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

EMLA-2021-0151-02-001 March 2, 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 Threemile Canyon Aggregate Area, Revision 2

Dear Mr. Pierard:

Enclosed please find two hard copies with electronic files of the "Phase II Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 2." This plan is being submitted to fulfill a proposed fiscal year 2021 milestone in Appendix B of the 2016 Compliance Order on Consent (Consent Order). A pre-submission meeting with the New Mexico Environment Department (NMED), the U.S. Department of Energy (DOE) Environmental Management Los Alamos Field Office (EM-LA), and Newport News Nuclear BWXT-Los Alamos, LLC (N3B) was held on February 11, 2021, and changes were made to the work plan based on NMED comments. As agreed to during the meeting, NMED will provide comments to DOE within 90 days of receipt of the work plan.

This investigation work plan presents the proposed sampling and analyses needed to define the vertical and/or lateral extent of one or more contaminants at three sites remaining to be investigated in the Threemile Canyon Aggregate Area. Two additional sites were recently remediated as part of the Known Cleanup Sites (Above SSLs) Campaign. The proposed investigation and remediation activities are based on the recommendations of the "Supplemental Investigation Report for Threemile Canyon Aggregate Area, Revision 1" (July 2018, EM2018-0011), which NMED approved on August 28, 2018. The results of the Phase II investigation activities will be reported in a Phase II investigation report.

Revision 1 of the Threemile Canyon Aggregate Area Phase II Investigation Work Plan was submitted to NMED in October 2011 (LA-UR-11-6156), and NMED approved the plan on November 22, 2011. In January 2012, NMED and DOE entered into a framework agreement for realignment of environmental priorities at Los Alamos National Laboratory. Under the framework agreement, NMED and DOE agreed to review characterization efforts undertaken to date pursuant to the Consent Order to identify those sites where the nature and extent of contamination have been adequately characterized. In accordance with this process, the investigation results were further evaluated in the approved July 2018 "Threemile Canyon Supplemental Investigation Report, Revision 1." The SIR concluded that nature and extent of contamination were defined at 20 of the 25 sites and recommended corrective action complete without controls for these 20 sites.

The five remaining sites, all located within Technical Area 15, were recommended for additional sampling to define nature and extent of contamination and/or removal of contaminated soil to reduce

potential risk. The enclosed Revision 2 addresses those five remaining sites. The two sites that were remediated as part of the Known Cleanup Sites (Above SSLs) Campaign are included, but no additional work is proposed. The remaining three sites are described along with their proposed sampling activities.

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: 2021.03.02 07:43:07 -07'00'

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 Threemile Canyon Aggregate Area, Revision 2 (EM2021-0021)

CC (letter with hard-copy enclosure[s]):
Brenda Bowlby, N3B
Cheryl Rodriguez, EM-LA

CC (letter with CD/DVD enclosure[s]):
Laurie King, EPA Region 6, Dallas, TX
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CC (letter emailed):
Jennifer Payne, LANL
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Emily Day, N3B
Michael Erickson, N3B
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Pamela T. Maestas

From: Martinez, Cynthia, NMENV <cynthia.martinez1@state.nm.us>
Sent: Wednesday, March 3, 2021 7:46 AM
To: Pamela T. Maestas
Subject: RE: Submittal to NMED on 3/2/2021 of Threemile Ph2 WP, Rev2

Hello,
Received.
Thank You

From: Pamela T. Maestas <pamela.maestas@em-la.doe.gov>
Sent: Tuesday, March 2, 2021 12:03 PM
To: Pierard, Kevin, NMENV <Kevin.Pierard@state.nm.us>
Cc: Dhawan, Neelam, NMENV <neelam.dhawan@state.nm.us>; Briley, Siona, NMENV <Siona.Briley@state.nm.us>; Catechis, Chris, NMENV <Chris.Catechis@state.nm.us>; Krambis, Christopher, NMENV <Christopher.Krambis@state.nm.us>; Schatz, Mitchell, NMENV <Mitchell.Schatz@state.nm.us>; Martinez, Cynthia, NMENV <cynthia.martinez1@state.nm.us>; Emily M. Day <Emily.Day@em-la.doe.gov>; Regulatory Documentation <RegDocs@EM-LA.DOE.GOV>; Tracy McFarland <Tracy.McFarland@em-la.doe.gov>; Brenda Bowlby <Brenda.Bowlby@em-la.doe.gov>
Subject: [EXT] Submittal to NMED on 3/2/2021 of Threemile Ph2 WP, Rev2

Mr. Pierard,
Attached for submittal is a pdf of the following:

- Submittal of the Phase II Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 2 (EMLA-2021-0151-02-001, letter and enclosure)

Please acknowledge receipt of this submittal by responding to this email.
Let me know if you have any questions.
Thank you.

Pamela T. Maestas
Regulatory Documentation Manager
Newport News Nuclear BWXT-Los Alamos, LLC
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1200 Trinity Drive, Suite 150
Los Alamos, NM 87544

March 2021
EM2021-0021

Phase II Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 2

N3B Los Alamos

EM2021-0021

Phase II Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 2

March 2021

Responsible program director:

Michael O. Erickson		Program Director	RCRA Remediation Program	2/22/21
Printed Name	Signature	Title	Organization	Date

Responsible N3B representative:

Kim Lebak		Program Manager	N3B Environmental Remediation Program	2/22/21
Printed Name	Signature	Title	Organization	Date

Responsible DOE EM-LA representative:

Arturo Q. Duran	Arturo Q. Duran Digitally signed by Arturo Q. Duran Date: 2021.03.02 09:01:02 -07'00'	Compliance and Permitting Manager	Office of Quality and Regulatory Compliance	
Printed Name	Signature	Title	Organization	Date

EXECUTIVE SUMMARY

The Threemile Canyon Aggregate Area is located in Technical Area 14 (TA-14), TA-15, TA-36, and former TA-12 (currently within the boundaries of TA-67 and TA-15) of Los Alamos National Laboratory (the Laboratory) and includes a total of 40 solid waste management units (SWMUs) and areas of concern (AOCs). Twenty-six of the sites were investigated in 2009–2010 and the results reported in the investigation report for the Threemile Canyon Aggregate Area. The approved investigation report concluded that additional sampling to define the extent of contamination was needed for 26 SWMUs and AOCs. Additional sampling requirements for 25 of these sites were documented in the approved "Phase II Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 1," submitted to the New Mexico Environment Department (NMED) in October 2011. Investigation of the remaining site is delayed because it lies within an area affected by firing site activities.

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

The revised process was used to evaluate the 2009–2010 data and previous decision-level investigation data for the 25 sites identified in the approved Phase II investigation work plan as requiring additional sampling to define extent. Based on the evaluation of investigation results using the revised process, the extent of contamination has been defined (or a determination has been made that no further sampling for extent is warranted) at 20 sites, and additional sampling for extent is required at 5 sites, of which 2 sites also require remediation. Human health and ecological risk assessments were performed for all 25 sites.

This revision to the approved 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 each of the five sites. 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 Laboratory has been a participant in a national effort by DOE to clean up 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, the Laboratory has investigated 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 Threemile 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 IWP describes work activities that will be completed in accordance with the Consent Order.

1.1 Work Plan Overview

The Threemile Canyon Aggregate Area is located in Technical Area 14 (TA-14), TA-15, TA-36, and former TA-12 (currently within the boundaries of TA-67 and TA-15 at the Laboratory) (Figure 1.1-1) and consists of 40 SWMUs and AOCs. Of these 40 sites, 26 were investigated in 2009–2010; the results were reported in the approved investigation report (LANL 2010, 111324.14; NMED 2010, 111458). Based on the data evaluation guidelines the Laboratory used at the time the investigation report was prepared, the Laboratory concluded that the extent of contamination was not defined for all 26 SWMUs and AOCs, and recommendations for additional sampling at 25 of these sites to define extent were incorporated into the approved Phase II IWP (LANL 2011, 207405; NMED 2011, 208344). (Additional sampling for 1 site is deferred under Appendix A of the Consent Order). In January 2012, after the investigation report and Phase II IWP were approved, NMED and DOE entered into a framework agreement for realignment of environmental priorities at the Laboratory. Under the framework agreement, NMED and DOE agreed to review characterization efforts undertaken to date pursuant to the Consent Order to identify those sites where the nature and extent of contamination have been adequately characterized. In accordance with this process, the investigation results were further evaluated in the approved July 2018 “Threemile Canyon Supplemental Investigation Report, Revision 1” (hereafter the SIR) (N3B 2018, 700033; NMED 2018, 700058). The SIR concluded nature and extent of contamination were defined at 20 of the 25 sites and recommended corrective action complete without controls for these 20 sites. The remaining 5 sites, all located within TA-15, were recommended for additional sampling to define nature and extent of contamination and/or removal of contaminated soil to reduce potential risk.

This revision to the Phase II IWP presents the proposed sampling and analyses needed to define the vertical and/or lateral extent of one or more contaminants at the five sites: SWMU 15-007(c), SWMU 15-008(b), AOC 15-008(g), SWMU 15-009(b), and SWMU 15-010(b). SWMUs 15-007(c) and 15-008(b) also pose a potential unacceptable risk under the industrial scenario [as well as to ecological receptors at SWMU 15-008(b)], and removal of contaminated soil to reduce risk was recommended at these two sites. Contaminants to be investigated include inorganic and organic chemicals and radionuclides. A brief description of the five sites and additional sampling requirements for each are presented in Table 1.1-1.

Section 2 presents the background and conceptual site model of the Threemile Canyon Aggregate Area. Section 3 presents site conditions, and section 4 first summarizes previous investigations and data collected and then presents the scope of proposed activities for each site. Section 5 describes investigation methods for proposed field activities. Ongoing monitoring and sampling programs within the aggregate area are summarized in section 6. Section 7 is an overview of the anticipated schedule of the investigation and reporting activities. The references cited in this Phase II work plan 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.

1.2 Work Plan Objectives

The objective of the revised Phase II IWP is to update the previous Phase II IWP to incorporate the recommendations of the approved SIR (N3B 2018, 700033; NMED 2018, 700058) concerning the five sites that require additional sampling to define extent of contamination and/or removal of contaminated soil to reduce risk.

To accomplish this objective, the revised Phase II work plan

- describes each site and its operating history,
- summarizes existing information on nature and extent of contamination,
- describes the rationale for proposed data collection activities,
- identifies and presents appropriate methods for achieving the investigation objectives and managing waste, and
- describes conduct of the investigation activities and reporting of the investigation results within a schedule prescribed by the Consent Order.

2.0 BACKGROUND

2.1 General Site Information

TA-15 was established in 1945 as a firing site area. Current activities at TA-15 consist of high explosives (HE) research, development, and testing mainly through hydrodynamic testing and dynamic experimentation. Many large explosive tests have taken place with the concurrent scattering of large amounts of natural uranium or depleted uranium (DU) and, to a lesser extent, beryllium and lead (LANL 1994, 040595). TA-15, also known as R-Site, occupies portions of Threemile Mesa on the Pajarito Plateau near the southwestern boundary of the Laboratory in a roughly rectangular area that measures approximately 1.3 mi wide by 1.5 mi long. TA-15 occupies approximately 1200 acres and is bounded by TA-66 and TA-67 to the north; TA-14, TA-16, TA-37, and TA-49 to the west and south; and

TA-36 to the east. The TA-15 SWMUs and AOCs within Threemile Canyon Aggregate Area are shown in Figure 2.1-1.

2.2 Operational History

TA-15 has been used from 1944 to the present for explosives experiments. Test explosions ranging from a few kilograms of HE to as much as 1800 kg have been detonated. In most cases, the tests are carried out aboveground, resulting in the test materials being scattered over areas as large as hundreds of square meters (LANL 1993, 020946, p. 1-10). Sites located within the Threemile Canyon Aggregate Area include Firing Sites C, R-44, R-45, and Ector and related support structures.

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 Threemile Canyon Aggregate Area may have occurred as a result of firing site activities, potential leaks from septic systems and sumps and associated drainlines, discharges from outfalls, and surface disposal areas. Previous sampling results indicate contamination from HE, inorganic chemicals, organic chemicals, and radionuclides (LANL 2010, 111324.14). Additional sampling is needed to define the extent of contamination at five sites.

2.3.2 Potential Contaminant Transport Mechanisms

Current potential transport mechanisms that may lead to exposure include

- dissolution and/or particulate transport of surface contaminants during precipitation and runoff events,
- airborne transport of contaminated surface soil,
- continued dissolution and advective/dispersive transport of chemical contaminants contained in subsurface soil and tuff as a result of past operations,
- disturbance of contaminants in shallow soil and subsurface tuff by Laboratory operations, and
- disturbance and uptake of contaminants in shallow soil by plants and animals.

2.3.3 Potential Receptors

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, 700500) 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 (COPC) 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 IWP summarizes the conclusions of the SIR regarding nature and extent of contamination at each site. These conclusions are based on existing decision-level data. Total uranium was included in the analytical suite of historical Resource Conservation and Recovery Act facility investigations and was subsequently included in the analytical suite for the 2009–2010 Threemile Canyon Aggregate Area investigation. Samples from most of these sites were also analyzed for isotopic uranium. Isotopic uranium results can be used to define extent for total uranium as well as uranium isotopes. Therefore, at sampling locations where the vertical and/or lateral extent of total uranium was not defined in previously collected samples, samples collected during the Phase II investigation will be analyzed only for isotopic uranium to define extent.

3.0 SITE CONDITIONS

Surface and subsurface features and geologic characteristics of the Threemile Canyon Aggregate Area are described in detail in the approved SIR (N3B 2018, 700033; NMED 2018, 700058). Conditions at the sites included 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 Threemile 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 15-007(c), Shaft

4.1.1 Site Description and Operational History

SWMU 15-007(c) is an underground shaft (structure 15-264) located at TA-15 approximately 400 ft east of building 15-45 and 100 ft north of underground shaft 15-265 [SWMU 15-007(d)] (Figure 2.1-1). The shaft, 6 ft in diameter by 120 ft deep, is situated within a 20-ft × 20-ft concrete pad and covered with a wooden lid. In 1972, the shaft was used to conduct a single underground test involving approximately 2 tons of HE, the only material used in the test (LANL 1993, 020946, p. 5-9). This test was designed to determine the ability of tuff to absorb the explosion. The explosion was confined to the bottom of the shaft by filling the shaft with layers of magnetite, cement, sand grout, bentonite, sand, and gravel. Before 2010, 0.25-in.-diameter lead shot was scattered on the surface of the concrete pad and on the soil on three sides of the pad. The source of the lead shot was probably bags of lead shot used for instrument shielding during the experiment (LANL 1997, 056562, p. 1).

The lead shot was removed from the concrete pad and from the surface of the surrounding soil during the 2009–2010 investigation.

4.1.2 Nature and Extent of Contamination and Risk

The approved SIR (N3B 2018, 700033; NMED 2018, 700058) concluded nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU15-007(c), except for the following:

- Vertical extent of lead at locations 15-610802 and 15-610813

Based on the risk-screening assessment results in the approved SIR (N3B 2018, 700033; NMED 2018, 700058), SWMU 15-007(c) does not pose potential unacceptable cancer risks or doses for the industrial and residential scenarios. There are potential unacceptable noncancer risks for the industrial and residential scenarios at SWMU 15-007(c) due to lead. The approved SIR (N3B 2018, 700033; NMED 2018, 700058) concluded there was no potential unacceptable risk to ecological receptors at SWMU 15-007(c).

4.1.3 Investigation/Remediation Activities at SWMU 15-007(c)

Corrective actions at SWMU 15-007(c) to address potential unacceptable human-health risk due to lead were performed during 2019 as part of the Known Cleanup Sites (Above SSLs) Campaign under the 2016 Consent Order. These corrective actions included performing an x-ray fluorescence survey to identify areas having lead concentrations above the industrial SSL. Soil containing lead with concentrations exceeding the industrial SSL was removed to 1 ft below ground surface (bgs). Approximately 18.9 yd^3 total of lead-contaminated soil was removed. Sampling to define the vertical extent of lead at locations 15-610802 and 15-610813 was also performed. The activities performed at SWMU 15-007(c) under the Known Cleanup Sites (Above SSLs) Campaign were documented in a field completion letter report submitted to NMED in November 2019 (N3B 2019, 700665). The results of the corrective actions, including a revised evaluation of nature and extent of contamination and risk for SMWU 15-007(c), will be documented in the Phase II investigation report for Threemile Canyon Aggregate Area.

4.2 SWMU 15-008(b), Surface Disposal Area

4.2.1 Site Description and Operational History

SWMU 15-008(b) is a former surface disposal area located at TA-15, north of inactive Firing Site R-44 [SWMU 15-006(c)] and extending along the edge of the mesa and downslope into Threemile Canyon (Figure 2.1-1). The surface disposal area covers approximately 8.5 acres. Soil and debris generated from activities at the R-44 firing site were disposed of at SWMU 15-008(b). Activities at the firing site began in 1951. The firing site was used extensively until 1978 and sporadically until 1992 when firing site activities ceased (LANL 1993, 020946, p. 6-8; LANL 1995, 050294, p. 4-73).

4.2.2 Nature and Extent of Contamination and Risk

The approved SIR (N3B 2018, 700033; NMED 2018, 700058) concluded nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 15-008(b), except for the following:

- Vertical extent of uranium at location 15-610723
- Vertical extent of uranium-238 at location 15-610723
- Based on the risk-screening assessment results in the approved SIR (N3B 2018, 700033; NMED 2018, 700058), SWMU 15-008(b) does not pose potential unacceptable cancer risks or doses for the industrial and residential scenarios. There are potential unacceptable noncancer risks for the industrial and residential scenarios at SWMU 15-008(b) due to lead. The approved SIR (N3B 2018, 700033; NMED 2018, 700058) concluded there is the potential for adverse effects to the American robin, montane shrew, deer mouse, earthworm, and plant at SWMU 15-008(b). These risks are primarily due to copper and lead.

4.2.3 Investigation/Remediation Activities at SWMU 15-008(b)

Corrective actions at SWMU 15-008(b) to address potential unacceptable human-health and ecological risk due to copper and lead were performed during 2019 as part of the Known Cleanup Sites (Above SSLs) Campaign under the 2016 Consent Order. These corrective actions included performing a walkover radiation survey to identify areas having elevated radioactivity. DU and debris observed on the ground surface during the survey were removed. Grid sampling was performed to better define the areas requiring soil removal. Soil containing lead with concentrations exceeding the industrial SSL (800 mg/kg) was removed to 1 ft, with the exception of three grid locations. Most of the soil with copper concentrations exceeding the EcoPRG (490 mg/kg) was excavated to 4.5 ft bgs or to 1 ft below the soil/tuff contact, whichever was encountered first. Soil areas were left to preserve soil around trees and vegetation. Following soil removal, confirmation samples were collected from the bottom of the excavation to 0.5 ft below the bottom of the excavation. A total of 1760 yd^3 of lead- and copper-contaminated soil was removed. Sampling to define the vertical extent of uranium and uranium-238 at location 15-610723 was also performed. The activities performed at SWMU 15-008(b) under the Known Cleanup Sites (Above SSLs) Campaign were documented in a field completion letter report submitted to NMED in November 2019 (N3B 2019, 700665). The results of the corrective actions, including a revised evaluation of nature and extent of contamination and risk for SMWU 15-008(b), will be documented in the Phase II investigation report for Threemile Canyon Aggregate Area.

4.3 AOC 15-008(g), Surface Disposal Associated with Firing Site R-45

4.3.1 Site Description and Operational History

AOC 15-008(g) is the location of a former pile of broken sandbags located in TA-15 at inactive Firing Site R-45 [SWMU 15-006(d)] (Figure 4.3-1). The sandbags were used as shielding for the explosives tests carried out at the firing site (LANL 1996, 054977, p. 5-103). Firing Site R-45 was constructed in 1951 and was used until 1992 for experiments involving small amounts of explosives. The sandbags had been removed from the site at an unknown date before 2008.

4.3.2 Nature and Extent of Contamination and Risk

The approved SIR (N3B 2018, 700033; NMED 2018, 700058) concluded nature and extent of contamination have been defined or no further sampling for extent is warranted at AOC 15-008(g), except for the following:

- Lateral extent of lead at location 15-610568

In addition, barium and 4-nitrotoluene data from sampling locations 15-610565, 15-610566, 15-610567, and 15-610568 at AOC 15-008(g) were rejected during the data validation process, and resampling to replace the rejected data is warranted (Figures 4.3-2 and 4.3-3).

Based on the risk-screening assessment results in the approved SIR (N3B 2018, 700033; NMED 2018, 700058), AOC 15-008(g) does not pose potential unacceptable risks or doses for the industrial, residential, and construction worker scenarios. The approved SIR (N3B 2018, 700033; NMED 2018, 700058) concluded there was no potential unacceptable risk to ecological receptors at AOC 15-008(g).

4.3.3 Proposed Activities at AOC 15-008(g)

Sampling will be performed to define lateral extent of lead and to replace data from the 2009–2010 investigation that were rejected during the data validation process. Two new sampling locations (8g-1 and 8g-2 in Figure 4.3-1) will be placed east and west of existing location 15-610568 to define the lateral extent of lead (extent to the south is defined by the adjacent road). Samples will be collected from depth intervals of 0.0–0.5 ft and 2.0–2.5 ft bgs, corresponding to the depth intervals sampled during the 2009–2010 investigation. Samples will be analyzed for lead.

Sampling locations 15-610565, 15-610566, 15-610567, and 15-610568 will be resampled to replace rejected barium and 4-nitrotoluene data. Samples will be collected from depth intervals of 0.0–0.5 ft and 2.0–2.5 ft bgs, corresponding to the depth intervals sampled during the 2009–2010 investigation and will be analyzed for barium and 4-nitrotoluene.

The proposed sampling and analyses at AOC 15-008(g) are presented in Table 4.3-1, and the proposed sampling locations are shown in Figure 4.3-4.

4.4 SWMU 15-009(b), Septic System

4.4.1 Site Description and Operational History

SWMU 15-009(b) is a septic system located at inactive Firing Site R-45 at TA-15. The septic system consists of a former septic tank (structure 15-61), a seepage pit, associated drainlines, and a former outfall (Figure 4.4-1). The septic tank was constructed in 1951 of reinforced concrete with a 540-gal. capacity. This septic system served restroom facilities in the firing site control building 15-45. The septic

tank originally discharged to an outfall located approximately 20 ft southeast of the septic tank. In the 1970s, a seepage pit measuring approximately 4 ft in diameter × 50 ft deep was constructed to receive discharges from the septic tank. A 2003 engineering drawing shows the outfall pipe has been plugged (LANL 2003, 102118).

The septic tank (structure 15-61) was removed in 2010 during the 2009–2010 investigation, but the drainlines and seepage pit remain in place.

4.4.2 Nature and Extent of Contamination and Risk

The approved SIR (N3B 2018, 700033; NMED 2018, 700058) concluded nature and extent of contamination have been defined or no further sampling for extent is warranted at SWMU 15-009(b), except for the following:

- Lateral extent of uranium, uranium-234, uranium-235/236, and uranium-238 at location 15-610831 (Figure 4.4-2)

Based on the risk-screening assessment results in the approved SIR (N3B 2018, 700033; NMED 2018, 700058), SWMU 15-009(b) does not pose potential unacceptable risks or doses for the industrial scenario or unacceptable carcinogenic risk for the residential scenario. There are potential unacceptable noncancer risks and doses for the residential scenario at SWMU 15-009(b) due to uranium and uranium isotopes. The approved SIR (N3B 2018, 700033; NMED 2018, 700058) concluded there was no potential unacceptable risk to ecological receptors at SWMU 15-009(b).

4.4.3 Proposed Activities at SWMU 15-009(b)

Sampling will be performed to define lateral extent of uranium and uranium isotopes. Surface and subsurface samples will be collected at two new sampling locations (9b-1 and 9b-2 in Figure 4.4-3) to define the lateral extent of uranium, uranium-234, uranium-235/236, and uranium-238 downgradient of previously sampled location 15-610831. Samples from the new sampling locations will be collected from depth intervals of 0.0–1.0 ft and 1.0–2.0 ft bgs, corresponding to the depth intervals sampled during the 2009–2010 investigation. Samples will be analyzed for isotopic uranium. (Isotopic uranium data will be used to define extent for uranium; see section 2.4.)

The proposed sampling and analyses at SWMU 15-009(b) are presented in Table 4.4-1, and the proposed sampling locations are shown in Figure 4.4-3. The proposed sample locations may be adjusted in the field to capture sediment potentially impacted by the site (see section 5.3.2).

The site does not pose potential unacceptable risk under the industrial scenario, and industrial use is the current and reasonably foreseeable land use. Therefore, corrective actions to address potential unacceptable risk and dose under the residential scenario are not proposed.

4.5 SWMU 15-010(b), Settling Tank

4.5.1 Site Description and Operational History

SWMU 15-010(b) is a settling tank (structure 15-147) located in the northwest corner of TA-15 near former shop building 15-8 (Figure 4.5-1). The tank, constructed in 1947 of concrete, measures 5 ft wide × 5 ft long × 5.5 ft deep with an approximate capacity of 900 gal. The tank was originally designed to be a septic tank, but subsequent engineering records confirm the tank was used as an HE settling tank. The settling tank served former building 15-8, which housed HE-machining operations

during the 1950s and discharged to an outfall at the edge of Threemile Canyon (LANL 1993, 020946, p. 10-25). The tank is no longer in operation, but the date it ceased to be used is not known.

The approved IWP (LANL 2008, 105673); (NMED 2008, 104256) proposed removing the tank. However, facility restrictions on the handling of HE prevented removal of the tank, which was found to contain liquid, until the contents were characterized. The liquid contents were sampled for waste characterization purposes, were found to be nonhazardous and nonradioactive, and were removed. The facility requested the tank be closed in place and filled with concrete (LANL 2010, 111324.14).

4.5.2 Nature and Extent of Contamination and Risk

The approved SIR (N3B 2018, 700033; NMED 2018, 700058) concluded nature and extent of contamination have been defined or no further sampling for extent is warranted in the drainage below SWMU 15-010(b). The approved IWP (LANL 2008, 105673); (NMED 2008, 104256) specified collection of samples beneath the inlet pipe, tank, tank inlet, and tank outlet, but these samples were not collected. Therefore, vertical extent of inorganic and organic chemicals and radionuclides at these locations is not defined.

Based on the risk-screening assessment results in the approved SIR (N3B 2018, 700033; NMED 2018, 700058), SWMU 15-010(b) does not pose potential unacceptable risks or doses for the industrial, residential, and construction worker scenarios for chemicals of potential concern (COPCs) in the drainage below the tank. The approved SIR (N3B 2018, 700033; NMED 2018, 700058) concluded there was no potential unacceptable risk to ecological receptors at SWMU 15-010(b) due to chemicals of ecological concern in the drainage below the tank.

4.5.3 Proposed Activities at SWMU 15-010(b)

Sampling will be performed to define the vertical extent of inorganic and organic chemicals and radionuclides at the location where the pipe exits building 15-8, beneath the inlet pipe, tank, tank inlet, and tank outlet. With the exception of the samples beneath the tank, samples will be collected at the locations and depths specified in the approved IWP for Threemile Canyon Aggregate Area (LANL 2008, 105673); (NMED 2008, 104256). The work plan specified collection of samples beneath the tank after the tank had been removed. Because the tank is not being removed, samples will instead be collected at depth intervals beneath the tank from a borehole advanced as close as possible to the tank.

The settling tank will be inspected to ensure it is empty. If liquid or sludge is in the tank, it will be pumped out, characterized, and disposed of appropriately (Appendix B). After the tank has been emptied, it will be inspected for visual evidence of cracks, and the depth to the bottom of the tank, tank inlet, and tank outlet will be measured. After samples have been collected, the inlet and outlet pipes will be plugged and the tank will be filled with concrete.

Eight subsurface samples will be collected from four locations beneath the pipe next to building 15-8, beneath the elbow in the inlet pipe, tank inlet, and tank outlet (locations 10b-1, 10b-2, 10b-3, and 10b-4 in Figure 4.5-1). Soil will be removed from above the expected location of the inlet pipe elbow to expose the pipe and verify the sampling location and depths before the samples are collected. A borehole will be advanced as close as possible to the middle of the tank sidewall (location 10b-5 in Figure 4.5-1). At each location, samples will be collected from two depths (at the base of the line or tank and 5 ft below the line or tank) and analyzed for target analyte list (TAL) metals, cyanide, nitrate, perchlorate, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), explosive compounds, polychlorinated biphenyls (PCBs), isotopic uranium, isotopic plutonium, americium-241, gamma spectroscopy, and tritium. The approved work plan (LANL 2008, 105673); (NMED 2008, 104256) specified analysis of all

samples for total uranium but, as indicated in section 2.4, isotopic uranium data will be used to define extent of uranium. The proposed sampling and analyses at SWMU 15-010(b) are presented in Table 4.5-1, and the proposed sampling locations are shown in Figure 4.5-1.

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. Additional procedures may be added as necessary to describe and document activities affecting quality.

Chemical analyses will be performed in accordance with the Newport News Nuclear BWXT-Los Alamos, LLC (N3B) analytical statement of work. 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 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 reasons, 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 Surface and Shallow Subsurface 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 immediately transferred 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 Spade-and-Scoop Method

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. Proposed sampling locations in the drainage below SWMU 15-009(b) have been identified and are shown in Figure 4.4-1. The 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.

5.4 Subsurface Sampling

Subsurface sampling is proposed that may include surface soil and fill, sediment, and tuff. Any adjustments will be noted in sample collections logs (SCLs) and recorded in the Phase II investigation report as deviations from this IWP. Subsurface samples will be collected following N3B-SOP-ER-2001, “Soil, Tuff, and Sediment Sampling.”

5.4.1 Hollow-Stem Auger

A hollow-stem auger may be used to drill holes deeper than approximately 15 ft or to shallower depths where hand-auger refusal is encountered. 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 that, when rotated, transports cuttings to the surface. The hollow stem of the auger allows insertion of a drill rod, split-spoon core barrel, Shelby tube, or other sampler through its center 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 an auger during drilling. Drilling without a center plug is acceptable if the soil plug that forms in the bottom of the auger is removed before sampling or installing a well casing. The soil plug can be washed out using a side-discharge rotary bit or augured out 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.

5.4.2 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 to 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.”

5.4.3 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 investigation report.

5.5 Chain of Custody and Sample Collection Logs

The collection, screening, and transport of samples will be documented on standard forms generated by the Sample Management Office (SMO). These include sample container labels and combined SCL/chain-of-custody (COC) forms. Sample collection portions of the combined forms will be completed at the time of sample collection and signed by the sampler, 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 initialed and applied to each sample container, and custody seals will be placed around container lids or openings. Documentation and handling of all samples will be conducted in accordance with N3B-ER-SOP-10093, R1, “Sample Control and Field Documentation,” and with N3B-ER-SOP-10094, R1, “Sample Receiving and Shipping by the N3B Sample Management Office.”

5.6 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 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 investigation report.

5.6.1 Radiological Screening

Based on the results of past sampling, field screening for radioactivity will be conducted primarily to ensure worker health and safety 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.

5.6.2 Organic Vapor Field Screening

Based on 2009–2010 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.

5.6.3 HE Screening

Samples collected within areas potentially contaminated with HE may require qualitative field screening for RDX (Royal Demolition Explosive [hexahydro-1,3,5-trinitro-1,3,5-triazine]) and TNT (2,4,6-trinitrotoluene) using Strategic Diagnostics, Inc., EnSys immunoassay test kits.

5.7 Quality Assurance/Quality Control Samples

Quality assurance(QA)/quality control (QC) samples will include field duplicate, equipment rinsate, and field trip blank samples. Field duplicate samples and field rinsate blanks will be collected at an overall frequency of at least 1 for every 10 regular samples or as directed by the current version of N3B-ER-SOP-20235, "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.

5.8 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.

Laboratory analytical data will be validated as outlined in N3B-PLN-SDM-1000, "Sample and Data Management Plan," N3B-AP-SDM-3000, "General Guidelines for Data Validation," N3B-AP-SDM-3014, "Examination and Verification of Analytical Laboratory Data," and additional method-specific analytical data validation guidelines. All procedures have been developed, where applicable, from the EPA QA/G-8 guidance on environmental data verification and data validation, Department of Defense/DOE "Consolidated Quality Systems Manual for Environmental Laboratories", and the EPA national functional guidelines for data review. N3B-PLN-SDM-1000 sets the validation frequency criteria at 100% examination/verification of data and a minimum 10% full validation of data. Data collected at Threemile Canyon Aggregate Area will undergo 100% examination/verification and 10% full validation.

5.9 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.

5.10 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 the borehole will be decontaminated by steam cleaning, hot water pressure-washing, or 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.

5.11 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 contamination.

All waste generated during field-investigation activities will be managed in accordance with N3B-ER-DIR-SOP-10021, R1, “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 Threemile 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 in this IWP. Monitoring of alluvial, perched intermediate, and regional groundwater within the Pajarito Canyon watershed is performed under the Consent Order as described for the General Surveillance monitoring group in the “Interim Facility-Wide Groundwater Monitoring Plan.” No monitoring locations lie within the Threemile Canyon Aggregate Area.

6.2 Storm Water

SWMUs 15-008(b) and 15-010(b) (Figure 2.1-1) are subject to the storm water monitoring requirements of a National Pollution Discharge Elimination System 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 Threemile Canyon Aggregate Area monitored under the IP and the corresponding SWMUs include

- 3M-SMA-0.2: SWMU 15-010(b) and
- 3M-SMA-0.6: SWMU 15-008(b).

The monitoring results are reported to EPA annually.

7.0 SCHEDULE

Following approval of this work plan, the work will be implemented in accordance with milestones or targets for the Pajarito Watershed Campaign established under the 2016 Consent Order.

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.

LANL (Los Alamos National Laboratory), July 1993. "RFI Work Plan for Operable Unit 1086," Los Alamos National Laboratory document LA-UR-92-3968, Los Alamos, New Mexico. (LANL 1993, 020946)

LANL (Los Alamos National Laboratory), August 24, 1994. "Notice of Deficiency (NOD) Response for Operable Unit (OU) 1086 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan," Los Alamos National Laboratory letter (ER:94-J351) to T. Taylor (DOE) from J. Jansen (ER Project Manager), Los Alamos, New Mexico. (LANL 1994, 040595)

LANL (Los Alamos National Laboratory), October 30, 1995. "RFI Report for Field Unit 2 (OU 1086), Potential Release Sites 15-004(b,c), 15-004(a,d), 15-004(f), 15-007(b), 15-008(a,b), 15-012(b), 15-009(e,j), C-15-004," Environmental Restoration Project, Los Alamos National Laboratory document LA-UR-95-3738, Los Alamos, New Mexico. (LANL 1995, 050294)

LANL (Los Alamos National Laboratory), May 1996. "RFI Report for Potential Release Sites at TA-15, 15-001, 15-002, 15-004(g,h), 15-005(b,c), 15-006(c,d), 15-007(a), 15-008(c,g), 15-009(a,f,i,k), 15-010(a-c), 15-011(a-c), 15-012(a), 15-014(a,b,d,e,g-l), C-15-001, C-15-005, C-15-007, C-15-010, and C-15-011 (located in former Operable Unit 1086)," Los Alamos National Laboratory document LA-UR-95-1685, Los Alamos, New Mexico. (LANL 1996, 054977)

LANL (Los Alamos National Laboratory), September 12, 1997. "Response to the NOD for IA Plans for TA-15 (Former OU 1086)," Los Alamos National Laboratory letter (EM/ER:97-373) to R.S. Dinwiddie (NMED RCRA Permits Manager) from H. Jansen (EM/ER) and T. Taylor (DOE), Los Alamos, New Mexico. (LANL 1997, 056562)

LANL (Los Alamos National Laboratory), May 14, 2003. "Utility Record Drawings, Sanitary Sewer System, TA-15," Engineering Drawing AB1021, sheet number 9 of 13, Los Alamos, New Mexico. (LANL 2003, 102118)

LANL (Los Alamos National Laboratory), October 2008. "Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-08-6727, Los Alamos, New Mexico. (LANL 2008, 105673)

LANL (Los Alamos National Laboratory), November 2010. "Investigation Report for Threemile Canyon Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-10-7227, Los Alamos, New Mexico. (LANL 2010, 111324.14)

LANL (Los Alamos National Laboratory), October 2011. "Phase II Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-11-6156, Los Alamos, New Mexico. (LANL 2011, 207405)

LANL (Los Alamos National Laboratory), September 2015. "Derivation and Use of Radionuclide Screening Action Levels, Revision 4," Los Alamos National Laboratory document LA-UR-15-24859, Los Alamos, New Mexico. (LANL 2015, 600929)

LANL (Los Alamos National Laboratory), February 2018. "Development of Ecological Preliminary Remediation Goals for Los Alamos National Laboratory, Revision 1.1," Los Alamos National Laboratory document LA-UR-18-20670, Los Alamos, New Mexico. (LANL 2018, 602891)

N3B (Newport News Nuclear BWXT-Los Alamos, LLC), July 2018. "Supplemental Investigation Report for Threemile Canyon Aggregate Area, Revision 1," Newport News Nuclear BWXT-Los Alamos, LLC, document EM2018-0011, Los Alamos, New Mexico. (N3B 2018, 700033)

N3B (Newport News Nuclear BWXT-Los Alamos, LLC), November 2019. "Field Completion Letter Report for Aggregate Area Known Cleanup Sites Campaign: SWMU 39-002(a), SWMU 46-004(q), SWMU 15-008(b), and SWMU 15-007(c)," Newport News Nuclear BWXT-Los Alamos, LLC, document EM2019-0360, Los Alamos, New Mexico. (N3B 2019, 700665)

NMED (New Mexico Environment Department), November 20, 2008. "Approval with Modifications for Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 1," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2008, 104256)

NMED (New Mexico Environment Department), December 8, 2010. "Approval with Modification, Threemile Canyon Aggregate Area Investigation Report, Revision 1," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2010, 111458)

NMED (New Mexico Environment Department), November 22, 2011. "Approval with Modification, Phase II Investigation Work Plan, Threemile Canyon Aggregate Area," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2011, 208344)

NMED (New Mexico Environment Department), February 21, 2018. "Approval, Development of Ecological Preliminary Remediation Goals for Los Alamos National Laboratory, Revision 1.1," New Mexico Environment Department letter to D. Hintze (DOE-EM-LA) and B. Robinson (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2018, 602908)

NMED (New Mexico Environment Department), August 28, 2018. "Approval, Supplemental Investigation Report for Threemile Canyon Aggregate Area, Revision 1," New Mexico Environment Department letter to D. Hintze (DOE-EM-LA) and N. Lombardo (N3B) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2018, 700058)

NMED (New Mexico Environment Department), March 7, 2019. "Risk Assessment Guidance for Site Investigations and Remediation, Volume 1, Soil Screening Guidance for Human Health Risk Assessments," February 2019 (Revision 1, 3/7/19), Hazardous Waste Bureau and Ground Water Quality Bureau, Santa Fe, New Mexico. (NMED 2019, 700500)

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.

Legend Item	Data Source
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.
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.

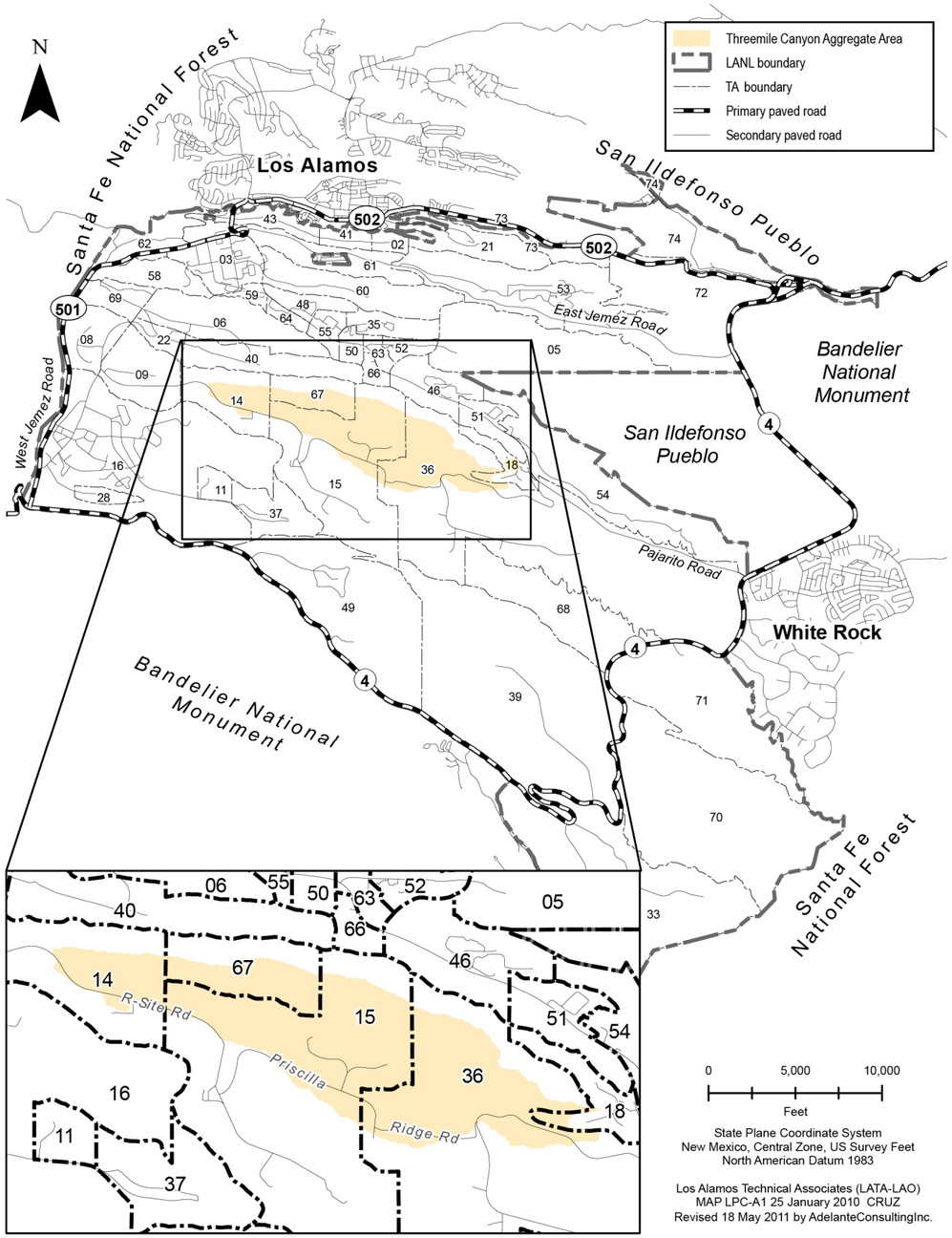

Figure 1.1-1 Location of Threemile Canyon Aggregate Area with respect to Laboratory technical areas

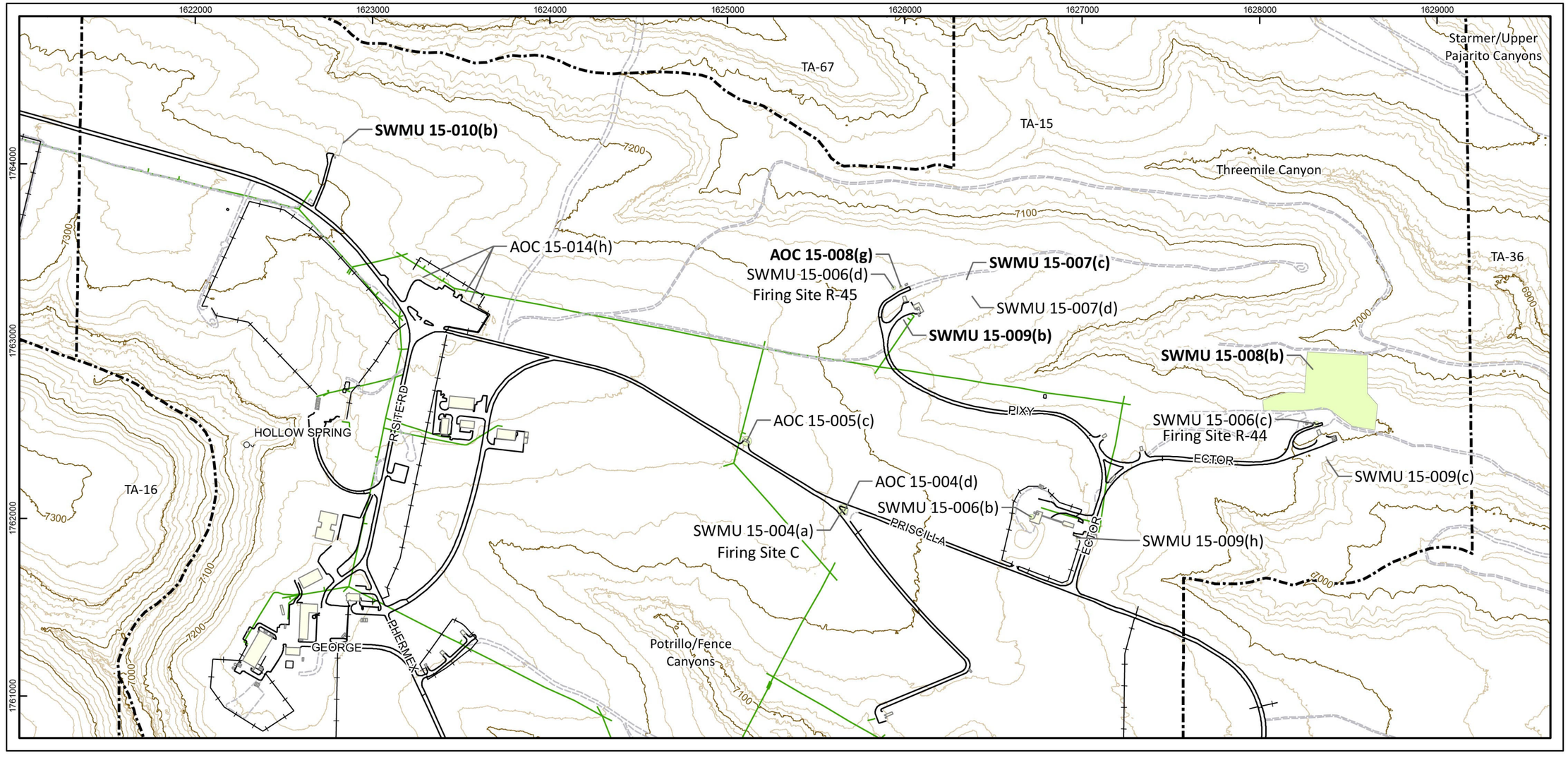

Figure 2.1-1 TA-15 SWMUs and AOCs within Threemile Canyon Aggregate Area

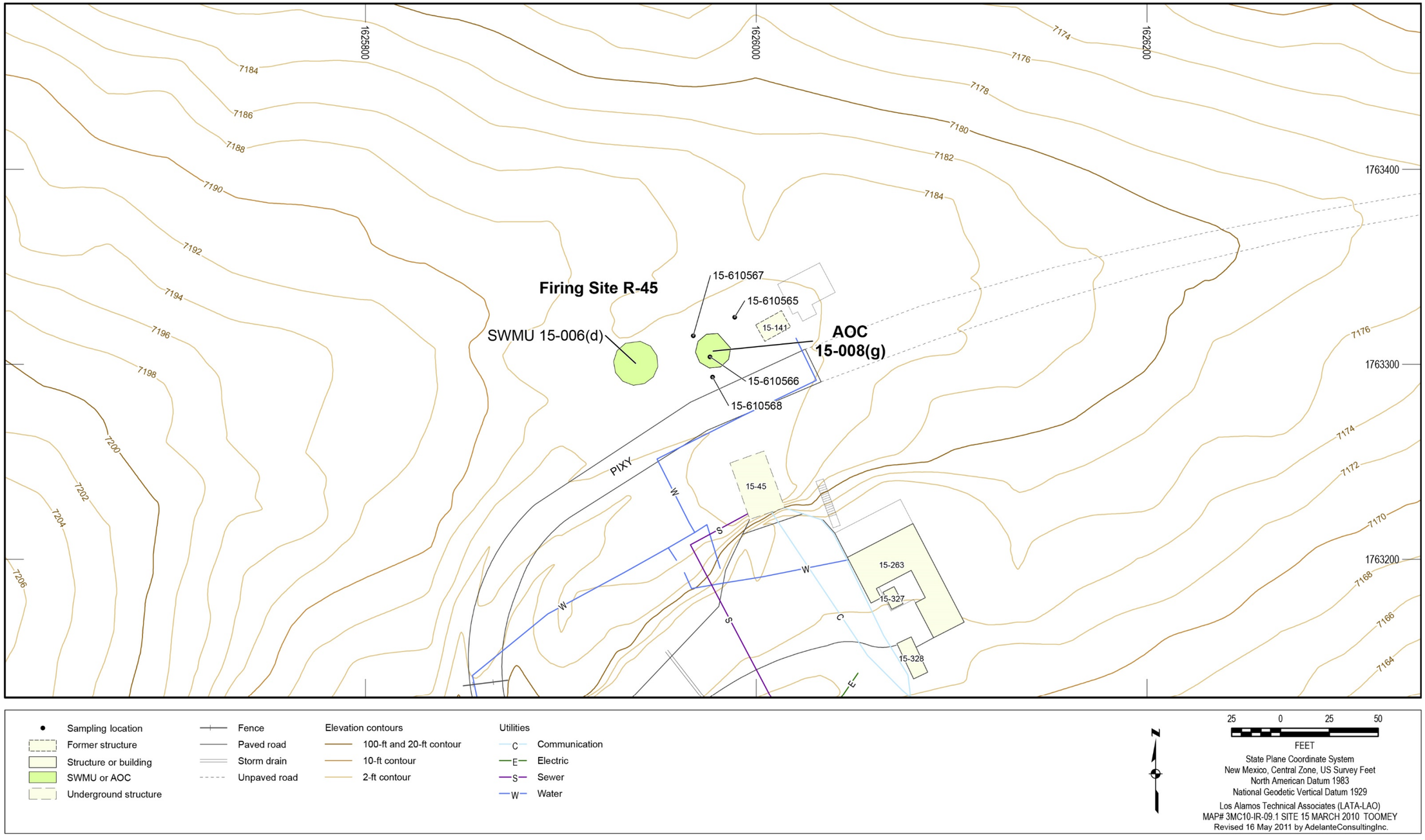

Figure 4.3-1 AOC 15-008(g) site map and sampling locations

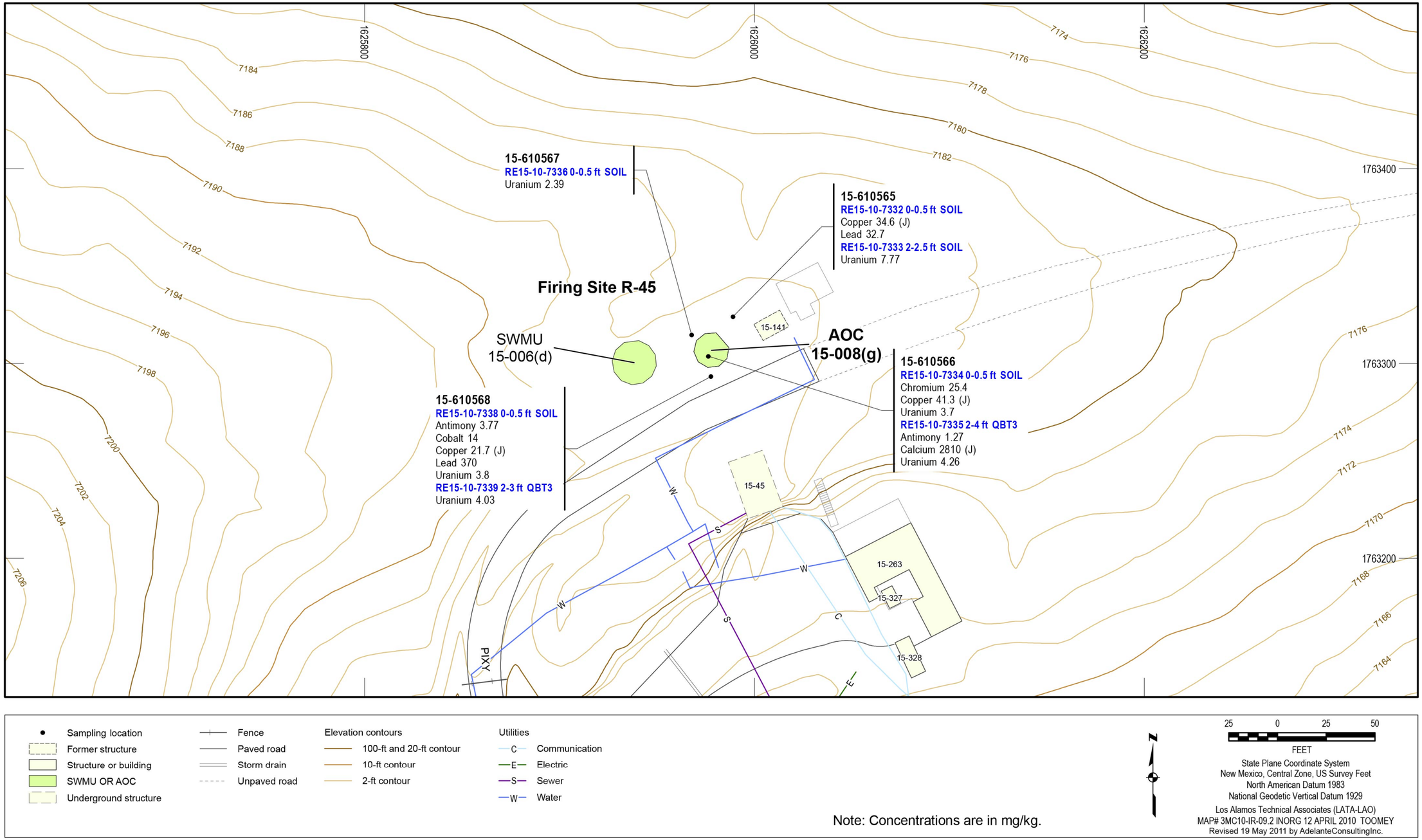

Figure 4.3-2 Inorganic chemicals detected or detected above BVs at AOC 15-008(g)

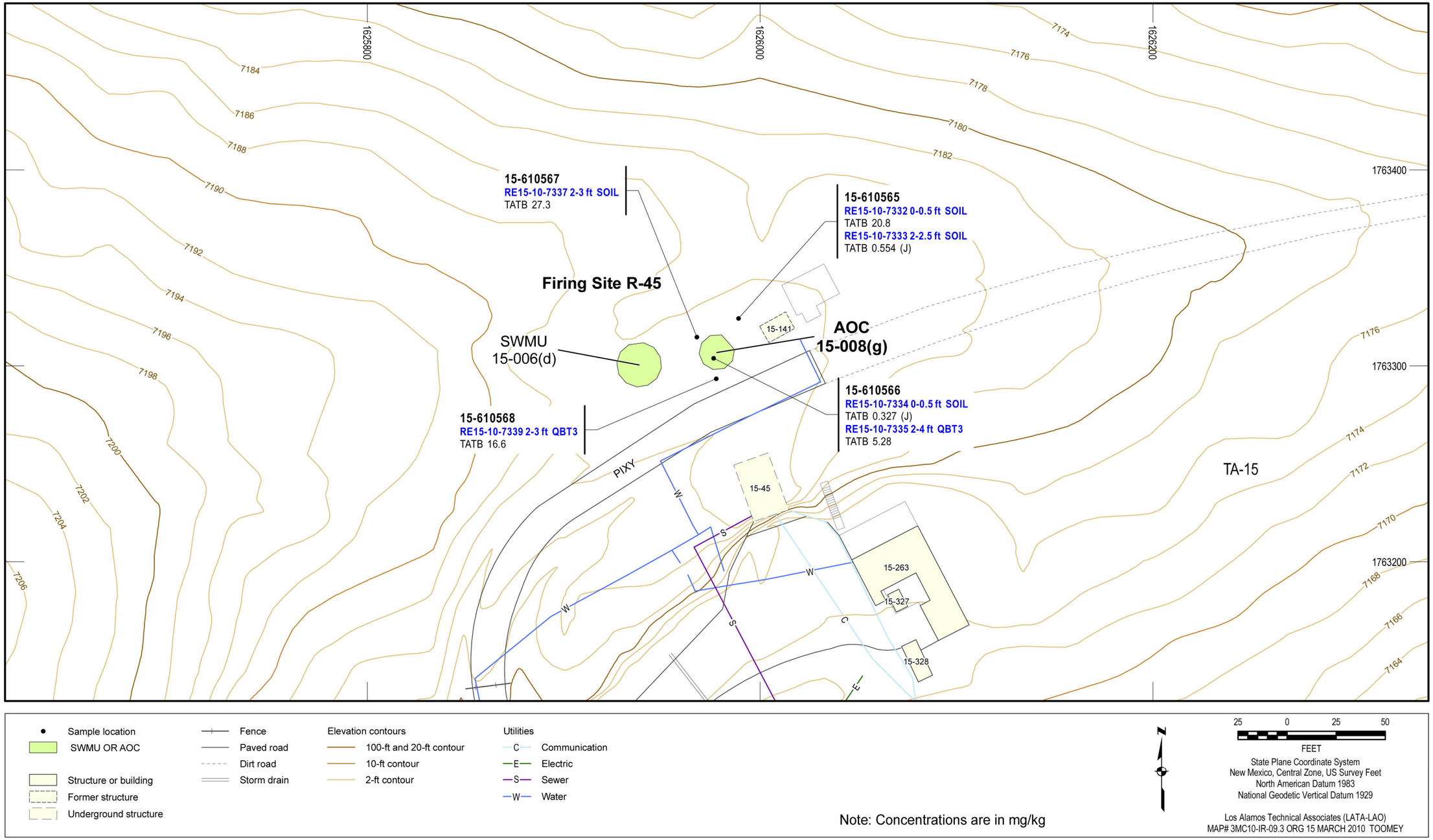

Figure 4.3-3 Organic chemicals detected at AOC 15-008(g)

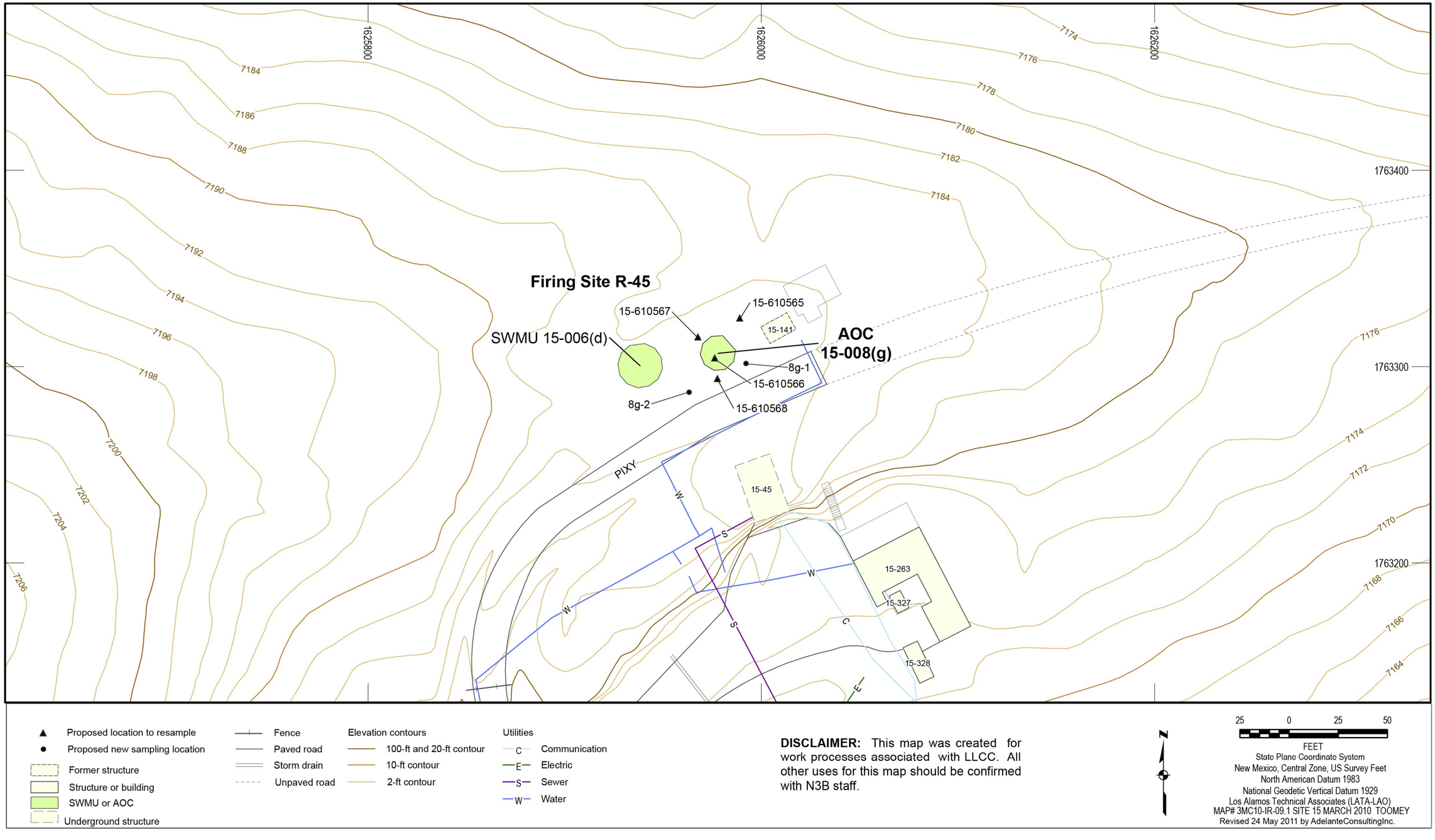

Figure 4.3-4 Proposed sampling locations at AOC 15-008(g)

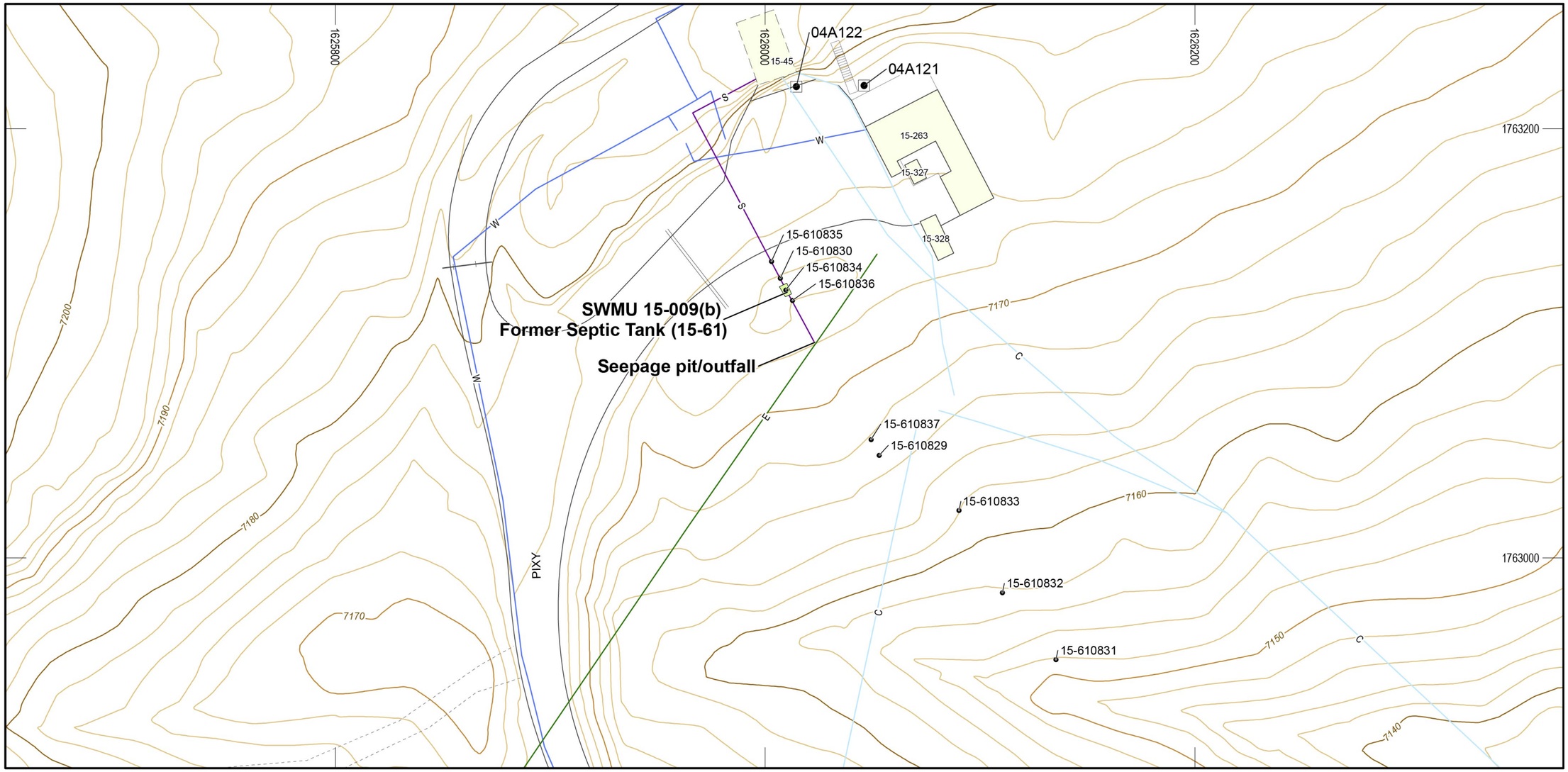

Figure 4.4-1 SWMU 15-009(b) site map and sampling locations

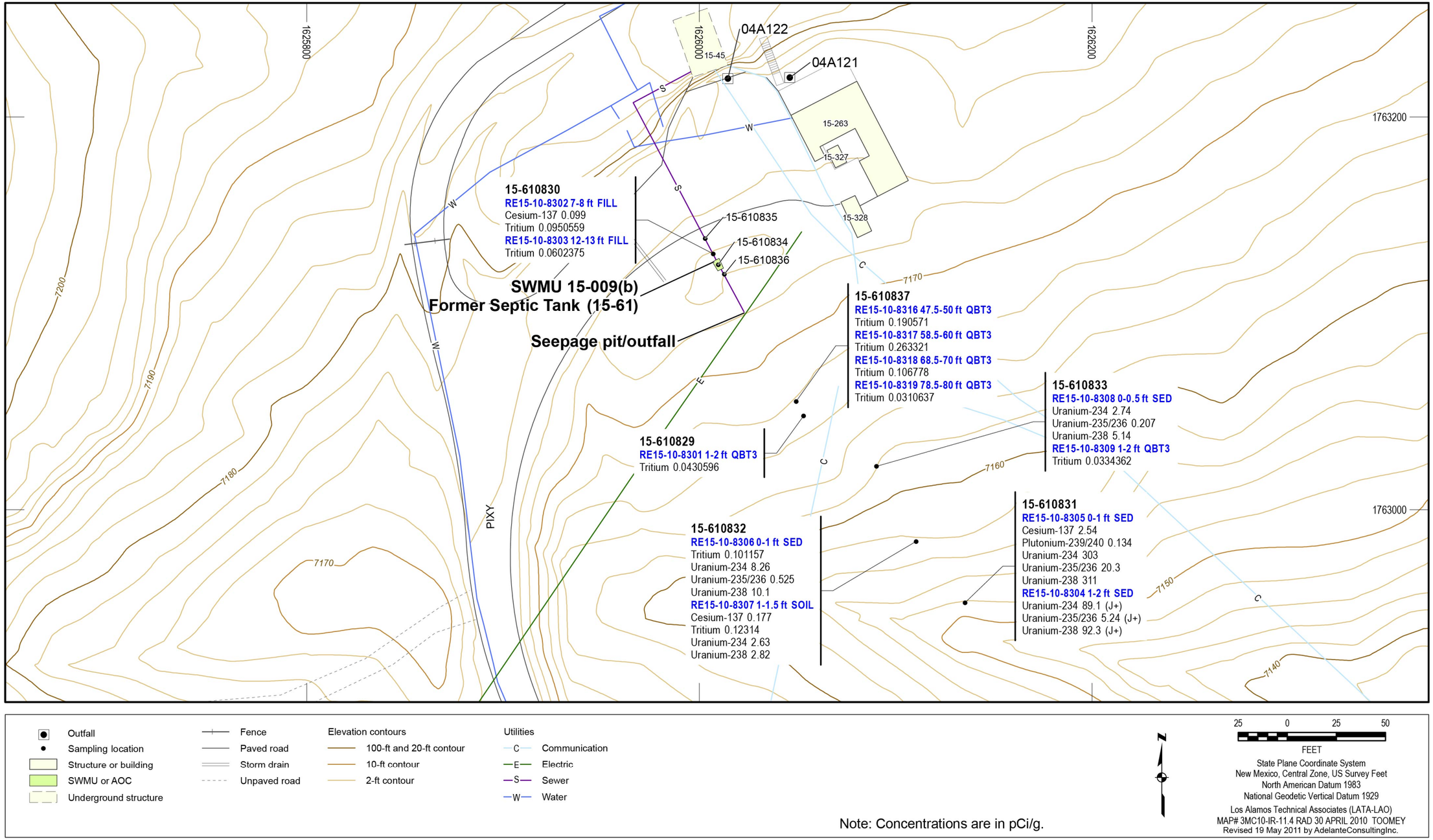

Figure 4.4-2 Radionuclides detected or detected above BVs/FVs at SWMU 15-009(b)

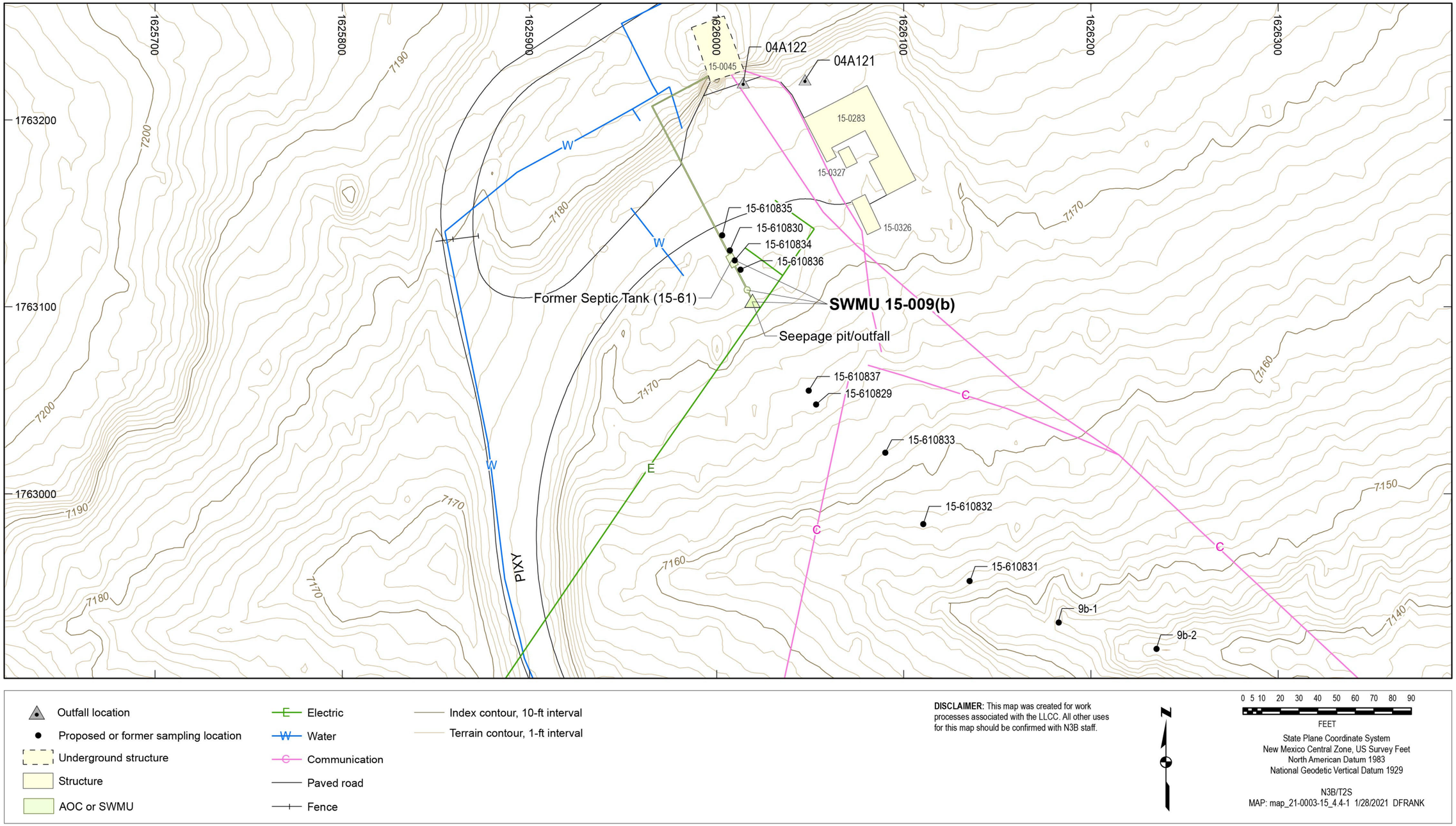

Figure 4.4-3 Proposed sampling locations at SWMU 15-009(b)

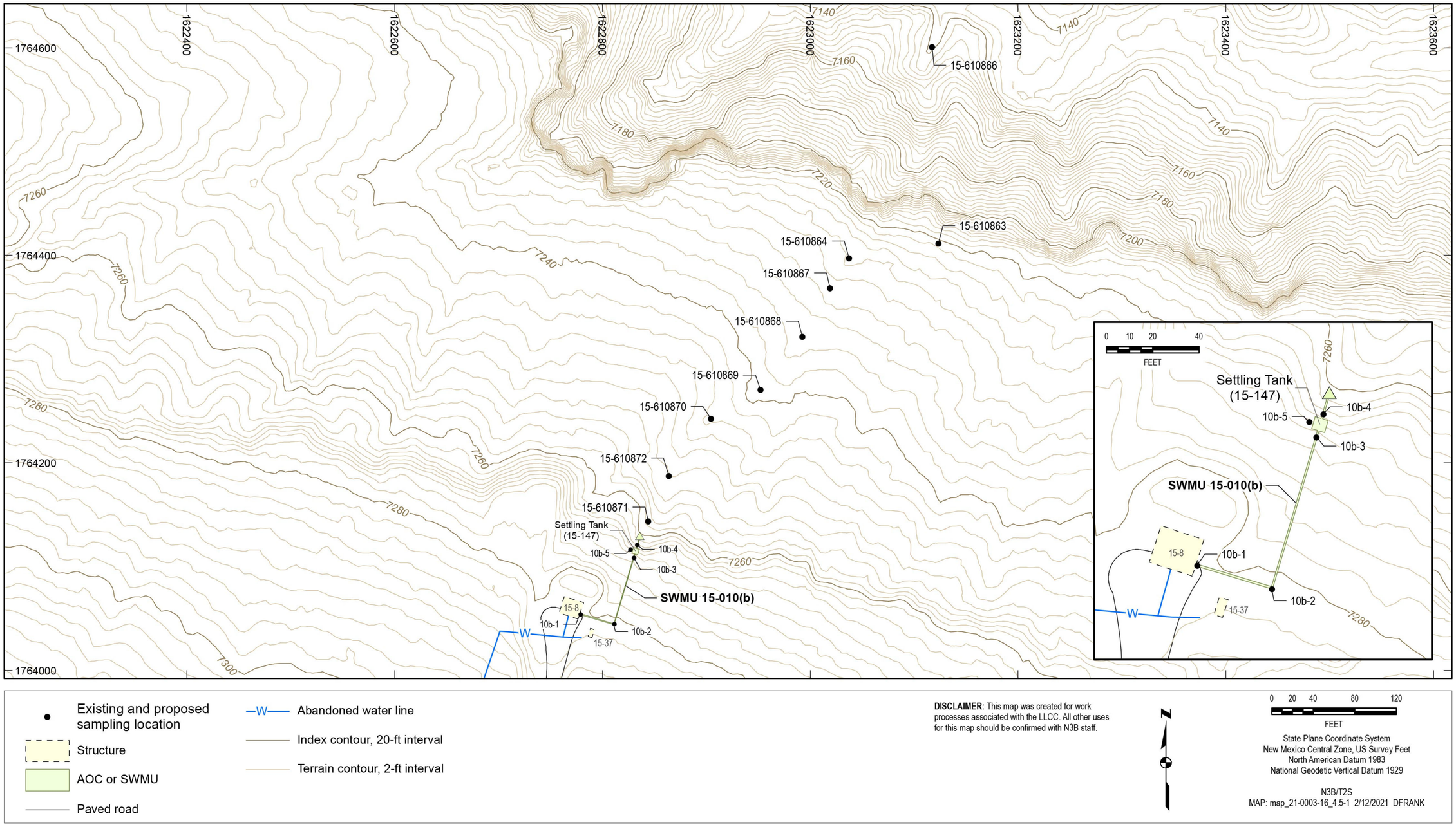

Figure 4.5-1 Site map and proposed sampling locations at SWMU 15-010(b)

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

SWMU/AOC	Site Description	2009–2010 Investigation Results	Proposed Activities
SWMU 15-007(c)	Shaft	Vertical extent of lead not defined at two locations. Potential unacceptable human health risk from lead.	Soil removal and sampling to define vertical extent were performed as part of Known Cleanup Sites (Above SSLs) Campaign (N3B 2019, 700665). Results will be reported in Phase II investigation report.
SWMU 15-008(b)	Surface disposal area (north of Firing Site R-44)	Vertical extent of uranium and uranium-238 not defined at one location. Potential unacceptable human health risk due to lead. Potential unacceptable ecological risk due to lead and copper.	Soil removal and sampling to define vertical extent were performed as part of Known Cleanup Sites (Above SSLs) Campaign (N3B 2019, 700665). Results will be reported in Phase II investigation report.
AOC 15-008(g)	Surface disposal area (at Firing Site R-45)	Lateral extent of lead not defined at one location. Barium and 4-nitrotoluene data rejected during data validation.	Sampling to define lateral extent and to replace rejected barium and 4-nitrotoluene data.
SWMU 15-009(b)	Septic system	Lateral extent of uranium, uranium-234, uranium-235/236, and uranium-238 not defined.	Sampling to define extent.
SWMU 15-010(b)	Settling tank	Vertical extent not defined beneath inlet line, tank inlet, tank, and tank outlet.	Sampling to define extent; emptying of tank contents and filling of tank with concrete.

Table 4.3-1
Proposed Sampling and Analysis at AOC 15-008(g)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	TAL Metals (EPA SW-846:6010C/6020B/7471A)	Explosive Compounds (EPA SW-846:8330B)
Define lateral extent of lead east of sampling location 15-610568	8g-1	Approximately 20 ft east-northeast of location 15-610568	0–0.5, 2–2.5	X[b,c]	—[d]
Define lateral extent of lead west of sampling location 15-610568	8g-2	Approximately 20 ft west-southwest of location 15-610568	0–0.5, 2–2.5	X[c]	—
Resample previous sampling locations to replace rejected data for barium and 4-nitrotoluene	15-610565, 15-610566, 15-610567, and 15-610568	Locations 15-610565, 15-610566, 15-610567, and 15-610568	0–0.5, 2–2.5	X[e]	X[f]

[a] Depths are below ground surface.

[b] X = Analysis will be performed.

[c] Lead only.

[d] — = Analysis will not be performed.

[e] Barium only.

[f] Nitrotoluene(4-) only.

Table 4.4-1
Proposed Sampling and Analysis at SWMU 15-009(b)

Sampling Objective	Location Number	Location Description	Depth[a] (ft)	Isotopic Uranium (HASL-300)
Define lateral extent of uranium, uranium-234, uranium-235/236, and uranium-238 downgradient of sampling location 15-610831.	9b-1	In drainage below outfall, approximately 50 ft downgradient of location 15-610831	0–1, 1–2	X[b]
Define lateral extent of uranium, uranium-234, uranium-235/236, and uranium-238 downgradient of sampling location 15-610831.	9b-2	In drainage below outfall, approximately 100 ft downgradient of location 15-610831	0–1, 1–2	X

[a] Depths are below ground surface.

[b] X = Analysis will be performed.

Table 4.5-1
Proposed Sampling and Analysis at SWMU 15-010(b)

Sampling Objective	Location Number	Location Description	Depth (ft)	TAL Metals (EPA SW-846:6010C/6020B/7471A)	Nitrate (EPA SW-846:9056)	Perchlorate (EPA SW-846:6850)	Total Cyanide (EPA SW-846:9012B)	SVOCs (EPA SW-846:8270D)	VOCs (EPA SW-846:8260B)	Explosive Compounds (EPA SW-846:8330B)	PCBs (EPA SW-846:8082A)	Americium-241 (HASL 300)	Gamma-Emitting Radionuclides (EPA 901.1)	Isotopic Plutonium (HASL-300)	Isotopic Uranium (HASL-300)	Tritium (EPA 906.0)
Define vertical extent beneath pipe next to building 15-8.	10b-1		0–1 ft below pipe, 5–6 ft below pipe	X*	X	X	X	X	X	X	X	X	X	X	X	X
Define vertical extent beneath inlet pipe.	10b-2	Elbow in inlet pipe approximately 70 ft south of tank inlet	0–1 ft below pipe, 5–6 ft below pipe	X	X	X	X	X	X	X	X	X	X	X	X	X
Define vertical extent beneath tank inlet.	10b-3	Inlet to tank	0–1 ft below inlet, 5–6 ft below inlet	X	X	X	X	X	X	X	X	X	X	X	X	X
Define vertical extent beneath tank outlet.	10b-4	Outlet from tank	0–1 ft below outlet, 5–6 ft below outlet	X	X	X	X	X	X	X	X	X	X	X	X	X
Define vertical extent beneath tank.	10b-5	Adjacent to middle of tank sidewall	0–1 ft below bottom of tank, 5–6 ft below bottom of tank	X	X	X	X	X	X	X	X	X	X	X	X	X

* 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 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.

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 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 initialed and 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 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. *Equipment rinsate blank*: 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. *Trip blanks*: Required for all field events that include the collection of samples for VOC analysis. Trip blanks are containers of certified clean sand that are opened and kept with the other sample containers during the sampling process. Trip blanks 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 QA. Specific requirements for each sample are printed on the sample collection logs 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 4°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.

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-846:6010C; SW-846:6020B; SW-846:7471A (mercury)
Total cyanide	EPA SW-846:9012B
Perchlorate	SW-846:6850
Nitrate	EPA SW-846:9056
PCBs	SW-846:8082A
SVOCs	SW-846:8270D
VOCs	SW-846:8260B
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-846:9045C
Explosive compounds	SW-846:8330B

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
COC	chain of custody
Consent Order	Compliance Order on Consent
COPC	chemical of potential concern
DOE	Department of Energy (U.S.)
DU	depleted uranium
EcoPRG	ecological preliminary remediation goal
EPA	Environmental Protection Agency (U.S.)
GPS	global positioning system
HE	high explosives
IP	individual permit
IWP	investigation work plan
LANL	Los Alamos National Laboratory
N3B	Newport News Nuclear BWXT-Los Alamos, LLC
NMED	New Mexico Environment Department
PCB	polychlorinated biphenyl
PID	photoionization detector
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RDX	Royal Demolition Explosive (hexahydro-1,3,5-trinitro-1,3,5-triazine)
SAL	screening action level
SCL	sample collection log
SIR	supplemental investigation report
SMA	site-monitoring area
SMO	Sample Management Office
SOP	standard operating procedure
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	solid waste management unit

TA	technical area
TAL	target analyte list
TNT	2,4,6-trinitrotoluene
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.
J	The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.
J+	The analyte was positively identified, and the result is likely to be biased high.
J-	The analyte was positively identified, and the result is likely to be biased low.
UJ	The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific detection or quantitation limit.
R	The data are rejected as a result of major problems with quality assurance/quality control (QA/QC) parameters.

Appendix B

Waste Management Plan

B-1.0 INTRODUCTION

This appendix describes how waste generated during the Threemile Canyon Aggregate Area Phase II investigation will be managed. Waste may include, but is not limited to, drill cuttings, 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, R1, "Characterization and Management of Environmental Programs Waste." This SOP incorporates the requirements of all 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, R1. 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 do not identify polychlorinated biphenyl (PCB) concentrations greater than 1 mg/kg. However, if this investigation identifies PCB concentrations of greater than 1 mg/kg, Newport News Nuclear BWXT-Los Alamos, LLC (N3B) may 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, 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 changes 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 characterization and management methods, and expected disposition of this waste stream.

B-2-2 Settling Tank Contents

The settling tank contents waste stream consists of liquid and sludge that may be present in the SWMU 15-010(b) settling tank. Any liquid or sludge in the tank will be removed by pumping before the tank is inspected and filled with concrete. The contents of the tank will be pumped into a transportable tank and stored on-site pending characterization. The tank contents will be characterized by direct sampling. The WCSF will specify the sampling suites for direct sampling of the waste stream. Additional constituents may be analyzed as necessary to meet the WAC for a receiving facility or if visual observations indicate that additional contaminants may be present.

N3B expects the tank contents will be nonhazardous or hazardous, depending on high explosives (HE) content. The tank contents will be sent to a wastewater treatment facility whose WAC allows the waste to be received. Table B-2.0-1 presents the characterization and management methods, and expected disposition of this waste stream.

B-2.3 Contact Waste

The contact waste stream consists of potentially contaminated materials that “contacted” other 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. Contact waste will be stored in containers and characterized in accordance with the approved WCSF.

Characterization of this waste stream will use acceptable knowledge (AK) based on data from the media with which it came into contact (e.g., drill cuttings, soil, sumps, etc.). N3B expects most of the contact waste to be designated as nonhazardous, nonradioactive waste that will be disposed of in accordance with the approved WCSF. Table B-2.0-1 presents the characterization and management methods, and expected disposition of this waste stream.

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 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.

B-2.5 Immunoassay Test Kit Wastes

Investigation samples may require field screening for RDX (Royal Demolition Explosive [hexahydro-1,3,5-trinitro-1,3,5-triazine]) and TNT (2,4,6-trinitrotoluene) using Strategic Diagnostics, Inc., EnSys immunoassay test kits. Wastes generated from field screening include spent solvent (acetone), water, and soil-crushed tuff. These wastes will be containerized in closed 5-gal. buckets and stored within a satellite accumulation area or less-than-90-day hazardous waste storage area. The soil-tuff in the wastes will be characterized using data from the samples collected. The waste will be treated and disposed of at an authorized off-site hazardous or mixed-waste facility.

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, or other appropriate containers	Land application, permitted off-site facility for which waste meets acceptance criteria
Settling tank contents	Hazardous or nonhazardous	Analytical results from direct sampling of waste	Accumulation in transportable tank	Treatment at permitted facility for which waste meets acceptance criteria
Contact waste	Industrial waste, nonhazardous, nonradioactive	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
Immunoassay test kit wastes	Hazardous or mixed low-level waste	AK; analytical results from direct sampling of waste	Accumulation in 5-gal. plastic drums	Treatment/disposal at permitted facility for which waste meets acceptance criteria