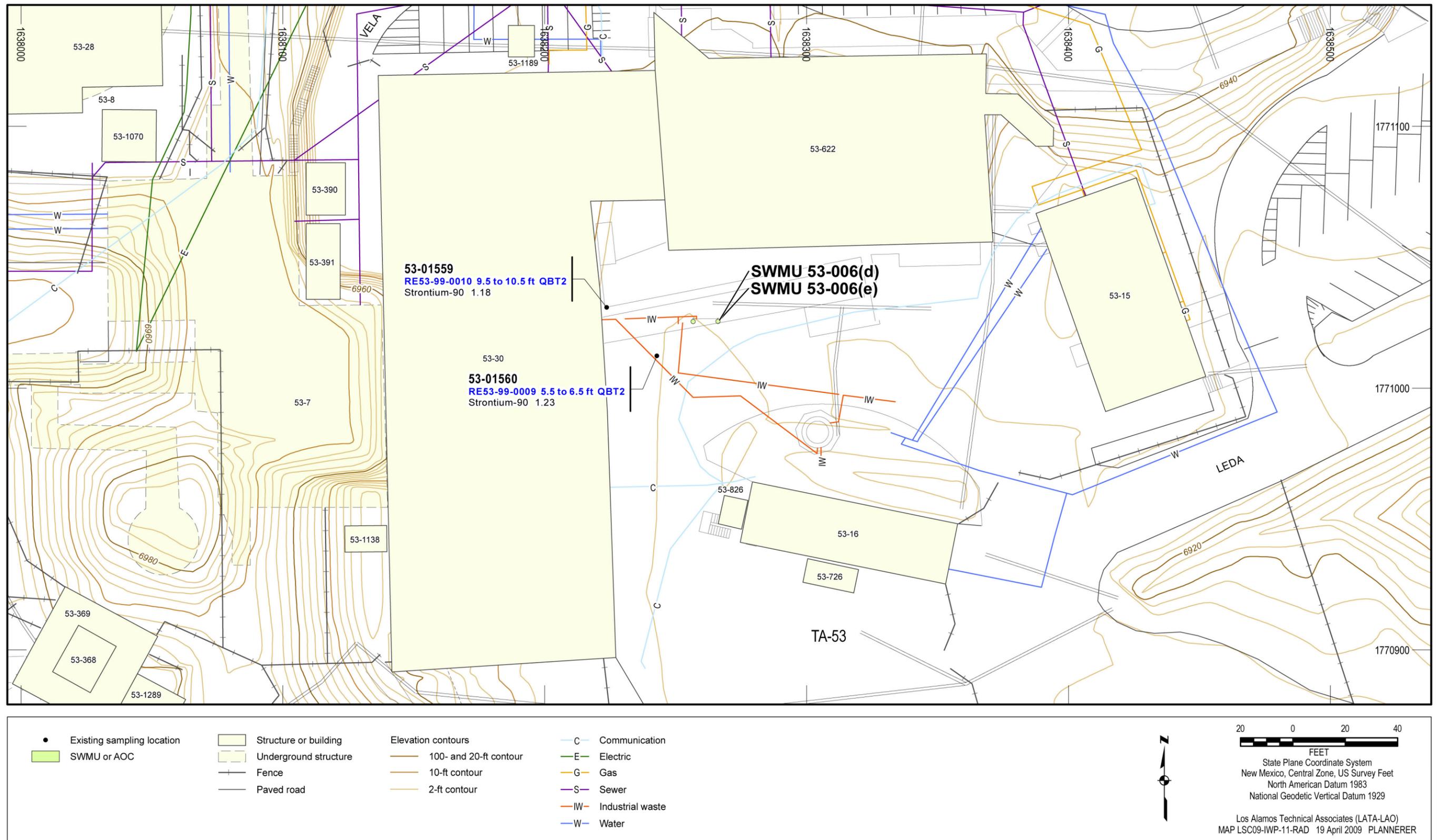


Figure 3.5-3 Radionuclides detected or detected above BVs/FVs at SWMUs 53-006(d) and 53-006(e)

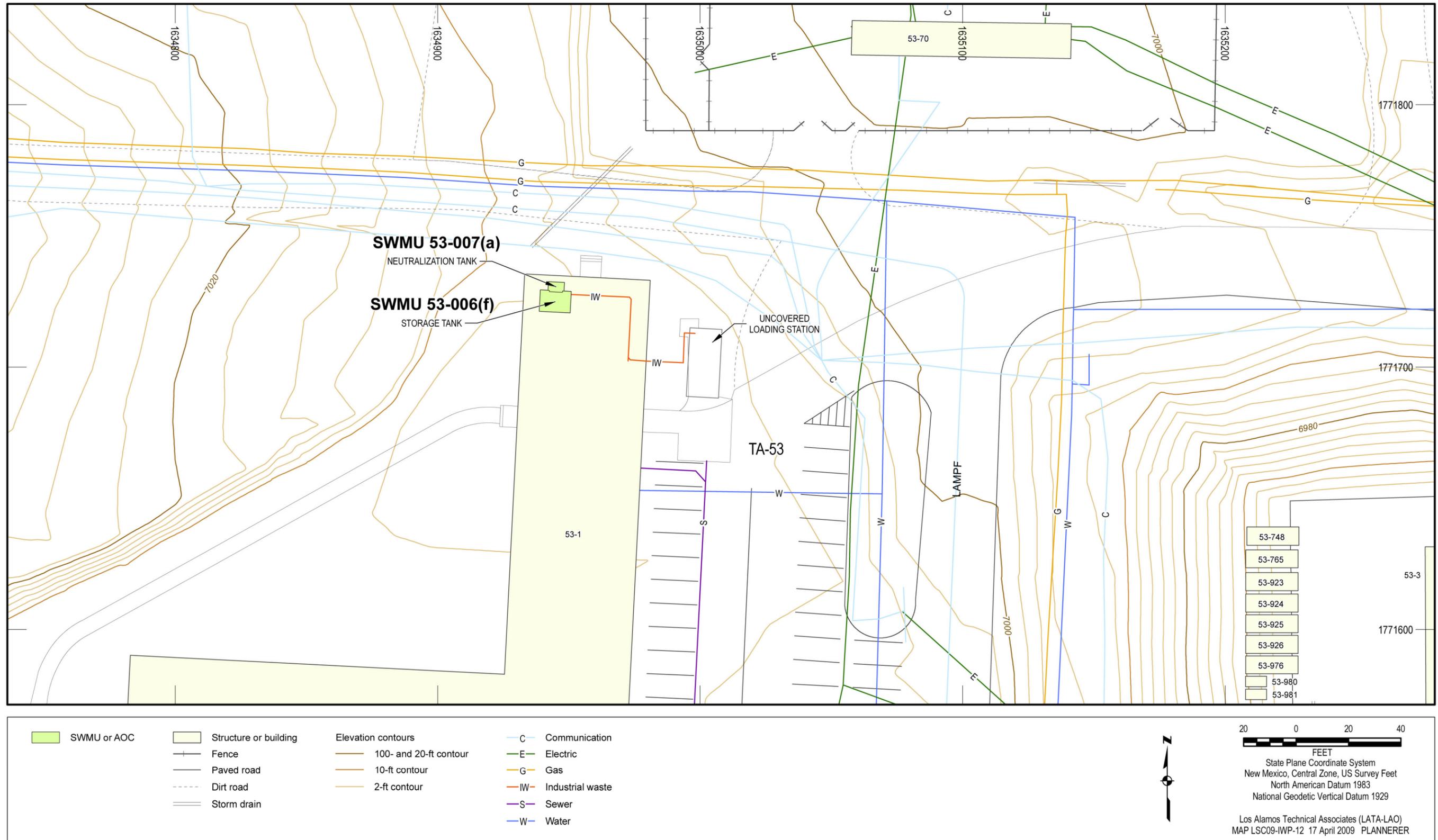


Figure 3.6-1 Site features and historical sampling locations for SWMUs 53-006(f) and 53-007(a)

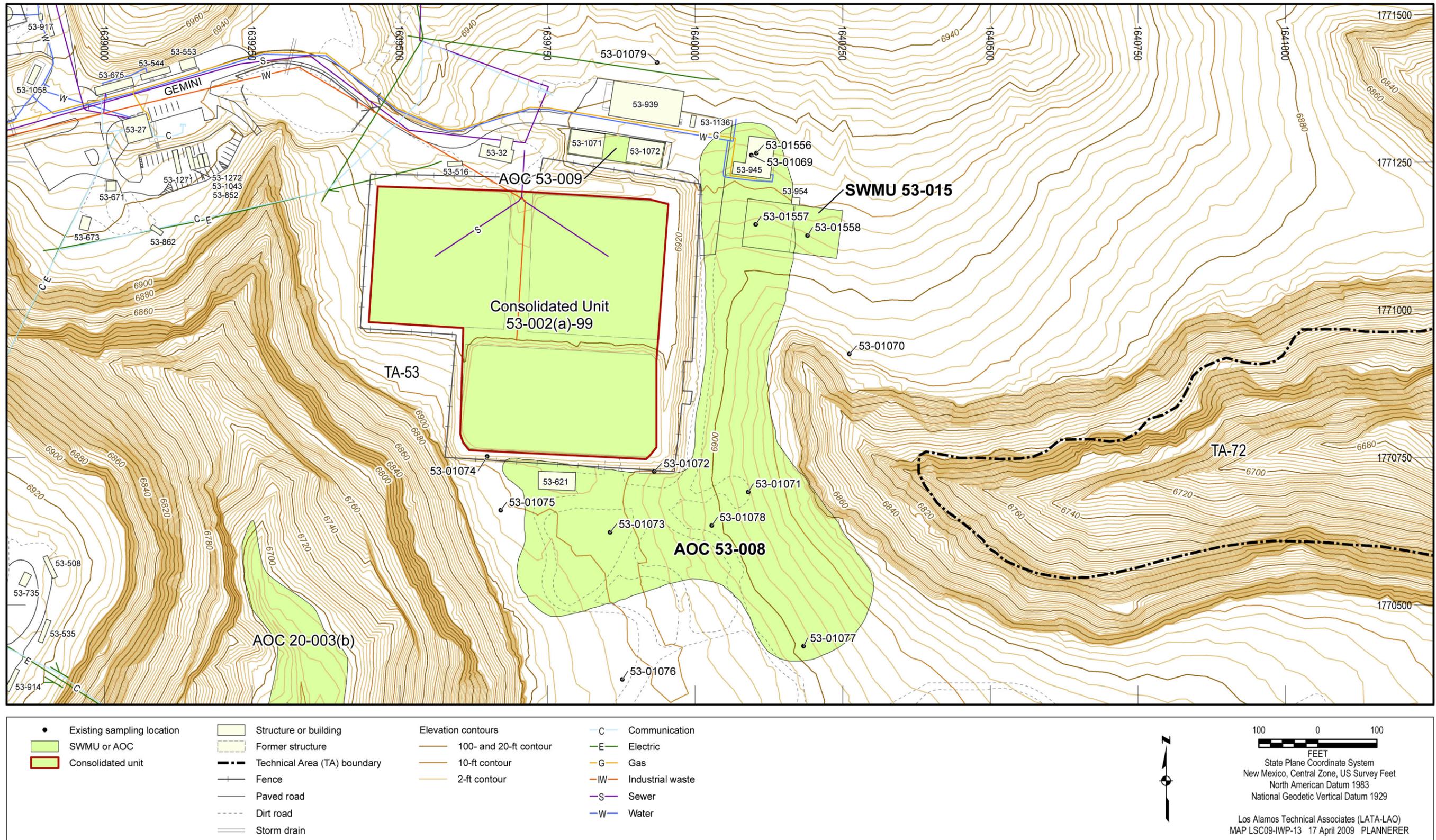
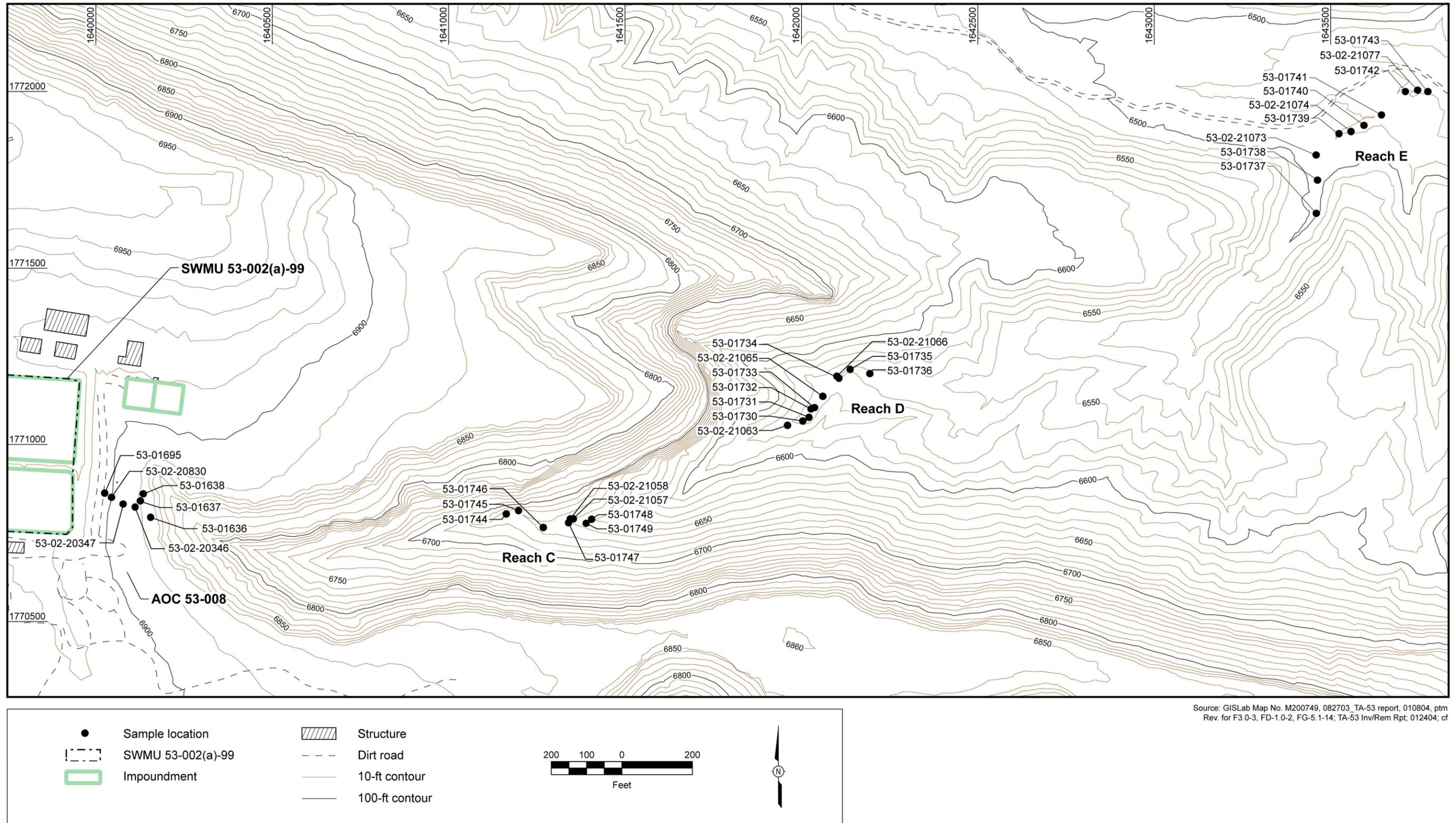


Figure 3.8-1 Site features and historical sampling locations for SWMU 53-015 and AOC 53-008



Source: GISLab Map No. M200749, 082703_TA-53 report, 010804, ptn
 Rev. for F3.0-3, FD-1.0-2, FG-5.1-14; TA-53 Inv/Rem Rpt; 012404; cf

Figure 3.8-2 Sampling locations at head of drainage and in downstream reaches

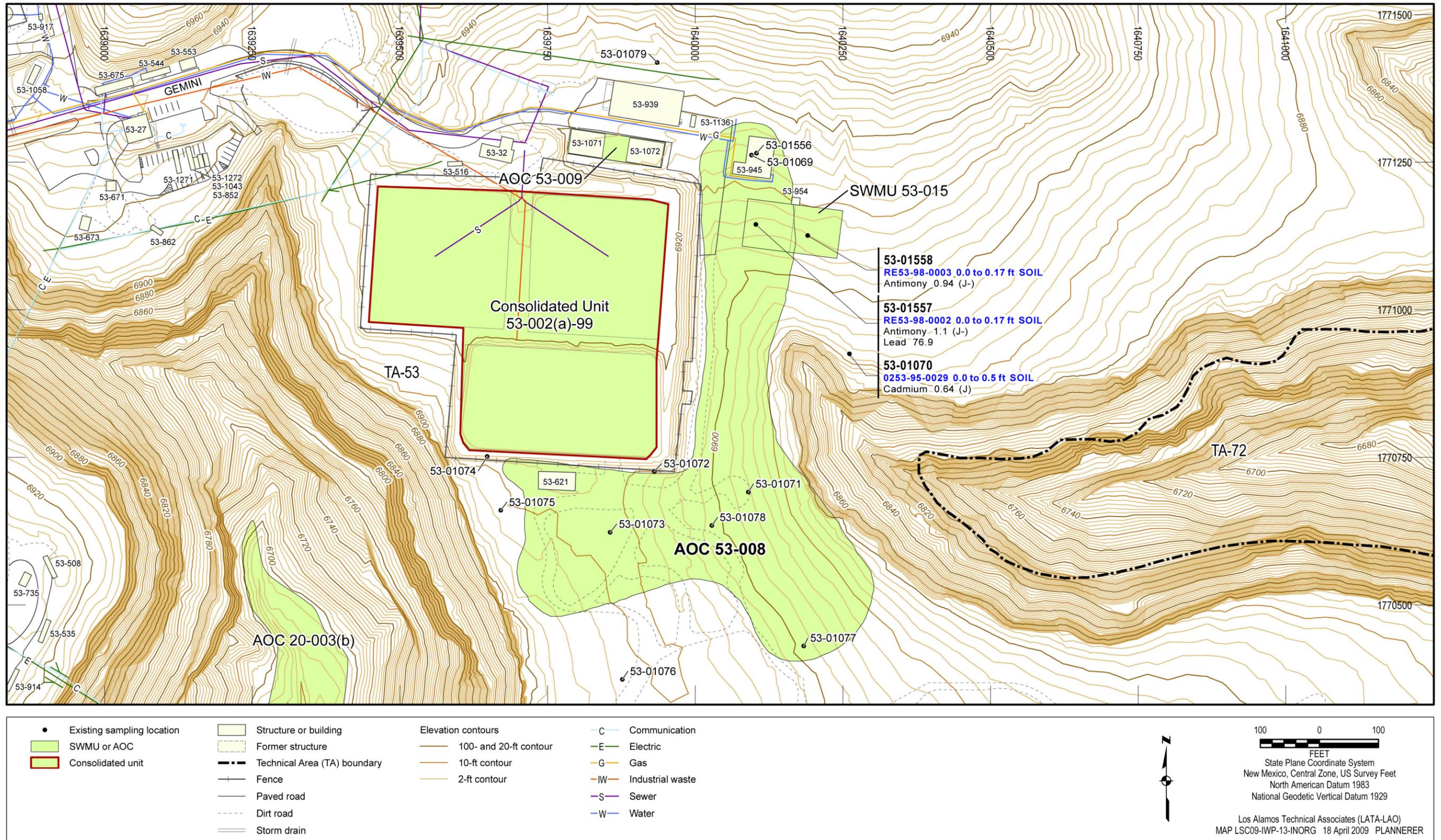


Figure 3.8-3 Inorganic chemicals detected above BVs at AOC 53-008

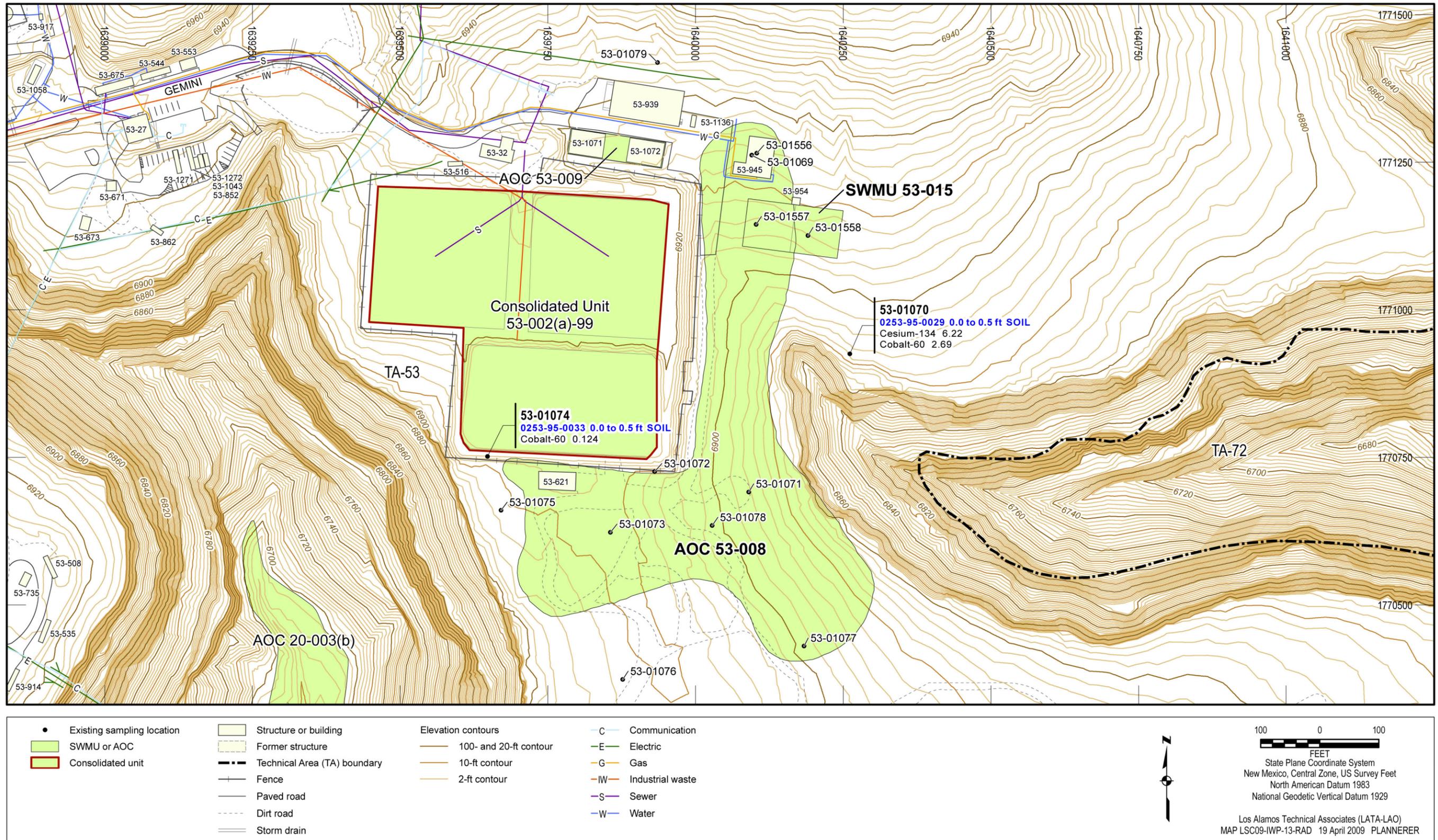


Figure 3.8-4 Radionuclides detected or detected above BVs/FVs for AOC 53-008

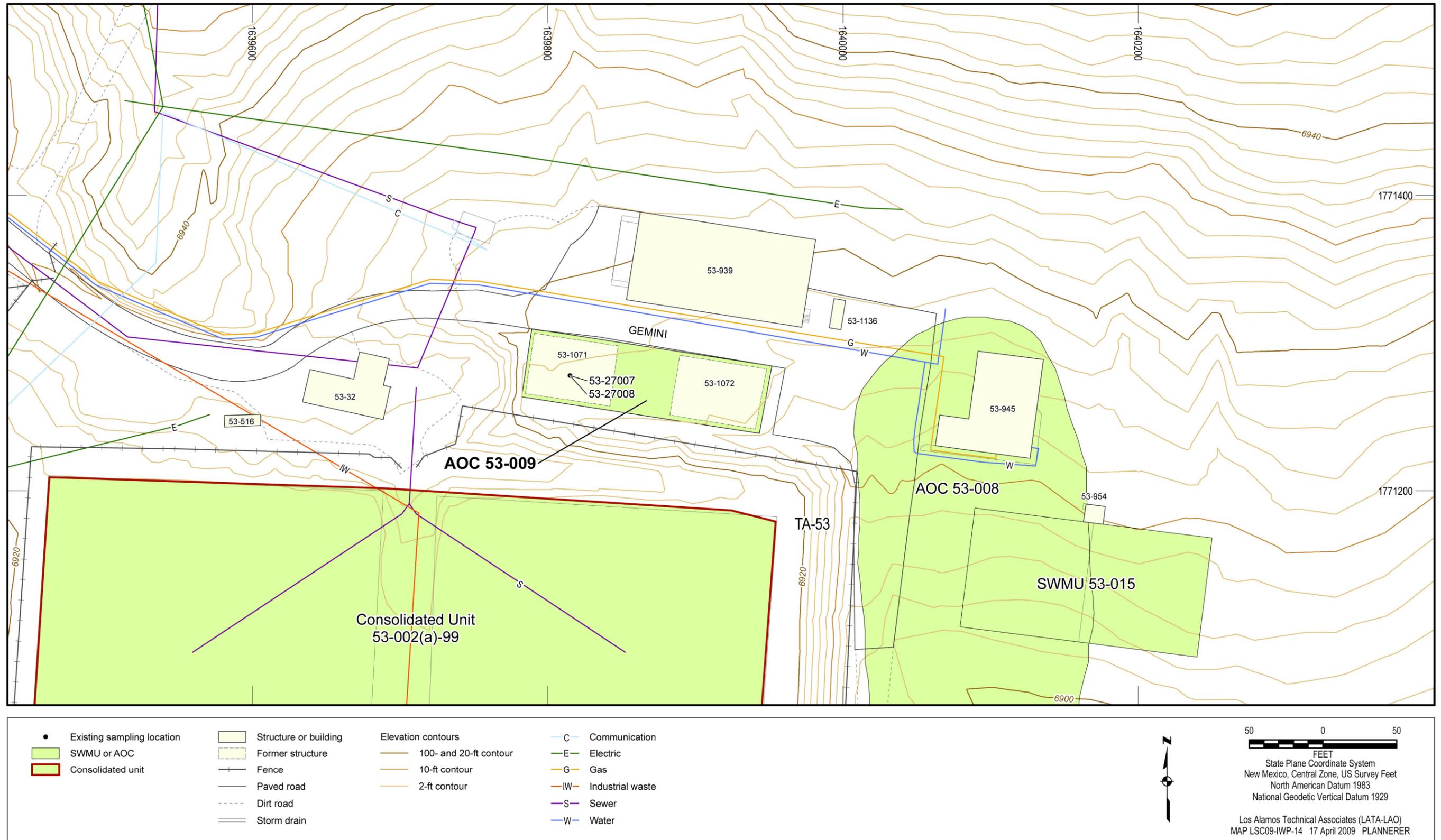


Figure 3.9-1 Site features and historical sampling locations for AOC 53-009

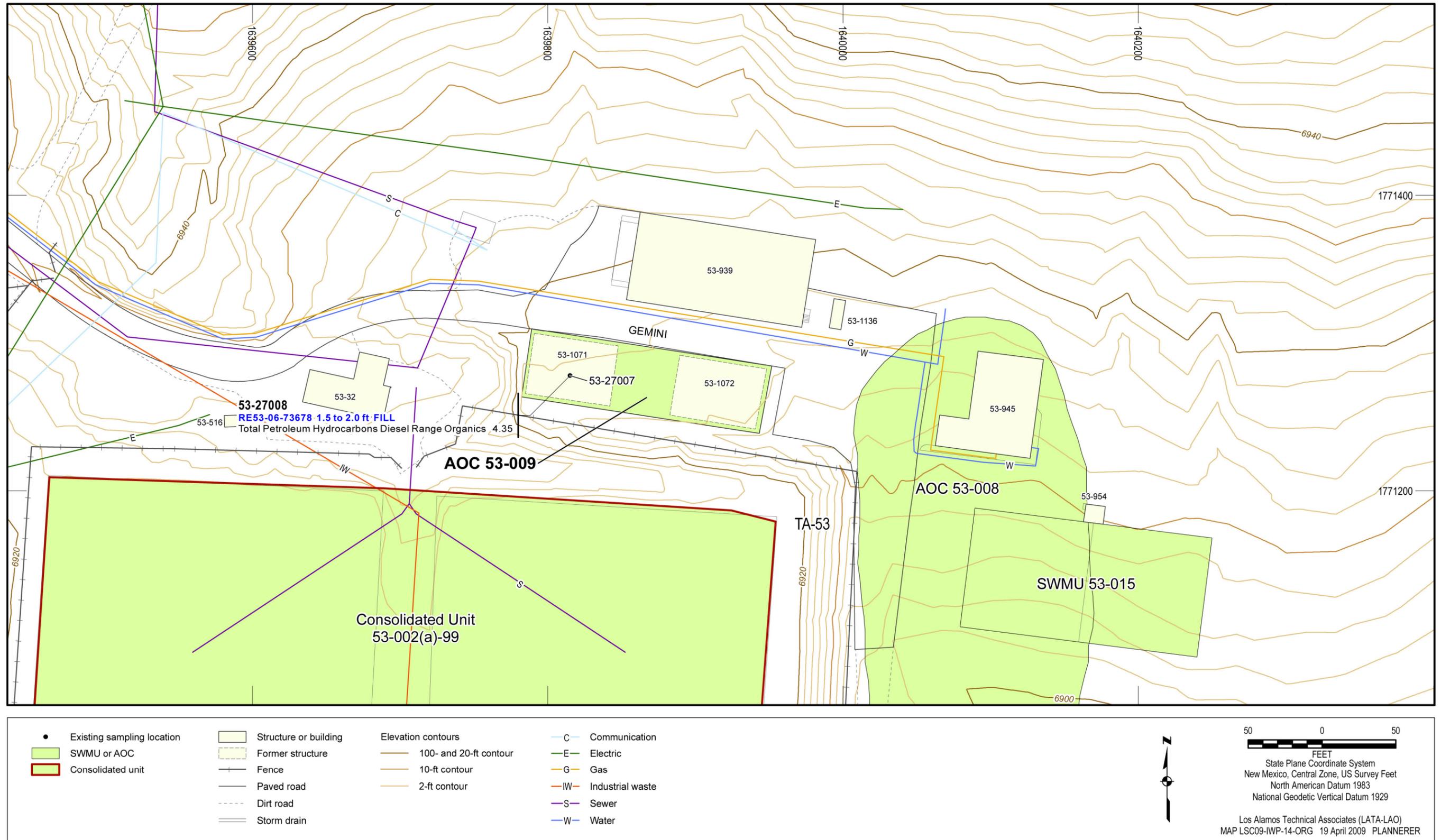


Figure 3.9-2 Organic chemicals detected at AOC 53-009

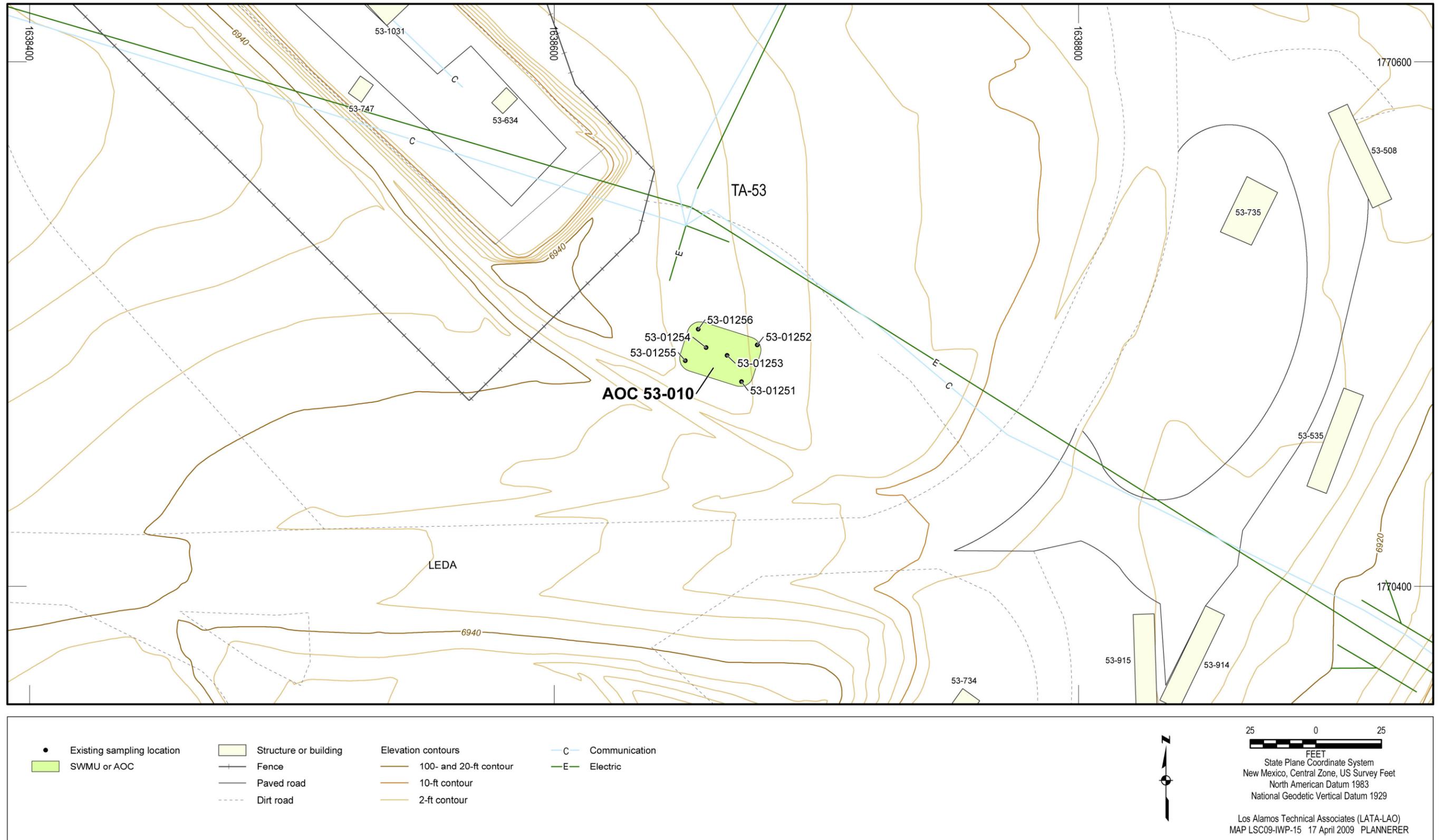


Figure 3.10-1 Site features and historical sampling locations for AOC 53-010

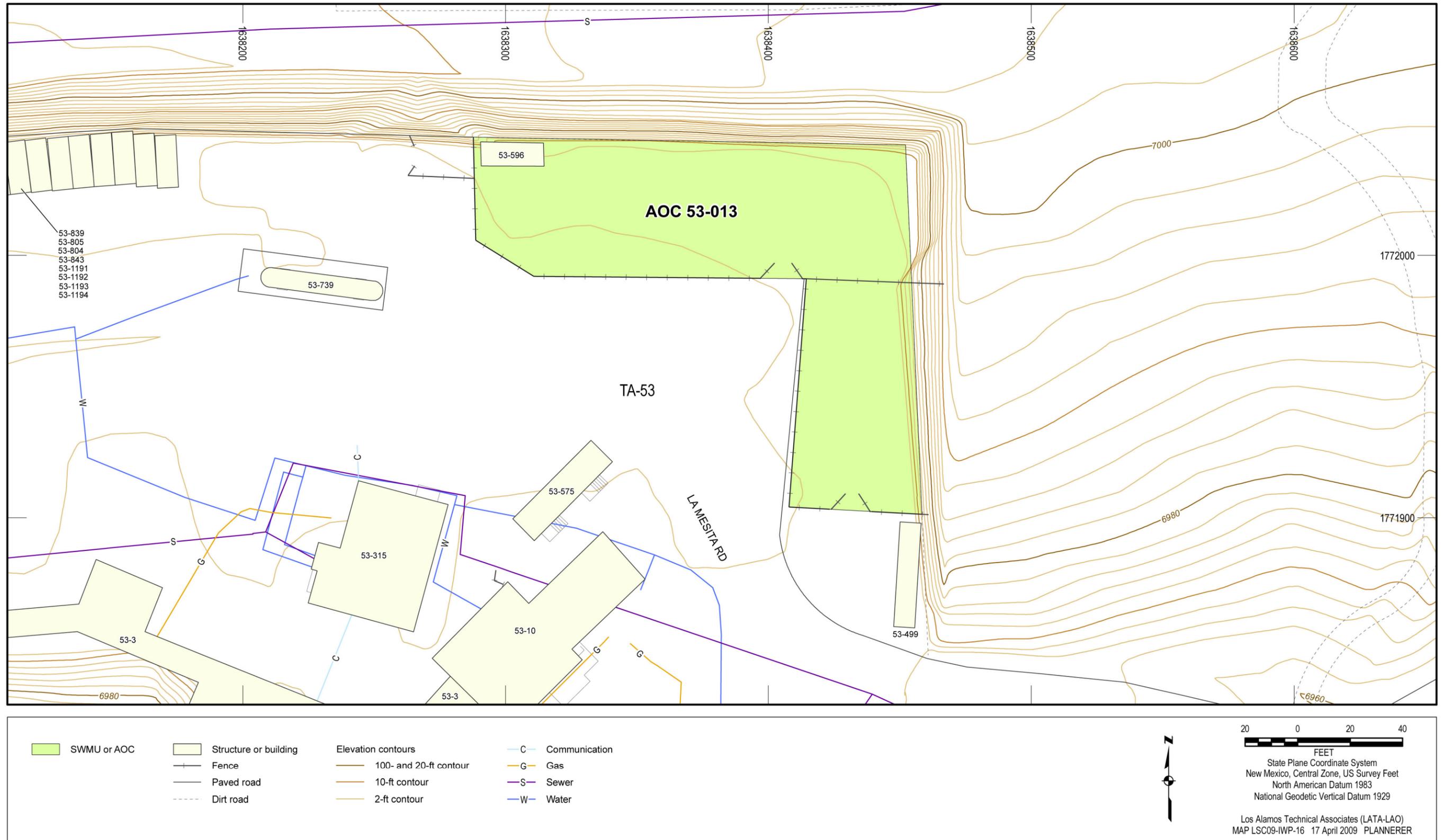


Figure 3.12-1 Site features and historical sampling locations for AOC 53-013

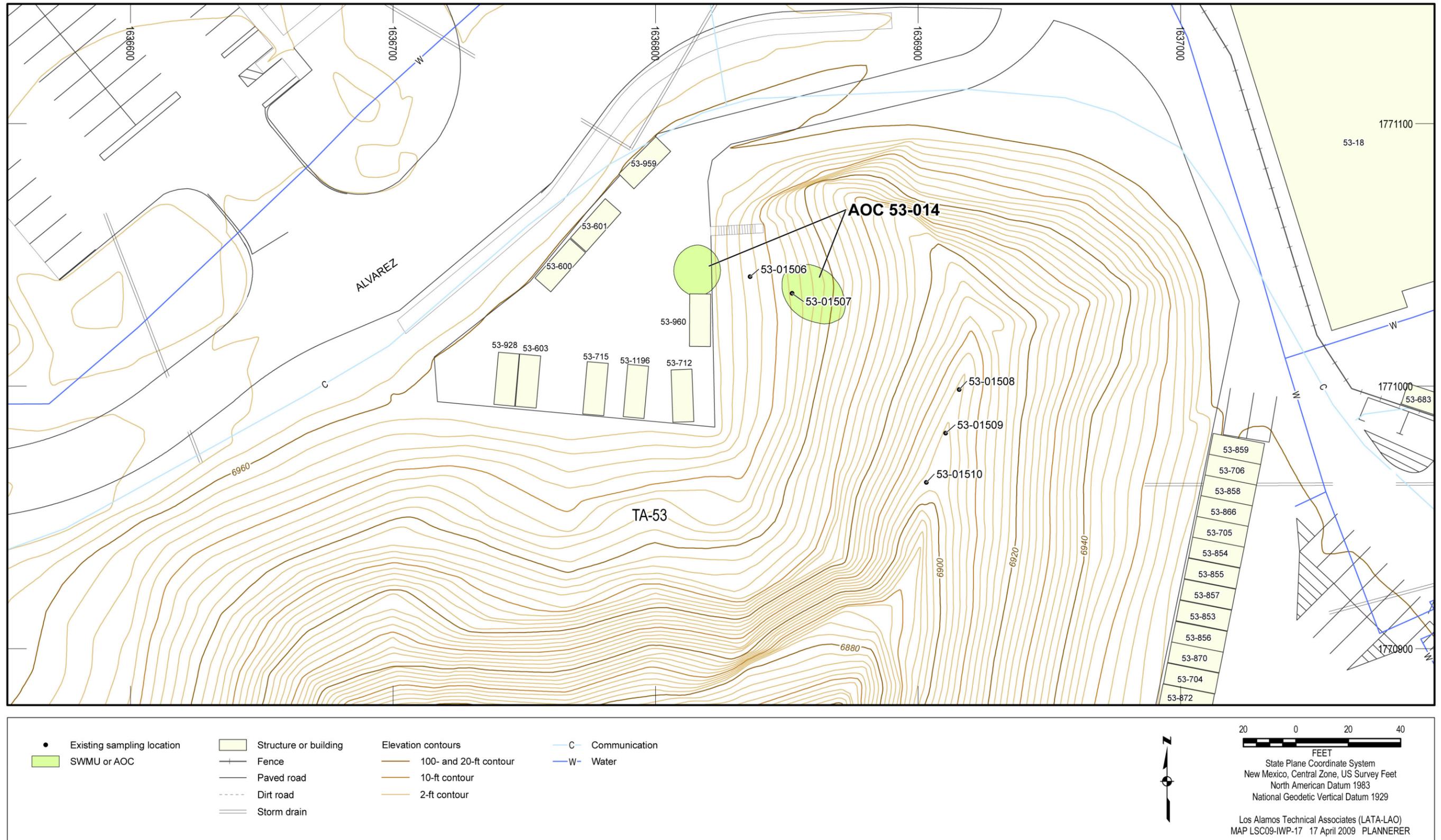


Figure 3.13-1 Site features and historical sampling locations for AOC 53-014

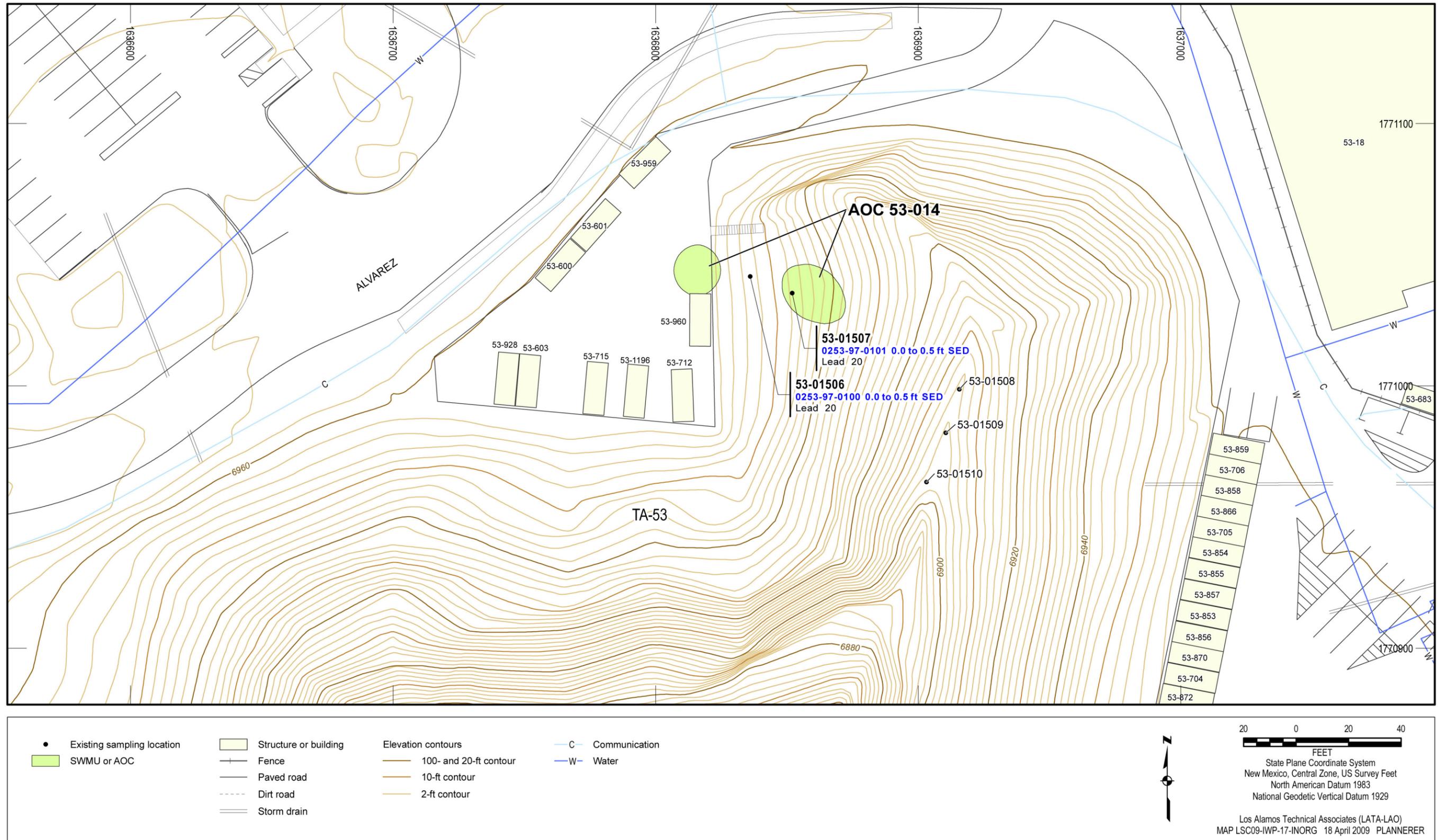


Figure 3.13-2 Inorganic chemicals detected above BVs at AOC 53-014

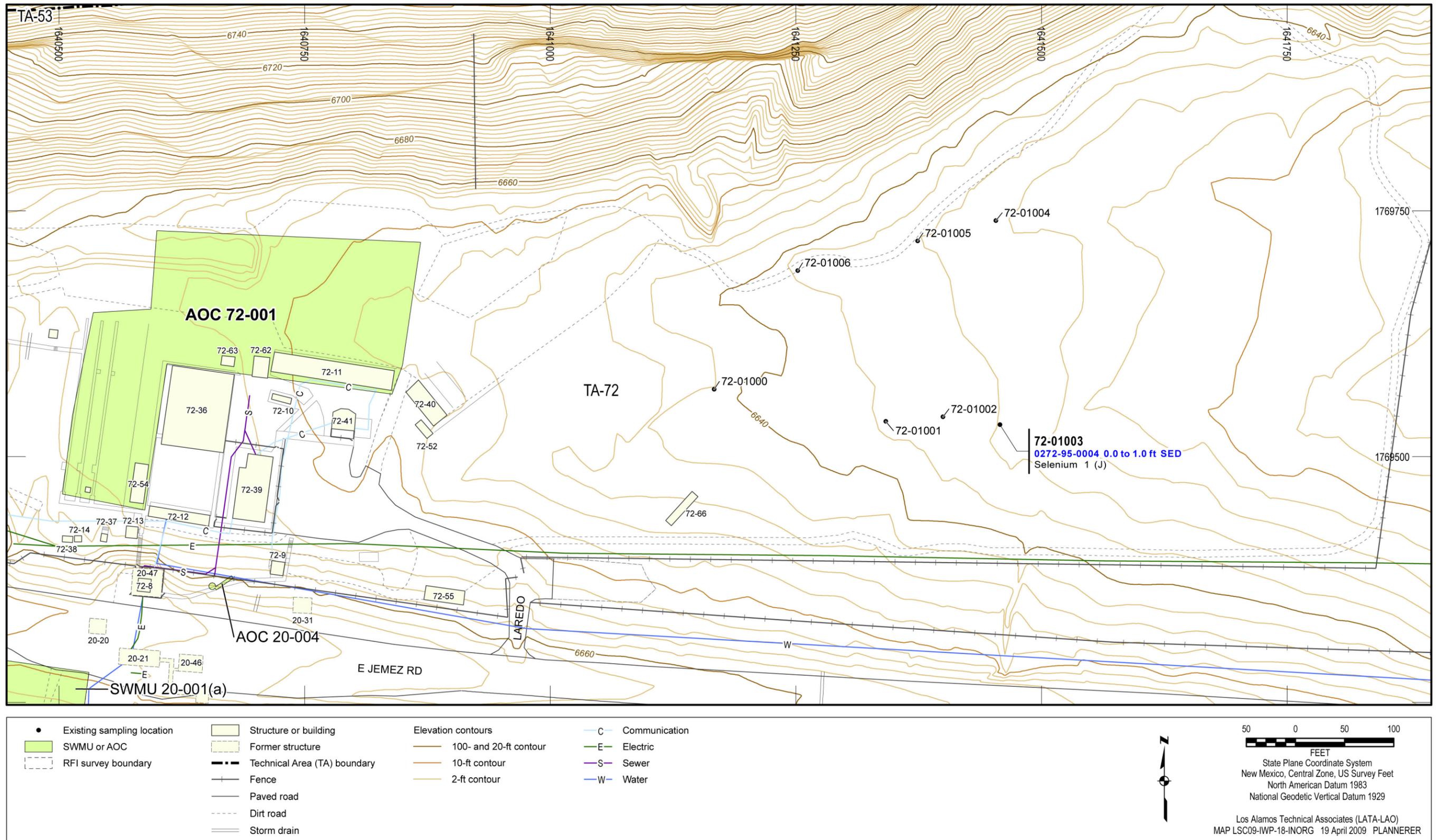


Figure 4.1-1 Inorganic chemicals detected above BVs at AOC 72-001

**Table 1.1-1
Status of SWMUs and AOCs in Lower Sandia Canyon Aggregate Area**

Consolidated Unit	Site ID	Brief Description	Site Status	Reference
Former TA-20				
	SWMU 20-001(a)	Landfill	Under Investigation	Work plan section 4.1.1
20-001(b)-00	SWMU 20-001(b)	Landfill	Under Investigation	Work plan section 4.1.2
	SWMU 20-002(c)	Former firing point	Under Investigation	Work plan section 4.1.6
	AOC 20-003(c)	Former U.S. Navy gun site	Under Investigation	Work plan section 4.1.9
20-001(c)-00	SWMU 20-001(c)	Landfill	Under Investigation	Work plan section 4.1.3
	SWMU 20-002(a)	Former firing pit	Under Investigation	Work plan section 4.1.4
	SWMU 20-002(b)	Former steel tanks (firing site)	Under Investigation	Work plan section 4.1.5
	SWMU 20-002(d)	Former firing site	Under Investigation	Work plan section 4.1.7
	SWMU 20-003(a)	Soil contamination associated with former firing site control building	Removed from Module VIII Hazardous Waste Facility Permit (HWFP) 04/22/07	NMED 2007, 095495
	AOC 20-003(b)	Former 20-mm gun firing site	Under Investigation	Work plan section 4.1.8
	AOC 20-003(d)	Firing site	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 20-004	Septic system	Under Investigation	Work plan section 4.1.10
	SWMU 20-005	Septic system	Under Investigation	Work plan section 4.1.11
	AOC C-20-001	Former storage building	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-20-002	Former storage building	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-20-003	Former building	NFA Approved, 01/21/05	EPA 2005, 088464
TA-53				
	SWMU 53-001(a)	Storage area	Under Investigation	Work plan section 4.2.1
	SWMU 53-001(b)	Storage area	Under Investigation	Work plan section 4.2.2
	AOC 53-001(c)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(d)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(e)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(f)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(g)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464

Table 1.1-1 (continued)

Consolidated Unit	Site ID	Brief Description	Site Status	Reference
	AOC 53-001(h)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(i)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(j)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(k)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(l)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(m)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(n)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-001(o)	Storage area	NFA Approved, 01/21/05	EPA 2005, 088464
53-002(a)-99	SWMU 53-002(a)	Former surface impoundments	Corrective Action Complete with Controls, 09/13/06	NMED 2006, 095421
	SWMU 53-002(b)	Former surface impoundment	Corrective Action Complete with Controls, 09/13/06	NMED 2006, 095421
	AOC 53-003	Sanitary waste holding tank	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-004	Bead blaster	NFA Approved, 01/21/05	EPA 2005, 088464
	SWMU 53-005	Former waste disposal pit	Under Investigation	Work plan section 4.2.3
53-006(b)-99	AOC 53-006(a)	Underground Tank	NFA Approved, 01/21/05	EPA 2005, 088464
	SWMU 53-006(b)	Underground storage tank	Under Investigation	Work plan section 4.2.4
	SWMU 53-006(c)	Underground storage tank	Under Investigation	Work plan section 4.2.4
53-006(d)-99	SWMU 53-006(d)	Underground storage tank	Under Investigation	Work plan section 4.2.5
	SWMU 53-006(e)	Underground storage tank	Under Investigation	Work plan section 4.2.5
	SWMU 53-006(f)	Underground storage tanks	Under Investigation	Work plan section 4.2.6
	SWMU 53-007(a)	Aboveground treatment tank	Under Investigation	Work plan section 4.2.7
	SWMU 53-007(b)	Aboveground storage tanks	Removed from Module VIII HWFP, 12/23/98	NMED 1998, 063042
	AOC 53-008	Storage area	Under Investigation	Work plan section 4.2.8
	AOC 53-009	Former storage area	Under Investigation	Work plan section 4.2.9
	AOC 53-010	Former storage area	Under Investigation	Work plan section 4.2.10
	AOC 53-011(a)	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464

Table 1.1-1 (continued)

Consolidated Unit	Site ID	Brief Description	Site Status	Reference
	AOC 53-011(b)	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-011(c)	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-011(d)	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-011(e)	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-012(d)	Outfall	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-012(e)	Drainline and outfall	Under Investigation	Work plan section 4.2.11
	AOC 53-012(f)	Outfall	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-012(g)	Outfall	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-012(h)	Outfall	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 53-013	Lead spill site	Under Investigation	Work plan section 4.2.12
	AOC 53-014	Lead spill site	Under Investigation	Work plan section 4.2.13
	SWMU 53-015	Wastewater treatment facility	Not subject to corrective actions	DOE 1999, 098985
	AOC C-53-001	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-002	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-003	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-004	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-005	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-006	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-007	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-008	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-009	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-010	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-011	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464

Table 1.1-1 (continued)

Consolidated Unit	Site ID	Brief Description	Site Status	Reference
	AOC C-53-012	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-013	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-014	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-015	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-016	Transformer	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-018	One-time spill	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC C-53-019	One-time spill	NFA Approved, 01/21/05	EPA 2005, 088464
TA-72				
	AOC 72-001	Small arms firing range	Under Investigation	Work plan section 4.3.1
	AOC 72-002	Suspected mortar impact area	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 72-003(a)	Septic system	NFA Approved, 01/21/05	EPA 2005, 088464
	AOC 72-003(b)	Septic system	NFA Approved, 01/21/05	EPA 2005, 088464

Note: Shading denotes NFA approved or complete with controls.

**Table 2.0-1
Summary of Historical Samples Collected and Analyses Requested at Former TA-20**

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
SWMU 20-001(a)												
0220-95-0001	20-01000	10.0–11.0	Fill	297 ^a	295	297	296	297	— ^b	297	—	—
0220-95-0008	20-01007	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0009	20-01008	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0010	20-01009	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0011	20-01010	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0012	20-01011	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0013	20-01012	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
0220-95-0014	20-01013	10.0–11.0	Fill	297	295	297	296	297	—	297	—	—
SWMU 20-001(b)												
0220-95-0015	20-01014	8.0–9.0	Soil	360	358	360	359, 360	360	—	—	—	—
0220-95-0016	20-01015	8.0–9.0	Soil	360	358	360	359, 360	360	—	—	—	—
0220-95-0017	20-01016	9.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0018	20-01017	9.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0019	20-01018	6.0–7.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0023	20-01019	1.0–2.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0024	20-01020	10.0–11.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0025	20-01021	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0026	20-01022	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0027	20-01023	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0028	20-01024	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0029	20-01025	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0030	20-01026	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—

Table 2.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0031	20-01027	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0032	20-01028	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0033	20-01029	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0034	20-01030	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0035	20-01031	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0036	20-01032	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0037	20-01033	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
0220-95-0038	20-01034	10.0–11.0	Soil	319	312	319	318, 319	319	—	—	—	—
SWMU 20-001(c)												
0220-95-0039	20-01035	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0040	20-01036	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0041	20-01037	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0042	20-01038	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0045	20-01039	0.0–0.5	Soil	360	358	360	359, 360	360	—	—	—	—
0220-95-0043	20-01039	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0047	20-01040	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0048	20-01041	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0049	20-01042	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0050	20-01043	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0051	20-01044	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0052	20-01045	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0053	20-01046	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0054	20-01047	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—
0220-95-0055	20-01048	10.0–10.0	Fill	360	358	360	359, 360	360	—	—	—	—

Table 2.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0056	20-01049	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0057	20-01050	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0058	20-01051	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0059	20-01052	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0060	20-01053	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0061	20-01054	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
0220-95-0062	20-01055	10.0–10.0	Fill	353	352	353	353, 354	353	—	—	—	—
SWMU 20-002(a)												
0220-95-0063	20-01056	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0064	20-01056	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0065	20-01057	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0066	20-01057	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0070	20-01058	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0071	20-01058	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0072	20-01059	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0073	20-01059	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0074	20-01060	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0075	20-01060	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0076	20-01061	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0077	20-01061	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0078	20-01062	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0079	20-01062	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0080	20-01063	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0081	20-01063	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—

Table 2.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0082	20-01064	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0083	20-01064	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0084	20-01065	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0085	20-01065	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
0220-95-0086	20-01066	0.0–0.5	Soil	283	264	283	265	283	—	283	—	—
0220-95-0087	20-01066	2.5–3.0	Soil	283	264	283	265	283	—	283	—	—
SWMU 20-002(b)												
0220-95-0088	20-01067	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0092	20-01067	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0093	20-01068	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0094	20-01068	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0095	20-01069	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0096	20-01069	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0097	20-01070	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0098	20-01070	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0099	20-01071	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0100	20-01071	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0101	20-01072	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0102	20-01072	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0103	20-01073	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0104	20-01073	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0105	20-01074	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0106	20-01074	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0107	20-01075	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—

Table 2.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0108	20-01075	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0109	20-01076	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0110	20-01076	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
0220-95-0114	20-01077	0.0–0.5	Soil	427	423	427	425	427	—	427	—	—
0220-95-0115	20-01077	2.5–3.0	Soil	427	423	427	425	427	—	427	—	—
SWMU 20-002(c)												
0220-95-0240	20-01144	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0241	20-01144	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0242	20-01144	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0243	20-01145	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0244	20-01145	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0245	20-01145	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0246	20-01146	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0247	20-01146	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0248	20-01146	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0249	20-01147	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0250	20-01147	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0251	20-01147	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0252	20-01148	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0253	20-01148	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0254	20-01148	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0255	20-01149	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0256	20-01149	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0260	20-01149	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—

Table 2.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0261	20-01150	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0262	20-01150	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0263	20-01150	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0264	20-01151	0.0–0.5	Soil	443	444	443	445	443	—	443	—	—
0220-95-0265	20-01151	2.5–3.0	Soil	443	444	443	445	443	—	443	—	—
0220-95-0266	20-01151	4.5–5.0	Soil	443	444	443	445	443	—	443	—	—
SWMU 20-002(d)												
0220-95-0143	20-01086	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0144	20-01086	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0145	20-01086	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0146	20-01087	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0147	20-01087	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0148	20-01087	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0149	20-01088	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0150	20-01088	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0151	20-01088	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0152	20-01089	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0153	20-01089	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0154	20-01089	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0158	20-01090	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0159	20-01090	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0160	20-01090	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0161	20-01091	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0162	20-01091	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—

Table 2.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0163	20-01091	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0164	20-01092	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0165	20-01092	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0166	20-01092	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0167	20-01093	0.0–0.5	Soil	436	428	436	426	436	—	436	—	—
0220-95-0168	20-01093	2.5–3.0	Soil	436	428	436	426	436	—	436	—	—
0220-95-0169	20-01093	4.5–5.0	Soil	436	428	436	426	436	—	436	—	—
AOC 20-003(b)												
0220-95-0170	20-01094	0.0–1.0	Soil	463	—	—	462	463	—	—	—	—
0220-95-0171	20-01094	5.0–5.5	Qbt 2	463	—	—	462	463	—	—	—	—
0220-95-0172	20-01095	2.0–3.0	Qbt 2	463	—	—	462	463	—	—	—	—
0220-95-0173	20-01096	0.0–1.0	Soil	463	—	—	462	463	—	—	—	—
0220-95-0174	20-01096	5.0–5.5	Soil	463	—	—	462	463	—	—	—	—
0220-95-0175	20-01097	2.0–3.0	Soil	463	—	—	462	463	—	—	—	—
0220-95-0176	20-01098	0.0–1.0	Soil	463	—	—	462	463	—	—	—	—
0220-95-0180	20-01098	5.0–5.5	Soil	463	—	—	462	463	—	—	—	—
0220-95-0181	20-01099	2.0–3.0	Soil	463	—	—	462	463	—	—	—	—
AOC 20-003(c)												
0220-95-0116	20-01078	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0117	20-01078	2.5–3.0	Soil	293	292	293	291	293	—	293	—	—
0220-95-0118	20-01078	4.5–5.0	Qbt 2	293	292	293	291	293	—	293	—	—
0220-95-0119	20-01079	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0120	20-01079	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0121	20-01079	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—

Table 2.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0122	20-01080	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0123	20-01080	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0124	20-01080	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0125	20-01081	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0126	20-01081	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0127	20-01081	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0128	20-01082	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0129	20-01082	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0130	20-01082	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0131	20-01083	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0132	20-01083	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0136	20-01083	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0137	20-01084	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0138	20-01084	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0139	20-01084	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0140	20-01085	0.0–0.5	Soil	293	292	293	291	293	—	293	—	—
0220-95-0141	20-01085	2.5–3.0	Fill	293	292	293	291	293	—	293	—	—
0220-95-0142	20-01085	4.5–5.0	Fill	293	292	293	291	293	—	293	—	—
AOC 20-004												
0220-95-0194	20-01106	0.0–0.5	Soil	—	—	—	362	—	361	—	361	—
0220-95-0195	20-01107	2.5–3.0	Soil	—	—	—	362	—	361	—	361	—
0220-95-0196	20-01108	2.5–3.0	Soil	—	—	—	362	—	361	—	361	—
0220-95-0197	20-01109	0.0–0.5	Soil	—	—	—	362	—	361	—	361	—
0220-95-0198	20-01110	1.0–1.33	Soil	—	—	—	362	—	361	—	361	—

Table 2.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	High Explosives	Isotopic Uranium	Metals	Strontium-90	SVOCs	Uranium	VOCs	Cyanide
0220-95-0199	20-01111	2.5–2.83	Soil	—	—	—	362	—	361	—	361	—
0220-95-0200	20-01112	0.0–0.5	Soil	—	—	—	362	—	361	—	361	—
0220-95-0201	20-01113	1.0–1.33	Soil	—	—	—	362	—	361	—	361	—
0220-95-0202	20-01114	2.5–3.0	Soil	—	—	—	362	—	361	—	361	—
SWMU 20-005												
0220-95-0228	20-01135	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0232	20-01136	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0233	20-01137	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0234	20-01138	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0235	20-01139	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0236	20-01140	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0237	20-01141	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0238	20-01142	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430
0220-95-0239	20-01143	4.5–5.0	Soil	—	—	—	430	—	—	—	—	430

^a Request number.

^b — = Analysis not requested.

**Table 2.0-2
Inorganic Chemicals Detected above BVs at Former TA-20**

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV^a				0.83	1.83	0.4	6120	19.3	14.7	0.5	21500	22.3	0.1	1.52	1	0.73	1.82	48.8
Qbt 2, 3, 4 BV^a				0.5	1.21	1.63	2200	7.14	4.66	0.5	14500	11.2	0.1	0.3	1	1.1	2.4	63.5
SWMU 20-001(a)																		
0220-95-0001	20-01000	10.0-11.0	Fill	— ^b	—	—	—	—	—	NA ^c	—	—	0.11 (U)	—	1.6 (U)	1.3 (U)	3.88	—
0220-95-0008	20-01007	10.0-11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.2 (U)	3.77	—
0220-95-0009	20-01008	10.0-11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.2 (U)	3.9	—
0220-95-0010	20-01009	10.0-11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	4.31	—
0220-95-0011	20-01010	10.0-11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.3 (U)	3.81	—
0220-95-0012	20-01011	10.0-11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	3.75	—
0220-95-0013	20-01012	10.0-11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.3 (U)	3.33	—
0220-95-0014	20-01013	10.0-11.0	Fill	—	—	—	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	3.44	—
SWMU 20-001(b)																		
0220-95-0015	20-01014	8.0-9.0	Soil	5.6 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	—	—	5.3	—
0220-95-0016	20-01015	8.0-9.0	Soil	5.6 (U)	—	0.74 (U)	—	—	17.5	NA	22400	—	—	—	—	—	5.3	—
0220-95-0017	20-01016	9.0-10.0	Fill	5.4 (U)	—	0.71 (U)	—	—	—	NA	—	—	—	—	—	—	5.5	—
0220-95-0018	20-01017	9.0-10.0	Fill	5.4 (U)	—	0.71 (U)	—	—	—	NA	—	—	—	—	—	—	5.6	—
0220-95-0019	20-01018	6.0-7.0	Fill	5.4 (U)	—	0.72 (U)	—	—	—	NA	—	—	—	—	—	—	5.3	—
0220-95-0023	20-01019	1.0-2.0	Fill	5.9 (U)	—	0.78 (U)	—	—	—	NA	—	—	—	—	—	—	5.5	—
0220-95-0024	20-01020	10.0-11.0	Fill	5.8 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	4.2	—	5.2	—
0220-95-0025	20-01021	10.0-11.0	Soil	5.7 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	—	—	2.8	—
0220-95-0026	20-01022	10.0-11.0	Soil	6.2 (U)	—	0.81 (U)	—	—	—	NA	—	—	—	—	—	—	5.5	—
0220-95-0027	20-01023	10.0-11.0	Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	—	NA	NA	NA	4.6	NA
0220-95-0028	20-01024	10.0-11.0	Soil	5.6 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	—	—	5	—
0220-95-0029	20-01025	10.0-11.0	Soil	5.6 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	—	—	5.3	—
0220-95-0030	20-01026	10.0-11.0	Soil	5.6 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	—	—	5.4	—
0220-95-0031	20-01027	10.0-11.0	Soil	6.1 (U)	—	0.8 (U)	—	—	—	NA	—	—	—	—	—	—	6	—
0220-95-0032	20-01028	10.0-11.0	Soil	6.3 (U)	—	0.83 (U)	—	—	—	NA	—	—	—	—	—	—	5.8	—
0220-95-0033	20-01029	10.0-11.0	Soil	6.4 (U)	—	84 (U)	—	—	—	NA	—	—	—	—	—	—	6.1	—
0220-95-0034	20-01030	10.0-11.0	Soil	6.2 (U)	—	1 (J)	—	—	—	NA	—	—	—	—	—	—	5.7	—
0220-95-0035	20-01031	10.0-11.0	Soil	6 (U)	—	0.79 (U)	—	—	—	NA	—	—	—	—	—	—	5.1	—
0220-95-0036	20-01032	10.0-11.0	Soil	6.1 (U)	—	0.8 (U)	—	—	—	NA	—	—	—	—	—	—	5.1	—
0220-95-0037	20-01033	10.0-11.0	Soil	6.1 (U)	—	1.9	—	—	—	NA	—	—	—	—	—	—	5	—

Table 2.0-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV^a				0.83	1.83	0.4	6120	19.3	14.7	0.5	21500	22.3	0.1	1.52	1	0.73	1.82	48.8
Qbt 2, 3, 4 BV^a				0.5	1.21	1.63	2200	7.14	4.66	0.5	14500	11.2	0.1	0.3	1	1.1	2.4	63.5
0220-95-0038	20-01034	10.0–11.0	Soil	6.1 (U)	—	0.81 (U)	—	—	—	NA	—	—	—	—	—	—	5.4	—
SWMU 20-002(a)																		
0220-95-0063	20-01056	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	0.11 (U)	—	1.4 (U)	1.4 (U)	2.53	—
0220-95-0064	20-01056	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.4 (U)	1.4 (U)	1.88	—
0220-95-0065	20-01057	0.0–0.5	Soil	—	—	—	—	—	82.6	NA	—	—	0.11 (U)	—	1.4 (U)	1.4 (U)	3.34	—
0220-95-0066	20-01057	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	0.11 (U)	—	1.4 (U)	1.4 (U)	2.29	—
0220-95-0070	20-01058	0.0–0.5	Soil	—	—	—	—	—	16.4	NA	—	—	—	—	1.4 (U)	1.4 (U)	5.08	—
0220-95-0071	20-01058	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.6 (U)	—	—
0220-95-0072	20-01059	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.4 (U)	1.4 (U)	2.54	—
0220-95-0073	20-01059	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.3 (U)	—	—
0220-95-0074	20-01060	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.3 (U)	2.81	—
0220-95-0075	20-01060	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.3 (U)	—	—
0220-95-0076	20-01061	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.4 (U)	2.96	—
0220-95-0077	20-01061	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.3 (U)	—	—
0220-95-0078	20-01062	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	37.9	—	—	1.3 (U)	1.3 (U)	2.4	—
0220-95-0079	20-01062	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	0.11 (U)	—	1.6 (U)	1.6 (U)	2.18	—
0220-95-0080	20-01063	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.4 (U)	3.01	—
0220-95-0081	20-01063	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	0.11 (U)	—	1.3 (U)	1.4 (U)	—	—
0220-95-0082	20-01064	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.4 (U)	1.4 (U)	3.42	—
0220-95-0083	20-01064	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	0.11 (U)	—	1.4 (U)	1.4 (U)	2.93	—
0220-95-0084	20-01065	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.3 (U)	3.15	—
0220-95-0085	20-01065	2.5–3.0	Soil	—	—	—	—	—	17	NA	—	—	—	—	1.4 (U)	1.4 (U)	2.93	—
0220-95-0086	20-01066	0.0–0.5	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.4 (U)	1.4 (U)	2.81	—
0220-95-0087	20-01066	2.5–3.0	Soil	—	—	—	—	—	—	NA	—	—	—	—	1.3 (U)	1.4 (U)	—	—
SWMU 20-002(b)																		
0220-95-0088	20-01067	0.0–0.5	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	0.14	—	1.7 (U)	1.4 (U)	4.49	—
0220-95-0092	20-01067	2.5–3.0	Soil	5.3 (U)	—	0.8 (U)	—	—	—	NA	—	—	—	—	1.8 (U)	1.5 (U)	3.93	—
0220-95-0093	20-01068	0.0–0.5	Soil	5.2 (U)	—	0.79 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.4 (U)	3.38	—
0220-95-0094	20-01068	2.5–3.0	Soil	5.5 (U)	—	0.83 (U)	—	—	—	NA	—	—	0.12 (U)	—	1.8 (U)	1.5 (U)	4.24	—
0220-95-0095	20-01069	0.0–0.5	Soil	5.9 (U)	—	0.89 (U)	—	—	—	NA	—	—	0.12 (U)	—	2 (U)	1.6 (U)	3.9	—
0220-95-0096	20-01069	2.5–3.0	Soil	5.6 (U)	—	0.84 (U)	—	—	—	NA	—	—	—	—	1.9 (U)	1.5 (U)	3.87	—
0220-95-0097	20-01070	0.0–0.5	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	3.69	—
0220-95-0098	20-01070	2.5–3.0	Soil	4.9 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	3.16	—

Table 2.0-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV^a				0.83	1.83	0.4	6120	19.3	14.7	0.5	21500	22.3	0.1	1.52	1	0.73	1.82	48.8
Qbt 2, 3, 4 BV^a				0.5	1.21	1.63	2200	7.14	4.66	0.5	14500	11.2	0.1	0.3	1	1.1	2.4	63.5
0220-95-0099	20-01071	0.0-0.5	Soil	5.3 (U)	—	0.79 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.4 (U)	4.62	—
0220-95-0100	20-01071	2.5-3.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.96	—
0220-95-0101	20-01072	0.0-0.5	Soil	4.9 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	1.9	—
0220-95-0102	20-01072	2.5-3.0	Soil	4.8 (U)	—	0.72 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	—	—
0220-95-0103	20-01073	0.0-0.5	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	—	—
0220-95-0104	20-01073	2.5-3.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	1.97	—
0220-95-0105	20-01074	0.0-0.5	Soil	5.1 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.88	—
0220-95-0106	20-01074	2.5-3.0	Soil	5.6 (U)	—	0.85 (U)	—	—	—	NA	—	—	—	—	1.9 (U)	1.5 (U)	1.98	—
0220-95-0107	20-01075	0.0-0.5	Soil	5.6 (U)	—	0.83 (U)	—	—	—	NA	—	—	—	—	1.9 (U)	1.5 (U)	3.49	—
0220-95-0108	20-01075	2.5-3.0	Soil	5.3 (U)	—	0.79 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.5 (U)	1.99	—
0220-95-0109	20-01076	0.0-0.5	Soil	5.2 (UJ)	—	0.78 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.95	—
0220-95-0110	20-01076	2.5-3.0	Soil	5.4 (UJ)	—	0.81 (U)	—	—	—	NA	—	—	0.12 (U)	—	1.8 (U)	1.5 (U)	2.49	—
0220-95-0114	20-01077	0.0-0.5	Soil	4.9 (UJ)	—	0.74 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	1.87	—
0220-95-0115	20-01077	2.5-3.0	Soil	5.1 (UJ)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	—	—
SWMU 20-002(c)																		
0220-95-0240	20-01144	0.0-0.5	Soil	5.1 (U)	—	0.77 (U)	—	44.7	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	3.8	60
0220-95-0241	20-01144	2.5-3.0	Soil	7.1 (U)	—	1.1 (U)	—	37.8	—	NA	—	—	0.15 (U)	—	2.4 (U)	2.1 (J)	2.01	52.6
0220-95-0242	20-01144	4.5-5.0	Soil	4.9 (U)	—	0.73 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	—	—
0220-95-0243	20-01145	0.0-0.5	Soil	5.3 (U)	—	0.79 (U)	—	50	—	NA	—	23.1	0.12	—	1.8 (U)	1.4 (U)	4.38	63.5
0220-95-0244	20-01145	2.5-3.0	Soil	5.4 (U)	—	0.81 (U)	—	88.4	—	NA	—	—	0.17	—	1.8 (U)	1.5 (U)	3.87	63.9
0220-95-0245	20-01145	4.5-5.0	Soil	4.9 (U)	—	0.73 (U)	—	—	—	NA	—	—	0.31	—	1.6 (U)	1.3 (U)	2.86	—
0220-95-0246	20-01146	0.0-0.5	Soil	5.1 (U)	—	0.77 (U)	—	57.9	—	NA	—	—	0.13	—	1.9 (J)	1.4 (U)	4.11	69.3
0220-95-0247	20-01146	2.5-3.0	Soil	5.2 (U)	—	0.78 (U)	—	46.7	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	3.78	52.6
0220-95-0248	20-01146	4.5-5.0	Soil	4.8 (U)	—	0.72 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.5 (J)	2.24	—
0220-95-0249	20-01147	0.0-0.5	Soil	5.1 (U)	—	0.76 (U)	—	48	—	NA	—	—	0.12	—	1.7 (U)	1.4 (U)	3.93	60.2
0220-95-0250	20-01147	2.5-3.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	3	—
0220-95-0251	20-01147	4.5-5.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.76	—
0220-95-0252	20-01148	0.0-0.5	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.87	—
0220-95-0253	20-01148	2.5-3.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.28	—
0220-95-0254	20-01148	4.5-5.0	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	2.27	—
0220-95-0255	20-01149	0.0-0.5	Soil	4.9 (U)	—	0.74 (U)	—	29	—	NA	—	—	0.11	—	1.6 (U)	1.4 (U)	3.38	—
0220-95-0256	20-01149	2.5-3.0	Soil	4.8 (U)	—	0.73 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	—	—
0220-95-0260	20-01149	4.5-5.0	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	2.11	—

Table 2.0-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV^a				0.83	1.83	0.4	6120	19.3	14.7	0.5	21500	22.3	0.1	1.52	1	0.73	1.82	48.8
Qbt 2, 3, 4 BV^a				0.5	1.21	1.63	2200	7.14	4.66	0.5	14500	11.2	0.1	0.3	1	1.1	2.4	63.5
0220-95-0261	20-01150	0.0-0.5	Soil	5.1 (U)	—	0.76 (U)	—	40.1	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	4.06	62
0220-95-0262	20-01150	2.5-3.0	Soil	5 (U)	—	0.75 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	1.93	—
0220-95-0263	20-01150	4.5-5.0	Soil	5.2 (U)	—	0.78 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.7 (J)	2.69	—
0220-95-0264	20-01151	0.0-0.5	Soil	5.4 (U)	—	0.81 (U)	—	29.9	—	NA	—	—	0.12 (U)	—	1.8 (U)	1.5 (U)	4.29	—
0220-95-0265	20-01151	2.5-3.0	Soil	5.4 (U)	—	0.8 (U)	—	115	—	NA	—	—	0.16	—	1.8 (U)	1.5 (U)	4.24	69.9
0220-95-0266	20-01151	4.5-5.0	Soil	5.1 (U)	—	0.76 (U)	—	32.9	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	3.16	—
SWMU 20-002(d)																		
0220-95-0143	20-01086	0.0-0.5	Soil	4.9 (U)	—	0.74 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.11	—
0220-95-0144	20-01086	2.5-3.0	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	—	—
0220-95-0145	20-01086	4.5-5.0	Soil	5.1 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.28	—
0220-95-0146	20-01087	0.0-0.5	Soil	5.2 (U)	—	0.78 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	1.94	—
0220-95-0147	20-01087	2.5-3.0	Soil	5.4 (U)	—	0.81 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.5 (U)	2.24	—
0220-95-0148	20-01087	4.5-5.0	Soil	5.3 (U)	—	0.79 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.5 (U)	2.14	50
0220-95-0149	20-01088	0.0-0.5	Soil	5.1 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.46	—
0220-95-0150	20-01088	2.5-3.0	Soil	5.2 (U)	—	0.79 (U)	—	—	—	NA	—	—	—	—	1.8 (U)	1.7 (J)	2.44	—
0220-95-0151	20-01088	4.5-5.0	Soil	5.3 (U)	—	0.79 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.8 (U)	1.5 (U)	2.33	—
0220-95-0152	20-01089	0.0-0.5	Soil	5.2 (U)	2.7	0.78 (U)	—	—	14.8	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	3.36	—
0220-95-0153	20-01089	2.5-3.0	Soil	5 (U)	—	0.74 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	—	—
0220-95-0154	20-01089	4.5-5.0	Soil	4.9 (U)	—	0.73 (U)	—	—	—	NA	—	—	—	—	1.6 (U)	1.3 (U)	—	—
0220-95-0158	20-01090	0.0-0.5	Soil	5 (U)	4.2	0.75 (U)	—	—	18.5	NA	—	—	—	—	1.7 (U)	1.4 (U)	5.74	—
0220-95-0159	20-01090	2.5-3.0	Soil	5.1 (U)	—	0.77 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.56	—
0220-95-0160	20-01090	4.5-5.0	Soil	4.9 (U)	—	0.74 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.6 (U)	1.4 (U)	—	—
0220-95-0161	20-01091	0.0-0.5	Soil	5.1 (U)	—	0.77 (U)	—	—	36	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	62.3	—
0220-95-0162	20-01091	2.5-3.0	Soil	5.2 (U)	—	0.78 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	6.08	—
0220-95-0163	20-01091	4.5-5.0	Soil	5 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	3.62	—
0220-95-0164	20-01092	0.0-0.5	Soil	5 (U)	—	0.76 (U)	—	—	18.8	NA	—	—	—	—	1.7 (U)	1.4 (U)	69.4	—
0220-95-0165	20-01092	2.5-3.0	Soil	5 (U)	—	0.76 (U)	—	—	—	NA	—	—	0.11 (U)	—	1.7 (U)	1.4 (U)	3.19	—
0220-95-0166	20-01092	4.5-5.0	Soil	5.1 (U)	—	0.76 (U)	—	—	—	NA	—	—	—	—	1.7 (U)	1.4 (U)	2.04	—
AOC 20-003(b)																		
0220-95-0171	20-01094	5.0-5.5	Qbt 2	—	—	—	—	—	—	NA	—	—	—	0.38 (U)	—	—	NA	—
0220-95-0172	20-01095	2.0-3.0	Qbt 2	—	—	—	—	—	—	NA	—	—	—	0.37 (U)	—	—	NA	—
0220-95-0173	20-01096	0.0-1.0	Soil	—	—	—	—	—	—	NA	—	65.1	—	—	—	—	NA	—

Table 2.0-2 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Antimony	Beryllium	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Iron	Lead	Mercury	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV^a				0.83	1.83	0.4	6120	19.3	14.7	0.5	21500	22.3	0.1	1.52	1	0.73	1.82	48.8
Qbt 2, 3, 4 BV^a				0.5	1.21	1.63	2200	7.14	4.66	0.5	14500	11.2	0.1	0.3	1	1.1	2.4	63.5
SWMU 20-005																		
0220-95-0228	20-01135	4.5-5.0	Soil	5.5 (U)	—	0.73 (U)	—	—	—	0.52 (U)	—	25.3	—	—	—	—	NA	—
0220-95-0232	20-01136	4.5-5.0	Soil	5.8 (U)	—	0.77 (U)	—	—	—	0.55 (U)	—	—	—	—	—	—	NA	—
0220-95-0233	20-01137	4.5-5.0	Soil	6 (U)	—	NA	—	—	—	0.57 (U)	—	—	—	—	—	—	NA	—
0220-95-0234	20-01138	4.5-5.0	Soil	6.1 (U)	—	0.81 (U)	—	—	—	0.58 (U)	—	—	—	—	—	—	NA	—
0220-95-0235	20-01139	4.5-5.0	Soil	6.3 (U)	—	0.83 (U)	—	—	—	0.59 (U)	—	—	—	—	—	—	NA	—
0220-95-0236	20-01140	4.5-5.0	Soil	6 (U)	—	0.79 (U)	—	—	—	0.57 (U)	—	—	—	—	—	—	NA	—
0220-95-0237	20-01141	4.5-5.0	Soil	5.7 (U)	—	0.76 (U)	—	—	—	0.54 (U)	—	—	—	—	—	—	NA	—
0220-95-0238	20-01142	4.5-5.0	Soil	5.5 (U)	—	0.73 (U)	—	—	—	0.52 (U)	—	—	—	—	—	—	NA	—
0220-95-0239	20-01143	4.5-5.0	Soil	5.7 (U)	—	0.75 (U)	—	—	—	0.53 (U)	—	—	—	—	—	—	NA	—

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

^a BVs from LANL 1998, 059730.

^b — = Result was not detected or was below the BV.

^c NA = Not analyzed.

**Table 2.0-3
Organic Chemicals Detected at Former TA-20**

Sample ID	Location ID	Depth (ft bgs)	Media	Benzoic Acid	Butylbenzylphthalate	Tetryl
SWMU 20-001(a)						
0220-95-0009	20-01008	10.0–11.0	Fill	NA*	NA	0.65

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.
*NA = Sample not analyzed for this chemical.

**Table 2.0-4
Radionuclides Detected or Detected above BVs/FVs at Former TA-20**

Sample ID	Location ID	Depth (ft bgs)	Media	Cesium-137	Europium-152	Ruthenium-106	Sodium-22	Strontium-90	Uranium-234	Uranium-235	Uranium-238
Soil BV/FV^a				1.65	na ^b	na	na	1.31	2.59	0.20	2.29
Qbt 2, 3, 4 BV/FV^a				na	na	na	na	na	1.98	0.09	1.93
SWMU 20-001(a)											
0220-95-0009	20-01008	10.0–11.0	Fill	— ^c	0.143	—	—	—	—	—	—
0220-95-0011	20-01010	10.0–11.0	Fill	—	0.161	—	—	—	—	—	—
0220-95-0012	20-01011	10.0–11.0	Fill	—	0.195	—	—	—	—	—	—
0220-95-0013	20-01012	10.0–11.0	Fill	0.033	—	—	—	—	—	—	—
0220-95-0014	20-01013	10.0–11.0	Fill	—	0.194	—	—	1.52	—	—	—
SWMU 20-001(b)											
0220-95-0023	20-01019	1.0–2.0	Fill	0.26	NA ^d	—	—	—	—	—	—
0220-95-0026	20-01022	10.0–11.0	Soil	—	NA	—	0.19	—	—	—	—
0220-95-0033	20-01029	10.0–11.0	Soil	—	NA	—	—	—	—	—	2.33
SWMU 20-002(b)											
0220-95-0093	20-01068	0.0–0.50	Soil	—	0.253	—	—	—	—	—	—
0220-95-0097	20-01070	0.0–0.50	Soil	—	0.31	—	—	—	—	—	—
0220-95-0106	20-01074	2.50–3.0	Soil	—	0.196	—	—	—	—	—	—
0220-95-0108	20-01075	2.50–3.0	Soil	—	—	0.078	—	—	—	—	—
0220-95-0114	20-01077	0.0–0.50	Soil	—	0.234	—	—	—	—	—	—
SWMU 20-002(c)											
0220-95-0244	20-01145	2.50–3.0	Soil	0.219	—	—	—	—	—	—	—
0220-95-0248	20-01146	4.50–5.0	Soil	—	—	—	—	0.58	—	—	—
0220-95-0250	20-01147	2.50–3.0	Soil	0.187	—	—	—	—	—	—	—
0220-95-0256	20-01149	2.50–3.0	Soil	—	—	—	—	0.6	—	—	—

Table 2.0-4 (continued)

Sample ID	Location ID	Depth (ft bgs)	Media	Cesium-137	Europium-152	Ruthenium-106	Sodium-22	Strontium-90	Uranium-234	Uranium-235	Uranium-238
Soil BV/FV^a				1.65	na ^b	na	na	1.31	2.59	0.20	2.29
Qbt 2, 3, 4 BV/FV^a				na	na	na	na	na	1.98	0.09	1.93
0220-95-0260	20-01149	4.50–5.0	Soil	—	—	—	—	0.54	—	—	—
0220-95-0265	20-01151	2.50–3.0	Soil	—	—	—	—	0.58	—	—	—
SWMU 20-002(d)											
0220-95-0144	20-01086	2.50–3.0	Soil	0.131	NA	NA	NA	1.18	—	—	—
0220-95-0147	20-01087	2.50–3.0	Soil	NA	NA	NA	NA	9.58	—	—	—
0220-95-0151	20-01088	4.50–5.0	Soil	NA	NA	NA	NA	—	—	0.227	—
0220-95-0153	20-01089	2.50–3.0	Soil	NA	NA	NA	NA	5.97	—	0.216	—
0220-95-0158	20-01090	0.0–0.50	Soil	—	NA	NA	NA	7.94	2.61	0.336	2.51
0220-95-0159	20-01090	2.50–3.0	Soil	NA	NA	NA	NA	—	4.06	0.327	3.73
0220-95-0161	20-01091	0.0–0.50	Soil	—	NA	NA	NA	7.96	33.3	2.02	—
0220-95-0162	20-01091	2.50–3.0	Soil	NA	NA	NA	NA	—	2.92	—	3.14
0220-95-0164	20-01092	0.0–0.50	Soil	—	NA	NA	NA	—	35	1.78	—
0220-95-0165	20-01092	2.50–3.0	Soil	NA	NA	NA	NA	—	—	0.271	—
AOC 20-003(b)											
0220-95-0172	20-01095	2.0–3.0	Qbt 2	—	NA	—	—	—	NA	0.55	NA
0220-95-0180	20-01098	5.0–5.50	Soil	—	NA	—	—	—	NA	0.39	NA
0220-95-0181	20-01099	2.0–3.0	Soil	—	NA	—	—	—	NA	0.46	NA

Note: Units are pCi/g.

^a BVs/FVs from LANL 1998, 059730.

^b na = Not available.

^c — = Result was not detected or was below the BV/FV.

^d NA = Sample was not analyzed for this radionuclide.

**Table 3.0-1
Summary of Historical Samples Collected and Analyses Requested at TA-53**

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Gross Alpha/Beta Radioactivity	Tritium	Isotopic Plutonium	Isotopic Uranium	Metals	PCBs	Pesticides/PCBs	Strontium-90	SVOCs	TPH	TPH-DRO	Uranium	VOCs	Cyanide
SWMU 53-001(a)																		
0253-95-0001	53-01051	0.0-0.5	Soil	— ^a	—	—	—	—	185 ^b	—	184	—	—	184	—	—	184	—
0253-95-0375	53-01051	0.0-0.5	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0002	53-01052	0.0-0.5	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0376	53-01052	0.0-0.5	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0003	53-01053	0.0-0.5	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0377	53-01053	0.0-0.5	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0004	53-01054	0.0-0.5	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0378	53-01054	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-97-0040	53-01054	0.0-0.5	Soil	—	—	—	—	—	—	—	3367R	—	—	—	—	—	—	—
0253-97-0041	53-01054	0.5-1.0	Soil	—	—	—	—	—	—	—	3367R	—	—	—	—	—	—	—
0253-97-0042	53-01054	1.0-1.5	Soil	—	—	—	—	—	—	—	3367R	—	—	—	—	—	—	—
0253-97-0070	53-01517	1.0-1.5	Qbt 3	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0071	53-01518	0.0-0.5	Soil	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0072	53-01519	0.0-0.5	Soil	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0074	53-01520	0.0-0.5	Soil	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0075	53-01521	0.0-0.5	Soil	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0076	53-01522	0.0-0.5	Soil	—	—	—	—	—	—	3476R	—	—	—	—	—	—	—	—
0253-97-0077	53-01523	0.67-1.17	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0078	53-01524	0.67-1.17	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0079	53-01525	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0080	53-01526	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0111	53-01526	2.5-3.0	Qbt 3	—	—	—	—	—	—	3730R	—	—	—	—	—	—	—	—
0253-97-0081	53-01527	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0082	53-01528	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0083	53-01529	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0084	53-01530	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0086	53-01531	0.0-0.5	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0087	53-01531	2.5-3.0	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0088	53-01531	5.5-6.0	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0089	53-01532	0.0-0.5	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0090	53-01532	2.5-3.0	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0091	53-01532	5.5-6.0	Qbt 3	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—

Table 3.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Gross Alpha/Beta Radioactivity	Tritium	Isotopic Plutonium	Isotopic Uranium	Metals	PCBs	Pesticides/PCBs	Strontium-90	SVOCs	TPH	TPH-DRO	Uranium	VOCs	Cyanide
0253-97-0092	53-01533	0.5-0.83	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0093	53-01533	0.83-1.25	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0105	53-01534	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0106	53-01535	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0107	53-01536	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0108	53-01537	0.0-0.5	Soil	—	—	—	—	—	—	3682R	—	—	—	—	—	—	—	—
0253-97-0112	53-01541	0.0-0.5	Soil	—	—	—	—	—	—	3730R	—	—	—	—	—	—	—	—
SWMU 53-001(b)																		
0253-95-0390	53-01055	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0391	53-01055	0.0-0.66	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0005	53-01055	0.0-1.0	Soil	—	—	—	—	—	211	210	—	—	—	210	—	—	210	—
0253-95-0007	53-01055	1.0-1.5	Soil	—	—	—	—	—	211	210	—	—	—	210	—	—	210	—
0253-95-0392	53-01056	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0008	53-01056	0.0-0.67	Soil	—	—	—	—	—	211	210	—	—	—	210	—	—	210	—
0253-95-0393	53-01056	0.33-0.66	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
SWMUs 53-006(b,c)																		
RE53-99-0003	53-01561	15.0-15.5	Soil	5529R	—	5529R	5529R	5529R	5528R	—	—	5529R	5527R	—	—	—	5527R	5528R
RE53-99-0006	53-01561	17.0-18.0	Qbt 2	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
RE53-99-0007	53-01562	5.0-6.0	Fill	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
RE53-99-0008	53-01562	6.0-7.0	Fill	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
RE53-99-0004	53-01563	7.64-8.64	Fill	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
RE53-99-0005	53-01563	8.64-9.64	Fill	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
SWMUs 53-006(d,e)																		
RE53-99-0001	53-01559	7.5-8.5	Soil	5409R	—	5409R	5409R	5409R	5408R	—	—	5409R	5407R	—	—	—	5407R	5408R
RE53-99-0010	53-01559	9.5-10.5	Qbt 2	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
RE53-99-0002	53-01560	3.5-4.5	Soil	5409R	—	5409R	5409R	5409R	5408R	—	—	5409R	5407R	—	—	—	5407R	5408R
RE53-99-0009	53-01560	5.5-6.5	Qbt 2	5921R	—	5921R	5921R	5921R	5920R	—	—	5921R	5919R	—	—	—	5919R	5920R
AOC 53-008																		
0253-95-0028	53-01069	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0029	53-01070	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0030	53-01071	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0031	53-01072	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0032	53-01073	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0033	53-01074	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—

Table 3.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Gross Alpha/Beta Radioactivity	Tritium	Isotopic Plutonium	Isotopic Uranium	Metals	PCBs	Pesticides/PCBs	Strontium-90	SVOCs	TPH	TPH-DRO	Uranium	VOCs	Cyanide
0253-95-0034	53-01075	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0035	53-01076	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0036	53-01077	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0037	53-01078	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
0253-95-0038	53-01079	0.0-0.5	Soil	221	—	—	—	—	220	—	—	—	—	—	—	—	—	—
RE53-98-0001	53-01556	0.0-0.17	Soil	5011R	5011R	—	—	—	5010R	—	—	—	—	—	—	—	—	—
RE53-98-0002	53-01557	0.0-0.17	Soil	5011R	5011R	—	—	—	5010R	—	—	—	—	—	—	—	—	—
RE53-98-0003	53-01558	0.0-0.17	Soil	5011R	5011R	—	—	—	5010R	—	—	—	—	—	—	—	—	—
AOC 53-009																		
RE53-06-73677	53-27007	2.0-2.5	Fill	—	—	—	—	—	—	—	—	—	6242S	—	6242S	—	6242S	—
RE53-06-73678	53-27008	1.5-2.0	Fill	—	—	—	—	—	—	—	—	—	6242S	—	6242S	—	6242S	—
AOC 53-010																		
0253-95-0039	53-01080	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
0253-95-0043	53-01081	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
0253-95-0044	53-01082	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
0253-95-0045	53-01083	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
0253-95-0046	53-01084	0.0-0.17	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
0253-95-0047	53-01085	0.0-0.17	Fill	—	—	—	—	—	—	—	—	—	219	219	—	—	—	—
VCXX-95-0069	53-01251	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
VCXX-95-0070	53-01252	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
VCXX-95-0071	53-01253	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
VCXX-95-0072	53-01254	0.0-0.08	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
VCXX-95-0073	53-01255	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
VCXX-95-0074	53-01256	0.0-0.5	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	72999	—
SWMU 53-012(e)																		
0253-95-0048	53-01086	0.0-0.33	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0387	53-01086	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0388	53-01087	0.0-0.66	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
0253-95-0051	53-01087	0.0-0.67	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0054	53-01088	0.0-0.33	Soil	—	—	—	—	—	185	—	184	—	—	184	—	—	184	—
0253-95-0389	53-01088	0.0-0.33	Fill	—	—	—	—	—	—	—	—	—	77057	—	—	—	—	—
AOC 53-014																		
0253-97-0100	53-01506	0.0-0.5	Sed	—	—	—	—	—	2969	—	—	—	—	—	—	—	—	—
0253-97-0101	53-01507	0.0-0.5	Sed	—	—	—	—	—	2969	—	—	—	—	—	—	—	—	—

Table 3.0-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Gross Alpha/Beta Radioactivity	Tritium	Isotopic Plutonium	Isotopic Uranium	Metals	PCBs	Pesticides/PCBs	Strontium-90	SVOCs	TPH	TPH-DRO	Uranium	VOCs	Cyanide
0253-97-0102	53-01508	0.0-0.5	Sed	—	—	—	—	—	2969	—	—	—	—	—	—	—	—	—
0253-97-0103	53-01509	0.0-0.5	Sed	—	—	—	—	—	2969	—	—	—	—	—	—	—	—	—
0253-97-0104	53-01510	0.0-0.5	Sed	—	—	—	—	—	2969	—	—	—	—	—	—	—	—	—

Note: Shading indicates samples were excavated during VCA.

^a — = Analysis not requested.

^b Request number.

**Table 3.0-2
Inorganic Chemicals Detected above BVs at TA-53**

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Soil BV^a				0.83	0.4	6120	19.3	14.7	0.5	22.3	0.1	15.4	1.52	1	0.73	48.8
Sediment BV^a				0.83	0.4	4420	10.5	11.2	0.82	19.7	0.1	9.38	0.3	1	0.73	60.2
Qbt 2, 3, 4 BV^a				0.5	1.63	2200	7.14	4.66	0.5	11.2	0.1	6.58	0.3	1	1.1	63.5
SWMU 53-001(a)																
0253-95-0001	53-01051	0.0–0.5	Soil	— ^b	—	—	—	—	NA ^c	—	0.12 (U)	—	—	1.5 (U)	1.5 (U)	—
0253-95-0002	53-01052	0.0–0.5	Soil	—	—	—	—	—	NA	—	0.16	—	—	1.5 (U)	1.5 (U)	—
0253-95-0003	53-01053	0.0–0.5	Soil	—	—	—	—	—	NA	—	—	—	—	1.5 (U)	1.5 (U)	—
0253-95-0004	53-01054	0.0–0.5	Soil	—	—	—	—	16.6	NA	22.5	0.16	—	—	1.5 (U)	1.6 (U)	—
SWMU 53-001(b)																
0253-95-0005	53-01055	0.0–1.0	Soil	6 (U)	1.2 (J)	—	—	37.2	NA	50.3	0.23 (U)	—	—	—	—	105
0253-95-0007	53-01055	1.0–1.5	Soil	5.8 (U)	0.7 (U)	—	—	—	NA	—	0.23 (U)	—	—	—	—	—
0253-95-0008	53-01056	0.0–0.67	Soil	6.1 (U)	0.78 (J)	—	—	—	NA	—	0.25 (U)	—	—	—	—	49.8
SWMUs 53-006(b,c)																
RE53-99-0003	53-01561	15.0–15.5	Soil	—	—	—	—	—	0.52 (U)	—	—	—	—	—	—	—
RE53-99-0006	53-01561	17.0–18.0	Qbt 2	0.54 (UJ)	—	—	—	—	0.54 (U)	—	—	—	0.43 (UJ)	—	—	—
RE53-99-0007	53-01562	5.0–6.0	Fill	—	—	—	—	—	0.53 (U)	—	—	—	—	—	—	—
RE53-99-0008	53-01562	6.0–7.0	Fill	—	—	—	—	—	0.53 (U)	—	—	—	—	—	—	—
RE53-99-0004	53-01563	7.6–8.6	Fill	—	—	—	—	—	0.52 (U)	—	—	—	—	—	—	—
RE53-99-0005	53-01563	8.6–9.6	Fill	—	—	—	—	—	0.52 (U)	—	—	—	—	—	—	—
SWMUs 53-006(d,e)																
RE53-99-0001	53-01559	7.5–8.5	Soil	—	—	—	—	—	0.52 (U)	—	—	—	—	—	—	—
RE53-99-0010	53-01559	9.5–10.5	Qbt 2	—	—	—	—	—	0.6 (U)	—	0.12 (U)	—	0.48 (UJ)	—	—	—
RE53-99-0002	53-01560	3.5–4.5	Soil	0.85 (UJ)	—	—	—	—	0.53 (U)	—	0.11 (U)	—	—	—	—	—
RE53-99-0009	53-01560	5.5–6.5	Qbt 2	0.58 (UJ)	—	—	—	—	0.58 (U)	—	0.12 (U)	—	0.47 (UJ)	—	—	—
AOC 53-008																
0253-95-0028	53-01069	0.0–0.5	Soil	5 (U)	0.61 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—
0253-95-0029	53-01070	0.0–0.5	Soil	5.3 (U)	0.64 (J)	—	—	—	NA	—	0.17 (U)	—	—	—	—	—
0253-95-0030	53-01071	0.0–0.5	Soil	5.3 (U)	0.64 (U)	—	—	—	NA	—	0.22 (U)	—	—	—	—	—
0253-95-0031	53-01072	0.0–0.5	Soil	5.3 (U)	0.64 (U)	—	—	—	NA	—	0.22 (U)	—	—	—	—	—
0253-95-0032	53-01073	0.0–0.5	Soil	5.1 (U)	0.62 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—
0253-95-0033	53-01074	0.0–0.5	Soil	5 (U)	0.6 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—
0253-95-0034	53-01075	0.0–0.5	Soil	5.1 (U)	0.61 (U)	—	—	—	NA	—	0.2 (U)	—	—	—	—	—
0253-95-0035	53-01076	0.0–0.5	Soil	5 (U)	0.6 (U)	—	—	—	NA	—	0.19 (U)	—	—	—	—	—
0253-95-0036	53-01077	0.0–0.5	Soil	5.1 (U)	0.61 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—

Table 3.0-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Soil BV^a				0.83	0.4	6120	19.3	14.7	0.5	22.3	0.1	15.4	1.52	1	0.73	48.8
Sediment BV^a				0.83	0.4	4420	10.5	11.2	0.82	19.7	0.1	9.38	0.3	1	0.73	60.2
Qbt 2, 3, 4 BV^a				0.5	1.63	2200	7.14	4.66	0.5	11.2	0.1	6.58	0.3	1	1.1	63.5
0253-95-0037	53-01078	0.0–0.5	Soil	5.4 (U)	0.65 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—
0253-95-0038	53-01079	0.0–0.5	Soil	5.3 (U)	0.63 (U)	—	—	—	NA	—	0.21 (U)	—	—	—	—	—
RE53-98-0002	53-01557	0.0–0.17	Soil	1.1 (J-)	—	—	—	—	NA	76.9	—	—	—	—	—	—
RE53-98-0003	53-01558	0.0–0.17	Soil	0.94 (J-)	—	—	—	—	NA	—	—	—	—	—	—	—
SWMU 53-012(e)																
0253-95-0048	53-01086	0.0–0.33	Soil	2.3 (J)	1.2 (J)	—	23.5	267	NA	38.6	0.27	27	—	2.3 (J)	1.7 (U)	218
0253-95-0051	53-01087	0.0–0.67	Soil	1.7 (J)	0.43 (J)	—	—	46.2	NA	—	0.11 (U)	—	—	1.5 (U)	1.5 (U)	87.4
0253-95-0054	53-01088	0.0–0.33	Soil	1.6 (J)	1.2 (J)	—	—	46.2	NA	29.7	0.11 (U)	—	—	1.5 (U)	1.5 (U)	159
AOC 53-014																
0253-97-0100	53-01506	0.0–0.5	Sed	NA	NA	NA	NA	NA	NA	20	NA	NA	NA	NA	NA	NA
0253-97-0101	53-01507	0.0–0.5	Sed	NA	NA	NA	NA	NA	NA	20	NA	NA	NA	NA	NA	NA

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A. Shading indicates samples were excavated during VCA.

^a BVs from LANL 1998, 059730.

^b — = Result was not detected or was below the BV

^c NA = Not analyzed.

**Table 3.0-3
Organic Chemicals Detected at TA-53**

Sample ID	Location ID	Depth (ft)	Media	Aroclor-1248	Aroclor-1254	Aroclor-1260	Benzene	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Chlordane[alpha-]	Chlordane[gamma-]	Dieldrin	Di-n-butylphthalate	Endosulfan II	Endrin Aldehyde	TPH-DRO	TPH Unknown Range	Total Recoverable Petroleum Hydrocarbons
SWMU 53-001(a)																		
0253-95-0001	53-01051	0.0–0.5	Soil	— ^a	—	—	—	NA ^b	—	—	—	—	NA	—	—	NA	458	NA
0253-95-0002	53-01052	0.0–0.5	Soil	—	—	—	—	NA	—	—	—	—	NA	—	—	NA	249	NA
0253-95-0003	53-01053	0.0–0.5	Soil	—	—	0.0778	—	NA	—	—	—	—	NA	—	—	NA	180	NA
0253-95-0004	53-01054	0.0–0.5	Soil	—	—	3.25	—	NA	—	0.00284	—	0.0141	NA	0.104	0.0722	NA	0.222	NA
0253-97-0040	53-01054	0.0–0.5	Soil	—	—	3.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0041	53-01054	0.5–1.0	Soil	—	—	3.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0042	53-01054	1.0–1.5	Soil	—	—	0.44	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0071	53-01518	0.0–0.5	Soil	—	—	0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0072	53-01519	0.0–0.5	Soil	—	—	0.42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0076	53-01522	0.0–0.5	Soil	—	—	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0077	53-01523	0.67–1.17	Soil	—	—	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0080	53-01526	0.0–0.5	Soil	—	—	2.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0111	53-01526	2.5–3.0	Qbt 3	—	—	0.094	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0086	53-01531	0.0–0.5	Qbt 3	—	—	0.065 (J-)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0092	53-01533	0.5–0.83	Soil	—	—	0.018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0253-97-0112	53-01541	0.0–0.5	Soil	—	—	0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SWMU 53-001(b)																		
0253-95-0005	53-01055	0.0–1.0	Soil	—	—	—	—	NA	—	NA	NA	NA	NA	NA	NA	NA	75.2	NA
0253-95-0007	53-01055	1.0–1.5	Soil	—	—	—	—	NA	—	NA	NA	NA	NA	NA	NA	NA	NA	15.7
0253-95-0008	53-01056	0.0–0.67	Soil	—	—	—	—	NA	—	NA	NA	NA	NA	NA	NA	NA	NA	18.1
SWMUs 53-006(b,c)																		
RE53-99-0006	53-01561	17.0–18.0	Qbt 2	NA	NA	NA	0.00051 (J)	0.043 (J)	—	NA	NA	NA	—	NA	NA	NA	NA	NA
RE53-99-0007	53-01562	5.0–6.0	Fill	NA	NA	NA	0.00078 (J)	0.059 (J)	—	NA	NA	NA	—	NA	NA	NA	NA	NA
RE53-99-0008	53-01562	6.0–7.0	Fill	NA	NA	NA	—	0.085 (J)	—	NA	NA	NA	—	NA	NA	NA	NA	NA
RE53-99-0004	53-01563	7.6–8.6	Fill	NA	NA	NA	—	0.097 (J)	—	NA	NA	NA	—	NA	NA	NA	NA	NA
RE53-99-0005	53-01563	8.6–9.6	Fill	NA	NA	NA	0.00051 (J)	—	—	NA	NA	NA	—	NA	NA	NA	NA	NA
SWMUs 53-006(d,e)																		
RE53-99-0010	53-01559	9.5–10.5	Qbt 2	NA	NA	NA	—	0.12 (J)	0.002 (J)	NA	NA	NA	0.052 (J)	NA	NA	NA	NA	NA
RE53-99-0009	53-01560	5.5–6.5	Qbt 2	NA	NA	NA	—	0.06 (J)	0.068	NA	NA	NA	—	NA	NA	NA	NA	NA

Table 3.0-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aroclor-1248	Aroclor-1254	Aroclor-1260	Benzene	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Chlordane[alpha-]	Chlordane[gamma-]	Dieldrin	Di-n-butylphthalate	Endosulfan II	Endrin Aldehyde	TPH-DRO	TPH Unknown Range	Total Recoverable Petroleum Hydrocarbons
AOC 53-009																		
RE53-06-73678	53-27008	1.5–2.0	Fill	NA	NA	NA	—	NA	—	NA	NA	NA	NA	NA	NA	4.35	NA	NA
AOC 53-010																		
0253-95-0039	53-01080	0.0–0.33	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	10.3 (J)
0253-95-0043	53-01081	0.0–0.33	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	13.2
0253-95-0044	53-01082	0.0–0.33	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	7.93 (J)
0253-95-0045	53-01083	0.0–0.33	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	3440
0253-95-0046	53-01084	0.0–0.17	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	3520
0253-95-0047	53-01085	0.0–0.17	Fill	NA	NA	NA	NA	—	NA	NA	NA	NA	—	NA	NA	NA	NA	5100
SWMU 53-012(e)																		
0253-95-0048	53-01086	0.0–0.33	Soil	0.76	0.351	—	—	NA	—	0.00804	0.00376	0.0156	NA	0.00499	—	NA	NA	2000
0253-95-0051	53-01087	0.0–0.67	Soil	0.0596	—	0.332	—	NA	—	—	—	—	NA	0.00993	0.00584	NA	NA	2090
0253-95-0054	53-01088	0.0–0.33	Soil	0.0474	—	0.335	—	NA	—	—	—	—	NA	0.00979	0.00599	NA	NA	1150

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A. Shading indicates samples were excavated during VCA.

^a — = Result was not detected.

^b NA = Not analyzed.

**Table 3.0-4
Radionuclides Detected or Detected above BVs/FVs at TA-53**

Sample ID	Location ID	Depth (ft)	Media	Cesium-134	Cobalt-60	Europium-152	Gross Alpha	Gross Beta	Gross Gamma	Strontium-90	Tritium
Soil BV/FV^a				na ^b	na	na	na	na	na	1.31	na
Qbt 2, 3, 4 BV/FV^a				na	na	na	na	na	na	na	na
SWMUs 53-006(b,c)											
RE53-99-0006	53-01561	17.0–18.0	Qbt 2	— ^c	—	—	NA ^d	NA	NA	0.75	—
RE53-99-0008	53-01562	6.0–7.0	Fill	—	—	—	NA	NA	NA	1.45	—
RE53-99-0004	53-01563	7.6–8.6	Fill	—	—	1.23	NA	NA	NA	—	—
RE53-99-0005	53-01563	8.6–9.6	Fill	—	—	—	NA	NA	NA	—	7.08
SWMUs 53-006(d,e)											
RE53-99-0010	53-01559	9.5–10.5	Qbt 2	—	—	—	NA	NA	NA	1.18	—
RE53-99-0009	53-01560	5.5–6.5	Qbt 2	—	—	—	NA	NA	NA	1.23	—
AOC 53-008											
0253-95-0029	53-01070	0.0–0.5	Soil	6.22	2.69	NA	NA	NA	NA	NA	NA
0253-95-0033	53-01074	0.0–0.5	Soil	—	0.124	NA	NA	NA	NA	NA	NA

Note: Units are pCi/g.

^a BVs/FVs from LANL 1998, 059730.

^b na = Not available.

^c — = Result was not detected or was below the BV/FV.

^d NA = Sample was not analyzed for this radionuclide.

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Table 3.8-1
Summary of Historical Samples Collected and Analyses Requested at and Downgradient of AOC 53-008 during Investigation and Cleanup of Consolidated Unit 53-002(a)-99

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Gamma Spectroscopy	Tritium	Herbicides	Hexavalent Chromium	Isotopic Plutonium	Isotopic Uranium	Metals	PAHs	PCBs	Pesticides	Pesticides/PCBs	Strontium-90	SVOCs	VOCs
Head of Drainage																		
RE53-99-0224	53-01636	0.0–0.3	Soil	— ^a	5907R ^b	5907R	—	—	5907R	5907R	5906R	—	5905R	—	—	5907R	5905R	—
RE53-99-0225	53-01637	0.0–0.5	Soil	—	5907R	5907R	—	—	5907R	5907R	5906R	—	5905R	—	—	5907R	5905R	—
RE53-99-0226	53-01638	0.0–0.25	Soil	—	5907R	5907R	—	—	5907R	5907R	5906R	—	5905R	—	—	5907R	5905R	—
RE53-99-0310	53-01695	1.0–2.0	Qbt 2	—	6015R	6015R	—	—	6015R	6015R	6014R	—	6013R	—	—	6015R	6013R	6013R
RE53-99-0311	53-01695	4.0–5.0	Qbt 2	—	6015R	6015R	—	—	6015R	6015R	6014R	—	6013R	—	—	6015R	6013R	6013R
RE53-99-0312	53-01695	14.0–15.0	Qbt 2	—	6015R	6015R	—	—	6015R	6015R	6014R	—	6013R	—	—	6015R	6013R	6013R
RE53-02-46713	53-02-20830	0.3–0.8	Qbt 2	—	1111S	—	—	—	—	—	—	—	—	—	—	—	—	—
RE53-02-46714	53-02-20830	28.9–30.0	Qbt 2	—	1111S	1111S	—	—	—	—	1110S	—	1109S	—	—	1111S	1109S	—
RE53-02-46715	53-02-20830	49.0–50.0	Qbt 2	—	1111S	1111S	—	—	—	—	1110S	—	1109S	—	—	1111S	1109S	—
RE53-02-46744	53-02-20846	0.0–0.5	Qbt 2	—	1148S	—	—	—	—	—	—	—	—	—	—	—	—	—
RE53-02-46745	53-02-20847	0.0–0.3	Qbt 2	—	1148S	—	—	—	—	—	—	—	—	—	—	—	—	—
Reach C																		
RE53-01-0018	53-01744	0.39–0.76	Sed	—	9704R	9704R	—	—	9704R	9704R	9703R	—	9702R	—	—	9704R	9702R	9702R
RE53-02-49303	53-01744	0.75–1.42	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-01-0019	53-01745	0.2–0.46	Sed	—	9704R	9704R	—	—	9704R	9704R	9703R	—	9702R	—	—	9704R	9702R	9702R
RE53-02-49304	53-01746	0.0–0.29	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-01-0002	53-01746	0.29–0.59	Sed	—	9704R	9704R	9702R	9703R	9704R	9704R	9703R	—	—	9702R	9702R	9704R	9702R	9702R
RE53-01-0020	53-01747	0.23–0.62	Sed	—	9704R	9704R	—	—	9704R	9704R	9703R	—	9702R	—	—	9704R	9702R	9702R
RE53-02-49305	53-01747	0.62–1.02	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49308	53-01748	0.0–0.23	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49309	53-01748	0.062–0.92	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-01-0022	53-01748	0.36–0.62	Sed	—	9704R	9704R	—	—	9704R	9704R	9703R	—	9702R	—	—	9704R	9702R	9702R
RE53-01-0023	53-01749	0.0–0.20	Sed	—	9704R	9704R	—	—	9704R	9704R	9703R	—	9702R	—	—	9704R	9702R	9702R
RE53-02-49306	53-02-21057	0.0–0.26	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49307	53-02-21058	0.33–0.65	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
Reach D																		
RE53-01-0047	53-01730	0.0–0.13	Sed	—	9672R	9672R	—	—	9672R	9672R	9671R	—	9670R	—	—	9672R	9670R	9670R
RE53-01-0048	53-01731	0.39–0.69	Sed	—	9672R	9672R	—	—	9672R	9672R	9671R	—	9670R	—	—	9672R	9670R	9670R
RE53-01-0051	53-01732	0.0–0.39	Sed	—	9672R	9672R	—	—	9672R	9672R	9671R	—	9670R	—	—	9672R	9670R	9670R
RE53-02-49310	53-01732	0.40–0.56	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-01-0050	53-01733	0.0–0.32	Sed	—	9672R	9672R	—	—	9672R	9672R	9671R	—	9670R	—	—	9672R	9670R	9670R
RE53-01-0012	53-01733	0.46–0.72	Sed	—	9690R	9690R	9688R	9689R	9690R	9690R	9689R	—	—	—	9688R	9690R	9688R	9688R
RE53-02-49311	53-01733	0.72–0.85	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S

Table 3.8-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Gamma Spectroscopy	Tritium	Herbicides	Hexavalent Chromium	Isotopic Plutonium	Isotopic Uranium	Metals	PAHs	PCBs	Pesticides	Pesticides/PCBs	Strontium-90	SVOCs	VOCs
RE53-01-0052	53-01734	0.0–0.59	Sed	—	9672R	9672R	—	—	9672R	9672R	9671R	—	9670R	—	—	9672R	9670R	9670R
RE53-01-0049	53-01735	0.0–0.2	Sed	—	9672R	9672R	—	—	9672R	9672R	9671R	—	9670R	—	—	9672R	9670R	9670R
RE53-02-49317	53-01735	0.19–0.59	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49318	53-01735	1.21–1.70	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-01-0045	53-01736	0.0–0.42	Sed	—	9672R	9672R	—	—	9672R	9672R	9671R	—	9670R	—	—	9672R	9670R	9670R
RE53-01-0046	53-01736	0.69–0.85	Sed	—	9672R	9672R	—	—	9672R	9672R	9671R	—	9670R	—	—	9672R	9670R	9670R
RE53-02-49319	53-01736	0.98–1.38	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49312	53-02-21063	0.0–1.02	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49313	53-02-21063	1.02–1.44	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49314	53-02-21065	0.0–0.29	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49315	53-02-21066	0.062–0.36	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49316	53-02-21066	0.36–0.65	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
Reach E																		
RE53-01-0001	53-01737	0.0–0.36	Sed	—	9675R	9675R	9673R	9674R	9675R	9675R	9674R	—	—	—	9673R	9675R	9673R	9673R
RE53-02-49320	53-01737	0.36–0.65	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-01-0017	53-01738	0.0–0.083	Sed	—	9675R	9675R	—	—	9675R	9675R	9674R	—	9673R	—	—	9675R	9673R	9673R
RE53-01-0016	53-01738	0.08–0.23	Sed	—	9675R	9675R	—	—	9675R	9675R	9674R	—	9673R	—	—	9675R	9673R	9673R
RE53-02-49321	53-01738	0.23–0.36	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-01-0014	53-01739	0.0–0.23	Sed	—	9675R	9675R	—	—	9675R	9675R	9674R	—	9673R	—	—	9675R	9673R	9673R
RE53-01-0015	53-01740	0.0–0.26	Sed	—	9675R	9675R	—	—	9675R	9675R	9674R	—	9673R	—	—	9675R	9673R	9673R
RE53-02-49324	53-01740	0.27–0.96	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-01-0024	53-01741	0.0–0.29	Sed	—	9704R	9704R	—	—	9704R	9704R	9703R	—	9702R	—	—	9704R	9702R	9702R
RE53-02-49325	53-01741	0.29–0.60	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-01-0025	53-01742	0.36–0.49	Sed	—	9704R	9704R	—	—	9704R	9704R	9703R	—	9702R	—	—	9704R	9702R	9702R
RE53-01-0026	53-01743	0.0–0.13	Sed	—	9704R	9704R	—	—	9704R	9704R	9703R	—	9702R	—	—	9704R	9702R	9702R
RE53-02-49322	53-02-21073	0.0–0.27	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49323	53-02-21074	0.0–0.27	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S
RE53-02-49326	53-02-21077	0.0–0.33	Sed	1147S	1147S	—	—	—	—	—	1146S	1145S	1145S	1145S	—	—	—	1145S

^a — = Analysis not requested.

^b Request number.

**Table 3.8-2
Inorganic Chemicals Detected above BVs in Samples Collected at and Downgradient of AOC 53-008 during Investigation and Cleanup of Consolidated Unit 53-002(a)-99**

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Copper	Lead	Magnesium	Selenium	Zinc
Soil BV^a				29200	0.83	8.17	295	0.4	6120	19.3	14.7	22.3	4610	1.52	48.8
Sediment BV^a				15400	0.83	3.98	127	0.4	4420	10.5	11.2	19.7	2370	0.3	60.2
Qbt 2, 3, 4 BV^a				7340	0.5	2.79	46	1.63	2200	7.14	4.66	11.2	1690	0.3	63.5
Head of Drainage															
RE53-99-0224	53-01636	0.0–0.3	Soil	— ^b	—	—	—	—	9300	—	—	—	—	—	49 (J+)
RE53-99-0310	53-01695	1.0–2.0	Qbt 2	12000	—	3.4	110	—	6400	8.8	4.9	—	1900	0.79 (J)	—
RE53-99-0311	53-01695	4.0–5.0	Qbt 2	—	—	—	—	—	—	—	—	—	—	0.42 (UJ)	—
RE53-99-0312	53-01695	14.0–15.0	Qbt 2	—	—	—	—	—	—	—	—	—	—	0.42 (UJ)	—
RE53-02-46714	53-02-20830	28.9–30.0	Qbt 2	—	—	—	—	—	—	—	—	—	—	0.36 (J-)	—
RE53-02-46715	53-02-20830	49.0–50.0	Qbt 2	—	—	—	—	—	—	—	—	—	—	0.31 (J-)	—
Reach C															
RE53-01-0018	53-01744	0.39–0.76	Sed	—	—	—	—	—	—	—	—	21.5 (J)	—	0.38 (J)	—
RE53-02-49303	53-01744	0.75–1.42	Sed	—	—	—	—	—	—	—	—	—	—	0.495 (U)	—
RE53-01-0019	53-01745	0.20–0.46	Sed	—	—	—	—	—	—	—	—	29.6 (J)	—	—	—
RE53-02-49304	53-01746	0.0–0.29	Sed	—	—	—	—	—	—	—	—	44.7	—	—	—
RE53-01-0002	53-01746	0.29–0.59	Sed	—	—	—	—	—	—	—	—	54 (J)	—	0.35 (J)	—
RE53-01-0020	53-01747	0.23–0.62	Sed	—	—	—	—	—	—	—	—	26.1 (J)	—	—	—
RE53-02-49305	53-01747	0.62–1.02	Sed	—	—	—	—	—	—	—	—	—	—	0.506 (U)	—
RE53-02-49308	53-01748	0.0–0.23	Sed	—	—	—	—	—	—	—	—	33.6	—	0.484 (U)	—
RE53-02-49309	53-01748	0.062–0.92	Sed	—	—	—	—	—	—	—	—	—	—	0.526 (U)	—
RE53-02-49306	53-02-21057	0.0–0.26	Sed	—	—	—	—	—	—	—	—	—	—	0.39 (J)	—
RE53-02-49307	53-02-21058	0.33–0.65	Sed	—	—	—	—	—	—	—	—	—	—	0.496 (U)	—
Reach D															
RE53-02-49310	53-01732	0.40–0.56	Sed	—	—	—	—	—	—	—	—	—	—	0.502 (U)	—
RE53-01-0050	53-01733	0.0–0.32	Sed	—	—	—	—	—	—	—	—	20.1	—	—	—
RE53-01-0012	53-01733	0.46–0.72	Sed	—	—	—	—	—	—	—	—	—	—	0.33 (J)	—
RE53-02-49311	53-01733	0.72–0.85	Sed	—	—	—	—	—	—	—	—	—	—	0.459 (U)	—
RE53-01-0049	53-01735	0.0–0.2	Sed	—	—	—	—	—	—	—	—	23.3	—	—	—
RE53-02-49317	53-01735	0.19–0.59	Sed	—	—	—	—	—	—	—	—	—	—	0.458 (U)	—
RE53-02-49318	53-01735	1.21–1.70	Sed	—	7.91 (J-)	—	—	—	—	—	—	—	—	0.456 (U)	—
RE53-01-0046	53-01736	0.69–0.85	Sed	—	—	—	—	—	—	—	12.1	—	—	0.32 (J)	—
RE53-02-49319	53-01736	0.98–1.38	Sed	—	—	—	—	—	—	—	—	—	—	0.461 (U)	—
RE53-02-49312	53-02-21063	0.0–1.02	Sed	—	—	—	—	—	—	—	—	—	—	0.46 (U)	—
RE53-02-49313	53-02-21063	1.02–1.44	Sed	—	—	—	—	—	—	—	—	—	—	0.499 (U)	—

Table 3.8-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Copper	Lead	Magnesium	Selenium	Zinc
Soil BV^a				29200	0.83	8.17	295	0.4	6120	19.3	14.7	22.3	4610	1.52	48.8
Sediment BV^a				15400	0.83	3.98	127	0.4	4420	10.5	11.2	19.7	2370	0.3	60.2
Qbt 2, 3, 4 BV^a				7340	0.5	2.79	46	1.63	2200	7.14	4.66	11.2	1690	0.3	63.5
RE53-02-49314	53-02-21065	0.0–0.29	Sed	—	—	—	—	—	—	—	—	30.3	—	0.492 (U)	—
RE53-02-49315	53-02-21066	0.062–0.36	Sed	—	—	—	—	0.49 (U)	—	—	—	—	—	0.49 (U)	—
RE53-02-49316	53-02-21066	0.36–0.65	Sed	—	—	—	—	—	—	—	—	—	—	0.472 (U)	—
Reach E															
RE53-02-49320	53-01737	0.356–0.65	Sed	—	—	—	—	—	—	—	—	—	—	0.518 (U)	—
RE53-01-0017	53-01738	0.0–0.083	Sed	—	—	—	—	—	—	—	—	20.3	—	—	—
RE53-02-49321	53-01738	0.23–0.36	Sed	—	—	—	—	—	—	—	—	—	—	0.46 (U)	—
RE53-02-49324	53-01740	0.27–0.96	Sed	—	—	—	—	—	—	—	—	—	—	0.466 (U)	—
RE53-01-0024	53-01741	0.0–0.29	Sed	—	—	—	—	—	—	—	—	—	—	0.32 (J)	—
RE53-02-49325	53-01741	0.29–0.60	Sed	—	—	—	—	—	—	—	—	—	—	0.479 (U)	—
RE53-02-49322	53-02-21073	0.0–0.27	Sed	—	—	—	—	—	—	—	—	—	—	0.489 (U)	—
RE53-02-49323	53-02-21074	0.0–0.27	Sed	—	—	—	—	—	—	—	—	22.2	—	0.487 (U)	—
RE53-02-49326	53-02-21077	0.0–0.33	Sed	—	—	—	—	0.488 (U)	—	—	—	—	—	0.488 (U)	—

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

^a BVs from LANL 1998, 059730.

^b — = Result was not detected or was below the BV.

Table 3.8-3
Organic Chemicals Detected in Samples Collected at and Downgradient of AOC 53-008 during Investigation and Cleanup of Consolidated Unit 53-002(a)-99

Sample ID	Location ID	Depth (ft)	Media	Acetone	Aroclor-1254	Aroclor-1260	Benzoic Acid	Benzyl Alcohol	Bis(2-ethylhexyl)phthalate	Bromomethane	Chlorotoluene[2-]	D[2,4-]	Dalapon	DB[2,4-]	DDE[4,4'-]	DDT[4,4'-]	Dichlorobenzene[1,2-]
Head of Drainage																	
RE53-99-0224	53-01636	0.0–0.3	Soil	NA ^a	— ^b	—	—	—	0.063 (J)	NA	NA	NA	NA	NA	NA	NA	NA
RE53-99-0310	53-01695	1.0–2.0	Qbt 2	—	—	—	—	0.025 (J)	—	—	—	NA	NA	NA	NA	NA	—
RE53-99-0312	53-01695	14.0–15.0	Qbt 2	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	—
Reach C																	
RE53-01-0018	53-01744	0.39–0.76	Sed	—	0.073	—	0.11 (J)	—	—	—	0.0052 (J)	NA	NA	NA	NA	NA	—
RE53-02-49303	53-01744	0.75–1.42	Sed	—	0.0126	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-01-0019	53-01745	0.20–0.46	Sed	NA	0.037	—	—	—	—	NA	NA	NA	NA	NA	NA	NA	—
RE53-02-49304	53-01746	0.0–0.29	Sed	—	0.0067	0.0089	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-01-0002	53-01746	0.29–0.59	Sed	NA	0.052	0.034	0.13 (J)	—	—	—	NA	—	—	—	—	—	—
RE53-01-0020	53-01747	0.23–0.62	Sed	—	0.039	—	—	—	—	—	—	NA	NA	NA	NA	NA	—
RE53-02-49305	53-01747	0.62–1.02	Sed	—	0.0069	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-02-49308	53-01748	0.0–0.23	Sed	—	0.0089	0.0052	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-02-49309	53-01748	0.062–0.92	Sed	—	0.0071	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-01-0022	53-01748	0.36–0.62	Sed	—	0.17	—	—	—	—	—	—	NA	NA	NA	NA	NA	—
RE53-01-0023	53-01749	0.0–0.2	Sed	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	—
RE53-02-49306	53-02-21057	0.0–0.26	Sed	—	0.0077	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-02-49307	53-02-21058	0.33–0.65	Sed	—	0.0023 (J)	—	NA	NA	NA	—	—	NA	NA	NA	0.00079 (J)	—	—
Reach D																	
RE53-01-0047	53-01730	0.0–0.13	Sed	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	—
RE53-01-0051	53-01732	0.0–0.39	Sed	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	—
RE53-01-0012	53-01733	0.46–0.72	Sed	—	—	—	—	—	—	—	—	—	0.22	—	—	—	—
RE53-02-49317	53-01735	0.19–0.59	Sed	—	0.0053	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-02-49318	53-01735	1.22–1.70	Sed	—	0.0028 (J)	—	NA	NA	NA	—	—	NA	NA	NA	0.0029	—	—
RE53-01-0046	53-01736	0.69–0.85	Sed	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	—
RE53-02-49319	53-01736	0.98–1.38	Sed	—	—	0.0046	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-02-49312	53-02-21063	0.0–1.02	Sed	0.0171	—	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-02-49313	53-02-21063	1.02–1.44	Sed	0.0113	0.0047	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-02-49314	53-02-21065	0.0–0.29	Sed	—	0.0056	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-02-49315	53-02-21066	0.062–0.36	Sed	—	0.0033 (J)	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—

Table 3.8-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Acetone	Aroclor-1254	Aroclor-1260	Benzoic Acid	Benzyl Alcohol	Bis(2-ethylhexyl)phthalate	Bromomethane	Chlorotoluene[2-]	D[2,4-]	Dalapon	DB[2,4-]	DDE[4,4-]	DDT[4,4-]	Dichlorobenzene[1,2-]
RE53-02-49316	53-02-21066	0.36-0.65	Sed	—	0.003 (J)	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
Reach E																	
RE53-01-0001	53-01737	0.0-0.36	Sed	—	—	—	—	—	—	—	—	0.16 (J+)	—	0.2 (J+)	—	—	0.0022 (J)
RE53-01-0017	53-01738	0.0-0.083	Sed	NA	—	—	—	—	—	—	NA	NA	NA	NA	NA	NA	—
RE53-02-49321	53-01738	0.23-0.36	Sed	—	0.0031 (J)	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-01-0014	53-01739	0.0-0.23	Sed	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	—
RE53-01-0015	53-01740	0.0-0.26	Sed	—	—	—	—	—	—	0.0012 (J)	—	NA	NA	NA	NA	NA	0.00057 (J)
RE53-02-49324	53-01740	0.27-0.96	Sed	0.037	—	—	NA	NA	NA	—	—	NA	NA	NA	0.00081 (J-)	0.00052 (J-)	—
RE53-01-0024	53-01741	0.0-0.29	Sed	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	—
RE53-02-49325	53-01741	0.29-0.60	Sed	—	—	—	NA	NA	NA	—	—	NA	NA	NA	0.00058 (J-)	0.0017 (J-)	—
RE53-01-0025	53-01742	0.36-0.49	Sed	—	—	—	—	—	—	—	—	NA	NA	NA	NA	NA	—
RE53-02-49322	53-02-21073	0.0-0.27	Sed	—	0.0044	0.0045	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-02-49323	53-02-21074	0.0-0.27	Sed	0.0075 (J)	0.0054 (J-)	—	NA	NA	NA	—	—	NA	NA	NA	—	—	—
RE53-02-49326	53-02-21077	0.0-0.33	Sed	—	—	—	NA	NA	NA	—	—	NA	NA	NA	0.0044 (J-)	0.002 (J-)	—

Table 3.8-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Dichlorobenzene[1,3-]	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethene[cis/trans-1,2-]	Fluoranthene	Hexachlorobenzene	Isopropyltoluene[4-]	Phenol	Pyrene	Tetrachloroethene	Toluene	Trichloroethene	Trichlorotrifluoroethane	Xylene (Total)
Head of Drainage																	
RE53-99-0224	53-01636	0.0–0.3	Soil	NA	NA	NA	NA	—	—	NA	—	—	NA	NA	NA	NA	NA
RE53-99-0310	53-01695	1.0–2.0	Qbt 2	—	—	—	—	—	—	—	0.029 (J)	—	—	—	—	—	—
RE53-99-0312	53-01695	14.0–15.0	Qbt 2	—	—	0.006 (J)	—	—	—	—	—	—	—	—	—	—	—
Reach C																	
RE53-01-0018	53-01744	0.39–0.76	Sed	0.0052 (J)	0.0025 (J)	—	0.0052 (J)	—	—	—	—	—	—	0.00063 (J)	—	—	—
RE53-02-49303	53-01744	0.75–1.42	Sed	—	—	—	NA	—	NA	—	—	—	—	—	—	NA	NA
RE53-01-0019	53-01745	0.20–0.46	Sed	—	—	NA	NA	—	—	NA	—	—	NA	NA	NA	NA	NA
RE53-02-49304	53-01746	0.0–0.29	Sed	—	—	—	NA	—	NA	—	—	—	—	0.0011 (J)	—	NA	NA
RE53-01-0002	53-01746	0.29–0.59	Sed	—	0.0031 (J)	NA	NA	0.088 (J)	—	NA	—	—	NA	NA	NA	0.0052 (J)	0.0052 (J)
RE53-01-0020	53-01747	0.23–0.62	Sed	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE53-02-49305	53-01747	0.62–1.02	Sed	—	—	—	NA	—	NA	—	—	—	—	—	—	NA	NA
RE53-02-49308	53-01748	0.0–0.23	Sed	—	—	—	NA	—	NA	—	—	—	—	0.0008 (J)	—	NA	NA
RE53-02-49309	53-01748	0.062–0.92	Sed	—	—	—	NA	—	NA	—	—	—	—	—	—	NA	NA
RE53-01-0022	53-01748	0.36–0.62	Sed	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE53-01-0023	53-01749	0.0–0.2	Sed	—	—	—	—	—	—	—	—	—	—	—	0.00057 (J)	—	—
RE53-02-49306	53-02-21057	0.0–0.26	Sed	—	—	—	NA	—	NA	—	—	—	—	0.0007 (J)	—	NA	NA
RE53-02-49307	53-02-21058	0.33–0.65	Sed	—	—	—	NA	—	NA	—	—	—	—	—	—	NA	NA
Reach D																	
RE53-01-0047	53-01730	0.0–0.13	Sed	—	—	—	—	—	0.23 (J)	—	—	—	—	—	—	—	—
RE53-01-0051	53-01732	0.0–0.39	Sed	—	—	—	—	—	—	0.0016 (J+)	—	—	0.00073 (J+)	0.0051 (J+)	—	—	—
RE53-01-0012	53-01733	0.46–0.72	Sed	—	—	—	—	—	—	0.0063	—	—	—	—	—	NA	—
RE53-02-49317	53-01735	0.19–0.59	Sed	—	—	—	NA	—	NA	0.344	—	—	—	0.0013 (J)	—	NA	NA
RE53-02-49318	53-01735	1.22–1.70	Sed	—	—	—	NA	—	NA	—	—	—	—	0.00053 (J)	—	NA	NA
RE53-01-0046	53-01736	0.69–0.85	Sed	—	—	—	—	—	—	—	—	—	—	0.00091 (J)	—	—	—
RE53-02-49319	53-01736	0.98–1.38	Sed	—	—	—	NA	—	NA	—	—	—	—	—	—	NA	NA
RE53-02-49312	53-02-21063	0.0–1.02	Sed	—	—	—	NA	—	NA	—	—	—	—	—	—	NA	NA
RE53-02-49313	53-02-21063	1.02–1.44	Sed	—	—	—	NA	—	NA	—	—	—	—	0.001 (J)	—	NA	NA
RE53-02-49314	53-02-21065	0.0–0.29	Sed	—	—	—	NA	—	NA	—	—	—	—	—	—	NA	NA
RE53-02-49315	53-02-21066	0.062–0.36	Sed	—	—	—	NA	—	NA	—	—	—	—	0.00068 (J)	—	NA	NA
RE53-02-49316	53-02-21066	0.36–0.65	Sed	—	—	—	NA	—	NA	—	—	—	—	0.00065 (J)	—	NA	NA

Table 3.8-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Dichlorobenzene[1,3-]	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethene[cis/trans-1,2-]	Fluoranthene	Hexachlorobenzene	Isopropyltoluene[4-]	Phenol	Pyrene	Tetrachloroethene	Toluene	Trichloroethene	Trichlorotrifluoroethane	Xylene (Total)
Reach E																	
RE53-01-0001	53-01737	0.0–0.36	Sed	—	0.01 (J)	—	—	—	—	—	—	—	—	—	—	—	—
RE53-01-0017	53-01738	0.0–0.083	Sed	0.0012 (J+)	0.0031 (J)	NA	NA	—	—	NA	—	—	NA	NA	0.00081 (J+)	NA	NA
RE53-02-49321	53-01738	0.23–0.36	Sed	—	—	—	NA	—	NA	—	—	—	—	—	—	NA	NA
RE53-01-0014	53-01739	0.0–0.23	Sed	—	—	—	—	—	—	—	—	—	—	—	0.0019 (J)	NA	—
RE53-01-0015	53-01740	0.0–0.26	Sed	0.00069 (J)	—	—	—	—	—	—	—	—	—	—	0.00061 (J)	NA	—
RE53-02-49324	53-01740	0.27–0.96	Sed	—	—	—	NA	—	NA	0.0303	—	—	—	0.0028	—	NA	NA
RE53-01-0024	53-01741	0.0–0.29	Sed	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0015 (J)
RE53-02-49325	53-01741	0.29–0.60	Sed	—	—	—	NA	—	NA	—	—	0.0101	—	0.00082 (J)	—	NA	NA
RE53-01-0025	53-01742	0.36–0.49	Sed	—	0.0049 (J)	—	—	—	—	—	—	—	—	—	—	—	—
RE53-02-49322	53-02-21073	0.0–0.27	Sed	—	—	—	NA	—	NA	—	—	—	—	—	—	NA	NA
RE53-02-49323	53-02-21074	0.0–0.27	Sed	—	—	—	NA	—	NA	—	—	—	—	0.00099 (J)	—	NA	NA
RE53-02-49326	53-02-21077	0.0–0.33	Sed	—	—	—	NA	—	NA	—	—	—	—	—	—	NA	NA

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

^a NA = Not analyzed.

^b — = Result was not detected.

**Table 3.8-4
Radionuclides Detected or Detected above BVs/FVs in Samples Collected at and
Downgradient of AOC 53-008 during Investigation and Cleanup of Consolidated Unit 53-002(a)-99**

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Sodium-22	Strontium-90
Soil BV/FV^a				0.013	na ^b	1.65	na	na	1.31
Sediment BV/FV^a				0.04	na	0.9	na	na	1.04
Qbt 2, 3, 4 BV/FV^a				na	na	na	na	na	na
Head of Drainage									
RE53-99-0224	53-01636	0.0–0.3	Soil	NA ^c	— ^d	—	0.74	—	4.98
RE53-99-0225	53-01637	0.0–0.5	Soil	NA	—	—	0.28	—	1.45
RE53-99-0226	53-01638	0.0–0.25	Soil	NA	0.71	—	3.7	—	2.64
RE53-99-0310	53-01695	1.0–2.0	Qbt 2	NA	—	—	0.13	0.28	1.65
RE53-99-0311	53-01695	4.0–5.0	Qbt 2	NA	—	—	—	—	1.48
RE53-99-0312	53-01695	14.0–15.0	Qbt 2	NA	—	—	—	—	2.08
RE53-02-46744	53-02-20846	0.0–0.5	Qbt 2	NA	0.44	—	2.7	NA	NA
Reach C									
RE53-01-0018	53-01744	0.39–0.76	Sed	0.163	1.95	0.989	5.83	—	—
RE53-02-49303	53-01744	0.75–1.42	Sed	—	NA	—	0.922	—	NA
RE53-01-0019	53-01745	0.2–0.46	Sed	—	1.25	—	2.86	—	—
RE53-02-49304	53-01746	0.0–0.29	Sed	—	0.388	—	0.942	—	NA
RE53-01-0002	53-01746	0.29–0.59	Sed	0.107	1.24	—	2.3	—	—
RE53-01-0020	53-01747	0.23–0.62	Sed	—	1.16	—	2.04	—	—
RE53-02-49305	53-01747	0.62–1.02	Sed	—	0.368	—	0.982	—	NA
RE53-02-49308	53-01748	0.0–0.23	Sed	—	0.667	—	1.35	—	NA
RE53-02-49309	53-01748	0.062–0.92	Sed	—	0.0797	—	0.253	—	NA
RE53-01-0022	53-01748	0.36–0.62	Sed	—	0.619	—	3.99	—	—
RE53-01-0023	53-01749	0.0–0.2	Sed	—	0.131	—	0.246	—	—
RE53-02-49307	53-02-21058	0.33–0.65	Sed	—	0.0618	—	0.249	—	NA

Table 3.8-4 (continued)

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Cesium-134	Cesium-137	Cobalt-60	Sodium-22	Strontium-90
Soil BV/FV^a				0.013	na^b	1.65	na	na	1.31
Sediment BV/FV^a				0.04	na	0.9	na	na	1.04
Qbt 2, 3, 4 BV/FV^a				na	na	na	na	na	na
Reach D									
RE53-02-49311	53-01733	0.72–0.85	Sed	—	—	—	0.303	—	NA
RE53-02-49317	53-01735	0.19–0.59	Sed	—	0.309	—	0.871	—	NA
RE53-02-49318	53-01735	1.21–1.70	Sed	—	—	—	0.0999	—	NA
RE53-02-49319	53-01736	0.98–1.38	Sed	—	—	—	0.332	—	NA
RE53-02-49312	53-02-21063	0.0–1.02	Sed	—	0.0699	—	0.197	—	NA
RE53-02-49314	53-02-21065	0.0–0.29	Sed	—	0.46	—	1.17	—	NA
RE53-02-49315	53-02-21066	0.062–0.36	Sed	—	0.151	—	0.407	—	NA
RE53-02-49316	53-02-21066	0.36–0.65	Sed	—	0.0424	—	0.29	—	NA
Reach E									
RE53-02-49321	53-01738	0.23–0.36	Sed	—	0.326	—	0.728	—	NA
RE53-02-49324	53-01740	0.27–0.96	Sed	—	—	1.02	—	—	NA
RE53-01-0024	53-01741	0.0–0.29	Sed	—	0.247	—	0.294	—	—
RE53-01-0025	53-01742	0.36–0.49	Sed	—	0.101	—	—	—	—
RE53-01-0026	53-01743	0.0–0.13	Sed	—	0.197	—	0.247	—	—
RE53-02-49322	53-02-21073	0.0–0.27	Sed	—	0.21	—	0.582	—	NA
RE53-02-49323	53-02-21074	0.0–0.27	Sed	—	0.306	—	0.783	—	NA
RE53-02-49326	53-02-21077	0.0–0.33	Sed	—	0.0877	—	0.246	—	NA

Note: Units are pCi/g.

^a BVs/FVs from LANL 1998, 059730.

^b na = Not available.

^c NA = Sample was not analyzed for this radionuclide.

^d — = Result was not detected or was below the BV/FV.

Table 4.0-1
Summary of Historical Samples
Collected and Analyses Requested at TA-72

Sample ID	Location ID	Depth (ft)	Media	Metals
0272-95-0001	72-01000	0.0–1.0	Sed	265*
0272-95-0002	72-01001	0.0–1.0	Sed	265
0272-95-0003	72-01002	0.0–1.0	Sed	265
0272-95-0004	72-01003	0.0–1.0	Sed	265
0272-95-0005	72-01004	0.0–1.0	Sed	265
0272-95-0009	72-01005	0.0–1.0	Sed	265
0272-95-0010	72-01006	0.0–1.0	Sed	265

*Request number.

Table 4.0-2
Inorganic Chemicals Detected above BVs at TA-72

Sample ID	Location ID	Depth (ft)	Media	Mercury	Selenium	Silver	Thallium
Sediment BV^a				0.1	0.3	1	0.73
0272-95-0001	72-01000	0.0–1.0	Sed	— ^b	0.97 (U)	1.3 (U)	1.3 (U)
0272-95-0002	72-01001	0.0–1.0	Sed	—	0.99 (U)	1.3 (U)	1.3 (U)
0272-95-0003	72-01002	0.0–1.0	Sed	—	0.98 (U)	1.3 (U)	1.3 (U)
0272-95-0004	72-01003	0.0–1.0	Sed	—	1.0 (J)	1.3 (U)	1.3 (U)
0272-95-0005	72-01004	0.0–1.0	Sed	—	0.99 (U)	1.3 (U)	1.4 (U)
0272-95-0009	72-01005	0.0–1.0	Sed	0.11 (U)	1.0 (U)	1.3 (U)	1.4 (U)
0272-95-0010	72-01006	0.0–1.0	Sed	—	0.98 (U)	1.3 (U)	1.3 (U)

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

^a BVs from LANL 1998, 059730.

^b — = Result was not detected or was below the BV.

Appendix A

*Acronyms and Abbreviations,
Metric Conversion Table, and Data Qualifier Definitions*

A-1.0 ACRONYMS AND ABBREVIATIONS

AOC	area of concern
BV	background value
cpm	counts per minute
DB	4-(2,4-dichlorophenoxy)butyric acid
DDE	dichlorophenyltrichloroethylene
DDT	dichlorodiphenyltrichloroethane
DOE	Department of Energy (U.S.)
DRO	diesel range organics
EP	Environmental Programs Directorate
FV	fallout value
HE	high explosives
HIC	high-integrity container
HIR	historical investigation report
HWFP	Hazardous Waste Facility Permit
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LASL	Los Alamos Scientific Laboratory (Laboratory's name before January 1, 1981)
NFA	no further action
NMED	New Mexico Environment Department
NMEID	New Mexico Environmental Improvement Division (NMED's name before 1991)
NPDES	National Pollutant Discharge Elimination System
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
RLW	radioactive liquid waste
RPF	Records Processing Facility
SAP	sampling and analysis plan
SMO	Sample Management Office
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area

TAL	target analyte list [EPA]
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TPH	total petroleum hydrocarbons
VCA	voluntary corrective action
VOC	volatile organic compound
WAC	waste acceptance criteria
XRF	x-ray fluorescence

A-2.0 METRIC CONVERSION TABLE

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

A-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

*Analytical Suites and Results
(on CD included with this document)*

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Mathematics

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The image shows a large, empty grid table with many columns and rows, centered on the page. The grid is composed of thin black lines forming a rectangular pattern. The table is completely blank, with no text or data inside the cells. The grid is approximately 20 columns wide and 40 rows high, though the lines are very close together, making it difficult to count precisely. The table is centered horizontally and vertically on the page.

The image displays a large, empty grid table. The grid is composed of numerous small, uniform rectangular cells arranged in a regular pattern. The grid is oriented vertically and occupies the central portion of the page. The lines forming the grid are thin and black, creating a dense array of empty spaces. There is no text or data within the cells.

This image shows a large, empty grid table. The grid is composed of many small, uniform rectangular cells arranged in a regular pattern. The grid is oriented vertically and occupies the central portion of the page. The lines forming the grid are thin and black, creating a dense array of empty cells. There is no text or data within the grid.

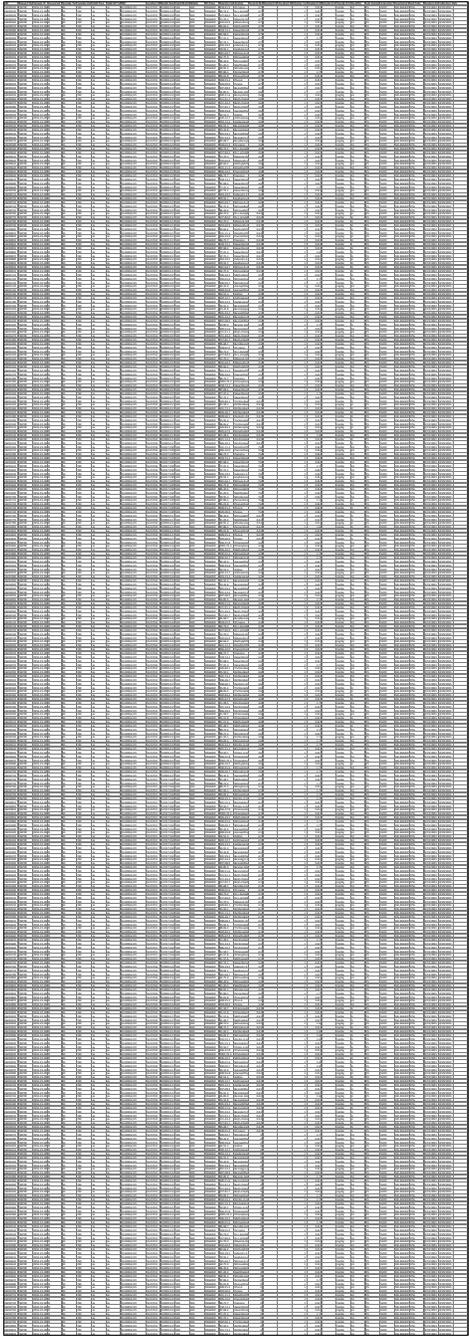
The image shows a large, empty table grid. The grid is composed of many small, empty rectangular cells arranged in a regular pattern. The grid is centered on the page and occupies most of the vertical space. The lines forming the grid are thin and black. There are no rows or columns containing any data or text.

This image shows a large, empty grid table with many rows and columns. The grid is composed of small, uniform cells, typical of a spreadsheet or data table. The table is oriented vertically and occupies the central portion of the page. There is no data or text within the cells.

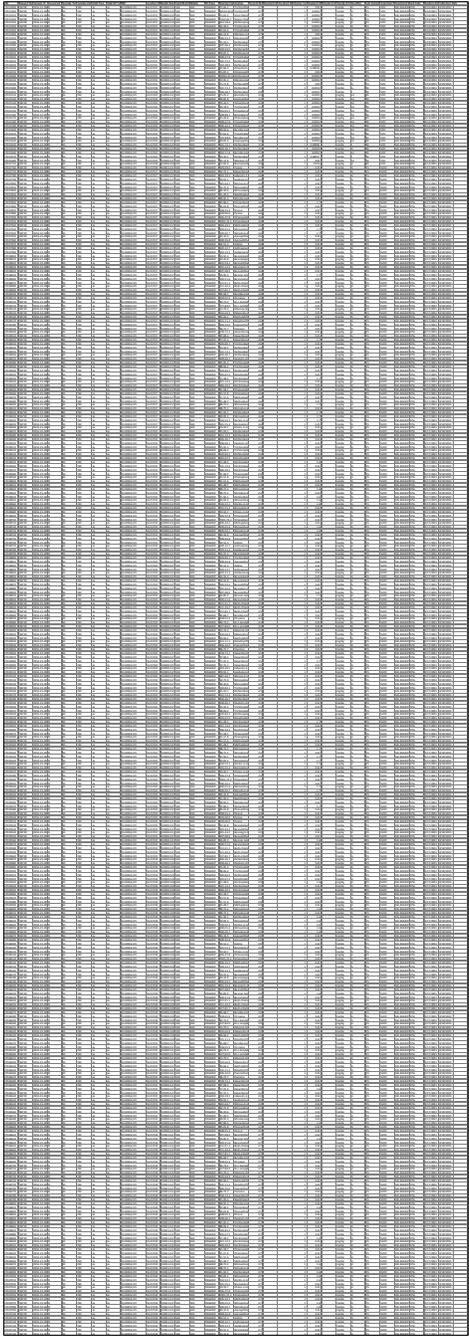
The image displays a large, empty grid table with a uniform structure. The table is composed of numerous columns and rows, creating a dense pattern of small rectangular cells. The grid is centered on the page and occupies most of the vertical space. The lines forming the grid are thin and black, set against a plain white background. There is no text or data within the cells.

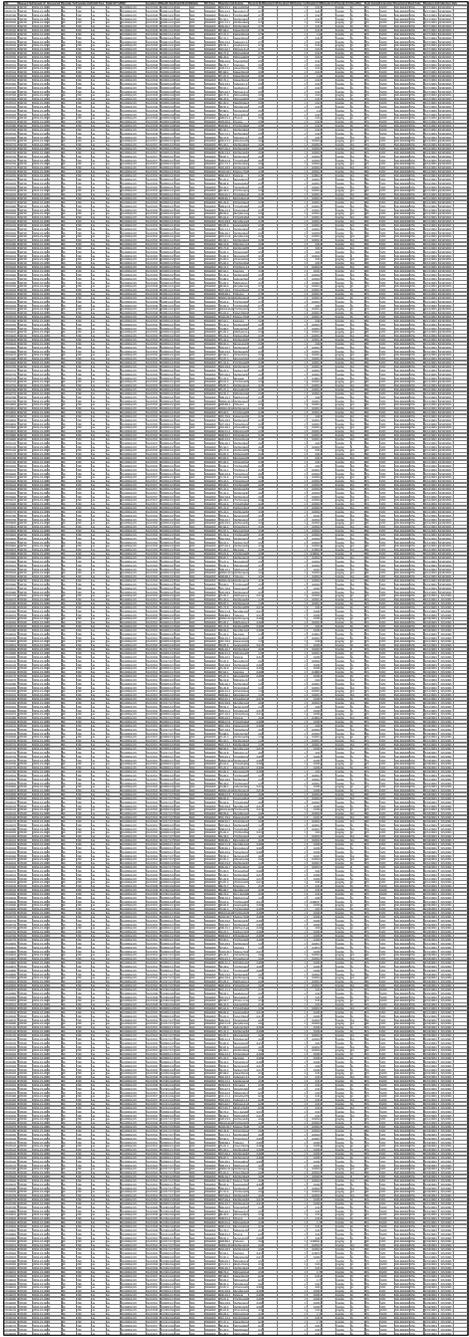
The image displays a large, empty grid table centered on a white page. The table is composed of numerous small, uniform rectangular cells arranged in a regular pattern. The grid is approximately 100 columns wide and 100 rows high, though the exact dimensions are difficult to discern due to the high resolution and small size of the individual cells. The lines forming the grid are thin and black, creating a dense, textured appearance. The table is completely blank, with no text or data entered into any of the cells.

The image displays a large, empty grid table. The grid is composed of numerous small, uniform rectangular cells arranged in a regular pattern. The grid is oriented vertically and occupies the central portion of the page. The lines forming the grid are thin and black, creating a dense mesh of empty spaces. There is no text or data within the cells.



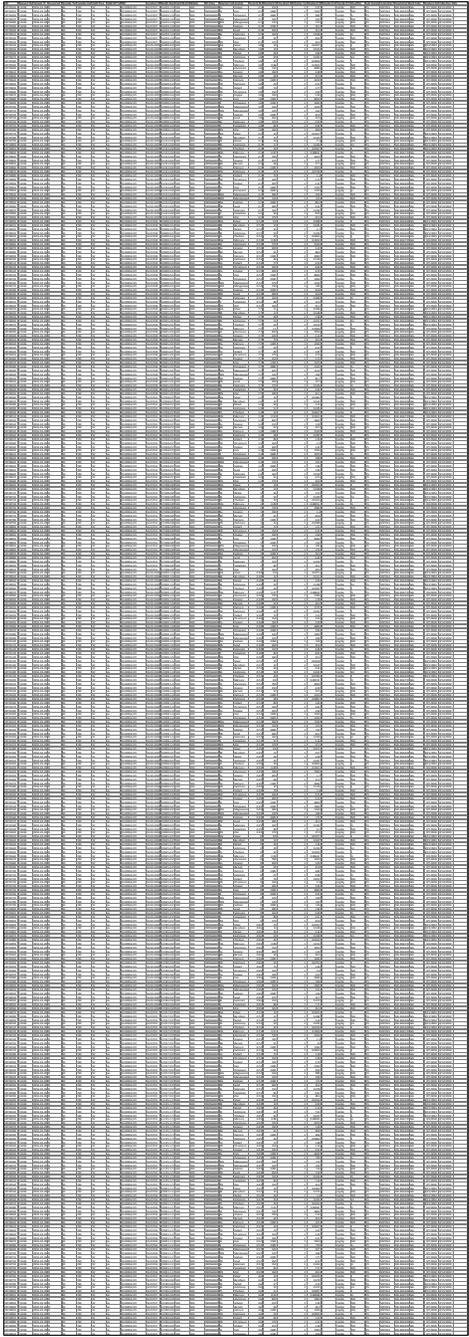
The image displays a large, empty grid table with a high density of columns and rows. The grid is rectangular and occupies the central portion of the page. It consists of numerous small, empty cells arranged in a regular pattern. The lines forming the grid are thin and black, creating a dense mesh of squares. There is no text or data within the cells.





This image shows a large, empty grid table. The grid is composed of many small, uniform rectangular cells arranged in a regular pattern. The grid is oriented vertically and occupies the central portion of the page. The lines forming the grid are thin and black, creating a dense array of empty cells. There is no text or data within the grid.

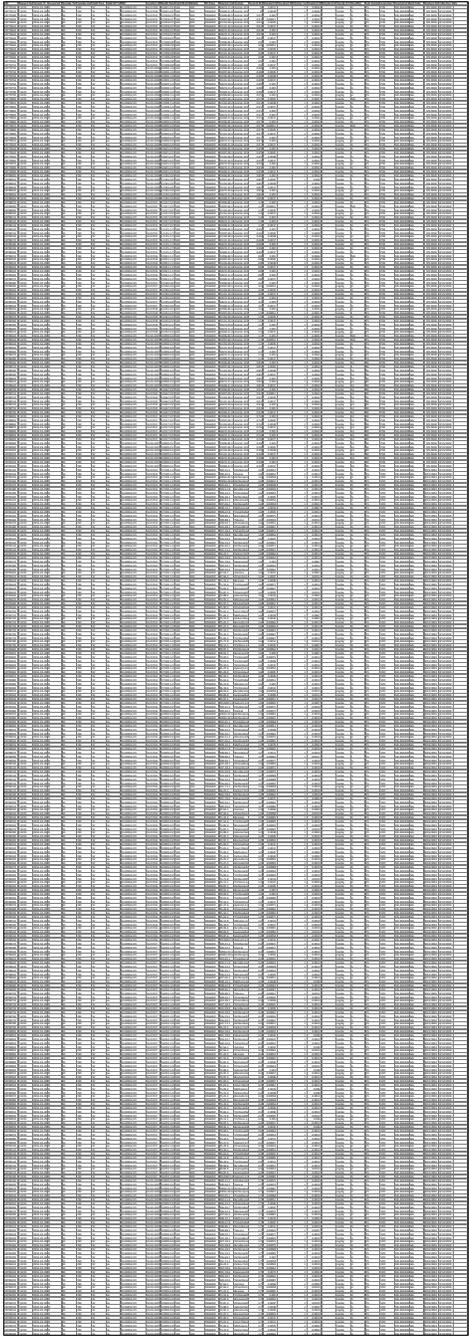
This image shows a large, empty grid table. The grid is composed of many small, uniform rectangular cells arranged in a regular pattern. The grid is oriented vertically and occupies the central portion of the page. The lines forming the grid are thin and black, creating a dense array of empty cells. There is no text or data within the grid.



This image shows a large, empty grid table with many rows and columns. The grid is composed of small, uniform cells, typical of a spreadsheet or data table. The table is oriented vertically and occupies the central portion of the page. There is no data or text within the cells.

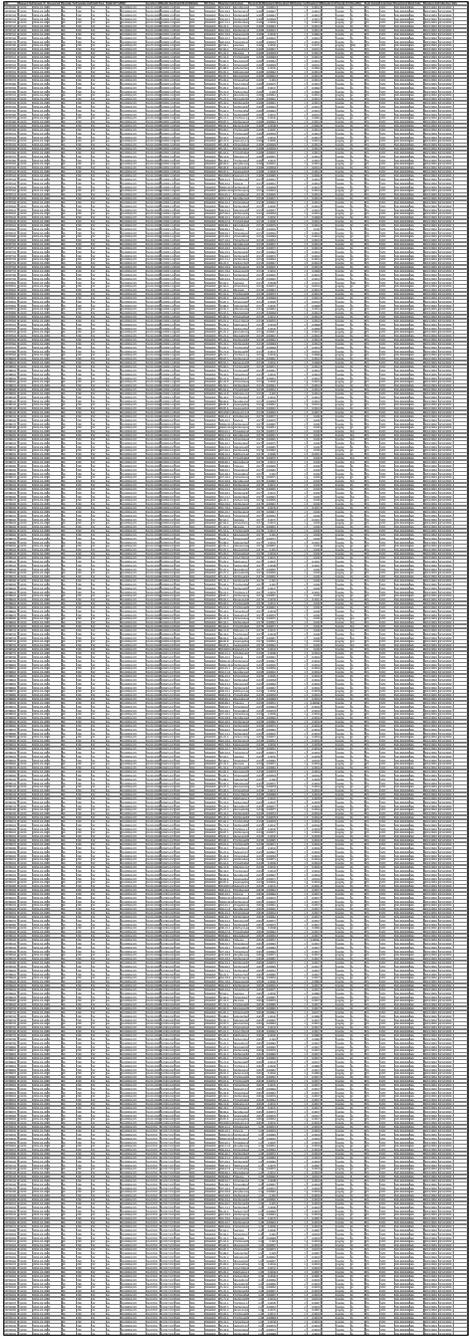
This image shows a large, empty table with a dense grid of cells. The table is oriented vertically and occupies the central portion of the page. It consists of many columns and rows, creating a fine grid pattern. The cells are currently empty, suggesting it is a blank ledger or a placeholder for data. The table is bounded by a thin black line.

The image displays a large, empty grid table with a high density of columns and rows. The grid is composed of thin black lines forming a rectangular pattern. The table is centered horizontally and vertically on the page. The grid is approximately 100 columns wide and 1000 rows high, though the individual cells are too small to be legible. The overall appearance is that of a blank ledger or a data table template.



This image shows a large, empty grid table with many rows and columns. The grid is composed of small, uniform cells, typical of a spreadsheet or data table. The table is centered on the page and occupies most of the vertical space. There are no visible entries or text within the cells.

This image shows a large, empty grid table. The grid is composed of many small, uniform rectangular cells arranged in a regular pattern. The grid is oriented vertically and occupies the central portion of the page. The lines forming the grid are thin and black, creating a dense array of empty cells. There is no text or data within the grid.



This image shows a large, empty grid table with many rows and columns. The grid is composed of small, uniform cells, typical of a spreadsheet or data table. The table is oriented vertically and occupies the central portion of the page. There is no data or text within the cells.

The image displays a large, empty grid table with a high density of columns and rows. The grid is composed of thin black lines forming a rectangular pattern. The table is centered horizontally and vertically on the page. The grid is approximately 100 columns wide and 1000 rows high, though the individual cells are too small to be clearly distinguished. The overall appearance is that of a blank ledger or a data table template.

This image shows a large, empty table with a dense grid of cells. The table is oriented vertically and occupies the central portion of the page. It consists of many columns and rows, creating a fine grid pattern. The cells are currently empty, suggesting it is a blank ledger or a placeholder for data. The table is bounded by a thin black line.

Table with 10 columns and 100 rows. The columns are labeled: Date, Time, Location, Activity, Duration, Frequency, Intensity, Notes, Status, and Comments. The table contains a dense grid of data points, likely representing a log or schedule.

Table with multiple columns and rows, containing dense data. The table is oriented vertically on the page.

URI	Request N	Sample ID	Excavated	Sample Te	Sample Us	Field Prep	Field QC T	Location I	Depth Ran	Field Matr	Media	RFI Class	Analyte Cd	Analyte	Percent M	Standard N	Standard U	Dilution Fa	Standard F	Standard L	Standard U	Qualifier	Lab Sampl	Analytical	Analytical	Lab Code	Analysis D	Collection Date
13970702	5408R	RE53-99-0N	ST	INV	na	na	53-01559	7.5000-8.5	5	SOIL	INORGANI	MN	Manganese	12.4729			1	280	mg/kg	R	CS	METALS	SW-846-60	KA	4/13/1999	3/29/1999		
13971622	5408R	RE53-99-0N	ST	INV	na	na	53-01560	3.5000-4.5	5	SOIL	INORGANI	MN	Manganese	11.5114			1	170	mg/kg	R	CS	METALS	SW-846-60	KA	4/13/1999	3/29/1999		
15984922	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	62-75-9	Nitrosodim	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15984932	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	62-53-3	Aniline	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15984942	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	108-95-2	Phenol	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15984952	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	111-44-4	Bis(2-chlor	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15984962	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	95-57-8	Chlorophe	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15984972	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	541-73-1	Dichlorobe	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15984982	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	106-46-7	Dichlorobe	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15984992	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	95-50-1	Dichlorobe	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985002	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	95-48-7	Methylphe	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985012	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	106-44-5	Methylphe	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985022	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	621-64-7	Nitroso-di	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985032	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	67-72-1	Hexachlor	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985042	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	98-95-3	Nitrobenze	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985052	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	78-59-1	Isophoron	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985062	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	88-75-5	Nitrophen	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985072	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	105-67-9	Dimethylp	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985082	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	65-85-0	Benzoic Ac	13			1	0.94	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985092	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	111-91-1	Bis(2-chlor	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985102	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	120-83-2	Dichloroph	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985112	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	120-82-1	Trichlorob	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985122	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	91-20-3	Naphthale	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985132	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	106-47-8	Chloroanil	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985142	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	87-68-3	Hexachlor	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985152	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	59-50-7	Chloro-3-n	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985162	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	91-57-6	Methylnap	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985172	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	77-47-4	Hexachlor	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985182	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	88-06-2	Trichlorop	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985192	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	95-95-4	Trichlorop	13			1	0.94	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985202	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	91-58-7	Chloronap	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985212	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	88-74-4	Nitroanilin	13			1	0.94	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985222	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	131-11-3	Dimethyl P	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985232	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	208-96-8	Acenaphth	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985242	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	99-09-2	Nitroanilin	13			1	0.94	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985252	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	83-32-9	Acenaphth	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985262	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	51-28-5	Dinitrophe	13			1	0.94	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985272	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	100-02-7	Nitrophen	13			1	0.94	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985282	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	132-64-9	Dibenzofur	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985292	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	121-14-2	Dinitrotolu	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985302	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	606-20-2	Dinitrotolu	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985312	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	84-66-2	Diethylpht	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985322	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	7005-72-3	Chlorophe	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985332	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	86-73-7	Fluorene	13			1	0.38	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985342	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	100-01-6	Nitroanilin	13			1	0.94	mg/kg	R	CS	SVOC	SW-846-82	RGGJ	6/21/1995	6/1/1995		
15985352	361	0220-95-0N	SS	INV	na	na	20-01111	2.5000-2.8	5	SOIL	ORGANIC	534-52-1	Dinitro															

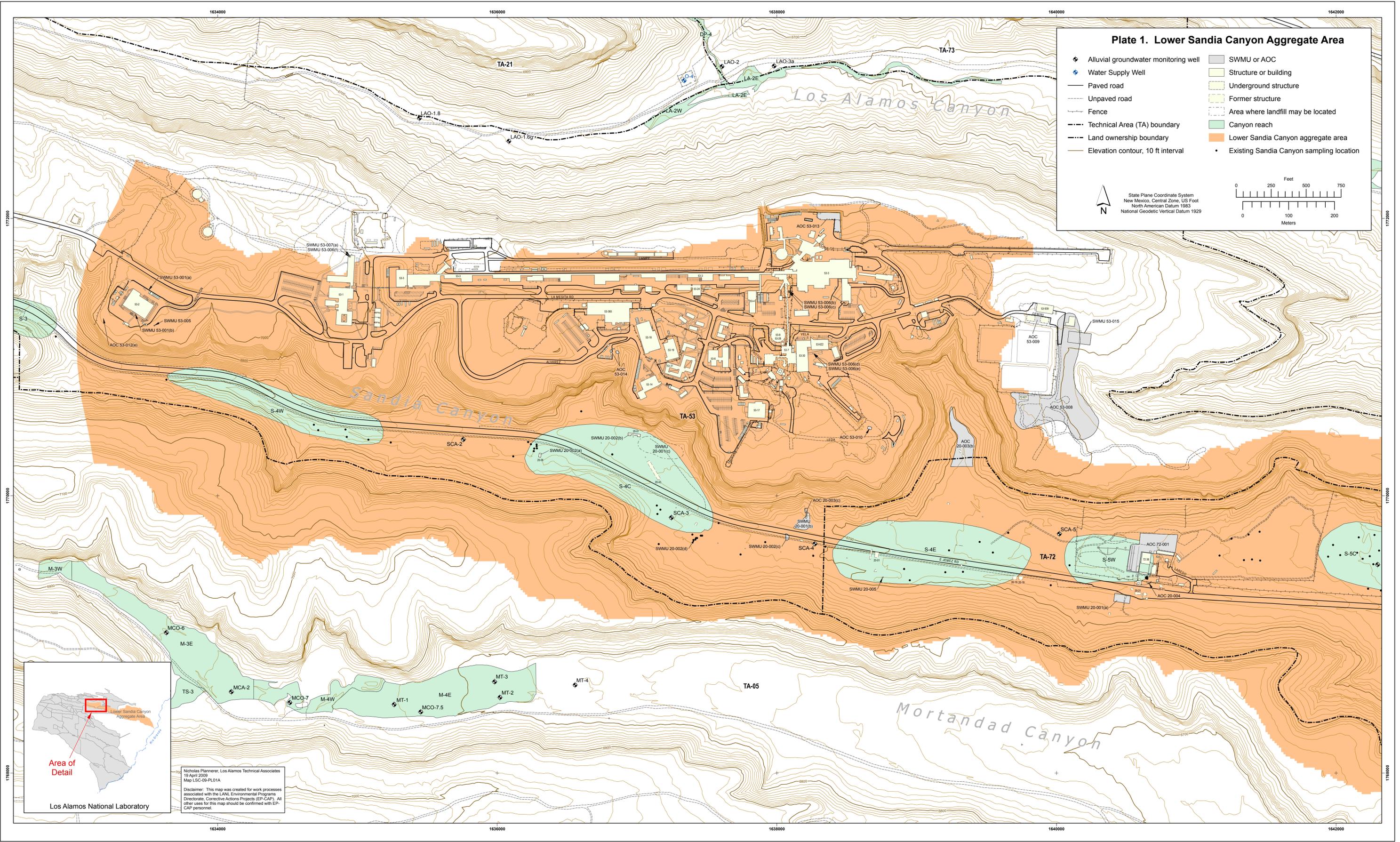


Plate 1. Lower Sandia Canyon Aggregate Area

<ul style="list-style-type: none"> ◆ Alluvial groundwater monitoring well ◆ Water Supply Well — Paved road - - - Unpaved road — Fence - - - Technical Area (TA) boundary - - - Land ownership boundary — Elevation contour, 10 ft interval 	<ul style="list-style-type: none"> ■ SWMU or AOC ■ Structure or building ■ Underground structure ■ Former structure ■ Area where landfill may be located ■ Canyon reach ■ Lower Sandia Canyon aggregate area • Existing Sandia Canyon sampling location
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State Plane Coordinate System
 New Mexico, Central Zone, US Foot
 North American Datum 1983
 National Geodetic Vertical Datum 1929

0 250 500 750 Feet
 0 100 200 Meters



Nicholas Plannerer, Los Alamos Technical Associates
 19 April 2009
 Map LSC-09-PL01A
 Disclaimer: This map was created for work processes associated with the LANL Environmental Programs Directorate, Corrective Actions Projects (EP-CAP). All other uses for this map should be confirmed with EP-CAP personnel.