



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

EMLA-23-BF294-2-1



September 27, 2023

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Subject: Submittal of Twomile Canyon Aggregate Area Progress Report

Dear Mr. Shean:

Enclosed please find two hard copies with electronic files of the "Twomile Canyon Aggregate Area Progress Report." This report fulfills fiscal year 2023 Milestone 10 in Appendix B of the 2016 Compliance Order on Consent under the Pajarito Watershed Campaign.

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,

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Enclosure(s):

1. Two hard copies with electronic files:
 Twomile Canyon Aggregate Area Progress Report (EM2023-0425)

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September 2023
EM2023-0425


Twomile Canyon Aggregate Area Progress Report

Newport News Nuclear BWXT-Los Alamos, LLC (N3B), under the U.S. Department of Energy Office of Environmental Management Contract No. 89303318CEM000007 (the Los Alamos Legacy Cleanup Contract), has prepared this document pursuant to the Compliance Order on Consent, signed June 24, 2016. The Compliance Order on Consent contains requirements for the investigation and cleanup, including corrective action, of contamination at Los Alamos National Laboratory. The U.S. government has rights to use, reproduce, and distribute this document. The public may copy and use this document without charge, provided that this notice and any statement of authorship are reproduced on all copies.

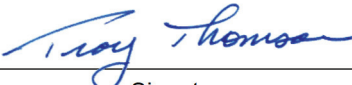
Twomile Canyon Aggregate Area Progress Report

September 2023


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EXECUTIVE SUMMARY

This progress report fulfills fiscal year (FY) 2023 Milestone 10 of the 2016 Compliance Order on Consent, Appendix B, under the Pajarito Watershed Campaign. Milestone 10 is a progress report summarizing the fieldwork implementation and status of site investigations conducted under the approved 2010 “Investigation Work Plan for Twomile Canyon Aggregate Area, Revision 1.” All solid waste management units (SWMUs) and areas of concern (AOCs) within the Twomile Canyon Aggregate Area are located at Technical Area 03 (TA-03), TA-06, TA-22, TA-40, TA-50, TA-59, and TA-69, and former TA-07. This report summarizes FY 2023 investigations at 35 sites, including the following:

- 4 SWMUs and 1 AOC in TA-03,
- 16 SWMUS and 4 AOCs in TA-06,
- 1 SWMU in former TA-07,
- 5 SWMUs in TA-22,
- 2 SWMUs and 1 AOC in TA-40, and
- 1 SWMU in TA-69.

This report also summarizes FY 2022 investigations for three SWMUs in former TA-07. Fieldwork for these sites was completed after submission of the 2022 “Twomile Canyon Aggregate Area Progress Report.”

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Plate

Plate 1 Twomile Canyon Aggregate Area

Acronyms and Abbreviations

AOC	area of concern
bgs	below ground surface
BV	background value
Consent Order	Compliance Order on Consent
DOE	Department of Energy (U.S.)
EM-LA	Environmental Management Los Alamos Field Office (DOE)
EPA	Environmental Protection Agency (U.S.)
FDEMI	frequency-domain electromagnetic induction
FV	fallout value
FY	fiscal year
GIS	Geographic Information System
GPR	ground-penetrating radar
HE	high explosives
HMX	Her Majesty's Explosive (1,3,5,7-tetranitro-1,3,5,7-tetrazocine)
IR	investigation report
IWP	investigation work plan
LANL	Los Alamos National Laboratory
MDA	material disposal area
N3B	Newport News Nuclear BWXT-Los Alamos, LLC
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
OU	operable unit
PBX	plastic-bonded explosive
PCB	polychlorinated biphenyl
PETN	pentaerythritol tetranitrate
RCRA	Resource Conservation and Recovery Act
RDX	Royal Demolition Explosive (hexahydro-1,3,5-trinitro-1,3,5-triazine)
RFI	RCRA facility investigation
SAA	satellite accumulation area
SRT	seismic refraction tomography
SSL	soil screening level

SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
TAL	target analyte list
TATB	triaminotrinitrobenzene
TDEMI	time-domain electromagnetic induction
TNT	trinitrotoluene
TPH	total petroleum hydrocarbons
VCA	voluntary corrective action
VOC	volatile organic compound
WWTP	wastewater treatment plant
XRF	x-ray fluorescence

1.0 PURPOSE OF REPORT

This progress report fulfills fiscal year (FY) 2023 Milestone 10 of the 2016 Compliance Order on Consent (Consent Order), Appendix B, under the Pajarito Watershed Campaign. Milestone 10 is a progress report summarizing the fieldwork implementation and status of site investigations conducted under the approved 2010 "Investigation Work Plan for Twomile Canyon Aggregate Area, Revision 1" (IWP) (LANL 2010, 109520; NMED 2010, 109652). The Twomile Canyon Aggregate Area is one of four aggregate areas in the Pajarito Watershed Campaign (Plate 1). All solid waste management units (SWMUs) and areas of concern (AOCs) within the Twomile Canyon Aggregate Area are located at Technical Area 03 (TA-03), TA-06, TA-22, TA-40, TA-50, TA-59, and TA-69, and former TA-07. The SWMUs and AOCs proposed for sampling in the IWP for Twomile Canyon Aggregate Area are listed below:

- SWMU 03-001(k) – Storage Area
- SWMU 03-003(a) – Storage Area
- SWMU 03-003(b) – Storage Area
- AOC 03-003(k) – Storage Area
- AOC 03-003(p) – Storage Area
- AOC 03-014(a2) – Drain Associated with Former WWTP (Wastewater Treatment Plant)
- SWMU 03-014(t) – Lift Station Associated with Former WWTP
- AOC 03-022 – Former Sump
- AOC 03-025(c) – Oil/Water Separator
- SWMU 03-033 – Former Tanks and Sumps
- AOC 03-038(f) – Drainline
- AOC 03-042 – Soil Contamination from Former Sump
- SWMU 03-043(c) – Soil Contamination from Former Manhole
- SWMU 03-050(a) – Soil Contamination from TA-03 Exhaust Emissions
- SWMU 03-050(d) – Soil Contamination from TA-03 Exhaust Emissions
- SWMU 03-050(f) – Soil Contamination from TA-03 Exhaust Emissions
- SWMU 03-050(g) – Soil Contamination from TA-03 Exhaust Emissions
- AOC 03-051(a) – Soil Contamination from Leaking Compressor
- AOC 03-051(b) – Soil Contamination from Leaking Compressor
- SWMU 03-052(a) – Storm Drain
- SWMU 03-054(a) – Outfall Associated with Cooling Tower 03-19
- SWMU 03-054(b) – Outfall from Building 03-38
- SWMU 03-054(d) – Outfall from Building 03-16
- SWMU 03-055(a) – Outfall from Building 03-16
- SWMU 06-001(a) – Septic System
- SWMU 06-001(b) – Septic System

- SWMU 06-002 – Septic System
- SWMU 06-003(a) – Firing Site
- SWMU 06-003(d) – Firing Site
- SWMU 06-003(e) – Firing Site
- SWMU 06-003(f) – Firing Site
- SWMU 06-003(h) – Firing Site
- SWMU 06-005 – Firing Site
- SWMU 06-006 – Storage Area
- SWMU 06-007(a) – Material Disposal Area (MDA) F
- SWMU 06-007(b) – Landfill
- SWMU 06-007(c) – Landfill
- SWMU 06-007(d) – Landfill
- SWMU 06-007(e) – Landfill
- SWMU 06-007(f) – Surface Disposal
- SWMU 06-007(g) – Soil Contamination from Former Building 06-12
- AOC 06-008 – Soil Contamination from Former Underground Storage Tank
- AOC C-06-001 – Soil Contamination from Former Storage Magazine 06-4
- AOC C-06-005 – Soil Contamination from Former Building 06-13
- AOC C-06-019 – Soil Contamination from Former Building 06-38
- SWMU 07-001(a) – Firing Site
- SWMU 07-001(b) – Firing Site
- SWMU 07-001(c) – Firing Site
- SWMU 07-001(d) – Firing Site
- SWMU 22-010(a) – Septic System
- SWMU 22-014(a) – Sump System
- SWMU 22-014(b) – Sump System
- SWMU 22-015(a) – Drainlines and Dry Wells
- SWMU 22-015(b) – Sump and Outfall
- SWMU 40-001(b) – Septic System
- SWMU 40-005 – Sump
- AOC 40-007(e) – Storage Area
- AOC C-50-001 – Former Transformer
- AOC 59-004 – Outfall from Building 59-1
- SWMU 69-001 – Twomile Incinerator Facility

2.0 OVERVIEW

This progress report summarizes the field investigations conducted by the U.S. Department of Energy (DOE) Environmental Management Los Alamos Field Office (EM-LA) and Newport News Nuclear BWXT-Los Alamos, LLC (N3B) in accordance with the approved IWP (LANL 2010, 109520; NMED 2010, 109652). This progress report presents the status of fieldwork implementation and site investigations completed to date for the Twomile Canyon Aggregate Area.

Sampling has been completed for the following SWMUs and AOCs:

- SWMU 03-050(g) – Soil Contamination from TA-03 Exhaust Emissions
- SWMU 06-001(a) – Septic System
- SWMU 06-001(b) – Septic System
- SWMU 06-002 – Septic System
- SWMU 06-003(d) – Firing Site
- SWMU 06-003(e) – Firing Site
- SWMU 06-003(f) – Firing Site
- SWMU 06-003(h) – Firing Site
- SWMU 06-005 – Firing Site
- SWMU 06-006 – Storage Area
- SWMU 06-007(a) – MDA F
- SWMU 06-007(b) – Landfill
- SWMU 06-007(c) – Landfill
- SWMU 06-007(d) – Landfill
- SWMU 06-007(e) – Landfill
- SWMU 06-007(f) – Surface Disposal
- SWMU 06-007(g) – Soil Contamination from Former Building 06-12
- AOC 06-008 – Soil Contamination from Former Underground Storage Tank
- AOC C-06-001 – Soil Contamination from Former Storage Magazine 06-4
- AOC C-06-005 – Soil Contamination from Former Building 06-13
- AOC C-06-019 – Soil Contamination from Former Building 06-38
- SWMU 07-001(a) – Firing Site
- SWMU 07-001(b) – Firing Site
- SWMU 07-001(c) – Firing Site
- SWMU 07-001(d) – Firing Site
- SWMU 22-010(a) – Septic System
- SWMU 22-014(a) – Sump System
- SWMU 22-014(b) – Sump System

- SWMU 22-015(a) – Drainlines and Dry Wells
- SWMU 22-015(b) – Sump and Outfall
- SWMU 40-005 – Sump
- AOC 40-007(e) – Storage Area

Following evaluation of analytical data, additional sampling was completed to define nature and extent of contamination at SWMUs 06-003(d), 06-003(f), 06-006, 07-001(a), 22-014(b), and AOCs 06-008 and C-06-019. Remediation is required at SWMU 22-014(b) because of elevated concentrations of Royal Demolition Explosive (RDX [hexahydro-1,3,5-trinitro-1,3,5-triazine]).

Sampling at the following SWMUs and AOCs has been initiated:

- SWMU 03-001(k) – Storage Area
- AOC 03-022 – Former Sump
- SWMU 03-054(a) – Outfall Associated with Cooling Tower 03-19
- SWMU 03-054(d) – Outfall from Building 03-16
- SWMU 03-055(a) – Outfall from Building 03-16
- SWMU 06-003(a) – Firing Site
- SWMU 40-001(b) – Septic System

2.1 Fieldwork Completed in FY 2022

This progress report primarily summarizes fieldwork that was completed in FY 2023. For field progress before FY 2023, refer to the Twomile Canyon Aggregate Area Progress Report for FY 2022, which was reviewed and met the requirements for FY 2022 Milestone 15 (N3B 2022, 702343; NMED 2023, 702534). Fieldwork completed for SWMUs 06-007(g) and 07-001(a) is included in the 2022 report. Fieldwork was completed for three additional SWMUs during FY 2022, SWMUs 07-001(b–d), after the 2022 report was submitted. These SWMUs are described in sections 2.2 through 2.4. Table 2.1-1 summarizes all fieldwork completed for Twomile Canyon Aggregate Area to date.

2.2 SWMU 07-001(b) – Firing Site

2.2.1 Site Description and Operational History

SWMU 07-001(b) is an inactive firing pit located near the east end of TA-06. Former TA-07 is now located within TA-06. The site consists of a circular depression, surrounded by an annular berm about 4 ft high and approximately 30 ft in diameter. The firing pit was used in the 1950s to destroy scrap detonators and explosives. The materials to be destroyed were mixed with Composition B scraps or flaked trinitrotoluene (TNT) and the mixture was detonated. A 1959 memorandum states this method was very effective in destroying detonators, with no intact detonators thrown out of a pit and no undestroyed detonators found during a site survey, although pellets of unexploded plastic-bonded explosive (PBX) were found (Spaulding 1959, 004574). The base explosives of the PBX historically used at Los Alamos National Laboratory (the Laboratory or LANL) include Her Majesty's Explosive (HMX [1,3,5,7-tetranitro-1,3,5,7-tetrazocine]); RDX; and triaminotrinitrobenzene (TATB) (LANL 1993, 020948). In 1959, this method of destroying detonators was discontinued at this site.

2.2.2 Previous Investigations

During the 1994 Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) conducted at SWMU 07-001(b), 12 samples were collected from 6 locations inside and outside the annular berm. Samples were submitted for analysis of target analyte list (TAL) metals, high explosives (HE), isotopic uranium, cesium-137, and strontium-90. Data from the 1994 RFI are screening level and showed inorganic chemicals detected above background values (BVs) and detected organic chemicals.

All samples from the 1994 RFI conducted at SWMU 07-001(b) were to have been submitted for analysis of semivolatile organic compounds (SVOCs), but SVOCs were omitted from the list of requested analyses. For this reason, and because holding times were exceeded for the samples submitted for HE analysis, the locations and depths sampled in 1994 were resampled in 1996, and all 12 samples were submitted for analysis of SVOCs and HE. Data from the 1996 resampling effort are decision level.

2.2.3 Investigation Objectives

The primary objective of the investigation at SWMU 07-001(b) is to implement the approved IWP and collect 18 samples from 6 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 07-001(b) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 45 samples from 15 locations were collected at SWMU 07-001(b).

2.2.4 Fieldwork Completed

Fieldwork was conducted between September 13 and September 20, 2022. A total of 45 samples were collected from 15 locations. Samples were collected from 0–1, 3–4, and 6–7 ft below ground surface (bgs) within and surrounding the firing site footprint. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, SVOCs, explosive compounds, isotopic uranium, gamma spectroscopy, strontium-90, and pH. Of the total samples, 20% were analyzed for polychlorinated biphenyls (PCBs). Figure 2.2-1 shows locations sampled at SWMU 07-001(b) in FY 2022.

2.3 SWMU 07-001(c) – Firing Site

2.3.1 Site Description and Operational History

SWMU 07-001(c) is in an inactive amphitheater-shaped firing site, approximately 50 ft × 50 ft, located near the eastern boundary of TA-06. Soft metal disks imbedded with bullets have been found at this site. Little is known about this site's history, but the site may have been used briefly to study ballistic initiation of critical mass through the study of projectiles fired at lead plates (LANL 1997, 056664).

2.3.2 Previous Investigations

During the 1994 Phase I RFI conducted at SWMU 07-001(c), three surface samples were collected at three locations where contaminants (metal debris) were determined most likely to be found. Samples were submitted for analysis of TAL metals, cyanide, HE, isotopic uranium, cesium-137, and strontium-90. Data from the 1994 RFI are screening level and showed inorganic chemicals detected above BVs and radionuclides detected above fallout values (FVs). No HE was detected, but holding times were exceeded on the samples submitted for HE analysis.

2.3.3 Investigation Objectives

The primary objective of the investigation at SWMU 07-001(c) is to implement the approved IWP and collect 18 samples from 6 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 07-001(c) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 48 samples from 16 locations were collected at SWMU 07-001(c).

2.3.4 Fieldwork Completed

Fieldwork was conducted between September 26 and September 28, 2022. A total of 48 samples were collected from 16 locations. A total of 21 samples from 7 locations within the former firing site were collected from 0–1, 2–3, and 4–5 ft bgs. Additionally, 27 samples from 9 locations were collected from 0–1, 2–3, and 4–5 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, SVOCs, explosive compounds, isotopic uranium, gamma spectroscopy, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 2.2-1 shows locations sampled at SWMU 07-001(c) in FY 2022.

2.4 SWMU 07-001(d) – Firing Site

2.4.1 Site Description and Operational History

SWMU 07-001(d) is an inactive firing site located near the eastern boundary of TA-06. The site is an approximately 20-ft-diameter × 3-ft-deep crater. Detonator parts have been found near the crater. Little is known about the operating history of this site, but it is believed to be the location of a one-time celebratory shot fired in 1945 after the Japanese surrender at the end of World War II (LANL 1997, 056664).

2.4.2 Previous Investigations

During the 1994 Phase I RFI conducted at SWMU 07-001(d), 12 samples were collected at 3 central locations inside the center of the crater and at 3 locations within 10 ft of the outside of the crater. Samples were submitted for analysis of TAL metals, cyanide, HE, isotopic uranium, cesium-137, and strontium-90. Data from the 1994 Phase I RFI are screening level and showed metals detected above BVs. No organic chemicals were detected, but the holding times for samples submitted for HE analysis were exceeded.

2.4.3 Investigation Objectives

The primary objective of the investigation at SWMU 07-001(d) is to implement the approved IWP and collect 21 samples from 7 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 07-001(d) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 36 samples from 12 locations were collected at SWMU 07-001(d).

2.4.4 Fieldwork Completed

Fieldwork was conducted between September 20 and September 22, 2022. A total of 36 samples were collected from 12 locations. Samples were collected from 0–1, 3–4, and 6–7 ft bgs from 6 historical and 6 new locations within and surrounding the former firing site. Samples were analyzed for TAL metals, total

cyanide, nitrate, perchlorate, SVOCs, explosive compounds, isotopic uranium, gamma spectroscopy, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 2.2-1 shows locations sampled at SWMU 07-001(d) in FY 2022.

3.0 SUMMARY OF FIELDWORK COMPLETED IN TA-03 DURING FISCAL YEAR 2023

The following sections summarize the status of fieldwork initiated at five SWMUs and one AOC in FY 2023.

3.1 SWMU 03-001(k) – Storage Area

3.1.1 Site Description and Operational History

SWMU 03-001(k) is the former location of a less-than-90-day hazardous waste accumulation area located on the south side of building 03-16, the inactive Van de Graaff accelerator and ion beam facility at TA-03. SWMU 03-001(k) consists of two level asphalt areas each measuring approximately 20 ft × 30 ft. The areas are located next to doors on the south side of the building. Concrete pads located in front of each doorway are bounded by asphalt paving on three sides. SWMU 03-001(k) was used primarily as a storage yard for electrical equipment destined for salvage (LANL 1993, 020947). A former shed on the southwest perimeter of the fenced area was registered as a satellite accumulation area (SAA). A 1986 field inspection of SWMU 03-001(k) noted oily unmarked drums where fresh vacuum oil for experiments was stored. Other containers stored at the site included empty drums, empty asphalt-lined drums for waste tritium, and drums containing spent solvents. Use of the storage area ceased in 1992. A 1993 inspection found no stains on the asphalt or concrete pad (LANL 1993, 020947).

3.1.2 Previous Investigations

Previous investigations at SWMU 03-001(k) were conducted in 1989, including samples of oil from drums and electrical equipment along with one asphalt chip sample within the storage area. Samples were submitted for analysis of PCBs. Data from the 1989 sampling event are screening level and showed PCBs at a concentration of 7.8 mg/kg in the asphalt chip sample (LANL 1993, 020947).

In 2001, four asphalt samples and five soil samples beneath the asphalt were collected to determine if contaminants were present at SWMU 03-001(k) (LANL 2001, 070937). The samples were submitted for analysis of inorganic chemicals, PCBs, and tritium; in addition, soil samples were submitted for organic chemical analysis. Data from the 2001 sampling event are screening-level data including metals detected above BVs, trace concentrations (<1 ppm) of Aroclor-1260, and tritium detected above FVs.

3.1.3 Investigation Objectives

The primary objective of the investigation at SWMU 03-001(k) is to implement the approved IWP and collect 78 samples from 28 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 03-001(k) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 88 samples from 28 locations will be collected at SWMU 03-001(k). Samples will be collected from 0–1, 2–3, and 4–5 ft beneath concrete or asphalt where electrical equipment and drums were stored. Samples will be collected from 0–1 ft bgs and from the top 1 ft of unweathered tuff in the drainage downgradient of the site.

3.1.4 Fieldwork Completed

Sampling at SWMU 03-001(k) was initiated on May 23, 2023. A total of 85 samples were collected from 26 locations. Samples were analyzed for TAL metals, total cyanide, nitrate, SVOCs, volatile organic compounds (VOCs) (except in surface samples), PCBs, tritium, and pH. Remaining fieldwork includes collection of three samples from two locations. Figure 3.1-1 shows locations sampled at SWMU 03-001(k) in FY 2023.

3.2 AOC 03-022 – Former Sump

3.2.1 Site Description and Operational History

AOC 03-022 is the former location of a containment sump (former structure 03-550) southwest of building 03-316, the high-voltage test facility at TA-03 (LANL 1990, 007511). The 84-ft-long × 17-ft-wide × 2.3-ft-deep containment sump was constructed of steel-reinforced concrete walls with a sand bottom underlain by a Hypalon liner and a metal screen and steel I-beams over the top (LANL 1996, 053795). Two 500-gal. steel tanks containing Shell Diala AX dielectric fluid used to operate the Marx generator in building 03-316 were situated on the I-beams (LANL 1996, 053795). The containment sump provided secondary containment for the two storage tanks. The tanks were connected to building 03-316 by a buried 90-ft-long, 6-in.-diameter steel transfer pipe. During a 1988 field inspection, oily water was observed in the sump along with oil spills next to the sump (LANL 1990, 007511). The storage tanks, pumps, and aboveground piping connecting the two tanks were removed in early 1995 (LANL 1995, 057590).

3.2.2 Previous Investigations

During the 1995 voluntary corrective action (VCA) conducted at AOC 03-022, the steel support structure, oily water, and the Hypalon liner were removed and disposed of along with all visibly stained soil beneath the liner. Soil beneath and surrounding the sump was sampled for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylene to guide excavation activities and resulted in soil and tuff with TPH concentrations greater than the 2600-mg/kg cleanup level being excavated to a depth of 4.7 ft bgs (LANL 1996, 053795). The oil transfer line and the soil surrounding the transfer line between the containment sump and building 03-316 were also removed and disposed of during the VCA (LANL 1996, 053795). Confirmation samples were collected and analyzed for TPH to confirm that the 2600-mg/kg TPH cleanup level had been met. Data from the 1995 VCA are screening level and showed TPH concentrations ranging from 257 mg/kg to 862 mg/kg in the confirmation samples (LANL 1996, 053795).

3.2.3 Investigation Objectives

The primary objective of the investigation at AOC 03-022 is to implement the approved IWP and collect 75 samples from 28 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC 03-022 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 91 samples from 36 locations were planned to be collected at AOC 03-022. Samples will be collected from 0–1, 3–4, and 5–6 ft beneath clean fill from 8 locations within the sump footprint. Additional samples will be collected from 0–1, 3–4, and 5–6 ft bgs around the sump footprint, along the former location of the drainline, and downgradient of the site.

3.2.4 Fieldwork Completed

Sampling was initiated on June 20, 2023. A total of 27 samples were collected from 11 locations. Samples were analyzed for TAL metals, total cyanide, VOCs (except in surface samples), SVOCs, PCBs, TPH, and pH. Remaining fieldwork includes collection of 64 samples from 25 locations. Figure 3.1-1 shows locations sampled at AOC 03-022 in FY 2023.

3.3 SWMU 03-050(g) – Soil Contamination from TA-03 Exhaust Emissions

3.3.1 Site Description and Operational History

SWMU 03-050(g) is an area of potential soil contamination associated with tritium emissions from exhaust stacks on the Van de Graaff facility (building 03-16). Tritium work was carried out at the Van de Graaff facility from 1951 to the early 1990s when the facility became inactive. Radiological decontamination and decommissioning activities began at the Van de Graaff facility in 2005.

3.3.2 Previous Investigations

No previous investigations have been conducted at SWMU 03-050(g).

3.3.3 Investigation Objectives

The primary objective of the investigation at SWMU 03-050(g) is to implement the approved IWP and collect 32 samples from 16 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 03-050(g) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 38 samples from 19 locations were collected at SWMU 03-050(g).

3.3.4 Fieldwork Completed

Sampling was conducted between June 6 and July 5, 2023. A total of 38 samples were collected from 19 locations. Samples were collected from 0–1 and 2–3 ft bgs from landscaped areas and dirt. Samples were analyzed for tritium and pH, and 20% of samples were analyzed for PCBs. Figure 3.1-1 shows locations sampled at SWMU 03-050(g) in FY 2023.

3.4 SWMU 03-054(a) – Outfall Associated with Cooling Tower 03-19

3.4.1 Site Description and Operational History

The 1990 SWMU report describes SWMU 03-054(a) as an outfall from a cooling tower (former structure 03-19). The 1990 SWMU report also describes SWMU 03-054(d) as an outfall that discharged blowdown from the cooling tower on the roof of the Van de Graaff facility (building 03-16) and wastewater from floor drains in former building 03-0208 (LANL 1990, 007511). Although the sources of each of these SWMUs are distinct, the discharge point for both SWMUs is the same (i.e., the outfall located next to the northwest corner of the Van de Graaff facility [building 03-16]). The cooling tower (former structure 03-19) associated with SWMU 03-054(a) was removed in 1966. When the cooling tower was removed, the chilled water system in the Van de Graaff facility (building 03-16) was connected to the drainline that previously drained the cooling tower. From 1966 to the time the Van de Graaff facility was decommissioned in the early 1990s, discharges from the flushing of the chilled water system in the

Van de Graaff building were directed to the outfall location at the northwest corner of building 03-16. Effluent from the outfall flowed directly to the west into Twomile Canyon.

Although the outfall operated as an National Pollutant Discharge Elimination System– (NPDES-) permitted outfall until 1998 (EPA 03A-025), the outfall currently receives only stormwater from the Van de Graaff building roof drains (Santa Fe Engineering Ltd. 1992, 074043).

3.4.2 Previous Investigations

No previous investigations have been conducted at SWMU 03-054(a).

3.4.3 Investigation Objectives

The primary objective of the investigation at SWMU 03-054(a) is to implement the approved IWP and collect 20 samples from 10 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 03-054(a) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 28 samples from 11 locations were planned to be collected at SWMU 03-054(a). Samples will be collected from 0–1, 2–3, and 4–5 ft beneath drainlines, from 0–1, 2–3, and 4–5 ft bgs downgradient of the outfall. In the drainage downgradient of the site, samples will be collected from 0–1 ft bgs and the top 1 ft of unweathered tuff.

3.4.4 Fieldwork Completed

Sampling was initiated on June 2, 2023. A total of 11 samples were collected from 5 locations. Samples were analyzed for TAL metals, hexavalent chromium, total cyanide, nitrate, VOCs, SVOCs, PCBs, tritium, and pH. Remaining fieldwork includes collection of 17 samples from 6 locations. Figure 3.1-1 shows locations sampled at SWMU 03-054(a) in FY 2023.

3.5 SWMU 03-054(d) – Outfall from Building 03-16

3.5.1 Site Description and Operational History

The 1990 SWMU report describes SWMU 03-054(d) as an outfall that discharged blowdown from the cooling tower on the roof of the Van de Graaff facility (building 03-16) and wastewater from floor drains in former building 03-0208 (LANL 1990, 007511). The 1990 SWMU report also describes SWMU 03-054(a) as an outfall from a cooling tower (former structure 03-19). Although the sources of each of these SWMUs are distinct, the discharge point for both SWMUs is the same (i.e., the outfall located next to the northwest corner of the Van de Graaff facility [building 03-16]). The cooling tower (former structure 03-19) associated with SWMU 03-054(a) was removed in 1966. When the cooling tower was removed, the chilled water system in the Van de Graaff facility (building 03-16) was connected to the drainline that previously drained the cooling tower. From 1966 to the time the Van de Graaff facility was decommissioned in the early 1990s, discharges from the flushing of the chilled water system in the Van de Graaff building were directed to the outfall location at the northwest corner of building 03-16. Effluent from the outfall flowed directly to the west into Twomile Canyon.

Although the outfall operated as an NPDES-permitted outfall until 1998 (EPA 03A-025), the outfall currently receives only stormwater from the Van de Graaff building roof drains (Santa Fe Engineering Ltd. 1992, 074043).

3.5.2 Summary of Previous Investigations

No previous investigations have been conducted at SWMU 03-054(d).

3.5.3 Investigation Objectives

The primary objective of the investigation at SWMU 03-054(d) is to implement the approved IWP and collect 10 samples from 5 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 03-054(d) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 24 samples from 8 locations were collected at SWMU 03-054(d).

3.5.4 Fieldwork Completed

Sampling was conducted between July 6 and July 27, 2023. A total of 24 samples were collected from 8 locations. Samples were collected from 0–1, 2–3, and 4–5 ft beneath drainlines, and from 0–1, 2–3, and 4–5 ft bgs at 3 mesa-top locations. Samples were analyzed for TAL metals, hexavalent chromium, cyanide, nitrate, VOCs (except in surface samples), SVOCs, PCBs, tritium, and pH. Figure 3.1-1 shows locations sampled at SWMU 03-054(d) in FY 2023.

3.6 SWMU 03-055(a) – Outfall from Building 03-16

3.6.1 Site Description and Operational History

SWMU 03-055(a) is an outfall located approximately 50 ft south of the Van de Graaff facility (building 03-16) at TA-03. Roof drains and one floor drain in generator room 68 discharged to the outfall at the edge of the mesa into Twomile Canyon (LANL 1995, 057590). The outfall currently receives only stormwater from Van de Graaff building roof drains (Santa Fe Engineering 1992, 074043). The Van de Graaff facility was constructed in 1952. The facility has been inactive since the late 1990s. Decontamination and decommissioning activities to remove radioactively contaminated equipment and fixtures from the interior of building 03-16 were implemented in 2005–2007.

3.6.2 Previous Investigations

No previous investigations have been conducted at SWMU 03-055(a).

3.6.3 Investigation Objectives

The primary objective of the investigation at SWMU 03-055(a) is to implement the approved IWP and collect 12 samples from 6 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 03-055(a) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 24 samples from 10 locations were planned to be collected at SWMU 03-055(a). Samples will be collected from 0–1, 2–3, and 4–5 ft beneath drainlines and from 0–1 ft and from the top 1 ft of unweathered tuff downgradient of the outfall.

3.6.4 Fieldwork Completed

Sampling was initiated on May 23, 2023. A total of 20 samples were collected from 7 locations. Samples were analyzed for TAL metals, total cyanide, nitrate, VOCs, SVOCs, tritium, and pH. Of the total samples collected, 20% were analyzed for PCBs. Remaining fieldwork includes collection of 4 samples from 3 locations. Figure 3.1-1 shows locations sampled at SWMU 03-055(a) in FY 2023.

4.0 SUMMARY OF FIELDWORK COMPLETED IN TA-06 DURING FISCAL YEAR 2023

The following sections summarize the status of fieldwork initiated at 16 SWMUs and 4 AOCs in FY 2023.

4.1 SWMU 06-001(a) – Septic System

4.1.1 Site Description and Operational History

SWMU 06-001(a) is an inactive septic system located north of former building 06-03 at TA-06. The septic system served former buildings 06-1 and 06-3 and consists of an 840-gal. septic tank (structure 06-40), inlet and outlet drainlines, and an associated outfall that discharged to Tributary A of Twomile Canyon. The septic tank is located approximately 100 ft north of former building 06-03.

Former building 06-1 was constructed in May 1944 and was originally used to develop analytical procedures for nonradioactive cobalt tracer shots. An engineering drawing shows the building as having two rooms, one identified as a carpenter shop and the other as a laboratory (McGehee et al. 2004, 108213). The laboratory had an acid-resistant workbench and a lead-lined sink connected to the septic system (LANL 1997, 056664). In the late 1950s, silver soldering may have been conducted in the carpenter shop. In the early 1980s, cable and boxed inert supplies were warehoused in former building 06-1 (Schott 1993, 021496). The building was not used after the carpenter shop closed in the 1980s.

Former building 06-3 was also constructed in 1944 and housed a restroom, darkroom, and laboratory with a lead-lined sink. The building was first used as a control bunker for explosives shots and was surrounded on three sides by an earthen berm. Explosion-proof fixtures were subsequently installed because diethyl ether was used in the analyses performed in the building (McGehee et al. 2004, 108213). From 1945 to 1948, building 06-3 housed offices, and from 1948 to the early 1950s, the building had a firing control panel and a bridgewire-testing laboratory to prepare cobalt tracers. In 1972, building 06-3 was remodeled into a printed circuit shop and was later used as a silk-screen facility until the mid-1980s. After the mid-1980s, the building was used for storage.

The septic system was decommissioned in 1986, and the outlet drainline from the septic tank (structure 06-40) was plugged in 1988 (LANL 1989, 011546). During a reconnaissance site visit in 1992, the septic tank was located and found to be empty (Rofer and Guthrie 1992, 015040). Buildings 06-1 and 06-3 were demolished and removed in 2004. The septic system was left in place.

4.1.2 Previous Investigations

Previous investigations at SWMU 06-001(a) were conducted in 1994 and were reported in the “RFI Report for Potential Release Sites at TAs -6, -8, -22, and -40 (located in former Operable Units 1157 and 1111)” (LANL 1997, 056664). Samples were collected from the tank sludge, adjacent to the tank, and at the outfall runoff area. One sample of tank sludge was collected. Three samples were collected from each of three boreholes in the tank area. One borehole was located at the tank inlet, one at the tank outlet, and

one next to the tank. Sample depth intervals ranged from 1.5–2.5 to 8.5–9.5 ft bgs. Two samples (0–0.5 and 0.5–1.5 ft bgs) were collected at each of three locations in the outfall drainage. All samples were submitted for laboratory analysis of TAL metals, total cyanide, SVOCs, and explosive compounds [not including pentaerythritol tetranitrate (PETN)]. The samples from the boreholes in the tank area were also analyzed for VOCs.

4.1.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-001(a) is to implement the approved IWP and collect 41 samples from 16 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-001(a) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 44 samples from 16 locations were collected at SWMU 06-001(a).

4.1.4 Fieldwork Completed

Sampling was conducted from March 13 to March 23, 2023. The septic tank was excavated and packaged as 15 yd³ of nonregulated debris waste. The inlet and outlet drainlines of the former septic tank were plugged with cement, and the excavation was backfilled. A total of 44 samples were collected from 16 locations. Samples were collected from 0–1, 2–3, and 5–6 ft beneath drainlines and tank, and from 0–1, 2–3, and 4–5 ft bgs downgradient of the outfall. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, gamma-emitting radionuclides, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.1-1 shows locations sampled at SWMU 06-001(a) in FY 2023.

4.2 SWMU 06-001(b) – Septic System

4.2.1 Site Description and Operational History

SWMU 06-001(b) is an inactive septic system located north of former building 06-6 at TA-06. The septic system served former building 06-6 and consists of a 960-gal.-capacity septic tank (structure 06-43), inlet and outlet drainlines, a distribution box, filter trench, and outfall that discharged to Tributary A of Twomile Canyon. The septic tank is located approximately 200 ft north of former building 06-6 and measures 5 ft wide × 9 ft long × 5 ft 9 in. deep. Effluent from the septic tank discharged north to a distribution box and then to a filter trench consisting of two parallel trenches with perforated pipe surrounded by sand and covered with gravel (LASL 1973, 108216). Overflow from the filter trench flowed north to the outfall. The septic system operated from 1945 to the 1980s. In 1989, the outlet drainline from the septic tank was cut and capped (LANL 2006, 095626). Building 06-6 was demolished and removed in 2004; however, the septic tank, drainlines, distribution box, and filter trenches were left in place.

Former building 06-6 originally housed laboratory operations related to detonator assembly, an electronics work room, a chemistry laboratory, two darkrooms, restrooms, and a sink (Creamer 1993, 015063). The sink drain received rinsate containing copper, brass, and steel parts dipped in nitric acid to remove silver solder flux and oxidized metals. Solvents were also used to degrease metal. Tin and lead soldering using paste and aqueous zinc/aluminum chloride fluxes was performed on electrical circuits. Manometric apparatuses containing liquid mercury were serviced. Ionizing radiation, in the form of electrically generated x-rays, was used through the 1950s to about 1965 (Schott 1993, 021496). By 1961, the darkrooms, assembly room, and a storage area had been converted to offices. In the 1970s, former

building 06-06 was used as a cable shop, where acetone, alcohol, and dilute acids may have been used. In the early 1980s, former building 06-06 was used for printed circuit production.

The RFI work plan for OU 1111 and the 1997 RFI report state that plumbing in former buildings 06-05 and 06-08 was tied to SWMU 06-001(b) (LANL 1993, 026068; LANL 1997, 056664). However, engineering drawings for these two buildings show no drains or points of discharge (McGehee et al. 2004, 108213). In addition, an engineering drawing of the sanitary sewer system at TA-06 shows no waste lines coming from either building (LANL 2001, 108215). Therefore, SWMU 06-001(b) did not receive any discharges from former buildings 06-5 and 06-8.

4.2.2 Previous Investigations

Previous investigations at SWMU 06-001(b) were conducted in 1994 and were reported in the “RFI Report for Potential Release Sites at TAs -6, -8, -22, and -40 (located in former Operable Units 1157 and 1111)” (LANL 1997, 056664). Samples were collected from the tank sludge, in the tank area, within the filter trench, and in the outfall area. Samples were field-screened for radioactivity, metals, SVOCs, VOCs, and HE and submitted for analysis of metals, cyanide, SVOCs, and HE (not including PETN). Samples from the boreholes in the tank area were also submitted for VOC analysis.

4.2.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-001(b) is to implement the approved IWP and collect 45 samples from 16 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-001(b) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 81 samples from 27 locations were collected at SWMU 06-001(b).

4.2.4 Fieldwork Completed

Investigation activities were conducted from November 29, 2022, to January 12, 2023. The septic tank was excavated and packaged as 8.5 yd³ of low-level waste. The inlet and outlet drainlines of the former septic tank were plugged with cement, and the excavation was backfilled. A total of 81 samples were collected from 27 locations. Samples were collected from 0–1, 2–3, and 5–6 ft beneath drainlines, tank, and structures associated with the septic system. Samples were also collected from 2–3, 5–6, and 9–10 ft bgs around the filter trench, and from 0–1, 2–3, and 4–5 ft bgs downgradient of the outfall. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, PCBs, VOCs (except in surface samples), SVOCs, explosive compounds, isotopic uranium, gamma-emitting radionuclides, and pH. Figure 4.1-1 shows locations sampled at SWMU 06-001(b) in FY 2023.

4.3 SWMU 06-002 – Septic System

4.3.1 Site Description and Operational History

SWMU 06-002 is the former location of a 1000-gal. steel septic tank (structure 06-41) and associated drainlines. The septic system was located approximately 420 ft southwest of the intersection of Twomile Mesa Road and Gomez Ranch Road. The tank received wastewater from two sources: process wastewater from the PETN recrystallization operation in building 06-10 [SWMU 06-003(g)], and sanitary wastewater from the employee rest house (building 06-20, AOC C-06-020). A 1992 memo estimates that up to 0.2 lb of PETN, with an unspecified quantity of solvents, may have been released to SWMU 06-002

during recrystallization operations (Meyers 1993, 015072). Engineering drawings show the discharge point to be 100 ft southeast of the septic tank (LANL 2010, 109520). The septic system discharged into Tributary B of Twomile Canyon. The tank was removed in 1965, but the drainlines remain in place.

4.3.2 Previous Investigations

Previous investigations at SWMU 06-002 were conducted in 1995, with resampling in 1998 to fill in gaps identified from 1995 sampling (Kopp 1998, 059185; LANL 1998, 062227). The 1995 and 1998 sampling results are included in the 1998 RFI report (LANL 1998, 062227).

Samples were collected in 1995 at three locations at the site of the former septic tank (LANL 1998, 062227). One surface (0–0.5 ft bgs) and one subsurface sample (approximately 3–4 ft bgs) were collected at each location. Samples collected in 1995 were field-screened for HE, radioactivity, and VOCs and submitted for analysis of metals and HE (not including PETN). Subsurface samples were also submitted for analysis of VOCs, and one surface sample was submitted for analysis of tritium. All field screening showed concentrations or counts at or below background (LANL 1998, 062227).

In 1998, two samples were collected at the septic system outfall and 10 ft beyond the outfall at depths of 0–0.5 and 4.25–4.5 ft bgs in both locations (LANL 1998, 062227). Samples were field-screened for HE, VOCs, and radiation and submitted for analysis of metals and HE (including PETN). Subsurface samples were also submitted for analysis of VOCs. One 1995 RFI sample location at the septic tank was also resampled at depths of 5.2–5.7 and 7.5–8.0 ft bgs. One sample was submitted for laboratory analysis of TAL metals and PETN and the other sample for laboratory analysis of antimony and PETN.

4.3.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-002 is to implement the approved IWP and collect 39 samples from 16 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-002 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 56 samples from 21 locations were collected at SWMU 06-002.

4.3.4 Fieldwork Completed

Sampling was conducted between October 4, 2022, and April 10, 2023. Trenching was conducted to confirm the locations of the drainlines from former buildings 06-10 and 06-20 to the location of the former septic tank and from the former septic tank to the outfall. A total of 56 samples were collected from 21 locations. Samples were collected from 0–1, 2–3, and 5–6 ft beneath drainlines and 4–5, 6–7, and 8–9 ft bgs at the location of the former septic tank. Samples were also collected from 0–1, 4–5, and 8–9 ft bgs downgradient of the outfall. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.1-1 shows locations sampled at SWMU 06-002 in FY 2023.

4.4 SWMU 06-003(a) – Firing Site

4.4.1 Site Description and Operational History

SWMU 06-003(a) is a 100-ft-radius concrete bowl (structure 06-37) located near the center of TA-06, south of Twomile Mesa Road. The concrete bowl was constructed in late 1944 for water recovery shots

and consisted of 16 sections with expansion joints running radially from the center of the bowl to its perimeter. Small-scale explosives tests (up to 10 lb of HE) contained in water vessels were detonated on a tower located on the central raised area of the bowl (Creamer 1993, 015063). A 5-ft long × 5-ft wide × 10-ft-deep filter pit is still present at the low point of the bowl next to the raised center area. A 2-ft layer of graded gravel overlain by 2 ft of filter sand was placed in the bottom of the pit. Water was removed from the bowl either by draining it through a drainline running under the bowl to an outfall north of the bowl or by pumping it through the sand and gravel filter. The firing site was used to investigate dispersal of material. Debris from a test explosion dropped into the bowl, which was then washed and the wash water filtered to recover shot fragments. The water recovery shots used depleted uranium. No fissionable materials were used in the tests. The site was used until mid-1945. The concrete bowl firing site is a historically significant structure because of its role in the Manhattan Project and is eligible for listing in the National Registry of Historic Places (McGehee et al. 2004, 108213). Therefore, any disturbance of the structure must be approved in advance by the New Mexico State Historic Preservation Office.

4.4.2 Previous Investigations

In 1978, SWMU 06-003(a) was monitored with a Phoswich counter; no radiation above background was detected (Elliott 1978, 004647).

During the 1994 RFI, samples were collected from three locations inside and three locations outside the bowl. Samples were field-screened for radioactivity, HE, and VOCs and submitted for analysis of metals, cyanide, HE (not including PETN), isotopic uranium, cesium-137, and strontium-90. Results showed metals above BVs and radionuclides above BVs and FVs.

In 1997, a sediment sample was collected from the filter pit, which was not sampled in 1994 to avoid potentially impacting salamander habitat. The sample location was screened for radioactivity, VOCs, and HE before the sample was collected. One surface sample was collected and submitted for analysis of metals, HE (including PETN), isotopic uranium, gamma-emitting radionuclides, and strontium-90 (LANL 1997, 056664).

4.4.3 Investigation Objectives

The objective of the investigation at SWMU 06-003(a) is to implement the approved IWP and collect 31 samples from 10 locations (LANL 2010, 109520; NMED 2010, 109652). Samples will be collected from 0–1, 2–3, and 4–5 ft bgs surrounding the concrete bowl, and 1 sample will be collected from approximately 10 ft below the filter pit. Samples from the outfall, from the filter pit drainline, and downgradient of the outfall will be collected from 0–1, 2–3, and 4–5 ft bgs or from the top 1 ft of unweathered tuff, whichever is shallower.

4.4.4 Fieldwork Completed

Sampling was initiated on November 23, 2022. A total of 27 samples have been collected from 6 locations. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, and pH. Of the total samples collected, 20% were analyzed for PCBs. Remaining fieldwork includes drilling an angled borehole for extent below the concrete bowl, removing water and sediment from the bowl, and sampling for radionuclides. Figure 4.4-1 shows locations sampled at SWMU 06-003(a) in FY 2023.

4.5 SWMU 06-003(d) – Firing Site

4.5.1 Site Description and Operational History

SWMU 06-003(d) is the former location of a firing chamber, former building 06-07, located 125 ft northwest of former building 06-06 at TA-06. The firing chamber was constructed of concrete and consisted of two rooms. One room measured 8 ft × 10 ft with 8-in.-thick walls and was completely enclosed. The other room measured 8 ft × 8 ft with 2-ft-thick walls lined with steel plate and was open on one end. From 1945 to 1952, the firing chamber was used to test-fire detonators completely or partially loaded with PETN (LANL 1993, 026068; Schott 1993, 021496). From 1952 to 1976, the firing chamber was used for experiments on detonation and shock waves in gases. The firing chamber was demolished and removed in 2004.

4.5.2 Previous Investigations

No previous investigations have been conducted at SWMU 06-003(d).

4.5.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-003(d) is to implement the approved IWP and collect 15 samples from 5 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-003(d) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 75 samples from 25 locations were collected at SWMU 06-003(d).

4.5.4 Fieldwork Completed

Initial sampling was conducted between October 27 and November 9, 2022. A total of 75 samples were collected from 25 locations. At each location, samples were collected from 0–1 ft, 3–4 ft, and 6–7 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, and pH. Of the total samples, 20% were analyzed for PCBs. Following data evaluation, an additional 8 samples from 4 locations were planned to define vertical extent of arsenic or lead. Samples were collected from 8–9 and 9–10 ft bgs and analyzed for either arsenic or lead. An additional 6 samples from 2 step-out locations were collected from 0–1, 3–4, and 6–7 ft bgs to define the lateral extent of lead and thallium at 1 location. Additional samples were collected between April 20 and April 25, 2023. Figure 4.1-1 shows locations sampled at SWMU 06-003(d) in FY 2023.

4.6 SWMU 06-003(e) – Firing Site

4.6.1 Site Description and Operational History

SWMU 06-003(e) is the former location of a firing chamber, former building 06-09 (LASL 1945, 015039), located 85 ft northeast of former building 06-06 at TA-06. The firing chamber was constructed in 1945 to use in detonator experiments and consisted of two adjacent concrete structures (rooms 101 and 102) as shown in engineering drawing ENG-R 2604 (pg. 1 of 1). Engineering drawing ENG-C 1629 shows that one of the structures consisted of an enclosed room next to a steel-plate-lined chamber that was open on one end. The enclosed room was 8 ft × 8 ft with 8-in.-thick walls. The chamber had dimensions of 6 ft × 8 ft with 2-ft-thick walls. The second structure consisted of a single enclosed room that was 12 ft × 8 ft with 1- and 2-ft-thick walls. The area between the two structures (rooms 101 and 102)

consisted of a concrete pad covered with a steel plate. From 1945 to 1952, the firing chamber was used to test-fire detonators completely or partially loaded with PETN (LANL 1993, 026068; Schott 1993, 021496). From 1952 to 1976, the site was used for experiments on detonation and shock waves in gases. The firing chamber was demolished and removed in 2004.

4.6.2 Previous Investigations

No previous investigations have been conducted at SWMU 06-003(e).

4.6.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-003(e) is to implement the approved IWP and collect 18 samples from 6 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-003(e) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 72 samples from 24 locations were collected at SWMU 06-003(e).

4.6.4 Fieldwork Completed

Sampling was conducted between December 14 and December 18, 2022. A total of 72 samples were collected from 24 locations. At each location, samples were collected from 0–1 ft, 3–4 ft, and 6–7 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.1-1 shows locations sampled at SWMU 06-003(e) in FY 2023.

4.7 SWMU 06-003(f) – Firing Site

4.7.1 Site Description and Operational History

SWMU 06-003(f) is a former firing site located on the north side of Twomile Mesa Road at TA-06. Engineering drawings show that the cleared circular pad was 60 ft in diameter and constructed of a 1-ft-thick layer of sand (McGehee et al. 2004, 108213). The circular area and some of the sand are still visible at the site. Experiments conducted at the firing site used metal parts made from irradiated copper to determine material dispersal from explosions. Nonradioactive cobalt was also used as a tracer. Experiments conducted at this site were controlled from building 06-3.

4.7.2 Previous Investigations

Previous investigations at SWMU 06-003(f) include a 1994 RFI (LANL 1997, 056664). Soil samples were collected from three locations within the area of the gravel pad and three locations that extended 10 ft beyond the firing site. At each location, samples were collected from the surface (0–0.5 ft bgs) and from the soil/tuff interface or 2–3 ft bgs, whichever was shallower. The site was surveyed radiologically and with a metal detector before sampling. Sample locations were field-screened for radioactivity, VOCs, and HE before samples were collected. All field-screening results were at background levels. Samples were submitted for laboratory analysis of metals, cyanide, HE (not including PETN), isotopic uranium, cesium-137, and strontium-90. Results showed metals detected above BVs.

4.7.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-003(f) is to implement the approved IWP and collect 21 samples from 7 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-003(f) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 96 samples from 32 locations were collected at SWMU 06-003(f).

4.7.4 Fieldwork Completed

Sampling was conducted between November 15 and December 4, 2022. A total of 96 samples were collected from 32 locations. At each location, samples were collected from 0–1 ft, 3–4 ft, and 6–7 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, isotopic uranium, gamma-emitting radionuclides, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Following data evaluation, an additional 6 samples from 2 step-out locations were planned to define lateral extent of arsenic. Samples were collected from 0–1, 3–4, and 6–7 ft bgs and analyzed for arsenic only. Additional samples were collected between April 18 and April 19, 2023. Figure 4.4-1 shows locations sampled at SWMU 06-003(f) in FY 2023.

4.8 SWMU 06-003(h) – Firing Site

4.8.1 Site Description and Operational History

SWMU 06-003(h) is a formerly used firing site located north of Twomile Mesa Road at TA-06. This site was not identified in the 1990 SWMU Report (LANL 1990, 007511) and was first discussed in the OU 1111 RFI work plan as part of MDA F (LANL 1993, 026068). In describing MDA F, the RFI work plan states that defective explosive lenses manufactured for use in the Fat Man implosion weapon were destroyed in this area by detonation in 1945 (LANL 1993, 026068). Some of the lenses were described as consisting of the explosive Baratol, which contains barium and TNT. A former employee involved with the detonations described this firing site as being located in the general area between the larger MDA F disposal pit [SWMU 06-007(a)] and Twomile Mesa Road (Van Vesse 1992, 015073).

In 1993, the Laboratory requested the U.S. Environmental Protection Agency (EPA) add SWMU 06-003(h) to the Laboratory's Hazardous Waste Facility Permit as a separate site; EPA approved the request in 1994 (LANL 1994, 039440).

4.8.2 Previous Investigations

Previous investigations at SWMU 06-003(h) include samples collected during a 1994 RFI, although the results of this sampling were never documented in a report. For the RFI, 11 surface soil samples (0.0–0.5 ft bgs) were collected from 11 locations. The sample collection logs provide a reference to "Aggregate 1 6-005" of the RFI work plan for OU 1111 (LANL 1993, 026068), which could be interpreted as SWMU 06-005. The sample locations noted in the logs, however, refer to "MDA F Lens Disposal Area," which has since been designated as SWMU 06-003(h). In addition, the sample locations are in the eastern portion of MDA F, whereas SWMU 06-005 is located to the west of MDA F. This evidence leads to the conclusion that these samples were for SWMU 06-003(h) rather than SWMU 06-005. Sample locations were spot-tested for HE and surveyed for radioactivity. The samples were submitted for analysis

of metals, cyanide, HE (not including PETN), isotopic uranium, cesium-137, and strontium-90. Results showed metals detected above BVs and strontium-90 detected above FV.

4.8.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-003(h) is to implement the approved IWP and collect 21 samples from 7 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-003(h) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 39 samples from 13 locations were collected at SWMU 06-003(h).

4.8.4 Fieldwork Completed

Sampling was conducted between April 5 and April 13, 2023. Field screening for metals and TNT was performed at 60 locations on a 20-ft grid. Metals were screened using x-ray fluorescence (XRF) and TNT using HE test kits. Three locations were chosen based on field-screening results that yielded the highest levels of metals and/or explosives. A total of 39 samples from 13 locations were collected. At each location, samples were collected from 0–1, 4–5, and 8–9 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, SVOCs, explosive compounds, isotopic uranium, gamma-emitting radionuclides, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.4-1 shows locations sampled at SWMU 06-003(h) in FY 2023.

4.9 SWMU 06-005 – Firing Site

4.9.1 Site Description and Operational History

SWMU 06-005 is the location of a timber-lined pit (former structure 06-42) measuring 16 ft wide × 16 ft long × 8 ft deep, located southwest of the intersection of Twomile Mesa Road and Gomez Ranch Road in TA-06. The purpose of the pit is not known; however, according to the 1990 SWMU Report, it may have been used as a firing pit (LANL 1990, 007511). The pit was constructed in 1945 and abandoned in 1952 when it was filled with soil.

4.9.2 Previous Investigations

Previous investigations at SWMU-06-005 include a RFI conducted in 1995, with resampling in 1998 to fill in gaps identified from 1995 sampling. The 1995 and 1998 sampling results are included in the 1998 RFI report (LANL 1998, 062227). In 1995, samples were collected at one location within the footprint of former building 06-13 and at two locations extending 5 ft from the building's outer boundary upgradient and downgradient of the building. At each location, samples were collected at the surface (0.0–0.5 ft bgs) and at the soil/tuff interface (2.6–3.1 or 3.0–3.3 ft bgs) (LANL 1998, 062227). All samples were field-screened for HE, radioactivity, and VOCs and submitted for analysis of TAL metals and HE (not including PETN). Subsurface samples were also analyzed for VOCs, and one surface sample was analyzed for tritium. All field screening showed concentrations or counts at or below background. In 1998, two of the 1995 RFI sample locations were resampled. At one location, a surface (0.0–0.5 ft) sample was collected and at the other location a subsurface sample (10.1–12.6 ft bgs) was collected. The samples were field-screened for HE, VOCs, and radiation and submitted for laboratory analysis of antimony, cadmium, and silver (LANL 1998, 062227).

4.9.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-005 is to implement the approved IWP and collect 16 samples at 6 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-005 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 18 samples at 6 locations were collected at SWMU 06-005.

4.9.4 Fieldwork Completed

Investigation activities were conducted between September 12, 2022, and January 11, 2023. Geophysical surveys were conducted using ground-penetrating radar (GPR) and time-domain electromagnetic induction (TDEMI) methods to locate the pit. A total of 18 samples from 6 locations were collected. Samples were collected from 0–1, 3–4, and 5–6 ft below backfill within the footprint of the pit. Samples were also collected from 0–1, 4–5, and 9–10 ft bgs at 4 step-out locations. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, SVOCs, explosive compounds, isotopic uranium, gamma-emitting radionuclides, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.4-1 shows locations sampled at SWMU 06-005 in FY 2023.

4.10 SWMU 06-006 – Storage Area

4.10.1 Site Description and Operational History

SWMU 06-006 is a former container and equipment storage area located along the south and east sides of former building 06-6 at TA-06. The storage area consisted of a concrete pad and asphalt parking lot measuring approximately 300 ft × 20 ft and was partially surrounded by a 4-ft berm (LANL 1990, 007511). Waste containers and electrical equipment, including capacitors, were stored in this area from the late 1970s to the late 1980s (ICF Kaiser Engineers 1995, 056879). A November 1988 field survey verified that drums containing oil, capacitors, and other equipment remained at the site. Evidence of spills and leaks was observed at the site in 1986 and 1988.

Former building 06-6 originally housed laboratory operations related to detonator assembly, an electronics work room, a chemistry laboratory, two darkrooms, restrooms, and a sink. In the 1970s, former building 06-6 was used as a cable shop, where acetone, alcohol, and dilute acids may have been used. In the early 1980s, former building 06-6 was used for printed circuit production. Building 06-6 was demolished and removed in 2004.

4.10.2 Previous Investigations

In 1994, three surface samples were collected of engineered material and soil from three locations was collected at the northeast corner of SWMU 06-006. Samples were analyzed for PCBs. Surface and subsurface sediment samples were collected at three locations in drainages along the north side of the SWMU and analyzed for VOCs, SVOCs, and PCBs. Results showed PCBs detected in two engineered material samples.

4.10.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-006 is to implement the approved IWP and collect 50 samples from 20 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to

ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-006 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 91 samples from 26 locations were collected at SWMU 06-006.

4.10.4 Fieldwork Completed

Sampling was conducted between March 27 and April 5, 2023. A total of 91 samples were collected from 26 locations. Surface samples were collected from 0.0–0.5 ft bgs from the storage pad material. Subsurface samples were collected from 0–1, 2–3, and 4–5 ft below the pad. Step-out locations around the pad were sampled from 0–1, 2–3, and 4–5 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, PCBs, isotopic uranium, gamma-emitting radionuclides, and pH. Following data evaluation, an additional 8 samples from 3 locations were collected to define vertical extent of thallium and lateral extent of mercury. Figure 4.1-1 shows locations sampled at SWMU 06-006 in FY 2023.

4.11 SWMU 06-007(a) – MDA F

4.11.1 Site Description and Operational History

SWMU 06-007(a), also known as MDA F, consists of two pits located north of Twomile Mesa Road at TA-06. One of the pits became operational in 1946 and the other in 1947. The pits were used to dispose of large classified objects that could not easily be destroyed by cutting. The larger pit was described as a bulldozed trench 50 ft wide x 20 ft deep at the deepest point and sloping up to the ground level at each end, with an overall length of 100 to 150 ft. It was reportedly used to dispose of several tons of metal parts, concrete mockups, handling fixtures, and other nonexplosive, nonradioactive classified materials (North 1974, 015083). The smaller pit was used to dispose of firing unit gaps that contained small amounts of radioactivity and small detonators with squibs (Courtright 1964, 005677). Chainlink fences were constructed around the large and small disposal pits in 1981 (LANL 1998, 063941). The area inside the larger fenced area was monitored for radioactivity on a consistent basis between 1981 and 1992; no readings above background levels were observed. The fences were observed to be present in 1992 but have since been removed.

4.11.2 Previous Investigations

As part of the 1986 Comprehensive Environmental Assessment and Response Program survey, most of MDA F was surveyed with GPR and magnetometry in an attempt to find the locations of pits and buried material (Weston 1986, 015243). Data from the survey are difficult to interpret because of the wide grid spacing and because fences were not removed (Sandness 1987, 015244). No definitive locations were identified.

No other previous investigations have been conducted at SWMU 06-007(a).

4.11.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-007(a) is to implement the approved IWP and collect 24 samples from 8 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-007(a) and to determine if the site poses a potential unacceptable risk to human health or the

environment. To meet both objectives, a total of 30 samples from 10 locations were collected at SWMU 06-007(a).

4.11.4 Fieldwork Completed

Investigation activities were conducted between September 13, 2022, and March 28, 2023. Geophysical surveys were conducted to locate the disposal pits, using GPR, TDEMI, and seismic refraction tomography (SRT) methods. A backhoe was used to excavate trenches or test pits at anomalies identified in the geophysical survey to verify the locations of the disposal units. A total of 30 samples were collected from 10 locations surrounding the pits and within the footprint of the pits. All samples were collected from 0–1, 3–4, and 6–7 ft below the bottom of the pits. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, gamma-emitting radionuclides, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.4-1 shows locations sampled at SWMU 06-007(a) in FY 2023.

4.12 SWMU 06-007(b) – Landfill

4.12.1 Site Description and Operational History

SWMU 06-007(b) is an inactive waste disposal pit at TA-06. The 1990 SWMU Report describes SWMU 06-007(b) as a waste disposal pit that measured 40 ft wide x70 ft long located directly south and east of the two MDA F disposal pits just outside the fenced area of MDA F [SWMU 06-007(a)] (LANL 1990, 007511). Engineering drawing ENG-R 5105, pg. 2 of 2 (Figure 6 in the 1990 SWMU Report [LANL 1990, 007511]) shows the single pit as described in the 1990 SWMU Report and as was observed during an aerial survey conducted in the 1940s.

4.12.2 Previous Investigations

No previous investigations have been conducted at SWMU 06-007(b).

4.12.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-007(b) is to implement the approved IWP and collect 12 samples from 4 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-007(b) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 18 samples from 6 locations were planned to be collected at SWMU 06-007(b).

4.12.4 Fieldwork Completed

Investigation activities were conducted between September 15, 2022, and January 25, 2023. Geophysical surveys were conducted to locate the pit using GPR, frequency-domain electromagnetic induction (FDEMI), and SRT methods. Trenching was conducted to locate the edges of the pit based on anomalies discovered during geophysical surveys. Probing was conducted with a hollow-stem auger to determine the bottom of the pit. A total of 19 samples were collected from 6 locations. All samples were collected from 0–1, 3–4, and 6–7 ft below the bottom of the pit. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, gamma-emitting radionuclides, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.4-1 shows locations sampled at SWMU 06-007(b) in FY 2023.

4.13 SWMU 06-007(c) – Landfill

4.13.1 Site Description and Operational History

SWMU 06-007(c) is a disposal pit identified in the 1990 SWMU Report (LANL 1990, 007511) based on a February 1950 Laboratory work order that called for excavating a 6-ft long × 6-ft wide × 6-ft deep pit on Twomile Mesa at TA-06, to be used to bury classified material (LASL 1950, 015074). The 1990 SWMU Report identifies SWMUs 06-007(c), 06-007(d), and 06-007(e) as sites sampled by DOE in 1987 and shows the location of these pits to be south of Twomile Mesa Road. The RFI work plan for former OU 1111 does not provide an exact location for SWMU 06-007(c), but it identifies these three SWMUs as being within the general area of MDA F [SWMU 06-007(a)], north of Twomile Mesa Road (LANL 1993, 026068). Engineering drawing ENG-R 5105, pg. 2 of 2 (Figure 6 in the 1990 SWMU Report [LANL 1990, 007511]) shows the disposal pit located south of Twomile Mesa Road near the general area of MDA F [SWMU 06-007(a)].

4.13.2 Previous Investigations

No previous investigations have been conducted at SWMU 06-007(c).

4.13.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-007(c) is to implement the approved IWP and collect 3 samples from 1 location (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-007(c) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 15 samples from 5 locations were planned to be collected at SWMU 06-007(c).

4.13.4 Fieldwork Completed

Investigation activities were conducted between September 22, 2022, and March 22, 2023. Geophysical surveys were conducted to locate the pits using GPR and magnetic methods. Trenches were excavated with a backhoe to target magnetic anomalies. The location of the pit was inferred from metal debris discovered during trenching, surface debris, and tuff boulders at the surface assumed to be fill. A total of 15 samples from 5 locations were planned, with an additional 12 samples from 4 locations added based on geophysics and trenching. A total of 27 samples were collected from 9 locations. All samples were collected from 0–1, 3–4, and 6–7 ft below the bottom of the pit. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, gamma-emitting radionuclides, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.4-1 shows locations sampled at SWMU 06-007(c) in FY 2023.

4.14 SWMU 06-007(d) – Landfill

4.14.1 Site Description and Operational History

SWMU 06-007(d) is a disposal pit identified in the 1990 SWMU Report (LANL 1990, 007511) based on an August 1950 Laboratory work order that called for excavating a 2 ft long × 2 ft wide × 4 ft deep pit, which was thought to have been excavated for disposal purposes in the 1940s directly south of Twomile Mesa Road and west of structure 06-37 [SWMU 06-003(a)] at TA-06 (LASL 1950, 015074). Engineering

drawing ENG-R 5105 (Figure 6 in the 1990 SWMU Report [LANL 1990, 007511]) shows the disposal pit south of Twomile Mesa Road near the general area of MDA F [SWMU 06-007(a)].

The 1990 SWMU report identifies SWMUs 06-007(c), 06-007(d), and 06-007(e) as sites sampled by DOE in 1987 and shows the location of these pits to be south of Twomile Mesa Road (LANL 1990, 007511). The RFI work plan for OU 1111 does not provide an exact location for SWMU 06-007(e), but it identifies these three SWMUs as being within the general area of MDA F, [SWMU 06-007(a)], north of Twomile Mesa Road (LANL 1993, 026068). It is not known which of these documents provides the correct location of these disposal pits.

4.14.2 Previous Investigations

No previous investigations have been conducted at SWMU 06-007(d).

4.14.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-007(d) is to implement the approved IWP and collect 3 samples from 1 location (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-007(d) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 12 samples from 4 locations were planned to be collected at SWMU 06-007(d).

4.14.4 Fieldwork Completed

Investigation activities were conducted between September 9, 2022, and March 20, 2023. Geophysical surveys were conducted to locate the former disposal pit using GPR and TDEMI methods. Trenching was conducted with a backhoe near magnetic anomalies identified during geophysical surveys. The possible location of the disposal pit was inferred from surface debris at 2 locations. A total of 12 samples from 4 locations were planned, and 9 samples from 3 locations were added based on results of geophysics and trenching. A total of 21 samples from 7 locations were collected. All samples were collected from 0–1, 3–4, and 6–7 ft below the bottom of the pit. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, gamma-emitting radionuclides, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.4-1 shows locations sampled at SWMU 06-007(d) in FY 2023.

4.15 SWMU 06-007(e) – Landfill

4.15.1 Site Description and Operational History

SWMU 06-007(e) is a disposal pit at TA-06 identified in the 1990 SWMU Report (LANL 1990, 007511) based on an environmental survey conducted by DOE in 1987 (DOE 1989, 015365). The 1990 SWMU Report describes SWMU 06-007(e) as a disposal pit that was thought to have been excavated at TA-06 in the 1940s directly south of Twomile Mesa Road and west of structure 06-37 [SWMU 06-003(a)] (LANL 1990, 007511). Engineering drawing ENG-R 5105, pg. 2 of 2 (Figure 6 in the 1990 SWMU Report [LANL 1990, 007511]) shows the disposal pit south of Twomile Mesa Road, east of SWMU 06-007(d), and northwest of structure 06-37 [SWMU 06-003(a)]. Dimensions of this disposal pit are not known.

The 1990 SWMU report identifies SWMUs 06-007(c), 06-007(d), and 06-007(e) as sites sampled by DOE in 1987 and shows the location of these pits to be south of Twomile Mesa Road (LANL 1990, 007511).

The RFI work plan for former OU 1111 does not provide an exact location for SWMU 06-007(e), but it identifies these three SWMUs as being within the general area of MDA F [SWMU 06-007(a)], north of Twomile Mesa Road (LANL 1993, 026068). It is not known which of these documents provides the correct location of these disposal pits.

4.15.2 Previous Investigations

No previous investigations have been conducted at SWMU 06-007(e).

4.15.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-007(e) is to implement the approved IWP and collect 3 samples from 1 location (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-007(e) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 12 samples from 4 locations were planned to be collected at SWMU 06-007(e).

4.15.4 Fieldwork Completed

Investigation activities were conducted between September 6, 2022, and March 19, 2023. Geophysical surveys were conducted to locate the former disposal pit using GPR, FDEMI, and TDEMI methods. Trenching was conducted with a backhoe based on anomalies identified during geophysical surveys. The possible location of the pit was inferred from metal debris found during trenching, tuff boulders at the surface assumed to be fill material, and surface debris found at two locations. A total of 12 samples from 4 locations were planned, and 12 samples from 4 locations were added based on geophysics and trenching. A total of 24 samples from 8 locations were collected. All samples were collected from 0–1, 3–4, and 6–7 ft below the bottom of the pit. Samples were analyzed for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, isotopic uranium, gamma-emitting radionuclides, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.4-1 shows locations sampled at SWMU 06-007(e) in FY 2023.

4.16 SWMU 06-007(f) – Surface Disposal Site

4.16.1 Site Description and Operational History

SWMU 06-007(f) is the location of a former disposal area about 400 ft north of the former location of building 06-3. The RFI work plan for former OU 1111 describes the former surface disposal site as measuring approximately 20 ft wide × 30 ft long and located approximately 400 ft north of the former location of building 06-3 on the north side of Twomile Mesa Road at TA-06 (LANL 1993, 026068). Disposal dates are not known. Empty chemical bottles and laboratory equipment, electrical equipment, barbed wire, and other miscellaneous debris were observed at the site. Based on the nearby presence of Jumbino parts, the site may have been used for disposal of waste from former buildings 06-1, 06-3, and 06-6, which housed laboratories and shops in the 1940s. Jumbino vessels were large steel vessels designed to contain shot fragments from implosion and detonator tests (LANL 1996, 054330).

4.16.2 Previous Investigations

Previous investigations at SWMU 06-007(f) include a 1994 RFI. All solid waste and debris at the site was surveyed for radioactivity; no elevated levels were detected. Soil samples were collected from 3 locations

at the surface (0.0–0.5 ft) and at the soil/tuff interface (2.5–3.5 ft) (LANL 1993, 026068). The samples were field-screened for radioactivity and HE and were sent for laboratory analysis of metals, cyanide, SVOCs, HE (not including PETN), cesium-137, and strontium-90. Subsurface samples were also analyzed for VOCs. Results from the 1994 RFI showed metals above BVs, detected organic chemicals, and cesium-137 above FV.

A VCA was conducted at the site in 1995. Debris at the site was field-screened for gross-alpha, -beta, and -gamma radioactivity and VOCs. No levels above background were detected. The VCA consisted of removing soil and debris from an area measuring approximately 20 ft x 30 ft. Debris removed from the site consisted of Manhattan Project–era artifacts, including laboratory equipment and glassware, inactive detonators, and chunks of metal. Soil was contaminated with ash, metal, and glass debris. The site also contained metal fragments from Jumbino vessels (LANL 1996, 054330). Confirmatory samples were collected following the excavation. Soil samples were collected from three surface locations within the footprint of the SWMU and were analyzed for TAL metals, SVOCs, and gamma-emitting radionuclides. No organic chemicals were detected. Activities and sampling results from the 1994 RFI and the 1995 VCA are documented in the 1996 VCA report (LANL 1996, 054330).

4.16.3 Investigation Objectives

The primary objective of the investigation at SWMU 06-007(f) is to implement the approved IWP and collect 21 samples from 7 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 06-007(f) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 39 samples from 13 locations were collected at SWMU 06-007(f).

4.16.4 Fieldwork Completed

Sampling was conducted between January 30 and February 4, 2023. A total of 39 samples were collected from 13 locations. Samples were collected below the level of the excavation performed during the VCA and from 0–1, 2–3, and 4–5 ft into undisturbed soil and tuff. Additional samples were collected from step-out locations from 0–1, 3–4, and 6–7 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, dioxins and furans, isotopic uranium, gamma-emitting radionuclides, strontium-90, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.1-1 shows locations sampled at SWMU 06-007(f) in FY 2023.

4.17 AOC 06-008 – Soil Contamination from Former Underground Storage Tank

4.17.1 Site Description and Operational History

AOC 06-008 is the former location of an underground storage tank (UST) (former structure 06-47) that was directly adjacent to the concrete bowl [SWMU 06-003(a)] at TA-06. The tank was partially buried, with approximately one-quarter of the tank exposed. The tank measured approximately 12 ft long and 4.5 ft wide and had a capacity of 2000 gal. The tank was removed in 1987. When it was removed, the tank contained approximately 600 gal. of liquid that appeared to be water. The tank contents were sampled and analyzed for gross-alpha, -beta, and -gamma radioactivity and tritium before removal; no detectable activity was measured. The tank contents were emptied and the tank was removed for salvage (McInroy 1993, 015266).

4.17.2 Previous Investigations

In 1978, AOC 06-008 was monitored with a Phoswich counter; no radiation above background was detected (Elliott 1978, 004647).

A Phase I RFI was conducted to characterize AOC 06-008 in 1994 (LANL 1997, 056664). Three soil cores were collected from the tank's former location. The cores were sampled at three intervals from the surface to the soil/tuff interface (0.0–0.5 ft; 1.5–2.5 ft; and 2–3, 2.5–3.5, or 3–4 ft bgs). The samples were field-screened for radioactivity, HE, and organic vapors and were submitted for analysis of TAL metals, cyanide, HE (not including PETN), isotopic uranium, cesium-137, and strontium-90. Results showed metals detected above BVs and cesium-137 above FV.

4.17.3 Investigation Objectives

The primary objective of the investigation at AOC 06-008 is to implement the approved IWP and collect 12 samples from 4 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC 06-008 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 24 samples from 8 locations were collected at AOC 06-008.

4.17.4 Fieldwork Completed

Sampling was conducted between January 6 and January 8, 2023. A total of 24 samples were collected from 8 locations. Samples were collected below the level of the former tank from 0–1, 3–4, and 6–7 ft below backfill. Samples were also collected from step-out locations from 4–5, 7–8, and 10–11 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, total recoverable petroleum hydrocarbons, isotopic uranium, isotopic plutonium, gamma-emitting radionuclides, americium-241, strontium-90, and pH. Of these samples, 20% were analyzed for PCBs. Following data evaluation, an additional 10 samples from 2 step-out locations (8-9 and 8-10) were collected to define lateral extent of arsenic and thallium. Samples were collected from 4–5, 7–8, 10–11, 12–13, and 14–15 ft bgs. An additional 2 samples from 1 location were collected to define vertical extent of arsenic. Additional samples were collected between May 22 and May 23, 2023. Figure 4.4-1 shows locations sampled at AOC 06-008 in FY 2023.

4.18 AOC C-06-001 – Soil Contamination from Former Storage Magazine 06-4

4.18.1 Site Description and Operational History

AOC C-06-001 consists of an area of potential soil contamination associated with the footprint of former building 06-4, an explosives magazine located west of former buildings 06-5 and 06-6 at TA-06. The magazine was a wooden frame structure measuring 7 ft long × 7 ft wide × 7 ft high with an earthen berm covering three sides and the roof. The magazine was used for explosives storage beginning in 1945 and was demolished in place in 1972 (Parker 1971, 004635).

4.18.2 Previous Investigations

A Phase I RFI was conducted at AOC C-06-001, and samples were collected in 1995 and 1998. The investigation and the sampling were not documented in a report. A surface (0.0–0.5 ft bgs) and subsurface (0.8–1.25 ft bgs to 3.8–4.3 ft bgs) sample were collected at each of three locations. The

samples were submitted for laboratory analysis of metals and HE. Two of these locations were resampled in 1998 with a surface (0.0–0.5 ft bgs) and subsurface (2.2–2.8 ft bgs and 4.2–4.8 ft bgs) sample collected at each location. These samples were submitted for laboratory analysis of antimony, cadmium, and HE (including PETN). Results showed inorganic chemicals above BVs.

4.18.3 Investigation Objectives

The primary objective of the investigation at AOC C-06-001 is to implement the approved IWP and collect 15 samples from 5 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC C-06-001 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 27 samples from 9 locations were collected at AOC C-06-001.

4.18.4 Fieldwork Completed

Sampling was conducted between November 10 and November 14, 2022. A total of 27 samples were collected from 9 locations. All samples were collected from 0–1, 3–4, and 6–7 ft bgs. Samples were analyzed for TAL metals, cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, isotopic uranium, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.1-1 shows locations sampled at AOC C-06-001 in FY 2023.

4.19 AOC C-06-005 – Soil Contamination from Former Building 06-13

4.19.1 Site Description and Operational History

AOC C-06-005 is the location of former building 06-13 approximately 125 ft south of the intersection with Twomile Mesa Road at TA-06. Former building 06-13 was a 16 ft long × 16 ft wide × 9 ft high wood-frame building located along the west side of Gomez Ranch Road and was used as a chemistry laboratory, a detonator assembly building, and for storing explosives. The laboratory sink in this building discharged to a French drain next to the east side of the building. The building was destroyed by burning in 1960. Explosives used in detonators assembled in the building included PETN, RDX, TNT, Composition A (a mixture of 91% to 98.5% RDX and 1.5% to 9% binders), Composition B (a mixture of 60% RDX and 40% TNT), and Baratol (a mixture of 76% barium nitrate and 24% TNT).

4.19.2 Previous Investigations

Previous investigations at AOC C-06-005 include a Phase I RFI conducted in 1995, with resampling in 1998 to fill in gaps identified from 1995 sampling. The 1995 and 1998 sampling results are included in the 1998 RFI report (LANL 1998, 062227). In 1995, samples were collected at one location within the footprint of former building 06-13 and at two locations extending 5 ft from the building's outer boundary upgradient and downgradient of the building. At each location, samples were collected at the surface (0.0–0.5 ft bgs) and at the soil/tuff interface (2.6–3.1 ft bgs or 3.0–3.3 ft bgs) (LANL 1998, 062227). All samples were field-screened for HE, radioactivity, and VOCs and submitted for analysis of TAL metals and HE (not including PETN). Subsurface samples were also analyzed for VOCs, and one surface sample was analyzed for tritium. All field screening showed concentrations or counts at or below background. In 1998, two of the 1995 RFI sample locations were resampled. At one location, a surface sample (0.0–0.5 ft bgs) was collected and at the other location a subsurface sample (10.1–12.6 ft bgs) was collected. The samples were field-screened for HE, VOCs, and radiation and submitted for laboratory

analysis of antimony, cadmium, and silver (LANL 1998, 062227). Results show metals above BVs, and organic chemicals were detected.

4.19.3 Investigation Objectives

The primary objective of the investigation at AOC C-06-005 is to implement the approved IWP, remove areas with soil contamination above the residential soil screening level (SSL) for lead, and collect 15 samples from 5 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC C-06-005 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 30 samples from 10 locations were planned to be collected at AOC C-06-005. An XRF survey was planned within the building footprint to identify areas of lead contamination. Soil with lead concentrations above the residential SSL (400 mg/kg) would be excavated, and confirmation samples would be collected from 0–1, 2–3, and 4–5 ft below the excavation.

4.19.4 Fieldwork Completed

Sampling was conducted from March 28 to April 3, 2023. The XRF survey did not identify lead contamination above the residential SSL. One additional sample location was added based on the maximum lead concentration (155.73 mg/kg) detected during the XRF survey. This location was sampled from 0–1, 2–3, and 4–5 ft bgs. A total of 33 samples were collected from 11 locations. Samples from within the building footprint and at step-out locations were collected from 0–1, 4–5, and 8–9 ft bgs. Samples from the additional location were analyzed for TAL metals only. All other samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, dioxins/furans, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 4.1-1 shows locations sampled at AOC C-06-005 in FY 2023.

4.20 AOC C-06-019 – Soil Contamination from Former Building 06-38

4.20.1 Site Description and Operational History

AOC C-06-019 is the former location of a generator building (former building 06-38) located north of the concrete bowl firing site [SWMU 06-003(a)] in TA-06. Engineering records show that this building was a wood-frame structure open on one end. The building was 10 ft long × 20 ft wide × 10 ft high with an earthen floor. Use of building 06-38 ceased in December 1959, and it was destroyed by burning in January 1960.

4.20.2 Previous Investigations

A Phase I RFI was conducted at AOC C-06-019 in 1994 (LANL 1997, 056664). Soil samples were collected from the three locations at the former generator building. Samples were collected from the surface (0.0–0.5 ft bgs) and from approximately 5–6 ft bgs at each location. The samples were field-screened for radioactivity, HE, and organic vapors and were submitted for laboratory analysis of TAL metals, cyanide, HE (not including PETN), SVOCs, VOCs, PCBs, isotopic uranium, cesium-137, and strontium-90. Results showed metals detected above BVs and detected organic chemicals.

4.20.3 Investigation Objectives

The primary objective of the investigation at AOC C-06-019 is to implement the approved IWP and collect 3 samples from 1 location (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to

ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC C-06-019 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 15 samples from 5 locations were collected at AOC C-06-019.

4.20.4 Fieldwork Completed

Sampling was conducted between January 5 and January 8, 2023. Fifteen samples were collected from five locations. All samples were collected from 0–1, 4–5, and 8–9 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, TPH, explosive compounds, dioxins and furans, isotopic uranium, isotopic plutonium, gamma-emitting radionuclides, americium-241, strontium-90, and pH. Two samples were analyzed for PCBs. Following data evaluation, an additional two samples from one location will be collected from 10–11 and 12–13 ft bgs to define the vertical extent of arsenic. This work will be completed in FY 2024 and will be reported in the investigation report (IR). Figure 4.4-1 shows locations sampled at AOC C-06-019 in FY 2023.

5.0 SUMMARY OF FIELDWORK COMPLETED IN FORMER TA-07 DURING FISCAL YEAR 2023

The following sections summarize the status of fieldwork initiated at one SWMU in FY 2023.

5.1 SWMU 07-001(a), Firing Site

5.1.1 Site Description and Operational History

SWMU 07-001(a) is an inactive firing pit located near the east end of TA-06 (Figure 5.1-1). The site consists of a circular depression surrounded by an annular berm about 4 ft high and approximately 30 ft in diameter. The firing pit was used in the 1950s to destroy scrap detonators and explosives. The materials to be destroyed were mixed with Composition B scraps or flaked TNT and the mixture was detonated. A 1959 memorandum states this method was very effective in destroying detonators, with no intact detonators thrown out of a pit and no undestroyed detonators found during a site survey, although pellets of unexploded PBX were found (Spaulding 1959, 004574). The base explosives of the PBX historically used at the Laboratory include HMX, RDX, and TATB (LANL 1993, 020948). In 1959, this method of destroying detonators was discontinued at this site.

5.1.2 Previous Investigations

Previous investigations at SWMU 07-001(a) were conducted in 1994 and were reported in the “RFI Report for Potential Release Sites at TAs -6, -8, -22, and -40 (located in former Operable Units 1157 and 1111)” (LANL 1997, 056664). Samples were collected from two depths at three central locations inside the annular berm and three locations away from the center of the site (two locations outside the berm and one location inside the berm) (LANL 1997, 056664). Samples were submitted for analysis of metals, total cyanide, HE, isotopic uranium, cesium-137, and strontium-90. Data collected in 1994 are screening-level data; however, the data showed metals detected above BVs.

All samples from the 1994 investigation at SWMU 07-001(a) were to have been submitted for analysis of SVOCs, but SVOCs were omitted from the list of requested analyses. For this reason, and because holding times were exceeded for the samples submitted for HE analysis, the locations and depths sampled in 1994 were resampled in 1996 with all samples submitted for analysis of SVOCs and HE. Data from the 1996 resampling effort are decision-level data and showed detected organic chemicals.

5.1.3 Investigation Objectives

The primary objective of the investigation at SWMU 07-001(a) is to implement the approved IWP and collect 18 samples from 6 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 07-001(a) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 57 samples from 19 locations were collected at SWMU 07-001(a). At each location, samples were collected from 0–1, 3–4, and 6–7 ft bgs.

5.1.4 Fieldwork Completed

Initial investigation of SWMU 07-001(a) took place in FY 2022. After data evaluation, an additional 16 samples from 4 locations were collected to define lateral extent of arsenic. Also, 2 deeper samples from 1 location were required to define vertical extent of arsenic. A total of 18 iteration samples (additional samples collected to define nature and extent of contamination) were collected from 5 locations between March 29 and March 31, 2023. Samples for lateral extent of arsenic were collected from 0–1, 3–4, 6–7, and 9–10 ft bgs. Samples for vertical extent were collected from 8–9 and 9–10 ft bgs. Iteration samples were analyzed for arsenic only. Figure 5.1-1 shows locations sampled at SWMU 07-001(a) in FY 2023.

6.0 SUMMARY OF FIELDWORK COMPLETED IN TA-22 DURING FISCAL YEAR 2023

The following sections summarize the status of fieldwork initiated at five SWMUs in FY 2023.

6.1 SWMU 22-010(a) – Septic System

6.1.1 Site Description and Operational History

SWMU 22-010(a) consists of an inactive septic tank (structure 22-50), drainlines, and drain field located directly north of building 22-34. The septic system was constructed in 1952 and received sanitary waste from building 22-34, the detonator explosives building (LANL 1990, 007512). The septic tank is constructed of concrete and discharged north to an 800 ft² tile drain field (LANL 1993, 026068). The drain field discharged into a marshy area at the head of Tributary B of Twomile Canyon (LANL 1997, 056664). The septic system became inactive in 1993 when building 22-34 was tied into the TA-46 Sanitary Wastewater System Consolidation plant and the inlet drainline to the septic tank was plugged.

6.1.2 Previous Investigations

During the 1994 Phase I RFI, samples of the septic tank contents were collected and soil samples were collected beneath the septic tank inlet and outlet, beneath the tank, and surrounding the tank (LANL 1997, 056664). Sample locations were field-screened for VOCs, HE, and radioactivity; the results were nondetections or at background levels and were submitted for analysis of metals, VOCs, SVOCs, and HE. Results from the 1994 RFI showed metals detected above BVs and detected organic chemicals.

Because the drain field location was incorrectly identified during the 1994 RFI, a second sampling event was conducted in 1997 (LANL 1997, 056664). To determine the location of the drain field, GPR was used. Six samples were collected from two depths from three boreholes (4.5–5.0 and 7.5–8.0 ft bgs; 3.0–3.5 and 6.7 ft bgs; 4.8–5.5 and 7.0–7.7 ft bgs, respectively). Sample locations were field-screened for radioactivity, VOCs, and HE before samples were collected. All samples were submitted for analysis of metals, VOCs, SVOCs, and HE.

6.1.3 Investigation Objectives

The primary objective of the investigation at SWMU 22-010(a) is to implement the approved IWP and collect 23 samples from 11 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 22-010(a) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 57 samples from 19 locations were collected at SWMU 22-010(a).

6.1.4 Fieldwork Completed

Investigation activities were conducted between November 11, 2022, and March 6, 2023. Geophysical surveys were conducted to locate the drain field using GPR methods. Approximately 1480 gal. of liquid waste was pumped from the septic tank between February 6 and February 14, 2023. The liquid waste was containerized and characterized as nonregulated industrial waste. The concrete and steel septic tank, plywood bin lining, and manhole riser were removed and containerized as 16 yd³ of nonregulated industrial waste. Excavation was conducted to remove the septic tank and manhole riser, and the drainlines were plugged with concrete. After the excavation was backfilled, a total of 57 samples were collected from 19 locations. Samples were collected from 0–1, 3–4, and 5–6 ft below the drainlines, septic tank, and manhole riser. Samples from the drain field were collected from 0–1, 2–3, and 4–5 ft below the drainlines. Samples were collected from locations downgradient of the outfall from 0–1, 2–3, and 4–5 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, and pH. Of the total samples, 20% were analyzed for PCBs.

During the 2022–2023 investigation, the septic tank was found to have a capacity of approximately 3000 gal. and the drainline, septic tank, and drain field were found to be located further east than depicted on the unit boundary. Figure 6.1-1 shows locations sampled at SWMU 22-010(a) in FY 2023.

6.2 SWMU 22-014(a) – Sump System

6.2.1 Site Description and Operational History

SWMU 22-014(a) consists of an active HE sump system located immediately south of building 22-93 at TA-22. The sump system consists of a concrete sump measuring approximately 4 ft deep × 9 ft long × 3 ft wide containing an inset aluminum tank, an inlet drainline, and an inactive outlet drainline and seepage pit. The sump system has been operating since 1985 and receives rinse water from a washing facility for parts and clothing from explosives compacting operations in rooms C112 and C114 in building 22-93 (LANL 1993, 007512). Before 1995, the sump discharged approximately 100 gal. of wastewater each week through a drainline to a seepage pit located 150 ft south of the sump in the upper part of Tributary B of Twomile Canyon. The seepage pit is 4 ft in diameter and 36 ft deep (LANL 1985, 109184). In 1995, the outflow from the sump was capped leaving the sump outlet drainline and seepage pit inactive (LANL 1997, 056664). Operations in building 22-93 continue to discharge wastewater to the sump, where the effluent is retained and suspended HE solids settle out as sludge. The sump contents are periodically removed for disposal at approved facilities at TA-16 (LANL 1997, 056664). The sump is equipped with a level monitor and an alarm that are monitored remotely in a manager's office.

6.2.2 Previous Investigations

During the 1994 Phase I RFI, 1 sample of sludge water was collected from the sump tank and 15 samples were collected from 3 depths at 5 borehole locations around the sump and next to the drainline outlet (LANL 1997, 056664). In addition, 9 samples were collected from 3 depths at 3 boreholes in the seepage pit area. Sample locations were field-screened for VOCs, HE, and radioactivity; the results were nondetections or at background levels. The samples were submitted for analysis of HE. Results showed detected HE in samples collected around the active sump.

6.2.3 Investigation Objectives

The primary objective of the investigation at SWMU 22-014(a) is to implement the approved IWP, remove the seepage pit infrastructure, and collect 52 samples from 19 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 22-014(a) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 61 samples from 19 locations were planned to be collected at SWMU 22-014(a).

6.2.4 Fieldwork Completed

Sampling was conducted from December 19, 2022, to February 18, 2023. A total of 59 samples were collected from 19 locations. Auger refusal at depth resulted in cancellation of 2 samples from 2 locations. Samples were collected from 0–1, 3–4, and 5–6 ft below the drainlines and sump. Samples were collected from locations downgradient of the seepage pit from 0–1, 2–3, and 4–5 ft bgs or from the top 1 ft of unweathered tuff. Six RFI locations were resampled in the drainage area from 0–1, 2–3, and 5–6 ft bgs or from the top 1 ft of unweathered tuff. One borehole was advanced adjacent to the seepage pit, and samples were collected at 10-ft intervals to a depth of 68 ft bgs. Samples were analyzed for TAL metals, cyanide, nitrate, perchlorate, VOCs, SVOCs, explosive compounds, and pH. Of the total samples, 20% were analyzed for PCBs. Removal of the seepage pit infrastructure was delayed because of noise restrictions in Mexican spotted owl core habitat. This activity will be completed in FY 2024 and will be reported in the IR. Figure 6.1-1 shows locations sampled at SWMU 22-014(a) in FY 2023.

6.3 SWMU 22-014(b) – Sump System

6.3.1 Site Description and Operational History

SWMU 22-014(b) consists of an inactive explosives sump and a former outfall area that serves rooms 101 through 113 in building 22-34 (LANL 1990, 007512). The sump is located on the northeast corner of building 22-34, is constructed of concrete, and is 4 ft × 2 ft × 3 ft deep with an inset aluminum tank (LANL 1990, 007512). The sump probably began to be used shortly after building 22-34 was completed in 1953. Building 22-34, currently used as a laser laboratory, previously housed a chemistry laboratory, an explosives laboratory, and a photographic laboratory (LANL 1997, 056664). The sump effluent drained to the north via a drainline to an outfall located in a marshy area in the upper part of Tributary B of Twomile Canyon until 1994, when the sump outlet was plugged (LANL 1997, 056664). The sump has not been used since 1994 when building 22-34 became a laser laboratory.

6.3.2 Previous Investigations

During the 1994 Phase I RFI, 15 samples were collected from 3 depths at 5 borehole locations around the sump and next to the drainline outlet (LANL 1997, 056664). In addition, 3 surface samples were

collected from 3 locations in the outfall area. The sample locations were field-screened for VOCs, HE, and radioactivity; the results were nondetections or at background levels and were submitted for analysis of metals, sulfates/copper salts, nitrates/nitrites, fluoride, cyanide, VOCs, SVOCs, and HE. Results showed metals detected above BVs, detected organic chemicals around the sump, and a single HE detection in the outfall area.

6.3.3 Investigation Objectives

The primary objective of the investigation at SWMU 22-014(b) is to implement the approved IWP, remove the sumps, and collect 39 samples from 15 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 22-014(b) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 47 samples from 16 locations were collected at SWMU 22-014(b).

6.3.4 Fieldwork Completed

Sampling was conducted between January 7 and February 28, 2023, including collection of investigation samples. A total of 47 samples were collected from 16 locations. Samples were collected from 0–1, 3–4, and 5–6 ft below the drainlines and sump. Samples were collected from locations in the outfall and downgradient of the outfall from 0–1, 2–3, and 4–5 ft bgs or from the top 1 ft of unweathered tuff. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, and pH. Of the total samples, 20% were analyzed for PCBs. Removal of the sumps was infeasible because of their proximity to an active HE building. To avoid compromising the structural integrity of the building, the sumps were abandoned in place by filling them with concrete. Following data evaluation, an additional 20 samples from 6 step-out locations were planned to define lateral extent of RDX and HMX at one location. Additional sampling was conducted between June 1 and June 7, 2023. Figure 6.1-1 shows locations sampled at SWMU 22-014(b) in FY 2023.

6.4 SWMU 22-015(a) – Drainlines and Dry Wells

6.4.1 Site Description and Operational History

SWMU 22-015(a) consists of two inactive seepage pits (Pits A and B), associated inlet drainlines, and a former NPDES-permitted outfall (EPA 128-128) located in an open grass-covered area east of building 22-91 at TA-22. Each pit has an outside diameter of 4 ft and is filled with crushed gravel with a central 4-in. polypropylene perforated pipe vented to the surface (Creamer 1993, 015248). Pit A is 26 ft deep, and Pit B is 20 ft deep (LANL 1997, 056749). The seepage pits were operated in series and served rooms B102, B107, B121, B123, B145, and B160 in building 22-91, which housed printed circuit board etching operations (DOE 1987, 008663). The seepage pits began operation shortly after building 22-91 was occupied in 1985. From 1985 to 1987, treated waste from the etching operations was discharged through a 6-in.-diameter polyvinyl chloride drainpipe to the seepage pits (LANL 1997, 056749). As the effluent production rate exceeded the infiltration rate of liquid into the tuff causing the seepage pits to overflow, the drainline was disconnected from the seepage pits in 1987 and the pits became inactive (Creamer 1993, 015248; LANL 1997, 056749). After the pits were disconnected, effluent was allowed to daylight for only a few months before the drainlines were tied into the TA-16 wastewater treatment facility (Creamer 1993, 015248).

6.4.2 Previous Investigations

In 1987, DOE sampled the marshy area in the upper part of Tributary B of Twomile Canyon east of buildings 22-91 and 22-93 that was impacted by releases from SWMU 22-015(a) (LANL 1990, 007512). Three surface samples and five subsurface samples (up to 5 ft bgs) were collected from six locations. Sample locations were field-screened for VOCs, HE and radioactivity; results were nondetections or at background levels. Samples were submitted for analysis of metals; VOCs; HE; asbestos; and alpha-, beta-, and gamma-emitting radionuclides. Results showed concentrations of inorganic chemicals above BVs.

During the 1994 Phase I RFI, nine samples were collected from three depths at three borehole locations: one next to and downgradient of Pit A, one next to and downgradient of Pit B, and one between the two pits (LANL 1997, 056749). Sample locations were field-screened for VOCs, HE, and radioactivity; the results were nondetections or at background levels. The samples were submitted for analysis of TAL metals, VOCs, SVOCs, and HE. The holding times for the HE analyses were exceeded, and PETN analysis was not requested. Results of the 1994 RFI showed metals detected above BVs in the seepage pit area.

In the 1997 RFI, four samples were collected from two boreholes, each drilled through a seepage pit into the underlying tuff 3 ft below the bottom of each pit. Samples from the Pit A borehole were collected at 27.7–28.7 and 29–30 ft bgs, and at the Pit B borehole samples were collected at 20.5–21.5 and 23–24 ft bgs. The samples were submitted for analysis of metals, VOCs, cyanide, and HE, including PETN. Data from the 1997 RFI are decision level and indicate metals detected above BVs and detected organic chemicals.

6.4.3 Investigation Objectives

The primary objective of the investigation at SWMU 22-015(a) is to implement the approved IWP, remove the seepage pit surface infrastructure, plug drainlines, and collect 47 samples from 17 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 22-015(a) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 64 samples from 20 locations were collected at SWMU 22-015(a).

6.4.4 Fieldwork Completed

Investigation activities were conducted between February 19 and June 14, 2023. The seepage pit infrastructure was removed and containerized as 7 yd³ of nonregulated waste. After the excavation was backfilled, a total of 64 samples were collected from 20 locations. Samples were collected from 0–1, 3–4, and 5–6 ft below the sump and drainlines associated with the seepage pits. Samples were collected from locations downgradient of the seepage pits from 0–1, 2–3, and 4–5 ft bgs or from the top 1 ft of unweathered tuff. Two borehole locations were advanced adjacent to each seepage pit, and samples were collected at 10-ft intervals to a depth of 30 ft below the bottom of the pit. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 6.1-1 shows locations sampled at SWMU 22-015(a) in FY 2023.

6.5 SWMU 22-015(b) – Sump and Outfall

6.5.1 Site Description and Operational History

SWMU 22-015(b) consists of an inactive HE sump, outlet drainline, and outfall located at the northeast corner of building 22-25, a structure previously used for the recrystallization of PETN (LANL 1997, 056749). The concrete sump measures 4.5 ft long × 3 ft wide × 3.5 ft deep and contains an inset aluminum tank. An outlet drainline from the sump extends to the outfall approximately 50 ft north of building 22-25. The outfall discharged to a hillside, which sloped to a drainage channel that flows eastward into Twomile Canyon. The sump and outfall operated from 1950 to the 1960s, when operations in building 22-25 ceased (Creamer 1992, 015247).

6.5.2 Previous Investigations

During the 1994 Phase I RFI, 15 samples were collected from 3 depths at 5 borehole locations around the sump and adjacent to the drainline outlet (LANL 1997, 056664). In addition, 3 surface samples were collected from 3 locations in the outfall area (LANL 1997, 056749). No samples were collected from the sump because no liquid or sludge was present. Sample locations were field-screened for radioactivity, VOCs, and HE; the results were nondetections or at background levels. The samples were submitted for analysis of VOCs and HE. Samples collected during the 1994 RFI for VOC analysis were lost by the analytical laboratory, and PETN was not requested as part of the HE suite (LANL 1997, 056749). Results showed no detected HE.

Supplemental samples collected in 1997 included three samples collected from three depths (0.0–0.5, 3.5–4.5, 6.6–7.7 ft bgs) beneath the sump outlet, and three samples collected from three depths (0.0–0.5, 3.0–3.5, 3.5–4.0 ft bgs) beneath the northeast corner of the sump. Six samples were collected from two depths (0.0–0.5 ft and from a second interval ranging in depth from 1.3 to 2.7 ft bgs) in the outfall area. Sample locations were field-screened for VOCs and HE before samples were collected; the results were nondetections or at background levels. The samples were submitted for analysis of VOCs and HE. Data from the 1997 sampling event are decision level. Three organic chemicals (tetryl; 2,4-dinitrotoluene; and toluene) were each detected in one sample.

6.5.3 Investigation Objectives

The primary objective of the investigation at SWMU 22-015(b) is to implement the approved IWP, remove the sump, plug drainlines, and collect 37 samples from 14 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 22-015(b) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 42 samples from 14 locations were collected at SWMU 22-015(b).

6.5.4 Fieldwork Completed

Investigation activities were conducted between December 15, 2022, and February 1, 2023. Before removal of the sump, 125 gal. of liquid waste was pumped from the sump and containerized as nonregulated industrial waste. The concrete and steel septic sump and plywood bin liner were removed and containerized as 12 yd³ of low-level waste. The inlet drainline was not located in place, but the outlet drainline was plugged. A total of 34 samples were collected from 14 locations. Samples were collected from 0–1, 3–4, and 5–6 ft below the sump and drainlines. Samples were collected from locations downgradient of the seepage pits from 0–1, 2–3, and 4–5 ft bgs or from the top 1 ft of unweathered tuff.

One RFI location was resampled from 0–1, 4–5, and 8–9 ft bgs. Eight samples were cancelled because of tuff being encountered at a shallow depth or concrete refusal after multiple step-outs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 6.5-1 shows locations sampled at SWMU 22-015(b) in FY 2023.

7.0 SUMMARY OF FIELDWORK COMPLETED IN TA-40 DURING FISCAL YEAR 2023

The following sections summarize the status of fieldwork initiated at two SWMUs and one AOC in FY 2023.

7.1 SWMU 40-001(b) – Septic System

7.1.1 Site Description and Operational History

SWMU 40-001(b) is an inactive septic system located southeast of building 40-1. The septic system consists of a 1215-gal. reinforced concrete septic tank (structure 40-24), an inactive drain field, two inactive seepage pits, associated piping, and an inactive distribution box. The septic tank was installed in 1949 and originally served former building 40-19 but currently serves buildings 40-1 and 40-23 (LANL 1993, 026068). The effluent from this tank was originally discharged to a drain field. In 1973, because of the inadequate percolation in the drain field, the septic tank overflow was diverted to two gravel-filled seepage pits (LASL 1973, 004636). It is not known if there was an outfall associated with this system. Because percolation in the seepage pits was also inadequate, the outlet drainline was plugged in 2004. The depth of the seepage pits is not known. The septic tank is no longer in service.

Building 40-1 originally housed an explosives laboratory, offices, and a darkroom. In the early 1980s, the explosives laboratory was removed and the building was converted entirely to office space (LANL 1993, 026068). Building 40-23, originally used for cable fabrication, an electronics laboratory, and a warehouse, was converted to offices, a laser laboratory, carpenter shop, and staff shop in the early 1980s (Creamer 1993, 015063). Former building 40-19, originally a three-room guard shack, was converted to a storage building in 1977 and was decommissioned and removed in 2006.

7.1.2 Previous Investigations

During the 1994 Phase I RFI, samples of the septic tank contents were collected from three depths in the tank, nine tuff samples were collected from three depths at three locations around the drain field and seepage pits, and six tuff samples were collected from two depths in the outfall area. Samples were submitted for analysis of metals, cyanide, VOCs, SVOCs, and HE. Results showed metals detected above BVs and detected organic chemicals and HE. Data from the 1994 RFI are screening level.

7.1.3 Investigation Objectives

The primary objective of the investigation at SWMU 40-001(b) is to implement the approved IWP, remove the distribution box and seepage pit infrastructure, remove or plug drainlines, and collect 61 samples from 27 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 40-001(b) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 120 samples from 40 locations were planned to be collected at SWMU 40-001(b). Samples will be collected from 0–1, 3–4, and 5–6 ft below the septic tank, distribution

box, and drainlines. Samples will be collected from locations downgradient of the drain field from 0–1, 2–3, and 4–5 ft bgs or from the top 1 ft of unweathered tuff. Two boreholes will be advanced in the seepage pit and downgradient, and samples will be collected at 10 ft intervals to a depth of 30 ft below the level of the seepage pit.

7.1.4 Fieldwork Completed

Investigation activities were initiated on October 25, 2022. A geophysical survey was conducted using GPR and FDEMI methods to locate the seepage pit infrastructure. Sampling was initiated on May 3, 2023, including collection of 111 investigation samples from 34 locations. Samples will be analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, and pH. Of the samples collected, 20% will be analyzed for PCBs. Remaining fieldwork includes collection of 9 samples from 5 locations and removal of the distribution box and seepage pit infrastructure. Figure 7.1-1 shows locations sampled at SWMU 40-001(b) in FY 2023.

7.2 SWMU 40-005 – Sump

7.2.1 Site Description and Operational History

SWMU 40-005 is an inactive HE sump (structure 22-75) located at the northwest corner of building 40-41 (formerly building 22-41), associated inlet and outlet drainlines, and a former NPDES-permitted outfall (EPA 05A-154) at TA-40. Before it was incorporated into TA-40, building 40-41 and the sump were part of TA-22. The concrete sump was constructed in 1961 and measures 4 ft 6 in. wide × 6 ft 4 in. long × 5 ft deep with an inset aluminum baffle tank (LANL 1990, 007512). Building 40-41 was constructed in 1952. Explosive grinding operations were previously conducted in the building and wastewater from a single sink drain discharged to the sump (Santa Fe Engineering Ltd. 1993, 031756). The sump discharged to a drainline to that flowed to Tributary B of Twomile Canyon. In 1994, the sump outlet port was capped, and in December 1995 the outfall was removed from the LANL NPDES permit (LANL 1997, 056664). The sump was subsequently filled with concrete.

7.2.2 Previous Investigations

During the 1994 Phase I RFI, 14 samples were collected from 2 to 3 depths at 4 locations at the corners of the sump and at one location beneath the sump outlet. Three surface samples were collected within the outfall area (LANL 1997, 056664). In addition, 6 surface samples were collected in a small marsh area about 0.25 mi upstream and upcanyon in an area north of building 22-34. Samples collected during the 1994 RFI were submitted for analysis of TAL metals only. Results showed metals detected above BVs.

In 1996, each of the 1994 RFI sample locations was resampled immediately next to the original sample location. Fifteen samples were collected in the sump area from five borehole locations around the sump. Three samples were collected from each borehole at depth intervals representing the surface (0.0–0.5 ft bgs), level with the bottom of the sump (4.5–5.5 ft bgs), and 3 ft below the sump (7.5–8.5 ft bgs). Four surface samples (0.0–0.5 ft bgs) were collected in the outfall area from one location at the outfall and three locations downgradient of the outfall. The sample locations were field-screened for radioactivity, VOCs, and HE before samples were collected and submitted for analysis of VOCs and HE; the results were nondetections or at background levels. Data from the 1996 sampling event are decision level and results showed two detected organic chemicals (acetone and methylene chloride).

7.2.3 Investigation Objectives

The primary objective of the investigation at SWMU 40-005 is to implement the approved IWP, verify and plug drainlines, and collect 35 samples from 14 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 40-005, and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 36 samples from 16 locations were collected at SWMU 40-005.

7.2.4 Fieldwork Completed

Sampling was conducted between April 19 and April 25, 2023. A total of 36 samples were collected from 16 locations. Samples were collected from 0–1, 4–5, and 8–9 ft below the drainlines. Samples were collected from 4 RFI locations from 0–1, 4–5, and 8–9 ft bgs. Samples in and downgradient of the outfall were collected from 0–1 and 2–3 ft bgs or from the top 1 ft of unweathered tuff. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, and pH. Of the total samples 20% were analyzed for PCBs. Drainlines were verified and plugged with concrete. Figure 7.2-1 shows locations sampled at SWMU 40-005 in FY 2023.

7.3 AOC 40-007(e) – Storage Area

7.3.1 Site Description and Operational History

AOC 40-007(e) is an SAA located in building 40-41 at the TA-40 firing sites. Building 40-41 is used for the preparation of explosives tests conducted at the TA-40 firing sites. Wastes accumulated in the SAA were associated with the HE detonator assembly and typically consist of rags contaminated with explosives; such wastes were generated at a rate of 1 to 2 gal./month (LANL 1990, 007513). No historical releases are documented for this site.

7.3.2 Previous Investigations

No previous investigations have been conducted at AOC 40-007(e).

7.3.3 Investigation Objectives

The primary objective of the investigation at AOC 40-007(e) is to implement the approved IWP and collect 8 samples from 4 locations (LANL 2010, 109520; NMED 2010, 109652). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC 40-007(e) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 14 samples from 4 locations were collected at AOC 40-007(e).

7.3.4 Fieldwork Completed

Sampling was conducted from April 19 to April 25, 2023. A total of 14 samples were collected from 4 locations. All samples were collected from 0–1, 2–3, and 4–5 ft bgs. Samples were analyzed for TAL metals, total cyanide, nitrate, perchlorate, VOCs (except in surface samples), SVOCs, explosive compounds, and pH. Of the total samples, 20% were analyzed for PCBs. Figure 7.2-1 shows locations sampled at AOC 40-007(e) in FY 2023.

8.0 SUMMARY OF FIELDWORK COMPLETED IN TA-69 DURING FISCAL YEAR 2023

The following sections summarize the status of fieldwork initiated at one SWMU in FY 2023.

8.1 SWMU 69-001 – Twomile Incinerator Facility

8.1.1 Site Description and Operational History

SWMU 69-001 is the site of the former Twomile Incinerator Facility, former building 69-3, used from 1960 to the late 1970s to destroy classified documents at TA-69 (LANL 1993, 020949). The building was 20 ft wide × 28 ft long × 15 ft tall. Two incinerators and a shredder were located within former building 69-3. Cleanout water from the incinerators drained through a pipe to a pond located on the northeast side of former building 69-3 in a shallow swale that drained into Twomile Canyon. Ash from the incinerators was manually removed and placed in the pond, which was bisected by a dirt road (LANL 1993, 020949) (LANL 1993, 020949). The portion of the pond on the south side of the road was located directly below the incinerator outflow pipe and measured approximately 15 ft × 15 ft. The portion of the pond on the north side of the road measured approximately 30 ft × 60 ft and was flanked by a 3-ft earthen berm on the east and north sides (ICF Kaiser Engineers 1995, 056712). Demolition of building 69-3 was completed in July and August 2004 (LANL 1996, 108214). The incinerator, incinerator building, drainage pond, and associated infrastructure have been removed, with the exception of the concrete foundation of former building 69-3.

8.1.2 Previous Investigations

During the 1994 Phase I RFI, four surface samples (0.0–0.5 ft bgs) were collected from one location next to former building 69-3 and three locations in the pond area (LANL 1996, 054334). One sample was submitted for analysis of VOCs and SVOCs; all four samples were submitted for analysis of metals. Results of the 1994 RFI showed metals detected above BVs.

During the 1995 VCA conducted at SWMU 69-001, 265 yd³ of ash and soil was removed from the incinerator pond, pond berm, and surrounding area (LANL 1996, 054334). Field screening of the site and potentially contaminated materials showed no detected HEs or VOCs, and radioactivity was at background levels. Following the removal, nine surface confirmation samples (0.0–0.5 ft bgs) were collected from the pond area and submitted for analysis of TAL metals. Results of the 1995 VCA also indicated metals detected above BVs.

8.1.3 Investigation Objectives

The objective of the investigation at SWMU 69-001 is to implement the approved IWP (LANL 2010, 109520; NMED 2010, 109652). A total of 42 samples from 23 locations were collected at SWMU 69-001. A total of 4 concrete chip samples were collected from the foundation of former building 69-3. Samples were collected around the building footprint from 0–1, 2–3, and 4–5 ft bgs or from the top 1 ft of unweathered tuff. Samples were also collected from sediment pockets on the canyon slope from 0–1 and 2–3 ft bgs or from the top 1 ft of unweathered tuff.

8.1.4 Fieldwork Completed

Sampling was conducted from April 11 to April 24, 2023. A total of 42 samples were collected from 23 locations. Two samples were cancelled because of tuff being encountered at a shallow depth. Samples were collected to a maximum depth of 5 ft bgs and were analyzed for TAL metals, total cyanide,

nitrate, perchlorate, VOCs (except in surface samples), SVOCs, dioxins/furans, PCBs, and pH. Figure 8.1-1 shows locations sampled at SWMU 69-001 in FY 2023.

9.0 FY 2023 MILESTONE

FY 2023 Milestone 10 of the 2016 Consent Order, Appendix B, the requirement of a progress report summarizing the fieldwork implementation and status of site investigations in the Twomile Canyon Aggregate Area, has been met by completion and submittal of this progress report. Sections 3.0 through 8.0 describe the fieldwork completed.

10.0 PLANNED WORK IN FY 2024

Fieldwork at Twomile Canyon Aggregate Area will continue in FY 2024 to complete the sampling planned in accordance with the approved IWP (LANL 2010, 109520; NMED 2010, 109652) as well as additional samples needed to define nature and extent of contamination and evaluate risk. Further sampling and/or required corrective actions to address unacceptable levels of contamination may be required following an evaluation of analytical data and preliminary risk assessments.

11.0 REFERENCES

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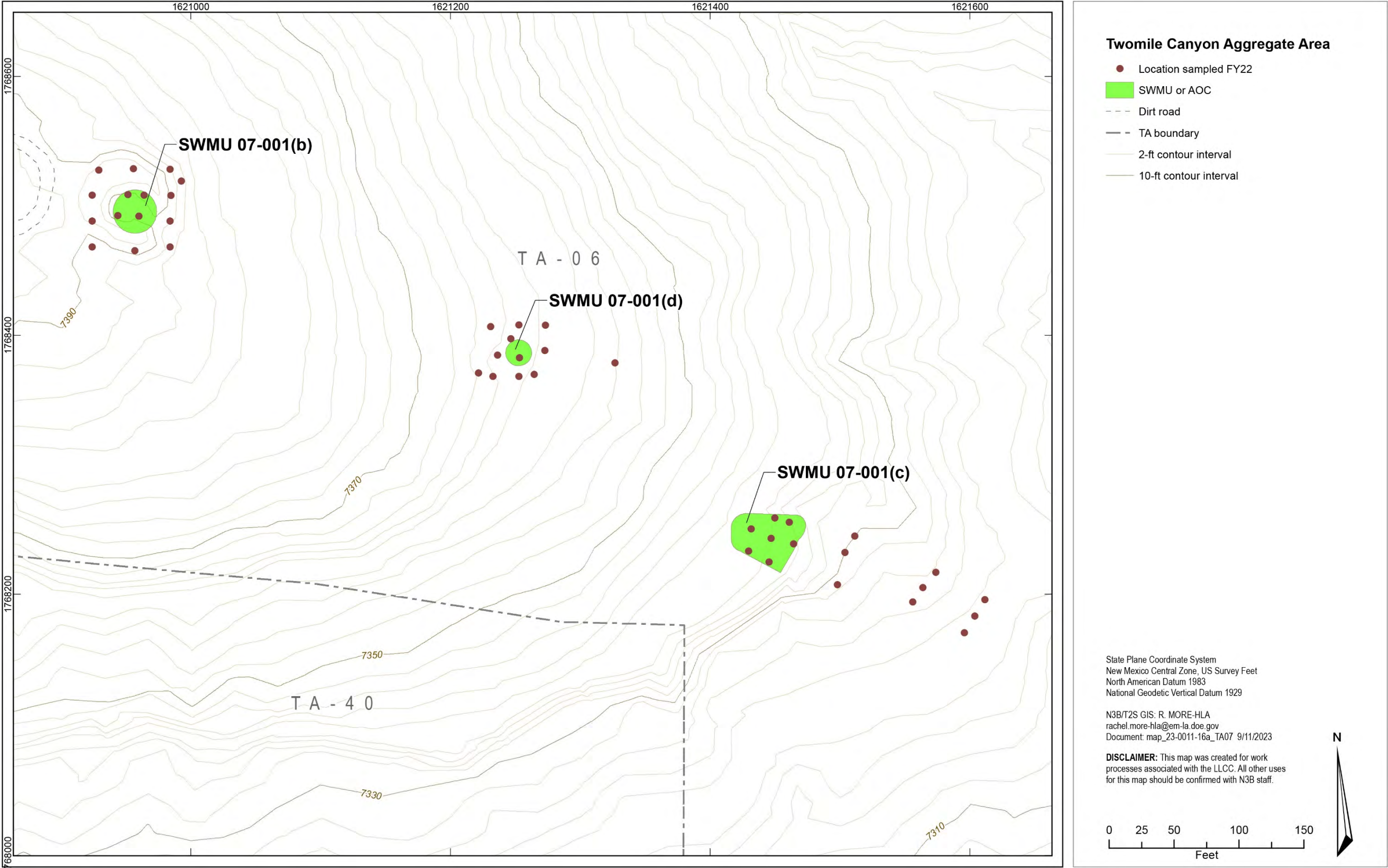


Figure 2.2-1 Locations sampled at SWMUs 07-001(b), 07-001(c), and 07-001(d) in FY 2022

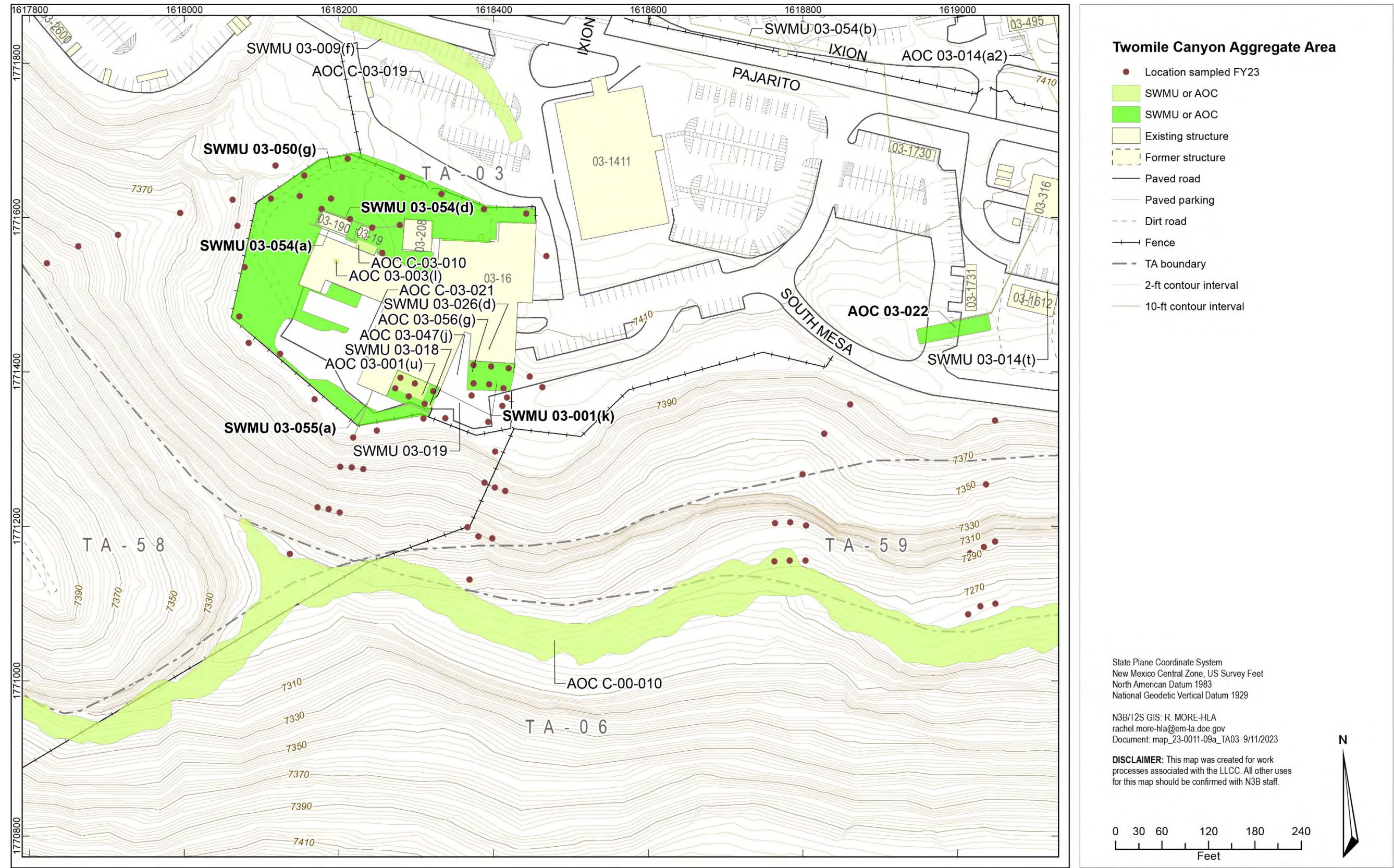
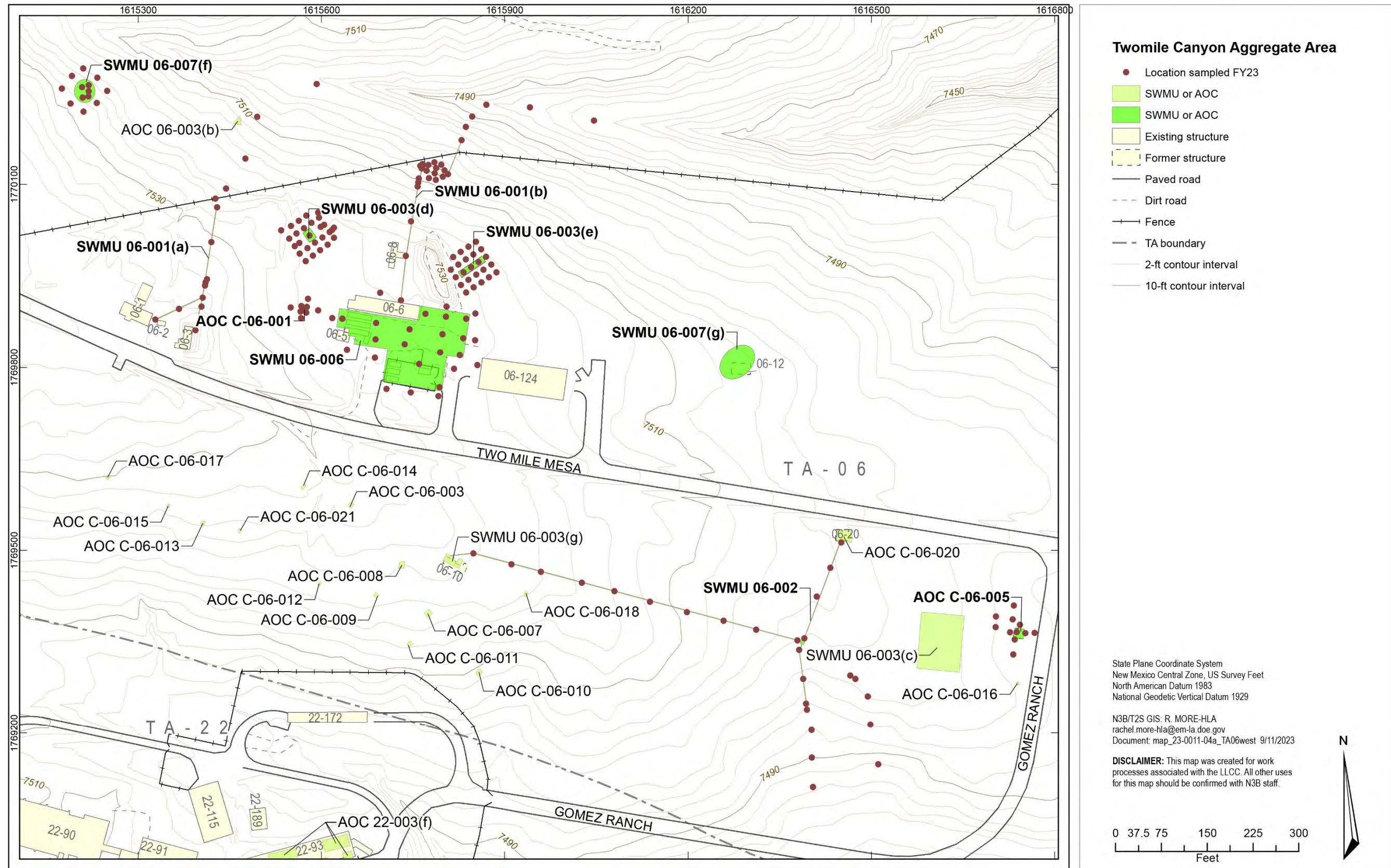


Figure 3.1-1 Locations sampled in TA-03 during FY 2023



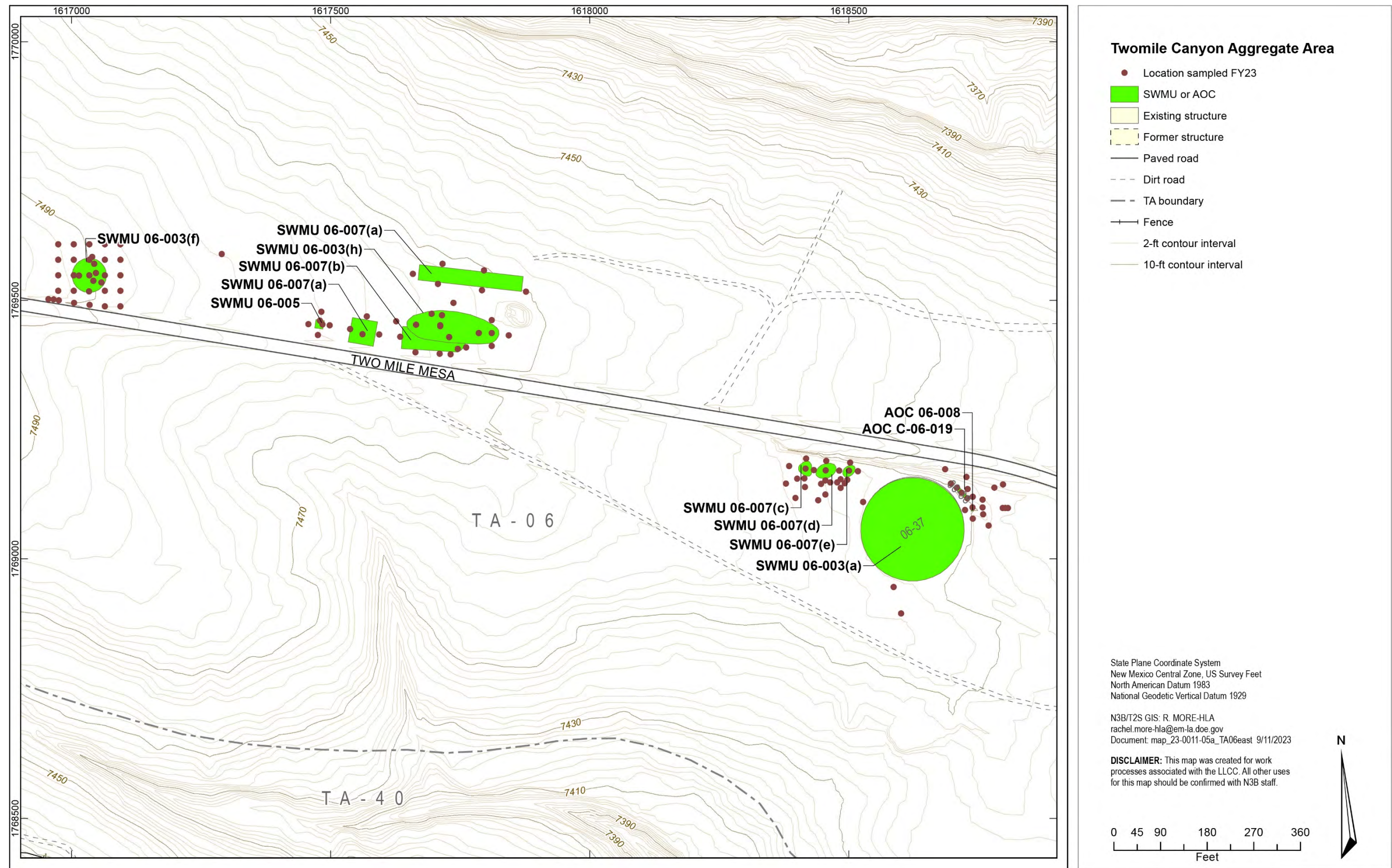


Figure 4.4-1 Locations sampled in TA-06 east during FY 2023



Figure 5.1-1 Locations sampled at SWMU 07-001(a) in FY 2023

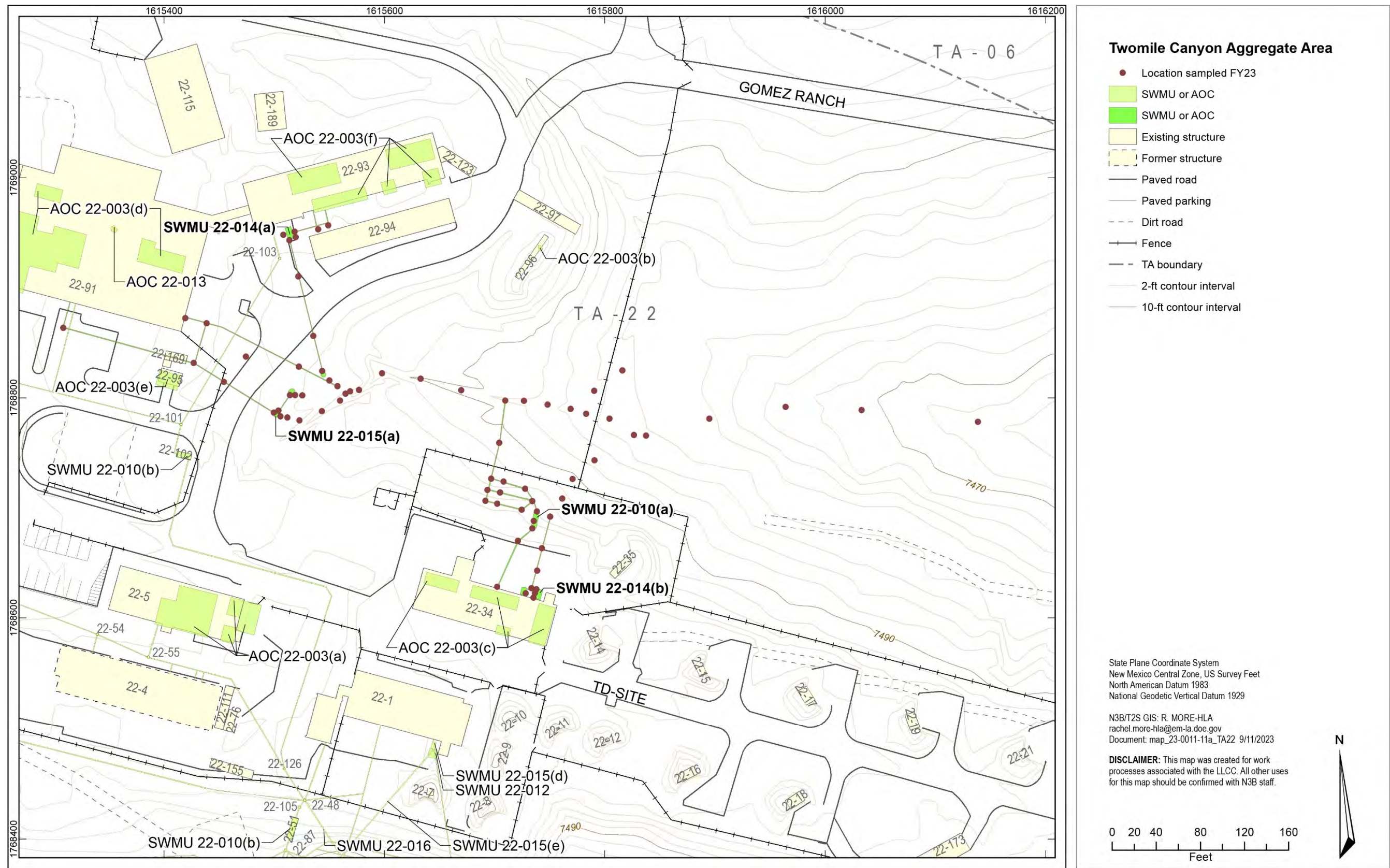


Figure 6.1-1 Locations sampled in TA-22 during FY 2023

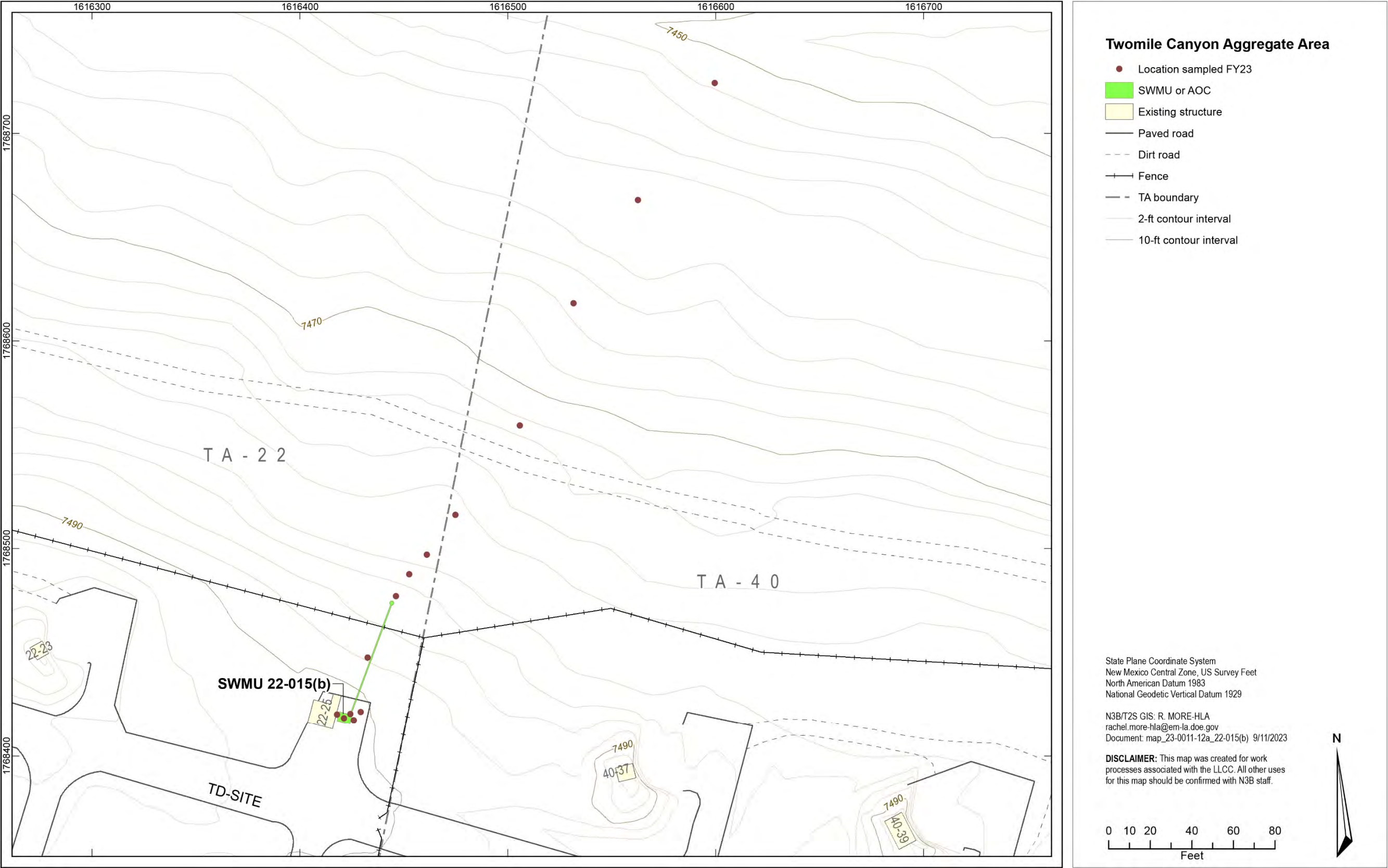


Figure 6.5-1 Locations sampled at SWMU 22-015(b) in FY 2023

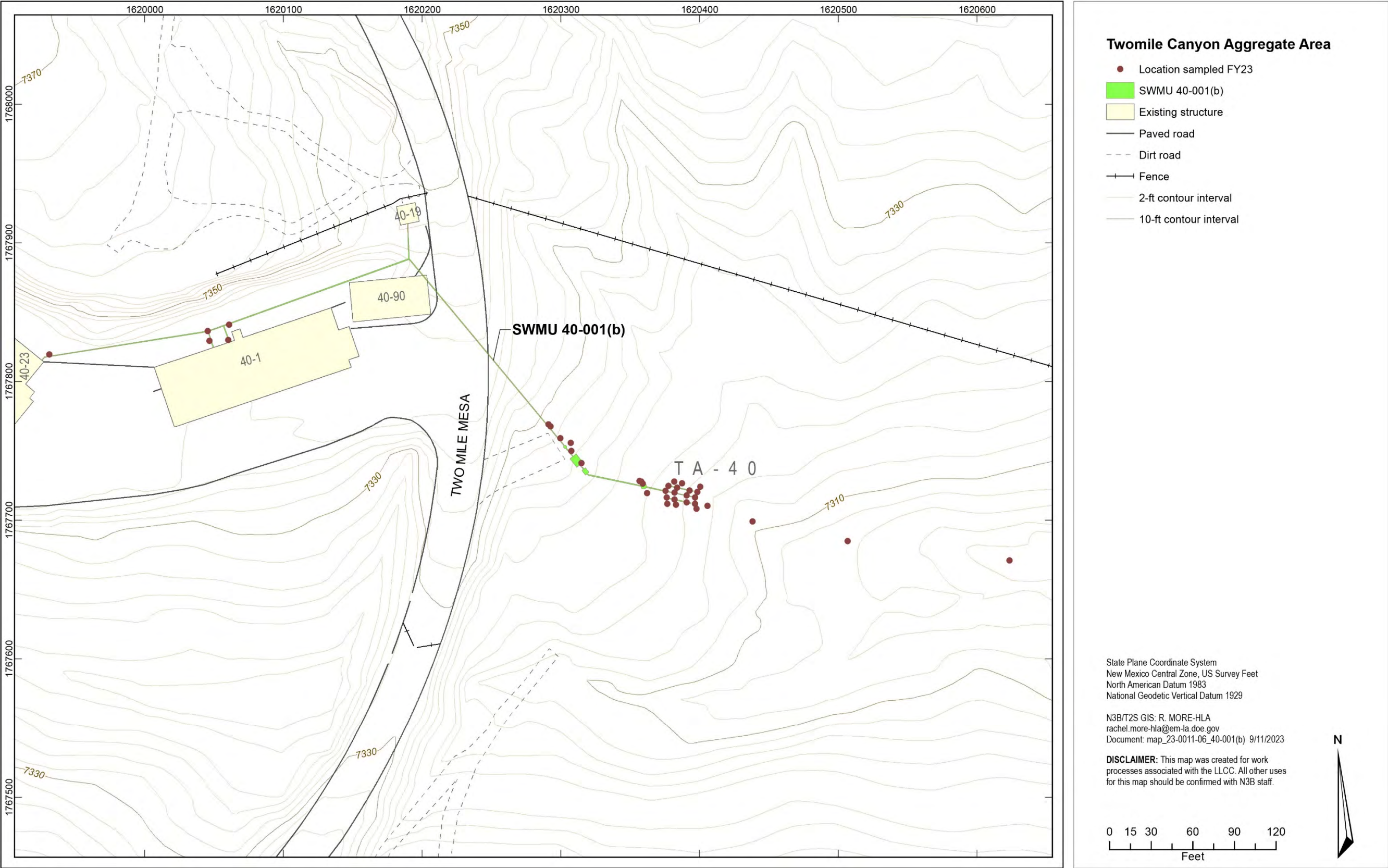


Figure 7.1-1 Locations sampled at SWMU 40-001(b) in FY 2023

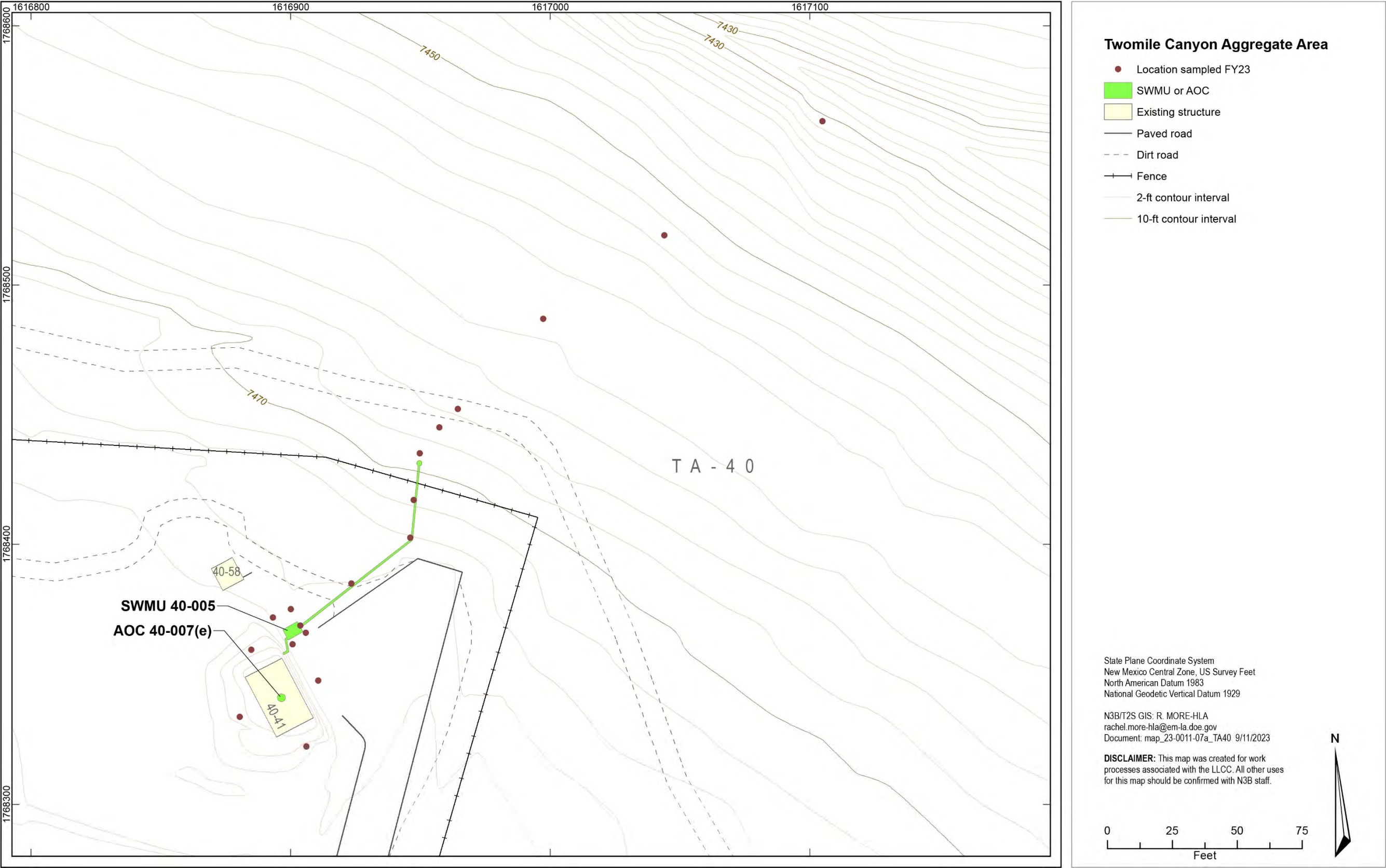


Figure 7.2-1 Locations sampled at SWMU 40-005 and AOC 40-007(e) in FY 2023

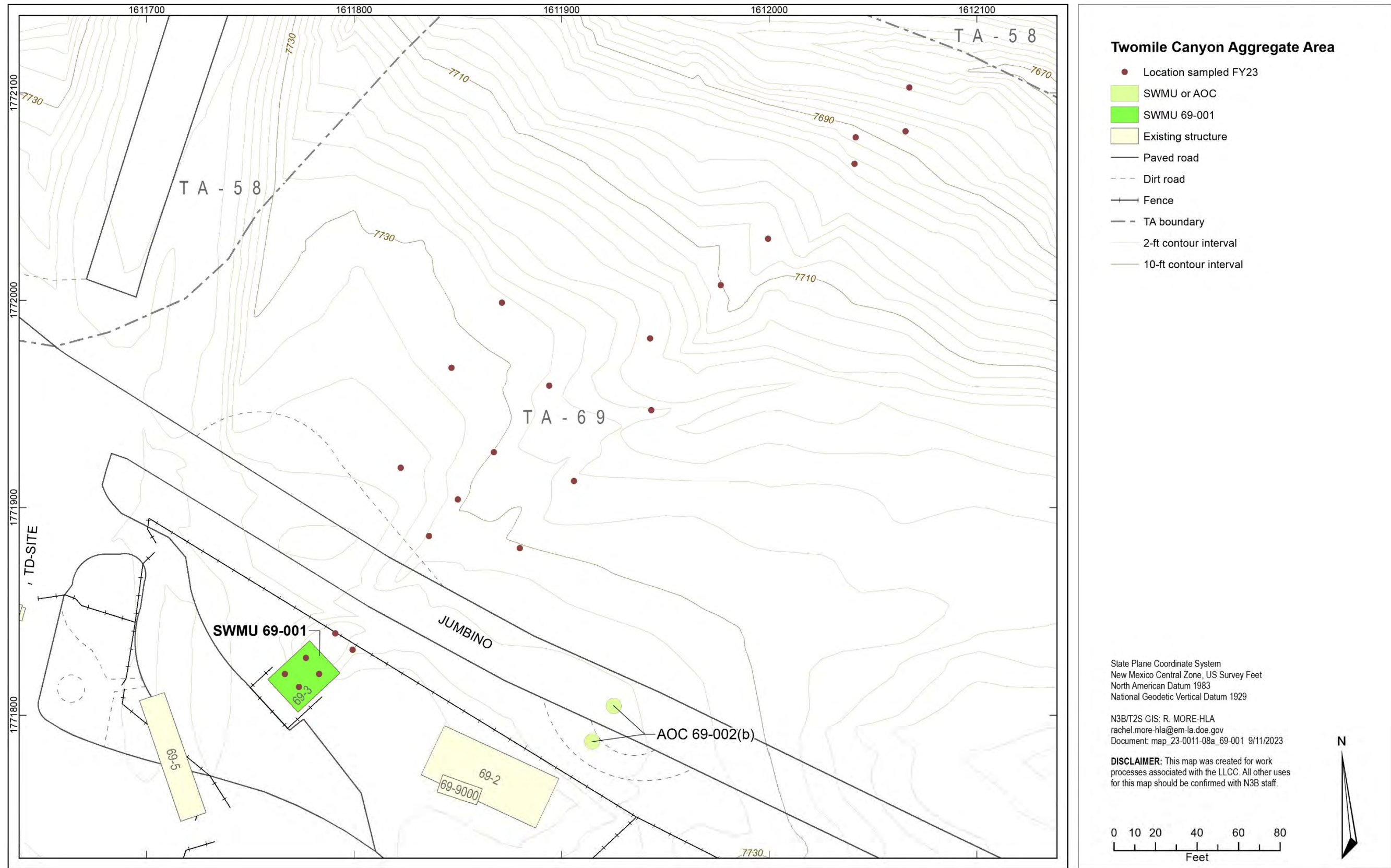


Figure 8.1-1 Locations sampled at SWMU 69-001 in FY 2023

Table 2.1-1
Summary of Fieldwork Completed at Twomile Canyon Aggregate Area

Technical Area	Sum of Planned Samples	Sum of Retrieved Samples	Sum of Samples Unable to Complete	Sum of Remaining Samples	Percent Complete	Sum of Iteration Samples
TA-03	803	203	3	597	26	0
TA-06	909	927	28	0	105	43
TA-07	186	186	0	0	100	18
TA-22	279	261	18	0	100	20
TA-40	177	161	7	9	95	0
TA-50	24	0	0	24	0	0
TA-59	34	0	0	34	0	0
TA-69	44	42	2	0	100	0
Total	2456	1780	58	618	75	81

