DEPARTMENT OF ENERGY
Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos, New Mexico 87544

EMLA-2021-0183-02-001 March 31, 2021

Mr. Kevin Pierard
Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6313

Subject: Submittal of the Phase II Investigation Work Plan for Chaquehui Canyon Aggregate Area

Dear Mr. Pierard:

Enclosed please find two hard copies with electronic files of the "Phase II Investigation Work Plan for Chaquehui Canyon Aggregate Area." This Phase II investigation work plan presents the proposed sampling and analyses needed to define the vertical and/or lateral extent of one or more contaminants at 16 sites recommended for additional investigation in the "Investigation Report for Chaquehui Canyon Aggregate Area." Soil removal activities and confirmation sampling and analyses are presented for 8 sites that pose a potential unacceptable risk under the industrial scenario or a potential unacceptable ecological risk. The results of the Phase II investigation activities will be reported in the Chaquehui Canyon Aggregate Area Phase II investigation report (IR), which is currently scheduled for delivery to the New Mexico Environment Department (NMED) on or before August 31, 2021. This Phase II investigation work plan is being submitted to fulfill a proposed fiscal year 2021 milestone in Appendix B of the 2016 Compliance Order on Consent.

The IR for the Chaquehui Canyon Aggregate Area was submitted to NMED on September 30, 2020. To date, the U.S. Department of Energy (DOE) Environmental Management Los Alamos Field Office (EM-LA) has not received comments from NMED on the IR. Because comments have not been received, EM-LA has not been able to incorporate changes associated with these comments into the Phase II work plan. Although comments can be addressed during the response process for the Phase II work plan, the time needed to receive and resolve comments and obtain NMED approval of the IR and Phase II work plan may impact the submittal date of August 31, 2021, for the Phase II IR.

A pre-submission meeting between NMED, EM-LA, and Newport News Nuclear BWXT-Los Alamos, LLC, was held on March 18, 2021. EM-LA discussed these schedule concerns with NMED, with both parties agreeing to meet again after EM LA receives NMED's comments on the IR.

If you have any questions, please contact Brenda Bowlby at (360) 930-4353 (brenda.bowlby@em-la.doe.gov) or Cheryl Rodriguez at (505) 414-0450 (cheryl.rodriguez@em.doe.gov).

Sincerely,

Arturo Q. Duran

Digitally signed by Arturo Q. Duran
Date: 2021.03.31 08:33:58 -06'00'

Arturo Q. Duran
Compliance and Permitting Manager
Environmental Management
Los Alamos Field Office

Enclosure(s):

1. Two hard copies with electronic files – Phase II Investigation Work Plan for Chaquehui Canyon Aggregate Area (EM2021-0038)

CC (letter with hard-copy enclosure[s]):
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March 2021
EM2021-0038

Phase II Investigation Work Plan for Chaquehui Canyon Aggregate Area

N3B Los Alamos

EM2021-0038

Phase II Investigation Work Plan for Chaquehui Canyon Aggregate Area

March 2021

Responsible program director:

Printed Name	Signature	Title	Organization	Date
Michael O. Erickson	[signature]	Program Director	RCRA Remediation Program	3/22/21

Responsible N3B representative:

Printed Name	Signature	Title	Organization	Date
Kim Lebak	[signature]	Program Manager	N3B Environmental Remediation Program	3/22/21

Responsible DOE EM-LA representative:

Printed Name	Signature	Title	Organization	Date
Arturo Q. Duran	Arturo Q. Duran Digitally signed by Arturo Q. Duran Date: 2021.03.31 08:34:36 -06'00'	Compliance and Permitting Manager	Office of Quality and Regulatory Compliance	

EXECUTIVE SUMMARY

The Chaquehui Canyon Aggregate Area is located in Technical Area 33 of Los Alamos National Laboratory and includes a total of 51 solid waste management units and areas of concern. Of these 51 sites, 8 have been previously investigated and/or remediated and have been approved for no further action. Forty-three of the sites were investigated in 2019–2020, and the results were reported in the investigation report for the Chaquehui Canyon Aggregate Area. Of these 51 sites, 16 require additional sampling to define extent of contamination, and 8 of the 16 sites require soil removal. This Phase II investigation work plan presents the proposed sampling and analyses needed to define the vertical and/or lateral extent of 1 or more contaminants at 16 sites. Soil removal activities and confirmation sampling and analyses are presented for 8 sites that pose a potential unacceptable risk under the industrial scenario or a potential unacceptable ecological risk. The results of the Phase II investigation activities will be reported in a Phase II investigation report.

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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). The Laboratory is located in north-central New Mexico approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory site covers 36 mi^2 of the Pajarito Plateau, which consists of a series of fingerlike mesas 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 location of the Chaquehui Canyon Aggregate Area with respect to the Laboratory technical areas is shown in Figure 1.0-1.

Newport News Nuclear BWXT-Los Alamos, LLC (N3B) is participating in a national effort by DOE to clean up Laboratory sites and facilities formerly involved in weapons research and development. The goal of this effort is to ensure past operations do not threaten human or environmental health and safety in and around Los Alamos County, New Mexico. To achieve this goal, N3B is investigating sites potentially contaminated by past Laboratory operations. These sites are designated as either solid waste management units (SWMUs) or areas of concern (AOCs).

This Phase II investigation work plan (IWP) addresses SWMUs and AOCs within the Chaquehui Canyon Aggregate Area at the Laboratory. These sites are potentially contaminated with hazardous chemicals and radionuclides. The New Mexico Environment Department (NMED), pursuant to the New Mexico Hazardous Waste Act, regulates cleanup of hazardous wastes and hazardous constituents. DOE regulates cleanup of radioactive contamination, pursuant to DOE Order 458.1, Administrative Change 3, “Radiation Protection of the Public and the Environment,” and DOE Order 435.1, “Radioactive Waste Management.” Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with DOE policy.

Corrective actions at Laboratory sites are subject to a Compliance Order on Consent (the Consent Order) issued by NMED. This Phase II IWP describes work activities that will be completed in accordance with the Consent Order.

1.1 Work Plan Overview

The Chaquehui Canyon Aggregate Area is located in Technical Area 33 (TA-33) at the Laboratory and consists of 51 SWMUs and AOCs (Plates 1 and 2). Of these 51 sites, 8 have been previously investigated and/or remediated and have been approved for no further action. Forty-three of the sites were investigated in 2019–2020, and the results were reported in the investigation report (IR) for the Chaquehui Canyon Aggregate Area (N3B 2020, 701046). Of these 43 sites, 16 require additional sampling to define extent of contamination, and 8 of the 16 sites require soil removal. SWMUs 33-002(a, b, c, d, and e) are currently being addressed by the drilling of 3 boreholes to determine the extent of subsurface tritium contamination. The analytical data for these 5 sites will be reported in an addendum to the Chaquehui Canyon Aggregate Area IR. This Phase II IWP presents the proposed sampling and analyses needed to define the vertical and/or lateral extent of 1 or more contaminants at 16 sites. Soil removal activities and confirmation sampling and analyses are presented for 8 sites that pose a potential unacceptable risk under the industrial scenario or a potential unacceptable ecological risk. Table 1.1-1 presents a brief description of the 16 sites and the proposed activities for each site.

Section 2 of this Phase II investigation work plan presents the background and conceptual site model of the Chaquehui Canyon Aggregate Area. Section 3 presents site conditions, and section 4 summarizes previous investigations and data collected and presents the scope of proposed activities for each site.

Section 5 describes investigation methods for proposed field activities. Ongoing monitoring and sampling programs in the Chaquehui Canyon Aggregate Area are presented in section 6. Section 7 is an overview of the anticipated schedule of the Phase II investigation and reporting activities. The references cited and the map data sources are provided in section 8. Appendix A of this work plan includes a list of acronyms and abbreviations, a metric conversion table, and a data qualifier definitions table. Appendix B describes management of waste generated during implementation of the work plan. Geophysical and radiological surveys proposed for the Phase II investigation are included in Appendix C.

1.2 Work Plan Objectives

The objective of the Phase II IWP is to complete characterization and corrective actions recommended in the Chaquehui Canyon Aggregate IR (N3B 2020, 701046) to define the extent of contamination and/or removal of contaminated soil to reduce risk.

To accomplish this objective, the Phase II IWP

- presents historical and background information on the sites,
- summarizes existing information on the nature and extent of contamination and risk,
- describes the rationale for proposed data collection activities,
- identifies and proposes appropriate methods and protocols for collecting, analyzing, and evaluating data to characterize these sites, and
- identifies and proposes appropriate methods and protocols for remediating select sites.

2.0 BACKGROUND

2.1 General Site Information

TA-33, also known as Hot Point (HP) Site, is located on the Lower Pajarito Plateau in the southeastern corner of the Laboratory (Plate 1). TA-33 occupies approximately 1000 acres and is currently used for experimental research activities that support the creation, delivery, and maintenance of innovative detection and energy-projection systems for remote applications in space and around the world. Structures within TA-33 are located on the mesa top that is bounded to the north by Ancho Canyon and on the south by Chaquehui Canyon. TA-33 extends southeast to the Rio Grande, southwest to Frijoles Canyon, northeast to Ancho Canyon, and northwest to NM 4.

2.2 Operational History

TA-33 was initially developed in 1947 as a test site for implosion-type initiator experiments using conventional high explosives (HE), depleted uranium (DU), and beryllium. Polonium-210 was prepared off-site and used as the radiation source for the experiments. The experiments were performed in underground chambers, on surface firing pads, and at firing sites equipped with large guns that fired projectiles into earthen berms. Initiator testing at TA-33 ceased in 1972.

After 1972, TA-33 has been used for offices, laboratories, and storage in support of electronics design and fabrication and experiments formerly conducted at the Hot Dry Rock Program. An antenna for the National Radio Astronomy Observatory (NRAO) Very Long Baseline Array radio telescope was sited at TA-33 in 1985 and is operational. The high-pressure tritium facility (former building 33-86) was constructed in 1955 and operated until 1990. The tritium facility was decommissioned and demolished in the mid-1990s.

TA-33 consists of five operational areas: a laboratory and office complex near the entrance of TA-33 at NM 4 (Main Site); the former western firing site (Area 6); the former southern firing site (South Site); the former eastern firing site (East Site); and the current site of the antenna for the NRAO Very Long Baseline Array radio telescope. Fifteen SWMUs and one AOC within the Chaquehui Canyon Aggregate Area are located at TA-33 and are addressed in this Phase II IWP.

- SWMUs 33-001(a,b,c,d,e) are disposal pits and an underground chamber and shaft that are collectively referred to as Material Disposal Area (MDA) E. MDA E is located at the south end of TA-33 near the edge of Chaquehui Canyon. It occupies an area approximately 140 ft × 220 ft and is enclosed by an 8-ft-high fence. SWMUs 33-001(a–d) are abandoned waste disposal pits 1 through 4, respectively. SWMU 33-001(e) is a former test chamber (structure 33-29) and shaft (structure 33-3). The test chamber and shaft were abandoned in place in April 1950 and use of the disposal pits ceased in 1963. Two additional pits (pits 5 and 6) are located within the fenced area of MDA E. No documentation indicates if pits 5 and 6 were ever used, and they are not designated as SWMUs or AOCs. Based upon 1962 recommendations, radiation control area signs were posted around the fenced sides of MDA E, pit 2 was covered with approximately 2 ft of dirt, and all excess equipment and debris were removed from the site (Rogers 1977, 005708, p. E-5). Currently, MDA E is surrounded by a fence, and the area is vegetated with trees, shrubs, and grasses.
- SWMU 33-004(a) is an active septic system that consists of a septic tank (structure 33-31), associated inlet and outlet drainlines, three manholes, two seepage pits, and a drain field in the northwest portion of Main Site at TA-33.
- SWMU 33-004(i) consists of two inactive drainlines and outfalls associated with a former machine shop (building 33-39) located near the east side of Main Site at TA-33.
- SWMU 33-006(a) is an inactive shot pad at South Site where implosion tests were conducted at the southern end of TA-33.
- SWMU 33-007(c) consists of an abandoned firing area (including building 33-16), three former shot pads, and two former catcher boxes associated with the initiator tests conducted at Area 6 in the west-central portion of TA-33.
- SWMU 33-008(c) is a former surface disposal area located east of Main Site buildings 33-39 and 33-113 outside of the Main Site security fence at TA-33.
- SWMU 33-010(c) is a former surface disposal area located at South Site on the northern rim of Chaquehui Canyon at the southern end of TA-33.
- SWMU 33-011(a) is a former 0.25-acre drum storage area directly within the footprint and south of former building 33-21 in the central portion of TA-33.
- SWMU 33-011(d) consists of a former storage area that was located on an asphalt pad around a warehouse (building 33-20) in the southwest corner of Main Site at TA-33.
- SWMU 33-012(a) is a former satellite accumulation area (SAA) for a former machine shop in building 33-39 at Main Site at TA-33.
- SWMU 33-017 consists of areas potentially impacted by operational releases from former operations within Main Site at TA-33.
- AOC C-33-001 consists of a former polychlorinated biphenyl (PCB) transformer (former structure 33-124) in the northern portion of Main Site at TA-33.

2.3 Conceptual Site Model

The sampling proposed in this Phase II IWP uses a conceptual site model to predict areas of potential contamination and to allow 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 the sites within the Chaquehui Canyon Aggregate Area may have occurred as a result of firing site and open burn activities; potential leaks from septic systems, sumps, and associated drainlines; discharges from outfalls; and contamination from surface and subsurface disposal sites, storage areas, landfills, and an underground chamber. Previous sampling results indicate contamination from HE, inorganic chemicals, organic chemicals, and radionuclides (N3B 2020, 701046).

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.

MDA E at South Site is located near the edge of the mesa near White Rock Canyon. Historically, large landslides have occurred in White Rock Canyon and have encroached on the mesa top. The potential for landslides to result in exposure of the wastes buried at MDA E was studied to determine whether this may be a potential transport mechanism (Reneau et al. 1995, 054405). This study concluded that future exposure of the wastes at MDA E by this mechanism over the period of hundreds to thousands of years is improbable.

2.3.3 Potential Receptors

Potential receptors at one or more of the sites may include

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

Laboratory and construction 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 contaminants in soil and sediment.

2.3.4 Cleanup Levels

As specified in the Consent Order, soil screening levels (SSLs) for inorganic and organic chemicals (NMED 2019, 700550) may be used as soil cleanup levels unless they are determined to be impracticable or values do not exist for the current and reasonably foreseeable future land uses. Screening action levels (SALs) may be used as soil cleanup levels for radionuclides (LANL 2015, 600929). Screening assessments compare chemical of potential concern concentrations for each site with industrial, residential, and construction worker SSLs and SALs.

The human-health cleanup goals specified in Section VIII of the Consent Order are a target risk of 1×10^{-5} for carcinogens or a hazard index of 1 for noncarcinogens. For radionuclides, the release requirements in DOE Order 458.1 will be met.

As specified in the Consent Order, ecological cleanup levels may be developed using a methodology and values approved by NMED. LANL created a methodology for developing ecological preliminary remediation goals (EcoPRGs) (LANL 2018, 602891) that was reviewed and approved by NMED (NMED 2018, 602908). The EcoPRGs may be used as cleanup levels for mitigating unacceptable ecological risk.

2.4 Data Overview

This Phase II IWP summarizes the available decision-level data and presents the conclusions of the Chaquehui Canyon Aggregate Area IR regarding the nature and extent of contamination at each site (N3B 2020, 701046). In addition, this work plan proposes sampling and analyses for those sites at which the extent of contamination has 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 assessments.

Analytical samples described in this work plan have undergone analyses at off-site laboratories. Because analytical practices and documentation of analyses vary in quality and completeness, analytical data presented are either screening-level or decision-level data. Screening-level data are appropriate for applications that require determination only of gross contamination areas and 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.

3.0 SITE CONDITIONS

Surface and subsurface features and geologic characteristics of the Chaquehui Canyon Aggregate Area are described in detail in the IR (N3B 2020, 701046). Conditions at the sites addressed in this Phase II IWP are predominantly influenced by

- a semiarid climate with low precipitation and a high evapotranspiration rate that limits the extent of subsurface moisture percolation and, therefore, the amount of moisture available to transport radionuclides or hazardous waste constituents in the subsurface, and
- a thick, relatively dry, unsaturated (vadose) zone that greatly restricts or prevents downward migration of contaminants to the regional aquifer.

These and other elements of the environmental setting in the Chaquehui Canyon Aggregate Area are considered when the investigation data are evaluated with respect to the fate and transport of contaminants.

4.0 SITE DESCRIPTIONS AND PROPOSED INVESTIGATION ACTIVITIES

4.1 SWMU 33-001(a), Disposal Pit (MDA E)

4.1.1 Site Description and Operational History

SWMU 33-001(a), disposal pit 1, is located inside the western edge of the fenced area of MDA E at South Site (Figure 4.1-1). The pit dimensions are approximately 15 ft long × 75 ft wide × 7 ft deep. Documentation indicates that pit 1 contains polonium-beryllium contaminated targets. The pit may also contain spent projectiles, uranium components, beryllium, and explosive test shot debris. The pit was backfilled and compacted in 1963 (Rogers 1977, 005708, p. E-1). MDA E consists of waste disposal pits and an underground test chamber and shaft and is located at the south end of TA-33 near the edge of Chaquehui Canyon. MDA E occupies an area approximately 140 ft long × 220 ft wide and is enclosed by an 8-ft-high fence. Based upon 1962 recommendations, radiation control area signs were posted on the fence around MDA E, and all excess equipment and debris were removed from the site. Currently, the fence remains around MDA E and the area is vegetated with trees, shrubs, and grasses.

4.1.2 Summary of Previous Investigations

In 1982 and 1983, the Laboratory Environmental Surveillance Program conducted surface and subsurface sampling at MDA E; additional subsurface sampling was conducted in 1989 (LANL 1992, 007671, pp. 3-55–3-60). These sampling efforts were undertaken to determine whether releases from MDA E had occurred. Data from samples collected at MDA E in 1982, 1983, and 1989 are screening-level data and summarized below.

In 1982, samples were collected from two 50-ft boreholes located outside the MDA E fence at multiple depth intervals and submitted for analysis of tritium, total uranium, and cesium-137. Tritium was detected, but these results were suspect because of the low moisture content of the samples. Uranium was detected above the background value (BV) and cesium-137 was detected slightly above the fallout value (FV). In 1983, 90 samples were collected within the MDA E fence from 45 random locations on a 30-ft × 30-ft sampling grid. Samples were submitted for analysis of tritium, total uranium, and cesium-137. Uranium was detected above the BV, cesium-137 was detected above the FV, and tritium was detected but has no BV or FV. In 1989, 19 samples were collected from 6 boreholes advanced within the MDA E fence to depths ranging from 9 ft to 59 ft below ground surface (bgs). Samples were submitted for analysis of tritium, total uranium, and lead. Tritium was detected, and lead and uranium were detected above BVs. These data were not used to evaluate the nature and extent of contamination.

During the 1996 Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) conducted at SWMU 33-001(a), four samples were collected from one borehole drilled approximately 15 ft south of the south end of disposal pit 1 within the fenced area around MDA E. Samples were submitted for analysis of HE, target analyte list (TAL) metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), gamma-emitting radionuclides, isotopic plutonium, and tritium. Data from the 1996 Phase I RFI meet data-validation standards and are decision-level data.

During the 2019–2020 investigation, sampling at SWMU 33-001(a) was performed outside the fenced area of MDA E to determine whether releases from the disposal pit had occurred and if the site posed unacceptable risks or doses under current conditions outside the fenced area. Seven samples were collected from one borehole located directly adjacent to the western edge of SWMU 33-001(a) from depth interval 9.0 ft bgs to 70.0 ft bgs. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides. In addition, one sample was analyzed for PCBs. No investigation to characterize the nature of the wastes in the disposal pit was performed.

4.1.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), the nature and extent of contamination have not been defined at MDA E. The approved "Investigation Work Plan for Chaquehui Canyon Aggregate Area, Revision 1" (LANL 2010, 111298.9; NMED 2011, 201242) proposed drilling one borehole directly adjacent to the outside edge of each SWMU to determine if any releases have occurred. The drilling of one borehole outside the MDA E fence cannot define the nature and extent of potential contamination within the disposal pits and the underground chamber and shaft. Therefore, additional investigation at SWMU 33-001(a) is required.

4.1.4 Proposed Activities at SWMU 33-001(a)

A radiological walkover and geophysical surveys will be conducted within the MDA E fence and on the mesa top outside the fence to define the nature and extent of potential contamination associated with the disposal pits. The radiological survey will identify any possible radiological contamination from the period when the pits were open. The geophysical surveys will be used to define disposal pit boundaries and the depth of cover material inside the MDA E fence.

Surface and subsurface samples will be collected from the depth intervals of 0.0–0.5 ft and 1.0–1.5 ft bgs on the mesa top inside and outside the fence on a 50-ft grid spacing (1a-1 to 1a-54). Surface and subsurface samples will also be collected in areas identified by the radiological walkover survey with elevated readings above 2 times background. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, pH, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides.

The proposed sampling and analyses at SWMU 33-001(a) are presented in Table 4.1-1, and the proposed sampling locations are shown in Figure 4.1-1.

4.2 SWMU 33-001(b), Disposal Pit (MDA E)

4.2.1 Site Description and Operational History

SWMU 33-001(b), disposal pit 2, is located along the southern edge of the fenced area of MDA E at South Site (Figure 4.1-1). Pit dimensions are approximately 15 ft long × 45 ft wide × 7 ft deep. Explosive test shot debris and a spent explosives device were buried in pit 2. According to engineering drawing R-3644, pit 2 was open in November 1962 and was backfilled sometime during 1963 (Rogers 1977, 005708, p. E-1). MDA E consists of waste disposal pits and an underground test chamber and shaft and is located at the south end of TA-33 near the edge of Chaquehui Canyon. MDA E occupies an area approximately 140 ft long × 220 ft wide and is enclosed by an 8-ft-high fence. Based upon 1962 recommendations, radiation control area signs were posted on the fence around MDA E, and all excess equipment and debris were removed from the site. Currently, the fence remains around MDA E and the area is vegetated with trees, shrubs, and grasses.

4.2.2 Summary of Previous Investigations

In 1982 and 1983, the Laboratory Environmental Surveillance Program conducted surface and subsurface sampling at MDA E; additional subsurface sampling was conducted in 1989 (LANL 1992, 007671, pp. 3-55–3-60). These sampling efforts were undertaken to determine whether releases from MDA E had occurred. Data from samples collected at MDA E in 1982, 1983, and 1989 are screening-level data and summarized below.

In 1982, samples were collected from two 50-ft boreholes located outside the MDA E fence at multiple depth intervals and submitted for analysis of tritium, total uranium, and cesium-137. Tritium was detected, but these results were suspect because of the low moisture content of the samples. Uranium was detected above the BV and cesium-137 was detected slightly above the FV. In 1983, 90 samples were collected within the MDA E fence from 45 random locations on a 30-ft × 30-ft sampling grid. Samples were submitted for analysis of tritium, total uranium, and cesium-137. Uranium was detected above the BV, cesium-137 was detected above the FV, and tritium was detected but has no BV or FV. In 1989, 19 samples were collected from 6 boreholes advanced within the MDA E fence to depths ranging from 9 ft to 59 ft bgs. Samples were submitted for analysis of tritium, total uranium, and lead. Tritium was detected, and lead and uranium were detected above BVs. These data were not used to evaluate the nature and extent of contamination.

During the 2019–2020 investigation, sampling at SWMU 33-001(b) was performed outside the fenced area of MDA E to determine whether releases from the disposal pit had occurred and if the site posed unacceptable risks or doses under current conditions outside the fenced area. Seven samples were collected from one borehole located directly adjacent to the southern edge of SWMU 33-001(b) from depth interval 9.0 ft bgs to 70.0 ft bgs. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides. In addition, two samples were analyzed for PCBs. No investigation to characterize the nature of the wastes in the disposal pit was performed.

4.2.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), the nature and extent of contamination have not been defined at MDA E. The approved "Investigation Work Plan for Chaquehui Canyon Aggregate Area, Revision 1" (LANL 2010, 111298.9; NMED 2011, 201242) proposed drilling one borehole directly adjacent to the outside edge of each SWMU to determine if any releases have occurred. The drilling of one borehole outside the MDA E fence cannot define the nature and extent of potential contamination within the disposal pits and the underground chamber and shaft. Therefore, additional investigation at SWMU 33-001(b) is required.

4.2.4 Proposed Activities at SWMU 33-001(b)

A radiological walkover and geophysical surveys will be conducted within the MDA E fence and on the mesa top outside the fence to define the nature and extent of potential contamination associated with the disposal pits. The radiological survey will identify any possible radiological contamination from the period when the pits were open. The geophysical surveys will be used to define disposal pit boundaries and the depth of cover material inside the MDA E fence.

Surface and subsurface samples will be collected from the depth intervals of 0.0–0.5 ft and 1.0–1.5 ft bgs on the mesa top inside and outside the fence on a 50-ft grid spacing (1a-1 to 1a-54). Surface and subsurface samples will also be collected in areas identified by the radiological walkover survey with elevated readings above 2 times background. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, pH, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides.

The proposed sampling and analyses at SWMU 33-001(b) are presented in Table 4.1-1, and the proposed sampling locations are shown in Figure 4.1-1.

4.3 SWMU 33-001(c), Disposal Pit (MDA E)

4.3.1 Site Description and Operational History

SWMU 33-001(c), disposal pit 3, is located along the southeast corner of the fenced area of MDA E at South Site (Figure 4.1-1). Pit dimensions are approximately 5 ft in diameter and 7 ft deep. Pit 3 reportedly contains a can of beryllium dust immersed in kerosene and may have contained other explosive test shot debris (Rogers 1977, 005708, p. E-1). Pit 3 was closed in September 1951 and backfilled. MDA E consists of waste disposal pits and an underground test chamber and shaft and is located at the south end of TA-33 near the edge of Chaquehui Canyon. MDA E occupies an area approximately 140 ft long × 220 ft wide and is enclosed by an 8-ft-high fence. Based upon 1962 recommendations, radiation control area signs were posted on the fence around MDA E, and all excess equipment and debris were removed from the site. Currently, the fence remains around MDA E and the area is vegetated with trees, shrubs, and grasses.

4.3.2 Summary of Previous Investigations

In 1982 and 1983, the Laboratory Environmental Surveillance Program conducted surface and subsurface sampling at MDA E; additional subsurface sampling was conducted in 1989 (LANL 1992, 007671, pp. 3-55–3-60). These sampling efforts were undertaken to determine whether releases from MDA E had occurred. Data from samples collected at MDA E in 1982, 1983, and 1989 are screening-level data and summarized below.

In 1982, samples were collected from two 50-ft boreholes located outside the MDA E fence at multiple depth intervals and submitted for analysis of tritium, total uranium, and cesium-137. Tritium was detected, but these results were suspect because of the low moisture content of the samples. Uranium was detected above the BV and cesium-137 was detected slightly above the FV. In 1983, 90 samples were collected within the MDA E fence from 45 random locations on a 30-ft × 30-ft sampling grid. Samples were submitted for analysis of tritium, total uranium, and cesium-137. Uranium was detected above the BV, cesium-137 was detected above the FV, and tritium was detected but has no BV or FV. In 1989, 19 samples were collected from 6 boreholes advanced within the MDA E fence to depths ranging from 9 ft to 59 ft bgs. Samples were submitted for analysis of tritium, total uranium, and lead. Tritium was detected, and lead and uranium were detected above BVs. These data were not used to evaluate the nature and extent of contamination.

During the 2019–2020 investigation, sampling at SWMU 33-001(c) was performed outside the fenced area of MDA E to determine whether releases from the disposal pit had occurred and if the site posed unacceptable risks or doses under current conditions outside the fenced area. Seven samples were collected from one borehole located directly adjacent to the southern edge of SWMU 33-001(c) from depth interval 9.0 ft bgs to 70.0 ft bgs. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides. In addition, two samples were analyzed for PCBs. No investigation to characterize the nature of the wastes in the disposal pit was performed. Therefore, additional investigation at SWMU 33-001(c) is required.

4.3.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), the nature and extent of contamination have not been defined at MDA E. The approved "Investigation Work Plan for Chaquehui Canyon Aggregate Area, Revision 1" (LANL 2010, 111298.9; NMED 2011, 201242) proposed drilling one borehole directly adjacent to the outside edge of each SWMU to determine if any releases have occurred. The drilling of one borehole outside the MDA E fence cannot define the nature and extent of potential contamination within the disposal pits and the underground chamber and shaft.

4.3.4 Proposed Activities at SWMU 33-001(c)

A radiological walkover and geophysical surveys will be conducted within the MDA E fence and on the mesa top outside the fence to define the nature and extent of potential contamination associated with the disposal pits. The radiological survey will identify any possible radiological contamination from the period when the pits were open. The geophysical surveys will be used to define disposal pit boundaries and the depth of cover material inside the MDA E fence.

Surface and subsurface samples will be collected from the depth intervals of 0.0–0.5 ft and 1.0–1.5 ft bgs on the mesa top inside and outside the fence on a 50-ft grid spacing (1a-1 to 1a-54). Surface and subsurface samples will also be collected in areas identified by the radiological walkover survey with elevated readings above 2 times background. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, pH, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides.

The proposed sampling and analyses at SWMU 33-001(c) are presented in Table 4.1-1, and the proposed sampling locations are shown in Figure 4.1-1.

4.4 SWMU 33-001(d), Disposal Pit (MDA E)

4.4.1 Site Description and Operational History

SWMU 33-001(d), disposal pit 4, is located along the east fenceline area of MDA E at South Site (Figure 4.1-1). The pit dimensions are approximately 15 ft long × 100 ft wide × 7 ft deep. Pit 4 contains explosive test shot debris, a spent explosives device, and miscellaneous radioactive material (Rogers 1977, 005708, p. E-1). Pit 4 was reportedly still used for disposal during the 1960s (Rogers 1977, 005708, p. E-1). It was backfilled sometime before 1977. MDA E consists of waste disposal pits and an underground test chamber and shaft and is located at the south end of TA-33 near the edge of Chaquehui Canyon. MDA E occupies an area approximately 140 ft long × 220 ft wide and is enclosed by an 8-ft-high fence. Based upon 1962 recommendations, radiation control area signs were posted on the fence around MDA E, and all excess equipment and debris were removed from the site. Currently, the fence remains around MDA E and the area is vegetated with trees, shrubs, and grasses.

4.4.2 Summary of Previous Investigations

In 1982 and 1983, the Laboratory Environmental Surveillance Program conducted surface and subsurface sampling at MDA E; additional subsurface sampling was conducted in 1989 (LANL 1992, 007671, pp. 3-55–3-60). These sampling efforts were undertaken to determine whether releases from MDA E had occurred. Data from samples collected at MDA E in 1982, 1983, and 1989 are screening-level data and summarized below.

In 1982, samples were collected from two 50-ft boreholes located outside the MDA E fence at multiple depth intervals and submitted for analysis of tritium, total uranium, and cesium-137. Tritium was detected, but these results were suspect because of the low moisture content of the samples. Uranium was detected above the BV and cesium-137 was detected slightly above the FV. In 1983, 90 samples were collected within the MDA E fence from 45 random locations on a 30-ft × 30-ft sampling grid. Samples were submitted for analysis of tritium, total uranium, and cesium-137. Uranium was detected above the BV, cesium-137 was detected above the FV, and tritium was detected but has no BV or FV. In 1989, 19 samples were collected from 6 boreholes advanced within the MDA E fence to depths ranging from 9 ft to 59 ft bgs. Samples were submitted for analysis of tritium, total uranium, and lead. Tritium was detected, and lead and uranium were detected above BVs. These data were not used to evaluate the nature and extent of contamination.

During the 1996 Phase I RFI conducted at SWMU 33-001(d), four samples were collected from one borehole drilled approximately 30 ft northeast of the northeast corner of disposal pit 4 within the fenced area around MDA E. Samples were submitted for analysis of HE, TAL metals, VOCs, SVOCs, gamma-emitting radionuclides, isotopic plutonium, and tritium. Data from the 1996 Phase I RFI meet data-validation standards and are decision-level data.

During the 2019–2020 investigation, sampling at SWMU 33-001(d) was performed outside the fenced area of MDA E to determine whether releases from the disposal pit had occurred and if the site posed unacceptable risks or doses under current conditions outside the fenced area. Seven samples were collected from one borehole located directly adjacent to the eastern edge of SWMU 33-001(d) from depth interval 9.0 ft bgs to 70.0 ft bgs. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides. In addition, one sample was analyzed for PCBs. No investigation to characterize the nature of the wastes in the disposal pit was performed.

4.4.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), the nature and extent of contamination have not been defined at MDA E. The approved “Investigation Work Plan for Chaquehui Canyon Aggregate Area, Revision 1” (LANL 2010, 111298.9; NMED 2011, 201242) proposed drilling one borehole directly adjacent to the outside edge of each SWMU to determine if any releases have occurred. The drilling of one borehole outside the MDA E fence cannot define the nature and extent of potential contamination within the disposal pits and the underground chamber and shaft. Therefore, additional investigation at SWMU 33-001(d) is required.

4.4.4 Proposed Activities at SWMU 33-001(d)

A radiological walkover and geophysical surveys will be conducted within the MDA E fence and on the mesa top outside the fence to define the nature and extent of potential contamination associated with the disposal pits. The radiological survey will identify any possible radiological contamination from the period when the pits were open. The geophysical surveys will be used to define disposal pit boundaries and the depth of cover material inside the MDA E fence.

Surface and subsurface samples will be collected from the depth intervals of 0.0–0.5 ft and 1.0–1.5 ft bgs on the mesa top inside and outside the fence on a 50-ft grid spacing (1a-1 to 1a-54). Surface and subsurface samples will also be collected in areas identified by the radiological walkover survey with elevated readings above 2 times background. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, pH, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides.

The proposed sampling and analyses at SWMU 33-001(d) are presented in Table 4.1-1, and the proposed sampling locations are shown in Figure 4.1-1.

4.5 SWMU 33-001(e), Soil Contamination from Underground Chamber and Shaft (MDA E)

4.5.1 Site Description and Operational History

SWMU 33-001(e) consists of an underground chamber, designated chamber 3 (former structure 33-29), and an associated underground elevator shaft (former structure 33-03) at MDA E at South Site (Figure 4.1-1). A portable cable building (former building 33-30) was attached to the elevator shaft and housed electrical and ventilation equipment for both the chamber and the shaft. The chamber and shaft were constructed between 1949 and 1950. The chamber was constructed of 2-ft-thick concrete walls with dimensions of 11 ft long × 14 ft wide. The chamber was situated 46 ft below ground surface (bgs). The elevator shaft was constructed of wood, iron, and concrete with dimensions of 6 ft long × 8 ft wide × 60 ft tall. The bottom of the shaft was at 48 ft bgs. Chamber 33-29 collapsed during an experiment conducted in April 1950 and was left in place. According to engineering drawing R-152, the portable cable building (former building 33-30) and the aboveground portions of the elevator shaft were removed in 1954. The chamber was used to conduct tests involving explosives, beryllium, and tungsten (LANL 1992, 007671, p. 3-51). MDA E occupies an area approximately 140 ft long × 220 ft wide and is enclosed by an 8-ft-high fence. Based upon 1962 recommendations, radiation control area signs were posted on the fence around MDA E, and all excess equipment and debris were removed from the site. Currently, the fence remains around MDA E and the area is vegetated with trees, shrubs, and grasses.

4.5.2 Summary of Previous Investigations

In 1982 and 1983, the Laboratory Environmental Surveillance Program conducted surface and subsurface sampling at MDA E; additional subsurface sampling was conducted in 1989 (LANL 1992, 007671, pp. 3-55–3-60). These sampling efforts were undertaken to determine whether releases from MDA E had occurred. Data from samples collected at MDA E in 1982, 1983, and 1989 are screening-level data and summarized below.

In 1982, samples were collected from two 50-ft boreholes located outside the MDA E fence at multiple depth intervals and submitted for analysis of tritium, total uranium, and cesium-137. Tritium was detected, but these results were suspect because of the low moisture content of the samples. Uranium was detected above the BV and cesium-137 was detected slightly above the FV. In 1983, 90 samples were collected within the MDA E fence from 45 random locations on a 30-ft × 30-ft sampling grid. Samples were submitted for analysis of tritium, total uranium, and cesium-137. Uranium was detected above the BV, cesium-137 was detected above the FV, and tritium was detected but has no BV or FV. In 1989, 19 samples were collected from 6 boreholes advanced within the MDA E fence to depths ranging from 9 ft to 59 ft bgs. Samples were submitted for analysis of tritium, total uranium, and lead. Tritium was detected, and lead and uranium were detected above BVs. These data were not used to evaluate the nature and extent of contamination.

During the 2019–2020 investigation, sampling at SWMU 33-001(e) was performed outside the fenced area of MDA E to determine whether releases from the underground chamber and shaft had occurred and if the site posed unacceptable risks or doses under current conditions outside the fenced area. Seven samples were collected from one borehole located 45 ft north of the outside edge of SWMU 33-001(e) from depth interval 9.0 ft bgs to 70.0 ft bgs. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides. In addition, one sample was analyzed for PCBs. No investigation to characterize the nature of the materials in the chamber and shaft was performed.

4.5.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), the nature and extent of contamination have not been defined at MDA E. The approved "Investigation Work Plan for Chaquehui Canyon Aggregate Area, Revision 1" (LANL 2010, 111298.9; NMED 2011, 201242) proposed drilling one borehole directly adjacent to the outside edge of each SWMU to determine if any releases have occurred. The drilling of one borehole outside the MDA E fence cannot define the nature and extent of potential contamination within the disposal pits and the underground chamber and shaft. Therefore, additional investigation at SWMU 33-001(e) is required.

4.5.4 Proposed Activities at SWMU 33-001(e)

A radiological walkover and geophysical surveys will be conducted within the MDA E fence and on the mesa top outside the fence to define the nature and extent of potential contamination associated with the disposal pits. The radiological survey will identify any possible radiological contamination from the period when the pits were open. The geophysical surveys will be used to define disposal pit boundaries and the depth of cover material inside the MDA E fence.

Surface and subsurface samples will be collected from the depth intervals of 0.0–0.5 ft and 1.0–1.5 ft bgs on the mesa top inside and outside the fence on a 50-ft grid spacing (1a-1 to 1a-54). Surface and subsurface samples will also be collected in areas identified by the radiological walkover survey with elevated readings above 2 times background. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, pH, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides.

The proposed sampling and analyses at SWMU 33-001(e) are presented in Table 4.1-1, and the proposed sampling locations are shown in Figure 4.1-1.

4.6 SWMU 33-004(a), Septic System

4.6.1 Site Description and Operational History

SWMU 33-004(a) is an active septic system consisting of a septic tank (structure 33-31), associated inlet and outlet drainlines, three manholes, two seepage pits, and a drain field in the northwest portion of Main Site (Figure 4.6-1). The septic tank has a capacity of 1360 gal. and is located 50 ft northeast of building 33-39. This septic tank is in use and serves all major buildings at the TA-33 Main Site at the north end of TA-33. Septic tank 33-31 received sanitary wastewater from a laboratory/office building (33-19) and a storage building (33-27). Industrial liquid wastes from building 33-19 were discharged to a separate outfall. Septic tank 33-31 discharged to a 90-ft-long × 80-ft-wide drain field located approximately 200 ft northeast of the septic tank. This drain field was constructed of rows of 4-in. vitrified-clay tiles spaced approximately 10 ft apart. In 1951, the septic system was redesigned to accept industrial wastes from laboratories in buildings 33-19, 33-113, and 33-114 and from the machine shop in building 33-39. Also, two 4-ft-diameter × 50-ft-deep gravel-filled seepage pits were constructed to receive the discharge from septic tank 33-31, and the drain field was disconnected and removed from service. The seepage pits continue to receive the effluent from the septic tank. Components of the SWMU 33-004(a) septic system are shown in engineering drawings AB1114 (2 of 7) (LANL 2006, 110681) and ENG C-25512 (LASL 1958, 107488).

A 1992 study of drains and discharges at TA-33 identified the following sources of discharges to this septic system: restrooms, water fountains, showers, laboratory floor drains and sink drains in building 33-19; janitor's closet sink drains in buildings 33-19 and 33-113; a floor drain in a shop in building 33-39; a sink drain in a shop in building 33-113; and roof drains from building 33-19 (Santa Fe Engineering Ltd. 1992, 062036, Tables 2, 6, 7, and 13). The specific materials discharged to these drains are not well documented.

A 1954 memorandum mentions occurrences of mercury spills in the electronics laboratory in building 33-19, and spilled mercury could potentially have been released to the drains (Jordan 1954, 007918). The shop in building 33-113 was primarily used to machine uranium but was also used for processing plastics and spray-painting (Hyatt 1956, 007929).

4.6.2 Summary of Previous Investigations

During the 1993 Phase I RFI conducted at SWMU 33-004(a), one sludge sample and one liquid sample were collected from septic tank 33-31 and submitted for analysis of TAL metals, SVOCs, VOCs, uranium, tritium, and gamma-emitting radionuclides (LANL 1995, 071300). One surface sample and two subsurface samples were collected from one borehole drilled to a depth of 15 ft bgs next to the septic tank. Samples were submitted for analysis of TAL metals, SVOCs, tritium, uranium, and gamma-emitting radionuclides. The two subsurface samples were also analyzed for VOCs. One borehole was drilled next to each seepage pit to a depth of 50 ft, and four samples were collected at four depths from each of these boreholes. Samples were submitted for analysis of TAL metals, SVOCs, VOCs, tritium, and gamma-emitting radionuclides, and all but one of the samples were also analyzed for uranium. Four surface and two subsurface samples were collected from random locations in the drain field and submitted for analysis of TAL metals, SVOCs, uranium, tritium, and gamma-emitting radionuclides. Two surface samples were also analyzed for herbicides, pesticides, and PCBs, and the subsurface samples were also analyzed for VOCs. Data from the 1993 Phase I RFI are screening-level data and showed numerous inorganic chemicals detected above BVs; numerous detected organic chemicals including VOCs, SVOCs polycyclic aromatic hydrocarbons (PAHs), and Aroclor-1254; and cesium-137 and tritium detected above FVs. These data were not used to evaluate the nature and extent of contamination.

In 1994, 4 additional samples were collected from the drain field to better characterize potential releases (LANL 1995, 071300). These subsurface samples were collected at joints in the vitrified-clay tiles and submitted for analysis of TAL metals, SVOCs, VOCs, tritium, uranium, and gamma-emitting radionuclides. Data from the 1994 sampling are screening-level data and showed numerous inorganic chemicals detected above BVs, 17 detected organic chemicals (primarily SVOCs/PAHs), and cesium-137 and tritium detected above FVs. These data were not used to evaluate the nature and extent of contamination.

In 1997, the Laboratory's Environmental Restoration (ER) Project collected one soil sample at each of three locations (below the tank, under the inlet, and under the outlet). Samples were submitted for analysis of TAL metals and VOCs (Michelotti and Kidman 1997, 074002). Data from the 1997 sampling event meet data-validation standards and are decision-level data.

During the 2019–2020 investigation, a total of 10 samples were collected from 5 locations beneath septic system structures to determine extent. At each location, samples were collected from 2 depths below the structures. A total of 14 samples were collected from 2 locations drilled next to two active seepage pits. At each location, samples were collected from 7 depths. A total of 24 samples were collected from 8 locations within the inactive drain field in order to determine extent. At each location samples were collected from 3 depths below the drain pipes. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, perchlorate, nitrate, VOCs, SVOCs, isotopic uranium and isotopic plutonium. In addition, 12 samples were analyzed for PCBs.

During the 2019–2020 investigation, the sampling crew potholed in the drain field and determined the individual tile drainlines were 10 ft apart from each other. Additional trenching was conducted to the east and west of the drainlines and no evidence of additional drainlines was found. The drainlines are shown in Figure 4.6-2.

4.6.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 33-004(a), except for the following:

- lateral and vertical extent of PCBs at locations 33-60595, 33-60597, and 33-60599 (Plate 3 and Table 4.6-1)
- vertical extent of PAHs at locations 33-60590, 33-60592, and 33-60597 (Plate 3 and Table 4.6-1)
- lateral extent of PAHs at location 33-60601 (Plate 3 and Table 4.6-1)
- vertical and lateral extent on the eastern side of the drain field
- nature and extent at the easternmost seepage pit

Based on the risk-screening assessment results presented in the IR (N3B 2020, 701046), SWMU 33-004(a) does not pose potential unacceptable risks or dose for the construction worker scenario. For the residential scenario, the risks are driven by PCBs and PAHs. Samples were not collected from the 0.0- to 1.0-ft depth interval, and the industrial scenario was not evaluated for SWMU 33-004(a). The IR concluded there is the potential for adverse effects to the earthworm at SWMU 33-004(a) from mercury (N3B 2020, 701046).

4.6.4 Proposed Activities at SWMU 33-004(a)

Samples will be collected from locations 33-60595, 33-60597, and 33-60599 at depth intervals of 3.7–4.7 and 5.7–6.7 ft bgs to define the vertical extent of PCBs. Only one depth at these locations was sampled previously.

Samples will be collected from locations 33-60590 and 33-60592 at a depth interval of 15.0–16.0 ft bgs and at location 33-60597 at a depth interval of 9.0–10.0 ft bgs to define vertical extent of PAHs.

Four new locations (4a-1, 4a-2, 4a-3, and 4a-4 in Figure 4.6-2) will be placed beneath the three easternmost pipes in the septic drain field to define the extent of potential contamination. Samples will be collected from the depth intervals of 0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft below the pipe. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, pH, VOCs, SVOCs, PCBs, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides.

Two new locations (4a-5 and 4a-6 in Figure 4.6-2) will be placed 5 ft and 10 ft north of location 33-60595 to define the lateral extent of PCBs. Samples will be collected from the depth intervals of 2.1–2.9 ft, 4.1–5.1 ft, and 6.1–7.1 ft bgs, corresponding to the depth intervals sampled during the 2019–2020 investigation. Samples will be analyzed for PCBs.

Corrective actions at SWMU 33-004(a) to address potential unacceptable ecological risk and human health risk will be performed by removing soil with elevated mercury concentrations at location 33-60596 to 3.6 ft bgs (Plate 4 and Table 4.6-2), removing soil with elevated mercury and PCB concentrations at location 33-60597 to 3.7 ft bgs, and removing soil with elevated PAH concentrations at location 33-60601 to 3.8 ft bgs. No confirmation samples are required at locations 33-60596 and 33-60601 because the vertical extent of contamination is defined by deeper samples previously collected at these two locations.

The size of each excavation will be defined by the collection of bounding confirmation samples before excavation activities begin. Four new locations (4a-7, 4a-8, 4a-9, and 4a-10 in Figure 4.6-2) will be placed 3 ft north, south, east, and west of existing location 33-60596 to define the vertical and lateral extent of mercury. Samples will be collected from the depth intervals of 1.6–2.25 ft, 3.6–4.6 ft, and 5.6–6.6 ft bgs, corresponding to the depth intervals sampled during the 2019–2020 investigation. Samples will be analyzed for mercury. Additional step-out samples will be collected if elevated mercury concentrations are encountered at these locations, and the excavation area will be expanded.

Four new locations (4a-11, 4a-12, 4a-13, and 4a-14 in Figure 4.6-2) will be placed 3 ft north, south, east, and west of existing location 33-60597 to define the vertical and lateral extent of mercury. Samples will be collected from the depth intervals of 1.7–2.4 ft, 3.7–4.7 ft, and 5.7–6.7 ft bgs, corresponding to the depth intervals sampled during the 2019–2020 investigation. Samples will be analyzed for mercury. Additional step-out samples will be collected if elevated mercury concentrations are encountered at these locations, and the excavation area will be expanded.

A new location (4a-15 in Figure 4.6-2) will be placed 10 ft north of location 33-60597 to define the lateral extent of PCBs to the north. Samples will be collected from the depth intervals of 1.7–2.4 ft, 3.7–4.7 ft, and 5.7–6.7 ft bgs, corresponding to the depth intervals sampled during the 2019–2020 investigation. Samples will be analyzed for PCBs.

Five new locations (4a-16, 4a-17, 4a-18, 4a-19, and 4a-20 in Figure 4.6-2) will be placed 3 ft north, south, east, and west of existing location 33-60601 to define the vertical and lateral extent of PAHs. Location 4a-17 will be placed 8 ft south of location 33-60601. Samples will be collected from the depth intervals of 1.8–2.8 ft, 3.8–4.8 ft, and 5.8–6.8 ft bgs, corresponding to the depth intervals sampled during the 2019–2020 investigation. Samples will be analyzed for PAHs. Additional step-out samples will be collected if elevated PAH concentrations are encountered at these locations, and the excavation area will be expanded.

Location 33-60594 was moved southeast of the seepage pit to avoid overhead power lines. A new location (4a-21 in Figure 4.6-2) will be hand- or power-augered as deep as possible next to the seepage pit. Samples will be collected from 5.0–6.0 ft, 9.0–10.0 ft, 19.0–20.0 ft, and 29.0–30.0 ft bgs, if possible. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, pH, VOCs, SVOCs, PCBs, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides.

The proposed sampling and analyses at SWMU 33-004(a) are presented in Table 4.6-3, and the proposed excavations and sampling locations are shown in Figure 4.6-2.

4.7 SWMU 33-004(i), Drainline and Outfall Associated with Building 33-39

4.7.1 Site Description and Operational History

SWMU 33-004(i) consists of two inactive drainlines and outfalls associated with a former machine shop (building 33-39) located near the east side of Main Site (Figure 4.7-1). Construction of building 33-39 was completed in 1951. The building housed a welding and soldering bench that used cadmium and silver, a lead-melting facility, a beryllium-machining room, and a sand blaster. Cadmium, uranium, stainless steel, and polystyrene plastic also were machined in the building. Machine shop operations in building 33-29 ceased in the late 1990s. Floor drains in the building were tied into two 4-in.-diameter vitrified clay pipes that discharged to outfalls east of building 33-39. The northernmost of the two outfalls is located approximately 30 ft east of the building, and the southern outfall is located approximately 40 ft east of the building. However, the sources of the discharges to these outfalls cannot be confirmed because a study of building drains at TA-33 confirmed that all wastewater discharges from building 33-39 are connected to the SWMU 33-004(a) septic system (Santa Fe Engineering, 1993, 062036, p. 7). The 1990 SWMU report confirms that the SWMU 33-004(a) septic system received discharges from building 33-39 beginning in 1951 (LANL 1990, 007513).

4.7.2 Summary of Previous Investigations

During the 1993 Phase I RFI conducted at SWMU 33-004(i), a geophysical survey was performed and the drainlines and outfalls east of building 33-39 were located. Six samples were collected at each outfall and at two locations in the drainages downstream of each outfall. Samples were submitted for analysis of TAL metals, SVOCs, herbicides, pesticides, tritium, total uranium, and gamma-emitting radionuclides. Data from the 1993 Phase I RFI are screening-level data and showed inorganic chemicals detected above BVs and detected organic chemicals (PAHs). Radionuclides were not detected or detected above BVs/FVs. These data were not used to evaluate the nature and extent of contamination.

During the 2019–2020 investigation, a total of 29 samples were collected from 6 previous RFI locations and 4 new locations downgradient of the outfalls. At each location, samples were collected at the surface and from two subsurface depths. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, and isotopic uranium. In addition, 5 samples were analyzed for PCBs.

4.7.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent of contamination is warranted at SWMU 33-004(i), except for the following:

- vertical extent of PCBs at locations 33-01055, 33-01057, 33-01058, 33-01059, and 33-01060 (Plate 5 and Table 4.7-1)

Based on the risk-screening assessment results presented in the IR (N3B 2020, 701046), SWMU 33-004(i) does not pose potential unacceptable cancer or noncancer risks or doses for the industrial scenario. There are potential unacceptable noncancer risks for the residential and construction worker scenarios and potential cancer risks for the residential scenario due to PCBs. The IR concluded there was no potential unacceptable risk to ecological receptors at SWMU 33-004(i) (N3B 2020, 701046).

4.7.4 Proposed Activities at SWMU 33-004(i)

To define the vertical extent of PCBs, sampling locations 33-01055, 33-01057, 33-01059, and 33-01060 will be resampled. Only one depth at these locations was sampled previously. Samples at locations 33-01055, 33-01057, and 33-01059 will be collected from the depth intervals of 2.0–3.0 ft and 4.0–5.0 ft bgs. Samples at location 33-01060 will be collected from the depth intervals of 0.0–1.0 ft, 2.0–3.0 ft, and 6.0–7.0 ft bgs.

Corrective actions at SWMU 33-004(i) to address potential unacceptable human health risks will be performed by removing soil with elevated PCB concentrations at location 33-01058 to 6 ft bgs (Plate 5 and Table 4.7-1). The size of the excavation will be defined by the collection of bounding confirmation samples before excavation activities begin. Two confirmation samples will be collected at location 33-01058 to define the vertical extent of PCBs. Samples will be collected from the depth intervals of 6.0–7.0 ft and 8.0–9.0 ft bgs and analyzed for PCBs. Four new locations (4i-1, 4i-2, 4i-3, and 4i-4 in Figure 4.7-2) will be placed 5 ft north, south, east, and west of existing location 33-01058 to define the vertical and lateral extent of PCBs. Two new locations (4i-5 and 4i-6 in Figure 4.7-2) will be placed 10 ft north and south of existing location 33-01058 to define the lateral extent of PCBs. Samples will be collected from the depth intervals of 0.0–1.0 ft, 2.0–3.0 ft, 4.0–5.0 ft, 6.0–7.0 ft, and 8–9 ft bgs. Samples will be analyzed for PCBs. Additional step-out samples will be collected if elevated PCB concentrations are encountered at these locations, and the excavation area will be expanded.

The proposed sampling and analyses at SWMU 33-004(i) are presented in Table 4.7-2, and the excavation and proposed sampling locations are shown in Figure 4.7-2.

4.8 SWMU 33-006(a), Firing Site

4.8.1 Site Description and Operational History

SWMU 33-006(a) is an inactive shot pad at South Site where implosion tests were conducted at the southern end of TA-33 (Figure 4.8-1). The shot pad is a 50-ft-diameter circular area located immediately north of and next to the roof of structure 33-26, an x-unit chamber (i.e., a control chamber that housed a firing voltage distribution system used for the remote detonation of test firings). The SWMU 33-006(a) shot pad was built in 1948, and the associated support building, known as an x-unit vault (structure 33-26), was constructed in 1950. Implosion tests performed at the shot pad contained up to 5000 lb of HE. Before detonations, wooden boxes covered the assemblages. Use of the site ceased in 1956, and structure 33-26 has remained vacant since then. The detonations conducted at the SWMU 33-006(a) shot pad scattered debris, shrapnel, and wood fragments over the mesa top of South Site and into Chaquehui Canyon. Shrapnel has been found at distances up to a mile away from the shot pad. The shot pad has not been used since 1955 when implosion testing was discontinued at TA-33. Currently, the pad is covered with up to a foot or more of sand (LANL 1995, 051903, p.58).

4.8.2 Summary of Previous Investigations

During the 1994 Phase I RFI conducted at the SWMU 33-006(a) shot pad and surrounding area, 46 surface soil samples were collected from 42 randomly selected locations across the site. In addition, 11 surface soil samples were collected from 10 locations in the drainage that receives runoff from the site. Samples were submitted for analysis of TAL metals, PCBs, pesticides, herbicides, gamma-emitting radionuclides, and HE. Data from the 1994 Phase I RFI are screening-level data and showed numerous inorganic chemicals detected above BVs; several detected HE; and cesium-137, plutonium-238, plutonium-239/240, and tritium activities detected or detected above FVs. These data were not used to evaluate the nature and extent of contamination.

An interim action (IA) was performed at SWMU 33-006(a) in 1996 to remove contaminated debris within a half-mile radius from the SWMU 33-006(a) shot pad and to prevent the off-site migration from Chaquehui Canyon to the Rio Grande. Firing site shrapnel and debris were removed from mesa-top areas and drainages along the southern rim of Chaquehui Canyon within Bandelier National Monument, from drainage channels along the northern rim of Chaquehui Canyon, and from the canyon bottom. A total of 1261 lb of debris was removed during the IA. Of the total, 770 lb was radioactively contaminated. For waste management purposes, all the debris was screened with an x-ray fluorescence detector to determine whether hazardous metals were present. A total of 20 lb of the debris contained lead and was handled as hazardous waste. Approximately 20 lb of the debris contained lead, was radioactively contaminated, and was handled as mixed waste. The remaining 451 lb of debris was considered nonhazardous and nonradioactive waste and was recycled.

In 1996, eight surface samples (0 to 0.5 ft) were collected from eight locations that had been sampled previously during the 1994 Phase I RFI at SWMU 33-006(a) because holding times for the HE analyses had been missed. The eight samples were submitted for analysis of HE. Two organic chemicals, 1,3-dinitrobenzene and 1,3,5-trinitrobenzene, were detected (1.5 mg/kg and 1.9 mg/kg, respectively) in one sample (0333-96-0588) from sampling location 33-01448 in SWMU 33-007(b), directly south of building 33-25. Since 1996, the entire area south of building 33-25 (including former sampling location 33-01448) has been significantly disturbed by the installation of new utilities for the complete renovation of building 33-25. This area was investigated as part of the characterization of SWMU 33-007(b). Although the 1996 data are of decision-level quality, the sampling depths and locations and analytical suites were not sufficient to define the extent of contamination. In addition, the 1996 data may not be representative of current conditions because of disturbance to the site. As a result, the 1996 data were not used to evaluate the nature and extent of contamination.

During the 2019–2020 investigation, a total of 20 samples were collected from 10 locations within and around the former shot pad. At each location, samples were collected at the surface and from the subsurface. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides. In addition, 6 samples were analyzed for PCBs.

Residual surface debris was removed from SWMU 33-006(a) during the 2019–2020 investigation. A total of 38 pieces of firing site debris was observed, flagged, removed, containerized, and characterized for disposal. Each location was screened for radioactivity, VOCs, and HE (Table 4.8-1). Per the approved IWP, Revision 1 (LANL 2010, 111298.9; NMED 2011, 201242), the locations with detected HE will be excavated and confirmation samples will be collected from two depths in the bottom of the excavation.

4.8.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 33-006(a), except for the following:

- lateral and vertical extent of copper at location 33-60423 (Figure 4.8-2 and Table 4.8-2)
- vertical extent of di-n-butylphthalate at location 33-60415 (Figure 4.8-3 and Table 4.8-3)

Based on the risk-screening assessment results presented in the IR (N3B 2020, 701046), SWMU 33-006(a) does not pose potential unacceptable risks or doses for the industrial, residential, and construction worker scenarios. The IR concluded there is the potential for adverse effects to the American robin (all feeding guilds), montane shrew, deer mouse, earthworm, and plant at SWMU 33-006(a) (N3B 2020, 701046). These risks are primarily due to copper and di-n-butylphthalate.

4.8.4 Proposed Activities at SWMU 33-006(a)

Corrective actions at SWMU 33-006(a) to address potential unacceptable ecological risk will be performed by removing soil with elevated copper and di-n-butylphthalate concentrations at location 33-60415 (Figures 4.8-2 and 4.8-3, and Tables 4.8-2 and 4.8-3). Soil will be removed to 3.0 ft bgs. The maximum detected concentration of di-n-butylphthalate occurred in the 2.0–3.0-ft sample. Additional samples will be collected at location 33-60415 from the depth intervals of 4.0–5.0 ft and 7.0–8.0 ft bgs to define the vertical extent of di-n-butylphthalate. Samples will be analyzed for di-n-butylphthalate.

Soil with elevated copper concentrations will also be removed at locations 33-60416, 33-60417, and 33-60423 (Figure 4.8-2 and Table 4.8-2). At locations 33-60416 and 33-60417, soil will be removed to

2.0 ft bgs. Copper concentrations decreased with depth at these locations from 0.0–1.0 ft to 2.0–3.0 ft bgs (1790 mg/kg to 1.72 mg/kg at location 33-60416 and 9270 mg/kg to 2.1 mg/kg at location 33-60417). At location 33-60423, soil will be removed to 2.25 ft bgs, where the copper concentration of 6610 mg/kg occurred. The surface sample at this location had a copper concentration of 138 mg/kg. Additional samples will be collected from the depth intervals of 3.0–4.0 ft and 6.0–7.0 ft bgs at location 33-60423 to define the vertical extent of copper. Samples will be analyzed for copper.

The size of each excavation will be defined by the collection of bounding confirmation samples before excavation activities begin. Four new locations (6a-1, 6a-2, 6a-3, and 6a-4 in Figure 4.8-4) will be placed 5 ft upgradient, downgradient, east, and west of existing location 33-60415 to define the vertical and lateral extent of copper and di-n-butylphthalate. Samples will be collected from the depth intervals of 0.0–1.0 ft and 2.0–3.0 ft bgs and 0.0–1.0 ft and 2.0–3.0 ft into tuff. Samples will be analyzed for copper and di-n-butylphthalate. Additional step-out samples will be collected if elevated copper and or di-n-butylphthalate concentrations are encountered at these locations, and the excavation area will be expanded.

Four new locations (6a-5, 6a-6, 6a-7, and 6a-8 in Figure 4.8-4) will be placed 5 ft upgradient, downgradient, east, and west of existing location 33-60416 to define the vertical and lateral extent of copper. Samples will be collected from the depth intervals of 0.0–1.0 ft and 2.0–3.0 ft bgs and 0.0–1.0 ft and 2.0–3.0 ft into tuff. Samples will be analyzed for copper. Additional step-out samples will be collected if elevated copper concentrations are encountered at these locations, and the excavation area will be expanded.

Four new locations (6a-9, 6a-10, 6a-11, and 6a-12 in Figure 4.8-4) will be placed 5 ft upgradient, downgradient, east, and west of existing location 33-60417 to define the vertical and lateral extent of copper. Samples will be collected from the depth intervals of 0.0–1.0 ft and 2.0–3.0 ft bgs and 0.0–1.0 ft and 2.0–3.0 ft into tuff. Samples will be analyzed for copper. Additional step-out samples will be collected if elevated copper concentrations are encountered at these locations, and the excavation area will be expanded.

Eight new locations (6a-13, 6a-14, 6a-15, 6a-16, 6a-17, 6a-18, 6a-19, and 6a-20 in Figure 4.8-4) will be placed 5 ft and 10 ft upgradient, downgradient, east, and west of existing location 33-60423 to define the vertical and lateral extent of copper. Samples will be collected from the depth intervals of 0.0–1.0 ft and 2.0–3.0 ft bgs and 0.0–1.0 ft and 2.0–3.0 ft into tuff. Samples will be analyzed for copper. Additional step-out samples will be collected if elevated copper concentrations are encountered at these locations, and the excavation area will be expanded.

Corrective actions to address potential HE contamination will be performed by removing soil to 1.0 ft bgs at 11 locations: 6a-002, -003, -004, -015, -019, -021, -023, -024, -030, -033, and -036 (Figure 4.8-4). These locations were selected based on EnSys immunoassay test kit field-screening results for Royal Demolition Explosive (RDX [hexahydro-1,3,5-trinitro-1,3,5-triazine]) and 2,4,6-trinitrotoluene (TNT) conducted during the 2019–2020 investigation. RDX and/or TNT field screening concentrations exceeded 2 ppm at these locations (Table 4.8-1). A 1-ft × 1-ft area will be excavated at each location and samples will be collected at the base of the excavation to define the nature and extent of contamination. Samples will be collected from the depth intervals of 0.0–1.0 ft and 2.0–3.0 ft below the excavation. Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, and isotopic plutonium, and gamma-emitting radionuclides.

The proposed sampling and analyses at SWMU 33-006(a) are presented in Table 4.8-4, and the proposed excavations and sampling locations are shown in Figure 4.8-4.

4.9 SWMU 33-007(c), Firing Sites

4.9.1 Site Description and Operational History

SWMU 33-007(c) consists of two abandoned gun firing areas associated with the initiator tests conducted at Area 6 in the west-central portion of TA-33 (Figure 4.9-1). The first gun firing area included a gun building (former structure 33-16), a gun mount (structure 33-64), and an earthen berm (structure 33-60). Structure 33-16 was completed in 1949 and housed an air gun, and then electronic equipment, to measure neutron production in "gun-type" initiators containing beryllium and polonium-210. Gun sizes with bore diameters ranging from 4-in. to 8-in. fired projectiles into berms where two 6-ft × 6-ft catcher boxes constructed of wood timbers were embedded in the north end of berm structure 33-60. Each catcher box contained soil, wood chips, and vermiculite. The second gun firing area included a large gun (structure 33-65), a hillside embankment (structure 33-61), and two barricades (structures 33-62 and 33-72) located north and east of the gun.

One concrete firing pad was located immediately west of structure 33-16, on which a large bore gun was mounted. The pad measured 6 ft × 10 ft and was surrounded by a concrete apron. The other two concrete firing pads were located in a level area excavated into a basaltic cinder cone approximately 100 ft southwest of structure 33-16. Two wooden barricades constructed of 8-in. × 8-in. timbers are located north and east of the shot pads. This area was used to test nuclear gun mockups. A 4-in. to 5-in. bore gun was used to fire projectiles into the back of the excavation. The back of the excavation currently extends about 75 ft farther back than when the site was used (Hoard 1991, 009734). The two catcher boxes were located approximately 20 ft south of structure 33-16 and measured approximately 6 ft × 6 ft, constructed of timber and filled with soil, wood chips, and vermiculite. Guns with a 2-in. to 5-in. bore diameter were placed on the concrete pads and used to fire projectiles containing test assemblies into targets placed in front of the catcher boxes. Materials used in the projectiles included beryllium, polonium-210, uranium, copper, lead, tungsten, and stainless steel (Hoard 1991, 009733). The projectiles frequently cracked open, contaminating the pads and surrounding area with polonium-210. Contaminated areas on the guns and pads were painted with lead-based paint to fix surface contamination (LANL 1992, 007671, p. 3-42).

A 1951 memorandum describes a test at Area 6 that resulted in a release of radioactive material from a projectile. The site was cleaned up using a bulldozer to scrape away the contaminated soil and embankment (Buckland 1951, 007845). A 1954 memorandum describes decontamination of one of the Area 6 gun barrels. The memorandum describes removing loose material and leaving impregnated spots as high as 1 million counts per minute. Contaminated surface soil was bulldozed from the shot area into the adjacent canyon (LASL 1954, 107465). Shots were discontinued at Area 6 by 1955. In 1956, structure 33-16 was used to make and machine laminating materials containing barium, titanium, lead, and zinc using epoxy resins. An exhaust blower and stack were installed along with an emissions stack. The buildings in Area 6 have been vacant since the late 1950s. The cinder cone has been further excavated. Currently, an aluminum tower (structure 33-192) is used for atmospheric physics monitoring within the excavated portion of the cinder cone.

4.9.2 Summary of Previous Investigations

During the 1993 Phase I RFI conducted at SWMU 33-007(c), 14 samples were collected from 14 locations around the firing areas (LANL 1992, 007671). Samples were submitted for analysis of TAL metals, herbicides, pesticides, PCBs, HE, total uranium, and gamma-emitting radionuclides. Data from the 1993 Phase I RFI are screening-level data and showed numerous detected inorganic chemicals above BVs and detected organic chemicals (Aroclor-1254; Aroclor-1260; and 2,4-dichlorophenoxyacetic acid). No radionuclides were detected or detected above BVs/FVs. These data were not used to evaluate the nature and extent of contamination.

In 1994, additional RFI activities were conducted at SWMU 33-007(c), including trenching through the catcher box area. Chunks of uranium and several experimental devices were discovered. No external radiation was measured from the experimental devices. Eight soil samples were collected from six locations within the trench, and one additional soil sample was collected next to the trench. Samples were submitted for analysis of TAL metals, total uranium, and isotopic uranium. Data from the 1994 Phase I RFI are screening-level data and showed inorganic chemicals detected above BVs and uranium isotope activities detected above BVs. These data were not used to evaluate the nature and extent of contamination. RFI sampling locations were subsequently excavated during the 1996 voluntary corrective action (VCA) described below.

During the 1995 IA conducted at SWMU 33-007(c), the site was stabilized to prevent migration of the contamination identified during the RFI (LANL 1996, 052919). A high-density polyethylene cover was placed over the catcher boxes to prevent run-on and runoff of precipitation. Additionally, the culvert west of structure 33-16 was dammed with sandbags. No samples were collected during the 1995 IA.

In April and May 1996, a pilot test of the segmented gate system (SGS) and containerized vat leach (CVL) system was conducted using soil in the catcher boxes. The SGS unit was used to radiologically screen the soil in the catcher boxes and separate radioactively contaminated soil and debris from soil and debris meeting dose-based cleanup levels. The CVL was then used to treat the contaminated soil by leaching uranium from the soil. Approximately 200 yd^3 of soil was removed from the catcher boxes and processed. A total of 56 experimental projectiles weighing 1720 lb total were discovered as the soil was screened before it was placed in the SGS. These projectiles were disposed of off-site.

In 1996, a VCA plan for SWMU 33-007(c) was prepared in conjunction with the pilot test (LANL 1996, 054906). The objective of the VCA was to verify the effectiveness of the SGS and CVL processes for remediating uranium-contaminated soil. The VCA plan also included developing cleanup levels for uranium-contaminated soil.

During the 1996 VCA implemented at SWMU 33-007(c), the clean soil separated using the SGS was sampled to determine whether it met the dose-based cleanup levels (114 pCi/g for uranium-234, 72 pCi/g for uranium-235, and 116 pCi/g for uranium-238) (LANL 1996, 062541). Thirteen samples were collected from the stockpile of clean soil processed through the SGS. An additional eight confirmation samples were collected from eight locations in the bottoms and sides of the catcher-box excavations. All samples were submitted for analysis of isotopic uranium. After sampling confirmed the clean soil met the dose-based cleanup levels for isotopic uranium, the soil was returned to the site. The projectiles previously placed into storage were characterized and disposed of as low-level waste. Data from the 1999 VCA confirmation samples collected from the bottoms and sides of the catcher-box excavations meet data-validation standards and are decision-level data.

During the 2019–2020 investigation, a total of 7 samples were collected from 3 locations within the footprint of the former catcher boxes to determine nature and extent. Samples were collected at the surface at each location and from 2 subsurface intervals at 2 locations. A total of 12 samples were collected from 4 locations around the former catcher boxes to determine extent. At each location, samples were collected from the surface and from 2 subsurface depths. A total of 18 samples were collected from 6 locations at previous RFI locations within and around the cinder cone to determine extent. At each location samples were collected from the surface and 2 subsurface depths. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, perchlorate, nitrate, VOCs, SVOCs, explosive compounds and isotopic uranium. In addition, 22 samples were analyzed for PCBs.

4.9.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 33-007(c), except for the following:

- vertical extent of cobalt at locations 33-60541, 33-60543, and 33-60547 (Plate 6 and Table 4.9-1)
- vertical and lateral extent of PCBs at locations 33-60541, 33-60542, 33-60544, and 33-60545 (Figure 4.9-2 and Table 4.9-2)

Based on the risk-screening assessment results presented in the IR (N3B 2020, 701046), SWMU 33-007(c) does not pose potential unacceptable risks or doses for the industrial and construction worker scenarios. There is a potential unacceptable noncarcinogenic risk for the residential scenario but no potential unacceptable cancer risk or dose. The IR concluded there was no potential unacceptable risk to ecological receptors at SWMU 33-007(c) (N3B 2020, 701046).

4.9.4 Proposed Activities at SWMU 33-007(c)

Sampling will be performed to define the vertical extent of cobalt at locations 33-60541, 33-60543, and 33-60547. Samples will be collected from depth intervals of 6.0–7.0 ft and 8.0–9.0 ft bgs at locations 33-60541 and 33-60547 and from depth intervals of 9.0–10.0 ft and 11.0–12.0 ft bgs at location 33-60543. Samples will be analyzed for cobalt.

Sampling will be performed to define the vertical and lateral extent of PCBs at locations 33-60541, 33-60542, 33-60544, and 33-60545. Samples will be collected from depth intervals of 2.0–3.0 ft and 4.0–5.0 ft bgs. Samples will be analyzed for PCBs. Only one depth at these locations was sampled previously.

The proposed sampling and analyses at SWMU 33-007(c) are presented in Table 4.9-3, and proposed sampling locations are shown in Figure 4.9-3.

4.10 SWMU 33-008(c), Landfill

4.10.1 Site Description and Operational History

SWMU 33-008(c) is a former surface disposal area located east of Main Site buildings 33-39 and 33-113 outside of the Main Site security fence (Figure 4.10-1). This former disposal site consists of two areas: one near a culvert outfall directly east of building 33-39 where glass bottles and other debris were discovered and the other consisting of surface debris situated north of the culvert. The culvert receives storm water runoff from Main Site and is located in a drainage channel that leads to a tributary of Chaquehui Canyon. Debris observed at the site included machined metal turnings, cables, glass bottles, and general trash on the ground surface and in the channel downstream of the culvert. The outlines of a possible trenched area are visible in aerial photographs from 1958 (USAF 1958, 015987). A small asphalt pad is located at the west end of the northern area and a partially full bottle was present on the ground surface. In 1999, a best management practice was performed at the site, during which all visible debris was removed from the watercourse (LANL 2000, 068748, p. 5).

4.10.2 Summary of Previous Investigations

During the 1996 Phase I RFI implemented at SWMU 33-008(c), geophysical surveys using metal detection and electromagnetic induction were conducted at the suspected fill areas. Survey results showed the presence of shallow metallic debris but did not indicate the presence of a landfill or buried debris (LANL 1996, 054963, p. 8). Survey results for the trench area did not identify geophysical anomalies. A total of 21 samples were collected from 13 locations in the surface debris areas and the drainage channel, at the culvert, and 40 ft downgradient of the culvert. The samples were submitted for analysis of TAL metals, cyanide, SVOCs, VOCs, and total uranium (LANL 1996, 054963, p. 6). Data from the 1996 Phase I RFI meet data-validation standards and are decision-level data.

During the 1999 best management practice (BMP) performed at SWMU 33-008(c), all visible debris was removed from surface disposal area and from the watercourse (LANL 2000, 068748, p. 5). A partially full 55-gal. drum of debris was removed from the area. Two sediment catchments were constructed within the drainage below the culvert to prevent migration of contaminated sediments. The first catchment was constructed 15 ft below the culvert, and the second was constructed 200 ft below the culvert.

During the 2019–2020 investigation, a total of 12 samples were collected from 6 locations—2 former RFI sample locations and 4 new locations at deeper depths—to determine extent. At each location, samples were collected from the surface and from the subsurface. Thirty samples were collected from 6 former RFI sample locations and from 4 new locations, downgradient of the area, in order to determine extent. At each location, samples were collected from the surface and from the subsurface. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, VOCs, SVOCs, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides. In addition, 8 samples were analyzed for PCBs. Residual debris was removed from SWMU 33-008(c) during the 2019–2020 investigation.

4.10.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 33-008(c), except for the following:

- vertical extent of antimony at location 33-01671 (Plate 7 and Table 4.10-1)
- vertical extent of PCBs at locations 33-01672, 33-01679, 33-01680, 33-01681, 33-01682, 33-01684, 33-60676, and 33-60676 (Plate 8 and Table 4.10-2)

The IR stated that further sampling for vertical extent of antimony at location 33-01681 is warranted (N3B 2020, 701046). Vertical extent is defined at location 33-01681; however, it is not defined at location 33-01671. The IR (N3B 2020, 701046) also stated the lateral extent of antimony is not defined at location 33-01680. The lateral extent of antimony is defined at location 33-01680 based on decreasing concentrations downgradient at location 33-01672.

Based on the risk-screening assessment results presented in the IR (N3B 2020, 701046), SWMU 33-008(c) does not pose potential unacceptable dose for the industrial, residential, and construction worker scenarios or unacceptable cancer risk to the construction worker scenario. There are potential unacceptable cancer and noncancer risks for the industrial and residential scenarios at SWMU 33-008(c) due primarily to chromium, mercury, manganese, copper, and Aroclor-1254. The back-calculated SSL for lead resulted in an exceedance of NMED's recommendation for the industrial, construction worker, and residential scenarios. The IR concluded there is potential for adverse effects to the American robin (all feeding guilds), deer mouse, earthworm, and plant at SWMU 33-008(c) (N3B 2020, 701046). These risks are primarily due to mercury, copper, nickel, and zinc.

4.10.4 Proposed Activities at SWMU 33-008(c)

Additional samples will be collected at location 33-01671 to define the vertical extent of antimony, copper, lead, zinc, and PAHs (Figure 4.10-2). Samples will be collected from depth intervals 0.0–1.0 and 2.0–3.0 ft into tuff. Samples will be analyzed for antimony, copper, lead, zinc, and PAHs.

Additional samples will be collected at locations 33-01672, 33-01679, 33-01680, 33-01681, 33-01682, 33-01684, and 33-60676 to define the vertical extent of PCBs (Figures 4.10-2 and 4.10-3). Samples at locations 33-01672, 33-01679, 33-01684, and 33-60676 will be collected from depth intervals 4.0–5.0 ft and 6.0–7.0 ft bgs. Samples from locations 33-01680, 33-01681, and 33-01682 will be collected from depth intervals 6.0–7.0 ft and 9.0–10.0 ft bgs. Only one depth at these locations was sampled previously. Samples will be analyzed for PCBs.

Corrective actions at SWMU 33-008(c) to address potential unacceptable human health and ecological risk will be performed by removing soil with elevated chromium, copper, lead, mercury, zinc, and PAH concentrations at locations 33-01671, 33-01672, 33-01673, 33-01674, 33-01680, 33-01681, 33-01682, 33-01684, and 33-01685. The size of the excavations will be defined by the collection of bounding confirmation samples before excavation activities begin.

Eleven new locations (8c-1 to 8c-11 in Figure 4.10-2) will be placed 5 ft north, south, east, and west of the proposed excavation for locations 33-01671, 33-01673, 33-01680, 33-01681, 33-01682, and 33-01684 to define the vertical and lateral extent of chromium, copper, lead, mercury, zinc, and PAHs. Samples will be collected from the depth intervals of 0.0–1.0 ft, 5.0–6.0 ft, and 9.0–10.0 ft bgs, corresponding to the depth intervals sampled previously at the locations. Samples will be analyzed for copper, lead, mercury, zinc, and PAHs. Additional step-out samples will be collected if elevated chromium, copper, lead, mercury, zinc, or PAH concentrations are encountered at these locations, and the excavation area will be expanded.

Soil with elevated copper, lead, mercury, zinc, and PAH concentrations will be removed at location 33-01681 to 6.0 ft bgs (Plates 7 and 8 and Tables 4.10-1 and 4.10-2). No confirmation samples are required at location 33-01681 because the vertical extent of contamination is defined by deeper samples previously collected at this location.

Soil with elevated copper, lead, and zinc concentrations will be removed at location 33-01684 to 3.0 ft bgs (Plate 7 and Table 4.10-1). No confirmation samples are required at location 33-01684 because the vertical extent of contamination is defined by deeper samples previously collected at this location.

Soil with elevated copper, lead, zinc, and PAH concentrations will be removed at locations 33-01671, 33-01673, 33-01674, and 33-01682 to 3.0 ft bgs (Plates 7 and 8 and Tables 4.10-1 and 4.10-2). Confirmation samples will be collected at locations 33-01671, 33-01673, and 33-01674 to define the vertical extent of copper, lead, zinc, and PAHs. Samples will be collected from 0.0–1.0 ft into tuff and 2.0–3.0 ft into tuff and analyzed for copper, lead, zinc, and PAHs. Samples at location 33-01671 will also be analyzed for antimony to define the vertical extent of antimony. No confirmation samples are required at location 33-01682 because the vertical extent of contamination is defined by deeper samples previously collected at this location.

Soil with elevated chromium, copper, lead, mercury, zinc, and PAH concentrations will be removed at location 33-01680 to 6.0 ft bgs (Plates 7 and 8 and Tables 4.10-1 and 4.10-2). No confirmation samples are required at location 33-01680 because the vertical extent of contamination is defined by deeper samples previously collected at this location.

Soil with elevated copper, lead, and zinc concentrations will be removed at location 33-01672 to 3.0 ft bgs (Plate 7 and Table 4.10-1). No confirmation samples are required at location 33-01672 because the vertical extent of contamination is defined by deeper samples previously collected at this location. Four new locations (8c-12, 8c-13, 8c-14, and 8c-15 in Figure 4.10-2) will be placed 2 ft north, south, east, and west of existing location 33-01672 to define the vertical and lateral extent of copper, lead, and zinc. Samples will be collected from the depth intervals of 0.0–1.0 ft, 5.0–6.0 ft, and 9.0–10.0 ft bgs, corresponding to the depth intervals sampled previously at location 33-01672. Samples will be analyzed for copper, lead, and zinc. Additional step-out samples will be collected if elevated copper, lead, or zinc concentrations are encountered at these locations, and the excavation area will be expanded.

Soil with elevated copper, lead, and zinc concentrations will be removed at location 33-01685 to the top of the tuff (Plate 7 and Table 4.10-1). No confirmation samples are required at location 33-01685 because the vertical extent of contamination is defined by deeper samples previously collected at this location. Four new locations (8c-16, 8c-17, 8c-18, and 8c-19 in Figure 4.10-3) will be placed 3 ft north, south, east, and west of existing location 33-01685 to define the vertical and lateral extent of copper, lead, and zinc. Samples will be collected from the depth intervals of 0.0–1.0 ft, 2.0–3.0 ft, and 5.0–6.0 ft bgs. Samples will be analyzed for copper, lead, and zinc. Additional step-out samples will be collected if elevated copper, lead, or zinc concentrations are encountered at these locations, and the excavation area will be expanded.

Removal of surface soil at the nine locations proposed will reduce human health and ecological risk. Site contamination contributing to human health and ecological risk is primarily present in the 0.0–1.0 ft surface interval, which is consistent with historical surface disposal activities. Specifically, removal of surface soil from 0.0–1.0 ft bgs (unless otherwise noted) at locations 33-01671 (maximum lead concentration), 33-01672 (0.0–2.0 ft), 33-01673, 33-01674, 33-01682 (0.0–2.0 ft, including PAH removal), 33-01684, and 33-01685 would eliminate lead concentrations greater than industrial and construction worker SSLs, and copper and zinc concentrations greater than their respective EcoPRGs (not including the elevated lead, copper, and/or zinc concentrations collocated with elevated mercury concentrations at locations 33-01680 and 33-01681). However, because of the broad distribution of the contaminants at these locations and depths, the surface material is recommended to be excavated to bedrock instead of to the minimum required depth of 1.0 or 2.0 ft bgs. Known depths to bedrock at these locations range between 2.0 and 3.75 ft bgs.

The mercury contamination contributing to human health and ecological risk is deeper, which suggests elemental mercury was dumped at SWMU 33-008(c). The highest mercury concentration detected below the 2.0-ft depth interval is at 5.0–5.6 ft bgs at location 33-01681. (Note: The top of the bedrock is 5.6 ft bgs at this location.) Excavating location 33-01680 (to remove chromium [above the industrial SSL], copper, lead, mercury, zinc, and PAHs), location 33-01681 (to remove copper, mercury, lead, zinc, and PAHs), and the area around both locations to 6.0 ft bgs would reduce mercury concentrations to below the residential SSL and should further reduce ecological risk.

The proposed sampling and analyses at SWMU 33-008(c) are presented in Table 4.10-3, and the excavation and proposed sampling locations are shown in Figures 4.10-2 and 4.10-3.

4.11 SWMU 33-010(c), Surface Disposal Site

4.11.1 Site Description and Operational History

SWMU 33-010(c) is a former surface disposal area located at South Site on the northern rim of Chaquehui Canyon at the southern end of TA-33 (Figure 4.11-1). The disposal area measured approximately 50 ft long × 30 ft wide × 2-ft to 4-ft deep and was approximately 230 ft south of structure

33-26 [SWMU 33-006(a)] along the western edge of the main South Site drainage channel. From approximately 1950 to 1955, this site was used to dispose of debris from the implosion tests conducted at SWMU 33-006(a). Debris disposed of at the site included copper and aluminum shrapnel, pieces of electronic cable, sand and soil with residual HE, and wood. Between shots, the shot pad and surrounding area were scraped, and the debris was bulldozed over the canyon edge onto the hillside below (LANL 1992, 007671, p. 3-53). During the VCA performed in 1999, all debris and soil was excavated and removed from the site (LANL 2000, 066889).

4.11.2 Summary of Previous Investigations

During the 1994 Phase I RFI conducted at SWMU 33-010(c), six surface soil samples (0 to 0.5 ft) were collected from five locations on the face of the disposal pile. Additionally, six sediment samples (0 to 0.5 ft) were collected from five locations in the drainage below the disposal pile as part of the investigation of SWMU 33-006(a) and were used to characterize SWMU 33-010(c) (LANL 1995, 051903, p. 110). Samples were field screened for radioactivity, organic chemicals, and HE and submitted for analysis of TAL metals, gamma-emitting radionuclides, and HE. Two sediment samples were also submitted for analysis of VOCs. Data from the 1994 Phase I RFI are screening-level data and showed numerous inorganic chemicals detected above BVs, no detected organic chemicals, and no radionuclides detected or detected above BVs/FVs. These data were not used to evaluate the nature and extent of contamination.

During the 1999 VCA performed at SWMU 33-010(c), all soil within the SWMU was excavated to undisturbed native soil and removed. The VCA used the SGS to separate radioactively contaminated soil and debris from nonradioactive soil and debris. The SGS unit was initially programmed to divert soil and debris with radioactivity above a cleanup criterion of 50 pCi/g at SWMU 33-010(c). Because of the fine, homogeneous nature of the contamination in the soil from this disposal area, the SGS was unable to separate the material efficiently. The SGS was reprogrammed to a target cleanup criterion of 65 pCi/g, and all soils from SWMU 33-010(c) were reprocessed through the SGS unit. A total of 289.39 yd^3 of soil and debris was excavated and processed through the SGS. Once the disposal area had been excavated to native soil, the excavated area was surveyed for radioactivity. Areas of radioactivity that exceeded 2 times local background were further excavated and resurveyed to confirm removal. Four surface soil samples (0 to 0.5 ft bgs) and four subsurface samples (2 to 2.5 ft bgs) were collected from four locations within the excavated area. Three surface samples (0 to 0.5 ft bgs) were collected from the drainage located east of the disposal area that empties into Chaquehui Canyon (Figure 4.11-1). Samples were submitted for laboratory analysis of isotopic uranium and TAL metals. Soil removed during the VCA that had radioactivity levels above the cleanup criterion of 65 pCi/g was disposed of at Area G at TA-54. Soil with radioactivity levels below the cleanup criterion was returned to the SWMU boundary. A total of 0.58 yd^3 of soil exceeded the cleanup criterion of 65 pCi/g; the remaining 288.81 yd^3 of excavated soil was below the cleanup criterion and was returned to the SWMU boundary. The returned soil was regraded, compacted, and reseeded with native vegetation (LANL 2000, 066889). Data from the 1999 VCA confirmation samples meet data-validation standards and are decision-level data.

During the 2019–2020 investigation, a total of 18 samples were collected from 6 locations within and around the remediated portion of the site. At each location, samples were collected at the surface and from two subsurface intervals. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, isotopic plutonium, tritium, and gamma-emitting radionuclides. In addition, four samples were analyzed for PCBs. Residual debris was removed from SWMU 33-010(c) during the 2019–2020 investigation.

4.11.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 33-010(c).

Based on the risk-screening assessment results presented in the IR (N3B 2020, 701046), SWMU 33-010(c) does not pose potential unacceptable risks or doses for the industrial, residential, and construction worker scenarios. However, the IR concluded there is potential for adverse effects to the American robin (all feeding guilds), montane shrew, deer mouse, earthworm, and plant at SWMU 33-010(c) (N3B 2020, 701046). These risks are primarily due to copper and zinc.

4.11.4 Proposed Activities at SWMU 33-010(c)

Corrective actions at SWMU 33-0010(c) to address potential unacceptable ecological risk will be performed by removing soil with elevated copper, lead, and zinc concentrations at location 33-60474. The size of the excavations will be defined by the collection of bounding confirmation samples before excavation activities begin.

Soil with elevated copper, lead, and zinc concentrations will be removed at location 33-60474 to 3.0 ft bgs (Figure 4.11-2 and Table 4.11-1). No confirmation samples are required at location 33-60474 because the vertical extent of contamination is defined by deeper samples previously collected at this location. Four new locations (10c-1, 10c-2, 10c-3, and 10c-4 in Figure 4.11-3) will be placed 3 ft north, south, east, and west of existing location 33-60474 to define the vertical and lateral extent of copper, lead, and zinc. Samples will also be collected at one location downgradient and four locations upgradient of the proposed excavation area (10c-5 and 10c-6, 10c-7, 10c-8, and 10c-9, respectively, in Figure 4.11-3) to define the vertical and lateral extent of copper, lead, and zinc. Samples will be collected from the depth intervals of 0.0–1.0 ft, 3.0–4.0 ft, and 6.0–7.0 ft bgs, corresponding to the depth intervals sampled previously at location 33-60474. Samples will be analyzed for copper, lead, and zinc. Additional step-out samples will be collected if elevated copper, lead, or zinc concentrations are encountered at these locations, and the excavation area will be expanded.

The proposed sampling and analyses at SWMU 33-010(c) are presented in Table 4.11-2, and the proposed excavation is shown in Figure 4.11-3.

4.12 SWMU 33-011(a), Soil Contamination from Former Storage Area

4.12.1 Site Description and Operational History

SWMU 33-011(a) is a former 0.25-acre drum storage area directly within the footprint of and south of former building 33-21 in the central portion of TA-33 (Figure 4.11-1). The 1990 SWMU report describes SWMU 33-011(a) as an approximately 0.25-acre area located within the drilling storage yard where steel drums containing waste oil were stored on pallets or directly on the soil following the removal of building 33-21 (LANL 1990, 007513). Following the removal of building 33-21 in 1974, this unpaved area was used to store 55-gal. drums of used oil on pallets or directly on the soil from 1974 to 1989; the drums are visible in a 1986 aerial photograph (Koogle and Pouls Engineering 1986, 017907). The used oil was stored before recycling. By 1989, the drums had been removed and SWMU 33-011(a) was being used to store drilling equipment, including drilling pipe associated with the Hot Dry Rock Program at Fenton Hill (TA-57). Drilling operations associated with the Hot Dry Rock Project ceased by 1992. The former location of building 33-21 remains vacant and unpaved, and several transportainers are located in the southern portion of SWMU 33-011(a).

Former laboratory building 33-21 was constructed in 1950 and an accidental release of plutonium and beryllium powder in 1960 contaminated the entire building. Building 33-21 was decontaminated within a few weeks but was never used again. In 1974, laboratory building 33-21 and the associated wastewater drainage systems [SWMUs 33-005(a-c)] were removed, and radioactively contaminated soil from much of the site was removed down to bedrock and disposed of at MDA G at TA-54. Soil was removed until radiation readings were below approximately 20 pCi/g gross alpha. The area was subsequently backfilled with clean fill and leveled.

4.12.2 Summary of Previous Investigations

During the 1993 Phase I RFI conducted at SWMU 33-011(a), three samples were collected from three locations based on the former drum storage area location reportedly depicted in the 1986 aerial photograph (Koogle and Pouls Engineering 1986, 017907). Samples were submitted for analysis of TAL metals, SVOCs, PCBs, pesticides, herbicides, gamma-emitting radionuclides, and isotopic plutonium. Data from the 1993 Phase I RFI are screening-level data and showed lead as the only inorganic chemical detected above the BV and numerous detected organic chemicals. No radionuclides were detected or detected above BVs/FVs. These data were not used to evaluate the nature and extent of contamination.

During the 2019–2020 investigation, a total of 12 samples were collected from 4 locations within the former storage area. At each location, samples were collected at three subsurface intervals. All samples were analyzed at off-site fixed laboratories for TAL metals, nitrate, perchlorate, cyanide, VOCs, SVOCs, isotopic uranium, isotopic plutonium, and gamma-emitting radionuclides. In addition, 4 samples were analyzed for PCBs.

4.12.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 33-011(a), except for the following:

- nature and extent across the site at SWMU 33-011(a)

Based on the risk-screening assessment results in the IR (N3B 2020, 701046), SWMU 33-011(a) does not pose potential unacceptable risks or doses for the residential and construction worker scenarios. Samples were not collected from the 0.0- to 1.0-ft depth interval, and the industrial scenario was not evaluated at SWMU 33-011(a). The IR concluded there was no potential unacceptable risk to ecological receptors at SWMU 33-011(a) (N3B 2020, 701046).

4.12.4 Proposed Activities at SWMU 33-011(a)

The nature and extent of contamination have been defined at the southern portion of SWMU 33-011(a). However, following a detailed review of engineering drawings for former building 33-21, the location of the former storage area was revised. As a result of this change, additional sampling will be conducted to define the nature and extent of potential contamination across the entire site.

Samples will be collected at six new locations (11a-1, 11a-2, 11a-3, 11a-4, 11a-5, and 11a-6 in Figure 4.12-1) within the footprint of the site and at eight step-out locations (11a-7, 11a-8, 11a-9, 11a-10, 11a-11, 11a-12, 11a-13, and 11a-14 in Figure 4.12-1) approximately 10 ft outside the footprint of the site. Samples will be collected from the depth intervals of 0.0–1.0, 2.0–3.0, and 5.0–6.0 ft bgs. All samples will be analyzed for TAL metals, nitrate, perchlorate, cyanide, pH, VOCs, SVOCs, PCBs, isotopic uranium, isotopic plutonium, and gamma-emitting radionuclides.

The proposed sampling and analyses at SWMU 33-011(a) are presented in Table 4.12-1, and the proposed sampling locations are shown in Figure 4.12-1.

4.13 SWMU 33-011(d), Storage Area

4.13.1 Site Description and Operational History

SWMU 33-011(d) consists of a former storage area that was located on an asphalt pad around building 33-20 (a warehouse) in the southwest corner of Main Site at TA-33 (Figure 4.13-1). Beryllium and uranium were stored in and outside of building 33-20 from 1950 until 1972. In addition, recovered scrap from shots containing uranium, beryllium, and tungsten was stored on the asphalt south of building 33-20. The amount of uranium stored at this site was reported to have been “tons” (Ahlquist 1983, 006854). Much of the material stored at the site was salvaged for use elsewhere. A 1987 site survey found no materials remaining in storage at this location (LANL 1992, 007671, p. 3-24).

4.13.2 Summary of Previous Investigations

During the Phase I RFI conducted at SWMU 33-011(d) in 1993, two asphalt samples and three soil samples from beneath the asphalt were collected at three locations (LANL 1995, 071300). Samples were submitted for analysis of TAL metals, uranium, and gamma-emitting radionuclides. Two samples were also analyzed for tritium and isotopic plutonium. Data from the 1993 Phase I RFI are screening-level data and showed inorganic chemicals detected above BVs and plutonium isotopes and tritium detected or detected above BVs/FVs. These data were not used to evaluate the nature and extent of contamination.

During the 1996 Phase II RFI conducted at SWMU 33-011(d), 14 samples were collected at 7 locations: 6 locations were beneath the asphalt and 1 location was in the drainage south of the asphalt. Samples were submitted for analysis of TAL metals, total uranium, and isotopic uranium. Data from the 1996 Phase II RFI meet data-validation standards and are decision-level data.

During the 2019–2020 investigation, a total of 15 samples were collected from five locations at previous RFI locations beneath an asphalt pad to determine vertical extent. At each location, samples were collected at the surface and from two subsurface depths below the structure. A total of 12 samples were collected from four step-out locations away from the asphalt pad to determine lateral extent. At each location, samples were collected from the surface and from two subsurface depths. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, perchlorate, nitrate, VOCs, SVOCs, isotopic uranium and isotopic plutonium. In addition, six samples were analyzed for PCBs.

4.13.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 33-011(d), except for the following:

- lateral extent of PAHs at location 33-60670 (Figure 4.13-2 and Table 4.13-1)

Based on the risk-screening assessment results presented in the IR (N3B 2020, 701046), SWMU 33-011(d) does not pose potential unacceptable risks or doses for the industrial and construction worker scenarios. The total excess cancer risk for the residential scenario is 2×10^{-4}, which is greater than the NMED target risk level of 1×10^{-5}, with PAHs as the main contributors. The IR concluded there was no potential unacceptable risk to ecological receptors at SWMU 33-011(d) based on the lack of habitat for the receptors (N3B 2020, 701046).

4.13.4 Proposed Activities at SWMU 33-011(d)

Additional sampling is recommended to define the lateral extent of PAHs at location 33-60670 (Figure 4.13-2 and Table 4.13-2). Samples will be collected at two step-out locations (11d-1 and 11d-2 in Figure 4.13-3) downgradient of location 33-60670. Samples will also be collected east of location 33-60670 (11d-3 in Figure 4.13-3) to define the extent of PAHs to the south of the former storage area. Samples will be collected from the depth intervals of 0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft bgs, corresponding to the depth intervals sampled during the 2019–2020 investigation. All samples will be analyzed for SVOCs.

The proposed sampling and analyses at SWMU 33-011(d) are presented in Table 4.13-2, and the proposed sampling locations are shown in Figure 4.13-3.

4.14 SWMU 33-012(a), Drum Storage Area

4.14.1 Site Description and Operational History

SWMU 33-012(a) is an SAA for a former machine shop in building 33-39 at Main Site (Figure 4.14-1). This SAA was located on an asphalt pad (approximately 20 ft wide × 20 ft long) on the east side of building 33-39 between the building and a storage shed. The area was used to accumulate spent solvents and solvent-contaminated oil in one 55-gal. drum at a time in accordance with RCRA requirements (40 Code of Federal Regulations [CFR] 262, “Standards Applicable to Generators of Hazardous Waste”). Each drum was placed on a pallet or directly on the asphalt pad. Drums containing PCB-contaminated oil and used oil with heavy metals may have also been stored on the asphalt pad. The SAA was established in the mid-1980s and was deactivated by 1992 and moved to the interior of building 33-39.

The 1990 SWMU report notes the presence of multiple oil stains at this site (LANL 1990, 007513). The 1992 RFI work plan, however, states no evidence that oil staining was observed (LANL 1992, 007671).

4.14.2 Summary of Previous Investigations

During the 1993 Phase I RFI conducted at SWMU 33-012(a), a grid-based radiation survey was conducted, and no anomalies were identified. Soil samples were collected at two random locations on the asphalt pad and at two locations on the edge of the pad. All of the samples were collected beneath the asphalt. Samples were submitted for analysis of TAL metals, SVOCs, PCBs, herbicides, pesticides, and gamma-emitting radionuclides. Data from the 1993 Phase I RFI are screening-level data and showed inorganic chemicals detected above BVs and detected organic chemicals; radionuclides were not detected or detected above BVs/FVs. These data were not used to evaluate the nature and extent of contamination.

During the 2019–2020 investigation, a total of 21 samples were collected from 7 locations at previous RFI locations beneath the pad, 3 new locations next to the pad, and 1 new location downgradient of the pad. At each location, samples were collected at the surface and from two subsurface depths below the structure. A total of 15 samples were collected from 5 locations specified in the NMED approval with modifications letter (NMED 2011, 201242). At each location, samples were collected from three depths beneath the pad. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, perchlorate, nitrate, VOCs, SVOCs, PCBs, isotopic uranium, tritium, and gamma-emitting radionuclides.

4.14.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 33-012(a), except for the following:

- lateral extent of PCBs at locations 33-60660 and 33-60661 (Plate 9 and Table 4.14-1)
- lateral extent of PAHs at locations 33-60659 and 33-60661 (Plate 9 and Table 4.14-1)

Based on the risk-screening assessment results presented in the IR (N3B 2020, 701046), there is no potential unacceptable cancer risk or dose for the construction worker scenario, but there is a potential unacceptable noncarcinogenic risk for the construction worker scenario at SWMU 33-012(a). There are also potential unacceptable risks for the industrial and residential scenarios due to PCBs and PAHs. The IR concluded there is the potential for adverse effects to the earthworm at SWMU 33-012(a) from PAHs, specifically pyrene, phenanthrene, and fluoranthene (N3B 2020, 701046).

4.14.4 Proposed Activities at SWMU 33-012(a)

Additional samples will be collected downgradient from locations 33-60659, 33-60660, and 33-60661 to define the lateral extent of PCBs and PAHs. PCB results for SWMU 33-012(a), where PCBs were sampled at all depths (0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft bgs), consistently show the highest concentrations detected in 0.0–1.0 ft bgs surface samples (Table 4.14-1 and Plate 9). Although Aroclor-1254 and Aroclor-1260 concentrations decrease downgradient in samples associated with SWMU 33-008(c), those locations are approximately 150 ft east of SWMU 33-012(a). There are also no samples between locations 33-01089 and 33-60661, associated with SWMU 33-012(a), and location 33-01058, associated with SWMU 33-004(i), where elevated Aroclor-1254 and Aroclor-1260 concentrations were detected in the 4.0–5.0-ft depth interval (Plate 5, Table 4.7-1).

Additional samples will be collected downgradient of locations 33-60659, 33-60660, and 33-60661 (locations 12a-1, 12a-2, 12a-3, 12a-4, 12a-5, 12a-6, and 12a-7 in Figure 4.14-2) to define the lateral extent of PCBs and PAHs. Samples will be collected from depth intervals 0.0–1.0, 2.0–3.0 ft, and 4.0–5.0 ft bgs, corresponding to the depth intervals sampled during the 2019–2020 investigation. Samples will be analyzed for PCBs and PAHs.

Additional samples will also be collected between locations 33-01089 and 33-60660 (locations 12a-8, 12a-9, 12a-10, 12a-11, 12a-12, and 12a-13 in Figure 4.14-2) to define the vertical and lateral extent of PCBs and PAHs to the east of the former drum storage area. Samples will be collected from depth intervals 0.0–1.0, 2.0–3.0 ft, and 4.0–5.0 ft bgs, corresponding to the depth intervals sampled during the 2019–2020 investigation. Samples will be analyzed for PCBs and PAHs.

Corrective actions at SWMU 33-012(a) to address potential unacceptable human health and ecological risk will be performed by removing soil with elevated PAH concentrations at locations 33-60659 and 33-60661. The size of the excavations will be defined by the collection of bounding confirmation samples before excavation activities begin.

Soil with elevated PAH concentrations will be removed at location 33-60659 to 2.0 ft bgs (Plate 9 and Table 4.14-1). No confirmation samples are required at location 33-60659 because the vertical extent of contamination is defined by deeper samples previously collected at this location. Three new locations (12a-14, 12a-15, and 12a-16 in Figure 4.14-2) will be placed 5 ft east, west, and south of existing location 33-60659 to define the vertical and lateral extent of PAHs. Samples will be collected from the depth intervals of 0.0–1.0, 2.0–3.0 ft, and 4.0–5.0 ft bgs. Samples will be analyzed for PAHs. Additional step-out samples will be collected if elevated PAH concentrations are encountered at these locations, and the excavation area will be expanded.

Soil with elevated PCB and PAH concentrations will be removed at location 33-60661 to 2.0 ft bgs (Plate 9 and Table 4.14-1). No confirmation samples are required at location 33-60661 because the vertical extent of contamination is defined by deeper samples previously collected at this location. Four new locations (12a-17, 12a-18, 12a-19, and 12a-20 in Figure 4.14-2) will be placed 5 ft north, south, east, and west of existing location 33-60661 to define the vertical and lateral extent of PCBs and PAHs. Samples at proposed locations 12a-10 and 12a-11 will be used to define the extent to the east of location 33-60661. Samples will be collected from the depth intervals of 0.0–1.0, 2.0–3.0 ft, and 4.0–5.0 ft bgs. Samples will be analyzed for PCBs and PAHs. Additional step-out samples will be collected if elevated PCB or PAH concentrations are encountered at these locations, and the excavation area will be expanded.

The proposed sampling and analyses at SWMU 33-012(a) are presented in Table 4.14-2, and the proposed excavation and sampling locations are shown in Figure 4.14-2.

4.15 SWMU 33-017, Operational Release

4.15.1 Site Description and Operational History

SWMU 33-017 consists of areas potentially impacted by operational releases from former operations within Main Site at TA-33 (Figure 4.15-1). SWMU 33-017 is located at the northern and eastern edges of Main Site and is approximately 600 ft long × 100 ft to 600 ft wide. The site generally slopes downward to the east and is at the head of a small drainage tributary of Chaquehui Canyon. SWMU 33-017 is potentially impacted by runoff from the paved areas of the Main Site complex, by deposition from airborne releases from TA-33 Main Site facilities, and by operational releases from an area east of building 33-39 used for vehicle maintenance.

Operations conducted within Main Site included uranium processing and machining, cadmium and silver welding and soldering, lead melting and casting, cadmium and beryllium machining, and tritium processing and decontamination. Additional materials handled at Main Site facilities included mercury and organic solvents. These operations began in 1949 and most continued until 1972. When these operations ceased, some of the facilities were used for offices and electronics laboratories.

4.15.2 Summary of Previous Investigations

During the 1993 RFI conducted at SWMU 33-017, 67 samples were collected from 66 locations including random offsets from a 100-ft grid overlying Main Site, four radial extensions from the grid, within the vehicle maintenance area, and locations from drainage channels that receive runoff from Main Site. Samples were submitted for analysis of TAL metals, total uranium, SVOCs, herbicides, pesticides, PCBs, isotopic plutonium, tritium, and gamma-emitting radionuclides. Data from the 1993 Phase I RFI are screening-level data and showed several inorganic chemicals detected above BVs; 23 detected organic chemicals; and cesium-137, plutonium-238, plutonium-239/240, and tritium detected or detected above FVs. These data were not used to evaluate the nature and extent of contamination.

During the 1996 Phase II RFI conducted at SWMU 33-017, the area of investigation focused on the area east of building 33-39 at the location of the former vehicle maintenance area. A total of 25 samples were collected from 24 locations. Samples were submitted for analysis of SVOCs and PCBs. Data from the 1996 Phase II RFI meet data-validation standards and are decision-level data.

During the 2019–2020 investigation, a total of 75 samples were collected from 25 previous RFI locations to determine nature and extent and define vertical extent. At each location, samples were collected at the surface and from two subsurface depths. A total of 15 samples were collected from 5 locations in the drainage downgradient of Main Site to the storm water gauge station E340 to determine lateral extent. At each location, samples were collected from three depths beneath the pad. All samples were analyzed at off-site fixed laboratories for TAL metals, cyanide, perchlorate, nitrate, VOCs, SVOCs, PCBs, isotopic uranium, tritium, isotopic plutonium, and gamma-emitting radionuclides.

4.15.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 33-017.

Based on the risk-screening assessment results in the IR (N3B 2020, 701046), SWMU 33-017 does not pose potential unacceptable risks or doses for the industrial, residential, and construction worker scenarios with the exception of excess chemical cancer risk under the residential scenario. The IR concluded there is the potential for adverse effects to the American robin (all feeding guilds), montane shrew, and deer mouse at SWMU 33-017 (N3B 2020, 701046). These risks are primarily due to copper, lead, mercury, zinc, and selenium.

4.15.4 Proposed Activities at SWMU 33-017

Corrective actions at SWMU 33-017 to address potential unacceptable ecological risk will be performed by removing soil with elevated copper, lead, mercury, zinc, and selenium concentrations at locations 33-01114, 33-01106, 33-01107, and 33-01612. The size of the excavations will be defined by the collection of bounding confirmation samples before excavation activities begin.

Soil with elevated copper, lead, mercury, zinc, and selenium concentrations will be removed at location 33-01114 to 3.0 ft bgs (Plate 10 and Table 4.15-1). No confirmation samples are required at location 33-01114 because the vertical extent of contamination is defined by deeper samples previously collected at this location. This location will be excavated as part of the proposed activities for SWMU 33-008(c). The proposed sample locations that bound the excavation at SWMU 33-008(c) will also be used to bound this location.

Soil with elevated copper, lead, mercury, zinc, and selenium concentrations will be removed at locations 33-01106, 33-01107, and 33-01612 to 2.0 ft bgs (Plate 10 and Table 4.15-1). No confirmation samples are required these locations because the vertical extent of contamination is defined by deeper samples previously collected. Four new locations (17-1, 17-2, 17-3, and 17-4 in Figure 4.15-2) will be placed 5 ft north, south, and west of existing locations 33-01106, 33-01107, and 33-01612 to define the vertical and lateral extent of copper, lead, mercury, zinc, and selenium. Samples will be collected from the depth intervals of 0.0–1.0, 2.0–3.0 ft, and 4.0–5.0 ft bgs, corresponding to the depth intervals sampled during the 2019–2020 investigation. Samples will be analyzed for TAL metals. Additional step-out samples will be collected if elevated copper, lead, mercury, zinc, or selenium concentrations are encountered at these locations, and the excavation area will be expanded.

The proposed sampling and analyses at SWMU 33-017 are presented in Table 4.15-2, and the proposed excavation and sampling locations are shown in Figure 4.15-2.

4.16 AOC C-33-001, Former Transformer

4.16.1 Site Description and Operational History

AOC C-33-001 consists of a former PCB transformer (former structure 33-124) in the northern portion of Main Site at TA-33 (Figure 4.16-1). The transformer was mounted on a 15-ft-long × 50-ft-wide concrete pad next to the northeast wall of building 33-114 and was bounded by asphalt to the north, east, and south. The pad was enclosed by a fence and accessible only through a locked gate. The transformer (former structure 33-124) was placed into service in the 1950s, and the mineral oil in the transformer contained PCBs. Oil stains were observed on the concrete pad and leaks from the transformer were observed during routine inspections conducted between September 1985 and March 1992. In 1992, the transformer was removed and replaced with a non-PCB transformer as part of DOE's program to remove all PCB-containing electrical equipment. The stained areas on the concrete pad were double-washed and double-rinsed; however, post-cleanup sampling was not conducted to verify the completion of cleanup as required by the Toxic Substances Control Act (TSCA) PCB spill cleanup requirements (40 CFR 761.130). Sampling conducted during the transformer replacement was limited to the area where the old transformer had been placed temporarily during removal.

4.16.2 Summary of Previous Investigations

During the 1993 Phase I RFI conducted at TA-33, the ER Project determined the sampling conducted during the removal and replacement of the PCB transformer did not meet RFI objectives and did not meet the confirmation sampling requirements of the TSCA PCB spill cleanup regulations (40 CFR 761.130). The RFI report, therefore, recommended additional sampling to determine whether historical releases of PCBs had occurred. The proposed sampling included field-screening the stained areas on the concrete pad and the soil around the perimeter of the pad. If field-screening detected PCBs in soil at the perimeter of the pad, additional screening samples were to be collected at greater distances from the pad until the extent of PCB contamination had been bounded (LANL 1995, 050113, pp. 90–93).

During the 1996 Phase II RFI conducted at TA-33, four samples were collected from four locations around the AOC C-33-001 transformer pad. The samples were submitted for analysis of PCBs/pesticides. Data from the 1996 RFI meet data-validation standards and are decision-level data.

In 1999, a BMP was performed at AOC C-33-001 consisting of the removal of PCB-contaminated soil and sediment using an industrial vacuum system on the asphalt area between buildings 33-113 and 33-114. The field team began by vacuuming the area closest to the transformer pads next to building 33-114 and continued to pick up sediment present in low-lying depressions on the asphalt. Special emphasis was placed on cracks and potholes that had developed over the years. In addition, the field team followed a low-grade slope from building 33-114 to the east between buildings 33-113 and 33-39 where surface sediment could migrate off-site during storm events. One 55-gal. drum of material was collected. No samples were collected during the 1999 BMP implementation.

During the 2019–2020 investigation, a total of 21 samples were collected from 4 previous RFI locations around the concrete pad and 3 additional locations downgradient to determine extent. At each location, samples were collected at the surface and from two subsurface depths. All samples were analyzed at off-site fixed laboratories for PCBs (Figure 4.16-2 and Table 4.16-1). During fieldwork numerous utilities were encountered, which limited the locations that could be sampled.

4.16.3 Nature and Extent of Contamination and Risk

Based on the sampling results presented in the IR (N3B 2020, 701046), nature and extent of contamination have been defined or no further sampling for extent is warranted at AOC C-33-001.

Based on the risk-screening assessment results in the IR (N3B 2020, 701046), AOC C-33-001 poses potential unacceptable cancer risks for the industrial, residential, and construction worker scenarios due to Aroclor-1260. The IR concluded there was no potential unacceptable risk to ecological receptors at AOC C-33-001 (N3B 2020, 701046).

4.16.4 Proposed Activities at AOC C-33-001

Corrective actions at AOC C-33-001 to address potential unacceptable human health risk will be performed by removing soil with elevated Aroclor-1260 concentrations at location 33-01749. Soil with elevated PCB concentrations will be removed at location 33-01749 to 2.0 ft bgs (Figure 4.16-2 and Table 4.16-1). No confirmation samples are required at location 33-01749 because the vertical extent of contamination is defined by deeper samples previously collected at this location. The excavation will be 2-ft by 2-ft in size because the area is surrounded by underground utilities. The excavation will be done by hand methods because the location is in a small area surrounded by underground utilities. Four new locations (1-1, 1-2, 1-3, and 1-4 in Figure 4.16-3) will be placed north, south, east, and west of location 33-01749 to define the vertical and lateral extent of PCBs. Samples will be collected from the depth intervals of 0.0–1.0, 2.0–3.0 ft, and 4.0–5.0 ft bgs, corresponding to the depth intervals sampled during the 2019–2020 investigation. Samples will be analyzed for PCBs.

The proposed sampling and analyses at AOC C-33-001 are presented in Table 4.16-2, and the proposed excavation and sampling location are shown in Figure 4.16-3.

5.0 INVESTIGATION METHODS

A summary of investigation methods to be implemented is presented in Table 5.0-1. Summaries of the field investigation methods are provided below.

Chemical and radiological analyses will be performed in accordance with the N3B “Exhibit D”, Scope of Work and Technical Specifications for Off-Site Analytical Laboratory Services. Accredited off-site contract analytical laboratories will use the most recent U.S. Environmental Protection Agency– (EPA-) and industry-accepted extraction and analytical methods for chemical analyses of analytical suites.

5.1 Establishing Sampling Locations

Proposed sampling locations are identified for each site based on engineering drawings, surveyed locations of existing structures, previous sampling locations, and topography or other features identified in the field. The coordinates of proposed locations will be obtained by georeferencing the points from the proposed sampling maps. The coordinates will be used to locate flags or other markers in the field using a differential global positioning system (GPS) unit. If any proposed sampling locations are moved because of field conditions, utilities, or other unexpected circumstances, the new locations will be surveyed immediately following sample collection as described in section 5.2.

5.2 Geodetic Surveys

Geodetic surveys will be conducted to locate historical structures and to document field activities such as sampling and excavation locations. The surveyors will use a Trimble GeoXT handheld 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 per the National Geodetic Vertical Datum of 1929.

5.3 Sampling

Soil and rock samples will be collected by the most efficient, least invasive method practicable. The methods will be determined by the field team based on site conditions such as topography, the nature of the material to be sampled, the depth intervals sampled, and accessibility. Typically, samples will be collected using spade-and-scoop, hand-auger, or hollow-stem auger drilling methods. For all methods, samples for VOC analysis will be transferred immediately from the sampling tool to the sample container to minimize the loss of subsurface VOCs during the sample collection process. Containers for VOC samples will be filled as completely as possible, leaving no or minimal headspace, and sealed with a Teflon-lined cap.

5.3.1 Surface Samples

Surface and shallow subsurface samples will be collected in accordance with standard operating procedure (SOP) N3B-SOP-ER-2001, “Soil, Tuff, and Sediment Sampling.” Stainless-steel shovels, spades, scoops, and bowls will be used for ease of decontamination. If the surface location is at bedrock, an axe or hammer and chisel may be used to collect samples.

5.3.2 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 (i.e., post-1943). Sediment samples will be collected using spade-and-scoop (see section 5.3.1) and/or hand-auger (see section 5.4.2) methods. Actual sediment sampling locations will be selected in the field based on geomorphic relationships in areas likely to have been affected by discharges from the SWMU. Because sediment is dynamic and subject to redistribution by runoff events, locations may need to be adjusted when this work plan is implemented. In the course of collecting sediment samples, it may be determined, based on field conditions, that the selected location is not appropriate (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 will be adjusted as appropriate based on geomorphic verification to ensure sampling locations are in the drainage(s) downgradient of the site. Any revised locations will be surveyed and the updated coordinates will be submitted for inclusion in the appropriate database.

5.3.3 Subsurface Samples

Subsurface sampling is proposed that may include surface soil and fill, sediment, and tuff. 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.

5.3.3.1 Hand Auger

Hand augers or power-assisted augers may be used to drill shallow holes at locations that can be sampled without the use of a drill rig and at locations inaccessible by a drill rig. The hand auger is advanced by turning the auger into the soil or tuff until the barrel is filled. The auger is removed and the sample is placed in a stainless-steel bowl. Hand-auger samples will be collected in accordance with N3B-SOP-ER-2001, “Soil, Tuff, and Sediment Sampling.”

5.3.3.2 Hollow-Stem Auger

A drill rig equipped with a hollow-stem auger may be used to drill deeper holes at locations that cannot be sampled using a hand-auger or power-assisted augers. 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 it 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.

A bottom plug or pilot bit can be fastened onto the bottom of the auger to keep out most of the soil and/or water that tends to clog the bottom of augers during drilling. Drilling without a center plug is acceptable if the soil plug, formed in the bottom of the auger, is removed before sampling or installing a well casing. The soil plug can be removed by washing out the plug using a side-discharge rotary bit or by auguring out the plug with a solid-stem auger bit sized to fit inside the hollow-stem auger.

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 N3B-SOP-ER-2001, “Soil, Tuff, and Sediment Sampling.”

Field documentation will include detailed borehole logs for each borehole drilled using the hollow-stem auger method. 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.

5.4 Borehole Abandonment

All hollow-stem auger boreholes will be properly abandoned in accordance with N3B-SOP-ER-6005, “Monitoring Well and Borehole Abandonment.” All boreholes are expected to have a total depth of 20 ft or less and will be abandoned by filling the borehole with bentonite chips and then hydrating the chips in 1- to 2-ft lifts. The borehole will be visually inspected while the bentonite chips are added to ensure bridging does not occur.

The use of backfill materials, such as bentonite and grout, will be documented in a field logbook with regard to volume (calculated and actual), intervals of placement, and additives used to enhance backfilling. All borehole abandonment information will be provided in the Phase II IR.

5.5 Field-Screening Methods

The primary field-screening methods to be used on samples include radiological screening and organic vapor screening using a photoionization detector (PID). Field screening for HE may also be required by the facility operator.

Field screening will be used primarily for health and safety purposes and for determining transportability of samples from the field sites to the Sample Management Office (SMO) and from the SMO to the analytical laboratories. Field-screening results may be used at the discretion of the field personnel to collect additional samples beyond those planned or to extend the depth of sampling as required. Field changes to sampling plans will be approved by the subcontractor technical representative and will be documented on field paperwork and in the Phase II IR.

5.5.1 Radiological Screening

Based on the results of past sampling, field screening for radioactivity will be conducted primarily to ensure worker health and safety and to meet U.S. Department of Transportation shipping requirements, rather than to direct 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. of soil and core material using appropriate field instruments. Instruments will be calibrated in accordance with N3B Radiation Protection Program requirements. All instrument calibration activities will be documented daily in the field logbooks.

5.5.2 Organic Vapor Field Screening

Based on 2019–2020 investigation results, significant VOC contamination is not expected to be encountered, and screening will be conducted for health and safety purposes.

Vapor screening of soil, sediment, and subsurface core will be conducted using a PID equipped with an 11.7 electronvolt lamp and capable of measuring quantities as low as 1.0 ppm. All samples will be screened for organic vapors in headspace gas.

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.

5.6 Requesting Samples Through the SMO

Sample collection and analyses shall be coordinated with the N3B SMO. Per N3B-SOP-SDM-1101, "Sample Control and Field Documentation," to request samples through the SMO, sampling personnel must complete Sample Request Module, obtain sample plan requestor permission within the N3B Environmental Information Management (EIM) database, and submit a sample plan request at least 5 days before the sampling event. Once the sample plan request is submitted, a summarized copy will be available for download. The sample plan requestor will be notified by the SMO if the plan is rejected, accepted, or if changes are necessary, and when the sampling paperwork is available. Sampling paperwork will consist of sample collection logs, container labels, and a shipping classification determination checklist.

5.7 Chain of Custody for Samples

The collection, screening, and transport of samples will be documented on standard forms generated by the SMO. These include sample collection logs, chain-of-custody forms, and sample container labels. Sample collection logs will be completed at the time of sample collection and signed by the sampler and a reviewer who will verify the logs for completeness and accuracy. Corresponding labels will be initialed and applied to each sample container, and custody seals will be placed around container lids or openings. Chain-of-custody forms will be completed and signed to verify that sample custody has been maintained throughout the sample life cycle.

5.8 Quality Assurance/Quality Control Samples

Quality assurance (QA) and quality control (QC) samples will include field duplicates, field rinsate samples, and field trip blanks. Field duplicates and field rinsates will be collected at an overall frequency of at least 1 for every 10 regular samples as specified in Appendix F, Section I.B.4.f, of the Consent Order and as directed by the current version of N3B-SOP-SDM-1100, "Sample Containers, Preservation, and Field Quality Control." Field trip blanks will be collected at a rate of at least 1 per day on days when VOC samples are collected.

5.9 Geophysical Surveys

Geophysical surveys will be performed to identify anomalies that could indicate the location of debris and disposal pits at MDA E. Geophysical methods to be employed include time domain electromagnetic induction, frequency domain electromagnetic induction, vertical gradient magnetometry, ground-penetrating radar, and seismic refraction tomography. Details on geophysical survey instrumentation, sensitivity, and site application are provided in Appendix C.

5.10 Radiological Surveys

Radiological surveys will be performed to identify areas of elevated radioactivity. The radiological surveys to be employed include Field Instrument for Detection of Low-Energy Radiation (FIDLER) and the Ludlum Measurement, Inc., Model 44-10 2-in. × 2-in. sodium iodide (NaI) scintillator detector. Details on radiological survey instrumentation, sensitivity, and site application are provided in Appendix C.

5.11 Cleanup Activities

SWMUs 33-004(a), 33-004(i), 33-006(a), 33-008(c), 33-010(c), 33-012(a), and 33-017 and AOC C-33-001 are proposed for remediation under this Phase II IWP. Excavation of contaminated media, waste disposition, and confirmation sampling will be completed at these sites. Excavations will be completed using a track excavator, backhoe, or by hand. The general sequence of activities for excavation, transportation, disposal, and confirmation sampling is summarized below. Specific details are provided in section 4.

5.11.1 Confirmation Sampling

Confirmation sampling will be performed at all sites to be excavated to define the size of the proposed excavation area (section 4).

5.11.2 Removal of Contaminated Soil

- Mobilize:
    - ❖ Prepare staging area.
    - ❖ Determine boundaries of contamination after surveying and staking coordinates of the area to be excavated, as identified in this Phase II IWP.
    - ❖ Mobilize heavy equipment to site.
    - ❖ Identify underground utilities.

- Prepare site:
    - Install fencing.
    - Install storm water controls.
    - Conduct preexcavation survey.
- Remove contaminated soil:
    - Excavate contaminated soil.
    - Stockpile and load rolloff container.
    - Survey boundaries of excavation.
    - Characterize waste for dispositioning.
    - Transport waste to off-site disposal facility.
- Backfill:
    - Backfill and compact.
    - Vegetate surface.
    - Survey finished surface.
- Demobilize.

5.11.3 Waste Management and Disposal

Management of all investigation waste, including waste generated during cleanup, is described in Appendix B.

5.12 Laboratory Analytical Methods

Analytical suites for samples to be collected include TAL metals, nitrate, perchlorate, total cyanide, SVOCs, VOCs, PCBs, explosive compounds, americium-241, gamma-emitting radionuclides, isotopic plutonium, isotopic uranium, and tritium. Analytical methods are summarized in Table 5.8-1. Sample collection and analysis will be coordinated with the SMO.

Analytical results meet the N3B minimum data quality objectives as outlined in N3B-PLN-SDM-1000, “Sample and Data Management Plan.” N3B-PLN-SDM-1000 sets the validation frequency criteria at 100% Level 1 examination and Level 2 verification of data, and at 10% minimum Level 3 validation of data. A Level 1 examination assesses the completeness of the data as delivered from the analytical laboratory, identifies any reporting errors, and checks the usability of the data based on the analytical laboratory’s evaluation of the data. A Level 2 verification evaluates the data to determine the extent to which the laboratory met the analytical method and the contract-specific QC and reporting requirements. A Level 3 validation includes Level 1 and 2 criteria and determines the effect of potential anomalies encountered during analysis and possible effects on data quality and usability. A Level 3 validation is performed manually with method-specific data validation procedures. Laboratory analytical data are validated by N3B personnel as outlined in N3B-PLN-SDM-1000; N3B-AP-SDM-3000, “General Guidelines for Data Validation”; N3B-AP-SDM-3014, “Examination and Verification of Analytical Data”; and additional method-specific analytical data validation procedures. All associated validation procedures have been developed, where applicable, from the EPA QA/G-8 Guidance on Environmental Data Verification and Data Validation; the Department of Defense/Department of Energy Consolidated Quality Systems Manual for Environmental Laboratories; the EPA National Functional Guidelines for Data Validation; and the

American National Standards Institute/American Nuclear Society 41.5, Verification and Validation of Radiological Data."

5.13 Health and Safety

The field investigations described in this Phase II IWP 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 conducted.

5.14 Equipment Decontamination

Equipment for drilling and sampling will be decontaminated before and after sampling activities to minimize the potential for cross-contamination. Dry decontamination methods will be used whenever possible to minimize waste and avoid generating liquid waste. Dry decontamination uses disposable paper towels and over-the-counter cleaner, such as Fantastik or equivalent. All sampling equipment will be decontaminated in accordance with N3B-SOP-ER-2002, “Field Decontamination of Equipment.”

Dry decontamination may be followed by wet decontamination, if necessary. Wet decontamination may include washing with a nonphosphate detergent and water, followed by a water rinse and a second rinse with deionized water. Alternatively, drilling/exploration equipment that may come in contact with a borehole will be decontaminated by steam cleaning, by hot water pressure-washing, or by another method before each new borehole is drilled. The equipment will be pressure-washed on a high-density polyethylene liner at 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.

5.15 Waste Management

Waste generated during field-investigation activities may include, but is 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 contaminants.

All waste generated during field-investigation activities will be managed in accordance with N3B-ER-DIR-SOP-10021, “Characterization and Management of Environmental Programs Waste,” applicable EPA and NMED regulations, and DOE orders. Appendix B presents the waste management plan.

6.0 MONITORING PROGRAMS

Groundwater, sediment, and surface-water monitoring are conducted in the Chaquehui Canyon Aggregate Area as part of other environmental activities. This monitoring is summarized below.

6.1 Groundwater

Groundwater monitoring is not performed to specifically monitor potential releases from any of the sites addressed in this Phase II IWP. Monitoring of alluvial, perched-intermediate, and regional groundwater within the Ancho Canyon watershed is performed under the Consent Order as described for the

General Surveillance monitoring group in the “Interim Facility-Wide Groundwater Monitoring Plan” (e.g., N3B 2020, 700927). No monitoring locations are within the Chaquehui Canyon Aggregate Area.

6.2 Storm Water

Twenty-one SWMUs and one AOC (Plate 1) are subject to the storm water monitoring requirements of a NPDES Individual Permit (IP) for storm water discharges from SWMUs and AOCs. Monitoring under the IP is performed using site-monitoring areas (SMAs) that monitor storm water runoff from individual SWMUs and AOCs or groups of SWMUs and AOCs. The SMAs in the Chaquehui Canyon Aggregate Area monitored under the IP and the corresponding sites are

- CHQ-SMA-0.5: SWMUs 33-004(g), 33-007(c), and 33-009
- CHQ-SMA-1.01: SWMU 33-002(d)
- CHQ-SMA-1.02: SWMUs 33-004(h), 33-008(c), 33-011(d), and 33-015
- CHQ-SMA-1.03: SWMUs 33-008(c) and 33-012(a); AOC C-33-003
- CHQ-SMA-2: SWMUs 33-004(d) and 33-007(c); AOC C-33-003
- CHQ-SMA-3: SWMU 33-010(f)
- CHQ-SMA-4: SWMU 33-011(e)
- CHQ-SMA-4.1: SWMU 33-016
- CHQ-SMA-4.5: SWMU 33-011(b)
- CHQ-SMA-5.05: SWMU 33-007(b)
- CHQ-SMA-6: SWMUs 33-004(j), 33-006(a), 33-007(b), 33-008(c), 33-010(c), 33-010(g), 33-010(h), and 33-014
- CHQ-SMA-7.1: SWMU 33-010(g)

The monitoring results are reported to EPA annually.

7.0 SCHEDULE

Fieldwork started January 2021 and is expected to take approximately 5 months to complete. Fieldwork is currently scheduled to be completed by May 28, 2021. Analytical data are expected to be received 30 days after the last sample is collected. The investigation report is scheduled for delivery to NMED on or before August 31, 2021.

8.0 REFERENCES AND MAP DATA SOURCES

8.1 References

The following reference list includes documents cited in this plan. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. This information is also included in text citations. ERIDs were assigned by the Laboratory’s Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory’s Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by N3B (IDs 700000 and above). IDs are used to locate documents in N3B’s Records Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and N3B maintain copies *of the Master Reference Set. The set ensures that NMED has the references to review documents. The set is updated when new references are cited in documents.*

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8.2 Map Data Sources

Map data sources used in original figures and/or plates created for this report are described below and identified by legend title.

Legend Item	Data Source
LANL Technical Areas	Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published 04 December 2008.
Paved roads	Paved Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
Paved parking	Paved Parking; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
Dirt roads	Dirt Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
LANL structures	Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
LANL fence lines	Security and Industrial Fences and Gates; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
LANL communications lines	Communication Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 08 August 2002; as published 28 May 2009.
LANL electric lines	Primary Electric Grid; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
LANL gas lines	Primary Gas Distribution Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
LANL sewer lines	Sewer Line System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
LANL steam lines	Steam Line Distribution System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 15 January 2009.
LANL water lines	Water Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
LANL industrial waste lines	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.

Legend Item	Data Source
LANL historical sampling locations	Point Feature Locations of the Environmental Restoration Project Database; Los Alamos National Laboratory, Waste and Environmental Services Division, 5 June 2010.
LANL PRS boundaries	Potential Release Sites; Los Alamos National Laboratory, Waste and Environmental Services Division, Environmental Data and Analysis Group, EP2009-0137; 1:2,500 Scale Data; 25 January 2010.
Contours	Hypsography, 2, 10, 20, and 100 Foot Contour Interval; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; 1991.

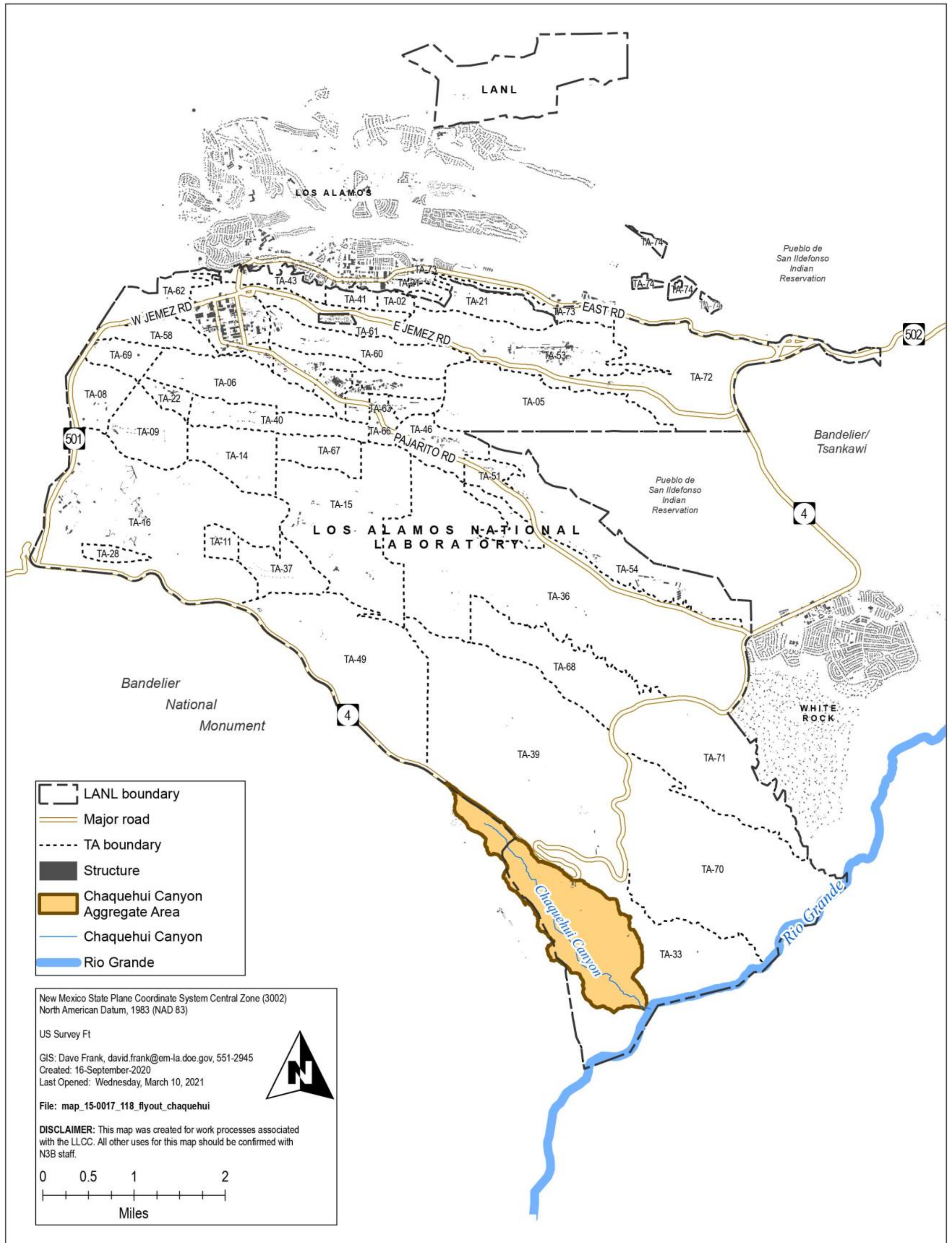

Figure 1.0-1 Location of Chaquehui Canyon Aggregate Area with respect to Laboratory technical areas

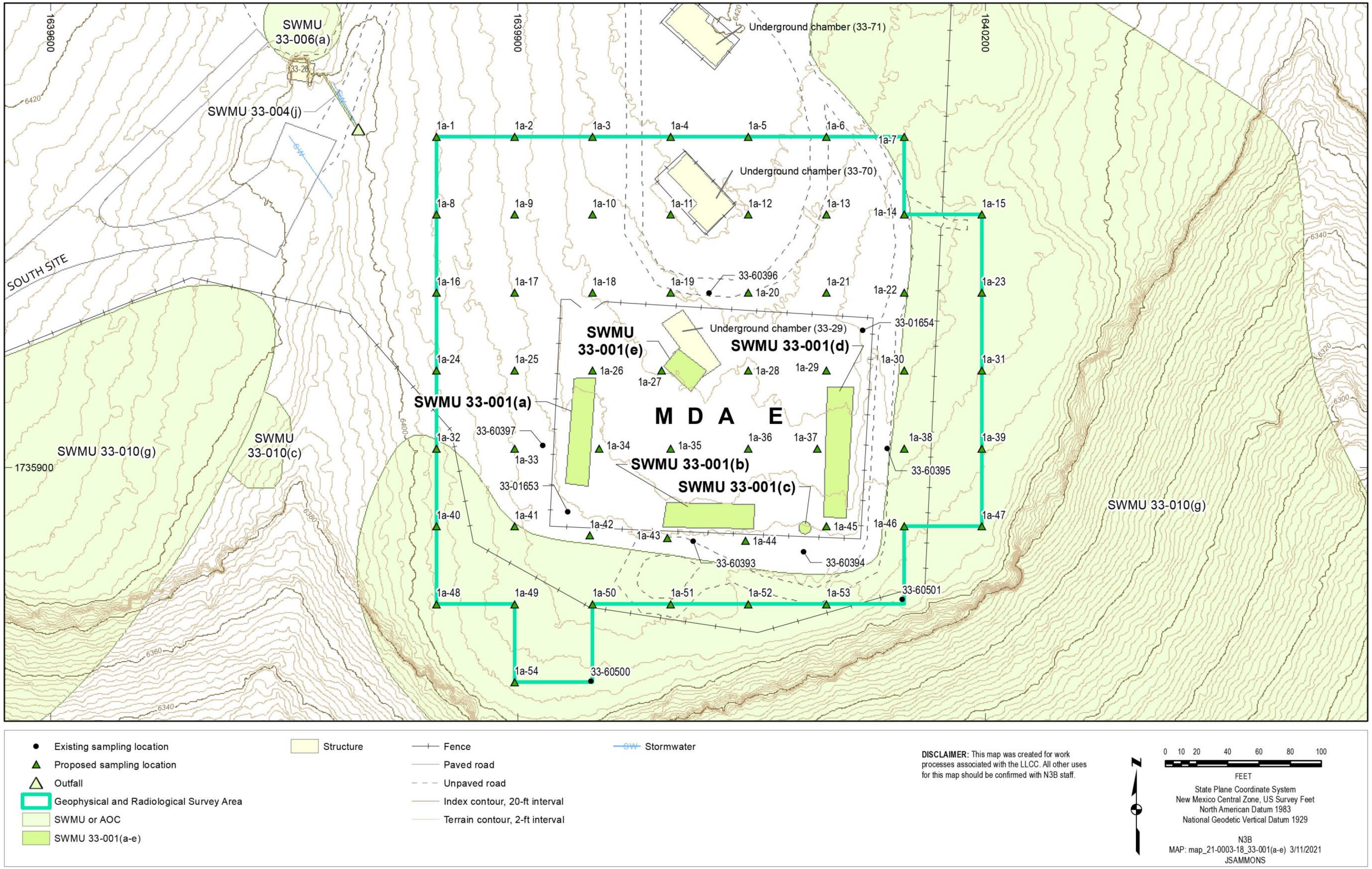

Figure 4.1-1 Site map and proposed sampling locations at SWMUs 33-001(a,b,c,d,e)

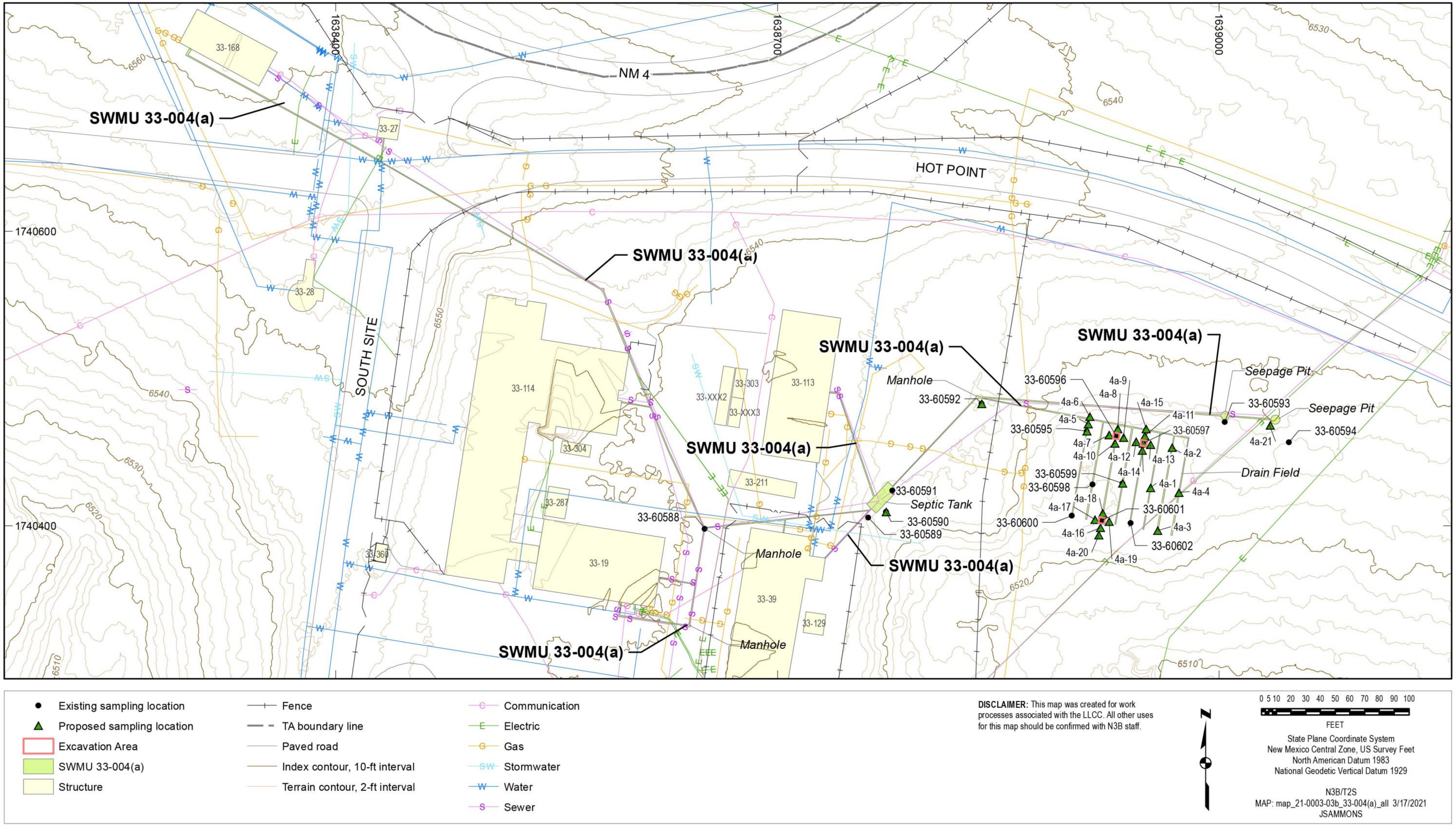

Figure 4.6-1 Site map and sampling locations at SWMU 33-004(a)

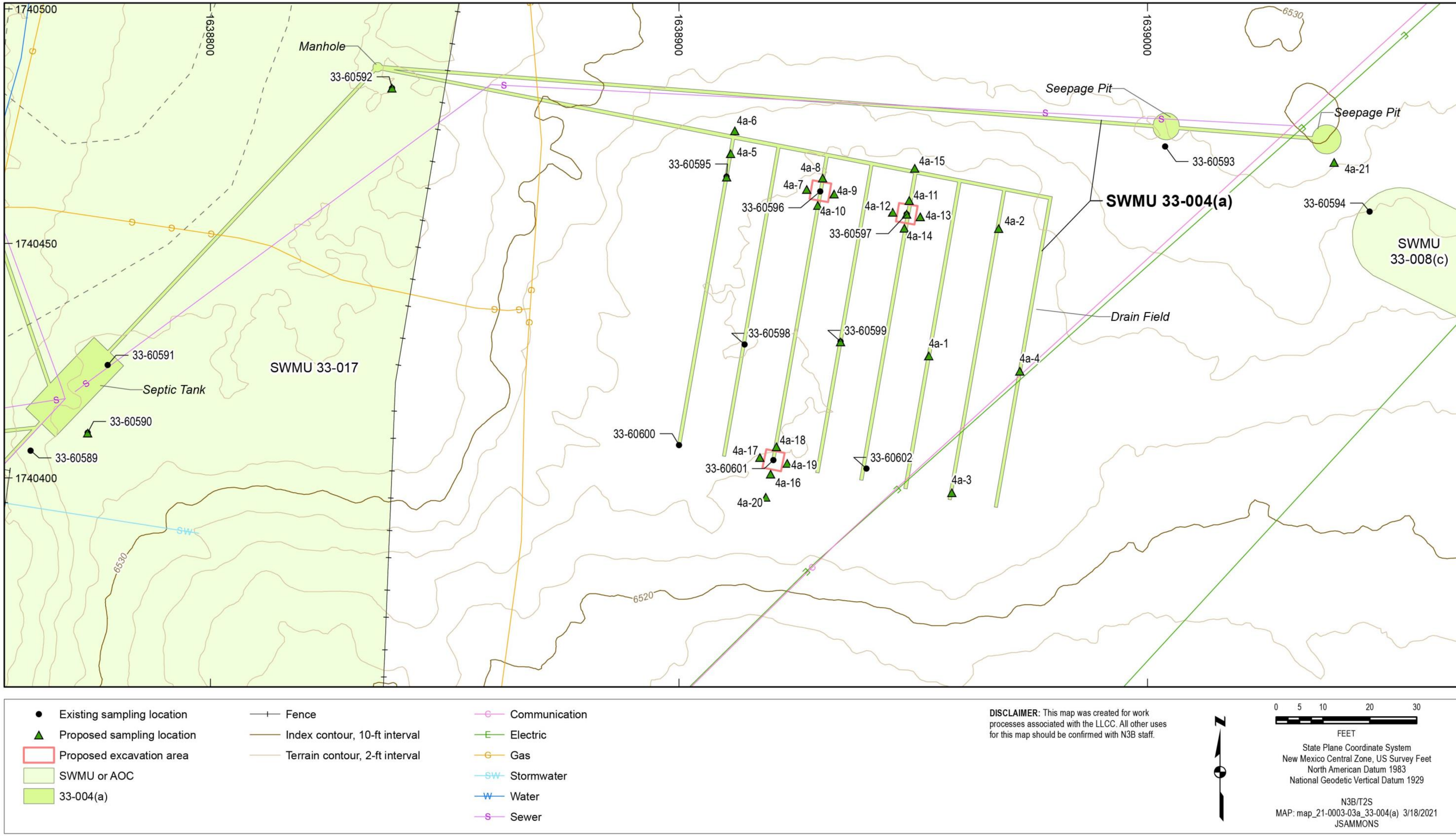

Figure 4.6-2 **Proposed sampling locations and excavation area at SWMU 33-004(a)**

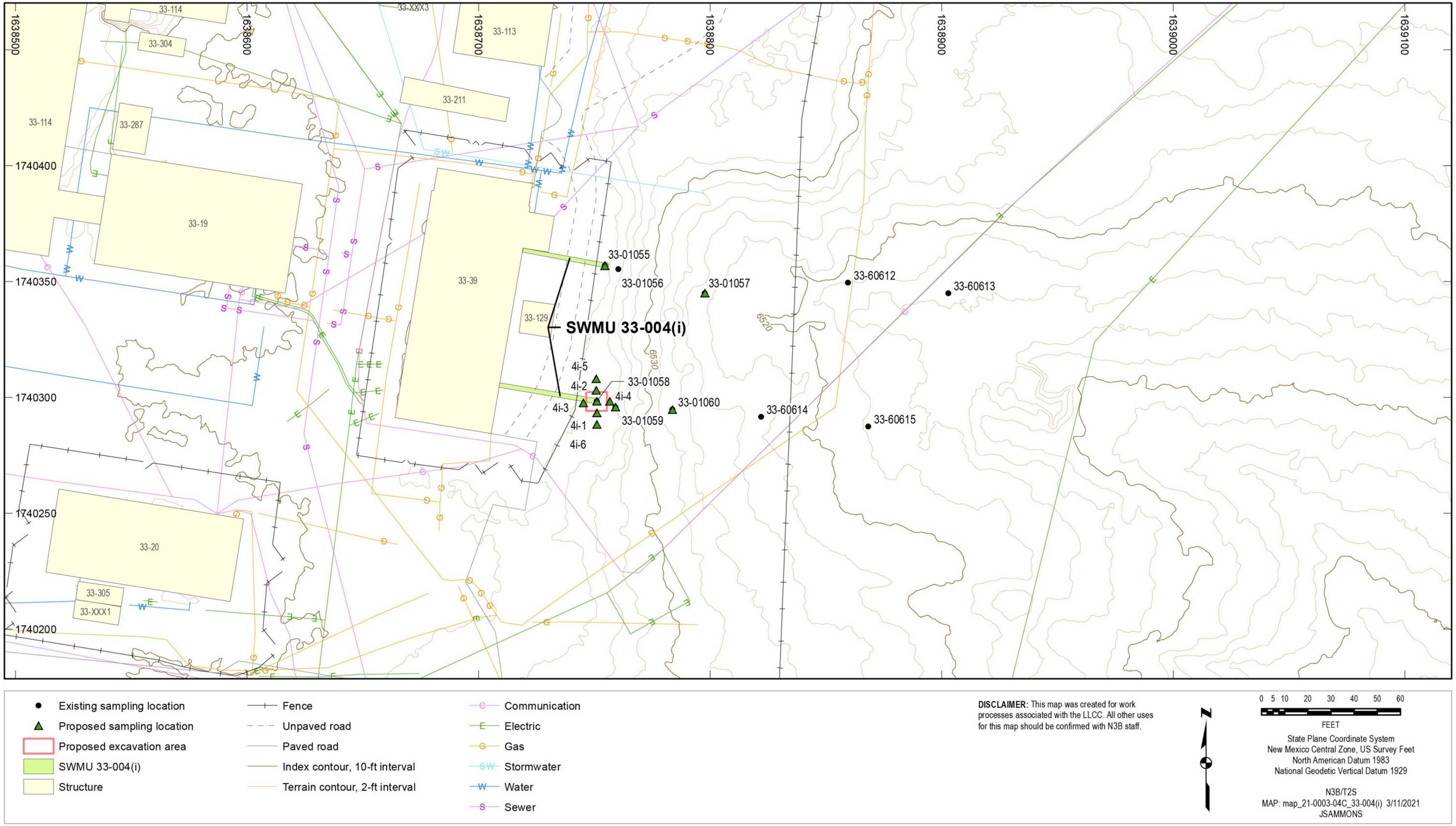

Figure 4.7-1 Site map and sampling locations at SWMU 33-004(i)

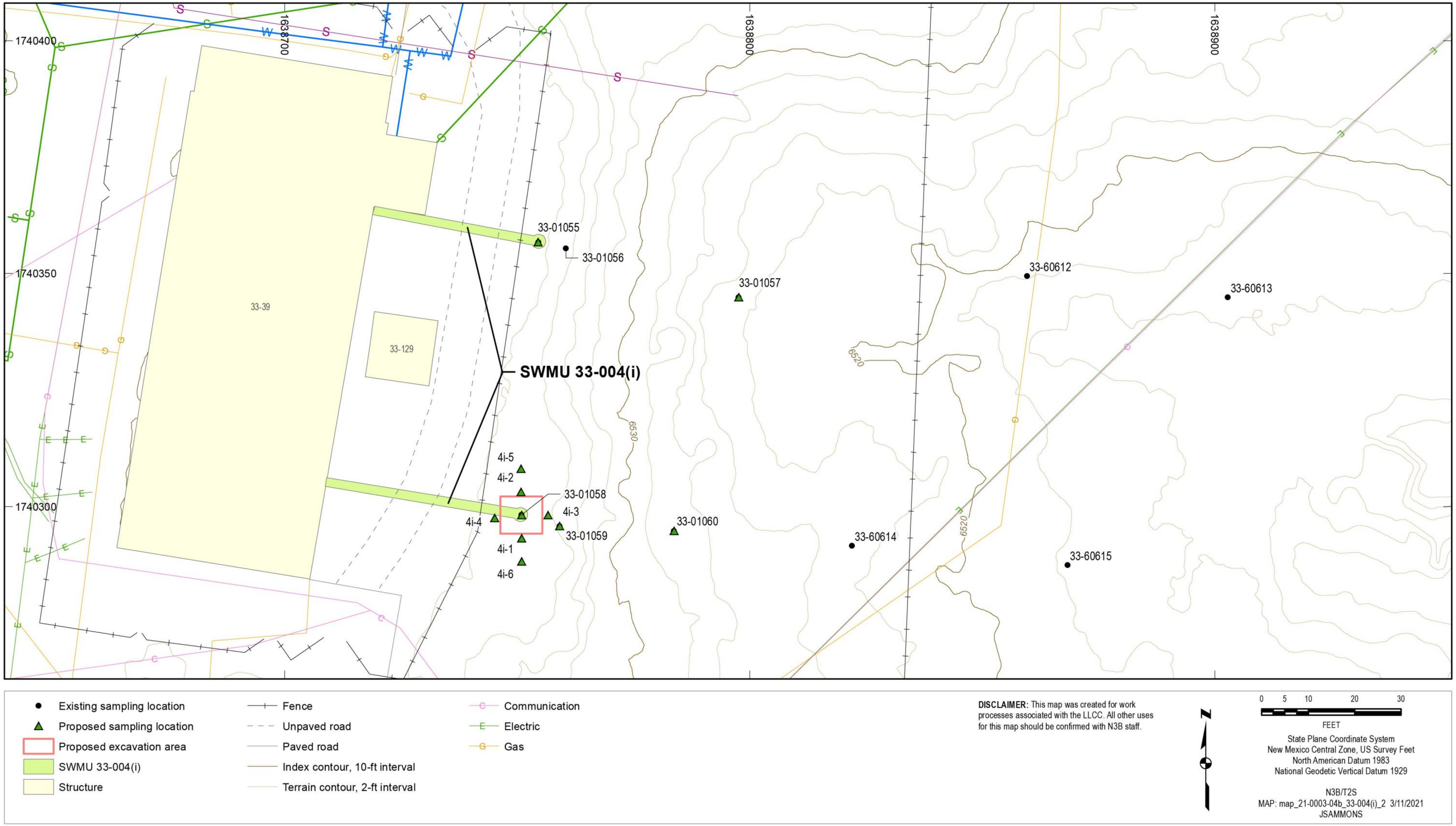

Figure 4.7-2 Proposed sampling locations and excavation area at SWMU 33-004(i)

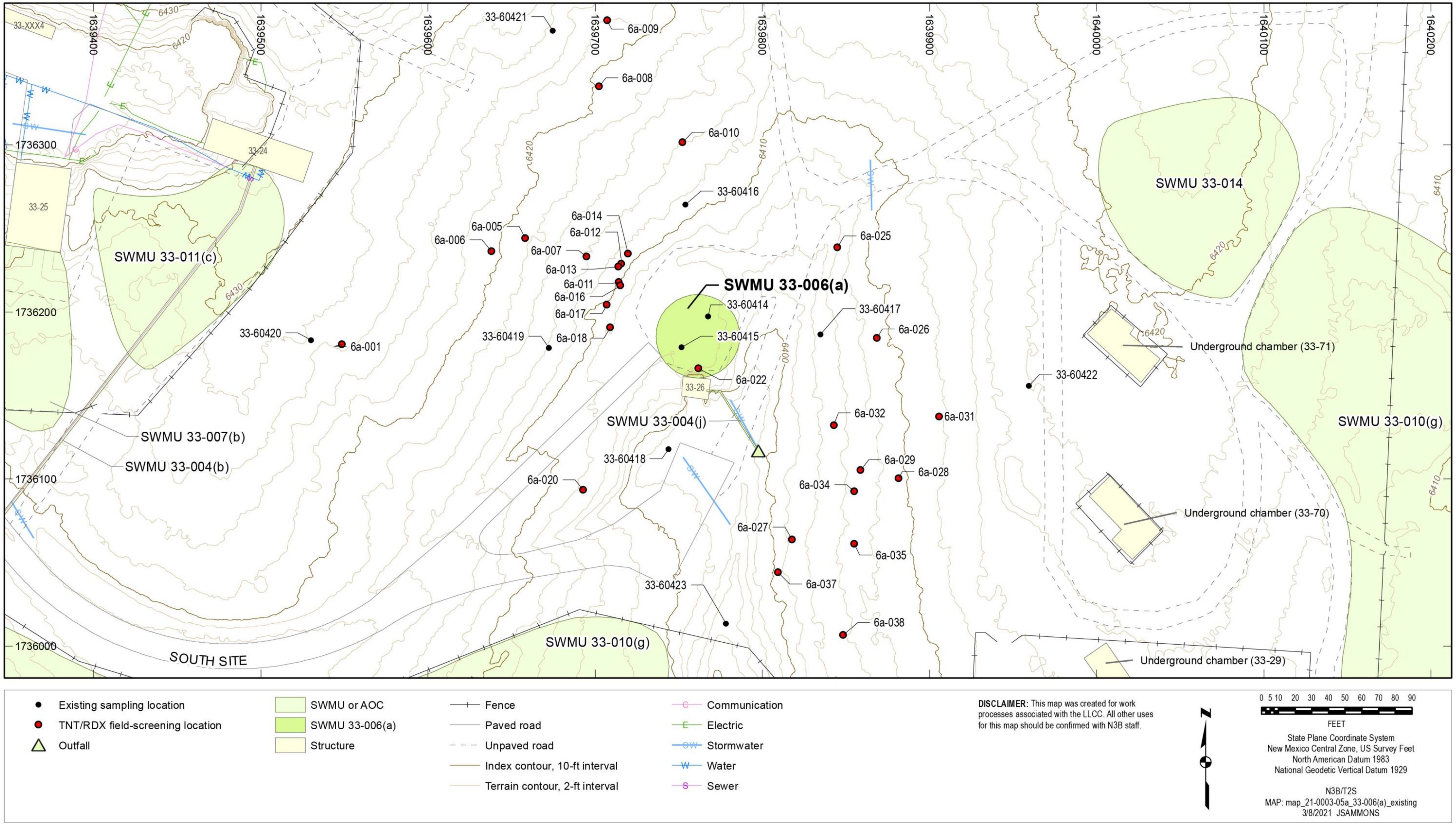

Figure 4.8-1 Site map and sampling locations at SWMU 33-006(a)

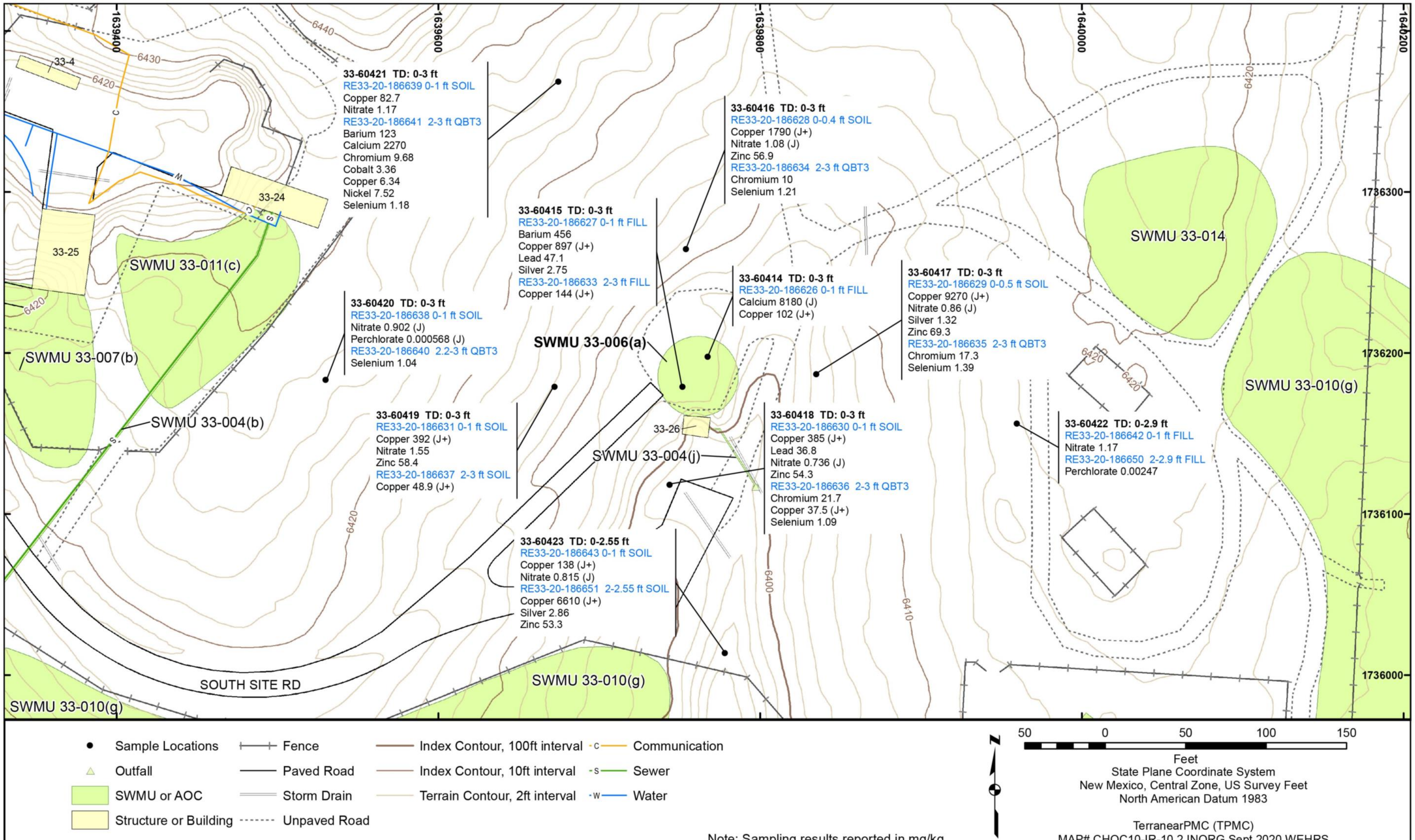

Figure 4.8-2 Inorganic chemicals detected or detected above BVs at SWMU 33-006(a)

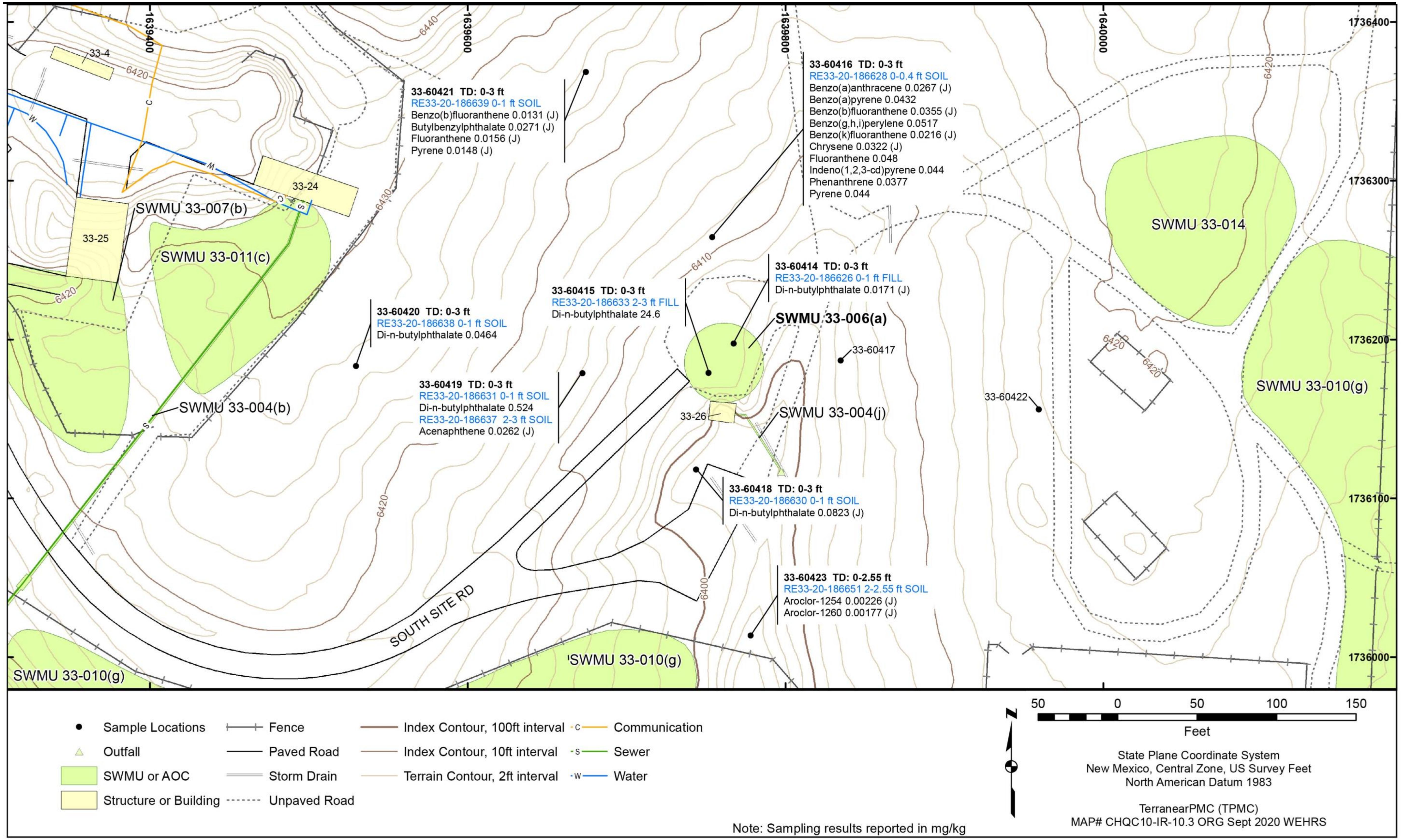

Figure 4.8-3 Organic chemicals detected at SWMU 33-006(a)

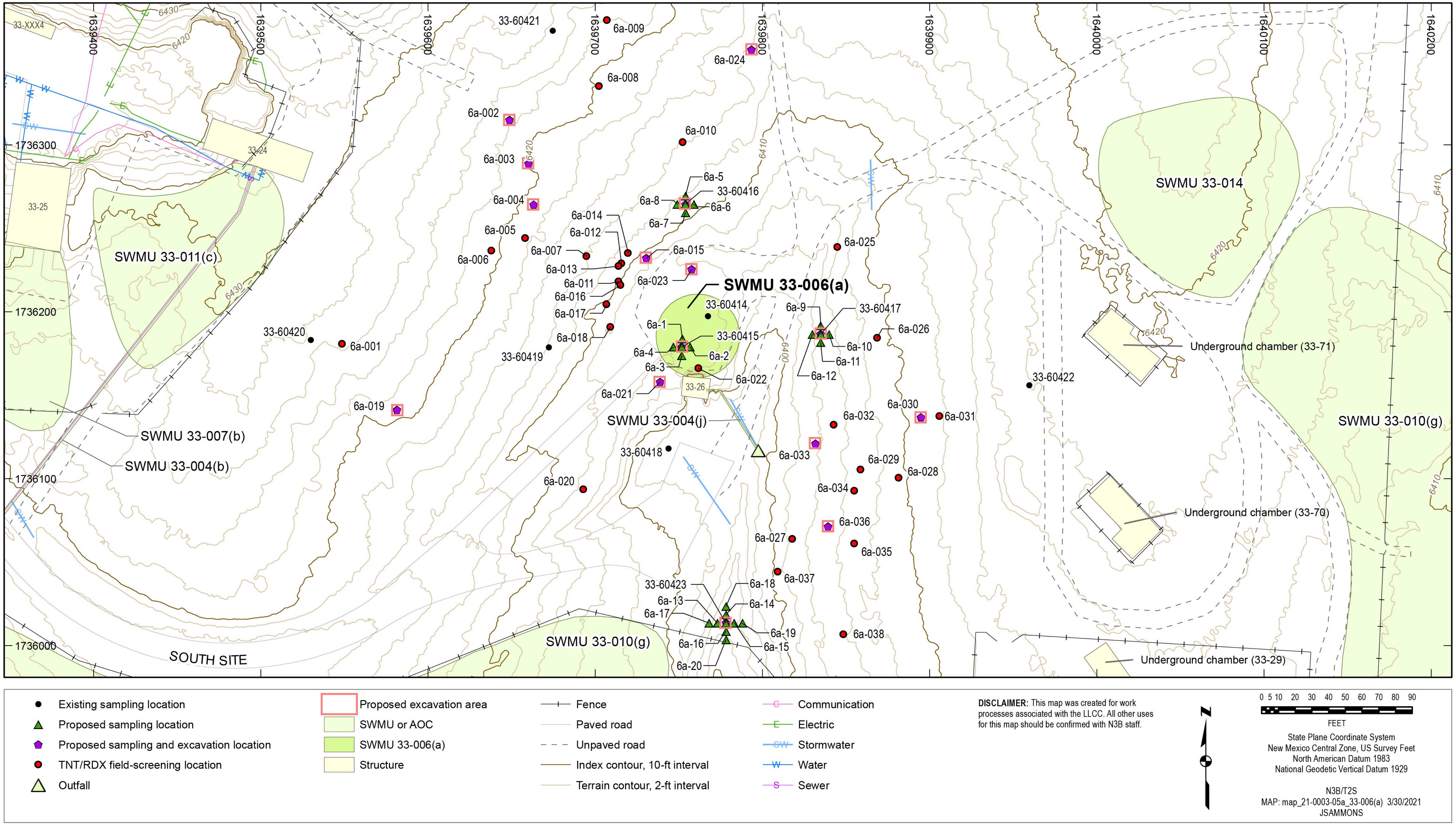

Figure 4.8-4 Proposed sampling locations and excavation areas at SWMU 33-006(a)

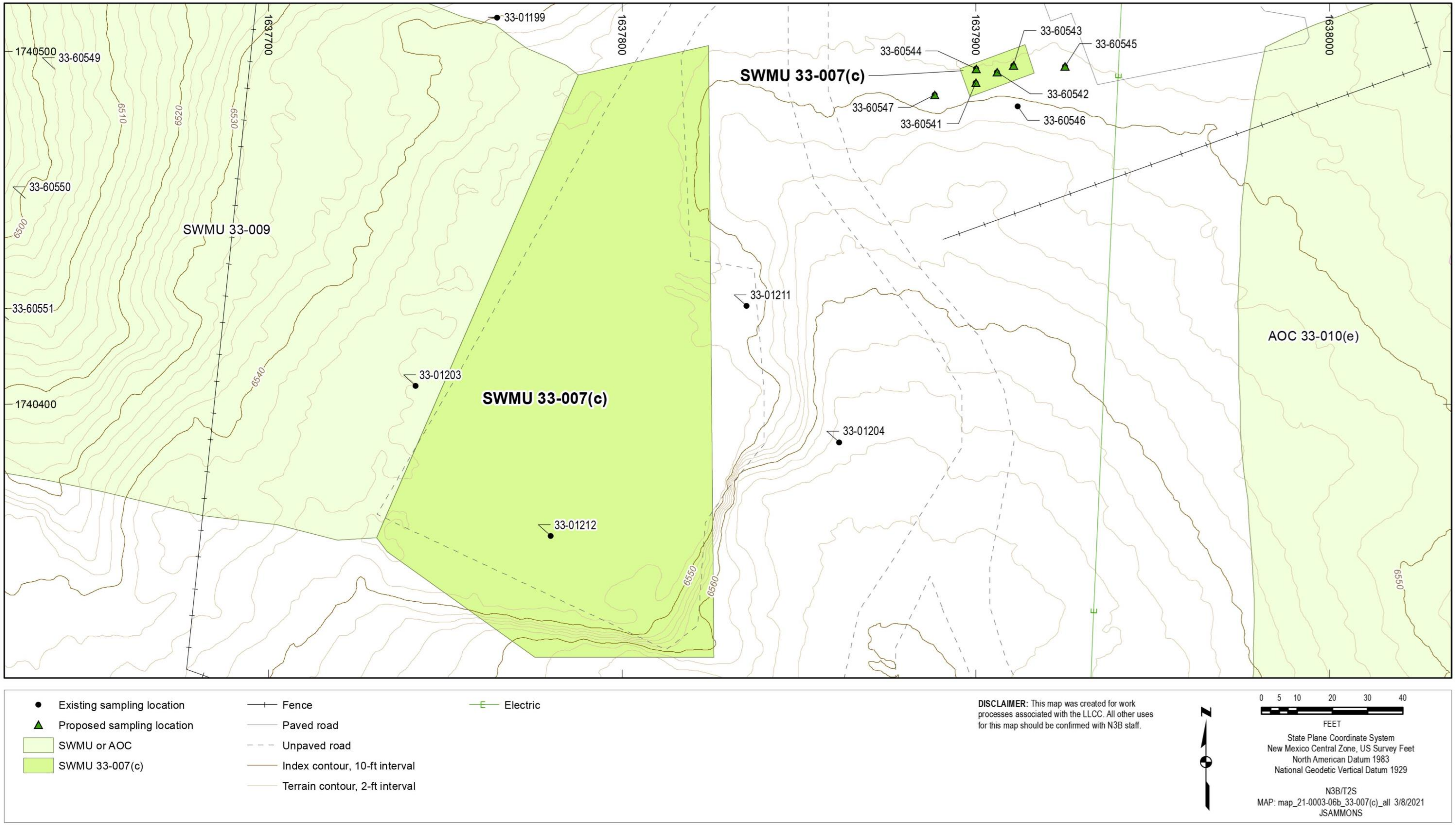

Figure 4.9-1 Site map and sampling locations at SWMU 33-007(c)

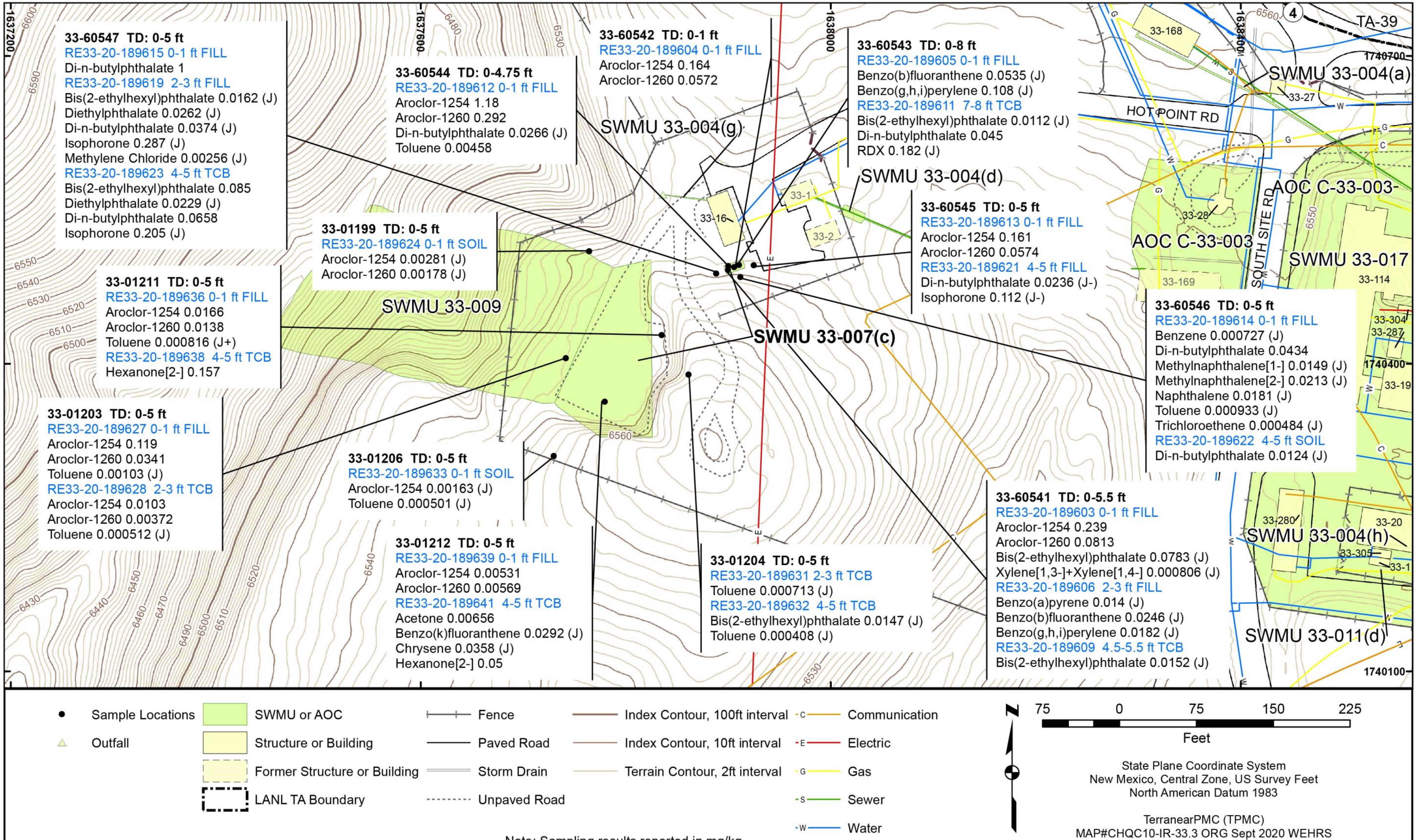

Figure 4.9-2 Organic chemicals detected at SWMU 33-007(c)

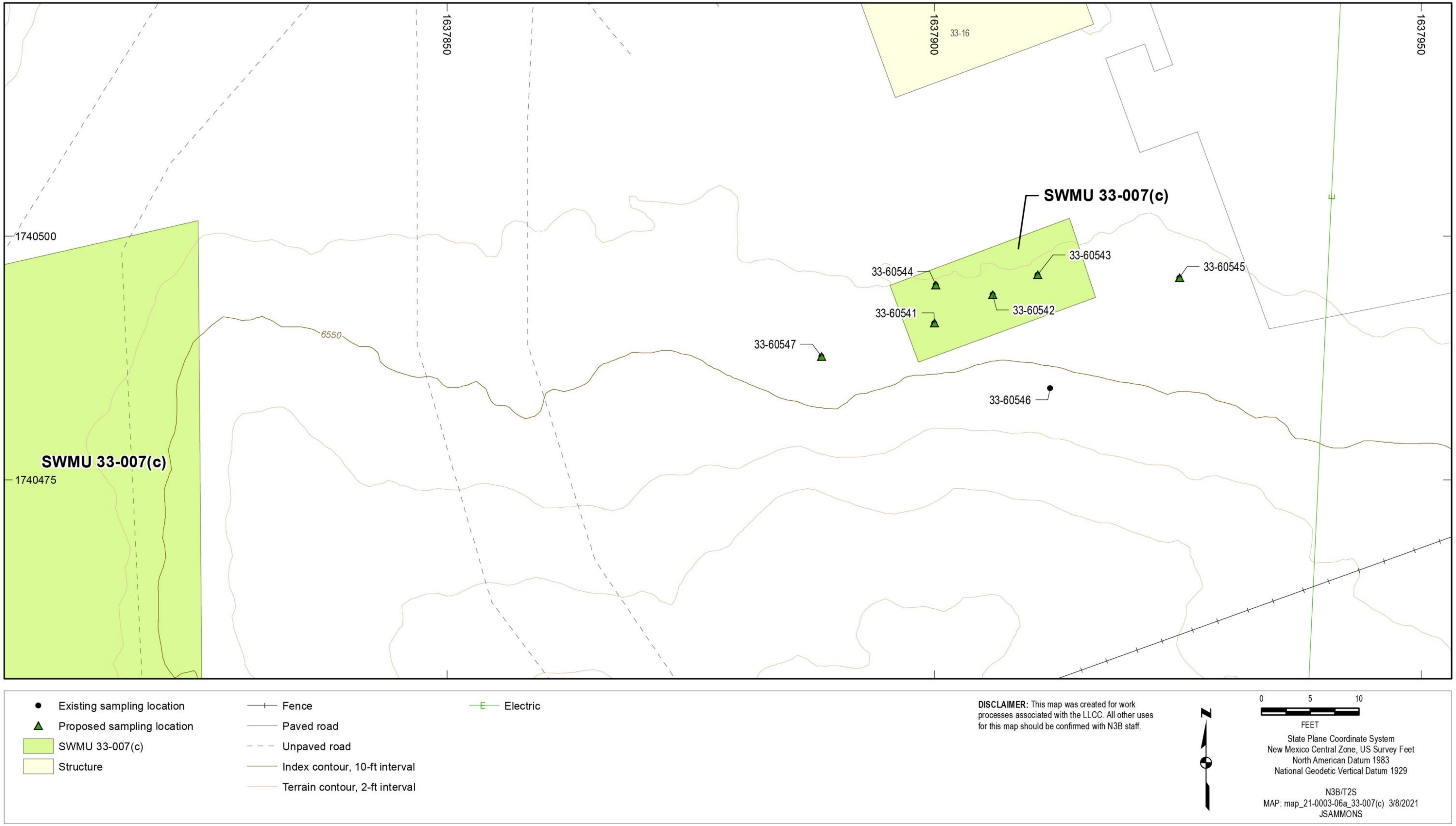

Figure 4.9-3 Proposed sampling locations at SWMU 33-007(c)

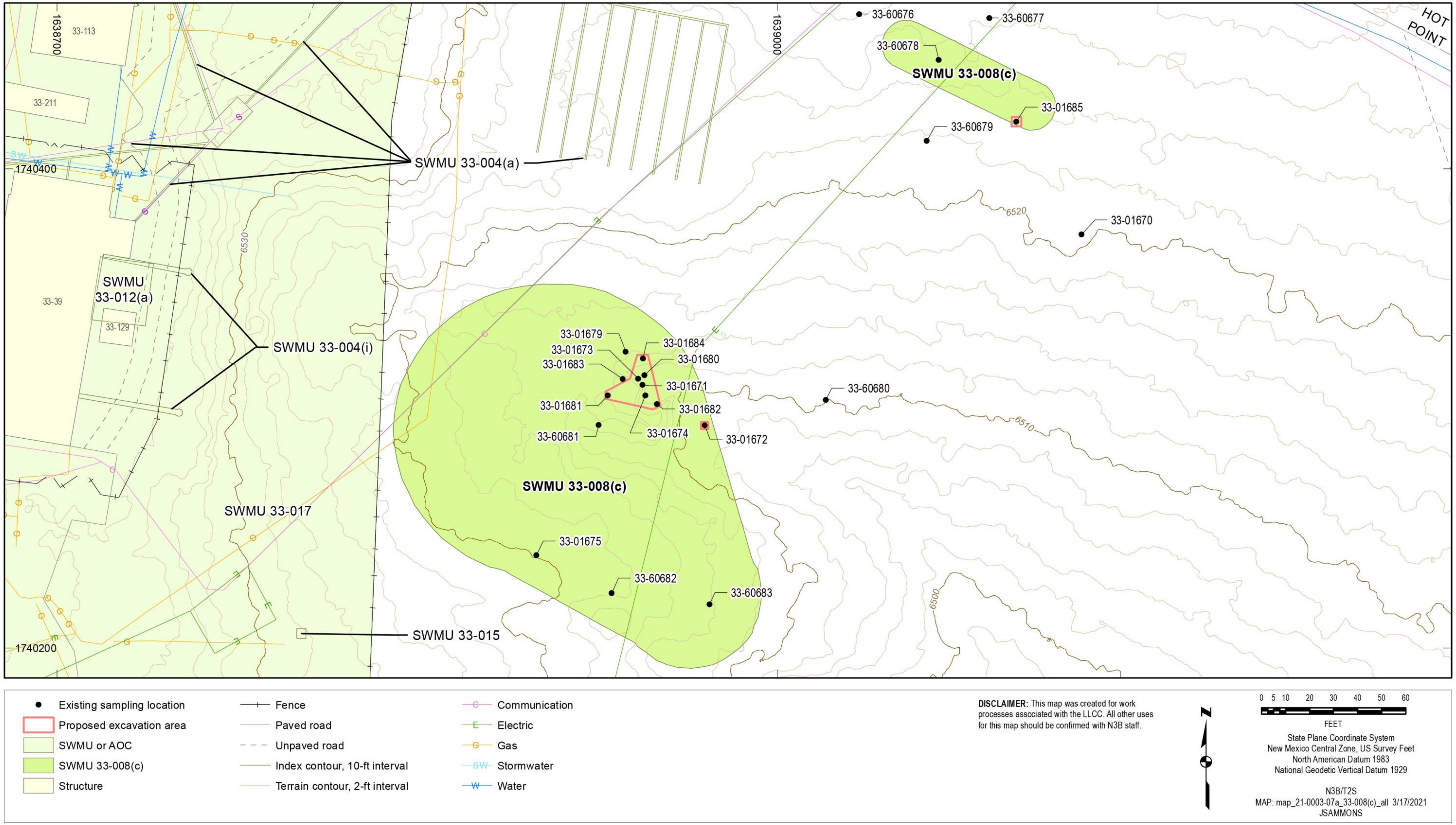

Figure 4.10-1 Site map and sampling locations at SWMU 33-008(c)

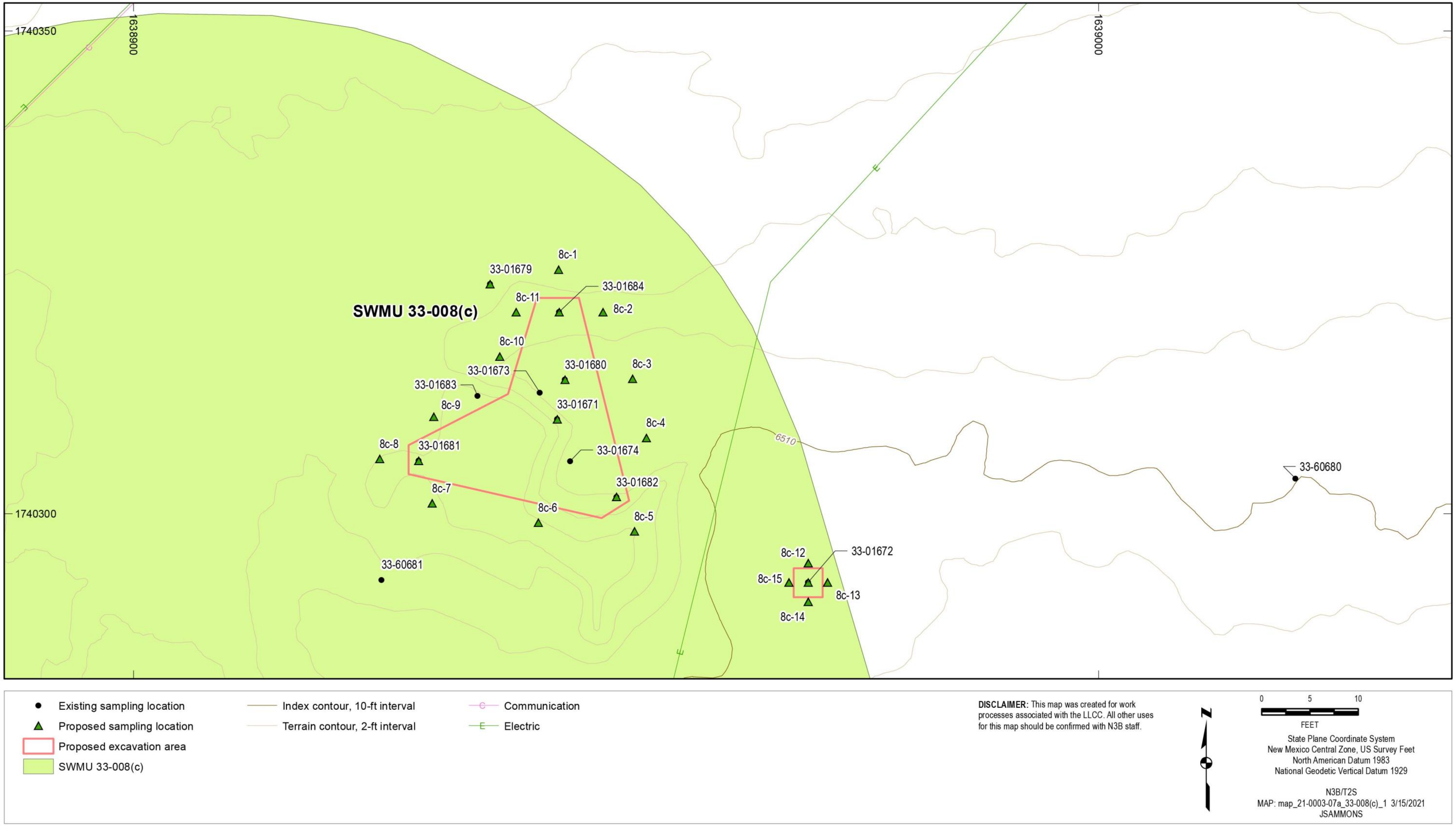

Figure 4.10-2 Proposed sampling locations and excavation areas at SWMU 33-008(c)

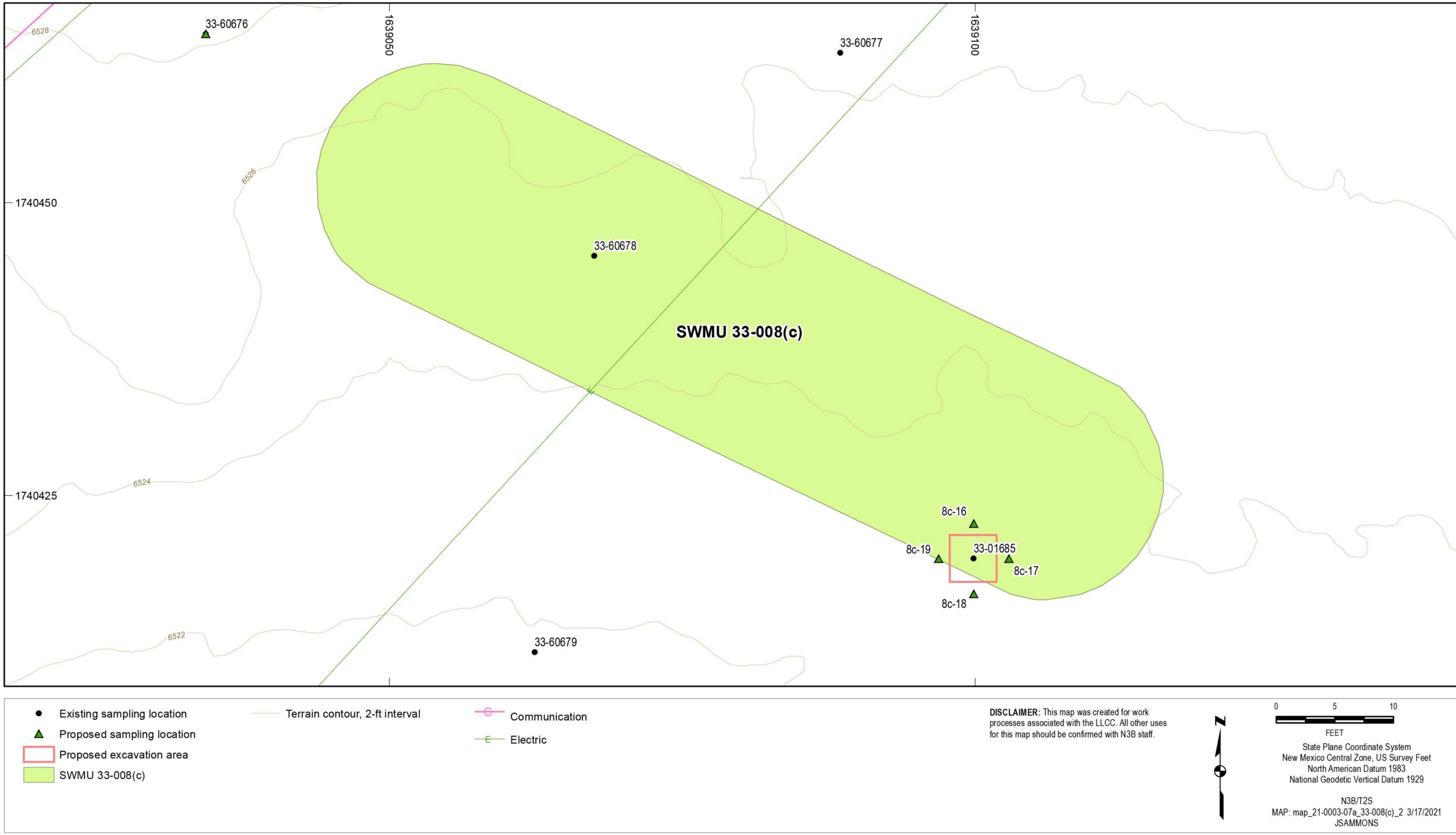

Figure 4.10-3 Proposed sampling locations and excavation area at northern area of SWMU 33-008(c)

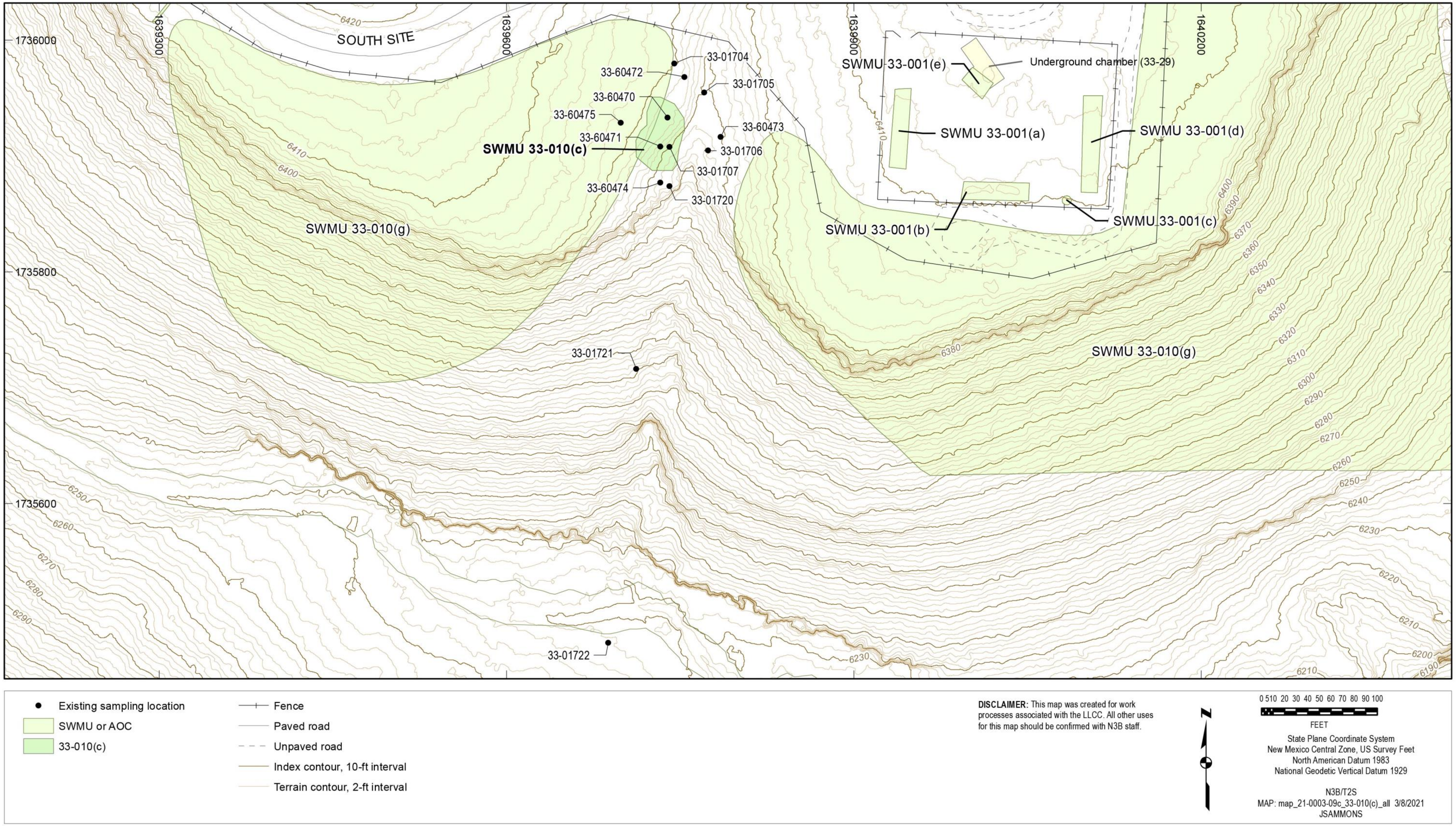

Figure 4.11-1 Site map and sampling locations at SWMU 33-010(c)

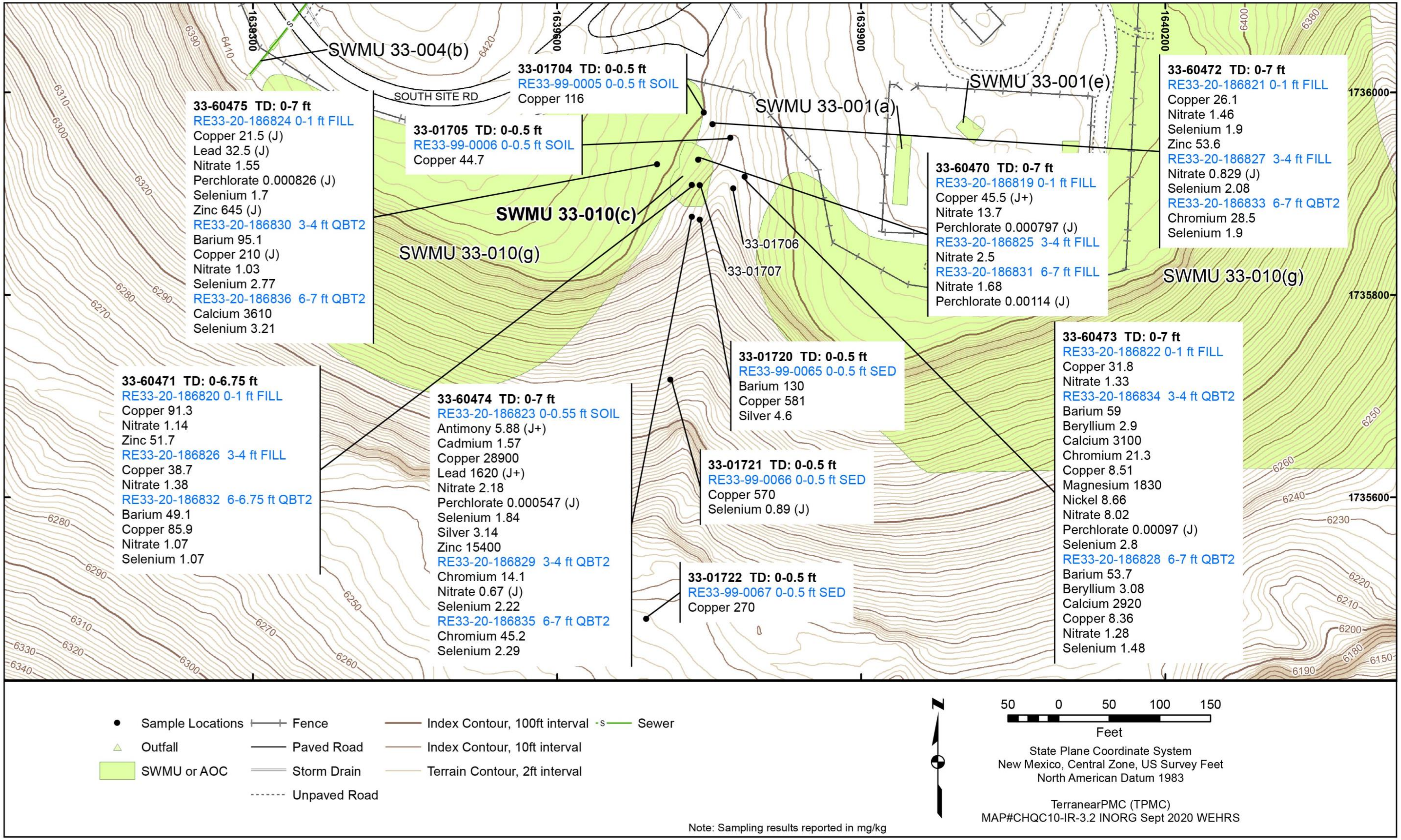

Figure 4.11-2 Inorganic chemicals detected or detected above BVs at SWMU 33-010(c)

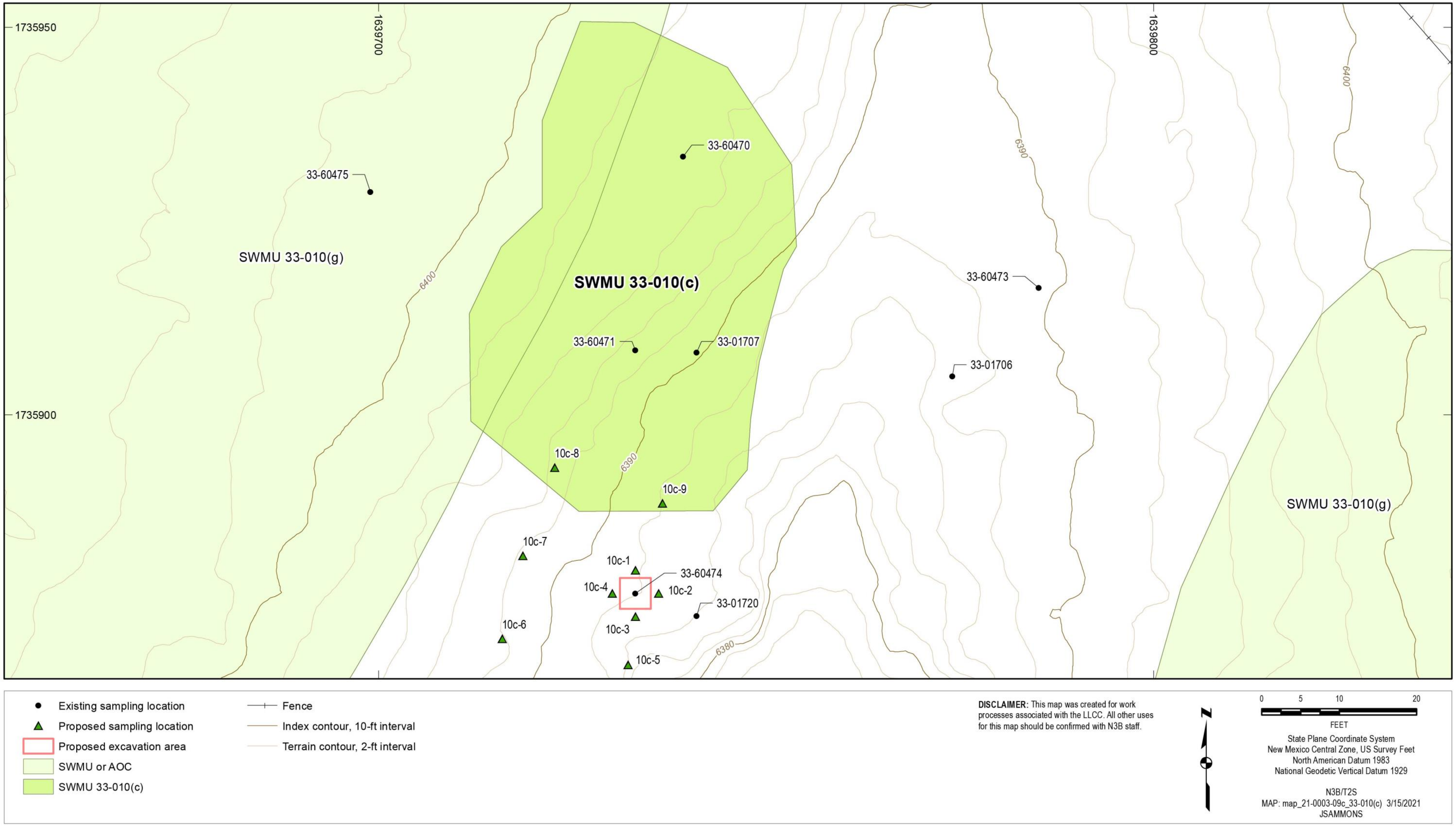

Figure 4.11-3 Proposed sampling locations and excavation area at SWMU 33-010(c)

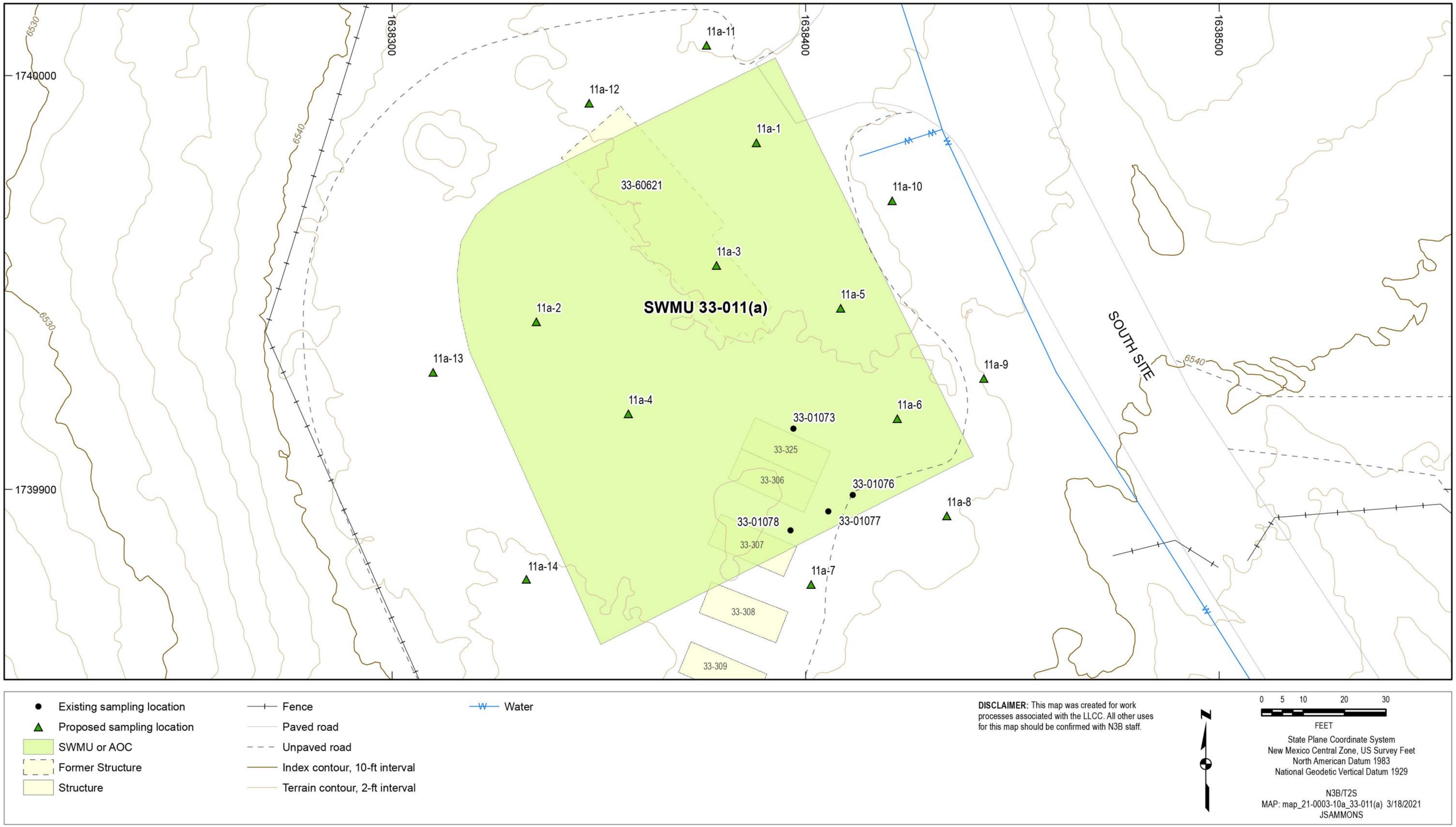

Figure 4.12-1 Site map and proposed sampling locations at SWMU 33-011(a)

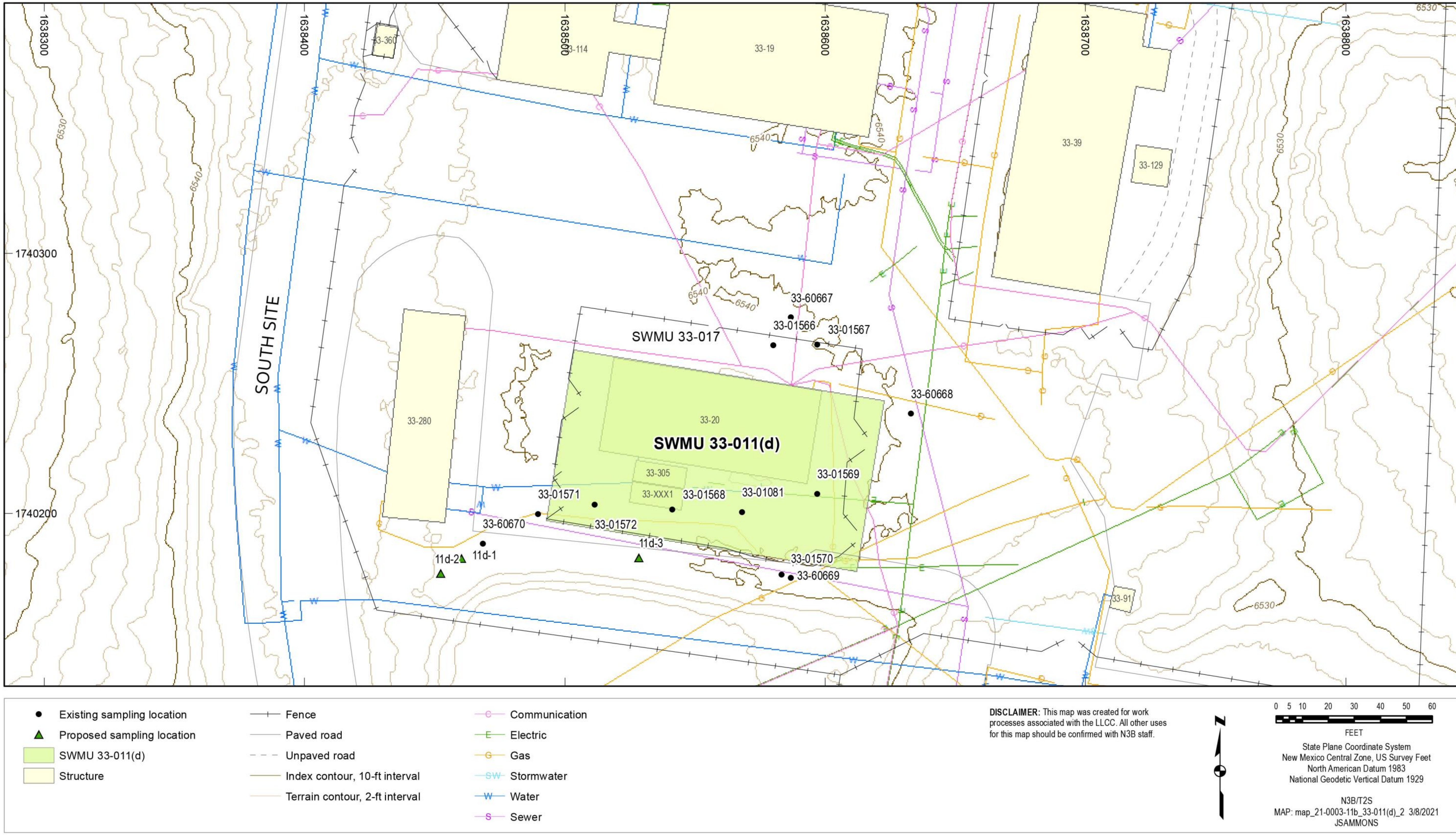

Figure 4.13-1 Site map and sampling locations at SWMU 33-011(d)

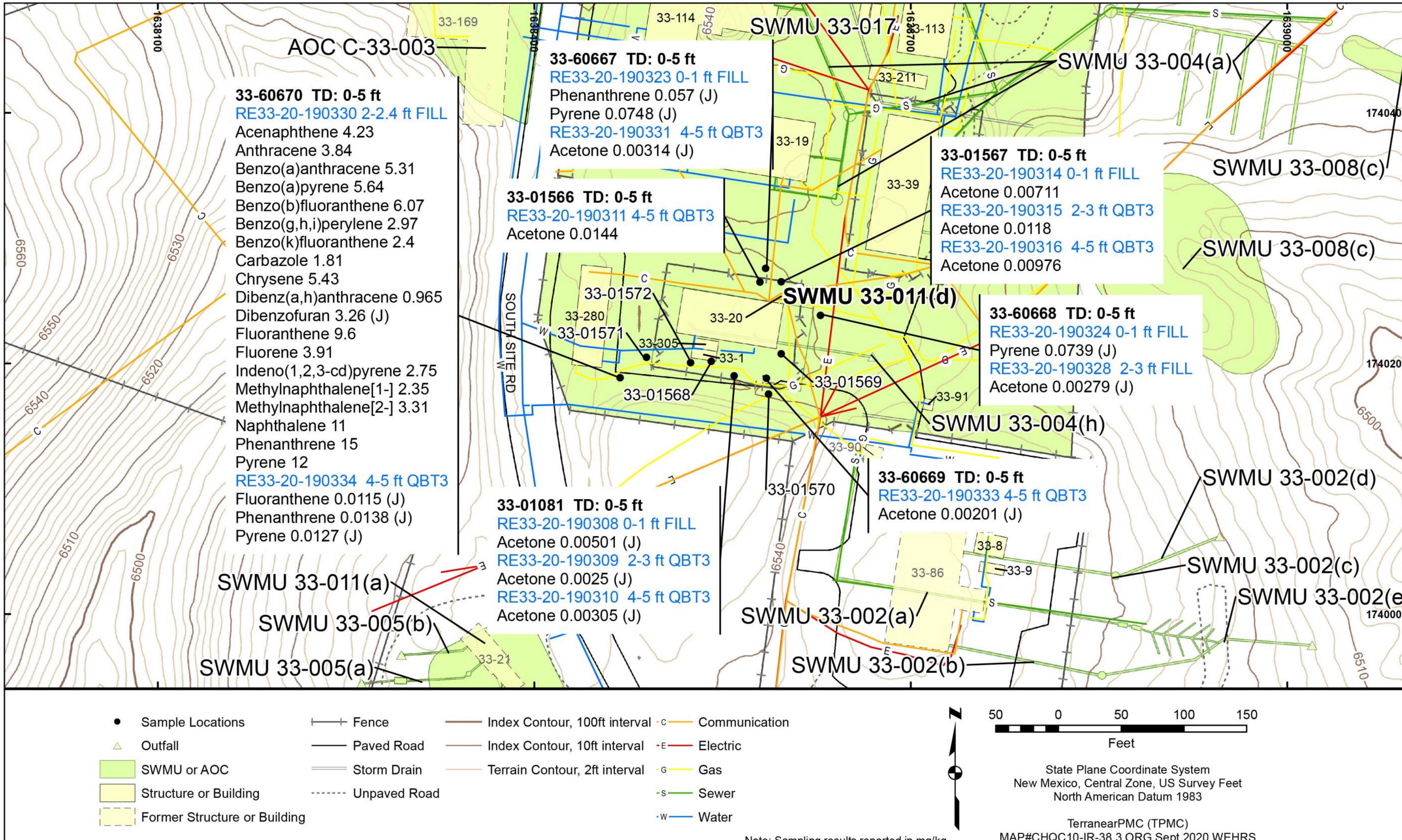

Figure 4.13-2 Organic chemicals detected at SWMU 33-011(d)

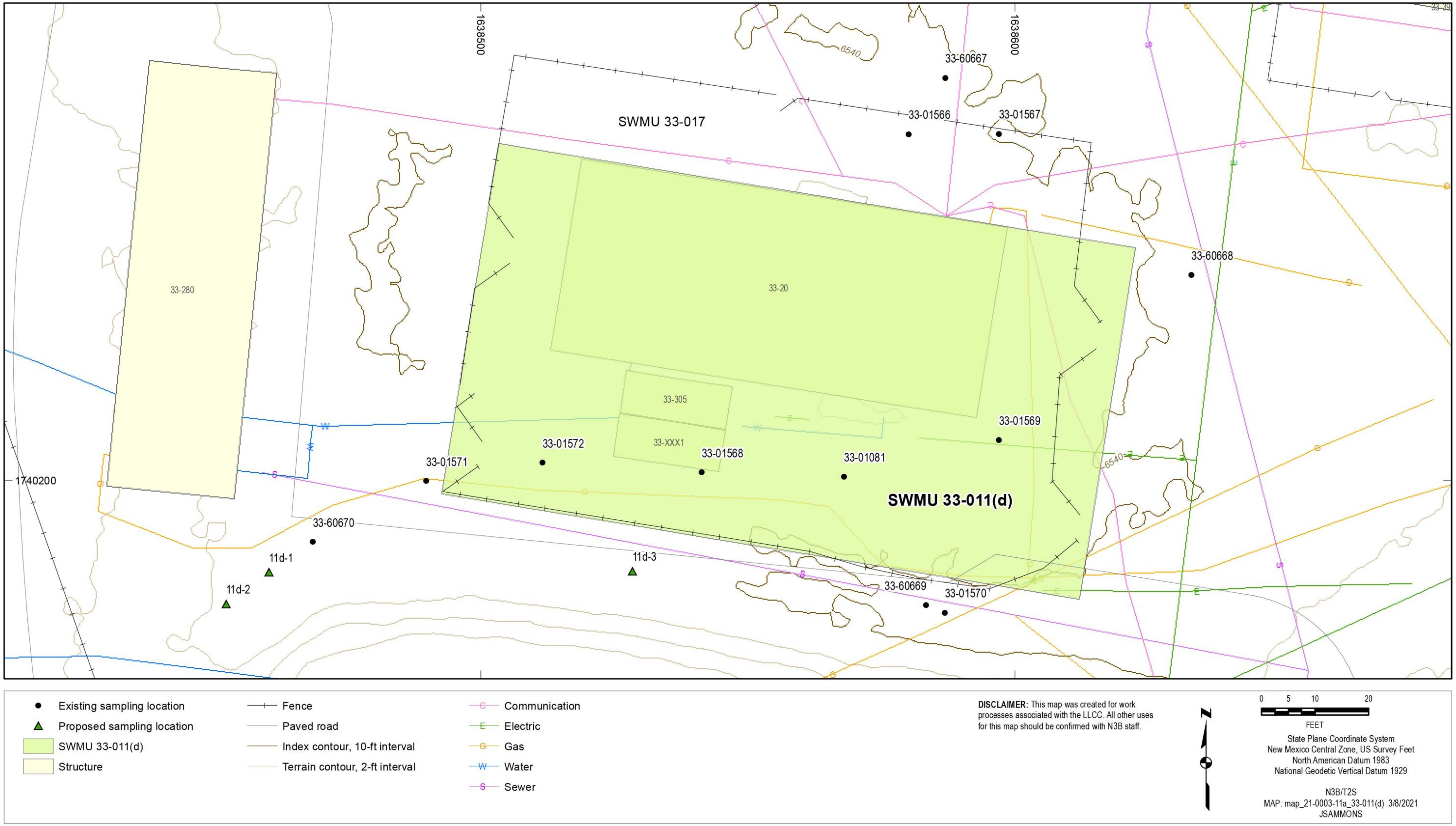

Figure 4.13-3 Proposed sampling locations at SWMU 33-011(d)

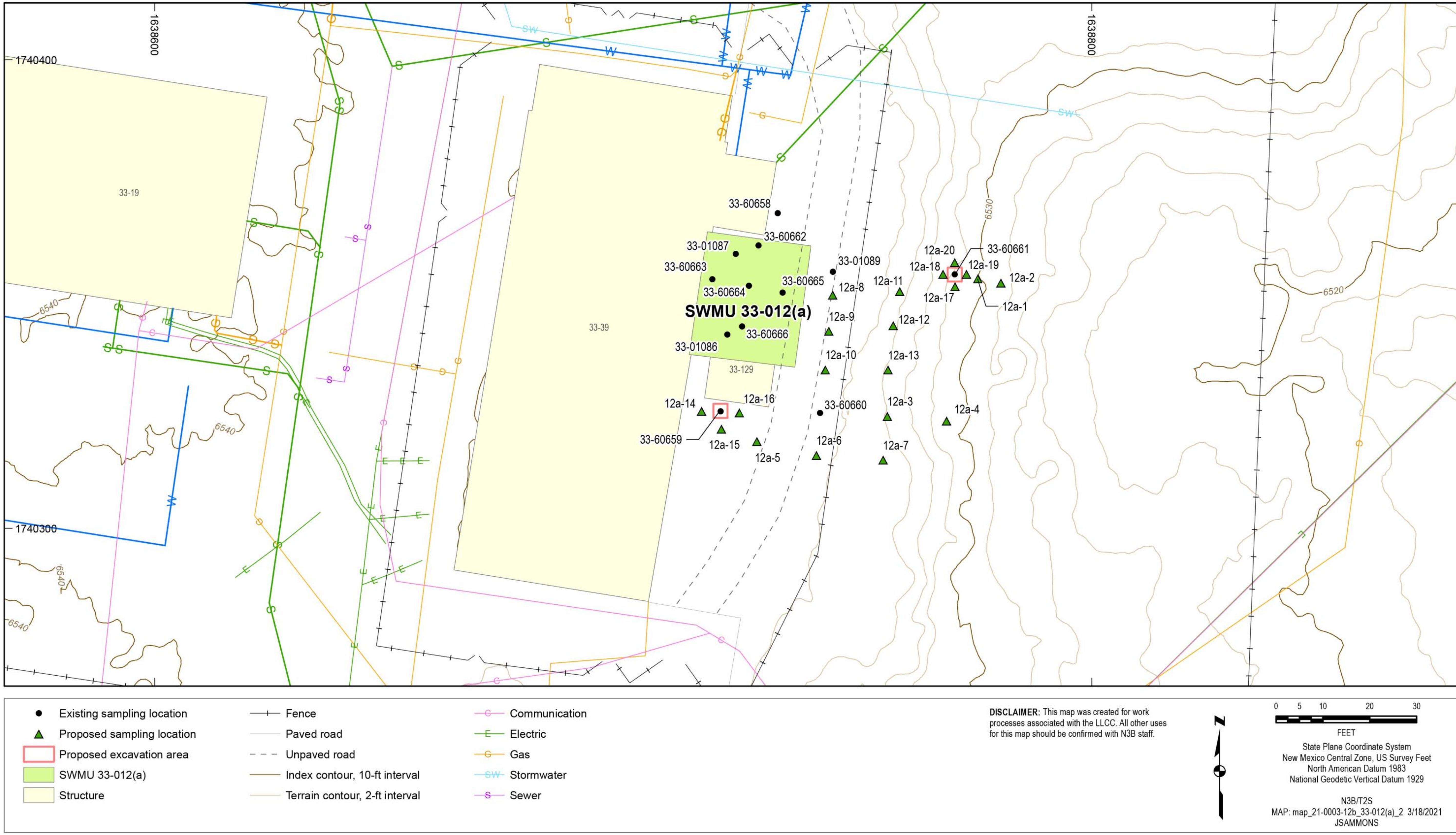

Figure 4.14-1 Site map and sampling locations at SWMU 33-012(a)

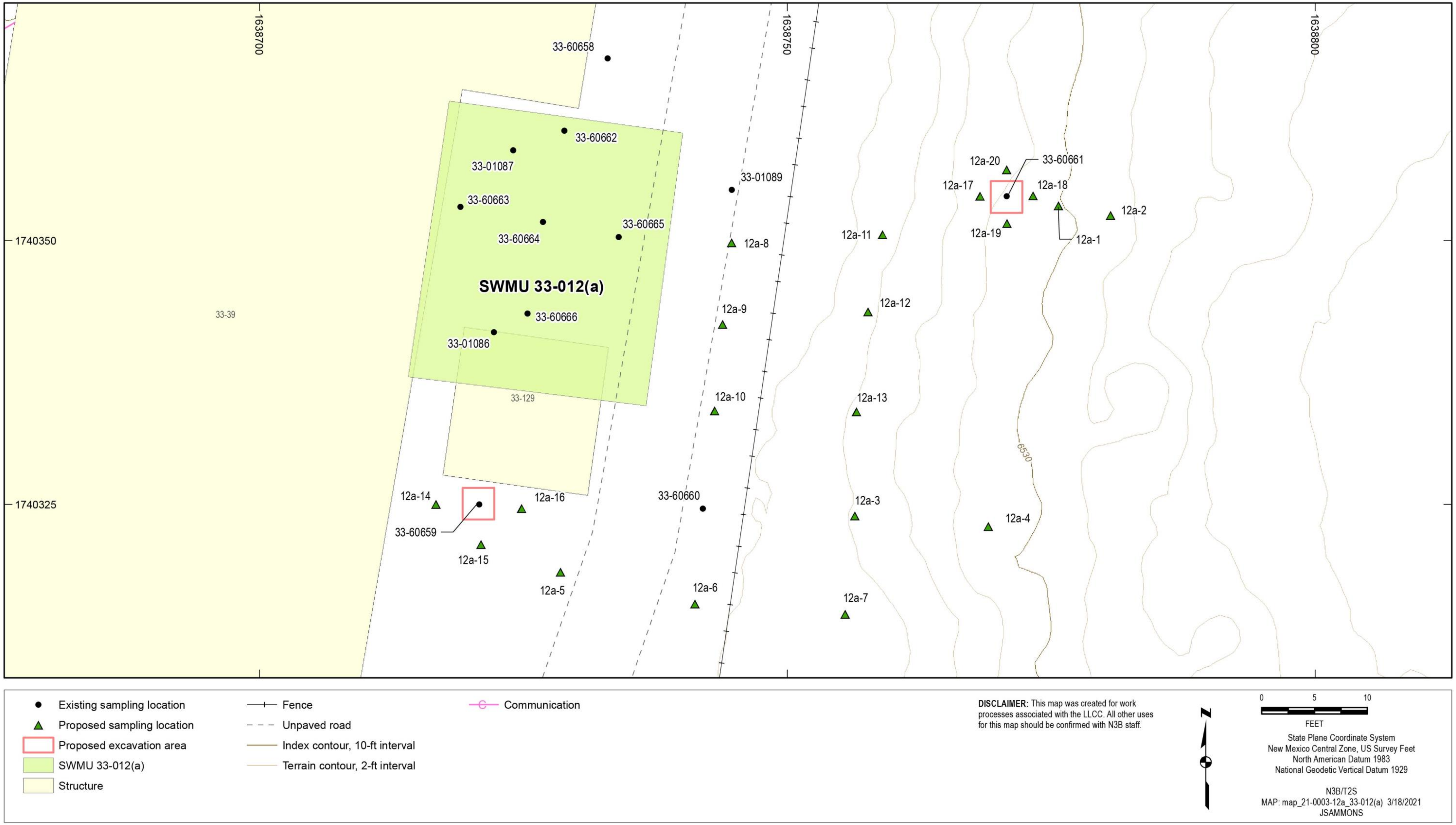

Figure 4.14-2 Proposed sampling locations and excavation areas at SWMU 33-012(a)

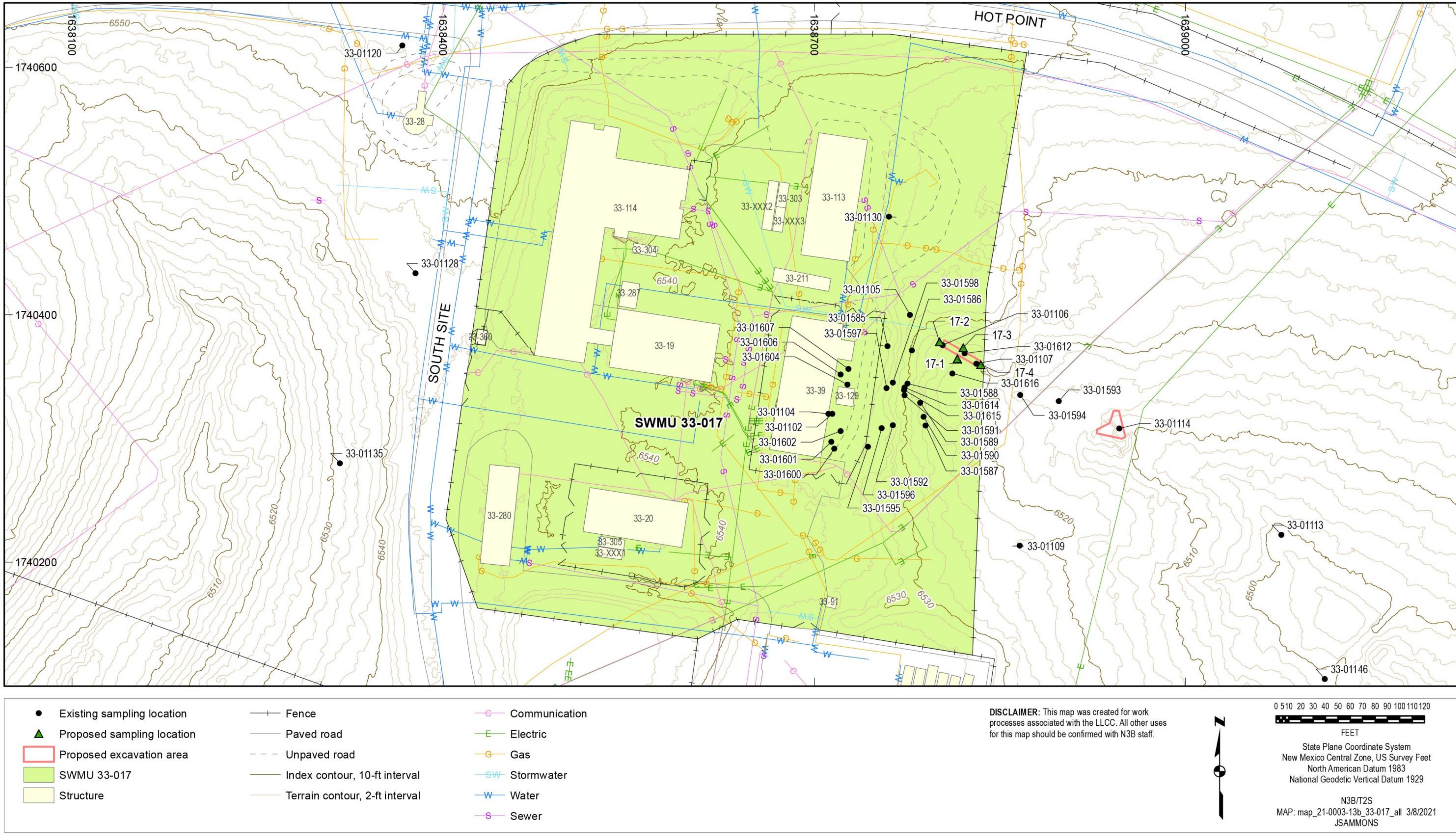

Figure 4.15-1 Site map and sampling locations at SWMU 33-017

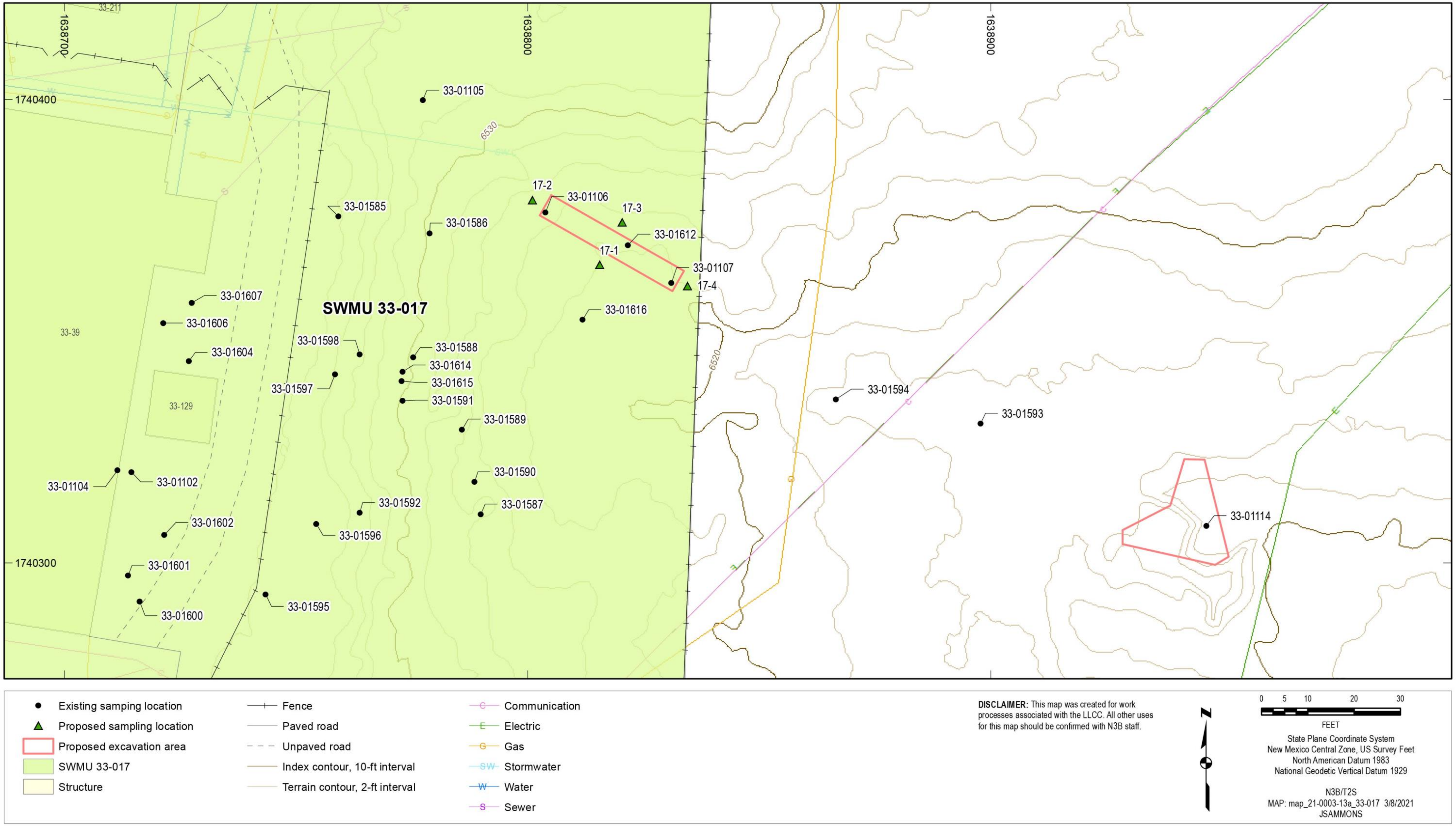

Figure 4.15-2 Proposed sampling locations and excavation areas at SWMU 33-017

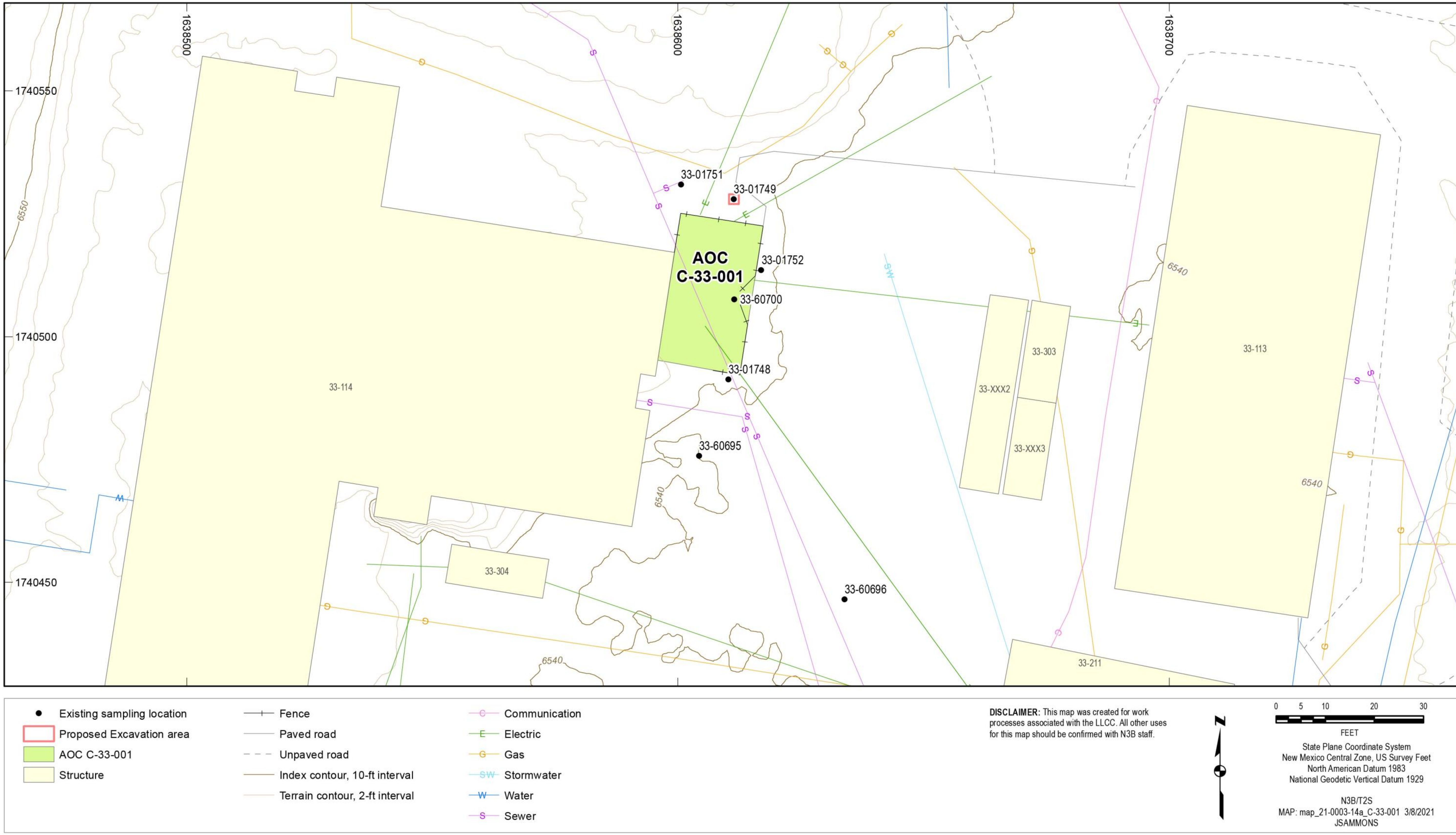

Figure 4.16-1 Site map and sampling locations at AOC C-33-001

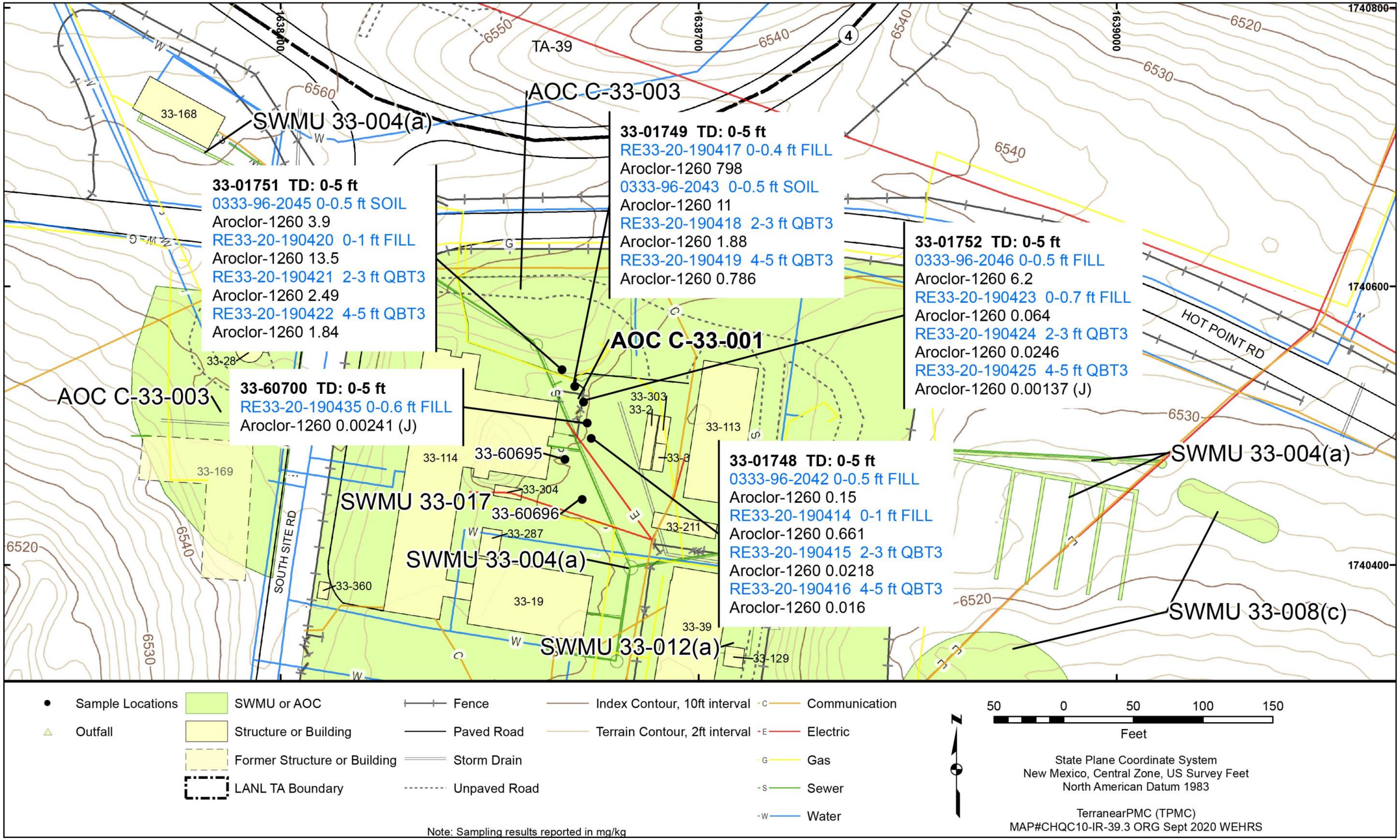

Figure 4.16-2 Organic chemicals detected at AOC C-33-001

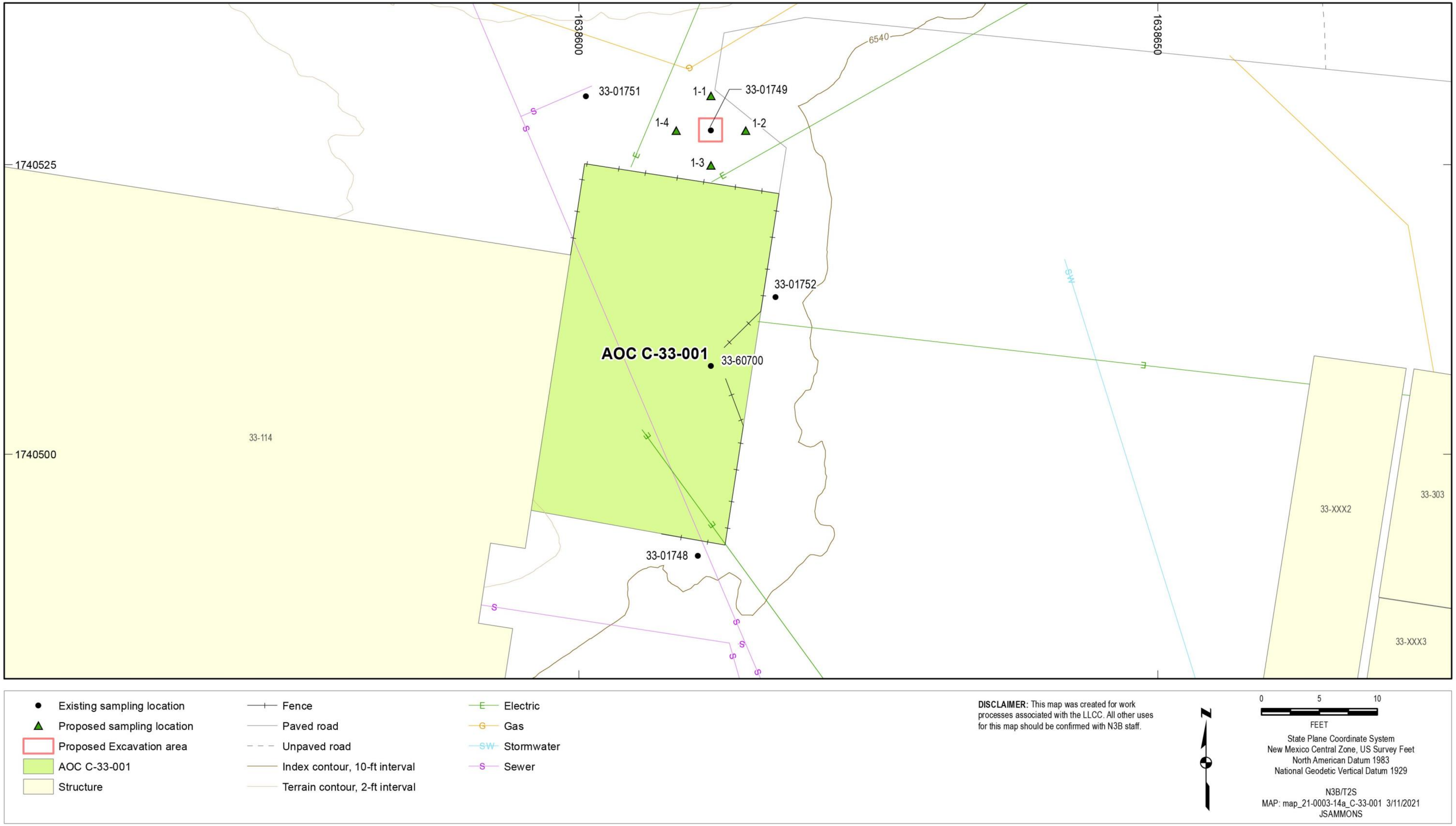

Figure 4.16-3 Proposed sampling locations and excavation area at AOC C-33-001

Table 1.1-1
Sites under Phase II Investigation in the Chaquehui Canyon Aggregate Area

SWMU/AOC	Brief Description	2019–2020 Investigation Results	Proposed Activities
SWMU 33-001(a)	Disposal Pit (MDA E)	Nature and extent of potential contamination not defined	Geophysical surveys, radiological survey, and additional extent sampling
SWMU 33-001(b)	Disposal Pit (MDA E)	Nature and extent of potential contamination not defined	Geophysical surveys, radiological survey, and additional extent sampling
SWMU 33-001(c)	Disposal Pit (MDA E)	Nature and extent of potential contamination not defined	Geophysical surveys, radiological survey, and additional extent sampling
SWMU 33-001(d)	Disposal Pit (MDA E)	Nature and extent of potential contamination not defined	Geophysical surveys, radiological survey, and additional extent sampling
SWMU 33-001(e)	Soil Contamination from Underground Chamber and Shaft (MDA E)	Nature and extent of potential contamination not defined	Geophysical surveys, radiological survey, and additional extent sampling
SWMU 33-004(a)	Septic System	Lateral and vertical extent of PCBs not defined at three locations. Potential unacceptable human health risk from PAHs. Potential unacceptable ecological risk due to mercury.	Soil removal and additional extent sampling
SWMU 33-004(i)	Drainline and Outfall associated with Building 33-39	Vertical extent of PCBs not defined at five locations. Potential unacceptable human health risk due to PCBs.	Soil removal and additional extent sampling
SWMU 33-006(a)	Firing Site	Lateral and vertical extent of copper not defined at one location. Potential unacceptable ecological risk due to copper and di-n-butylphthalate.	Soil removal and additional extent sampling
SWMU 33-007(c)	Firing Sites	Vertical extent of cobalt not defined at six locations and vertical and lateral extent of PCBs not defined at one location.	Additional extent sampling
SWMU 33-008(c)	Landfill	Vertical extent of antimony not defined at one location, lateral extent of antimony not defined at one location, and vertical extent of PCBs not defined at four locations. Potential unacceptable human health risk from chromium, mercury, manganese, copper, and PCBs. Potential unacceptable ecological risk due to mercury, copper, nickel, and zinc.	Soil removal and additional extent sampling
SWMU 33-010(c)	Surface Disposal Site	Potential unacceptable ecological risk due to copper and zinc.	Soil removal
SWMU 33-011(a)	Soil Contamination from Former Storage Area	Extent not defined for the northern section of SWMU 33-011(a)	Additional extent sampling
SWMU 33-011(d)	Storage Area	Lateral extent of PAHs not defined at one location	Additional extent sampling
SWMU 33-012(a)	Drum Storage Area	Lateral extent of PCBs not defined at one location and lateral extent of PAHs not defined at two locations. Potential unacceptable human health risk from PCBs and PAHs. Potential unacceptable ecological risk due to PAHs.	Soil removal and additional extent sampling
SWMU 33-017	Operational release	Potential unacceptable ecological risk due to copper, lead, mercury, zinc, and selenium	Soil removal
AOC C-33-001	Former transformer	Potential unacceptable human health risk from PCBs.	Soil removal

Table 4.1-1
Proposed Sampling and Analysis at SWMUs 33-001(a,b,c,d,e)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	TAL Metals (SW-846:6010D[b]/6020B[b]/7471A[b])	Cyanide (SW-846:9012A[b])	Nitrate (SW-846:9056A[b])	Perchlorate (SW-846:6850)	pH (SW-846-9045D[b])	Explosive Compounds (SW-846:8330B[b])	Isotopic Uranium (HASL-300)	Isotopic Plutonium (HASL-300)	Tritium (EPA 906.0)	Gamma-Emitting Radionuclides (EPA 901.1)
Define nature and extent of contamination associated with a surface release from the disposal pits outside and inside the fence at MDA E	Grid locations 1a-1 to 1a-54	Grid spacing every 50 ft on the mesa top outside and inside the MDA E fence	0.0–0.5, 1.0–1.5	X[c]	X	X	X	X	X	X	X	X	X
Define nature and extent of contamination in areas with elevated readings above 2 times background identified by the radiological walkover survey	To be determined	Areas that exceed 2 times background identified by the radiological walkover survey	0.0–0.5, 1.0–1.5	X	X	X	X	X	X	X	X	X	X

[a] Depths are below ground surface.

[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.

[c] X = Analysis will be performed.

Table 4.6-1
Organic Chemicals Detected at SWMU 33-004(a)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthylene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate
Construction Worker SSL[a]				**7530[b]**	**242,000**	**75,300**	**4.91**	**85.3**	**240**	**15.0**	**240**	**7530**	**2310**	**5380**
Industrial SSL[a]				**25,300[b]**	**960,000**	**253,000**	**11**	**11.1**	**32.3**	**23.6**	**32.3**	**25,300**	**323**	**1830**
Residential SSL[a]				**1740**	**66,300**	**17,400**	**1.14**	**2.43**	**1.53**	**1.12**	**1.53**	**1740**	**15.3**	**380**
RE33-20-189907	33-60588	7.1–8.1	QBT3	—[c]	—	—	—	—	0.0125 (J)	—	—	—	—	—
RE33-20-189908	33-60589	7.4–8.4	FILL	—	—	—	NA[d]	NA	0.0374 (J)	0.0404 (J)	0.0523	0.0242 (J)	—	0.136
RE33-20-189913	33-60589	10.4–11.3	FILL	—	—	—	0.0595	0.0326	—	0.0156 (J)	0.0219 (J)	0.0153 (J)	—	0.0606
RE33-20-189909	33-60590	9.5–10.5	QBT3	—	0.0207	—	NA	NA	0.023 (J)	0.0183 (J)	0.0233 (J)	0.0129 (J)	—	—
RE33-20-189914	33-60590	12.5–13.5	QBT3	—	—	—	NA	NA	0.0249 (J)	0.0231 (J)	0.0264 (J)	—	—	—
RE33-20-189910	33-60591	7.4–7.9	FILL	—	—	—	NA	NA	0.0749 (J)	—	0.0749 (J)	—	—	—
RE33-20-189915	33-60591	10.4–11.4	QBT3	—	0.0274	—	NA	NA	—	—	—	—	—	—
RE33-20-189911	33-60592	9.2–10.2	QBT3	—	0.00213 (J)	—	NA	NA	0.0247 (J)	0.023 (J)	0.023 (J)	0.0178 (J)	—	—
RE33-20-189916	33-60592	12.2–13.2	QBT3	—	—	—	NA	NA	0.0203 (J)	0.0199 (J)	0.0256 (J)	—	—	—
RE33-20-189957	33-60593	9.0–10	QBT3	—	—	—	—	—	—	—	—	—	—	0.0259 (J)
RE33-20-189958	33-60593	19.0–20.0	QBT2	—	—	—	—	—	—	—	—	—	—	0.0883
RE33-20-189960	33-60593	39.0–40.0	QBT2	—	—	—	NA	NA	—	—	—	—	—	0.165
RE33-20-189961	33-60593	52.0–53.0	QBT2	—	—	—	NA	NA	—	—	—	—	—	0.0537
RE33-20-189962	33-60593	60.0–61.0	QBT2	—	—	—	NA	NA	—	—	—	—	—	0.0418
RE33-20-189963	33-60593	74.5–75.5	QBT2	—	—	—	NA	NA	—	—	—	—	—	0.11
RE33-20-189964	33-60594	9.0–10.0	QBT3	—	—	—	—	—	—	—	—	—	—	0.0246 (J)
RE33-20-189965	33-60594	19.0–20.0	QBT2	—	—	—	—	—	—	—	—	—	—	0.0213 (J)
RE33-20-189966	33-60594	29.0–30.0	QBT2	—	—	—	NA	NA	—	—	—	—	—	0.0586
RE33-20-189967	33-60594	39.0–40.0	QBT2	—	—	—	NA	NA	—	—	—	—	—	0.0116 (J)
RE33-20-189968	33-60594	52.5–53.5	QBT2	—	—	—	NA	NA	—	—	—	—	—	0.0396
RE33-20-189969	33-60594	59.0–60.0	QBT2	—	—	—	NA	NA	—	—	—	—	—	0.0205 (J)
RE33-20-189970	33-60594	69.0–70.0	QBT2	—	—	—	NA	NA	—	—	—	—	—	0.0389
RE33-20-189971	33-60595	2.1–2.9	FILL	—	—	0.071 (J)	4.96	1.8	0.666	0.597	0.856	0.345	0.318	0.561

Table 4.6-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthylene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate
Construction Worker SSL[a]				**7530[b]**	**242,000**	**75,300**	**4.91**	**85.3**	**240**	**15.0**	**240**	**7530[b]**	**2310**	**5380**
Industrial SSL[a]				**25,300[b]**	**960,000**	**253,000**	**11**	**11.1**	**32.3**	**23.6**	**32.3**	**25,300[b]**	**323**	**1830**
Residential SSL[a]				**1740**	**66,300**	**17,400**	**1.14**	**2.43**	**1.53**	**1.12**	**1.53**	**1740[b]**	**15.3**	**380**
RE33-20-189979	33-60595	4.1–5.1	QBT3	—	—	—	NA	NA	—	—	—	—	—	0.0113 (J)
RE33-20-189987	33-60595	6.1–7.1	QBT3	—	—	—	NA	NA	0.0418	0.0404	0.0537	0.0211 (J)	0.0176 (J)	0.072
RE33-20-189972	33-60596	1.6–2.25	FILL	—	—	0.254	NA	NA	2.63	2.58	3.26	1.46	1.21	0.568
RE33-20-189988	33-60596	5.6–6.6	QBT3	—	—	—	0.00533	0.00234 (J)	—	—	—	—	—	—
RE33-20-189973	33-60597	1.7–2.4	FILL	—	—	—	2.98	1.09	0.543	0.458	0.569	0.316	—	0.0869 (J)
RE33-20-189981	33-60597	3.7–4.7	QBT3	—	0.00888	—	NA	NA	—	—	—	—	—	—
RE33-20-189989	33-60597	5.7–6.7	QBT3	—	0.00215 (J)	—	NA	NA	0.0293 (J)	0.0363	0.0435	0.0166 (J)	0.0162 (J)	0.0207 (J)
RE33-20-189974	33-60598	1.9–2.9	FILL	—	—	—	NA	NA	0.461	0.426	0.562	0.211	0.204	—
RE33-20-189982	33-60598	3.9–4.9	QBT3	—	—	—	NA	NA	0.028 (J+)	0.0211 (J+)	0.0259 (J+)	—	0.0167 (J+)	—
RE33-20-189990	33-60598	5.9–6.9	QBT3	—	—	—	0.00918	0.00398	0.0145 (J)	—	—	—	—	—
RE33-20-189975	33-60599	1.5–2.3	FILL	—	—	0.359	1.04	0.394	3.1	2.95	3.96	1.56	1.34	0.162 (J)
RE33-20-189983	33-60599	3.5–4.5	QBT3	—	—	—	NA	NA	0.0398	0.0312 (J)	0.0367	0.0237 (J)	—	—
RE33-20-189976	33-60600	2.2–3.2	FILL	—	—	0.371	NA	NA	3.6	3.07	4.17	1.55	1.37	0.12 (J)
RE33-20-189992	33-60600	6.2–7.2	QBT3	—	—	—	0.00178 (J)	—	—	—	—	—	—	—
RE33-20-189977	33-60601	1.8–2.8	FILL	0.169 (J)	—	1.25	NA	NA	10.6	9.71	12.4	4.26	4.69	—
RE33-20-189985	33-60601	3.8–4.8	QBT3	—	—	0.0272 (J)	NA	NA	0.258	0.234	0.334	0.141	0.0898	—
RE33-20-189993	33-60601	5.8–6.8	QBT3	—	—	—	NA	NA	0.0663	0.0546	0.0755	0.0311 (J)	0.0205 (J)	—
RE33-20-189978	33-60602	1.9–2.8	FILL	—	—	0.305	NA	NA	3.12	3.05	3.92	1.69	1.44	—
RE33-20-189986	33-60602	3.9–4.9	QBT3	—	—	—	NA	NA	—	—	—	—	—	—

Table 4.6-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Carbazole	Chrysene	Di-n-butylphthalate	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Toluene
Construction Worker SSL[a]				**85[e]**	**23,100**	**26,900**	**24**	**10,000**	**10,000**	**240**	**7530**	**7530**	**14,000**
Industrial SSL[a]				**1200[f,g]**	**3230**	**91,600**	**3.23**	**33,700**	**33,700**	**32.3**	**25,300**	**25,300**	**61,300**
Residential SSL[a]				**78[f,g]**	**153**	**6160**	**0.153**	**2320**	**2320**	**1.53**	**1740**	**1740**	**5230**
RE33-20-189907	33-60588	7.1–8.1	QBT3	—	—	—	—	0.0189 (J)	—	—	0.0113 (J)	0.0125 (J)	—
RE33-20-189908	33-60589	7.4–8.4	FILL	—	0.0319 (J)	—	—	0.054	—	0.0221 (J)	0.0204 (J)	0.0438	—
RE33-20-189913	33-60589	10.4–11.3	FILL	—	—	—	—	0.0176 (J)	—	—	—	0.0203 (J)	—
RE33-20-189909	33-60590	9.5–10.5	QBT3	—	0.0201 (J)	—	—	0.0251 (J)	—	0.0118 (J)	0.0158 (J)	0.0323 (J)	—
RE33-20-189914	33-60590	12.5–13.5	QBT3	—	0.0199 (J)	—	—	0.0365	—	—	0.0311 (J)	0.0419	—
RE33-20-189910	33-60591	7.4–7.9	FILL	—	—	—	—	0.0954 (J)	—	—	0.0861 (J)	0.112 (J)	—
RE33-20-189915	33-60591	10.4–11.4	QBT3	—	—	—	—	—	—	—	—	—	—
RE33-20-189911	33-60592	9.2–10.2	QBT3	—	0.0185 (J)	—	—	0.0289 (J)	—	—	0.0251 (J)	0.0345 (J)	—
RE33-20-189916	33-60592	12.2–13.2	QBT3	—	0.0167 (J)	—	—	0.0335 (J)	—	—	0.0242 (J)	0.0313 (J)	—
RE33-20-189957	33-60593	9.0–10	QBT3	—	—	—	—	—	—	—	—	—	—
RE33-20-189958	33-60593	19.0–20.0	QBT2	—	—	—	—	—	—	—	—	—	—
RE33-20-189960	33-60593	39.0–40.0	QBT2	—	—	—	—	—	—	—	—	—	—
RE33-20-189961	33-60593	52.0–53.0	QBT2	—	—	—	—	—	—	—	—	—	—
RE33-20-189962	33-60593	60.0–61.0	QBT2	—	—	—	—	—	—	—	—	—	—
RE33-20-189963	33-60593	74.5–75.5	QBT2	NA	—	—	—	—	—	—	—	—	—
RE33-20-189964	33-60594	9.0–10.0	QBT3	NA	—	—	—	—	—	—	—	—	—
RE33-20-189965	33-60594	19.0–20.0	QBT2	NA	—	—	—	—	—	—	—	—	—
RE33-20-189966	33-60594	29.0–30.0	QBT2	NA	—	—	—	—	—	—	—	—	—
RE33-20-189967	33-60594	39.0–40.0	QBT2	NA	—	—	—	—	—	—	—	—	—
RE33-20-189968	33-60594	52.5–53.5	QBT2	NA	—	—	—	—	—	—	—	—	—
RE33-20-189969	33-60594	59.0–60.0	QBT2	NA	—	—	—	—	—	—	—	—	—
RE33-20-189970	33-60594	69.0–70.0	QBT2	NA	—	—	—	—	—	—	—	—	—
RE33-20-189971	33-60595	2.1–2.9	FILL	—	0.68	0.352	0.0924 (J)	1.43	—	0.377	0.291	1.33	0.000546 (J)
RE33-20-189979	33-60595	4.1–5.1	QBT3	—	—	—	—	—	—	—	—	—	—
RE33-20-189987	33-60595	6.1–7.1	QBT3	—	0.0442	0.0326 (J)	—	0.0744	—	0.0256 (J)	0.0218 (J)	0.0727	—
RE33-20-189972	33-60596	1.6–2.25	FILL	0.0865 (J)	2.58	0.485	0.454	3.77	0.0918 (J)	1.47	0.761	6.66	0.00121

Table 4.6-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Carbazole	Chrysene	Di-n-butylphthalate	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Toluene
Construction Worker SSL[a]				**85[e]**	**23,100**	**26,900**	**24**	**10,000**	**10,000**	**240**	**7530**	**7530**	**14,000**
Industrial SSL[a]				**1200[f,g]**	**3230**	**91,600**	**3.23**	**33,700**	**33,700**	**32.3**	**25,300**	**25,300**	**61,300**
Residential SSL[a]				**78[f,g]**	**153**	**6160**	**0.153**	**2320**	**2320**	**1.53**	**1740**	**1740**	**5230**
RE33-20-189988	33-60596	5.6–6.6	QBT3	—	—	—	—	—	—	—	—	—	—
RE33-20-189973	33-60597	1.7–2.4	FILL	—	0.413	—	0.105 (J)	0.701	—	0.358	0.192	0.825	0.000697 (J)
RE33-20-189981	33-60597	3.7–4.7	QBT3	—	—	—	—	—	—	—	—	—	—
RE33-20-189989	33-60597	5.7–6.7	QBT3	—	0.0331 (J)	0.0162 (J)	—	0.0539	—	0.0204 (J)	0.0276 (J)	0.0532	—
RE33-20-189974	33-60598	1.9–2.9	FILL	—	0.485	—	—	0.681	—	0.264	0.164 (J)	0.911	0.000903 (J)
RE33-20-189982	33-60598	3.9–4.9	QBT3	—	0.0211 (J+)	—	—	0.0378 (J+)	—	—	0.0102 (J+)	0.0498 (J+)	—
RE33-20-189990	33-60598	5.9–6.9	QBT3	—	—	—	—	0.0169 (J)	—	—	—	0.0169 (J)	—
RE33-20-189975	33-60599	1.5–2.3	FILL	0.215 (J)	2.54	—	0.482	5.35	—	1.78	1.4	7.08	0.00094 (J)
RE33-20-189983	33-60599	3.5–4.5	QBT3	—	0.0336 (J)	—	—	0.0624	—	0.0158 (J)	0.0161 (J)	0.0789	—
RE33-20-189976	33-60600	2.2–3.2	FILL	0.202	3.35	—	0.484	5.16	0.0709 (J)	1.84	1.28	7.15	—
RE33-20-189992	33-60600	6.2–7.2	QBT3	—	—	—	—	—	—	—	—	—	—
RE33-20-189977	33-60601	1.8–2.8	FILL	0.621	9.96	—	1.59	15.1	0.311 (J)	5.71	4.59	23.3	0.000504 (J)
RE33-20-189985	33-60601	3.8–4.8	QBT3	0.0122 (J)	0.263	—	0.0444	0.446	—	0.146	0.101	0.5	0.000432 (J)
RE33-20-189993	33-60601	5.8–6.8	QBT3	—	0.0557	—	—	0.113	—	0.0338 (J)	0.0321 (J)	0.118	—
RE33-20-189978	33-60602	1.9–2.8	FILL	0.0937 (J)	3.2	0.154 (J)	0.508	4.66	0.085 (J)	1.75	1.12	6.63	0.00041 (J)
RE33-20-189986	33-60602	3.9–4.9	QBT3	—	—	—	—	0.0126 (J)	—	—	—	0.0153 (J)	—

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] SSLs from NMED (2019, 700550) unless otherwise noted.

[b] Pyrene used as a surrogate based on structural similarity.

[c] — = Not detected.

[d] NA= Not analyzed.

[e] Construction worker SSLs calculated using the equations outlined in NMED (2019, 700550), incorporating toxicity and chemical-specific parameters from U.S. Environmental Protection Agency (EPA) regional screening level tables (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[f] SSLs from EPA regional screening tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] Dibenzofuran used as a surrogate based on structural similarity.

Table 4.6-2
Inorganic Chemicals above BVs at SWMU 33-004(a)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Cadmium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Zinc
Soil Background Value[a]				**0.83**	**295**	**0.4**	**19.3**	**14.7**	**0.5**	**22.3**	**0.1**	**na[b]**	**na**	**1.52**	**1**	**48.8**
Qbt 2,3,4 Background Value[a]				**0.5**	**46**	**1.63**	**7.14**	**4.66**	**0.5**	**11.2**	**0.1**	**na**	**na**	**0.3**	**1**	**63.5**
Construction Worker SSL[c]				**142**	**4390**	**72.1**	**134[d]**	**14,200**	**12.1**	**800**	**77.1**	**566,000**	**248**	**1750**	**1770**	**106,000**
Industrial SSL[c]				**519**	**255,000**	**1110**	**505[d]**	**51,900**	**63.3**	**800**	**389**	**2,080,000**	**908**	**6490**	**6490**	**389,000**
Residential SSL[c]				**31.3**	**15,600**	**70.5**	**96.6[d]**	**3130**	**11.2**	**400**	**23.5**	**125,000**	**54.8**	**391**	**391**	**23,500**
RE33-20-189907	33-60588	7.1–8.1	QBT3	0.903 (U)	—[e]	—	21.8	—	—	—	—	5.34	—	0.675 (J)	—	—
RE33-20-189912	33-60588	10.0–11.0	QBT3	—	—	—	29.6	—	—	—	—	3.24	—	2.51	—	—
RE33-20-189908	33-60589	7.4–8.4	FILL	—	—	—	—	—	—	—	0.172 (J+)	16.5	—	2.33	—	—
RE33-20-189913	33-60589	10.4–11.3	FILL	—	—	—	—	—	—	—	—	14.6	—	2.45	—	—
RE33-20-189909	33-60590	9.5–10.5	QBT3	—	—	—	16.1	5.73	—	—	—	103	—	0.749 (J)	—	—
RE33-20-189914	33-60590	12.5–13.5	QBT3	—	—	—	24.6	—	—	—	—	23.3	—	0.848 (J)	—	—
RE33-20-189910	33-60591	7.4–7.9	FILL	—	—	—	—	—	—	—	—	4.26	—	—	—	55.8
RE33-20-189915	33-60591	10.4–11.4	QBT3	—	—	—	25	—	—	—	—	1.92	—	0.79 (J)	—	—
RE33-20-189911	33-60592	9.2–10.2	QBT3	—	—	—	23.7	—	—	—	—	9.38	—	0.998 (J)	—	—
RE33-20-189916	33-60592	12.2–13.2	QBT3	0.501 (U)	—	—	48.4	—	—	—	—	5.72	—	0.942 (J)	—	—
RE33-20-189957	33-60593	9.0–10	QBT3	—	—	—	—	—	—	—	—	1.86	0.000577 (J)	1.35	—	—
RE33-20-189958	33-60593	19.0–20.0	QBT2	—	—	—	—	—	—	—	—	1.52	0.00075 (J)	0.567 (J)	—	—
RE33-20-189959	33-60593	29.0–30.0	QBT2	—	—	—	—	—	—	—	—	1.41	—	1.14	—	—
RE33-20-189960	33-60593	39.0–40.0	QBT2	—	—	—	—	—	—	—	—	1.66	0.000759 (J)	0.969	—	—
RE33-20-189961	33-60593	52.0–53.0	QBT2	—	—	7.99	—	—	—	—	—	2	—	1.1	—	—
RE33-20-189962	33-60593	60.0–61.0	QBT2	—	—	—	—	—	—	—	—	2.51	—	1.14	—	—
RE33-20-189963	33-60593	74.5–75.5	QBT2	—	—	—	—	—	—	—	—	1.93	—	1.09	—	—
RE33-20-189964	33-60594	9.0–10.0	QBT3	—	—	—	—	—	—	—	—	—	0.00106 (J)	0.915 (J)	—	—
RE33-20-189965	33-60594	19.0–20.0	QBT2	—	—	—	—	—	—	—	—	0.587 (J)	0.000931 (J)	0.72 (J)	—	—
RE33-20-189966	33-60594	29.0–30.0	QBT2	—	—	—	—	—	—	—	—	—	0.000694 (J)	0.898 (J)	—	—
RE33-20-189967	33-60594	39.0–40.0	QBT2	—	—	—	—	—	—	—	—	—	—	0.915 (J)	—	—
RE33-20-189968	33-60594	52.5–53.5	QBT2	—	—	—	—	—	—	—	—	—	—	0.971	—	—
RE33-20-189969	33-60594	59.0–60.0	QBT2	—	—	—	—	—	—	—	—	—	—	0.98 (J)	—	—
RE33-20-189970	33-60594	69.0–70.0	QBT2	—	—	—	—	—	—	—	—	0.67 (J)	—	0.967 (J)	—	—
RE33-20-189971	33-60595	2.1–2.9	FILL	—	—	—	—	25.9	—	73.1	0.261	22.2	—	—	1.5	74.5
RE33-20-189979	33-60595	4.1–5.1	QBT3	—	55.6	—	24.7	4.87	—	—	—	7.85	—	0.898 (J)	—	—

Table 4.6-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Cadmium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Zinc
Soil Background Value[a]				**0.83**	**295**	**0.4**	**19.3**	**14.7**	**0.5**	**22.3**	**0.1**	**na[b]**	**na**	**1.52**	**1**	**48.8**
Qbt 2,3,4 Background Value[a]				**0.5**	**46**	**1.63**	**7.14**	**4.66**	**0.5**	**11.2**	**0.1**	**na**	**na**	**0.3**	**1**	**63.5**
Construction Worker SSL[c]				**142**	**4390**	**72.1**	**134[d]**	**14,200**	**12.1**	**800**	**77.1**	**566,000**	**248**	**1750**	**1770**	**106,000**
Industrial SSL[c]				**519**	**255,000**	**1110**	**505[d]**	**51,900**	**63.3**	**800**	**389**	**2,080,000**	**908**	**6490**	**6490**	**389,000**
Residential SSL[c]				**31.3**	**15,600**	**70.5**	**96.6[d]**	**3130**	**11.2**	**400**	**23.5**	**125,000**	**54.8**	**391**	**391**	**23,500**
RE33-20-189987	33-60595	6.1–7.1	QBT3	—	—	—	18.7	—	—	—	—	5.82	—	0.898 (J)	—	—
RE33-20-189972	33-60596	1.6–2.25	FILL	—	—	—	—	36.1	—	85.8	0.75 (J-)	38.2	—	—	2.21	79.3
RE33-20-189980	33-60596	3.6–4.6	QBT3	—	—	—	29.4	—	—	—	—	3.11	—	1.13	—	—
RE33-20-189988	33-60596	5.6–6.6	QBT3	—	—	—	11.8	—	—	—	—	3.81	—	1.44	—	—
RE33-20-189973	33-60597	1.7–2.4	FILL	0.947 (U)	—	—	32.8	108	—	279	1.6	45.2	—	—	7.91	64.6
RE33-20-189981	33-60597	3.7–4.7	QBT3	—	—	—	64.1	—	—	—	—	3.69	—	1.06	—	—
RE33-20-189989	33-60597	5.7–6.7	QBT3	—	—	—	24.5	6.19	—	11.4 (J+)	—	3.37	—	1.02	—	—
RE33-20-189974	33-60598	1.9–2.9	FILL	—	—	—	—	—	—	—	0.132 (J-)	9.56	—	—	—	54.9
RE33-20-189982	33-60598	3.9–4.9	QBT3	—	—	—	35	—	—	—	—	4.37	—	1.01 (J)	—	—
RE33-20-189990	33-60598	5.9–6.9	QBT3	—	—	—	53.9	—	—	—	—	3.86	—	1.08	—	—
RE33-20-189975	33-60599	1.5–2.3	FILL	—	—	—	—	15	—	28.2 (J+)	0.183 (J-)	12.6	—	—	—	52.9
RE33-20-189983	33-60599	3.5–4.5	QBT3	—	—	—	14.6	—	—	—	—	4.02	—	1.04	—	—
RE33-20-189991	33-60599	5.5–6.5	QBT3	—	—	—	11.1	—	—	—	—	2.86	—	1.35	—	—
RE33-20-189976	33-60600	2.2–3.2	FILL	—	—	—	—	—	—	—	—	32.5	—	—	—	—
RE33-20-189984	33-60600	4.2–5.2	QBT3	—	—	—	21	—	—	—	—	1.5	—	0.777 (J)	—	—
RE33-20-189992	33-60600	6.2–7.2	QBT3	—	—	—	32.6	—	—	—	—	1.46	—	0.716 (J)	—	—
RE33-20-189977	33-60601	1.8–2.8	FILL	—	—	—	—	—	—	—	—	54.5	0.000577 (J)	—	—	—
RE33-20-189985	33-60601	3.8–4.8	QBT3	—	—	—	25.4	—	—	—	—	33.2	—	1.06	—	—
RE33-20-189993	33-60601	5.8–6.8	QBT3	—	—	—	25	—	0.532	—	—	8.87	—	1.34	—	—
RE33-20-189978	33-60602	1.9–2.8	FILL	—	—	0.487 (J)	—	32.8	—	44.7 (J+)	0.31 (J-)	35	—	—	—	50.2
RE33-20-189986	33-60602	3.9–4.9	QBT3	—	—	—	17	—	—	—	—	17.8	—	0.933 (J)	—	—
RE33-20-189994	33-60602	5.9–6.9	QBT3	—	—	—	22.6	—	—	—	—	3.71	—	1.2	—	—

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2019, 700550) unless otherwise noted.

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

Table 4.6-3
Proposed Sampling and Analysis at SWMU 33-004(a)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	TAL Metals (SW-846:6010D[b]/6020B[b]/7471A[b])	Mercury (SW-846:7471A[b])	Cyanide (SW-846:9012A[b])	Nitrate (SW-846:9056A[b])	Perchlorate (SW-846:6850)	pH (SW-846-9045D[b])	VOCs (SW-846:8260D[b])	SVOCs (SW-846:8270C[b])	PAHs (SW-846:8270-SIM_PAHS)	PCBs (SW-846:8082A[b])	Isotopic Uranium (HASL-300)	Isotopic Plutonium (HASL-300)	Tritium (EPA 906.0)	Gamma-emitting radionuclides (EPA 901.1M)
Define vertical extent of PCBs at locations 33-60595, 33-60597, and 33-60599	33-60595, 33-60597, and 33-60599	Locations 33-60595, 33-60597, and 33-60599	3.7–4.7, 5.7–6.7	—[c]	—	—	—	—	—	—	—	—	X[d]	—	—	—	—
Define vertical extent of PAHs at locations 33-60590 and 33-60592	33-60590 and 33-60592	Locations 33-60590 and 33-60592	15.0–16.0	—	—	—	—	—	—	—	—	X	—	—	—	—	—
Define vertical extent of PAHs at locations 33-60597	33-60597	Location 33-60597	9.0–10.0	—	—	—	—	—	—	—	—	X	—	—	—	—	—
Define lateral extent on the eastern side of the septic tank drain field	4a-1 to 4a-4	Eastern side of septic drain field	0.0–1.0, 2.0–3.0, and 4.0–5.0 below pipe	X	—[c]	X	X	X	X	X	X	—	X	X	X	X	X
Define lateral extent of PCBs north of location 33-60595	4a-5 to 4a-6	5 ft and 10 ft north of location 33-60595	2.1–2.9, 4.1–5.1, 6.1–7.1	—	—	—	—	—	—	—	—	—	X	—	—	—	—
Define vertical and lateral extent of mercury adjacent to location 33-60596 to confirm excavation area	4a-7 to 4a-10	Four 3-ft step-outs from location 33-60596	1.6–2.25, 3.6–4.6, 5.6–6.6	—	X	—	—	—	—	—	—	—	—	—	—	—	—
Define vertical and lateral extent of mercury adjacent to location 33-60597 to confirm excavation area	4a-11 to 4a-14	Four 3-ft step-outs from location 33-60597	1.7–2.4, 3.7–4.7, 5.7–6.7	—	X	—	—	—	—	—	—	—	—	—	—	—	—
Define lateral extent of PCBs north of location 33-60597	4a-15	10-ft step-out north of location 33-60597	1.7–2.4, 3.7–4.7, 5.7–6.7	—	—	—	—	—	—	—	—	—	X	—	—	—	—
Define vertical and lateral extent of PAHs adjacent to location 33-60601 to confirm excavation area and 10-ft to the south	4a-16 to 4a-20	Four 3-ft step-outs from location 33-60601 and one 8-ft step-out location to the south	1.8–2.8, 3.8–4.8, 5.8–6.8	—	—	—	—	—	—	—	—	X	—	—	—	—	—
Define nature and extent of contamination at the easternmost seepage pit	4a-21	Next to the easternmost seepage pit	5.0–6.0, 9.0–10.0, 19.0–20.0, 29.0–30.0	X	—	X	X	X	X	X	X	—	X	X	X	X	X

[a] Depths are below ground surface, unless specified otherwise.
[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.
[c] — = Analysis will not be performed.
[d] X = Analysis will be performed.

Table 4.7-1
Organic Chemicals Detected at SWMU 33-004(i)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Carbazole	Chrysene	Di-n-butylphthalate
Construction Worker SSL[a]				**15,100**	**75,300**	**4.91**	**85.3**	**240**	**15.0**	**240**	**7530[b]**	**2310**	**85[c]**	**23,100**	**26,900**
Industrial SSL[a]				**50,500**	**253,000**	**11**	**11.1**	**32.3**	**23.6**	**32.3**	**25,300[b]**	**323**	**1200[d,e]**	**3230**	**91,600**
Residential SSL[a]				**3480**	**17,400**	**1.14**	**2.43**	**1.53**	**1.12**	**1.53**	**1740[b]**	**15.3**	**78[d,e]**	**153[f]**	**6160**
RE33-20-190004	33-01055	0.0–1.0	FILL	0.114 (J)	0.17 (J)	0.249	0.116	0.407	0.39	0.46	0.206	0.187	0.0766 (J)	0.379	0.0729 (J)
RE33-20-190014	33-01055	2.0–3.0	FILL	0.27	0.728	NA[f]	NA	1.52	1.34	1.62	0.665	0.642	0.363	1.42	—[g]
RE33-20-190024	33-01055	4.0–5.0	FILL	0.0232 (J)	0.0532	NA	NA	0.158	0.178	0.198	0.0946	0.0774	0.0203 (J)	0.148	—
RE33-20-190005	33-01056	0.0–1.0	FILL	0.159 (J)	0.314 (J)	NA	NA	0.966	1	1.24	0.553	0.494	0.203 (J)	0.955	—
RE33-20-190015	33-01056	2.0–3.0	FILL	—	0.0889 (J)	NA	NA	1.01	1.16	1.46	0.664	0.569	—	1.01	—
RE33-20-190006	33-01057	0.0–1.0	SOIL	—	—	0.629	0.268	0.0385 (J)	0.0452	0.0586	0.0256 (J)	0.0224 (J)	—	0.0373 (J)	—
RE33-20-190007	33-01058	0.0–1.0	FILL	0.214 (J)	0.456	NA	NA	1.12	0.904	1.09	0.471	0.49	0.207 (J)	1.06	—
RE33-20-190017	33-01058	2.0–3.0	FILL	—	—	NA	NA	—	—	—	—	—	—	—	—
RE33-20-190027	33-01058	4.0–5.0	FILL	—	—	24.8	7.18	0.021 (J)	0.0155 (J)	0.0214 (J)	—	—	—	0.0204 (J)	—
RE33-20-190008	33-01059	0.0–1.0	FILL	—	0.2 (J)	0.0496	0.0287	0.555	0.571	0.669	0.28 (J)	0.223 (J)	—	0.521	—
RE33-20-190018	33-01059	2.0–3.0	FILL	1.48	2.32	NA	NA	3.39	2.8	3.44	1.2	1.37	1.02	3.22	—
RE33-20-190028	33-01059	4.0–5.0	FILL	—	—	NA	NA	—	—	—	—	—	—	—	—
RE33-20-190009	33-01060	0.0–1.0	FILL	—	—	NA	NA	0.256	0.252	0.294	0.0981 (J)	0.115 (J)	—	0.241	—
RE33-20-190019	33-01060	2.0–3.0	FILL	—	—	NA	NA	0.0163 (J)	—	0.0141 (J)	—	—	—	—	—
RE33-20-190029	33-01060	4.0–5.0	FILL	—	—	0.00885	0.00464	—	—	—	—	—	—	—	—
RE33-20-190010	33-60612	0.0–1.0	SOIL	0.0149 (J)	0.0206 (J)	NA	NA	0.0988	0.123	0.148	0.0896	0.0562	0.0206 (J)	0.118	0.0224 (J)
RE33-20-190020	33-60612	2.0–3.0	SOIL	0.0305 (J)	0.0674	NA	NA	0.162	0.18	0.195	0.145	0.0692	0.0319 (J)	0.172	—
RE33-20-190011	33-60613	0.0–1.0	SOIL	0.106 (J)	0.185 (J)	NA	NA	0.492	0.5	0.551	0.283	0.226	0.112 (J)	0.46	—
RE33-20-190021	33-60613	2.0–3.0	QBT3	—	—	NA	NA	0.0151 (J)	0.013 (J)	0.0151 (J)	—	—	—	0.012 (J)	—
RE33-20-190031	33-60613	4.0–5.0	QBT3	—	0.0214 (J)	NA	NA	0.0669	0.0634	0.0767	0.0371	0.0294 (J)	0.0154 (J)	0.0683	—
RE33-20-190012	33-60614	0.0–1.0	SOIL	—	—	NA	NA	0.0332 (J)	0.0368 (J)	0.0428 (J)	0.0216 (J)	0.0189 (J)	—	0.0327 (J)	—
RE33-20-190013	33-60615	0.0–1.0	SOIL	—	—	NA	NA	0.0384 (J)	0.0389 (J)	0.046	0.0223 (J)	0.0188 (J)	—	0.038 (J)	—

Table 4.7-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Isopropylbenzene	Isopropyltoluene[4-]	Methylnaphthalene[1-]	Methylnaphthalene[2-]	Naphthalene	Phenanthrene	Pyrene
Construction Worker SSL[a]				**24**	**10,000**	**10,000**	**240**	**2740**	**2740[h]**	**6060**	**1000**	**159**	**7530**	**7530**
Industrial SSL[a]				**3.23**	**33,700**	**33,700**	**32.3**	**14,200**	**14,200[h]**	**813**	**3370**	**241**	**25,300**	**25,300**
Residential SSL[a]				**0.153**	**2320**	**2320**	**1.53**	**2360**	**2360[h]**	**172**	**232**	**49.7**	**1740**	**1740**
RE33-20-190004	33-01055	0.0–1.0	FILL	—	0.882	0.0878 (J)	0.247	—	—	—	—	0.101 (J)	0.631	0.622
RE33-20-190014	33-01055	2.0–3.0	FILL	0.231	4.14	0.219	0.79	—	—	—	—	—	2.41	2.81
RE33-20-190024	33-01055	4.0–5.0	FILL	0.0257 (J)	0.326	0.0193 (J)	0.0981	—	—	—	—	0.0107 (J)	0.177	0.256
RE33-20-190005	33-01056	0.0–1.0	FILL	0.159 (J)	2.24	0.125 (J)	0.583	—	—	—	—	—	1.28	1.55
RE33-20-190015	33-01056	2.0–3.0	FILL	0.224	1.44	—	0.626	—	—	—	—	—	0.235	1.26
RE33-20-190006	33-01057	0.0–1.0	SOIL	—	0.0865	—	0.0248 (J)	—	—	—	—	—	0.0366 (J)	0.0605
RE33-20-190007	33-01058	0.0–1.0	FILL	—	2.34	0.184 (J)	0.548	—	—	—	—	—	1.75	1.91
RE33-20-190017	33-01058	2.0–3.0	FILL	—	—	—	—	—	—	—	0.000499 (J)	—	—	—
RE33-20-190027	33-01058	4.0–5.0	FILL	—	0.0428	—	—	0.0227	0.00583	—	—	—	0.038	0.0314 (J)
RE33-20-190008	33-01059	0.0–1.0	FILL	—	1.18	—	0.276 (J)	—	—	—	—	—	0.782	0.892
RE33-20-190018	33-01059	2.0–3.0	FILL	0.366	6.6	1.36	1.43	—	—	0.284 (J)	0.414	1.09	7.72	6.99
RE33-20-190028	33-01059	4.0–5.0	FILL	—	—	—	—	—	—	—	0.00141	—	—	—
RE33-20-190009	33-01060	0.0–1.0	FILL	—	0.435	—	0.13 (J)	—	—	—	—	—	0.38	0.478
RE33-20-190019	33-01060	2.0–3.0	FILL	—	0.0282 (J)	—	—	—	—	—	—	—	0.0155 (J)	0.021 (J)
RE33-20-190029	33-01060	4.0–5.0	FILL	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190010	33-60612	0.0–1.0	SOIL	—	0.162	—	0.0953	—	—	—	—	—	0.119	0.269
RE33-20-190020	33-60612	2.0–3.0	SOIL	0.0561	0.295	0.0391 (J)	0.152	—	—	—	—	0.0525	0.293	0.328
RE33-20-190011	33-60613	0.0–1.0	SOIL	0.0767 (J)	1.06	0.124 (J)	0.299	—	—	—	—	0.0905 (J)	0.903	0.893
RE33-20-190021	33-60613	2.0–3.0	QBT3	—	0.0201 (J)	—	—	—	—	—	—	—	0.019 (J)	0.0261 (J)
RE33-20-190031	33-60613	4.0–5.0	QBT3	—	0.112	—	0.035	—	—	—	—	—	0.0963	0.149
RE33-20-190012	33-60614	0.0–1.0	SOIL	—	0.0636	—	0.0198 (J)	—	—	—	—	—	0.0378 (J)	0.0649
RE33-20-190013	33-60615	0.0–1.0	SOIL	—	0.0603	—	0.0331 (J)	—	—	—	—	—	0.0282 (J)	0.0675

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] SSLs from NMED (2019, 700550) unless otherwise noted.

[b] Pyrene used as a surrogate based on structural similarity.

[c] Construction worker SSLs calculated using the equations outlined in NMED (2019, 700550), incorporating toxicity and chemical-specific parameters from U.S. Environmental Protection Agency EPA regional screening level (RSL) tables (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[d] SSL from EPA RSL tables (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[e] Dibenzofuran used as a surrogate based on structural similarity.

[f] NA = Not analyzed.

[g] — = Not detected.

[h] Isopropylbenzene used as a surrogate based on structural similarity

Table 4.7-2
Proposed Sampling and Analysis at SWMU 33-004(i)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	PCBs (SW-846:8082A[b])
Define vertical extent of PCBs at locations 33-01055, 33-01057, and 33-01059	33-01055, 33-01057, and 33-01059	Locations 33-01055, 33-01057, and 33-01059	2.0–3.0, 4.0–5.0	X[c]
Define vertical extent of PCBs at location 33-01060	33-01060	Location 33-01060	0.0–0.1, 2.0–3.0, 6.0–7.0	X
Define vertical extent of PCBs at location 33-01058	33-01058	Location 33-01058	6.0–7.0, 8.0–9.0	X
Define lateral extent of PCBs at location 33-01058	4i-1 to 4i-6	Four 5-ft step-outs and two 10-ft step-outs from location 33-01058	0–1.0, 2.0–3.0, 4.0–5.0, 6.0–7.0, 8.0–9.0	X

[a] Depths are below ground surface.

[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.

[c] X = Analysis will be performed.

Table 4.8-1
Field Screening Results from SWMU 33-006(a)

Sample Date	Sample ID	PID[a] Results (ambient/result in PPM)	Radiation Values (Alpha/Beta-Gamma dpm)	TNT[b] Screening Concentration (ppm)	RDX[c] Screening Concentration ppm)
2/26/2020	6a-001	0.0/0.2	NDA/NDA[d]	0.03	0.62
2/26/2020	6a-002	0.0/0.2	NDA/NDA	15.63	0.09
2/26/2020	6a-002a	0.0/1.7	60/2730	0.59	0.53
2/26/2020	6a-003	0.0/0.2	NDA/NDA	59.54	0.18
2/26/2020	6a-003a	0.0/1.4	42/2800	57.21	6.00
2/26/2020	6a-004	0.0/0.2	NDA/NDA	124.98	1.87
2/26/2020	6a-004a	0.0/0.6	36/2360	7.71	0.18
2/26/2020	6a-005	0.0/0.1	NDA/NDA	1.39	0.93
2/26/2020	6a-006	0.0/0.1	NDA/NDA	0.03	2.04
2/26/2020	6a-007	0.0/0.1	NDA/NDA	0.06	0.36
2/26/2020	6a-008	0.0/0.2	NDA/NDA	0.53	0.71
2/26/2020	6a-009	0.0/0.2	NDA/NDA	0.77	2.13
2/26/2020	6a-010	0.0/0.2	NDA/NDA	0.84	0.18
2/26/2020	6a-011	0.0/0.4	NDA/NDA	2.20	0.93
2/26/2020	6a-012	0.0/0.2	NDA/NDA	0.77	0.00
2/26/2020	6a-013	0.0/0.2	NDA/NDA	0.31	0.04
2/26/2020	6a-014	0.0/0.1	NDA/NDA	1.30	0.04
2/26/2020	6a-015	0.0/0.3	NDA/NDA	5.57	1.02
2/26/2020	6a-015a	0.0/0.0	152/5760	0.12	0.22
2/26/2020	6a-016	0.0/0.3	NDA/NDA	0.43	1.73
2/26/2020	6a-017	0.0/0.3	NDA/NDA	2.35	0.04
2/26/2020	6a-018	0.0/0.1	NDA/NDA	0.68	1.02
2/26/2020	6a-019	0.0/0.3	NDA/NDA	1.27	2.71
2/26/2020	6a-020	0.0/0.2	NDA/NDA	0.19	0.04
2/26/2020	6a-021	0.0/0.3	NDA/NDA	1.517	3.200
2/26/2020	6a-022	0.0/0.1	NDA/NDA	1.084	0.889
2/26/2020	6a-023	0.0/0.0	NDA/800	0.341	0.889
2/26/2020	6a-024	0.0/0.2	NDA/NDA	13.715	6.489
2/26/2020	6a-024a	0.08/0.9	60/2640	2.817	0.444
2/26/2020	6a-025	0.0/0.3	NDA/800	0.836	0.000
2/26/2020	6a-026	0.0/0.4	NDA/NDA	1.300	0.622
2/26/2020	6a-027	0.0/0.2	NDA/NDA	1.641	1.644
2/26/2020	6a-028	0.0/0.3	NDA/NDA	0.619	0.044
2/26/2020	6a-029	0.0/0.1	NDA/NDA	0.774	1.244

Table 4.8-1 (continued)

Sample Date	Sample ID	PID[a] Results (ambient/result in PPM)	Radiation Values (Alpha/Beta-Gamma dpm)	TNT[b] Screening Concentration (ppm)	RDX[c] Screening Concentration ppm)
2/26/2020	6a-030	0.0/0.1	NDA/NDA	37.430	1.422
2/26/2020	6a-030a	0.0/0.1	24/2400	0.650	1.022
2/26/2020	6a-031	0.0/0.1	NDA/NDA	0.650	1.289
2/26/2020	6a-032	0.0/0.1	NDA/NDA	1.269	0.978
2/26/2020	6a-033	0.0/0.2	NDA/NDA	0.464	3.689
2/26/2020	6a-034	0.0/0.4	NDA/NDA	0.248	0.267
2/26/2020	6a-035	0.0/0.2	NDA/200	0.248	1.111
2/26/2020	6a-036	0.0/0.1	NDA/NDA	0.960	3.822
2/26/2020	6a-037	0.0/0.2	NDA/NDA	0.372	2.133
2/26/2020	6a-038	0.0/0.2	NDA/NDA	0.619	0.489

[a] PID = Photoionization detector.

[b] TNT = Trinitrotoluene[2,4,6-].

[c] RDX = Royal Demolition Explosive (hexahydro-1,3,5-trinitro-1,3,5-triazine).

[d] NDA—No detectable activity.

Table 4.8-2
Inorganic Chemicals above BVs at SWMU 33-006(a)

Sample ID	Location ID	Depth (ft)	Media	Barium	Calcium	Chromium	Cobalt	Copper	Lead	Nickel	Nitrate	Perchlorate	Selenium	Silver	Zinc
Soil Background Value[a]				**295**	**6120**	**19.3**	**8.64**	**14.7**	**22.3**	**15.4**	**na[b]**	**na**	**1.52**	**1**	**48.8**
Qbt 2,3,4 Background Value[a]				**46**	**2200**	**7.14**	**3.14**	**4.66**	**11.2**	**6.58**	**na**	**na**	**0.3**	**1**	**63.5**
Industrial SSL[c]				**255,000**	**na**	**505[d]**	**388**	**51,900**	**800**	**25,700**	**2,080,000**	**908**	**6490**	**6490**	**389,000**
Recreational SSL[c]				**124,000**	**na**	**281[d]**	**186**	**24,800**	**1110**	**12,400**	**991,000**	**434**	**3100**	**3100**	**186,000**
Residential SSL[c]				**15,600**	**na**	**96.6[d]**	**23.4**	**3130**	**400**	**1560**	**125,000**	**54.8**	**391**	**391**	**23,500**
RE33-20-186626	33-60414	0.0–1.0	FILL	—[e]	8180 (J)	—	—	102 (J+)	—	—	—	—	—	—	—
RE33-20-186632	33-60414	2.0–3.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-186627	33-60415	0.0–1.0	FILL	456	—	—	—	897 (J+)	47.1	—	—	—	—	2.75	—
RE33-20-186633	33-60415	2.0–3.0	FILL	—	—	—	—	144 (J+)	—	—	—	—	—	—	—
RE33-20-186628	33-60416	0.0–0.4	SOIL	—	—	—	—	1790 (J+)	—	—	1.08 (J)	—	—	—	56.9
RE33-20-186634	33-60416	2.0–3.0	QBT3	—	—	10	—	—	—	—	—	—	1.21	—	—
RE33-20-186629	33-60417	0.0–0.5	SOIL	—	—	—	—	9270 (J+)	—	—	0.86 (J)	—	—	1.32	69.3
RE33-20-186635	33-60417	2.0–3.0	QBT3	—	—	17.3	—	—	—	—	—	—	1.39	—	—
RE33-20-186630	33-60418	0.0–1.0	SOIL	—	—	—	—	385 (J+)	36.8	—	0.736 (J)	—	—	—	54.3
RE33-20-186636	33-60418	2.0–3.0	QBT3	—	—	21.7	—	37.5 (J+)	—	—	—	—	1.09	—	—
RE33-20-186631	33-60419	0.0–1.0	SOIL	—	—	—	—	392 (J+)	—	—	1.55	—	—	—	58.4
RE33-20-186637	33-60419	2.0–3.0	SOIL	—	—	—	—	48.9 (J+)	—	—	—	—	—	—	—
RE33-20-186638	33-60420	0.0–1.0	SOIL	—	—	—	—	—	—	—	0.902 (J)	0.000568 (J)	—	—	—
RE33-20-186640	33-60420	2.2–3.0	QBT3	—	—	—	—	—	—	—	—	—	1.04	—	—
RE33-20-186639	33-60421	0.0–1.0	SOIL	—	—	—	—	82.7	—	—	1.17	—	—	—	—
RE33-20-186641	33-60421	2.0–3.0	QBT3	123	2270	9.68	3.36	6.34	—	7.52	—	—	1.18	—	—
RE33-20-186642	33-60422	0.0–1.0	FILL	—	—	—	—	—	—	—	1.17	—	—	—	—
RE33-20-186650	33-60422	2.0–2.9	FILL	—	—	—	—	—	—	—	—	0.00247	—	—	—
RE33-20-186643	33-60423	0.0–1.0	SOIL	—	—	—	—	138 (J+)	—	—	0.815 (J)	—	—	—	—
RE33-20-186651	33-60423	2.0–2.55	SOIL	—	—	—	—	6610 (J+)	—	—	—	—	—	2.86	53.3

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.
[a] BVs from LANL (1998, 059730).
[b] na = Not available.
[c] SSLs from NMED (2019, 700550) unless otherwise noted.
[d] SSL for total chromium.
[e] — = Not detected or not detected above BV.

Table 4.8-3
Organic Chemicals Detected at SWMU 33-006(a)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Butylbenzylphthalate	Chrysene	Di-n-butylphthalate	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
Construction Worker SSL[a]				**15,100**	**4.91**	**85.3**	**240**	**15.0**	**240**	**7530[b]**	**2310**	**53,800[b]**	**23,100**	**26,900**	**10,000**	**240**	**7530**	**7530**
Industrial SSL[a]				**50,500**	**11**	**11.1**	**32.3**	**23.6**	**32.3**	**2530[b]**	**323**	**1200[b]**	**3230**	**91,600**	**33,700**	**32.3**	**25,300**	**25,300**
Residential SSL[a]				**3480**	**1.14**	**2.43**	**1.53**	**1.12**	**1.53**	**1740[b]**	**15.3**	**2900[b]**	**153**	**6160**	**2320**	**1.53**	**1740**	**1740**
RE33-20-186626	33-60414	0.0–1.0	FILL	—[c]	—	—	—	—	—	—	—	—	—	0.0171 (J)	—	—	—	—
RE33-20-186633	33-60415	2.0–3.0	FILL	—	—	—	—	—	—	—	—	—	—	24.6	—	—	—	—
RE33-20-186628	33-60416	0.0–0.4	SOIL	—	NA[d]	NA	0.0267 (J)	0.0432	0.0355 (J)	0.0517	0.0216 (J)	—	0.0322 (J)	—	0.048	0.044	0.0377	0.044
RE33-20-186630	33-60418	0.0–1.0	SOIL	—	NA	NA	—	—	—	—	—	—	—	0.0823 (J)	—	—	—	—
RE33-20-186631	33-60419	0.0–1.0	SOIL	—	NA	NA	—	—	—	—	—	—	—	0.524	—	—	—	—
RE33-20-186637	33-60419	2.0–3.0	SOIL	0.0262 (J)	NA	NA	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-186638	33-60420	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	0.0464	—	—	—	—
RE33-20-186639	33-60421	0.0–1.0	SOIL	—	NA	NA	—	—	0.0131 (J)	—	—	0.0271 (J)	—	—	0.0156 (J)	—	—	0.0148 (J)
RE33-20-186651	33-60423	2.0–2.55	SOIL	—	0.00226 (J)	0.00177 (J)	—	—	—	—	—	—	—	—	—	—	—	—

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] SSLs from NMED (2019, 700550) unless otherwise noted.

[b] Pyrene used as a surrogate based on structural similarity.

[c] — = Not detected.

[d] NA = Not analyzed.

Table 4.8-4
Proposed Sampling and Analysis at SWMU 33-006(a)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	TAL Metals (SW-846:6010D[b]/6020B[b]/7471A[b])	Copper (SW-846:6010C[b])	Total Cyanide (SW-846:9012B[b])	Nitrate (SW-846:9056A[b])	Perchlorate (SW-846:6850)	pH (SW-846-9045D[b])	Di-n-butylphthalate (SW-846:8270D[b])	VOCs (SW-846:8260D[b])	SVOCs (SW-846:8270D[b])	Explosive Compounds (SW-846:8330B[b])	PCBs (SW-846:8082A[b])	Isotopic Uranium (HASL-300)	Isotopic Plutonium (HASL-300)	Tritium (EPA 906.0)	Gamma-Emitting Radionuclides (EPA 901.1)
Define vertical extent of di-n-butylphthalate at location 33-60415	33-60415	33-60415	4.0–5.0, 7.0–8.0	—[c]	—	—	—	—	—	X[d]	—	—	—	—	—	—	—	—
Define vertical extent of copper at location 33-60423	33-60423	33-60423	3.0–4.0, 6.0–7.0	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—
Define vertical and lateral extent of copper and di-n-butylphthalate at location 33-60415	6a-1 to 6a-4	Four 5-ft step-outs from location 33-60415	0.0–1.0, 2.0–3.0, 0.0–1.0 into tuff, 2.0–3.0 into tuff	—	X	—	—	—	—	X	—	—	—	—	—	—	—	—
Define vertical and lateral extent of copper at location 33-60416	6a-5 to 6a-8	Four 5-ft step-outs from location 33-60416	0.0–1.0, 2.0–3.0, 0.0–1.0 into tuff, 2.0–3.0 into tuff	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—
Define vertical and lateral extent of copper at location 33-60417	6a-9 to 6a-12	Four 5-ft step-outs from location 33-60417	0.0–1.0, 2.0–3.0, 0.0–1.0 into tuff, 2.0–3.0 into tuff	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—
Define vertical and lateral extent of copper at location 33-60423	6a-13 to 6a-20	Four 5-ft and four 10-ft step-outs from location 33-60423	0.0–1.0, 2.0–3.0, 0.0–1.0 into tuff, 2.0–3.0 into tuff	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—
Surface soil removal at 11 EnSys immunoassay test kit locations, followed by collection of confirmation samples.	EnSys immunoassay test kit locations 6a-002, 6a-003, 6a-004, 6a-015, 6a-019, 6a-021, 6a-023, 6a-024, 6a-030, 6a-033, 6a-036	Locations where elevated high explosives were observed during 2019–2020 sampling	0.0–1.0 below excavation, 2.0–3.0 below excavation	X	—	X	X	X	X	—	X	X	X	X	X	X	X	X

[a] Depths are below ground surface, unless specified otherwise.

[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.

[c] — = Analysis will not be performed.

[d] X = Analysis will be performed.

Table 4.9-1
Inorganic Chemicals above BVs at SWMU 33-007(c)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium
Soil Background Value[a]				**29,200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21,500**	**22.3**	**4610**
Construction Worker SSL[b]				**41,400**	**142**	**41.2**	**4390**	**148**	**72.1**	**na[c]**	**134[d]**	**36.7**	**14,200**	**248,000**	**800**	**na**
Industrial SSL[b]				**1,290,000**	**519**	**35.9**	**255,000**	**2580**	**1110**	**na**	**505[d]**	**388**	**51,900**	**908,000**	**800**	**na**
Residential SSL[b]				**78,000**	**31.3**	**7.07**	**15,600**	**156**	**70.5**	**na**	**96.6[d]**	**23.4**	**3130**	**548,00**	**400**	**na**
RE33-20-189624	33-01199	0.0–1.0	SOIL	—[e]	1.54 (U)	—	—	—	0.409 (J)	—	—	11.4	15.1	—	—	7820
RE33-20-189625	33-01199	2.0–3.0	SOIL	—	—	—	—	—	—	—	—	—	15.3	—	—	8530
RE33-20-189626	33-01199	4.0–5.0	SOIL	—	0.949 (U)	—	—	—	—	—	—	—	15.1	—	—	7350
RE33-20-189627	33-01203	0.0–1.0	FILL	—	1.48 (U)	—	—	—	—	6400	39.5 (J+)	—	—	—	23.8 (J+)	—
RE33-20-189628	33-01203	2.0–3.0	TCB	8590	—	1.38	166	0.928	—	5750	13.3 (J+)	10.1	14.9	14,500	3.91 (J+)	9230
RE33-20-189629	33-01203	4.0–5.0	TCB	7490	—	0.592 (J)	178	0.369	—	9290	18.3 (J+)	13.2	18.4	16,200	—	12,100
RE33-20-189630	33-01204	0.0–1.0	SOIL	—	—	—	344	—	—	—	21.4 (J+)	15.1	17.9	23,900	—	6840
RE33-20-189631	33-01204	2.0–3.0	TCB	17,200	—	3.17	192	1.37	—	15,800	14.6 (J+)	13.4	18.9	21,800	8.06 (J+)	12,000
RE33-20-189632	33-01204	4.0–5.0	TCB	12,500	—	3.63	219	0.552	—	81,800	9.28 (J+)	11.2	21.7	15,400	—	22,700
RE33-20-189633	33-01206	0.0–1.0	SOIL	—	—	—	356	—	—	—	—	14.3	15.4	22,200	—	6710
RE33-20-189634	33-01206	2.0–3.0	TCB	21,000	—	1.98	454	1.46	—	14,000	15.8 (J+)	18	17.9	25,600	7.41 (J+)	14,600
RE33-20-189635	33-01206	4.0–5.0	TCB	11,700	—	1.67	133	0.701	0.18 (J)	16,400	12.8	7.79	16	15,100	3.78 (J+)	13,900
RE33-20-189636	33-01211	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	18.1	—	—	—
RE33-20-189637	33-01211	2.0–3.0	FILL	—	1.41 (U)	—	—	—	—	—	—	10.8	32.7	—	—	8540
RE33-20-189638	33-01211	4.0–5.0	TCB	6320	—	0.427 (J)	142	0.332	—	5830	12.7 (J+)	12.5	20.9	15,100	—	10,100
RE33-20-189639	33-01212	0.0–1.0	FILL	—	—	—	—	—	—	7290 (J)	—	—	—	—	—	—
RE33-20-189640	33-01212	2.0–3.0	TCB	3440 (J+)	—	0.908 (J)	101	0.438	—	3320 (J)	9.21 (J)	5.63	13	8050	26.5	4410
RE33-20-189641	33-01212	4.0–5.0	TCB	4090 (J+)	—	0.451 (J)	85.4	0.235	—	4100 (J)	11.2 (J)	7.08	17.7	11,200	2.05 (J)	6690
RE33-20-189603	33-60541	0.0–1.0	FILL	—	3.43 (J+)	—	—	—	—	—	—	14.7 (J)	20.9	—	—	—
RE33-20-189606	33-60541	2.0–3.0	FILL	—	—	—	—	—	—	7020	—	—	—	—	—	—
RE33-20-189609	33-60541	4.5–5.5	TCB	4350	—	0.892 (J)	135	0.372	—	3600	16.1	225 (J)	50.1	13,700	2.39	8200
RE33-20-189604	33-60542	0.0–1.0	FILL	—	2.29 (U)	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189605	33-60543	0.0–1.0	FILL	—	2.4	—	—	—	—	—	—	—	20.6	—	—	—
RE33-20-189608	33-60543	2.0–3.0	FILL	—	—	—	—	—	—	18,500	—	—	—	—	—	—
RE33-20-189611	33-60543	7.0–8.0	TCB	4300	—	0.85 (J)	126	0.308	0.816	8480	12.9	76.5	17.9	10,100	1.44 (J)	6870
RE33-20-189612	33-60544	0.0–1.0	FILL	—	2.53 (U)	—	—	—	—	12,600	—	—	19.2	—	—	—

Table 4.9-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium
Soil Background Value[a]				**29,200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21,500**	**22.3**	**4610**
Construction Worker SSL[b]				**41,400**	**142**	**41.2**	**4390**	**148**	**72.1**	**na[c]**	**134[d]**	**36.7**	**14,200**	**248,000**	**800**	**na**
Industrial SSL[b]				**1,290,000**	**519**	**35.9**	**255,000**	**2580**	**1110**	**na**	**505[d]**	**388**	**51,900**	**908,000**	**800**	**na**
Residential SSL[b]				**78,000**	**31.3**	**7.07**	**15,600**	**156**	**70.5**	**na**	**96.6[d]**	**23.4**	**3130**	**54,800**	**400**	**na**
RE33-20-189616	33-60544	2.0–3.0	FILL	—	1.03 (U)	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189620	33-60544	4.0–4.75	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189613	33-60545	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	17.1	—	—	—
RE33-20-189617	33-60545	2.0–3.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189621	33-60545	4.0–5.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189614	33-60546	0.0–1.0	FILL	—	2.01 (U)	—	—	—	—	—	25.5	—	24.3	—	—	—
RE33-20-189618	33-60546	2.0–3.0	SOIL	—	0.919 (U)	—	—	—	—	20,500	—	—	—	—	—	—
RE33-20-189622	33-60546	4.0–5.0	SOIL	—	7.58 (J+)	—	—	—	—	11,300	—	—	—	—	—	5130
RE33-20-189615	33-60547	0.0–1.0	FILL	—	2.58	—	—	—	—	—	—	—	22	—	—	—
RE33-20-189619	33-60547	2.0–3.0	FILL	—	1.78 (U)	—	—	—	0.538 (U)	25,900	—	—	—	—	—	5470
RE33-20-189623	33-60547	4.0–5.0	TCB	6490	—	1.48	136	0.518	0.18 (J)	8540	6.79	94.3	16.1	12,800	5	7540

Table 4.9-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
Soil Background Value[a]				**671**	**0.1**	**15.4**	**na**[c]	**na**	**3460**	**1.52**	**1**	**915**	**0.73**	**39.6**	**48.8**
Construction Worker SSL[b]				**464**	**77.1**	**753**	**566,000**	**248**	**na**	**1750**	**1770**	**na**	**3.54**	**614**	**106,000**
Industrial SSL[b]				**160,000**	**389**	**25,700**	**2,080,000**	**908**	**na**	**6490**	**6490**	**na**	**13**	**6530**	**389,000**
Residential SSL[b]				**10,500**	**23.5**	**1560**	**125,000**	**54.8**	**na**	**391**	**391**	**na**	**0.782**	**394**	**23,500**
RE33-20-189624	33-01199	0.0–1.0	SOIL	—	—	53.3	1.51	—	—	—	—	—	—	—	—
RE33-20-189625	33-01199	2.0–3.0	SOIL	—	—	44.9	—	—	—	—	—	—	—	—	—
RE33-20-189626	33-01199	4.0–5.0	SOIL	—	—	31.2	—	—	—	—	—	—	—	—	—
RE33-20-189627	33-01203	0.0–1.0	FILL	—	—	25.9	1 (J)	—	—	—	—	—	—	—	—
RE33-20-189628	33-01203	2.0–3.0	TCB	276	0.0148 (J)	49.8	—	—	1370 (J+)	1.35	—	317	—	15.9	23.3 (J+)
RE33-20-189629	33-01203	4.0–5.0	TCB	309	0.0103 (J)	43.6	1.36	—	1370 (J+)	0.688 (J)	—	657	—	19.9	21.3 (J+)
RE33-20-189630	33-01204	0.0–1.0	SOIL	—	—	25.7	—	—	—	1.64	—	—	—	44.2	—
RE33-20-189631	33-01204	2.0–3.0	TCB	387	0.0272	47.8	—	0.00593	2750 (J+)	1.61	—	2880	0.192 (J)	39.1	36.7 (J+)
RE33-20-189632	33-01204	4.0–5.0	TCB	275	0.0206 (J)	35.6	—	0.0117	2550 (J+)	1.36	—	4750	—	35.5	28.2 (J+)
RE33-20-189633	33-01206	0.0–1.0	SOIL	—	—	39.4	2.99	0.000582 (J)	—	1.71	—	—	—	—	—
RE33-20-189634	33-01206	2.0–3.0	TCB	408	0.0261	56.6	0.756 (J)	—	2830 (J+)	1.41	—	418	0.173 (J)	28.4	34.4 (J+)
RE33-20-189635	33-01206	4.0–5.0	TCB	231	0.026 (J)	45.4	—	0.00174 (J)	2230 (J+)	1.01 (J)	—	829	—	20.3	20.2
RE33-20-189636	33-01211	0.0–1.0	FILL	—	—	21.1	—	0.0009 (J)	—	—	—	—	—	—	—
RE33-20-189637	33-01211	2.0–3.0	FILL	—	—	83.3	—	—	—	—	—	—	—	—	—
RE33-20-189638	33-01211	4.0–5.0	TCB	271	—	60.4	—	—	1880 (J+)	0.715 (J)	0.111 (J)	1160	—	22.4	21.7 (J+)
RE33-20-189639	33-01212	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189640	33-01212	2.0–3.0	TCB	170	—	41.9	—	—	783	0.906 (J)	—	390	—	10.5	10.2
RE33-20-189641	33-01212	4.0–5.0	TCB	175	—	35.9	—	—	917	0.824 (J)	—	480	—	16.3	12.8
RE33-20-189603	33-60541	0.0–1.0	FILL	—	0.124	31.4	2.75	—	—	—	—	—	—	—	—
RE33-20-189606	33-60541	2.0–3.0	FILL	—	—	19.2	11.9	—	—	—	—	—	—	—	—
RE33-20-189609	33-60541	4.5–5.5	TCB	220	—	72.2	7.47	—	1340	0.749 (J)	18.5	773 (J+)	—	14.1	26.6
RE33-20-189604	33-60542	0.0–1.0	FILL	—	—	20.8	0.762 (J)	—	—	—	—	—	—	—	—
RE33-20-189605	33-60543	0.0–1.0	FILL	—	—	41.4	1.37	—	—	1.58	—	—	—	—	—
RE33-20-189608	33-60543	2.0–3.0	FILL	—	—	—	1.55	—	—	—	—	—	—	—	—
RE33-20-189611	33-60543	7.0–8.0	TCB	144	—	42.5	5.87	—	1180	0.799 (J)	10.3	616	—	12.2	13.5 (J+)
RE33-20-189612	33-60544	0.0–1.0	FILL	—	0.11	27.7	0.982 (J)	—	—	—	—	—	—	—	—

Table 4.9-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
Soil Background Value[a]				**671**	**0.1**	**15.4**	**na[c]**	**na**	**3460**	**1.52**	**1**	**915**	**0.73**	**39.6**	**48.8**
Construction Worker SSL[b]				**464**	**77.1**	**753**	**566,000**	**248**	**na**	**1750**	**1770**	**na**	**3.54**	**614**	**106,000**
Industrial SSL[b]				**160,000**	**389**	**25,700**	**2,080,000**	**908**	**na**	**6490**	**6490**	**na**	**13**	**6530**	**389,000**
Residential SSL[b]				**10,500**	**23.5**	**1560**	**125,000**	**54.8**	**na**	**391**	**391**	**na**	**0.782**	**394**	**23,500**
RE33-20-189616	33-60544	2.0–3.0	FILL	—	—	—	4.64	—	—	—	—	—	—	—	—
RE33-20-189620	33-60544	4.0–4.75	FILL	—	—	—	17.9	—	—	—	—	—	—	—	—
RE33-20-189613	33-60545	0.0–1.0	FILL	—	—	24.6	0.883 (J)	—	—	1.67	—	—	—	—	—
RE33-20-189617	33-60545	2.0–3.0	FILL	—	—	20.9	—	—	—	—	—	—	—	—	—
RE33-20-189621	33-60545	4.0–5.0	FILL	—	—	—	0.893 (J)	—	—	—	—	—	—	—	—
RE33-20-189614	33-60546	0.0–1.0	FILL	—	0.174	27.1	3.65	—	—	—	—	—	—	—	—
RE33-20-189618	33-60546	2.0–3.0	SOIL	—	—	—	17.7	—	—	—	—	—	—	—	—
RE33-20-189622	33-60546	4.0–5.0	SOIL	—	—	—	112	0.000699 (J)	—	—	—	—	—	—	—
RE33-20-189615	33-60547	0.0–1.0	FILL	—	0.111	34.7	0.86 (J)	—	—	1.65	—	—	—	—	—
RE33-20-189619	33-60547	2.0–3.0	FILL	—	—	84	4.13	—	—	—	—	—	—	—	—
RE33-20-189623	33-60547	4.0–5.0	TCB	254	0.022 (J)	69.8	3.13	—	1830	1.18	11	541	—	15.2	26.3 (J+)

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] SSLs from NMED (2019, 700550) unless otherwise noted.

[c] na = Not available.

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

Table 4.9-2
Organic Chemicals Detected at SWMU 33-007(c)

Sample ID	Location ID	Depth (ft)	Media	Acetone	Aroclor-1254	Aroclor-1260	Benzene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate	Chrysene	Di-n-butylphthalate
Construction Worker SSL[a]				**242,000**	**4.91**	**85.3**	**142**	**15.0**	**240**	**7530**[b]	**2310**	**5380**	**23,100**	**26,900**
Industrial SSL[a]				**960,000**	**11**	**11.1**	**87.2**	**23.6**	**32.3**	**25,300**[b]	**323**	**1830**	**3230**	**91,600**
Residential SSL[a]				**66,300**	**1.14**	**2.43**	**17.8**	**1.12**	**1.53**	**1740**[b]	**15.3**	**380**	**153**	**6160**
RE33-20-189624	33-01199	0.0–1.0	SOIL	—[c]	0.00281 (J)	0.00178 (J)	—	—	—	—	—	—	—	—
RE33-20-189627	33-01203	0.0–1.0	FILL	—	0.119	0.0341	—	—	—	—	—	—	—	—
RE33-20-189628	33-01203	2.0–3.0	TCB	—	0.0103	0.00372	—	—	—	—	—	—	—	—
RE33-20-189631	33-01204	2.0–3.0	TCB	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189632	33-01204	4.0–5.0	TCB	—	—	—	—	—	—	—	—	0.0147 (J)	—	—
RE33-20-189633	33-01206	0.0–1.0	SOIL	—	0.00163 (J)	—	—	—	—	—	—	—	—	—
RE33-20-189636	33-01211	0.0–1.0	FILL	—	0.0166	0.0138	—	—	—	—	—	—	—	—
RE33-20-189638	33-01211	4.0–5.0	TCB	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189639	33-01212	0.0–1.0	FILL	—	0.00531	0.00569	—	—	—	—	—	—	—	—
RE33-20-189641	33-01212	4.0–5.0	TCB	0.00656	—	—	—	—	—	—	0.0292 (J)	—	0.0358 (J)	—
RE33-20-189603	33-60541	0.0–1.0	FILL	—	0.239	0.0813	—	—	—	—	—	0.0783 (J)	—	—
RE33-20-189606	33-60541	2.0–3.0	FILL	—	NA[d]	NA	—	0.014 (J)	0.0246 (J)	0.0182 (J)	—	—	—	—
RE33-20-189609	33-60541	4.5–5.5	TCB	—	NA	NA	—	—	—	—	—	0.0152 (J)	—	—
RE33-20-189604	33-60542	0.0–1.0	FILL	—	0.164	0.0572	—	—	—	—	—	—	—	—
RE33-20-189605	33-60543	0.0–1.0	FILL	—	NA	NA	—	—	0.0535 (J)	0.108 (J)	—	—	—	—
RE33-20-189611	33-60543	7.0–8.0	TCB	—	NA	NA	—	—	—	—	—	0.0112 (J)	—	0.045
RE33-20-189612	33-60544	0.0–1.0	FILL	—	1.18	0.292	—	—	—	—	—	—	—	0.0266 (J)
RE33-20-189613	33-60545	0.0–1.0	FILL	—	0.161	0.0574	—	—	—	—	—	—	—	—
RE33-20-189621	33-60545	4.0–5.0	FILL	—	NA	NA	—	—	—	—	—	—	—	0.0236 (J-)
RE33-20-189614	33-60546	0.0–1.0	FILL	—	NA	NA	0.000727 (J)	—	—	—	—	—	—	0.0434
RE33-20-189622	33-60546	4.0–5.0	SOIL	—	NA	NA	—	—	—	—	—	—	—	0.0124 (J)
RE33-20-189615	33-60547	0.0–1.0	FILL	—	NA	NA	—	—	—	—	—	—	—	1
RE33-20-189619	33-60547	2.0–3.0	FILL	—	NA	NA	—	—	—	—	—	0.0162 (J)	—	0.0374 (J)
RE33-20-189623	33-60547	4.0–5.0	TCB	—	NA	NA	—	—	—	—	—	0.085	—	0.0658

Table 4.9-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Diethylphthalate	Dinitrotoluene[2,4-]	Hexanone[2-]	Isophorone	Methylene Chloride	Methylnaphthalene[1-]	Methylnaphthalene[2-]	Naphthalene	RDX	Toluene	Trichloroethene	Xylene[1,3-]+Xylene[1,4-]
Construction Worker SSL[a]				**215,000**	**1760**	**53,700**	**1210**	**6060**	**1000**	**159**	**1350**	**14,000**	**6.90**	**798**	**215,000**
Industrial SSL[a]				**733,000**	**1300**	**27,000**	**5130**	**813**	**3370**	**241**	**428**	**61,300**	**36.5**	**4280**	**733,000**
Residential SSL[a]				**49,300**	**200**	**5610**	**409**	**172**	**232**	**49.7**	**83.1**	**5230**	**6.77**	**871**	**49,300**
RE33-20-189624	33-01199	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189627	33-01203	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	0.00103 (J)	—	—
RE33-20-189628	33-01203	2.0–3.0	TCB	—	—	—	—	—	—	—	—	—	0.000512 (J)	—	—
RE33-20-189631	33-01204	2.0–3.0	TCB	—	—	—	—	—	—	—	—	—	0.000713 (J)	—	—
RE33-20-189632	33-01204	4.0–5.0	TCB	—	—	—	—	—	—	—	—	—	0.000408 (J)	—	—
RE33-20-189633	33-01206	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	0.000501 (J)	—	—
RE33-20-189636	33-01211	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	0.000816 (J+)	—	—
RE33-20-189638	33-01211	4.0–5.0	TCB	—	—	0.157	—	—	—	—	—	—	—	—	—
RE33-20-189639	33-01212	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189641	33-01212	4.0–5.0	TCB	—	—	0.05	—	—	—	—	—	—	—	—	—
RE33-20-189603	33-60541	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	0.000806 (J)
RE33-20-189606	33-60541	2.0–3.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189609	33-60541	4.5–5.5	TCB	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189604	33-60542	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189605	33-60543	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189611	33-60543	7.0–8.0	TCB	—	—	—	—	—	—	—	—	0.182 (J)	—	—	—
RE33-20-189612	33-60544	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	0.00458	—	—
RE33-20-189613	33-60545	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189621	33-60545	4.0–5.0	FILL	—	—	—	0.112 (J-)	—	—	—	—	—	—	—	—
RE33-20-189614	33-60546	0.0–1.0	FILL	—	—	—	—	—	0.0149 (J)	0.0213 (J)	0.0181 (J)	—	0.000933 (J)	0.000484 (J)	—

Table 4.9-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Diethylphthalate	Dinitrotoluene[2,4-]	Hexanone[2-]	Isophorone	Methylene Chloride	Methylnaphthalene[1-]	Methylnaphthalene[2-]	Naphthalene	RDX	Toluene	Trichloroethene	Xylene[1,3-]+Xylene[1,4-]
Construction Worker SSL[a]				**215,000**	**1760**	**53,700**	**1210**	**6060**	**1000**	**159**	**1350**	**14,000**	**6.90**	**798**	**215,000**
Industrial SSL[a]				**733,000**	**1300**	**27,000**	**5130**	**813**	**3370**	**241**	**428**	**61,300**	**36.5**	**4280**	**733,000**
Residential SSL[a]				**49,300**	**200**	**5610**	**409**	**172**	**232**	**49.7**	**83.1**	**5230**	**6.77**	**871**	**49,300**
RE33-20-189622	33-60546	4.0–5.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-189615	33-60547	0.0–1.0	FILL	—	1.88	—	—	—	—	—	—	—	—	—	—
RE33-20-189619	33-60547	2.0–3.0	FILL	0.0262 (J)	—	—	0.287 (J)	0.00256 (J)	—	—	—	—	—	—	—
RE33-20-189623	33-60547	4.0–5.0	TCB	0.0229 (J)	—	—	0.205 (J)	—	—	—	—	—	—	—	—

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] SSLs from NMED (2019, 700550) unless otherwise noted.

[b] Pyrene used as a surrogate based on structural similarity.

[c] — = Not detected.

[d] NA = Not analyzed.

Table 4.9-3
Proposed Sampling and Analysis at SWMU 33-007(c)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	Cobalt (SW-846:6010C[b])	PCBs (SW-846:8082A[b])
Define vertical extent of cobalt at locations 33-60541 and 33-60547	33-60541, 33-60547	Locations 33-60541 and 33-60547	6.0–7.0, 8.0–9.0	X[c]	—[d]
Define vertical extent of cobalt at location 33-60543	33-60543	Location 33-60543	9.0–10.0, 11.0–12.0	X	—
Define vertical and lateral extent of PCBs at locations 33-60541, 33-60542, 33-60544, and 33-60545	33-60541, 33-60542, 33-60544, 33-60545	Locations 33-60541, 33-60542, 33-60544, and 33-60545	2.0–3.0, 4.0–5.0	—	X

[a] Depths are below ground surface.

[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.

[c] X = Analysis will be performed.

[d] — = Analysis will not be performed.

Table 4.10-1
Inorganic Chemicals above BVs at SWMU 33-008(c)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (total)	Iron
Soil Background Value[a]				**29,200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**
Qbt 2,3,4 Background Value[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**
Sediment Background Value[a]				**15,400**	**0.83**	**3.98**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**0.82**	**13,800**
Construction Worker SSL[b]				**41,400**	**142**	**41.2**	**4390**	**148**	**72.1**	**na[c]**	**134[d]**	**36.7**	**14,200**	**12.1**	**248,000**
Industrial SSL[b]				**1,290,000**	**519**	**35.9**	**255,000**	**2580**	**1110**	**na**	**505[d]**	**388**	**51,900**	**63.3**	**908,000**
Residential SSL[b]				**78,000**	**31.3**	**7.07**	**15,600**	**156**	**70.5**	**na**	**96.6[d]**	**23.4**	**3130**	**11.2**	**54,800**
RE33-20-190358	33-01670	0.0–0.1	SOIL	—[e]	—	—	—	—	—	—	—	—	—	—	—
0333-96-0652	33-01670	0.0–0.5	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190359	33-01670	5.0–6.0	QBT3	—	0.808 (U)	—	—	—	—	—	12.2	—	—	—	—
0333-96-0653	33-01671	0.0–0.5	SED	—	2.7 (J-)	4.6 (U)	—	—	1.9	—	11.9	—	3100	—	—
0333-96-0654	33-01671	0.5–0.83	SED	—	28.2 (J-)	4.7 (U)	—	—	1.4	—	—	—	1630	—	—
0333-96-0655	33-01672	0.0–0.5	SED	—	—	4.4 (U)	163	—	4.2	—	13.7	—	498	—	—
RE33-20-190362	33-01672	0.0–1.0	SOIL	—	1.71 (U)	—	—	—	6.39	—	26.7	—	722 (J)	—	29,000 (J)
0333-96-0656	33-01672	1.0–1.5	SED	—	4.4 (J-)	6	189	—	8	—	52.1	8.8 (J)	1320	—	75,600
RE33-20-190363	33-01672	5.0–6.0	QBT3	—	—	—	—	—	—	—	13.3	—	—	—	—
RE33-20-190364	33-01672	9.0–10.0	QBT3	—	—	—	—	—	—	—	8.01	—	—	—	—
0333-96-0657	33-01673	0.0–0.5	SED	—	2.4 (J-)	—	—	—	2.7	—	27.5	5.9 (J)	1670	—	54,000
0333-96-0658	33-01674	0.0–0.5	SED	—	—	4 (U)	—	—	2.1	—	—	—	744	—	—
0333-96-0659	33-01675	0.0–0.5	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190365	33-01679	0.0–1.0	SOIL	—	—	—	—	—	0.401 (J)	—	—	—	26.7 (J)	—	—
0333-96-0673	33-01679	0.0–2.0	SOIL	—	5.6 (U)	—	—	—	0.71 (U)	—	—	—	24.6	—	—
0333-96-0674	33-01679	3.0–5.0	SOIL	—	5.9 (U)	—	—	—	0.74 (U)	—	—	—	—	—	—
RE33-20-190366	33-01679	5.0–6.0	QBT3	—	—	—	—	—	—	—	23	—	—	—	—
0333-96-0675	33-01679	5.0–7.0	QBT3	—	5.9 (U)	—	—	—	—	—	7.8	—	5 (J)	—	—
RE33-20-190367	33-01679	9.0–10.0	QBT3	—	—	—	—	—	—	—	8.05 (J+)	—	—	—	—
0333-96-0677	33-01680	0.0–0.5	SED	—	17 (J-)	8.5	719	—	41.6	9120	118	19.2	25,200	—	52,300
RE33-20-190368	33-01680	0.0–1.0	SOIL	—	73.2 (J+)	—	389	—	22.2	—	2790	42.9	10,800 (J)	—	121000 (J)
0333-96-0678	33-01680	0.0–2.0	SED	—	—	4.8	210	—	20.9 (J-)	—	63.7 (J+)	9 (J)	2920	—	29,000

Table 4.10-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (total)	Iron
Soil Background Value[a]				**29,200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**
Qbt 2,3,4 Background Value[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**
Sediment Background Value[a]				**15,400**	**0.83**	**3.98**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**0.82**	**13,800**
Construction Worker SSL[b]				**41,400**	**142**	**41.2**	**4390**	**148**	**72.1**	**na[c]**	**134[d]**	**36.7**	**14,200**	**12.1**	**248,000**
Industrial SSL[b]				**1,290,000**	**519**	**35.9**	**255,000**	**2580**	**1110**	**na**	**505[d]**	**388**	**51,900**	**63.3**	**908,000**
Residential SSL[b]				**78,000**	**31.3**	**7.07**	**15,600**	**156**	**70.5**	**na**	**96.6[d]**	**23.4**	**3130**	**11.2**	**54,800**
RE33-20-190369	33-01680	5.0–6.0	QBT3	—	—	—	—	—	—	—	18.5	—	22.3 (J)	—	—
RE33-20-190370	33-01680	9.0–10.0	QBT3	—	—	—	—	—	—	—	—	—	164 (J)	—	—
RE33-20-190371	33-01681	0.0–1.0	SOIL	—	2.34 (J)	—	—	—	29.7	—	30 (J+)	15.3	2420	0.732	—
0333-96-0681	33-01681	0.5–1.25	SED	19,400	7.9 (J)	14	615	—	139	6830	297	38.2	10,500	—	125,000
RE33-20-190372	33-01681	5.0–5.6	SOIL	—	0.844 (J)	—	—	—	1	—	—	—	305	—	—
0333-96-0682	33-01681	5.0–6.0	SOIL	—	6.6 (U)	—	—	—	2.5	—	—	12.2	172	—	24,000
RE33-20-190373	33-01681	9.0–10.0	QBT3	—	—	—	—	—	—	—	8.44 (J+)	—	32.7	—	—
0333-96-0684	33-01682	0.0–1.0	SED	—	—	—	—	—	2.4	—	—	—	470	—	—
RE33-20-190374	33-01682	0.0–1.0	SOIL	—	—	—	—	—	3.3	—	—	—	629 (J)	—	30,300 (J)
0333-96-0685	33-01682	1.0–2.0	SOIL	—	1.1 (J-)	—	—	—	1.7	—	79.3	—	1090	—	—
RE33-20-190375	33-01682	5.0–6.0	QBT3	—	—	—	—	—	—	—	12.3	—	5.18 (J)	—	—
RE33-20-190376	33-01682	9.0–10.0	QBT3	—	0.533 (U)	—	—	—	—	—	14	—	38.8 (J)	—	—
0333-96-0669	33-01683	0.0–0.5	SED	—	6.4 (U)	—	—	—	0.81 (U)	—	11.5	—	38	—	—
0333-96-0670	33-01684	0.0–0.5	FILL	—	5.7 (J)	—	—	—	8.6	—	43.7	11.3	762	—	61,300
RE33-20-190377	33-01684	0.0–1.0	SOIL	—	1.43 (U)	—	—	—	6.49	—	33.6	11.5	756 (J)	—	—
RE33-20-190378	33-01684	5.0–6.0	QBT3	—	—	—	62.6	—	—	5800	17.8	—	12 (J)	—	—
RE33-20-190379	33-01684	9.0–10.0	QBT3	—	—	—	—	—	—	—	11.1 (J+)	—	5.49	—	—
RE33-20-190360	33-01685	0.0–0.15	FILL	—	4.09 (U)	—	—	—	11.4	—	—	—	10,700	—	—
0333-96-0671	33-01685	0.0–0.5	SOIL	—	8.1 (J)	—	—	—	17.6	—	35.6	10.5	6070	—	44,900
RE33-20-190361	33-01685	5.0–6.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190350	33-60676	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190354	33-60676	5.0–6.0	QBT3	—	—	—	—	—	—	—	10.4	—	—	—	—
RE33-20-190351	33-60677	0.0–0.1	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190355	33-60677	5.0–6.0	QBT3	—	0.906 (J)	—	—	—	—	2260	25.2	—	—	—	—
RE33-20-190352	33-60678	0.0–0.5	SOIL	—	—	—	—	—	—	—	—	—	—	—	—

Table 4.10-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (total)	Iron
Soil Background Value[a]				**29,200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21,500**
Qbt 2,3,4 Background Value[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**0.5**	**14,500**
Sediment Background Value[a]				**15,400**	**0.83**	**3.98**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**0.82**	**13,800**
Construction Worker SSL[b]				**41,400**	**142**	**41.2**	**4390**	**148**	**72.1**	**na[c]**	**134[d]**	**36.7**	**14,200**	**12.1**	**248,000**
Industrial SSL[b]				**1,290,000**	**519**	**35.9**	**255,000**	**2580**	**1110**	**na**	**505[d]**	**388**	**51,900**	**63.3**	**908,000**
Residential SSL[b]				**78,000**	**31.3**	**7.07**	**15,600**	**156**	**70.5**	**na**	**96.6[d]**	**23.4**	**3130**	**11.2**	**54,800**
RE33-20-190369	33-01680	5.0–6.0	QBT3	—	—	—	—	—	—	—	18.5	—	22.3 (J)	—	—
RE33-20-190356	33-60678	5.0–6.0	QBT3	—	—	—	—	—	—	—	9.03	—	—	—	—
RE33-20-190353	33-60679	0.0–0.3	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190357	33-60679	5.0–6.0	QBT3	—	0.678 (U)	—	—	—	—	—	13.6	—	—	—	—
RE33-20-190380	33-60680	0.0–0.95	SOIL	NA[f]	1.16 (U)	—	—	—	—	—	—	—	—	—	—
RE33-20-190384	33-60680	5.0–6.0	QBT3	—	0.63 (U)	—	—	1.33	—	4140	21.6	—	—	—	—
RE33-20-190388	33-60680	9.0–10.0	QBT2	—	—	—	—	—	—	5070	10.1	—	—	—	—
RE33-20-190381	33-60681	0.0–1.0	SED	—	—	—	—	—	—	—	12	5.45	—	—	—
RE33-20-190385	33-60681	5.0–6.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190389	33-60681	9.0–10.0	QBT2	—	—	—	—	—	—	—	12.4	—	—	—	—
RE33-20-190382	33-60682	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190386	33-60682	5.0–6.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190390	33-60682	9.0–10.0	QBT3	—	—	—	—	—	—	7310	—	—	—	—	—
RE33-20-190383	33-60683	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190387	33-60683	5.0–6.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190391	33-60683	9.0–10.0	QBT3	—	—	—	—	—	—	—	7.61	—	—	—	—

Table 4.10-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Lead	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value[a]				**22.3**	**4610**	**671**	**0.1**	**15.4**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value[a]				**11.2**	**1690**	**482**	**0.1**	**6.58**	**0.3**	**1**	**1.1**	**2.4**	**17**	**63.5**
Sediment Background Value[a]				**19.7**	**2370**	**543**	**0.1**	**9.38**	**0.3**	**1**	**0.73**	**2.22**	**19.7**	**60.2**
Construction Worker SSL[b]				**800**	**na**	**464**	**77.1**	**753**	**1750**	**1770**	**3.54**	**277**	**614**	**106,000**
Industrial SSL[b]				**800**	**na**	**160,000**	**389**	**25,700**	**6490**	**6490**	**13**	**3880**	**6530**	**389,000**
Residential SSL[b]				**400**	**na**	**10,500**	**23.5**	**1560**	**391**	**391**	**0.782**	**234**	**394**	**23,500**
RE33-20-190358	33-01670	0.0–0.1	SOIL	—	—	—	—	—	—	—	—	NA	—	—
0333-96-0652	33-01670	0.0–0.5	SOIL	—	—	—	—	—	—	—	0.81 (U)	2.6	—	—
RE33-20-190359	33-01670	5.0–6.0	QBT3	—	—	—	—	—	0.93 (J)	—	—	NA	—	—
0333-96-0653	33-01671	0.0–0.5	SED	322	—	—	0.59	20.9	0.9 (U)	11.2	0.86 (U)	6.2	—	351
0333-96-0654	33-01671	0.5–0.83	SED	6960	—	—	1.8	13.8	0.43 (U)	6.5	0.82 (U)	5.08	—	288
0333-96-0655	33-01672	0.0–0.5	SED	176	—	—	3.2	24.2	1.1 (U)	15.8	0.89 (U)	9.2	—	721
RE33-20-190362	33-01672	0.0–1.0	SOIL	204	—	—	2.49	19.4 (J)	—	14.7	—	NA	—	933
0333-96-0656	33-01672	1.0–1.5	SED	238	—	—	3.9	92	2.3 (U)	11.1	1.7 (U)	12.4	—	1310
RE33-20-190363	33-01672	5.0–6.0	QBT3	—	—	—	—	—	0.989 (J)	—	—	NA	—	—
RE33-20-190364	33-01672	9.0–10.0	QBT3	—	—	—	—	—	0.821 (J)	—	—	NA	—	—
0333-96-0657	33-01673	0.0–0.5	SED	205	—	—	5.6	31	1.3 (U)	2.7	1.6 (U)	10.7	—	607
0333-96-0658	33-01674	0.0–0.5	SED	81.7	—	855	1.9	—	0.69 (U)	2.1 (J)	2.2 (J)	4.53	—	1090
0333-96-0659	33-01675	0.0–0.5	SOIL	—	—	—	—	—	—	—	0.76 (U)	2.79	—	—
RE33-20-190365	33-01679	0.0–1.0	SOIL	—	—	—	—	—	—	4.53	—	NA	—	119
0333-96-0673	33-01679	0.0–2.0	SOIL	—	—	—	—	—	—	—	—	3.22	—	114
0333-96-0674	33-01679	3.0–5.0	SOIL	—	—	—	—	—	—	—	—	2.3	—	—
RE33-20-190366	33-01679	5.0–6.0	QBT3	—	—	—	—	—	0.847 (J)	—	—	NA	—	—
0333-96-0675	33-01679	5.0–7.0	QBT3	—	—	—	—	—	0.39 (U)	—	—	—	—	—
RE33-20-190367	33-01679	9.0–10.0	QBT3	—	—	—	—	—	0.868 (J)	—	—	NA	—	—
0333-96-0677	33-01680	0.0–0.5	SED	2040	—	888	15.3	232	3.6	42.1	1.8 (J)	134	—	9440
RE33-20-190368	33-01680	0.0–1.0	SOIL	820	—	1150	0.346	224 (J)	—	50.6	—	NA	—	3050
0333-96-0678	33-01680	0.0–2.0	SED	484	—	837	272	78.9 (J+)	0.44 (U)	14.5 (J-)	—	19.5	—	2230
0333-96-0679	33-01680	2.0–4.0	QBT3	56.5	—	—	3.7	—	0.41 (U)	—	—	2.62	—	453
RE33-20-190369	33-01680	5.0–6.0	QBT3	11.8 (J+)	—	—	0.125	—	0.873 (J)	—	—	NA	—	—
RE33-20-190370	33-01680	9.0–10.0	QBT3	48.8 (J+)	—	—	0.172	—	0.962 (J)	—	—	NA	—	—

Table 4.10-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Lead	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value[a]				**22.3**	**4610**	**671**	**0.1**	**15.4**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value[a]				**11.2**	**1690**	**482**	**0.1**	**6.58**	**0.3**	**1**	**1.1**	**2.4**	**17**	**63.5**
Sediment Background Value[a]				**19.7**	**2370**	**543**	**0.1**	**9.38**	**0.3**	**1**	**0.73**	**2.22**	**19.7**	**60.2**
Construction Worker SSL[b]				**800**	**na**	**464**	**77.1**	**753**	**1750**	**1770**	**3.54**	**277**	**614**	**106,000**
Industrial SSL[b]				**800**	**na**	**160,000**	**389**	**25,700**	**6490**	**6490**	**13**	**3880**	**6530**	**389,000**
Residential SSL[b]				**400**	**na**	**10,500**	**23.5**	**1560**	**391**	**391**	**0.782**	**234**	**394**	**23,500**
RE33-20-190371	33-01681	0.0–1.0	SOIL	297	—	9320	5630	37.3	—	6.16	—	NA	—	10,400
0333-96-0681	33-01681	0.5–1.25	SED	2350	—	8310	11.7	1820	0.4 (U)	31.9	—	117	29.9	12,700
RE33-20-190372	33-01681	5.0–5.6	SOIL	32.4	—	—	63.6	16.9	—	—	—	NA	—	211
0333-96-0682	33-01681	5.0–6.0	SOIL	75.3	—	1050	0.47	23.2	—	—	—	6.92	—	510
RE33-20-190373	33-01681	9.0–10.0	QBT3	17.9	—	—	0.246	—	0.792 (J)	—	—	NA	—	84.8
0333-96-0684	33-01682	0.0–1.0	SED	145	—	—	1.7 (J+)	12.6	0.44 (U)	12.7	0.84 (U)	5.95	—	326
RE33-20-190374	33-01682	0.0–1.0	SOIL	153	—	—	0.129	22 (J)	—	8.33	—	NA	—	610
0333-96-0685	33-01682	1.0–2.0	SOIL	2860	—	—	1.8 (J+)	48.6	—	1.4 (J)	0.82 (U)	2.76	—	329
RE33-20-190375	33-01682	5.0–6.0	QBT3	—	—	—	—	—	0.971 (J)	—	—	NA	—	—
RE33-20-190376	33-01682	9.0–10.0	QBT3	17 (J+)	—	—	—	23.5 (J)	0.805 (J)	—	—	NA	—	64.1
0333-96-0669	33-01683	0.0–0.5	SED	54	—	—	0.43	—	0.44 (U)	9.6	—	4.11	28	210
0333-96-0670	33-01684	0.0–0.5	FILL	217	—	737	0.5	60.7	—	1.9 (J)	—	4.61	—	948
RE33-20-190377	33-01684	0.0–1.0	SOIL	182	—	687	1.72	37.3 (J)	—	3.98	—	NA	—	869
RE33-20-190378	33-01684	5.0–6.0	QBT3	—	—	—	—	—	0.767 (J)	—	—	NA	—	—
RE33-20-190379	33-01684	9.0–10.0	QBT3	—	—	—	—	—	0.79 (J)	—	—	NA	—	—
RE33-20-190360	33-01685	0.0–0.15	FILL	327	—	—	4.53	—	—	18.2	—	NA	—	1030
0333-96-0671	33-01685	0.0–0.5	SOIL	690	—	842	22.9	62.8	—	12.7	—	44	—	1780
RE33-20-190361	33-01685	5.0–6.0	QBT3	—	—	—	—	—	1.16	—	—	NA	—	—
RE33-20-190350	33-60676	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190354	33-60676	5.0–6.0	QBT3	—	—	—	—	—	1.12	—	—	NA	—	—
RE33-20-190351	33-60677	0.0–0.1	SOIL	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190355	33-60677	5.0–6.0	QBT3	—	—	—	—	—	0.926 (J)	—	—	NA	—	—
RE33-20-190352	33-60678	0.0–0.5	SOIL	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190356	33-60678	5.0–6.0	QBT3	—	—	—	—	—	1.13	—	—	NA	—	—
RE33-20-190353	33-60679	0.0–0.3	SOIL	—	—	—	—	—	—	—	—	NA	—	—

Table 4.10-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Lead	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Uranium	Vanadium	Zinc
Soil Background Value[a]				**22.3**	**4610**	**671**	**0.1**	**15.4**	**1.52**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt 2,3,4 Background Value[a]				**11.2**	**1690**	**482**	**0.1**	**6.58**	**0.3**	**1**	**1.1**	**2.4**	**17**	**63.5**
Sediment Background Value[a]				**19.7**	**2370**	**543**	**0.1**	**9.38**	**0.3**	**1**	**0.73**	**2.22**	**19.7**	**60.2**
Construction Worker SSL[b]				**800**	**na**	**464**	**77.1**	**753**	**1750**	**1770**	**3.54**	**277**	**614**	**106,000**
Industrial SSL[b]				**800**	**na**	**160,000**	**389**	**25,700**	**6490**	**6490**	**13**	**3880**	**6530**	**389,000**
Residential SSL[b]				**400**	**na**	**10,500**	**23.5**	**1560**	**391**	**391**	**0.782**	**234**	**394**	**23,500**
RE33-20-190357	33-60679	5.0–6.0	QBT3	—	—	—	—	—	0.987	—	—	NA	—	—
RE33-20-190380	33-60680	0.0–0.95	SOIL	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190384	33-60680	5.0–6.0	QBT3	—	—	—	—	—	1.19	—	—	NA	—	—
RE33-20-190388	33-60680	9.0–10.0	QBT2	—	2060 (J+)	—	—	—	1.11	—	—	NA	—	—
RE33-20-190381	33-60681	0.0–1.0	SED	—	—	—	—	—	0.583 (J)	—	—	NA	24.1	—
RE33-20-190385	33-60681	5.0–6.0	SOIL	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190389	33-60681	9.0–10.0	QBT2	—	—	—	—	—	1.09 (J)	—	—	NA	—	—
RE33-20-190382	33-60682	0.0–1.0	SOIL	—	—	—	—	—	—	1.17 (U)	—	NA	—	—
RE33-20-190386	33-60682	5.0–6.0	SOIL	—	—	—	—	—	—	1.06 (U)	—	NA	—	—
RE33-20-190390	33-60682	9.0–10.0	QBT3	—	—	—	—	—	1.06	1.05 (U)	—	NA	—	—
RE33-20-190383	33-60683	0.0–1.0	SOIL	—	—	—	—	—	—	1.17 (U)	—	NA	—	—
RE33-20-190387	33-60683	5.0–6.0	SOIL	—	—	—	—	—	—	1.11 (U)	—	NA	—	—
RE33-20-190391	33-60683	9.0–10.0	QBT3	—	—	—	—	—	0.748 (J)	1.04 (U)	—	NA	—	—

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] SSLs from NMED (2019, 700550) unless otherwise noted.

[c] na = Not available.

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

[f] NA = Not analyzed.

Table 4.10-2
Organic Chemicals Detected at SWMU 33-008(c)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Azobenzene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Carbazole	Chrysene
Construction Worker SSL[a]				**15,100**	**242,000**	**75,300**	**4.91**	**85.3**	**na**[b,c]	**240**	**15.0**	**240**	**7530**[d]	**2310**	**1,080,000**[d]	**5380**	**91,700**	**85**[e]	**23,100**
Industrial SSL[a]				**50,500**	**960,000**	**253,000**	**11**	**11.1**	**260**[d]	**32.3**	**23.6**	**32.3**	**253,000**[d]	**323**	**3,300,000**[d]	**1830**	**411,000**	**1200**[f,g]	**3230**
Residential SSL[a]				**3480**	**66,300**	**17,400**	**1.14**	**2.43**	**5.6**[d]	**1.53**	**1.12**	**1.53**	**1740**[d]	**15.3**	**250,000**[d]	**380**	**37,400**	**78**[f,g]	**153**
0333-96-0652	33-01670	0.0–0.5	SOIL	—[h]	NA[i]	—	NA	NA	—	—	—	—	—	1.6	—	—	NA	—	—
RE33-20-190359	33-01670	5.0–6.0	QBT3	—	0.0066	—	NA	NA	—	—	—	—	—	—	—	—	—	NA	—
0333-96-0653	33-01671	0.0–0.5	SED	—	NA	—	NA	NA	0.43 (J)	—	—	—	—	—	—	—	NA	—	—
0333-96-0654	33-01671	0.5–0.83	SED	—	—	—	NA	NA	—	—	—	—	—	—	—	—	—	—	—
0333-96-0655	33-01672	0.0–0.5	SED	0.41 (J)	NA	0.65 (J)	NA	NA	—	1.6 (J)	1.7	2.9	0.48 (J)	2.9	—	—	NA	0.83 (J)	1.5 (J)
RE33-20-190362	33-01672	0.0–1.0	SOIL	0.281	—	0.496	0.163	0.142	—	1.11	1.32	1.48	0.772	0.602	—	—	—	NA	1.14
0333-96-0656	33-01672	1.0–1.5	SED	—	—	0.38 (J)	NA	NA	—	1.2 (J)	1.5 (J)	2.8	1.1 (J)	2.8	—	—	—	0.45 (J)	1.3 (J)
RE33-20-190363	33-01672	5.0–6.0	QBT3	—	—	—	NA	NA	—	—	—	0.0117 (J)	0.0127 (J)	—	—	1.38	—	NA	—
RE33-20-190364	33-01672	9.0–10.0	QBT3	—	—	—	NA	NA	—	0.0199 (J)	0.0263 (J)	0.0259 (J)	0.0259 (J)	—	—	0.0135 (J)	—	NA	0.0178 (J)
0333-96-0658	33-01674	0.0–0.5	SED	—	NA	—	NA	NA	—	0.19 (J)	—	0.27 (J)	—	0.27 (J)	—	—	NA	—	—
0333-96-0659	33-01675	0.0–0.5	SOIL	—	NA	—	NA	NA	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190365	33-01679	0.0–1.0	SOIL	0.0475	—	—	0.0054	0.00671	—	0.0234 (J)	0.0253 (J)	0.0279 (J)	0.0177 (J)	—	—	—	—	NA	0.0207 (J)
0333-96-0673	33-01679	0.0–2.0	SOIL	—	NA	—	NA	NA	—	0.058 (J)	0.077 (J)	0.056 (J)	0.053 (J)	0.06 (J)	—	—	NA	NA	0.072 (J)
0333-96-0674	33-01679	3.0–5.0	SOIL	—	—	—	NA	NA	—	—	—	—	—	—	—	—	—	NA	—
0333-96-0677	33-01680	0.0–0.5	SED	1.9 (J)	NA	2.9 (J)	NA	NA	—	5.7 (J)	6.2 (J)	10	3.4 (J)	10	—	—	NA	3 (J)	5.1 (J)
RE33-20-190368	33-01680	0.0–1.0	SOIL	0.89	—	1.47	0.14	0.0509	—	2.24	2.83	2.8	1.81	1.03	—	0.746	—	NA	2.15
0333-96-0678	33-01680	0.0–2.0	SED	—	0.009 (J)	—	NA	NA	—	—	—	—	—	—	—	—	0.007 (J)	—	—
0333-96-0679	33-01680	2.0–4.0	QBT3	—	—	—	NA	NA	—	0.6	0.76	0.77	0.74	0.37	—	—	—	—	0.7
RE33-20-190369	33-01680	5.0–6.0	QBT3	—	—	—	NA	NA	—	0.019 (J)	—	0.0164 (J)	0.0115 (J)	—	—	—	—	NA	0.0145 (J)
RE33-20-190370	33-01680	9.0–10.0	QBT3	—	—	—	NA	NA	—	0.0114 (J)	—	—	—	—	—	—	—	NA	—
RE33-20-190371	33-01681	0.0–1.0	SOIL	—	—	—	0.433	0.144	—	—	—	—	—	—	—	5.62	—	NA	—
0333-96-0681	33-01681	0.5–1.25	SED	4.4	—	6.8	NA	NA	—	9	9.6	6	6.1	6.8	0.11 (J)	2.3	—	NA	9.6
RE33-20-190372	33-01681	5.0–5.6	SOIL	—	—	—	NA	NA	—	—	—	—	—	—	—	—	—	NA	—

Table 4.10-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Azobenzene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Carbazole	Chrysene
Construction Worker SSL[a]				**15,100**	**24,2000**	**753,00**	**4.91**	**85.3**	**na[b,c]**	**240**	**15.0**	**240**	**7530[d]**	**2310**	**1,080,000[d]**	**5380**	**91,700**	**85[e]**	**23,100**
Industrial SSL[a]				**50,500**	**960,000**	**253,000**	**11**	**11.1**	**260[d]**	**32.3**	**23.6**	**32.3**	**253,000[d]**	**323**	**3,300,000[d]**	**1830**	**411,000**	**1200[f,g]**	**3230**
Residential SSL[a]				**3480**	**66,300**	**17,400**	**1.14**	**2.43**	**5.6[d]**	**1.53**	**1.12**	**1.53**	**1740[d]**	**15.3**	**250,000[d]**	**380**	**37,400**	**78[f,g]**	**153**
0333-96-0682	33-01681	5.0–6.0	SOIL	0.14 (J)	—	0.27 (J)	NA	NA	—	0.45	0.46	0.31 (J)	0.31 (J)	0.35 (J)	—	—	—	NA	0.49
RE33-20-190373	33-01681	9.0–10.0	QBT3	0.193	—	0.365	NA	NA	—	0.677	0.882	0.892	0.467	0.335	—	0.81	—	NA	0.69
0333-96-0684	33-01682	0.0–1.0	SED	—	—	—	NA	NA	—	0.36 (J)	0.47 (J)	0.75 (J)	0.21 (J)	NA	—	—	—	0.19 (J)	0.41 (J)
RE33-20-190374	33-01682	0.0–1.0	SOIL	1.97	—	6.28	0.166	0.116	—	10.9	12.3	13	6.69	5.16	—	0.163 (J)	—	NA	10.3
0333-96-0685	33-01682	1.0–2.0	SOIL	0.16 (J)	0.012 (J)	0.32 (J)	NA	NA	—	0.41 (J)	0.37 (J)	0.65 (J)	0.17 (J)	NA	—	—	—	0.39 (J)	0.38 (J)
RE33-20-190376	33-01682	9.0–10.0	QBT3	—	—	—	NA	NA	—	0.0205 (J)	0.0205 (J)	0.0205 (J)	0.0165 (J)	—	—	—	—	NA	0.0161 (J)
0333-96-0669	33-01683	0.0–0.5	SED	0.13 (J)	NA	0.19 (J)	NA	NA	—	0.55	0.69	0.57	0.47	0.61	—	0.045 (J)	NA	NA	0.71
0333-96-0670	33-01684	0.0–0.5	FILL	—	NA	—	NA	NA	—	0.16 (J)	0.22 (J)	0.23 (J)	0.23 (J)	0.22 (J)	—	—	NA	NA	0.24 (J)
RE33-20-190377	33-01684	0.0–1.0	SOIL	1.39	—	0.0517	1.12	0.592	—	0.259	0.418	0.546	0.402	0.167	—	0.0228 (J)	—	NA	0.305
RE33-20-190379	33-01684	9.0–10.0	QBT3	—	—	—	NA	NA	—	—	—	—	—	—	—	—	—	NA	—
RE33-20-190360	33-01685	0.0–0.15	FILL	—	—	—	NA	NA	—	0.0512	0.0622	0.0772	0.0366	0.0234 (J)	—	—	—	NA	0.0527
0333-96-0671	33-01685	0.0–0.5	SOIL	—	NA	—	NA	NA	—	0.052 (J)	0.077 (J)	0.064 (J)	0.055 (J)	0.063 (J)	—	—	NA	NA	0.064 (J)
RE33-20-190361	33-01685	5.0–6.0	QBT3	—	0.0051	—	NA	NA	—	—	—	—	—	—	—	—	—	NA	—
RE33-20-190350	33-60676	0.0–1.0	SOIL	—	—	—	0.00737	0.00473	—	0.0116 (J)	—	0.014 (J)	—	—	—	—	—	NA	—
RE33-20-190354	33-60676	5.0–6.0	QBT3	—	0.00332 (J)	—	NA	NA	—	—	—	—	—	—	—	—	—	NA	—
RE33-20-190351	33-60677	0.0–0.1	SOIL	—	—	—	NA	NA	—	0.0125 (J)	—	—	—	—	—	—	—	—	0.0125 (J)
RE33-20-190355	33-60677	5.0–6.0	QBT3	—	—	—	0.00124 (J)	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190356	33-60678	5.0–6.0	QBT3	—	—	—	NA	NA	—	—	—	—	—	—	—	0.015 (J)	—	NA	—
RE33-20-190353	33-60679	0.0–0.3	SOIL	—	—	—	NA	NA	—	—	—	—	—	—	—	0.0188 (J)	—	NA	—
RE33-20-190357	33-60679	5.0–6.0	QBT3	—	0.00553	—	NA	NA	—	—	—	—	—	—	—	—	—	NA	—
RE33-20-190380	33-60680	0.0–0.95	SOIL	—	—	—	NA	NA	—	—	—	—	—	—	—	—	—	NA	—
RE33-20-190383	33-60683	0.0–1.0	SOIL	—	—	—	NA	NA	—	0.0242 (J)	—	—	—	—	—	—	—	NA	0.0339 (J)

Table 4.10-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Di-n-butylphthalate	Di-n-octylphthalate	Dibenz(a,h)anthracene	Dibenzofuran	Dichlorobenzene[1,4-]	Dimethylphenol[2,4-]	Ethylbenzene	Fluoranthene	Fluorene	Hexanone[2-]	Indeno(1,2,3-cd)pyrene	Isopropylbenzene	Methylene Chloride	Methylnaphthalene[1-]	Methylnaphthalene[2-]	Methylphenol[2-]
Construction Worker SSL[a]				**26,900**	**3540[e]**	**24**	**85[e]**	**24,800**	**5380**	**1770**	**10,000**	**10,000**	**1760[e]**	**240**	**2740**	**1210**	**6060**	**1000**	**13,400**
Industrial SSL[a]				**91,600**	**8200[f]**	**3.23**	**1200[f]**	**6730**	**18,300**	**368**	**33,700**	**33,700**	**1300[f]**	**32.3**	**14,200**	**5130**	**813**	**3370**	**41,000**
Residential SSL[a]				**6160**	**630[f]**	**0.153**	**78[f]**	**1290**	**1230**	**75.1**	**2320**	**2320**	**200[f]**	**1.53**	**2360**	**409**	**172**	**232**	**3200**
0333-96-0652	33-01670	0.0–0.5	SOIL	—	—	—	—	—	—	NA	—	—	NA	—	NA	NA	NA	—	—
RE33-20-190359	33-01670	5.0–6.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0333-96-0653	33-01671	0.0–0.5	SED	—	—	—	—	—	—	NA	0.63 (J)	—	NA	—	NA	NA	NA	—	—
0333-96-0654	33-01671	0.5–0.83	SED	—	—	—	—	—	—	—	0.47 (J)	—	—	—	—	0.0082	NA	—	—
0333-96-0655	33-01672	0.0–0.5	SED	—	—	—	—	—	—	NA	2.8	—	NA	0.64 (J)	NA	NA	NA	—	—
RE33-20-190362	33-01672	0.0–1.0	SOIL	0.0725 (J)	—	0.206 (J)	—	—	—	—	2.34	0.267	—	0.865	—	—	0.102 (J)	0.131 (J)	—
0333-96-0656	33-01672	1.0–1.5	SED	—	—	—	—	—	—	—	1.9	—	—	1.2 (J)	—	0.0029 (J)	NA	—	—
RE33-20-190363	33-01672	5.0–6.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190364	33-01672	9.0–10.0	QBT3	—	—	—	—	—	—	—	0.0245 (J)	—	—	0.0227 (J)	—	—	—	—	—
0333-96-0658	33-01674	0.0–0.5	SED	—	—	—	—	—	—	NA	—	—	NA	—	NA	NA	NA	—	—
0333-96-0659	33-01675	0.0–0.5	SOIL	—	—	—	—	—	—	NA	0.21 (J)	—	NA	—	NA	NA	NA	—	—
RE33-20-190365	33-01679	0.0–1.0	SOIL	—	—	—	—	—	—	—	0.0396	—	—	0.023 (J)	—	—	—	—	—
0333-96-0673	33-01679	0.0–2.0	SOIL	—	—	—	—	—	—	NA	0.11 (J)	—	NA	0.049 (J)	NA	NA	NA	—	—
0333-96-0674	33-01679	3.0–5.0	SOIL	—	—	—	—	—	—	—	—	—	0.006(J)	—	—	—	NA	—	—
0333-96-0677	33-01680	0.0–0.5	SED	—	—	—	—	—	—	NA	10	—	NA	4.1 (J)	NA	NA	NA	—	—
RE33-20-190368	33-01680	0.0–1.0	SOIL	0.355	—	0.501	—	—	—	0.000719 (J)	4.83	0.873	—	2.06	—	—	0.355	0.516	—
0333-96-0678	33-01680	0.0–2.0	SED	—	—	—	—	—	—	—	—	—	—	—	—	—	NA	—	—
0333-96-0679	33-01680	2.0–4.0	QBT3	1.3	—	0.2 (J)	—	—	—	—	0.75	—	—	0.56	—	—	NA	—	—
RE33-20-190369	33-01680	5.0–6.0	QBT3	—	—	—	—	—	—	—	0.0349 (J)	—	—	0.0145 (J)	—	—	—	—	—
RE33-20-190370	33-01680	9.0–10.0	QBT3	—	—	—	—	—	—	—	0.018 (J)	—	—	—	—	—	—	—	—
RE33-20-190371	33-01681	0.0–1.0	SOIL	0.194 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0333-96-0681	33-01681	0.5–1.25	SED	1.7	—	2.5	3.3	—	0.24 (J)	—	21	5.7	—	6.1	—	—	NA	3	0.16 (J)
RE33-20-190372	33-01681	5.0–5.6	SOIL	—	—	—	—	—	—	—	—	—	—	—	0.00198	—	—	—	—
0333-96-0682	33-01681	5.0–6.0	SOIL	0.16 (J)	—	0.12 (J)	0.089 (J)	—	—	—	1	0.16 (J)	—	0.28 (J)	—	—	NA	0.065 (J)	—
RE33-20-190373	33-01681	9.0–10.0	QBT3	—	0.0218 (J)	0.119	0.137 (J)	—	—	0.00885	1.41	0.218	—	0.549	—	—	0.0625	0.0802	—
0333-96-0684	33-01682	0.0–.01	SED	—	—	—	—	—	—	—	0.68 (J)	—	—	0.23 (J)	—	0.005 (J)	NA	—	—

Table 4.10-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Di-n-butylphthalate	Di-n-octylphthalate	Dibenz(a,h)anthracene	Dibenzofuran	Dichlorobenzene[1,4-]	Dimethylphenol[2,4-]	Ethylbenzene	Fluoranthene	Fluorene	Hexanone[2-]	Indeno(1,2,3-cd)pyrene	Isopropylbenzene	Methylene Chloride	Methylnaphthalene[1-]	Methylnaphthalene[2-]	Methylphenol[2-]
Construction Worker SSL[a]				**26,900**	**3540[e]**	**24**	**85[e]**	**24,800**	**5380**	**1770**	**10,000**	**10,000**	**1760[e]**	**240**	**2740**	**1210**	**6060**	**1000**	**13,400**
Industrial SSL[a]				**91,600**	**8200[f]**	**3.23**	**1200[f]**	**6730**	**18,300**	**368**	**33,700**	**33,700**	**1300[f]**	**32.3**	**14,200**	**5130**	**813**	**3370**	**41,000**
Residential SSL[a]				**6160**	**630[f]**	**0.153**	**78[f]**	**1290**	**1230**	**75.1**	**2320**	**2320**	**200[f]**	**1.53**	**2360**	**409**	**172**	**232**	**3200**
RE33-20-190374	33-01682	0.0–1.0	SOIL	0.235 (J)	—	2.04	1.6 (J)	—	—	0.00453	26.2	2.39	—	7.97	—	—	0.561	0.817	—
0333-96-0685	33-01682	1.0–2.0	SOIL	—	—	—	—	—	—	—	1.1	—	—	0.2 (J)	—	0.0029 (J)	NA	—	—
RE33-20-190376	33-01682	9.0–10.0	QBT3	—	—	—	—	—	—	—	0.0296 (J)	—	—	0.0179 (J)	—	—	—	—	—
0333-96-0669	33-01683	0.0–0.5	SED	0.049 (J)	—	0.17 (J)	0.059 (J)	0.18 (J)	—	NA	1.2	0.11 (J)	NA	0.45	NA	NA	NA	—	—
0333-96-0670	33-01684	0.0–0.5	FILL	0.063 (J)	—	0.083 (J)	—	—	—	NA	0.2 (J)	—	NA	0.17 (J)	NA	NA	NA	—	—
RE33-20-190377	33-01684	0.0–1.0	SOIL	0.832	—	0.117	—	—	—	—	0.338	0.0157 (J)	—	0.416	—	—	—	—	—
RE33-20-190379	33-01684	9.0–10.0	QBT3	0.0113 (J)	—	—	—	—	—	—	0.0124 (J)	—	—	—	—	—	—	—	—
RE33-20-190360	33-01685	0.0–0.15	FILL	1.65	—	0.0121 (J)	—	—	—	—	0.0944	—	—	0.038	—	—	—	—	—
0333-96-0671	33-01685	0.0–0.5	SOIL	4.8	—	—	—	—	—	NA	0.098 (J)	—	NA	0.05 (J)	NA	NA	NA	—	—
RE33-20-190361	33-01685	5.0–6.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190350	33-60676	0.0–1.0	SOIL	—	—	—	—	—	—	—	0.0178 (J)	—	—	—	—	—	—	—	—
RE33-20-190354	33-60676	5.0–6.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190351	33-60677	0.0–0.1	SOIL	—	—	—	—	—	—	—	0.0231 (J)	—	—	—	—	—	—	—	—
RE33-20-190355	33-60677	5.0–6.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190356	33-60678	5.0–6.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190353	33-60679	0.0–0.3	SOIL	—	—	—	—	—	—	—	0.0192 (J)	—	—	—	—	—	—	—	—
RE33-20-190357	33-60679	5.0–6.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190380	33-60680	0.0–0.95	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190383	33-60683	0.0–1.0	SOIL	—	—	—	—	—	—	—	0.0504	—	—	—	—	—	—	—	—

Table 4.10-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Methylphenol[4-]	Naphthalene	Phenanthrene	Phenol	Propylbenzene[1-]	Pyrene	Pyridine	Styrene	Tetrachloroethene	Toluene	Trichloroethene	Trimethylbenzene[1,2,4-]	Trimethylbenzene[1,3,5-]	Xylene (total)	Xylene[1,2-]	Xylene[1,3-]+Xylene[1,4-]
Construction Worker SSL[a]				**26,800**	**159**	**7530**	**77,400**	**14,400**	**7530**	**85[e]**	**10,200**	**120**	**14,000**	**6.90**	**245**	**3540**	**798**	**736**	**798**
Industrial SSL[a]				**82,000**	**241**	**25,300**	**275,000**	**24,000**	**25,300**	**12,000[f]**	**51,300**	**629**	**61,300**	**36.5**	**1800**	**1500**	**4280**	**3940**	**4280**
Residential SSL[a]				**6300**	**49.7**	**1740**	**18,500**	**3800**	**1740**	**780[f]**	**7260**	**111**	**5230**	**6.77**	**300**	**270**	**871**	**805**	**871**
0333-96-0652	33-01670	0.0–0.5	SOIL	—	—	—	—	NA	—	1.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
RE33-20-190359	33-01670	5.0–6.0	QBT3	NA	—	—	—	—	—	—	—	—	—	—	—	—	NA	—	—
0333-96-0653	33-01671	0.0–0.5	SED	—	—	0.54 (J)	—	NA	0.66 (J)	—	NA	NA	NA	NA	NA	NA	NA	NA	NA
0333-96-0654	33-01671	0.5–0.83	SED	—	—	0.45 (J)	—	—	0.54 (J)	—	—	—	—	—	—	—	—	NA	NA
0333-96-0655	33-01672	0.0–0.5	SED	—	0.75 (J)	2.8	—	NA	3.4	—	NA	NA	NA	NA	NA	NA	NA	NA	NA
RE33-20-190362	33-01672	0.0–1.0	SOIL	NA	0.358	1.93	—	—	1.65	—	—	—	—	—	—	—	NA	—	—
0333-96-0656	33-01672	1.0–1.5	SED	—	—	1.5 (J)	—	—	2	—	—	—	—	—	—	—	—	NA	NA
RE33-20-190363	33-01672	5.0–6.0	QBT3	NA	—	—	—	—	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190364	33-01672	9.0–10.0	QBT3	NA	—	0.0163 (J)	—	—	0.0195 (J)	—	—	—	—	—	—	—	NA	—	—
0333-96-0658	33-01674	0.0–0.5	SED	—	—	—	—	NA	0.23 (J)	—	NA	NA	NA	NA	NA	NA	NA	NA	NA
0333-96-0659	33-01675	0.0–0.5	SOIL	—	—	—	—	NA	0.24 (J)	—	NA	NA	NA	NA	NA	NA	NA	NA	NA
RE33-20-190365	33-01679	0.0–1.0	SOIL	NA	—	0.026 (J)	—	—	0.0362 (J)	—	—	—	—	—	—	—	NA	—	—
0333-96-0673	33-01679	0.0–2.0	SOIL	—	—	0.1 (J)	—	NA	0.1 (J)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0333-96-0674	33-01679	3.0–5.0	SOIL	—	—	—	—	—	—	NA	—	0.002(J)	0.001 (J)	0.002(J)	—	—	0.002(J)	NA	NA
0333-96-0677	33-01680	0.0–0.5	SED	—	3.3 (J)	11	—	NA	11	—	NA	NA	NA	NA	NA	NA	NA	NA	NA
RE33-20-190368	33-01680	0.0–1.0	SOIL	NA	1.67	5.2	—	—	3.58	—	—	—	0.00863 (J)	—	0.00279	0.00144	NA	0.000837 (J)	0.00143 (J)
0333-96-0678	33-01680	0.0–2.0	SED	—	—	—	—	—	—	NA	—	—	—	—	—	—	—	NA	NA
0333-96-0679	33-01680	2.0–4.0	QBT3	—	—	0.47	—	—	0.82	NA	—	—	—	—	—	—	—	NA	NA
RE33-20-190369	33-01680	5.0–6.0	QBT3	NA	0.0123 (J)	0.0372	—	—	0.0275 (J)	—	—	—	—	—	—	—	NA	—	—
RE33-20-190370	33-01680	9.0–10.0	QBT3	NA	—	0.0213 (J)	—	—	0.0147 (J)	—	—	—	—	—	—	—	NA	—	—
RE33-20-190371	33-01681	0.0–1.0	SOIL	NA	—	—	—	0.000444 (J)	—	—	0.00407	—	—	—	0.00298	0.00197	NA	—	—
0333-96-0681	33-01681	0.5–1.25	SED	0.41	9.6	25	0.22 (J)	—	18	NA	—	—	0.004 (J)	0.003 (J)	0.002 (J)	—	0.002 (J)	NA	NA
RE33-20-190372	33-01681	5.0–5.6	SOIL	NA	—	—	—	0.00077(J)	—	—	0.0313	—	—	—	0.00187	0.00107 (J)	NA	—	—
0333-96-0682	33-01681	5.0–6.0	SOIL	—	0.25 (J)	0.98	—	—	0.82	NA	—	0.002 (J)	0.002 (J)	0.002 (J)	0.002 (J)	—	0.003 (J)	NA	NA
RE33-20-190373	33-01681	9.0–10.0	QBT3	NA	0.235	1.36	—	—	1.43	—	0.000683 (J)	—	—	—	—	—	NA	—	—
0333-96-0684	33-01682	0.0–1.0	SED	—	—	0.46 (J)	—	—	0.71 (J)	—	—	—	—	—	—	—	—	NA	NA

Table 4.10-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Methylphenol[4-]	Naphthalene	Phenanthrene	Phenol	Propylbenzene[1-]	Pyrene	Pyridine	Styrene	Tetrachloroethene	Toluene	Trichloroethene	Trimethylbenzene[1,2,4-]	Trimethylbenzene[1,3,5-]	Xylene (total)	Xylene[1,2-]	Xylene[1,3-]+Xylene[1,4-]
Construction Worker SSL[a]				**26,800**	**159**	**7530**	**77,400**	**14,400**	**7530**	**85[e]**	**10,200**	**120**	**14,000**	**6.90**	**245**	**3540**	**798**	**736**	**798**
Industrial SSL[a]				**82,000**	**241**	**25,300**	**275,000**	**24,000**	**25,300**	**12,000[f]**	**51,300**	**629**	**61,300**	**36.5**	**1800**	**1500**	**4280**	**3940**	**4280**
Residential SSL[a]				**6300**	**49.7**	**1740**	**18,500**	**3800**	**1740**	**780[f]**	**7260**	**111**	**5230**	**6.77**	**300**	**270**	**871**	**805**	**871**
RE33-20-190374	33-01682	0.0–1.0	SOIL	NA	2.3	21	—	—	15.8	—	—	—	—	—	—	—	NA	—	—
0333-96-0685	33-01682	1.0–2.0	SOIL	—	—	1	—	—	0.92	—	—	—	—	—	—	—	—	NA	NA
RE33-20-190376	33-01682	9.0–10.0	QBT3	NA	—	0.0252 (J)	—	—	0.0274 (J)	—	—	—	—	—	—	—	NA	—	—
0333-96-0669	33-01683	0.0–0.5	SED	—	0.06 (J)	0.91	—	NA	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
0333-96-0670	33-01684	0.0–0.5	FILL	—	—	0.076 (J)	—	NA	0.19 (J)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RE33-20-190377	33-01684	0.0–1.0	SOIL	NA	0.082	0.201	—	—	0.281	—	—	—	—	—	—	—	NA	—	—
RE33-20-190379	33-01684	9.0–10.0	QBT3	NA	—	0.0156 (J)	—	—	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190360	33-01685	0.0–0.15	FILL	NA	—	0.0428	—	—	0.0571	—	—	—	—	—	—	—	NA	—	—
0333-96-0671	33-01685	0.0–0.5	SOIL	—	—	0.064 (J)	—	NA	0.11 (J)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RE33-20-190361	33-01685	5.0–6.0	QBT3	NA	—	—	—	—	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190350	33-60676	0.0–1.0	SOIL	NA	—	—	—	—	0.0128 (J)	—	—	—	—	—	—	—	NA	—	—
RE33-20-190354	33-60676	5.0–6.0	QBT3	NA	—	—	—	—	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190351	33-60677	0.0–0.1	SOIL	NA	—	—	—	—	0.0197 (J)	—	—	—	—	—	—	—	NA	—	—
RE33-20-190355	33-60677	5.0–6.0	QBT3	NA	—	—	—	—	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190356	33-60678	5.0–6.0	QBT3	NA	—	—	—	—	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190353	33-60679	0.0–0.3	SOIL	NA	—	—	—	—	0.0153 (J)	—	—	—	—	—	—	—	NA	—	—
RE33-20-190357	33-60679	5.0–6.0	QBT3	NA	—	—	—	—	—	—	—	—	—	—	—	—	NA	—	—
RE33-20-190380	33-60680	0.0–0.95	SOIL	NA	—	—	—	—	—	—	—	—	0.000901 (J)	—	—	—	NA	—	—
RE33-20-190383	33-60683	0.0–1.0	SOIL	NA	—	0.031 (J)	—	—	0.0431	—	—	—	—	—	—	—	NA	—	—

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] SSLs from NMED (2019, 700550) unless otherwise noted.

[b] na = Not available.

[c] Does not have either NMED or EPA SSL values.

[d] Pyrene used as a surrogate based on structural similarity.

[e] Construction worker SSLs calculated using the equations outlines in NMED (2019. 700550), incorporating toxicity and chemical-specific parameters from EPA regional screening level (RSL) tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[f] SSLs from EPA RSL tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[g] Dibenzofuran used as a surrogate based on structural similarity.

[h] — = Not detected.

[i] NA = Not analyzed.

Table 4.10-3
Proposed Sampling and Analysis at SWMU 33-008(c)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	Antimony (SW-846:6010C[b])	Chromium (SW-846:6010C[b])	Copper (SW-846:6010C[b])	Lead (SW-846:6010C[b])	Mercury (SW-846:7471A[b])	Zinc (SW-846:6010C[b])	PAHs (SW-846:8270-SIM_PAHS)	PCBs (SW-846:8082A[b])
Define vertical extent of antimony, copper, lead, zinc, and PAHs at location 33-01671	33-01671	Location 33-01671	0.0–1.0 ft into tuff 2.0–3.0 ft into tuff	X[c]	—[d]	X	X	—	X	X	—
Define vertical extent of PCBs at locations 33-01672, 33-01679, 33-01684, and 33-60676	33-01672, 33-01679, 33-01684, 33-60676	Locations 33-01672, 33-01679, 33-01684, 33-60676	4.0–5.0, 6.0–7.0	—	—	—	—	—	—	—	X
Define vertical extent of PCBs at locations 33-01680, 33-01681, and 33-01682	33-01680, 33-01681, 33-01682	Locations 33-01680, 33-01681, 33-01682	6.0–7.0, 9.0–10.0	—	—	—	—	—	—	—	X
Define vertical and lateral extent of copper, lead, mercury, zinc, and PAHs at locations 33-01671, 33-01673, 33-01680, 33-01681, 33-01682, and 33-01684	8c-1 to 8c-11	Eleven 5-ft step-outs from excavation	0.0–1.0, 5.0–6.0, 9.0–10.0	—	X	X	X	X	X	X	—
Define vertical and lateral extent of copper, lead, and zinc at location 33-01672	8c-12 to 8c-15	Four 2-ft step-outs from location 33-01672	0.0–1.0, 5.0–6.0, 9.0–10.0	—	—	X	X	—	X	—	—
Define vertical and lateral extent of copper, lead, and zinc at location 33-01685	8c-16 to 8c-19	Four 3-ft step-outs from location 33-01685	0.0–1.0, 5.0–6.0, 9.0–10.0	—	—	X	—	X	X	—	—

[a] Depths are below ground surface, unless specified otherwise.

[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.

[c] X = Analysis will be performed.

[d] — = Analysis will not be performed.

Table 4.11-1
Inorganic Chemicals above BVs at SWMU 33-010(c)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Beryllium	Cadmium	Calcium	Chromium	Copper	Lead	Magnesium	Nickel	Nitrate	Perchlorate	Selenium	Silver	Zinc
Soil Background Value[a]				**0.83**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**4610**	**15.4**	**na[b]**	**na**	**1.52**	**1**	**48.8**
Qbt 2,3,4 Background Value[a]				**0.5**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**4.66**	**11.2**	**1690**	**6.58**	**na**	**na**	**0.3**	**1**	**63.5**
Sediment Background Value[a]				**0.83**	**127**	**1.31**	**0.4**	**4420**	**10.5**	**11.2**	**19.7**	**2370**	**9.38**	**na**	**na**	**0.3**	**1**	**60.2**
Construction Worker SSL[c]				**142**	**4390**	**148**	**72.1**	**na**	**134[d]**	**14,200**	**800**	**na**	**753**	**566,000**	**248**	**1750**	**1770**	**106,000**
Industrial SSL[c]				**519**	**255,000**	**2580**	**1110**	**na**	**505[d]**	**51,900**	**800**	**na**	**25700**	**2,080,000**	**908**	**6490**	**6490**	**389,000**
Residential SSL[c]				**31.3**	**15,600**	**156**	**70.5**	**na**	**96.6[d]**	**3130**	**400**	**na**	**1560**	**125,000**	**54.8**	**391**	**391**	**23,500**
RE33-99-0005	33-01704	0.0–0.5	SOIL	—[e]	—	—	—	—	—	116	—	—	—	NA[f]	NA	—	—	—
RE33-99-0006	33-01705	0.0–0.5	SOIL	0.91 (U)	—	—	—	—	—	44.7	—	—	—	NA	NA	—	—	—
RE33-99-0007	33-01706	0.0–0.5	SOIL	0.86 (U)	—	—	—	—	—	—	—	—	—	NA	NA	—	—	—
RE33-99-0065	33-01720	0.0–0.5	SED	—	130	—	—	—	—	581	—	—	—	NA	NA	0.46 (U)	4.6	—
RE33-99-0066	33-01721	0.0–0.5	SED	—	—	—	—	—	—	570	—	—	—	NA	NA	0.89 (J)	—	—
RE33-99-0067	33-01722	0.0–0.5	SED	—	—	—	—	—	—	270	—	—	—	NA	NA	0.44 (U)	—	—
RE33-20-186819	33-60470	0.0–1.0	FILL	1.38 (U)	—	—	—	—	—	45.5 (J+)	—	—	—	13.7	0.000797 (J)	—	—	—
RE33-20-186825	33-60470	3.0–4.0	FILL	1.15 (U)	—	—	—	—	—	—	—	—	—	2.5	—	—	—	—
RE33-20-186831	33-60470	6.0–7.0	FILL	1.67 (U)	—	—	—	—	—	—	—	—	—	1.68	0.00114 (J)	—	—	—
RE33-20-186820	33-60471	0.0–1.0	FILL	1.85 (U)	—	—	—	—	—	91.3	—	—	—	1.14	—	—	—	51.7
RE33-20-186826	33-60471	3.0–4.0	FILL	1.47 (U)	—	—	—	—	—	38.7	—	—	—	1.38	—	—	—	—
RE33-20-186832	33-60471	6.0–6.75	QBT2	1.19 (U)	49.1	—	—	—	—	85.9	—	—	—	1.07	—	1.07	—	—
RE33-20-186821	33-60472	0.0–1.0	FILL	1.3 (U)	—	—	—	—	—	26.1	—	—	—	1.46	—	1.9	—	53.6
RE33-20-186827	33-60472	3.0–4.0	FILL	2.24 (U)	—	—	—	—	—	—	—	—	—	0.829 (J)	—	2.08	—	—
RE33-20-186833	33-60472	6.0–7.0	QBT2	1.99 (U)	—	—	—	—	28.5	—	—	—	—	—	—	1.9	—	—
RE33-20-186822	33-60473	0.0–1.0	FILL	1.96 (U)	—	—	—	—	—	31.8	—	—	—	1.33	—	—	—	—
RE33-20-186834	33-60473	3.0–4.0	QBT2	1.68 (U)	59	2.9	—	3100	21.3	8.51	—	1830	8.66	8.02	0.00097 (J)	2.8	—	—
RE33-20-186828	33-60473	6.0–7.0	QBT2	1.18 (U)	53.7	3.08	—	2920	—	8.36	—	—	—	1.28	—	1.48	—	—
RE33-20-186823	33-60474	0.0–0.55	SOIL	5.88 (J+)	—	—	1.57	—	—	28,900	1620 (J+)	—	—	2.18	0.000547 (J)	1.84	3.14	15,400
RE33-20-186829	33-60474	3.0–4.0	QBT2	1.45 (U)	—	—	—	—	14.1	—	—	—	—	0.67 (J)	—	2.22	—	—
RE33-20-186835	33-60474	6.0–7.0	QBT2	1.58 (U)	—	—	—	—	45.2	—	—	—	—	—	—	2.29	—	—
RE33-20-186824	33-60475	0.0–1.0	FILL	—	—	—	—	—	—	21.5 (J)	32.5 (J)	—	—	1.55	0.000826 (J)	1.7	1.08 (U)	645 (J)
RE33-20-186830	33-60475	3. 0–4.0	QBT2	—	95.1	—	—	—	—	210 (J)	—	—	—	1.03	—	2.77	—	—
RE33-20-186836	33-60475	6.0–7.0	QBT2	—	—	—	—	3610	—	—	—	—	—	—	—	3.21	1.02 (U)	—

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2019, 700550) unless otherwise noted.

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

[f] NA = Not analyzed.

Table 4.11-2
Proposed Sampling and Analysis at SWMU 33-010(c)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	Lead (SW-846:6010C[b])	Copper (SW-846:6010C[b])	Zinc (SW-846:6010C[b])
Define vertical and lateral extent of lead, copper, and zinc at location 33-60474	10c-1 to 10c-4	Four 3 ft step-outs from location 33-60474	0.0–1.0 3.0–4.0 6.0–7.0	X[c]	X	X
Define vertical and lateral extent of lead, copper, and zinc upgradient and downgradient from location 33-60474	10c-5 to 10c-9	Upgradient and downgradient from location 33-60474	0.0–1.0 3.0–4.0 6.0–7.0	X	X	X

[a] Depths are below ground surface.

[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.

[c] X = Analysis will be performed.

Table 4.12-1
Proposed Sampling and Analysis at SWMU 33-011(a)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	TAL Metals (SW-846:6010D[b]/6020B[b]/7471A[b])	Cyanide (SW-846:9012B[b])	Nitrate (SW-846:9056A[b])	Perchlorate (SW-846:6850)	pH (SW-846-9045D[b])	VOCs (SW-846:8260D[b])	SVOCs (SW-846:8270D[b])	PCBs (SW-846:8082A[b])	Isotopic Uranium (HASL-300)	Isotopic Plutonium (HASL-300)	Gamma-Emitting Radionuclides (EPA 901.1)
Define nature and extent of potential contamination inside the storage area boundary	11a-1 to 11a-6	Six locations within storage area boundary	0.0–1.0, 2.0–3.0, 5.0–6.0	X[c]	X	X	X	X	X	X	X	X	X	X
Define nature and extent of potential contamination outside the storage area boundary	11a-7 to 11a-14	Eight 10-ft step-outs from storage area boundary	0.0–1.0, 2.0–3.0, 5.0–6.0	X	X	X	X	X	X	X	X	X	X	X

[a] Depths are below ground surface.

[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.

[c] X = Analysis will be performed.

Table 4.13-1
Organic Chemicals Detected at SWMU 33-011(d)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Carbazole	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Methylnaphthalene[1-]	Methylnaphthalene[2-]	Naphthalene	Phenanthrene	Pyrene
Construction Worker SSL[a]				**151,00**	**242,000**	**75,300**	**240**	**15.0**	**240**	**7530**[b]	**2310**	**85**[c]	**23,100**	**24**	**85**[c]	**10,000**	**10,000**	**240**	**6060**	**1000**	**159**	**7530**	**7530**
Industrial SSL[a]				**50,500**	**960,000**	**253,000**	**32.3**	**23.6**	**32.3**	**25,300**[b]	**323**	**1200**[d,e]	**3230**	**3.23**	**1200**[d]	**33,700**	**33,700**	**32.3**	**813**	**3370**	**241**	**25,300**	**25,300**
Residential SSL[a]				**3480**	**66,300**	**17,400**	**1.53**	**1.12**	**1.53**	**1740**[b]	**15.3**	**78**[d,e]	**153**	**0.153**	**78**[d]	**2320**	**2320**	**1.53**	**172**	**232**	**49.7**	**1740**	**1740**
RE33-20-190308	33-01081	0.0–1.0	FILL	—[f]	0.00501 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190309	33-01081	2.0–3.0	QBT3	—	0.0025 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190310	33-01081	4.0–5.0	QBT3	—	0.00305 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190311	33-01566	4.0–5.0	QBT3	—	0.0144	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190314	33-01567	0.0–1.0	FILL	—	0.00711	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190315	33-01567	2.0–3.0	QBT3	—	0.0118	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190316	33-01567	4.0–5.0	QBT3	—	0.00976	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190323	33-60667	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.057 (J)	0.0748 (J)
RE33-20-190331	33-60667	4.0–5.0	QBT3	—	0.00314 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190324	33-60668	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0739 (J)
RE33-20-190328	33-60668	2.0–3.0	FILL	—	0.00279 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190333	33-60669	4.0–5.0	QBT3	—	0.00201 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190330	33-60670	2.0–2.4	FILL	4.23	—	3.84	5.31	5.64	6.07	2.97	2.4	1.81	5.43	0.965	3.26 (J)	9.6	3.91	2.75	2.35	3.31	11	15	12
RE33-20-190334	33-60670	4.0–5.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	0.0115 (J)	—	—	—	—	—	0.0138 (J)	0.0127 (J)

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] SSLs from NMED (2019, 700550) unless otherwise noted.

[b] Pyrene used as a surrogate based on structural similarity.

[c] Construction worker SSLs calculated using the equations outlined in NMED (2019, 700550), incorporating toxicity and chemical-specific parameters from EPA regional screening level (RSL) tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[d] SSLs from EPA RSL tables (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

[e] Dibenzofuran used as a surrogate based on structural similarity.

[f] — = Not detected.

Table 4.13-2
Proposed Sampling and Analysis at SWMU 33-011(d)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	PAHs (SW-846:8270-SIM_PAHS)
Lateral extent of PAHs downgradient from location 33-60670	11d-1, 11d-2	One 10-ft step-out and one 20-ft step-out downgradient from location 33-60670	0.0–1.0, 2.0–3.0, 4.0–5.0	X[b]
Lateral extent of PAHs south of former storage area	11d-3	South of former storage area	0.0–1.0, 2.0–3.0, 4.0–5.0	X

[a] Depths are below ground surface.

[b] X = Analysis will be performed.

Table 4.14-1
Organic Chemicals Detected at SWMU 33-012(a)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate	Carbazole
Construction Worker SSL[a]				**15,100**	**242,000**	**75,300**	**4.91**	**85.3**	**240**	**15.0**	**240**	**753**[b]	**2310**	**5380**	**85**[c]
Industrial SSL[a]				**50,500**	**960,000**	**253,000**	**11**	**11.1**	**32.3**	**23.6**	**32.3**	**25,300**[b]	**323**	**1830**	**1200**[d,e]
Residential SSL[a]				**3480**	**66,300**	**17,400**	**1.14**	**2.43**	**1.53**	**1.12**	**1.53**	**1740**[b]	**15.3**	**380**	**78**[d,e]
RE33-20-190287	33-01086	0.0–1.0	FILL	—[f]	—	—	0.0258	0.0197 (J)	0.138 (J)	—	—	—	—	—	—
RE33-20-190288	33-01086	2.0–3.0	FILL	—	0.0237	—	—	—	—	—	—	—	—	—	—
RE33-20-190289	33-01086	4.0–5.0	FILL	0.0185 (J)	0.0166	0.0238 (J)	—	—	0.0534	0.0547	0.0514	0.0428	0.0218 (J)	—	—
RE33-20-190290	33-01087	0.0–1.0	FILL	—	—	—	0.0269	0.0152	—	—	—	—	—	—	—
RE33-20-190291	33-01087	2.0–3.0	FILL	—	—	—	0.00207 (J)	0.00154 (J)	0.0236 (J)	0.0203 (J)	0.0203 (J)	—	—	—	—
RE33-20-190292	33-01087	4.0–5.0	FILL	—	—	—	0.00163 (J)	0.00154 (J)	0.0237 (J)	0.0241 (J)	0.0225 (J)	0.0176 (J)	0.0122 (J)	—	—
RE33-20-195039	33-01089	0.0–1.0	FILL	—	—	—	2.44	0.935	0.122 (J)	0.1 (J)	0.119 (J)	—	0.0434 (J)	—	—
RE33-20-195040	33-01089	2.0–3.0	FILL	—	—	—	0.00834	0.00386 (J)	0.0266 (J)	0.0258 (J)	0.0207 (J)	0.0171 (J)	0.0155 (J)	—	—
RE33-20-195041	33-01089	4.0–5.0	FILL	—	—	—	0.00263 (J)	0.0013 (J)	0.0128 (J)	—	—	—	—	—	—
RE33-20-190275	33-60658	0.0–1.0	FILL	—	—	—	0.0635	0.0452	0.109 (J)	0.0928 (J)	0.111 (J)	0.0632 (J)	—	—	—
RE33-20-190279	33-60658	2.0–3.0	FILL	—	—	—	—	—	0.0227 (J)	0.0205 (J)	0.0214 (J)	—	—	—	—
RE33-20-190283	33-60658	4.0–5.0	FILL	0.0148 (J-)	—	0.0266 (J-)	—	—	0.065 (J-)	0.0671 (J-)	0.0722 (J-)	0.0329 (J-)	0.0279 (J-)	—	—
RE33-20-190276	33-60659	0.0–1.0	FILL	1.31	—	6.98	0.0336	0.0288	19.1	14.7	20.8	7.58	7.39	—	9.5
RE33-20-190284	33-60659	4.0–5.0	FILL	0.0577	—	0.114	—	—	0.377	0.384	0.449	0.202	0.184	—	0.0581
RE33-20-190277	33-60660	0.0–1.0	FILL	—	—	—	0.02	0.0223	0.147 (J)	0.143 (J)	0.167 (J)	0.105 (J)	0.0655 (J)	—	—
RE33-20-190281	33-60660	2.0–3.0	FILL	0.562	—	0.903	0.256	0.157	1.59	1.86	1.94	1.09	0.811	—	0.422
RE33-20-190285	33-60660	4.0–5.0	FILL	—	—	—	0.0195	0.0102	0.0233 (J)	0.0214 (J)	0.021 (J)	0.0126 (J)	—	—	—
RE33-20-190278	33-60661	0.0–1.0	FILL	0.359 (J)	—	0.463	7.47	2.04	1.12	1.03	1.06	0.782	0.541	0.122 (J)	0.219 (J)
RE33-20-190282	33-60661	2.0–3.0	FILL	—	0.0294	—	0.131	0.0461	0.0153 (J)	0.0125 (J)	0.0125 (J)	—	—	—	—
RE33-20-190286	33-60661	4.0–5.0	FILL	—	0.00903	—	0.317	0.114	0.0203 (J+)	0.0189 (J+)	0.0164 (J+)	0.0122 (J+)	—	—	—
RE33-20-190293	33-60662	0.0–1.0	FILL	—	0.00535 (J)	—	0.161	0.0656 (J)	0.945 (J)	—	—	—	—	—	—
RE33-20-190298	33-60662	2.0–3.0	FILL	—	0.00837	—	—	—	—	—	—	—	—	—	—
RE33-20-190303	33-60662	4.0–5.0	FILL	0.0744	0.048	0.0967	—	—	0.231	0.246	0.234	0.17	0.0901	—	0.0467
RE33-20-190294	33-60663	0.0–1.0	FILL	—	—	—	0.0204 (J)	0.0223 (J)	0.313 (J)	0.202 (J)	0.254 (J)	—	—	—	—

Table 4.14-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate	Carbazole
Construction Worker SSL[a]				**15,100**	**242,000**	**75,300**	**4.91**	**85.3**	**240**	**15.0**	**240**	**753[b]**	**2310**	**5380**	**85[c]**
Industrial SSL[a]				**50,500**	**960,000**	**253,000**	**11**	**11.1**	**32.3**	**23.6**	**32.3**	**25,300[b]**	**323**	**1830**	**1200[d,e]**
Residential SSL[a]				**3480**	**66,300**	**17,400**	**1.14**	**2.43**	**1.53**	**1.12**	**1.53**	**1740[b]**	**15.3**	**380**	**78[d,e]**
RE33-20-190299	33-60663	2.0–3.0	FILL	—	0.0863	—	—	—	0.0211	0.0202	0.0181	0.016	—	—	—
RE33-20-190304	33-60663	4.0–5.0	FILL	0.0153 (J)	—	0.0169 (J)	—	0.00224 (J)	0.0598	0.0606	0.0594	0.035 (J)	0.0252 (J)	—	0.0128 (J)
RE33-20-190295	33-60664	0.0–1.0	FILL	—	0.0134	—	0.153	0.0646 (J)	—	—	—	—	—	—	—
RE33-20-190300	33-60664	2.0–3.0	FILL	—	—	—	0.00635	0.00293 (J)	—	—	—	—	—	—	—
RE33-20-190305	33-60664	4.0–5.0	FILL	—	—	—	0.0116	0.00644	—	—	—	—	—	—	—
RE33-20-190296	33-60665	0.0–1.0	FILL	—	—	—	0.0191 (J)	0.0185 (J)	—	—	—	—	—	—	—
RE33-20-190297	33-60666	0.0–1.0	FILL	—	—	—	0.0393 (J)	0.039 (J)	—	—	—	—	—	—	—
RE33-20-190302	33-60666	2.0–3.0	FILL	—	—	—	—	—	0.0234 (J)	0.0192 (J)	—	—	—	—	—
RE33-20-190307	33-60666	4.0–5.0	FILL	—	—	—	—	—	0.014 (J)	—	—	—	—	—	—

Table 4.14-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Methylnaphthalene[1-]	Methylnaphthalene[2-]	Naphthalene	Phenanthrene	Pyrene	Total PAHs	Trichloroethene
Construction Worker SSL[a]				**23,100**	**24**	**10,000**	**10,000**	**240**	**6060**	**1000**	**159**	**7530**	**7530**	**na[g]**	**6.90**
Industrial SSL[a]				**3230**	**3.23**	**33,700**	**33,700**	**32.3**	**813**	**3370**	**241**	**25,300**	**25,300**	**na**	**36.5**
Residential SSL[a]				**153**	**0.153**	**2320**	**2320**	**1.53**	**172**	**232**	**49.7**	**1740**	**1740**	**na**	**6.77**
RE33-20-190287	33-01086	0.0–1.0	FILL	—	—	0.223 (J)	—	—	—	—	—	—	0.235 (J)	459	—
RE33-20-190288	33-01086	2.0–3.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190289	33-01086	4.0–5.0	FILL	0.0419	—	0.0839	0.016 (J)	0.0395 (J)	—	—	0.0206 (J)	0.0946	0.097	409	—
RE33-20-190290	33-01087	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190291	33-01087	2.0–3.0	FILL	0.0174 (J)	—	0.031 (J)	—	—	—	—	—	0.0248 (J)	0.0517	128	—
RE33-20-190292	33-01087	4.0–5.0	FILL	0.0196 (J)	—	0.0318 (J)	—	—	—	—	—	0.0298 (J)	0.0535	150	—
RE33-20-195039	33-01089	0.0–1.0	FILL	0.1 (J)	—	0.206	—	—	—	—	—	0.122 (J)	0.252	743	—
RE33-20-195040	33-01089	2.0–3.0	FILL	0.0207 (J)	—	0.0357 (J)	—	0.0183 (J)	—	—	—	0.035 (J)	0.0572	164	—
RE33-20-195041	33-01089	4.0–5.0	FILL	—	—	0.0147 (J)	—	—	—	—	—	0.0178 (J)	0.024 (J)	56.5	0.000909 (J)
RE33-20-190275	33-60658	0.0–1.0	FILL	0.0868 (J)	—	0.128 (J)	—	—	—	—	—	—	0.174 (J)	413	—
RE33-20-190279	33-60658	2.0–3.0	FILL	0.0163 (J)	—	0.0304 (J)	—	—	—	—	—	0.0257 (J)	0.0304 (J)	108	—
RE33-20-190283	33-60658	4.0–5.0	FILL	0.0583 (J-)	—	0.0912 (J-)	0.0169 (J-)	0.0359 (J-)	—	—	0.0198 (J-)	0.104 (J-)	0.111 (J-)	470 (J-)	—
RE33-20-190276	33-60659	0.0–1.0	FILL	18.7	2.13	49.3	0.819	8.81	—	—	0.49	31.3	62.9	172,000	—
RE33-20-190284	33-60659	4.0–5.0	FILL	0.353	0.0516	0.748	0.065	0.223	0.0183 (J)	0.0223 (J)	0.0569	0.475	0.672	2800	—
RE33-20-190277	33-60660	0.0–1.0	FILL	0.133 (J)	—	0.25	—	0.103 (J)	—	—	—	0.156 (J)	0.28	918	—
RE33-20-190281	33-60660	2.0–3.0	FILL	1.55	0.296	2.78	0.564	1.14	0.182 (J)	0.262	0.836	3.26	3.6	15,100	—
RE33-20-190285	33-60660	4.0–5.0	FILL	0.0191 (J)	—	0.0362 (J)	—	0.013 (J)	—	—	—	0.0374 (J)	0.0351 (J)	130	—
RE33-20-190278	33-60661	0.0–1.0	FILL	1	0.204 (J)	2.18	0.259 (J)	0.741	—	—	0.182 (J)	1.84	2.33	8860	—
RE33-20-190282	33-60661	2.0–3.0	FILL	—	—	0.0226 (J)	—	—	—	—	—	0.0171 (J)	0.0216 (J)	73.8	—
RE33-20-190286	33-60661	4.0–5.0	FILL	0.0133 (J+)	—	0.0227 (J+)	—	0.014 (J+)	—	—	—	0.0217 (J+)	0.0259 (J+)	86.7 (J+)	—
RE33-20-190293	33-60662	0.0–1.0	FILL	—	—	1.23 (J)	—	—	—	—	—	1.03 (J)	1.29 (J)	3550	—
RE33-20-190298	33-60662	2.0–3.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190303	33-60662	4.0–5.0	FILL	0.219	0.0471	0.379	0.0727	0.151	0.0298 (J)	0.0331 (J)	0.0913	0.443	0.456	1930	—
RE33-20-190294	33-60663	0.0–1.0	FILL	—	—	0.332 (J)	—	—	—	—	—	0.261 (J)	0.417 (J)	1260	—
RE33-20-190299	33-60663	2.0–3.0	FILL	0.0156	—	0.027	—	0.0164	—	—	—	0.0244	0.0341	104	—

Table 4.14-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Methylnaphthalene[1-]	Methylnaphthalene[2-]	Naphthalene	Phenanthrene	Pyrene	Total PAHs	Trichloroethene
Construction Worker SSL[a]				**23,100**	**24**	**10,000**	**10,000**	**240**	**6060**	**1000**	**159**	**7530**	**7530**	**na[g]**	**6.90**
Industrial SSL[a]				**3230**	**3.23**	**33,700**	**33,700**	**32.3**	**813**	**3370**	**241**	**25,300**	**25,300**	**na**	**36.5**
Residential SSL[a]				**153**	**0.153**	**2320**	**2320**	**1.53**	**172**	**232**	**49.7**	**1740**	**1740**	**na**	**6.77**
RE33-20-190304	33-60663	4.0–5.0	FILL	0.0499	—	0.113	0.0186 (J)	0.0388 (J)	—	—	0.0243 (J)	0.101	0.094	453	—
RE33-20-190295	33-60664	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190300	33-60664	2.0–3.0	FILL	—	—	—	—	—	—	—	—	—	0.0546 (J)	54.6	—
RE33-20-190305	33-60664	4.0–5.0	FILL	—	—	—	—	—	—	—	—	—	0.0142 (J)	14.2	—
RE33-20-190296	33-60665	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	0.0639 (J)	63.9	—
RE33-20-190297	33-60666	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	0.0649	64.9	—
RE33-20-190302	33-60666	2.0–3.0	FILL	0.0175 (J)	—	0.0313 (J)	—	—	—	—	—	0.028 (J)	0.043	102	—
RE33-20-190307	33-60666	4.0–5.0	FILL	—	—	0.0179 (J)	—	—	—	—	—	—	0.0136 (J)	31.5	—

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] SSLs from NMED (2019, 700550) unless otherwise noted.

[b] Pyrene used as a surrogate based on structural similarity.

[c] Construction worker SSLs calculated using the equations outlined in NMED (2019, 700550), incorporating toxicity and chemical-specific parameters from EPA regional screening level (RSL) tables (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[d] SSLs from EPA RSL tables (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[e] Dibenzofuran used as a surrogate based on structural similarity.

[f] — = Not detected.

[g] na = Not available.

Table 4.14-2
Proposed Sampling and Analysis at SWMU 33-012(a)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	PAHs (SW-846:8270-SIM_PAHS)	PCBs (SW-846:8082A[b])
Define lateral extent of PCBs and PAHs at locations 33-60659, 33-60660, and 33-60661	12a-1 to 12a-7	Three locations downgradient from location 33-60659, two locations downgradient from location 33-60660, and two locations downgradient from location 33-60661	0.0–1.0, 2.0–3.0, 4.0–5.0	X[c]	X
Define vertical and lateral extent of PCBs and PAHs to the east of the former drum storage area	12a-8 to 12a-13	Six downgradient locations between locations 33-01089 and 33-60660	0.0–1.0, 2.0–3.0, 4.0–5.0	X	X
Define vertical and lateral extent of PAHs at location 33-60659	12a-14 to 12a-16	Three 5-ft step-outs from location 33-60659	0.0–1.0, 2.0–3.0, 4.0–5.0	X	—[d]
Define vertical and lateral extent of PCBs and PAHs at location 33-60661	12a-17 to 12a-20	Four 5-ft step-outs from location 33-60661	0.0–1.0, 2.0–3.0, 4.0–5.0	X	X

[a] Depths are below ground surface.

[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.

[c] X = Analysis will be performed.

[d] — = Analysis will not be performed.

Table 4.15-1
Inorganic Chemicals above BVs at SWMU 33-017

Sample ID	Location ID	Depth (ft)	Media	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Sodium	Zinc
Soil Background Value[a]				**0.83**	**8.17**	**295**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21,500**	**22.3**	**671**	**0.1**	**15.4**	**na[b]**	**na**	**1.52**	**1**	**915**	**48.8**
Qbt 2,3,4 Background Value[a]				**0.5**	**2.79**	**46**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**14,500**	**11.2**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**2770**	**63.5**
Sediment Background Value[a]				**0.83**	**3.98**	**127**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**13,800**	**19.7**	**543**	**0.1**	**9.38**	**na**	**na**	**0.3**	**1**	**1470**	**60.2**
Construction Worker SSL[c]				**142**	**41.2**	**4390**	**72.1**	**na**	**134[d]**	**36.7**	**14,200**	**248,000**	**800**	**464**	**77.1**	**753**	**566,000**	**248**	**1750**	**1770**	**na**	**106,000**
Industrial SSL[c]				**519**	**35.9**	**255,000**	**1110**	**na**	**505[d]**	**388**	**51,900**	**908,000**	**800**	**160,000**	**389**	**25,700**	**2,080,000**	**908**	**6490**	**6490**	**na**	**389,000**
Residential SSL[c]				**31.3**	**7.07**	**15,600**	**70.5**	**na**	**96.6[d]**	**23.4**	**3130**	**54,800**	**400**	**10,500**	**23.5**	**1560**	**125,000**	**54.8**	**391**	**391**	**na**	**23,500**
RE33-20-190034	33-01102	0.0–1.0	FILL	—[e]	—	—	0.735	—	—	—	16.6	—	—	—	—	—	1.52	—	—	—	—	164
RE33-20-190059	33-01102	2.0–3.0	FILL	—	—	—	—	6910	—	—	—	—	—	—	—	—	—	—	1.63	—	—	—
RE33-20-190084	33-01102	4.0–5.0	FILL	1.02 (U)	—	—	—	6490	—	—	—	—	—	—	—	—	—	—	1.81	—	—	—
RE33-20-190035	33-01104	0.0–1.0	FILL	—	—	—	1.9	—	—	—	—	—	—	—	—	—	1.5	—	—	—	—	208
RE33-20-190060	33-01104	2.0–3.0	FILL	—	—	—	—	6180	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190085	33-01104	4.0–5.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190036	33-01105	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	9.34	0.00155 (J)	—	—	—	—
RE33-20-190061	33-01105	2.0–3.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	1.85	—	—	—	—	—
RE33-20-190086	33-01105	4.0–5.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	3.19	0.000528 (J)	—	—	—	—
RE33-20-190037	33-01106	0.0–1.0	SOIL	1.05 (U)	—	—	0.901	—	—	—	42	—	73.4 (J+)	—	—	—	1.95	—	—	29.1	—	166
RE33-20-190062	33-01106	2.0–3.0	QBT3	1.15 (U)	—	—	—	—	18.2	—	5.82	—	—	—	—	—	—	—	0.915 (J)	2.09	—	—
RE33-20-190087	33-01106	4.0–5.0	QBT2	0.51 (U)	—	—	—	—	11.1	—	—	—	14.5 (J+)	—	—	—	—	—	0.957 (J)	6.7	—	—
RE33-20-190038	33-01107	0.0–0.5	SOIL	—	—	—	1.61	—	23.7	—	76.1	—	220	—	0.169	—	3.14	0.000858 (J)	—	63.4	—	229
RE33-20-190063	33-01107	2.0–3.0	QBT3	—	—	—	—	—	19.2	—	—	—	—	—	—	—	—	—	0.944 (J)	—	—	—
RE33-20-190088	33-01107	4.0–5.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.03 (J)	—	—	—
RE33-20-190039	33-01109	0.0–0.7	SOIL	—	—	—	—	—	—	—	16	—	24.5	—	—	—	1.54	—	—	—	—	93.5
RE33-20-190064	33-01109	2.0–3.0	QBT3	—	—	—	—	—	15.7	—	—	—	—	—	—	—	—	—	0.887 (J)	—	—	—
RE33-20-190089	33-01109	4.0–5.0	QBT3	—	—	—	—	3140	—	—	—	—	—	—	—	—	—	—	1.3	—	—	—
RE33-20-190040	33-01113	0.0–1.0	SED	—	—	—	0.504 (J)	—	—	—	25.9	—	30.5	—	—	—	1.08 (J)	—	0.423 (J)	—	—	142
RE33-20-190065	33-01113	2.0–3.0	QBT2	—	—	—	—	—	16.4	—	29.6	—	11.7	—	—	—	—	—	0.682 (J)	—	—	63.6
RE33-20-190090	33-01113	4.0–5.0	QBT2	0.962 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.822 (J)	—	—	—
RE33-20-190041	33-01114	0.0–1.0	SOIL	4.55	13.5	—	4.05	—	—	—	2320	—	537	—	2.64	125	—	—	—	10.6	—	592
RE33-20-190066	33-01114	2.0–3.0	QBT3	—	—	—	2.53	—	15.1	—	140	—	128	—	0.124	6.77	—	—	0.76 (J)	1.11	—	201
RE33-20-190091	33-01114	4.0–5.0	QBT3	—	—	65.1	3.62	—	12 (J+)	5.25	186	56,600	105	1350	—	—	—	—	0.874 (J)	—	—	436

Table 4.15-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Sodium	Zinc
Soil Background Value[a]				**0.83**	**8.17**	**295**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21,500**	**22.3**	**671**	**0.1**	**15.4**	**na[b]**	**na**	**1.52**	**1**	**915**	**48.8**
Qbt 2,3,4 Background Value[a]				**0.5**	**2.79**	**46**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**14,500**	**11.2**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**2770**	**63.5**
Sediment Background Value[a]				**0.83**	**3.98**	**127**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**13,800**	**19.7**	**543**	**0.1**	**9.38**	**na**	**na**	**0.3**	**1**	**1470**	**60.2**
Construction Worker SSL[c]				**142**	**41.2**	**4390**	**72.1**	**na**	**134[d]**	**36.7**	**14,200**	**248,000**	**800**	**464**	**77.1**	**753**	**566,000**	**248**	**1750**	**1770**	**na**	**106,000**
Industrial SSL[c]				**519**	**35.9**	**255000**	**1110**	**na**	**505[d]**	**388**	**51,900**	**908,000**	**800**	**160,000**	**389**	**25,700**	**2,080,000**	**908**	**6490**	**6490**	**na**	**389,000**
Residential SSL[c]				**31.3**	**7.07**	**15,600**	**70.5**	**na**	**96.6[d]**	**23.4**	**3130**	**54,800**	**400**	**10,500**	**23.5**	**1560**	**125,000**	**54.8**	**391**	**391**	**na**	**23,500**
RE33-20-190042	33-01116	0.0–1.0	SOIL	—	—	—	—	7050	—	—	—	—	—	—	—	—	7.64	0.00134 (J)	—	—	—	—
RE33-20-190067	33-01116	2.0–3.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	0.887 (J)	0.00312	—	—	—	—
RE33-20-190092	33-01116	4.0–5.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.000675 (J)	—	—	—	—
RE33-20-190043	33-01120	0.0–1.0	FILL	1.26 (U)	—	—	—	—	—	—	19.3	—	22.5	—	—	—	—	0.0007 (J)	—	—	—	—
RE33-20-190068	33-01120	2.0–3.0	QBT3	—	—	56.8	—	3010	—	—	—	—	—	—	—	—	—	0.000617 (J)	1.36	—	—	—
RE33-20-190093	33-01120	4.0–5.0	QBT3	0.593 (U)	—	—	—	—	22.9 (J)	—	—	—	—	—	—	—	—	—	1.49	—	—	—
RE33-20-190044	33-01128	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—	3.21	—	—	—	—	—
RE33-20-190069	33-01128	2.0–2.8	FILL	—	—	—	—	—	—	—	19.8	—	—	—	—	39.9	1.25	—	—	—	1190	—
RE33-20-190094	33-01128	4.0–5.0	QBT3	0.791 (U)	—	—	—	—	25.6	—	—	—	—	—	—	—	1.22	—	0.633 (J)	—	—	—
RE33-20-190045	33-01130	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	1.39	—	—	—	—	—
RE33-20-190070	33-01130	2.0–3.0	FILL	1 (U)	—	—	—	—	—	—	—	—	—	—	—	—	15.9	—	—	—	—	—
RE33-20-190095	33-01130	4.0–5.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—	5.47	—	—	—	—	—
RE33-20-190046	33-01135	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	31	—	—	—	3.84	0.000661 (J)	—	—	—	—
RE33-20-190071	33-01135	2.0–3.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	0.808 (J)	0.000801 (J)	1.11	—	—	—
RE33-20-190096	33-01135	4.0–5.0	QBT3	—	—	—	—	—	22.4 (J+)	—	—	—	—	—	—	—	—	0.000716 (J)	1.05	—	—	—
RE33-20-190047	33-01145	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	0.129	—	57.2	0.00926	—	—	—	—
RE33-20-190072	33-01145	2.0–3.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	1.85	0.00141 (J)	1.15	—	—	—
RE33-20-190097	33-01145	4.0–5.0	QBT3	—	—	—	—	—	29.7	—	—	—	—	—	—	—	8.04	0.0022	0.8 (J)	—	—	—
RE33-20-190048	33-01146	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	1.38 (J)	—	—	—	—	—
RE33-20-190073	33-01146	2.0–3.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00236	—	—	—	—
RE33-20-190098	33-01146	4.0–5.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	1 (J)	0.00405	—	—	—	—
RE33-20-190049	33-01152	0.0–1.0	SOIL	1.02 (U)	—	—	—	—	—	—	—	—	—	—	—	—	14.1	—	—	—	—	—
RE33-20-190074	33-01152	2.0–3.0	QBT3	—	—	—	—	2380	—	—	—	—	—	—	—	—	1.17	—	0.5 (J)	—	—	—
RE33-20-190099	33-01152	4.0–5.0	QBT3	0.802 (U)	—	—	—	—	14.5	—	—	—	—	—	—	—	0.801 (J)	—	0.601 (J)	—	—	—
RE33-20-190050	33-01156	0.0–1.0	SOIL	—	—	—	—	6290	—	—	—	—	—	—	—	—	1.31	—	—	—	—	—
RE33-20-190075	33-01156	2.0–3.0	QBT3	—	—	—	—	—	14.8	—	—	—	—	—	—	—	—	0.000598 (J)	1.41	—	—	—

Table 4.15-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Sodium	Zinc
Soil Background Value[a]				**0.83**	**8.17**	**295**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21,500**	**22.3**	**671**	**0.1**	**15.4**	**na[b]**	**na**	**1.52**	**1**	**915**	**48.8**
Qbt 2,3,4 Background Value[a]				**0.5**	**2.79**	**46**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**14,500**	**11.2**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**2770**	**63.5**
Sediment Background Value[a]				**0.83**	**3.98**	**127**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**13,800**	**19.7**	**543**	**0.1**	**9.38**	**na**	**na**	**0.3**	**1**	**1470**	**60.2**
Construction Worker SSL[c]				**142**	**41.2**	**4390**	**72.1**	**na**	**134[d]**	**36.7**	**14,200**	**248,000**	**800**	**464**	**77.1**	**753**	**566,000**	**248**	**1750**	**1770**	**na**	**106,000**
Industrial SSL[c]				**519**	**35.9**	**255000**	**1110**	**na**	**505[d]**	**388**	**51,900**	**908,000**	**800**	**160,000**	**389**	**25,700**	**2,080,000**	**908**	**6490**	**6490**	**na**	**389,000**
Residential SSL[c]				**31.3**	**7.07**	**15,600**	**70.5**	**na**	**96.6[d]**	**23.4**	**3130**	**54,800**	**400**	**10,500**	**23.5**	**1560**	**125,000**	**54.8**	**391**	**391**	**na**	**23,500**
RE33-20-190100	33-01156	4.0–5.0	QBT3	1.22 (U)	—	—	—	—	20.8	—	—	—	—	—	—	—	0.604 (J)	0.0028	1.04	—	—	—
RE33-20-190051	33-01166	0.0–0.2	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	1.48	—	—	—	—	—
RE33-20-190076	33-01166	2.0–3.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.981	—	—	—
RE33-20-190101	33-01166	4.0–5.0	QBT3	—	—	—	—	2350	14.8	—	—	—	—	—	—	—	—	—	1.19	—	—	—
RE33-20-190052	33-01604	0.0–1.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RE33-20-190077	33-01604	2.0–3.0	FILL	0.882 (U)	—	—	—	—	—	—	—	—	—	—	—	—	0.901 (J)	—	1.55	—	—	—
RE33-20-190102	33-01604	4.0–5.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—	0.961 (J)	—	—	—	—	—
RE33-20-190053	33-01606	0.0–1.0	FILL	—	—	—	0.45 (J)	—	—	—	45.7 (J+)	—	—	—	—	—	0.769 (J)	—	—	—	—	147
RE33-20-190078	33-01606	2.0–3.0	FILL	—	—	—	—	15,500	—	—	—	—	—	—	—	—	0.741 (J)	—	1.65	—	—	—
RE33-20-190103	33-01606	4.0–5.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—	1.26	—	—	—	—	—
RE33-20-190054	33-01607	0.0–1.0	FILL	1.37 (U)	—	—	—	—	—	—	—	—	—	—	—	—	1.08 (J)	—	—	—	—	—
RE33-20-190079	33-01607	2.0–3.0	FILL	—	—	—	—	8620	—	—	15.2	—	—	—	—	—	1.87	—	—	—	—	—
RE33-20-190104	33-01607	4.0–5.0	FILL	—	—	—	—	10,600	—	—	—	—	—	—	—	—	1.58	—	—	—	—	—
RE33-20-190055	33-01612	0.0–1.0	SOIL	0.856 (U)	—	—	1.78	—	19.7	—	68.1	—	194	—	—	—	—	—	—	71.2	—	239
RE33-20-190080	33-01612	2.0–3.0	QBT3	—	—	—	—	—	8.78 (J+)	—	—	—	—	—	—	—	—	—	0.821 (J)	—	—	—
RE33-20-190105	33-01612	4.0–5.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	0.103	—	—	—	0.803 (J)	—	—	—
RE33-20-190056	33-01614	0.0–1.0	FILL	0.892 (U)	—	—	6.91	—	—	—	63.8 (J+)	—	40.2	—	—	—	13.6	0.0193	—	—	—	110
RE33-20-190081	33-01614	2.0–3.0	FILL	—	—	—	—	8790	—	—	—	—	—	—	—	—	22	0.0265	—	—	—	—
RE33-20-190106	33-01614	4.0–5.0	FILL	—	—	—	—	—	—	—	—	—	—	—	—	—	35.4	0.00713	—	—	952	—
RE33-20-190057	33-01615	0.0–1.0	FILL	—	—	—	—	6910	—	—	34.8 (J+)	—	32.4	—	—	—	4.55	0.00631	—	—	—	69
RE33-20-190082	33-01615	2.0–3.0	FILL	—	—	—	—	7240	—	—	—	—	—	—	—	—	4.61	0.0124	—	—	—	—
RE33-20-190107	33-01615	4.0–5.0	FILL	—	—	—	—	7200	—	—	—	—	—	—	—	—	17.1	0.00487	—	—	—	—
RE33-20-190058	33-01616	0.0–1.0	SOIL	1.11 (U)	—	—	1.09	—	—	—	46.5	—	76.4	—	0.155	—	2.13	0.000964 (J)	—	25.9	—	179
RE33-20-190083	33-01616	2.0–3.0	QBT2	—	—	—	—	—	17.1	—	—	—	—	—	—	—	—	—	0.953 (J)	—	—	—
RE33-20-190108	33-01616	4.0–5.0	QBT2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.91 (J)	—	—	—
RE33-20-190109	33-60616	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	1.64	—	—	—	—	—

Table 4.15-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Nitrate	Perchlorate	Selenium	Silver	Sodium	Zinc
Soil Background Value[a]				**0.83**	**8.17**	**295**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21,500**	**22.3**	**671**	**0.1**	**15.4**	**na[b]**	**na**	**1.52**	**1**	**915**	**48.8**
Qbt 2,3,4 Background Value[a]				**0.5**	**2.79**	**46**	**1.63**	**2200**	**7.14**	**3.14**	**4.66**	**14,500**	**11.2**	**482**	**0.1**	**6.58**	**na**	**na**	**0.3**	**1**	**2770**	**63.5**
Sediment Background Value[a]				**0.83**	**3.98**	**127**	**0.4**	**4420**	**10.5**	**4.73**	**11.2**	**13,800**	**19.7**	**543**	**0.1**	**9.38**	**na**	**na**	**0.3**	**1**	**1470**	**60.2**
Construction Worker SSL[c]				**142**	**41.2**	**4390**	**72.1**	**na**	**134[d]**	**36.7**	**14,200**	**248,000**	**800**	**464**	**77.1**	**753**	**566,000**	**248**	**1750**	**1770**	**na**	**106,000**
Industrial SSL[c]				**519**	**35.9**	**255000**	**1110**	**na**	**505[d]**	**388**	**51,900**	**908,000**	**800**	**160,000**	**389**	**25,700**	**2,080,000**	**908**	**6490**	**6490**	**na**	**389,000**
Residential SSL[c]				**31.3**	**7.07**	**15,600**	**70.5**	**na**	**96.6[d]**	**23.4**	**3130**	**54,800**	**400**	**10,500**	**23.5**	**1560**	**125,000**	**54.8**	**391**	**391**	**na**	**23,500**
RE33-20-190114	33-60616	2.0–3.0	QBT3	0.984 (U)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.762 (J)	—	—	—
RE33-20-190119	33-60616	4.0–5.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.863 (J)	—	—	—
RE33-20-190110	33-60617	0.0–1.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00131 (J)	0.937 (J)	—	—	—
RE33-20-190115	33-60617	2.0–3.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.14	—	—	—
RE33-20-190120	33-60617	4.0–5.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.000623 (J)	1.07	—	—	—
RE33-20-190111	33-60618	0.0–1.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	0.955 (J)	—	0.885 (J)	—	—	—
RE33-20-190116	33-60618	2.0–3.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.9 (J)	—	—	—
RE33-20-190121	33-60618	4.0–5.0	QBT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.000696 (J)	0.952 (J)	—	—	—
RE33-20-190112	33-60619	0.0–1.0	SOIL	—	—	—	—	—	—	—	—	—	—	—	—	—	1.1 (J)	—	—	—	—	—
RE33-20-190117	33-60619	2.5–3.5	QBT3	0.998 (U)	—	—	—	—	14	—	—	—	—	—	—	—	—	—	0.864 (J)	—	—	—
RE33-20-190122	33-60619	4.0–5.0	QBT3	—	—	—	—	—	25.2 (J+)	—	—	—	—	—	—	—	—	0.00301	1.54	—	—	—
RE33-20-190113	33-60620	0.0–1.0	QBT2	—	—	—	—	—	—	—	—	—	—	—	—	—	1.26	0.00054 (J)	1.22	—	—	—
RE33-20-190118	33-60620	2.0–3.0	QBT2	—	—	—	—	—	—	—	—	—	—	—	—	—	0.909 (J)	—	1.38	—	—	—
RE33-20-190123	33-60620	4.0–5.0	QBT2	—	—	—	—	—	31.2	—	—	—	—	—	—	—	0.871 (J)	—	1.44	—	—	—

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] na = Not available.

[c] SSLs from NMED (2019, 700550) unless otherwise noted.

[d] SSL for total chromium.

[e] — = Not detected or not detected above BV.

Table 4.15-2
Proposed Sampling and Analysis at SWMU 33-017

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	TAL Metals (SW-846:6010D[b]/6020B[b]/7471A[b])
Define the vertical and lateral extent of copper, lead, mercury, zinc, and selenium at locations 33-01106, 33-01107, and 33-01612	17-1 to 17-4	Four 5-ft step outs from locations 33-01106, 33-01107, and 33-01612	0.0–1.0, 2.0-3.0, 4.0-5.0	X[c]

[a] Depths are below ground surface.

[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.

[c] X = Analysis will be performed.

Table 4.16-1
Organic Chemicals above BVs at AOC C-33-001

Sample ID	Location ID	Depth (ft)	Media	Aroclor-1260
Construction Worker SSL*				**85.3**
Industrial SSL*				**11.1**
Residential SSL*				**2.43**
0333-96-2042	33-01748	0.0–0.5	FILL	0.15
RE33-20-190414	33-01748	0.0–1.0	FILL	0.661
RE33-20-190415	33-01748	2.0–3.0	QBT3	0.0218
RE33-20-190416	33-01748	4.0–5.0	QBT3	0.016
RE33-20-190417	33-01749	0.0–0.4	FILL	798
0333-96-2043	33-01749	0.0–0.5	SOIL	11
RE33-20-190418	33-01749	2.0–3.0	QBT3	1.88
RE33-20-190419	33-01749	4.0–5.0	QBT3	0.786
0333-96-2045	33-01751	0.0–0.5	SOIL	3.9

Table 4.16-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aroclor-1260
Construction Worker SSL*				**85.3**
Industrial SSL*				**11.1**
Residential SSL*				**2.43**
RE33-20-190420	33-01751	0.0–1.0	FILL	13.5
RE33-20-190421	33-01751	2.0–3.0	QBT3	2.49
RE33-20-190422	33-01751	4.0–5.0	QBT3	1.84
0333-96-2046	33-01752	0.0–0.5	FILL	6.2
RE33-20-190423	33-01752	0.0–0.7	FILL	0.064
RE33-20-190424	33-01752	2.0–3.0	QBT3	0.0246
RE33-20-190425	33-01752	4.0–5.0	QBT3	0.00137 (J)
RE33-20-190435	33-60700	0.0–0.6	FILL	0.00241 (J)

Notes: Results are in mg/kg. Data qualifiers are presented in Appendix A.

* SSLs from NMED (2019, 700550) unless otherwise noted.

Table 4.16-2
Proposed Sampling and Analysis at AOC C- 33-001

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	PCBs (SW-846:8082A[b])
Define vertical and lateral extent of PCBs adjacent to location 33-01479	1-1 to 1-4	Four step-outs from location 33-01749	0.0–1.0, 2.0–3.0, 4.0–5.0	X[c]

[a] Depths are below ground surface.

[b] Most recent promulgated, certified, and appropriate method will be used during field investigations.

[c] X = Analysis will be performed.

Table 5.0-1
Summary of Investigation Methods

Method	Summary
Spade-and-Scoop Collection of Soil Samples	This method is typically used to collect shallow (e.g., approximately 0–12 in.) soil or sediment samples. The spade-and-scoop method involves digging a hole to the desired depth, as prescribed in the sampling and analysis plan, and collecting a discrete grab sample. The sample for VOC analysis is transferred immediately from the sampler to the sample container to minimize the loss of VOCs during the sample collection process. Containers for VOC samples are filled as completely as possible, leaving no or minimal headspace, and sealed with a Teflon-lined cap. The remaining sample material is typically placed in a clean stainless-steel bowl for transfer into various sample containers.
Hand-Auger Sampling	This method is typically used for sampling soil or sediment at depths of less than 10–15 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 that can be advanced to the desired sampling depth. When the desired depth is reached, the auger is decontaminated before the hole is advanced to the sampling depth. The sample for VOC analysis is transferred immediately from the sampler to the sample container to minimize the loss of VOCs during the sample collection process. Containers for VOC samples are filled as completely as possible, leaving no or minimal headspace, and sealed with a Teflon-lined cap. The remaining sample material is transferred from the auger bucket to a stainless-steel sampling bowl before the various required sample containers are filled.
Hollow-Stem Auger Drilling Methods	In this method, hollow-stem augers (sections of seamless pipe with auger flights welded to the pipe) act as a screw conveyor to bring cuttings of sediment, soil, and/or rock to the surface. Auger sections are typically 5 ft in length and have outside diameters of 4.25 to 14 in. Drill rods, split-spoon core barrels, Shelby tubes, and other samplers can pass through the center of the hollow-stem auger sections for collection of discrete samples from desired depths. Hollow-stem augers are used as temporary casings when setting wells to prevent cave-ins of the borehole walls. If samples are to be collected for VOC analysis, the sampler will be lined with brass sleeves. Immediately upon retrieval of the sampler, it will be opened and a sleeve from the desired depth interval will be collected for VOC analysis. The ends of the sleeve will immediately be covered with Teflon film and capped with plastic caps. Tape will then be used to seal the ends of the cap to the sleeve. Material from the remaining sleeves will then be field screened, visually inspected, and placed in a stainless-steel bowl. Samples for the remaining analysis will then be transferred to appropriate sample containers, depending on the analytical method requirement.
Handling, Packaging, and Shipping of Samples	Field team members seal and label samples before packing and ensure that the sample containers and the containers used for transport are free of external contamination. Field team members package all samples so as to minimize the possibility of breakage during transportation. After all environmental samples are collected, packaged, and preserved, a field team member transports the samples either to the SMO or to an SMO-approved radiation screening laboratory under chain of custody (COC). The SMO arranges to ship samples to the analytical laboratories. The field team member must inform the SMO and/or the radiation screening laboratory coordinator when levels of radioactivity are in the action-level or limited-quantity ranges. The SMO will coordinate with the Contact-Handled Transuranic (Waste) (CH-TRU) Program to ship any limited quantity or above samples.

Table 5.0-1 (continued)

Method	Summary
Sample Control and Field Documentation	The collection, screening, and transport of samples are documented on standard forms generated by the SMO. These include sample container labels and combined sample collection log (SCL)/COC forms. Sample collection portions of the combined forms will be completed at the time of sample collection and signed by the sampler and a reviewer who will verify the logs for completeness and accuracy. The COC portions of the combined forms will be completed and signed to verify the samples are not left unattended. Corresponding labels will be applied to each sample container, and custody seals will be placed around container lids or openings. Site attributes (e.g., former and proposed soil sampling locations, sediment sampling locations) are located by using a GPS. Horizontal locations will be measured to the nearest 0.5 ft. The survey results for this field event will be presented as part of the investigation report. Sample coordinates will be uploaded into the Sample Management Database.
Field Quality-Control Samples	Field quality-control (QC) samples are collected as follows. *Field duplicate*: At a frequency of 10%; collected at the same time as a regular sample and submitted for the same analyses. *Field rinsates (FR)*: At a frequency of 10%; collected by rinsing sampling equipment with deionized water, which is collected in a sample container and submitted for laboratory analysis. *Field Trip blanks (FTBs)*: Required for all field events that include the collection of samples for VOC analysis. FTBs are containers of certified clean sand that are opened and kept with the other sample containers during the sampling process. FTBs are collected at a frequency of one per day when samples are collected for VOC analysis.
Field Decontamination of Drilling and Sampling Equipment	Dry decontamination is the preferred method to minimize generating liquid waste. Dry decontamination may include using a wire brush or other tool to remove soil or other material adhering to the sampling equipment, followed by using a commercial cleaning agent (nonacid, waxless cleaner) and paper wipes. Dry decontamination may be followed by wet decontamination if necessary. Wet decontamination may include washing with a nonphosphate detergent and water, followed by a water rinse and a second rinse with deionized water. Alternatively, steam-cleaning may be used.
Containers and Preservation of Samples	Specific requirements/processes for sample containers, preservation techniques, and holding times are based on EPA guidance for environmental sampling, preservation, and quality assurance (QA). Specific requirements for each sample are printed on the SCLs provided by the SMO (size and type of container [glass, amber glass], polyethylene, preservative, etc.). All samples are preserved by placing them in insulated containers with ice to maintain a temperature of ≤6°C. Other requirements such as nitric acid or other preservatives may apply to different media or analytical requests.
Management, Characterization, and Storage of Waste	Waste is managed, characterized, and stored in accordance with an approved waste characterization strategy form that documents site history, field activities, and the characterization approach for each waste stream managed. Waste characterization complies with on-site or off-site waste acceptance criteria. All stored waste will be marked with appropriate signage and labels, as appropriate. Drummed waste will be stored on pallets to prevent deterioration of the containers. Waste generators are required to reduce the volume of waste generated as much as technically and economically feasible. Means of storing, controlling, and transporting each potential waste type and classification shall be determined before waste-generating field operations begin. A waste storage area will be established before waste is generated. Waste storage areas located in controlled areas of the Laboratory will be controlled as needed to prevent inadvertent addition or management of wastes by unauthorized personnel. Each container of waste generated will be individually labeled as to waste classification, item identification number, and radioactivity (if applicable), immediately following containerization. All waste shall be segregated by classification and compatibility to prevent cross-contamination. Appendix B describes waste management.

Table 5.0-1 (continued)

Method	Summary
Geodetic Surveys	This method describes the procedure for coordinating and evaluating geodetic surveys and establishing QA and QC for geodetic survey data. The procedure covers evaluating geodetic survey requirements, preparing to perform a geodetic survey, performing geodetic survey field activities, preparing geodetic survey data for QA review, performing QA review of geodetic survey data, and submitting geodetic survey data.
Geophysical Surveys	The proposed geophysical surveys are described in detail in Appendix C. They include time domain electromagnetic induction, frequency domain electromagnetic induction, vertical gradient magnetometry, ground-penetrating radar, and seismic refraction tomography. The surveys will help define where trenches and miscellaneous debris are positioned within the site.
Radiological Surveys	The proposed radiological surveys are described in detail in Appendix C. The FIDLER and Ludlum NaI detectors will be used to determine areas with elevated radioactivity.

Table 5.8-1
Summary of Analytical Methods

Analyte	Analytical Method
TAL metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, zinc)	SW-846:6010D; SW-846:6020B; SW-846:7471A (mercury)
Total cyanide	SW-846:9012B
Perchlorate	SW-846:6850
Nitrate	SW-846:9056A
PCBs	SW-846:8082A
SVOCs	SW-846:8270D
VOCs	SW-846:8260D
Americium-241	HASL-300:AM-241
Gamma-emitting radionuclides	EPA:901.1
Isotopic plutonium	HASL-300:ISOPU
Isotopic uranium	HASL-300:ISOU
Tritium	EPA 906.0
pH	SW-846:9045D
Explosive compounds	SW-846:8330B
PAHs	SW-846:8270-SIM

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
bgs	below ground surface
BMP	best management practice
BV	background value
CFR	Code of Federal Regulations
CH-TRU	Contact-Handled Transuranic (Waste) Program
COC	chain of custody
Consent Order	Compliance Order on Consent
CVL	containerized vat leach
DOE	Department of Energy (U.S.)
EcoPRG	ecological preliminary remediation goal
EIM	Environmental Information Management (database)
EPA	Environmental Protection Agency (U.S.)
FDEM	frequency domain electromagnetic
FIDLER	Field Instrument for Detection of Low-Energy Radiation
FR	field rinsate
FV	fallout value
FTB	field trip blank
GPR	ground-penetrating radar
GPS	global positioning system
GSSI	Geophysical Survey Systems, Inc.
HE	high explosives
HP	Hot Point
IA	interim action
IP	individual permit
IR	investigation report
IWP	investigation work plan
LANL	Los Alamos National Laboratory
LLW	low-level waste
MDA	Material Disposal Area
MLLW	mixed low-level waste
N3B	Newport News Nuclear BWXT-Los Alamos, LLC

NDA	no detectable activity
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
NRAO	National Radio Astronomy Observatory
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization detector
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RDX	Royal Demolition Explosive (hexahydro-1,3,5-trinitro-1,3,5-triazine)
RFI	RCRA facility investigation
RSL	regional screening level
SAA	satellite accumulation area
SAL	screening action level
SCL	sample collection log
SGS	segmented gate system
SMA	site-monitoring area
SMO	Sample Management Office
SOP	standard operating procedure
SRT	seismic refraction tomography
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
TAL	target analyte list
TDEM	time domain electromagnetic
TFI	total field intensity
TNT	2,4,6-trinitrotoluene
TSCA	Toxic Substances Control Act
VCA	voluntary corrective action
VGM	vertical gradient magnetometry
VOC	volatile organic compound
WAC	waste acceptance criteria
WCSF	waste characterization strategy form

A-2.0 METRIC CONVERSION TABLE

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

A-3.0 DATA QUALIFIER DEFINITIONS

Data Qualifier	Definition
U	The analyte was analyzed for but not detected above the reported estimated quantitation limit.
J	The analyte was positively identified, and the associated numerical value is the approximate concentration of the analyte in the sample.
J+	The analyte was positively identified, and the associated numerical value is the approximate concentration of the analyte in the sample but likely to have a high bias.
J-	The analyte was positively identified, and the associated numerical value is the approximate concentration of the analyte in the sample but likely to have a low bias.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate.
R	The data are unusable. (Note: Analyte may or may not be present.)

Appendix B

Waste Management Plan

B-1.0 INTRODUCTION

This appendix describes how waste generated during the Chaquehui Canyon Aggregate Area Phase II investigation will be managed. Waste 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 contaminants.

B-2.0 WASTE STREAMS

All waste generated during investigation activities will be managed in accordance with standard operating procedure (SOP) N3B-ER-DIR-SOP-10021, “Characterization and Management of Environmental Programs Waste.” This SOP incorporates the requirements of applicable U.S. Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED) regulations and U.S. Department of Energy (DOE) orders.

A waste characterization strategy form (WCSF) will be prepared and approved per requirements of N3B-ER-DIR-SOP-10021. The WCSF will provide detailed information on waste characterization methods, management, containerization, and potential volumes. Waste characterization is completed through review of sampling data and/or documentation or by direct sampling of the waste or the media being investigated (e.g., surface soil, subsurface soil). 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 sites addressed in this work plan identify polychlorinated biphenyl (PCB) concentrations at a maximum value of 798 mg/kg at AOC C-33-001. When AOC C-33-001 is remediated, Newport News Nuclear BWXT-Los Alamos, LLC (N3B) shall submit a request to EPA (with a copy to NMED) to manage the waste as PCB remediation waste.

Wastes will be containerized and placed in clearly marked, appropriately constructed waste accumulation areas. Waste accumulation area postings, regulated storage duration, and inspection requirements will be based on the type of waste and its classification. Container and storage requirements as well as transportation and disposal requirements will be detailed in the WCSF and approved before waste is generated. Table B-2.0-1 summarizes the estimated waste streams, waste types, waste volumes, and other data.

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

B-2.1 Drill Cuttings

Hollow-stem auger sampling may be needed to collect subsurface samples during the Phase II investigation. Drill cuttings consist of soil and tuff/rock chips generated by the drilling of boreholes for the intent of sampling. Drill cuttings include excess core sample not submitted for analysis and any returned samples sent for analysis. Drill cuttings will be containerized in IP-1 bags, 55-gal. drums, B-12 containers, or other appropriate containers at the point of generation. The initial management of the cuttings will rely on the data from previous investigations and/or process knowledge. Drill cuttings will be managed in secure, designated areas appropriate to the type of the waste. If new analytical data change the expected waste category, the waste will be managed in accumulation areas appropriate to the final waste determination. This waste stream will be characterized based either on direct sampling of the waste or on the results from core samples collected during drilling. The WCSF will specify the sampling suites for direct sampling of the waste stream. Additional constituents may be analyzed as necessary to meet the waste acceptance criteria (WAC) for a receiving facility or if visual observations indicate that additional contaminants may be present.

Cuttings will be land-applied if they meet the criteria in the NMED-approved Notice of Intent Decision Tree for Land Application of Investigation-Derived Waste Solids from Construction of Wells and Boreholes. N3B expects that cuttings will be land-applied or disposed of in accordance with the approved WCSF. Table B-2.0-1 presents the estimated volumes, characterization and management methods, and expected disposition of this waste stream.

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 solid waste management unit (SWMU) or area of concern (AOC) to be excavated. This material will be field screened for radioactivity and volatile organic compounds (VOCs) during the excavation process. If contamination is not detected during screening, the spoils will be stored either in rolloff bins or 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. Incremental samples of the spoils will be collected as the spoils are excavated, or the media may be sampled in piles or containers. A minimum of one sample will be collected for every 100 yd^3. The samples will be analyzed for VOCs; target analyte list (TAL) metals; nitrate, explosive compounds, and perchlorate, if screening and/or process knowledge 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 total petroleum hydrocarbons and PCBs. If the spoils are determined to be suitable for reuse (i.e., meets residential cleanup standards as determined using NMED's and DOE's soil screening guidance), N3B may use the soil to backfill the excavations. If the spoils are not suitable for reuse, they will be treated/disposed of at an authorized facility appropriate for the waste regulatory classification. Based on existing data, N3B expects spoils that cannot be reused to be designated as industrial waste or low-level waste (LLW); however, the waste may also be classified as hazardous, mixed low-level waste (MLLW), or PCB waste. All wastes will be treated/disposed of at an authorized on-site or off-site facility appropriate for the waste classification.

B-2.3 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 such as gloves; decontamination wastes such as paper wipes; and disposable sampling supplies. Characterization of this waste stream will use acceptable knowledge (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. It will be managed in secure, designated areas appropriate to the type of the waste. If new analytical data change the expected waste category, the waste will be managed in accumulation areas appropriate to the final waste determination. N3B expects most of the contact waste to be designated industrial waste or LLW; however, the waste may also be classified as hazardous, MLLW, or PCB waste. All wastes will be treated/disposed of at an authorized on-site or off-site facility appropriate for the waste classification.

B-2.4 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, N3B employs dry equipment 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, samples will be analyzed for the analytical suites specified in the WCSF. N3B expects most of these wastes to be nonhazardous, nonradioactive liquid waste that will be sent to facilities with a WAC allowing the waste to be received. Table B-2.0-1 presents the characterization and management methods and expected disposition of this waste stream.

Table B-2.0-1
Summary of Estimated Waste Generation and Management

Waste Stream	Expected Waste Type	Characterization Method	On-Site Management	Expected Disposition
Drill cuttings	Industrial waste, nonhazardous, nonradioactive	Analytical results from direct sampling of waste or core samples	Accumulation in 55-gal. drums, IP-1 bags, B-12 containers, or other appropriate containers	Land application, permitted off-site facility for which waste meets acceptance criteria
Excavated Environmental Media	Industrial waste, LLW, MLLW, PCB	Analytical results from direct sampling of waste or core samples	Accumulation in 55-gal. drums, IP-1 bags, or other appropriate containers	Land application, permitted off-site facility for which waste meets acceptance criteria
Contact waste	Industrial waste, LLW, MLLW, PCB	AK	Accumulation in 55-gal. drums	Permitted off-site facility for which waste meets acceptance criteria
Decontamination fluids	Industrial waste, nonhazardous, nonradioactive	AK; analytical results from direct sampling of waste	Accumulation in 30-gal. plastic drums	Treatment at permitted facility for which waste meets acceptance criteria

Appendix C

Geophysical and Radiological Surveys

C-1.0 GEOPHYSICAL SURVEY OVERVIEW

Several geophysical methods for the subsurface geophysical investigation are proposed at Material Disposal Area (MDA E). These methods include

- time domain electromagnetic (TDEM) induction,
- frequency domain electromagnetic (FDEM) induction,
- vertical gradient magnetometry (VGM),
- ground-penetrating radar (GPR) and,
- seismic refraction tomography (SRT).

This combination of geophysical data will help identify where disposal pits and miscellaneous debris are positioned and located within the site, differentiate the depth of cover and material type (metallic versus non-metallic), and evaluate subsurface soil thickness and bedrock characteristics below the site. Geophysical survey data will be acquired in the walking mode using the appropriate line spacing for the instrument type. The geophysical survey type and equipment used for each method is described below.

C-1.1 Time Domain Electromagnetic Induction

For TDEM measurements, a primary magnetic field, generated by current supplied to the transmitter coil, induces eddy currents in nearby metallic objects. The induced eddy currents decay with time at a rate dependent on the characteristics of the object, producing a secondary magnetic field with the same rate of decay. The time-decay of the secondary magnetic field generates a signal within each of the two receiver coils, thereby confirming the presence of metal.

A Geonics Limited, EM61-MK2 (EM61) high-sensitivity metal detector is proposed for the TDEM induction survey. The EM61 is an industry standard instrument for shallow metal detection (e.g., unexploded ordnance surveys, landfill investigations, underground storage tank locates). The EM61 instrument detects ferrous and non-ferrous conductive metals (e.g., copper, aluminum, brass, steel). The effective depth of detection varies with the size (mass and surface area) of the buried metal object. As a general reference range, the EM61 can typically detect a 1-in.-diameter steel pipe 4 in. in length up to a maximum burial depth of about 16 in. A 55-gal. steel drum has a maximum detection burial depth of approximately 6 ft below ground surface (bgs), and a large tank has a detection burial depth up to approximately 10 ft bgs.

C-1.2 Frequency Domain Electromagnetic Induction

The FDEM induction survey will be conducted to define changes in terrain conductivity related to buried disposal pit boundaries as well as to evaluate metallic and/or non-metallic materials associated with the disposal pits and their contents. There are many available FDEM induction instruments, most of which will provide two channels of response for each depth of investigation, termed “in-phase” and “quadrature.” The in-phase channel provides a measure of magnetic susceptibility and is largely a measure of the presence of metallic objects. The quadrature channel can be represented in terms of electrical conductivity or resistivity, so it responds to changes in soil composition or water content, or targets that vary in their electrical conductivity. Older electromagnetic induction instruments, such as the Geonics EM-31-MK2 or EM-34-MK2, provide a single pair of in-phase and quadrature data for each measurement point that represents mean values within a prescribed effective depth range. Because they provide only mean resistivity values commonly referred to as bulk-conductivities, they provide little information about the depth of features they detect. Several FDEM induction instruments have been commercially developed in the past decade that can provide in-phase and quadrature data for multiple depths of investigation with a single (walking) pass.

A GF Instruments CMD Explorer is proposed for the FDEM induction survey. The CMD Explorer uses a single transmitter coil with three receiver coils at different offsets from the transmitter coil (1.48 m, 2.82 m, and 4.49 m). The three offsets provide three different depths of investigation, with a maximum effective depth of investigation typically equal to the coil spacing (i.e., 4.49-m coil spacing will effectively image to a depth of about 15 ft bgs). The CMD is a bulk measurement instrument such that the measured response for a given point represents the sum of all the response contributions beneath the coil. While this instrument can detect larger ferrous and non-ferrous metallic objects such as metal tanks, culverts, and pipes, it is more specifically designed for identifying changes in soil conditions (e.g., soil composition, water content) making it an effective tool for defining the lateral extent of disposal pits.

C-1.3 Vertical Gradient Magnetometry

A magnetic gradient survey will be performed in conjunction with electromagnetic surveys to non-invasively characterize the lateral extents and variability of buried waste materials. Magnetic gradient data will be acquired by means of VGM, using two Geometrics G-858 magnetic sensors positioned one above the other (about 3 ft apart). Each sensor independently measures the total field intensity (TFI) of the earth's magnetic field, and the combined measurements of the two sensors provide the vertical gradient of that magnetic field. Depending on data quality and the value of using the gradient measurement, TFI measurements will be used to present the best resolution of subsurface features below the site.

A Geometrics G-858 magnetometer will be used for the VGM survey. The G-858 magnetometer measures the total magnetic field and will detect magnetic metal objects (e.g., ferrous metals) by measuring the changes in the Earth's magnetic field caused by the object. The effective depth of investigation of the G-858 is variable as it depends on the cumulative effect of many factors including the size, mass, shape, and orientation of the metal object; the orientation of the remnant magnetic field of the object; and the magnetic properties of the materials surrounding the object. In general, the G-858 is capable of detecting large ferrous metal objects, such as pipelines, drums, and tanks, at significantly greater depths that either the EM61 or CMD, with detection depths to 20 ft or greater for large ferrous metallic masses or buried (vertical) well casings (i.e., plugged and abandoned well casings).

C-1.4 Ground-Penetrating Radar

GPR uses radar pulses to image the subsurface. It is a non-intrusive method of surveying the subsurface to investigate underground utilities such as concrete, asphalt, metals, pipes, cables, or masonry. This nondestructive method uses electromagnetic radiation in the microwave band (ultrahigh frequency/very high frequency) of the radio spectrum and detects the reflected signals from subsurface structures. Reflecting interfaces may be soil horizons, the groundwater surface, soil/rock interfaces, man-made objects, or any other interface possessing a contrast in dielectric properties. The dielectric properties of materials correlate with many of the mechanical and geologic parameters of materials.

The GPR survey will be conducted using the most effective GPR frequency selected during testing/evaluation. Both 270-MHz and 400-MHz GPR frequencies will be tested to determine which is most appropriate for the site subsurface conditions. The Geophysical Survey Systems, Inc. (GSSI) SIR 4000 GPR console will be used with the appropriate antenna for acquiring measurements over selected geophysical anomalies identified in the TDEM, FDEM, and VGM surveys. GPR is capable of identifying both metallic and non-metallic buried objects. The effective depth of investigation is strongly affected by the site-specific soil properties such as clay content, water content, and metal content. The manufacturer's specification for maximum depth of investigation for the 270-MHz antenna is listed as 18 ft; however, this is possible only under ideal/sandy soil conditions above the water table. For typical good soil site conditions, the effective depth of investigation is generally about 8–10 ft (in unsaturated soil settings).

GPR transects will be oriented perpendicular to the longitudinal axis of any disposal pit detected, as well as to any transects parallel to the disposal pit long axis. Final position of these transects will be based on significant electromagnetic and magnetic geophysical anomalies derived from other geophysical investigations performed at the site. In addition, a GPR transect will be conducted away from known disposal pit locations (and also not coincident with previously identified geophysical anomalies). These data will provide information on the suitability of GPR for surveying native ground compared with buried debris and disposal pit materials.

GPR test transects are proposed to be acquired using two separate frequency GPR antennas, 400 MHz and 270 MHz respectively. Following the acquisition of the GPR test transects, these data will be processed on-site and analyzed to determine if GPR, at either of the tested frequency ranges, is suitable for imaging of the buried (disposal pit) materials at the site. If GPR data from either of the two frequencies prove to be useful, the most well-suited frequency antenna (400 MHz or 270 MHz) will be selected for completion of a GPR survey. Multiple GPR transects will be oriented along the length of the disposal pits and coincident with all previously identified geophysical anomalies at the site. These lines will cover the width of the disposal pits and anomalies with a nominal line spacing of 10 ft.

C-1.5 Seismic Refraction Tomography

The SRT method uses P- and S-wave energy to map vertical and lateral subsurface changes. A hammer blow generates a shock wave that travels through the ground, which is refracted along material boundaries and is then received at the surface by sensors (geophones). Refraction interfaces correlate with real-world boundaries in the ground, such as soil to bedrock boundaries. SRT is performed on soil and rock sites to generate 2- or 3-dimensional compression or shear wave velocity profiles. These velocity profiles can be used to estimate vertical and lateral variations in soil properties as well as the depth to, shape of, and physical properties of bedrock.

A Geometrics Geode seismograph and a land streamer receiver array with 24 sensors at 1-m spacing for a total receiver array length of 23 m will be used for the SRT survey. SRT can map the depth to top of bedrock and lateral changes in compressibility of overburden soil deposits. The maximum depth of investigation for SRT is a function of the size of the active receiver array (23 m), the seismic source (sledgehammer), and the subsurface velocity structure. The typical maximum depth of investigation using these parameters is about 30 to 40 ft, depending on surface conditions at the time of the survey (e.g., muddy/soft surface soils versus stiff conditions).

Each SRT line is positioned to be approximately 475 ft long in the east-west direction, and approximately 675–700 ft in total length pending site access and space. SRT data will be collected with a 24-channel seismograph (Geometrics Geode) with 24 gimbaled geophones mounted on a "landstreamer" tow-cable with 1-m spacing (~75.5 ft long); thus a roll-along SRT format will be used to cover the line length on the ground.

C-1.6 Global Positioning System

Global positioning system (GPS) positional measurements will be made with a Trimble Geospatial Geo7X instrument. TDEM, FDEM, VGM, and GPR instrumentation had GPS data streamed into each system at a rate of 1 Hz (1 sample per second). The GPS system has approximately 1-ft horizontal accuracy for these measurements. The GPS will also be used to mark the ends, middle, and other important points along the receiver array for data processing to include both topography and lateral stationing.

C-2.0 RADIOLOIGICAL WALKOVER SURVEY OVERVIEW

Radiological surveys are proposed at MDA E to identify former waste disposal sites and debris associated with elevated radioactivity. The GPS-based radiological surveys to be performed include

- Field Instrument for Detection of Low-Energy Radiation (FIDLER) lower-energy gamma detector, and
- Ludlum Measurement, Inc., Model 44-10 2-in. × 2-in. sodium iodide (NaI) scintillator detector for high-energy gamma radiation.

C-2.1 FIDLER and Ludlum NaI detectors

The GPS-based radiological survey systems proposed for the radiological survey at MDA E consist of an Alpha Spectra, Inc., 5-in.-diameter by 0.063-in. NaI FIDLER detector and a Ludlum Model 44-10 2-in. by 2-in. NaI scintillator detector. Both detectors will be paired with a Ludlum Model 3000 digital ratemeter/scaler meter, which is connected with a Juniper Systems, Inc., mapping-grade GPS and Juniper Systems datalogger via Bluetooth. The Ludlum Model 3000 and GPS receiver unit are carried in backpacks with the detector(s) held at approximately 6 in. above the ground surface by the surveyor. The initial survey will be performed using the FIDLER detector, and a second survey will be performed using a Ludlum Model 44-10 2 × 2-in. NaI detector. The Model 3000 reports 1-s scalar counts (cps) and a 1-min ratemeter count rate based on the 1-s scaler count (cpm). Each measurement will be logged with an associated coordinate and spatial statistics related to GPS accuracy. Both the FIDLER and the Model 44-10 detector surveys will be performed with the detector, transect spacing of approximately 0.5 m (where possible), and a survey scan speed of approximately 0.5-m per second.