

DEPARTMENT OF ENERGY

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EMLA-23-BF299-2-1

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September 25, 2023

Subject: Submittal of Starmer/Upper Pajarito Canyon Aggregate Area Progress Report

Dear Mr. Shean:

Enclosed please find two hard copies with electronic files of the "Starmer/Upper Pajarito Canyon Aggregate Area Progress Report." This report fulfills the fiscal year 2023 Milestone 12 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@emla.doe.gov) or Cheryl Rodriguez at (505) 414-0450 (cheryl.rodriguez@em.doe.gov).

Sincerely,

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Enclosure(s):

 Two hard copies with electronic files: Starmer/Upper Pajarito Canyon Aggregate Area Progress Report (EM2023-0582)

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September 2023 EM2023-0582

Starmer/Upper Pajarito 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.

Starmer/Upper Pajarito Canyon Aggregate Area Progress Report

September 2023

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1.0 PURPOSE OF REPORT

This progress report fulfills fiscal year (FY) 2023 Milestone #12 of the 2016 Compliance Order on Consent (Consent Order), Appendix B, under the Pajarito Watershed campaign. The Starmer/ Upper Pajarito Canyon Aggregate Area is one of four aggregate areas in the Pajarito Watershed campaign. Milestone #12 is a progress report summarizing the fieldwork implementation and status of site investigations conducted in accordance with the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" (LANL 2011, 111794; NMED 2011, 201465).

The Starmer/Upper Pajarito Canyon Aggregate Area is located in Technical Areas (TAs) 08 and 09, and portions of TA-22 and TA-40 at Los Alamos National Laboratory (LANL or the Laboratory) and consists of 139 solid waste management units (SWMUs) and areas of concern (AOCs) (Plate 1). Of these 139 sites, 62 have been previously investigated and/or remediated and proposed for no further action. The remaining 77 sites were addressed in the approved work plan (LANL 2011, 111794; NMED 2011, 201465). Of these 77 sites, the approved work plan proposed to delay investigation at 7 sites and investigation at 3 sites is deferred. The remaining 67 SWMUs and AOCs under investigation are listed below.

- AOC 08-001(a) Off-Gas System
- AOC 08-001(b) Off-Gas System
- SWMU 08-002 Firing Site
- SWMU 08-003(a) Former Septic Tank
- SWMU 08-004(b) Drainline
- SWMU 08-004(c) Floor Drain and Sumps
- SWMU 08-004(d) Drains
- SWMU 08-005 Former Storage Vessel
- SWMU 08-006(a) Material Disposal Area (MDA) Q
- SWMU 08-009(a) Drainline and Outfall
- AOC 08-009(c) Storm Drain and Outfall from Building 08-23
- SWMU 08-009(d) Drains
- SWMU 08-009(e) Outfall from Building 08-21
- AOC 08-009(f) Outfall Associated with Building 08-22
- SWMU 09-001(a) Soil Contamination from Firing Site and Former Firing Site Structure 09-4
- SWMU 09-001(b) Firing Site
- SWMU 09-001(c) Firing Site
- SWMU 09-001(d) Firing Site
- SWMU 09-002 Burn Pit
- SWMU 09-003(a) Soil Contamination Associated with Former Settling Tank
- SWMU 09-003(b) Soil Contamination Associated with Former Settling Tank

- SWMU 09-003(d) Soil Contamination Associated with Former Settling Tank
- SWMU 09-003(e) Soil Contamination Associated with Former Basket Pit
- SWMU 09-003(g) Soil Contamination Associated with Former Sump and Pipes
- SWMU 09-003(h) Soil Contamination Associated with Former Sump and Pipes
- SWMU 09-003(i) Soil Contamination Associated with Former Sump and Pipes
- SWMU 09-004(a) Settling Tank
- SWMU 09-004(b) Settling Tank
- SWMU 09-004(c) Settling Tank
- SWMU 09-004(d) Settling Tank
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- SWMU 09-004(I) Settling Tank
- SWMU 09-004(m) Settling Tank
- SWMU 09-004(n) Settling Tank
- SWMU 09-004(o) Settling Tank
- SWMU 09-005(a) Soil Contamination from Former Septic Tank
- SWMU 09-005(d) Septic Tank
- SWMU 09-005(g) Settling Tank
- SWMU 09-006 Soil Contamination Associated with Former Septic Tank
- SWMU 09-008(b) Oxidation Pond
- SWMU 09-009 Surface Impoundment
- AOC 09-010(a) Storage Area
- AOC 09-010(b) Storage Area
- AOC 09-011(b) Storage Area
- AOC 09-011(c) Storage Area
- AOC 09-012 Disposal Pit
- SWMU 09-013 MDA M
- AOC 09-014 Soil Contamination Associated with Former Camera Mount
- SWMU C-09-001 Soil Contamination Associated with Outfall

- SWMU 22-010(b) Septic System
- SWMU 22-011 Disposal Pit (verify absence of waste only)
- SWMU 22-012 Decontamination Pad
- SWMU 22-015(c) Outfall from Building 22-52
- SWMU 22-015(d) Drainline and Outfall Associated with Building 22-1
- SWMU 22-015(e) Sump
- SWMU 22-016 Septic System
- SWMU 40-001(c) Septic System
- SWMU 40-003(a) Scrap Burn Site/Open Detonation
- AOC 40-003(b) Burning Area
- SWMU 40-004 Operational Release
- SWMU 40-009 Landfill
- SWMU 40-010 Surface Disposal Site

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 "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" (LANL 2011, 111794; NMED 2011, 201465). This progress report presents the status of fieldwork implementation and progress to date for the Starmer/Upper Pajarito Canyon Aggregate Area.

Characterization sampling was completed or initiated in FY 2023 at 27 SWMUs and AOCs in TA-08 and TA-09. The results from the investigation of the 27 SWMUs and AOCs will be presented in the Investigation Report for Starmer/Upper Pajarito Canyon Aggregate Area. One additional site in TA-09 was determined to be collocated with a utility layer and will not be sampled.

2.1 Fieldwork Completed in FY 2022

The FY 2022 "Starmer/Upper Pajarito Canyon Aggregate Area Progress Report" fulfilled the requirements for FY 2022 Milestone #17 (N3B 2022, 702345; NMED 2022, 702530). Sampling for SWMU 09-001(d) was completed in FY 2022 after the FY 2022 progress report was submitted. The investigation summary for SWMU 09-001(d) is presented in section 2.2. Table 2.1-1 summarizes all fieldwork completed for Starmer/Upper Pajarito Canyon Aggregate Area to date.

2.2 SWMU 09-001(d) - Firing Site

2.2.1 Site Description and Operational History

SWMU 09-001(d) consists of two former firing chambers that were located at former building 09-1, an x-ray laboratory used to study implosions of small charges. One firing chamber was located on the south exterior wall of the building. This firing chamber was approximately 25 ft² and constructed of steel-faced concrete. The firing chamber was roofed and contained three firing areas, two of which were open to the

south. The chamber tested positive for radioactive contamination (U^{238}) before its removal in 1965 (LANL 1993, 020949). The second firing chamber was located on the building's west exterior wall. The second firing chamber was approximately 10.5 ft wide × 11 ft long, constructed of steel plated timbers, and enclosed on all four sides and on top. Both firing chambers were removed when building 09-1 was removed in 1965.

Although associated with TA-09, SWMU 09-001(d) is within the physical boundaries of TA-08.

2.2.2 Previous Investigations

During the 1994 Resource Conservation and Recovery Act (RCRA) facility investigation (RFI), SWMU 09-001(d) was sampled as part of a set of sites referred to as the Anchor Ranch East Site set, which also included SWMUs 09-003(g), 09-003(h), and 09-003(i). This set of sites was grouped because of past activities (high explosives [HE] research, development, and testing) and demolition and decommissioning of their associated structures (buildings 09-1, 09-2, 09-3, and 09-13). Thirteen surface samples were collected from 13 locations in the area around former building 09-1. Samples were fieldscreened for radioactivity, organic vapors, and HE. Field-screening results showed no elevated radioactivity levels, and photoionization detector (PID) measurements were less than 1 ppm; HE was not detected in any of the samples. All samples were submitted to an off-site analytical laboratory for analysis of target analyte list (TAL) metals, nitrate, semivolatile organic compounds (SVOCs), and HE (LANL 1996, 054586).

2.2.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-001(d) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 26 samples from 13 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-001(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 87 samples from 29 locations are planned to be collected at SWMU 09-001(d). At each location, samples will be collected from 0–1 ft, 2–3 ft, and 4–5 ft below ground surface (bgs). The samples locations are shown in Figure 2.2-1.

2.2.4 Fieldwork Completed

Following the submittal of the FY 2022 progress report, 25 samples from 10 locations were collected. Fieldwork was completed on September 29, 2022. Samples were collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs. Three samples from 2 locations were unable to be collected due to auger refusal at approximately 2.5 and 4.5 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, SVOCs, volatile organic compounds (VOCs) (except in surface samples), dioxins/furans, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Twenty percent of samples were analyzed for polychlorinated biphenyls (PCBs). Figure 2.2-1 shows locations sampled at SWMU 09-001(d) in FY 2022.

3.0 SUMMARY OF FIELDWORK COMPLETED IN TA-08 FOR FY 2023

The following sections summarize the status of fieldwork initiated at SWMU 08-009(e) in FY 2023.

3.1 SWMU 08-009(e) – Outfall from Building 08-21

3.1.1 Site Description and Operational History

SWMU 08-009(e) is the outfall at TA-08 associated with the photo-developing processes that occurred in building 08-21 (a laboratory and office building). The outfall, which is located approximately 200 ft east of building 08-21, is a former National Pollutant Discharge Elimination System– (NPDES-) permitted outfall (06A075) that drained into Starmer Gulch, a tributary of Pajarito Canyon. Building 08-21 was built in 1950 as an administration and laboratory building. The south wing originally contained 13 darkrooms, a photo-processing and photo-development laboratory, and a metallography laboratory. Before 1991, the waste generated in the photo laboratory was sent through a silver recovery resin bed for the removal of silver. After the silver was removed, the waste water was discharged to the NPDES-permitted outfall.

At the metallography laboratory, plutonium parts coated with nickel were x-rayed and fuel elements that consisted of graphite impregnated with uranium-235 were polished. In 1982 or 1983, the metallography laboratory was decontaminated and the floor was removed and replaced. In about 1998, the south wing was converted to office space, and only the photo laboratory and darkrooms remain in place. The outfall was removed from the Laboratory's NPDES permit effective January 14, 1998, and currently receives stormwater only (EPA 1998, 109568). In 2003, Anchor Ranch Road was rerouted from TA-08 to TA-22. As part of this road reconstruction activity, the storm culvert beneath Anchor Ranch Road [and associated with the SWMU 08-009(e) outfall] was removed and the drainage was completely recontoured. A drop inlet located approximately 80 ft east of building 08-21 receives stormwater only from a grassy island, and was not associated with operations in the building.

3.1.2 Previous Investigations

During the 1994 RFI conducted at SWMU 08-009(e), four samples were collected from two locations east and downstream of the east end of the culvert that ran under Anchor Ranch Road. Samples were fieldscreened for radioactivity, organic vapors, and HE. Field-screening results showed no elevated radioactivity levels, and PID measurements were less than 1 ppm; HE was not detected. The samples were submitted for analysis of TAL metals and SVOCs. Data from the 1994 RFI are screening level and showed inorganic chemicals detected above background values (BVs); SVOCs were not detected.

3.1.3 Investigation Objectives

The primary objective of the investigation at SWMU 08-009(e) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 30 samples from 15 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 08-009(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 45 samples from 15 locations will be collected at SWMU 08-009(e). At 8 locations, samples will be collected from 0–1 ft, 2–3 ft, and 5–6 ft below the drainline. Seven locations around the outfall and downgradient of the outfall will be collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs.

3.1.4 Fieldwork Completed

Sampling was initiated on January 31, 2023. A total of 21 samples were collected from 7 locations. Three samples were collected from 1 location from 0–1 ft, 2–3 ft, and 5–6 ft below the drainlines. A total of 18 samples were collected from 6 locations from 0–1 ft, 2–3 ft, and 4–5 ft bgs in the outfall and downgradient of the outfall. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Twenty percent of all samples were analyzed for PCBs. Remaining fieldwork includes collecting 24 samples from 8 locations. Figure 3.1-1 shows locations sampled at SWMU 08-009(e) in FY 2023.

4.0 SUMMARY OF FIELDWORK COMPLETED IN TA-09 FOR FY 2023

The following sections summarizes fieldwork initiated at 28 SWMUs and AOCs in FY 2023.

4.1 SWMU 09-001(a) – Soil Contamination from Former Firing Site Structure 09-04

4.1.1 Site Description and Operational History

SWMU 09-001(a) is a former firing point (former structure 09-57) and a former site control chamber (former structure 09-4) located at the TA-09 Far Point firing site, approximately 260 ft north of existing buildings 09-36 and 09-40. Engineering records show structure 09-4 as an 8-ft-wide × 10-ft-long × 8-ft-high building constructed of 12-in.-thick reinforced concrete walls, with a door that was steel plated on the outside, and covered with earth on three sides (LASL 1943, 110445). A 2.5-ft-wide × 8-ft-long wood bench stretched along the entire length of one interior wall with electrical outlets for instrumentation placed along the same wall. Structure 09-4 was built in 1944, decommissioned in 1959, and removed in 1965 (LANL 1993, 020949). The structure 09-57 firing point consisted of a 7-ft-wide × 8-ft-long × 12-in.-thick concrete pad with an attached 8-ft-wide × 10-ft-high steel-plated barricade made of 12-in. × 12-in. timbers imbedded in concrete. Structure 09-57 was decommissioned in 1957 and destroyed by intentional burning in 1960. The concrete pad was removed in 1965. The other former control chamber (structure 09-5) [SWMU 09-001(b)] was located approximately 70 ft north of the SWMU 09-001(a) control chamber.

4.1.2 Previous Investigations

During the 1994 RFI, SWMUs 09-001(a) and 09-001(b) were investigated as a single site. Ten surface samples were collected from 10 locations within a grid adjacent to and between the former control chambers (structures 09-4 and 09-5) and the former firing site (structure 09-57). Samples were field-screened for radioactivity, organic vapors, and HE. Field-screening results showed no elevated radioactivity levels, and PID measurements were less than 1 ppm; HE was not detected in any of the samples. Samples were submitted for analysis of TAL metals, nitrate, SVOCs, and HE (LANL 1996, 054586). Data from the 1994 RFI are screening level and showed inorganic chemicals detected above BVs and detected nitrate; organic chemicals were not detected.

4.1.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-001(a) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 28 samples from 14 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient

number of samples are collected to define nature and extent of contamination at SWMU 09-001(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 60 samples from 20 locations were collected at SWMU 09-001(a).

4.1.4 Fieldwork Completed

Sampling was conducted between January 6 and January 10, 2023. A total of 60 samples were collected from 20 locations. At 14 locations within and around the concrete firing pad, samples were collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs. An additional 6 locations were sampled downgradient of the firing pad from 0–1 ft, 2–3 ft, and 4–5 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, dioxins/furans, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Twenty percent of all samples were analyzed for PCBs. Figure 4.1-1 shows locations sampled at SWMU 09-001(a) in FY 2023.

4.2 SWMU 09-001(b) – Firing Site

4.2.1 Site Description and Operational History

SWMU 09-001(b) is a former firing site control chamber (former structure 09-5) that was located at the TA-09 Far Point firing site, approximately 300 ft north of existing buildings 09-36 and 09-40. Engineering records shows structure 09-5 as a 12-ft-long × 10-ft-wide × 8-ft-high building constructed of 14-in.-thick reinforced concrete walls, with a door that was steel plated on the outside, and covered with earth on three sides (LASL 1943, 110540). A 2.5-ft-wide × 8-ft.-long wood bench stretched along the length of one interior wall. Structure 09-5 was built in 1947, decommissioned in 1959, and removed in 1965 (LANL 1993, 020949). The other former control chamber (structure 09-4) was located approximately 70 ft south and former firing site (structure 09-57) was located approximately 60 ft west [SWMU 09-001(a)] of the SWMU 09-001(b) control chamber.

4.2.2 Previous Investigations

During the 1994 RFI, SWMUs 09-001(a) and 09-001(b) were investigated as a single site. Ten surface samples were collected from 10 locations within a grid adjacent to and between the former control chambers (structures 09-4 and 09-5) and the former firing site (structure 09-57). Samples were field-screened for radioactivity, organic vapors, and HE. Field-screening results showed no elevated radioactivity levels, and PID measurements were less than 1 ppm; HE was not detected in any of the samples. Samples were submitted for analysis of TAL metals, nitrate, SVOCs, and HE (LANL 1996, 054586). Data from the 1994 RFI are screening level and showed inorganic chemicals detected above BVs, and detected nitrate; organic chemicals were not detected.

4.2.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-001(b) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect six samples from three locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-001(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 nine samples from three locations were collected at SWMU 09-001(b). Samples were planned to be collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs.

4.2.4 Fieldwork Completed

Sampling was conducted on January 6, 2023. A total of six samples were collected from three locations, from 0–1 ft, 2–3 ft, and 4–5 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, PCBs, dioxins/furans, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Figure 4.1-1 shows locations sampled at SWMU 09-001(b) in FY 2023.

4.3 SWMU 09-001(c) – Firing Site

4.3.1 Site Description and Operational History

SWMU 09-001(c) is a former recovery pit (former structure 09-15) that was located at the northernmost end of the TA-09 Far Point firing site. The recovery pit was 12 $\text{ft}^2 \times 8$ ft deep, with timbered sides lined with a 0.75-in.-thick steel plate, and a metal cover. The pit was designed to recover metal from misfired shots. The pit was installed in 1943, modified in 1951, decommissioned in 1959, flash burned to remove HE residue in 1960, and removed in 1965 (LANL 1993, 020949).

4.3.2 **Previous Investigations**

During the 1995 RFI conducted at SWMU 09-001(c), three samples were collected from three locations within and adjacent to the former pit and submitted for analysis of TAL metals, nitrate, and HE. Data from the 1995 RFI are decision-level.

4.3.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-001(c) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 10 samples from 5 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-001(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 18 samples from 9 locations were collected at SWMU 09-001(c).

4.3.4 Fieldwork Completed

Sampling was conducted between December 20, 2022, and January 5, 2023. A total of 18 samples were collected from 9 locations. Samples were collected from 5 locations within and around the perimeter of the former firing structure. An additional 4 locations were sampled at 10-ft step-out locations. All samples were collected from 8–9 ft and 14–15 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, dioxins/furans, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Figure 4.1-1 shows locations sampled at SWMU 09-001(c) in FY 2023.

4.4 SWMU 09-002 – Burn Pit

4.4.1 Site Description and Operational History

SWMU 09-002 is a decommissioned burn pit located at TA-09 approximately 230 ft southeast of the SWMU 09-001(c) recovery pit. The burn pit consists of an open surface depression, measuring approximately 10 ft wide × 13 ft long × 3 ft deep (LANL 1998, 059686). The sides of the pit are lined with

rocks blackened from past burning operations. The burn pit was used from 1945 until 1956 to dispose of film, photographs, and papers associated with studies of the experimental detonations conducted at the former Far Point firing sites.

4.4.2 Previous Investigations

An RFI was conducted at SWMU 09-002 in May 1994. Two surface (0–0.5 ft bgs) soil samples were collected from two locations in the bottom of the burn pit. No ash or burned debris was observed in the soil sampling locations. Samples were field-screened for organic vapors and HE. PID measurements were less than 1 ppm; HE was not detected in the samples. All samples were submitted to an off-site analytical laboratory for analyses of inorganic chemicals (metals) (LANL 1998, 059686).

The results of the analyses of the samples collected during the 1994 RFI (LANL 1998, 059686) did not show detection of inorganic chemicals.

4.4.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-002 is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 21 samples from 9 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-002 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 39 samples from 13 locations were collected at SWMU 09-002.

4.4.4 Fieldwork Completed

Sampling was conducted between November 17 and December 16, 2022. A total of 39 samples were collected from 13 locations. Samples were collected from 5 locations within and surrounding the former burn pit from 0–1 ft, 3–4 ft, and 5–6 ft bgs. An additional 4 locations were positioned 10 ft from the burn pit and were sampled from 0–1 ft, 3–4 ft, and 5–6 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, dioxins/furans, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Twenty percent of samples were analyzed for PCBs. Figure 4.1-1 shows locations sampled at SWMU 09-002 in FY 2023.

4.5 SWMU 09-003(a) – Soil Contamination Associated with Former Settling Tank

4.5.1 Site Description and Operational History

SWMU 09-003(a) consists of a former sump (structure 09-83) that was located approximately 12 ft north of former building 09-14 at TA-09. The sump was constructed of reinforced concrete, measured approximately 4 ft wide × 4 ft long × 4 ft deep, and was installed in 1943. The sump served as an acid waste settling tank for building 09-14, a former HE processing and development laboratory (LANL 1993, 014995). Building 09-14 was a large-scale laboratory that used beryllium and uranium-238 in addition to large quantities of HE (LANL 1993, 020949). At the time of removal, contaminant encrustation was present on the interior of the sump.

4.5.2 Previous Investigations

During the 1995 RFI conducted at SWMU 09-003(a), six samples were collected from six locations within and adjacent to the former sump location. Samples were submitted for analysis of TAL metals, total cyanide, HE, VOCs, and tritium. Data from the 1995 RFI are decision-level.

4.5.3 Investigation Objectives

The objective of the investigation at SWMU 09-003(a) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 10 samples from 5 locations (LANL 2011, 111794; NMED 2011, 201465).

4.5.4 Fieldwork Completed

Sampling was conducted between October 7 and November 29, 2022. A total of 10 samples were collected from 5 locations. Samples were collected from beneath the former sump and around the perimeter of the sump from 4–5 ft and 9–10 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, and pH. Figure 3.1-1 shows locations sampled at SWMU 09-003(a) in FY 2023.

4.6 SWMU 09-003(b) – Soil Contamination Associated with Former Settling Tank

4.6.1 Site Description and Operational History

SWMU 09-003(b) is a former sump (structure 09-84) that was located at TA-09, north of former building 09-14. The sump, made of reinforced concrete and measuring approximately 4 ft wide × 5 ft long × 3 ft deep, was installed in 1943 and functioned as an acid waste settling tank (LANL 1993, 014995). There is a discrepancy in archival documentation as to whether this sump served building 09-12 (a personnel shelter) or 09-14 (a former HE processing and development laboratory). However, since the sump was in very close proximity to former building 09-14, it likely served that building. The sump was decommissioned in 1962 and removed in 1965. At the time of removal, contaminant encrustation was present in the sump's interior (LANL 1993, 020949).

4.6.2 **Previous Investigations**

During the 1995 RFI conducted at SWMU 09-003(b), six samples were collected from six locations within and adjacent to the former sump location. Samples were submitted for analysis of TAL metals, total cyanide, HE, and VOCs. Data from the 1995 RFI are decision-level.

4.6.3 Investigation Objectives

The objective of the investigation at SWMU 09-003(b) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 10 samples from 5 locations (LANL 2011, 111794; NMED 2011, 201465).

4.6.4 Fieldwork Completed

Sampling was conducted between October 7 and October 12, 2022. A total of 10 samples were collected from 5 locations. Samples were collected from beneath the former sump and around the perimeter of the sump from 4–5 ft and 9–10 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total

cyanide, explosive compounds, VOCs, SVOCs, PCBs, and pH. Figure 3.1-1 shows locations sampled at SWMU 09-003(b) in FY 2023.

4.7 SWMU 09-003(d) – Soil Contamination Associated with Former Settling Tank

4.7.1 Site Description and Operational History

SWMU 09-003(d) is a former sump (structure 09-88) that was located approximately 10 ft east of former building 09-1. The sump, constructed of reinforced concrete and measuring approximately 4 ft wide × 7 ft long × 7 ft deep, was installed in 1943. Archival documentation does not state which building this sump served. However, since the sump was in very close proximity to former building 09-1, it likely served that building (an x-ray laboratory used to study implosions of small charges). The sump was decommissioned in 1959 and removed in 1965.

Although associated with TA-09, SWMU 09-003(d) is located within the physical boundary of TA-08.

4.7.2 Previous Investigations

During the 1995 RFI conducted at SWMU 09-003(d), five samples were collected from five locations around the former sump location. Samples were submitted for analysis of TAL metals, total cyanide, nitrate, HE, and VOCs. Data from the 1995 RFI are decision-level.

4.7.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-003(d) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 10 samples from 5 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-003(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 12 samples from 6 locations were collected at SWMU 09-003(d).

4.7.4 Fieldwork Completed

Sampling was conducted between October 26 and November 2, 2022. A total of 12 samples were collected from 6 locations. Samples were collected from beneath the former sump and around the perimeter of the sump from 4–5 ft and 9–10 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Figure 3.1-1 shows locations sampled at SWMU 09-003(d) in FY 2023.

4.8 SWMU 09-003(e) – Soil Contamination Associated with Former Basket Pit

4.8.1 Site Description and Operational History

SWMU 09-003(e) is a former basket washing pit (structure 09-62) (LANL 1990, 007511) that was located approximately 5 ft north of former building 09-14 at TA-09. The pit was constructed of reinforced concrete, measured approximately 4 ft wide × 4 ft long × 5 ft deep, and was installed in 1950. The former basket washing pit served basket washing operations conducted in former building 09-14, a former HE processing and development laboratory (LANL 1993, 014995). Building 09-14 was a large-scale laboratory that used beryllium and uranium-238 in addition to large quantities of HE. Effluent from former

building 09-14 basket washing operations was discharged through a drain and drainline associated with the pit. Building 09-14 was decommissioned in 1962 and destroyed by burning in 1965. The basket washing pit was decommissioned in 1960 and removed in 1965. At the time of removal, contaminant encrustation was present on the interior of the concrete pit (LANL 1993, 020949).

4.8.2 Previous Investigations

During the 1995 RFI conducted at SWMU 09-003(e), five samples were collected from five locations within and adjacent to the former pit location. Samples were submitted for analysis of TAL metals, total cyanide, HE, and VOCs. Data from the 1995 RFI are decision-level.

4.8.3 Investigation Objectives

The objective of the investigation at SWMU 09-003(e) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 10 samples from 5 locations (LANL 2011, 111794; NMED 2011, 201465).

4.8.4 Fieldwork Completed

Sampling was conducted between October 12 and October 27, 2022. A total of 10 samples were collected from 5 locations. Samples were collected from beneath the former sump and around the perimeter of the sump from 4–5 ft and 9–10 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, and pH. Figure 3.1-1 shows locations sampled at SWMU 09-003(e) in FY 2023.

4.9 SWMU 09-003(g) – Soil Contamination Associated with Former Sump and Pipes

4.9.1 Site Description and Operational History

SWMU 09-003(g) is identified in the 1990 SWMU Report (LANL 1990, 007511) as the sumps and associated drainlines in former building 09-2, which housed a photo darkroom and boiler plant. Engineering drawings show that the sumps in building 09-2 were actually condensate pits that received boiler condensate. One pit measured approximately 3 ft wide × 7 ft long, and was installed in 1943 when the building was constructed. The second, larger pit measured 5.5 ft wide × 8 ft long and was installed in 1948 (LASL 1948, 110444). Building 09-2 was decommissioned in 1959 and intentionally destroyed by burning in 1960. The condensate pits and drainlines associated with former building 09-2 were removed in 1965.

Although associated with TA-09, SWMU 09-003(g) is located within the physical boundary of TA-08.

4.9.2 Previous Investigations

During the 1994 RFI, the Anchor Ranch East Site set of sites, including SWMU 09-003(g), was investigated under a common sampling plan. Thirteen surface samples were collected from 13 locations on a 25-ft × 25-ft sampling grid established over the Anchor Ranch East Site decontamination and decommissioning (D&D) area [SWMUs 09-001(d), 09-003(g), 09-003(h), and 09-003(i)]. Samples were field-screened for radioactivity, organic vapors, and HE. Field-screening results showed no elevated radioactivity or VOCs, and HE was not detected in any of the samples. Samples were submitted for analysis of TAL metals, nitrate, SVOCs, and HE (LANL 1996, 054586). Data from the 1994 RFI are

screening-level and showed inorganic chemicals detected above BVs, and detected nitrate; HE and SVOCs were not detected.

4.9.3 Investigation Objectives

The objective of the investigation at SWMU 09-003(g) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 20 samples from 10 locations (LANL 2011, 111794; NMED 2011, 201465).

4.9.4 Fieldwork Completed

Sampling was conducted between October 6 and December 3, 2022. A total of 22 samples were collected from 10 locations. Samples were collected from beneath the former sump, around the perimeter of the sump, and within the building footprint from 4–5 ft, 7–8 ft, and 9–10 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, dioxins/furans, and pH. Figure 3.1-1 shows locations sampled at SWMU 09-003(g) in FY 2023.

4.10 SWMU 09-003(h) – Soil Contamination Associated with Former Sump and Pipes

4.10.1 Site Description and Operational History

SWMU 09-003(h) is identified in the 1990 SWMU Report as the sump and associated pipes in former building 09-3, an HE casting facility (LANL 1990, 007511). Although associated with TA-09, SWMU 09-003(h) is located within the physical boundary of TA-08. Engineering drawings show the sumps in building 09-3 consisted of a single catch basin that functioned as an HE settling tank. Built in 1943, former building 09-3 was divided into two sections: one was 17 ft wide × 30 ft long × 8 ft high, and the other was 12 ft² × 9 ft high. The sections were joined by a wood-framed corridor. The larger section had three reinforced-concrete walls and one wood-framed wall. The building was surrounded on three sides and on the top by an earthen berm. The catch basin received wastewater from drain troughs in the original building and had no discharge lines. The building housed an HE casting facility and contained a hydraulic press. A control room for remote-control mixing of HE was added in 1949. The RFI work plan states that building 09-3 was also used to store radioactively contaminated equipment. Building 09-3 was decommissioned in 1959 and removed in 1965, including the catch basin and drain troughs.

Although associated with TA-09, SWMU 09-003(h) is located within the physical boundary of TA-08.

4.10.2 Previous Investigations

During the 1994 RFI, SWMU 09-003(h) was sampled as part of a set of sites referred to as the Anchor Ranch East Site set, which also included SWMUs 09-001(d), 09-003(g), and 09-003(i). This set of sites was grouped because of past activities (HE research, development, and testing) and D&D of their associated structures (buildings 09-1, 09-2, 09-3, and 09-13). Thirteen surface samples were collected from 13 locations in the area around former building 09-3. Samples were field-screened for radioactivity, organic vapors, and HE. Field-screening results showed no elevated radioactivity levels, and PID measurements were less than 1 ppm; HE was not detected in any the samples. Samples were submitted for analysis of TAL metals, nitrate, SVOCs, and HE (LANL 1996, 054586). Data from the 1994 RFI are screening level and showed inorganic chemicals detected above BVs, and detected nitrate; HE and SVOCs were not detected.

4.10.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-003(h) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 12 samples from 6 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-003(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 15 locations were collected at SWMU 09-003(h).

4.10.4 Fieldwork Completed

Sampling was conducted between August 26 and December 1, 2022. A total of 39 samples were collected from 15 locations. Samples were collected from 6 locations beneath the former sump and around the perimeter of the sump from 4–5 ft and 9–10 ft bgs. Samples were collected from 5 locations along sink drain and trough, and 4 locations around the perimeter of the former building, from 0–1 ft, 2–3 ft, and 4–5 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, PCBs, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Figure 3.1-1 shows locations sampled at SWMU 09-003(h) in FY 2023.

4.11 SWMU 09-003(i) – Soil Contamination Associated with Former Sump and Pipes

4.11.1 Site Description and Operational History

SWMU 09-003(i) consists of the former sump and drainlines that served former building 09-13 (a machine shop and charge preparation building) at TA-09. Built in 1945, building 09-13 was a wood frame structure measuring 17 ft wide × 20 ft long × 9 ft high. Building 09-13 was decommissioned in 1959 and burned in 1965 (LANL 1993, 020949). The sump and drainlines associated with building 09-13 were removed in 1965 and disposed of at TA-54.

4.11.2 **Previous Investigations**

During the 1994 RFI, SWMU 09-003(i) was sampled as part of a set of sites referred to as the Anchor Ranch East Site set, which also included SWMUs 09-001(d), 09-003(g), and 09-003(h). This set of sites was grouped because of past activities (HE research, development, and testing) and D&D of the associated structures (buildings 09-1, 09-2, 09-3, and 09-13). Thirteen surface samples were collected from 13 locations in the area around former building 09-1. Samples were field-screened for radioactivity, organic vapors, and HE. Field-screening results showed no elevated radioactivity levels, and PID measurements were less than 1 ppm; HE was not detected in any the samples. Samples were submitted for analysis of TAL metals, nitrate, SVOCs, and HE (LANL 1996, 054586). Data from the 1994 RFI are screening level and showed inorganic chemicals detected above BVs, and detected nitrate; HE and SVOCs were not detected.

4.11.3 Investigation Objectives

The objective of the investigation at SWMU 09-003(i) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 20 samples from 10 locations (LANL 2011, 111794; NMED 2011, 201465).

4.11.4 Fieldwork Completed

Sampling was conducted between November 2 and November 29, 2022. A total of 18 samples were collected from 9 locations. Samples were collected from 1 location beneath the former sump, and 8 locations around the perimeter of the former building from 4–5 ft and 9–10 ft bgs. Two samples from 1 location were unable to be collected due to power-auger refusal at approximately 4 ft bgs, preventing collection of samples from the 4–5 and 9–10 ft intervals. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, PCBs, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Figure 3.1-1 shows locations sampled at SWMU 09-003(i) in FY 2023.

4.12 SWMU 09-004(d) – Settling Tank

4.12.1 Site Description and Operational History

SWMU 09-004(d) consists of a decommissioned sump (structure 09-187) located at TA-09 on the south side of building 09-38 (a processing laboratory). The sump, installed between 1950 and 1952, is made of reinforced concrete and formerly received industrial waste from a laboratory on the south side of building 09-38. Activities in the building involved HE casting and pressing; small-scale mixers and extruders also are located in the building. The sump collected settling HE particles that were not filtered out by the building's waste system and discharged effluent to a former NPDES-permitted outfall (EPA 05A067). Periodically, the sump was inspected, debris was removed using specially equipped trucks, and the sump was cleaned (LANL 1993, 020949). In November 2006, the sump was filled with gravel and capped with concrete (Johnson 2006, 110442).

4.12.2 Previous Investigations

No previous investigations have been conducted at SWMU 09-004(d).

4.12.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-004(d) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 20 samples from 10 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-004(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 33 samples from 11 locations were planned to be collected at SWMU 09-004(d). A total of 21 samples from 7 locations were to be collected adjacent to inlet and outlet drainlines at 50-ft intervals. A total of 12 samples were to be collected from 4 locations adjacent to the sump inlet, outlet, and sides. An additional location was added to the inlet drainline. Samples were to be collected from 0–1 ft, 2–3 ft, and 5–6 ft below the drainline or sump.

4.12.4 Fieldwork Completed

Sampling was initiated on March 18, 2023. A total of 5 samples were collected from 2 locations. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, and pH. Twenty percent of samples were analyzed for PCBs. Remaining fieldwork includes collecting 28 samples from 10 locations. Figure 4.1-1 shows locations sampled at SWMU 09-004(d) in FY 2023.

4.13 SWMU 09-004(e) – Settling Tank

4.13.1 Site Description and Operational History

SWMU 09-004(e) consists of a sump (structure 09-188) located on the south side of building 09-45 (a processing laboratory). The sump, installed between 1950 and 1952, is constructed of aluminum-lined, reinforced concrete and receives industrial waste from a laboratory on the south side of building 09-38. Activities in the building involve HE-synthesis scale-up, processing, and development; and ball-milling and sieving of explosives. Building 09-45 also contains various sized reactors, mixers, and extruders. The sump collects settling HE particles that are not filtered out by the building's waste system. Originally, effluent from the sump was discharged to an NPDES-permitted outfall (EPA 05A067). The outfall has been removed from the permit, and the sump is now periodically cleaned by pumping to a specially equipped truck. The sump is equipped with an overfill alarm and is regularly inspected.

4.13.2 Previous Investigations

No previous investigations have been conducted at SWMU 09-004(e).

4.13.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-004(e) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 22 samples from 11 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-004(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 33 samples from 11 locations were planned to be collected at SWMU 09-004(e).

4.13.4 Fieldwork Completed

Sampling was conducted between February 24 and March 8, 2023. A total of 33 samples were collected from 11 locations. A total of 21 samples were collected from 7 locations adjacent to the inlet and outlet drainlines. Twelve samples were collected from 4 locations adjacent to the sump inlet, outlet, and sides. All samples were collected from 0–1 ft, 2–3ft, and 5–6 ft below the drainline or sump. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at SWMU 09-004(e) in FY 2023.

4.14 SWMU 09-004(f) – Settling Tank

4.14.1 Site Description and Operational History

SWMU 09-004(f) consists of a sump (structure 09-189) located at TA-09 on the south side of building 09-46 (a processing laboratory). The sump, installed between 1950 and 1952, is constructed of aluminum-lined, reinforced concrete and receives industrial waste from a processing laboratory in building 09-46. Activities in the building involve HE-synthesis scale-up and processing; the building was also used as a storage facility for radioactive materials and waste until 1991. The sump collects settling HE particles that are not filtered out by the building's waste system. Originally, effluent from the sump was discharged to an NPDES-permitted outfall (EPA 05A067). The outfall has been removed from the permit, and the sump is now periodically cleaned by pumping to a specially equipped truck. The sump is equipped with an overfill alarm and is regularly inspected.

4.14.2 Previous Investigations

No previous investigations have been conducted at SWMU 09-004(f).

4.14.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-004(f) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 32 samples from 16 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-004(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 51 samples from 17 locations were planned to be collected at SWMU 09-004(f). Samples were to be collected from 0–1 ft, 2–3 ft, and 5–6 ft below the drainline or sump.

4.14.4 Fieldwork Completed

Sampling was initiated on March 11, 2023. A total of 35 samples were collected from 13 locations. Remaining fieldwork includes collecting 16 samples from 6 locations. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at SWMU 09-004(f) in FY 2023.

4.15 SWMU 09-004(i) – Settling Tank

4.15.1 Site Description and Operational History

SWMU 09-004(i) consists of an inactive HE sump (structure 09-192) located north of building 09-33, and associated inlet and outlet drainlines, and a former outfall at TA-09. The sump, installed between 1950 and 1952, is constructed of reinforced concrete and formerly received industrial waste from building 09-33. Activities in the building involved compressed gas reactions using cyanogens, fluorine, chlorine, and hydrogen cyanide. The sump collected settling HE particles that were not filtered out by the building's waste system and discharged to a former NPDES-permitted outfall (EPA 05A066) in Pajarito Canyon. Periodically, the sump was inspected, debris was removed using specially equipped trucks, and the sump was cleaned (LANL 1993, 020949). Building 09-33 had been decontaminated and vacated by 1993 and the outfall was removed from the NPDES permit in the late 1990s. During September 2001 decommissioning activities, the sump was pressure-washed, filled with gravel, and capped with concrete (IT Corporation 2001, 073732).

4.15.2 Previous Investigations

No previous investigations have been conducted at SWMU 09-004(i).

4.15.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-004(i) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 24 samples from 12 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-004(i) 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 planned to be collected at SWMU 09-004(i). Samples were to be collected from 0–1 ft, 2–3 ft, and 5–6 ft below the drainline or sump.

4.15.4 Fieldwork Completed

Sampling was initiated on March 1, 2023. A total of 33 samples were collected from 11 locations. Remaining fieldwork includes collecting 3 samples from 1 location. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at SWMU 09-004(i) in FY 2023.

4.16 SWMU 09-004(j) – Settling Tank

4.16.1 Site Description and Operational History

SWMU 09-004(j) consists of an inactive HE sump (structure 09-193) located north of building 09-34, and associated inlet and outlet drainlines, and a former outfall. The sump, installed between 1950 and 1952, is constructed of reinforced concrete and formerly received industrial waste from building 09-34. Activities in the building involved HE pressing, mixing, and sieving; small-scale propellant grain preparation also was conducted in the building. Most of the activity in the building involved welding, opening containers with weapons components, and cutting explosive crystals. The sump collected settling HE particles that were not filtered out by the building's waste system and discharged effluent to a former NPDES-permitted outfall (EPA 05A067) in Pajarito Canyon. Periodically, the sump was inspected, debris was removed using specially equipped trucks, and the sump was cleaned (LANL 1993, 020949). During September 2001 decommissioning activities, the sump was pressure-washed, filled with gravel, and capped with concrete (IT Corporation 2001, 073732). Building 09-34 is still in use.

4.16.2 Previous Investigations

No previous investigations have been conducted at SWMU 09-004(j).

4.16.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-004(j) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 22 samples from 11 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-004(j) 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 09-004(j).

4.16.4 Fieldwork Completed

Sampling was conducted between March 8 and March 26, 2023. A total of 39 samples were collected from 13 locations. Samples were collected from 0–1 ft, 2–3 ft, and 5–6 ft below the drainline or sump. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at SWMU 09-004(j) in FY 2023.

4.17 SWMU 09-004(k) – Settling Tank

4.17.1 Site Description and Operational History

SWMU 09-004(k) consists of an inactive HE sump (structure 09-194) located north of building 09-35, and associated inlet and outlet drainlines, and a former outfall. The sump, installed between 1950 and 1952, is constructed of reinforced concrete and formerly received industrial waste from building 09-35. Activities

in the building involved large-scale HE pressing. The sump collected settling HE particles that were not filtered out by the building's waste system and discharged effluent to a former NPDES-permitted outfall (EPA 05A067) in Pajarito Canyon. Periodically, the sump was inspected, debris was removed using specially equipped trucks, and the sump was cleaned (LANL 1993, 020949). During September 2001 decommissioning activities, the sump was pressure-washed, filled with gravel, and capped with concrete. Building 09-35 underwent D&D and was removed in 2006; the concrete slab remains in place.

4.17.2 Previous Investigations

No previous investigations have been conducted at SWMU 09-004(k).

4.17.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-004(k) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 20 samples from 10 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-004(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 51 samples from 17 locations were planned to be collected at SWMU 09-004(k). Samples were to be collected from 0–1 ft, 2–3 ft, and 5–6 ft below the drainline or sump.

4.17.4 Fieldwork Completed

Sampling was initiated on March 16, 2023. A total of 27 samples were collected from 9 locations. Remaining fieldwork includes collecting 24 samples from 8 locations. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at SWMU 09-004(k) in FY 2023.

4.18 SWMU 09-004(I) – Settling Tank

4.18.1 Site Description and Operational History

SWMU 09-004(I) consists of an inactive HE sump (structure 09-195) located northeast of building 09-40, and associated inlet and outlet drainlines, and a former outfall. The sump, installed between 1950 and 1952, is constructed of reinforced concrete and formerly received industrial waste from building 09-40. Activities in the building involved temperature compatibility studies using large environmental test chambers and ovens. The sump collected settling HE particles that were not filtered out by the building's waste system and discharged effluent to a former NPDES-permitted outfall (EPA 05A066) in Pajarito Canyon. Periodically, the sump was inspected, debris was removed using specially equipped trucks, and the sump was cleaned (LANL 1993, 020949). During September 2001 decommissioning activities, the sump was pressure-washed, filled with gravel, and capped with concrete (IT Corporation 2001, 073732). Building 09-40 is still in use.

4.18.2 **Previous Investigations**

No previous investigations have been conducted at SWMU 09-004(I).

4.18.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-004(I) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 18 samples from 9 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-004(I) 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 planned to be collected at SWMU 09-004(I). Samples were to be collected from 0–1 ft, 2–3 ft, and 5–6 ft below the drainline or sump.

4.18.4 Fieldwork Completed

Sampling was initiated on December 5, 2022. A total of 26 samples were collected from 9 locations. Remaining fieldwork includes collecting 10 samples from 4 locations. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at SWMU 09-004(I) in FY 2023.

4.19 SWMU 09-004(n) – Settling Tank

4.19.1 Site Description and Operational History

SWMU 09-004(n) consists of an inactive HE sump (structure 09-197) located north of building 09-43, and associated inlet and outlet drainlines, and a former outfall. The sump, installed between 1950 and 1952, is constructed of reinforced concrete and formerly received industrial waste from building 09-43. Activities in the building involved HE-pressing activities. The sump collected settling HE particles that were not filtered out by the building's waste system and discharged effluent to a former NPDES-permitted outfall (EPA 05A067) in Pajarito Canyon. Periodically, the sump was inspected, debris was removed using specially equipped trucks, and the sump was cleaned (LANL 1993, 020949). During September 2001 decommissioning activities, the sump was pressure-washed, filled with gravel, and capped with concrete (IT Corporation 2001, 073732). Building 09-43 underwent D&D and was removed in 2006; the concrete slab remains in place.

4.19.2 Previous Investigations

No previous investigations have been conducted at SWMU 09-004(n).

4.19.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-004(n) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 60 samples from 30 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-004(n) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 108 samples from 36 locations were planned to be collected at SWMU 09-004(n). A total of 93 samples were to be collected from 31 locations from 0–1 ft, 2–3 ft, and 5–6 ft below the drainline or sump. An additional 10 locations were to be sampled at the outfall and in the drainage downgradient from 0–1 ft, 2–3 ft, and 4–5 ft bgs. A total of 15 samples were to be collected from 5 locations beneath the building 09-43 foundation, if field conditions allowed, from 0–1 ft, 2–3 ft, and 5–6 ft below the concrete slab.

4.19.4 Fieldwork Completed

Sampling was initiated on March 23, 2023. Two samples were collected from one location beneath the drainline. Samples were collected from the 0–1 ft and 2–3 ft intervals only. Remaining fieldwork includes collecting 106 samples from 36 locations. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Figure 4.1-1 shows locations sampled at SWMU 09-004(n) in FY 2023.

4.20 SWMU 09-004(o) – Settling Tank

4.20.1 Site Description and Operational History

SWMU 09-004(o) consists of an active HE sump (structure 09-198) located northeast of building 09-48, and associated inlet and outlet drainlines, and a former outfall. The sump, installed between 1950 and 1952, is constructed reinforced concrete with an aluminum liner, and receives industrial waste from building 09-48. Activities in the building involve HE machining. The sump collects settling HE particles that are not filtered out by the building's waste system. Originally, effluent from the sump was discharged to a NPDES-permitted outfall (EPA 05A068) in Pajarito Canyon. The outfall was removed from the permit in the late 1990s; the sump contents are pumped out by a specially equipped truck and treated off-site. The sump is equipped with an overfill alarm and is regularly inspected.

4.20.2 Previous Investigations

During the 1999 RFI conducted at SWMU 09-004(o), two samples were collected from one location in the drainage downgradient of the former outfall and submitted for analysis of HE. Data from the 1999 RFI are decision-level.

4.20.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-004(o) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 46 samples from 23 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-004(o) and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 69 samples from 23 locations were planned to be collected at SWMU 09-004(o). Samples were to be collected from 0–1 ft, 2–3 ft, and 5–6 ft below the sump and drainline.

4.20.4 Fieldwork Completed

Sampling was initiated on March 12, 2023. A total of 22 samples were collected from 8 locations. Remaining fieldwork includes collecting 47 samples from 16 locations. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at SWMU 09-004(o) in FY 2023.

4.21 SWMU 09-005(d) – Septic Tank

4.21.1 Site Description and Operational History

SWMU 09-005(d) consists of an inactive septic system located near the western boundary of TA-09, approximately 165 ft east of Anchor Ranch Road. The septic system consists of a septic tank (structure 09-211) and inlet and outlet drainlines. Constructed of concrete, the septic tank (structure 09-211) measures 4 ft wide × 30 ft long × 6 ft deep and has a capacity of 4000 gal. The tank is divided into four compartments; each with an access port consisting of corrugated-metal pipe with a steel-plate cover. The septic tank was installed in 1970 as part of a sanitary-system upgrade that consisted of replacing septic tank 09-81 [SWMU 09-005(a)]. All former discharges to septic tank 09-81 from buildings 08-20, 08-21, 08-22, 08-23, and 08-24, where the strontium-90 spill occurred in 1954, were rerouted to septic tank 09-211. The SWMU 09-005(d) septic tank discharged to the SWMU 09-008(b) oxidation pond. During 1988 decommissioning activities, the septic tank contents were removed along with the access ports and sand was backfilled over the tank (LANL 1996, 054586).

Although associated with TA-09, SWMU 09-005(d) is located within the physical boundary of TA-08.

4.21.2 Previous Investigations

During the 1994 RFI conducted at SWMU 09-005(d), two samples of the tank contents (sludge) were collected from two locations within the tank. Two additional samples were collected of material encrusted on the inside walls of the tank. Samples were submitted for analysis of strontium-90. Data from the 1994 RFI are screening-level and showed strontium-90 detected above the fallout value (FV) in the one sample.

4.21.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-005(d) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 14 samples from 7 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-005(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 18 samples from 8 locations were planned to be collected at SWMU 09-005(d).

4.21.4 Fieldwork Completed

Sampling was conducted between February 9 and February 18, 2023. A total of 18 samples were collected from 8 locations. A total of 12 samples were collected from 6 locations beneath drainlines adjacent to and below the septic tank, from 8–9 ft and 13–14 ft bgs. Six samples were collected from 2 locations below the sewer line junction, from 0–1 ft, 2–3 ft, and 5–6 ft below the sewer line. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs, SVOCs, PCBs, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Figure 3.1-1 shows locations sampled at SWMU 09-005(d) in FY 2023.

4.22 SWMU 09-006 – Soil Contamination Associated with Former Septic Tank

4.22.1 Site Description and Operational History

SWMU 09-006 is a former septic system consisting of a septic tank (former structure 09-203), associated inlet and outlet drainlines, and a former outfall located approximately 100 ft northeast of building 09-2. Installed in 1943, the septic tank was constructed of reinforced concrete and measured 4 ft wide × 9 ft long × 4 ft deep and had a wooden cover. The septic tank served former building 09-2 and was used until 1950, when it was replaced by septic tank 09-81 [SWMU 09-005(a)]. Building 09-2 housed a boiler plant and darkroom facilities (LASL 1954, 110449). Septic tank 09-203 was removed in 1965; the inlet and outlet drainlines remain in place.

The 1990 SWMU Report (LANL 1990, 007511) incorrectly states that septic tank 09-203 served building 09-3. An engineering drawing of building 09-3 (an HE casting facility) shows the building had no drainlines leading from the building to a septic tank and also confirms the building had no restroom or sink drains (LASL 1949, 110613). Building 09-2, however, did contain sink and restroom drains and associated drainlines.

Although associated with TA-09, SWMU 09-006 is located within the physical boundary of TA-08.

4.22.2 Previous Investigations

During the 1995 RFI conducted at SWMU 09-006, two samples were collected from two locations at the former location of septic tank 09-203. Samples were submitted for analysis of TAL metals, total cyanide, HE, VOCs, and tritium. Data from the 1995 RFI are decision-level.

4.22.3 Investigation Objectives

The primary objective of the investigation at SWMU 09-006 is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 24 samples from 12 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 09-006 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 51 samples from 17 locations were planned to be collected at SWMU 09-006. A total of 24 samples from 8 locations were to be collected from 0–1 ft, 2–3 ft, and 5–6 ft below the septic tank and drainlines. An additional 12 samples from 4 locations were to be collected from the outfall and downgradient of the outfall from 0–1 ft, 2–3 ft, and 4–5 ft bgs. If field conditions allowed, 15 samples from 5 locations were to be collected from 0–1 ft, 2–3 ft, and 5–6 ft below the concrete slab.

4.22.4 Fieldwork Completed

Sampling was conducted between January 24 and February 18, 2023. A total of 36 samples were collected from 12 locations. Samples were collected beneath the concrete slab at former building 09-3 as part of the investigation for SWMU 09-003(g). Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, PCBs, and pH. Figure 3.1-1 shows locations sampled at SWMU 09-006 in FY 2023.

4.23 AOC 09-010(a) – Storage Area

4.23.1 Site Description and Operational History

AOC 09-010(b) is a former container storage shelter (structure 09-206) that was located approximately 35 ft south of building 09-45 (a processing laboratory). Built in 1961, the shelter measured approximately 2.5 ft wide × 11 ft long × 6.5 ft high. It was constructed of four steel pipe posts anchored in concrete with corrugated steel siding on three sides, with the north side open. The shelter had a steel-grid floor suspended above the ground with a secondary containment pan below the floor. The storage shelter was used to store 5-gal. and 55-gal. containers of organic solvents. The shelter was removed in 1995 as part of a voluntary corrective action (VCA) (LANL 1996, 053777).

The 1990 SWMU Report describes AOC 09-010(b) as being located northeast of building 09-142 (LANL 1990, 007511). It is presumed that this is a typographical error that associated the AOC 09-010(b) container storage shelter with structure 09-42, which is also an HE processing laboratory, as opposed to structure 09-142, which is a manhole. However, no waste container storage shelter existed at building 09-42. Only two waste container shelters were constructed at TA-09, former structures 09-206 and 09-207 (LASL 1961, 095144.1). Container storage shelter 09-206 [AOC 09-010(b)] was constructed south of building 09-45 and container storage shelter 09-207 [AOC 09-010(a)] was constructed north of building 09-48.

4.23.2 Previous Investigations

During the 1995 VCA conducted at AOC 09-010(a), structure 09-207 was removed. Storage shelter components including the four steel pipe posts, corrugated steel siding, and concrete were field-screened for radioactivity, organic vapors, and HE. Screening results showed no radioactivity detected above instrument background and no detected organic vapors or HE. Depressions from the concrete footings for the steel pipe posts were backfilled with gravel. Soil removal and confirmation sampling were not conducted during the VCA. Approximately 3100 lb of concrete and metal from the storage structure were disposed of at the Los Alamos County Landfill (LANL 1996, 053777).

4.23.3 Investigation Objectives

The primary objective of the investigation at AOC 09-010(a) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 10 samples from 5 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC 09-010(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 15 samples from 5 locations were planned to be collected at AOC 09-010(a).

4.23.4 Fieldwork Completed

Sampling was conducted on March 12, 2023. A total of 15 samples were collected from 5 locations. Samples were collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at AOC 09-010(a) in FY 2023.

4.24 AOC 09-010(b) – Storage Area

4.24.1 Site Description and Operational History

AOC 09-010(b) is a former container storage shelter (former structure 09-206) that was located approximately 35 ft south of building 09-45 at TA-09. Built in 1961, the shelter measured approximately 4.5 ft wide × 12 ft long × 6.6 ft high and was originally located south of building 09-37, as shown in engineering drawing ENG-C 25840 and a 1965 aerial photograph (LASL 1960, 110606; Koogle and Pouls Engineering 1965, 016397). The shelter was constructed of four steel pipe posts anchored in concrete with corrugated steel siding on three sides, with the north side open (LANL 1996, 053777). The shelter had a steel-grid floor suspended above the ground with a secondary containment pan below the floor (LANL 1996, 053777). The storage shelter was used to store 5-gal. and 55-gal. containers of organic solvents (LANL 1996, 053777). The exact date the container storage shelter was moved from building 09-37 to building 09-45 is not known; however, the shelter can be shown located there at its earliest in the 1991 Orthographic GIS Layer shortly after the identification within the 1990 SWMU Report. The container storage shelter was removed in 1995 (LANL 1996, 053777). Building 09-45 has housed an HE laboratory since 1961 and remains active. The shelter appears to have been assigned an updated structure number (09-277) based on the TA-09 Structure History Book and Potential Release Site Website photographs showing the removal of the structure (LANL Date Unknown, 070386).

The 1990 SWMU Report describes AOC 09-010(b) as being located northeast of building 09-142 (LANL 1990, 007511). It is presumed that this is a typographical error that associated the AOC 09-010(b) container storage shelter with structure 09-42, which is also an HE processing laboratory, as opposed to structure 09-142, which is a manhole. However, no waste container storage shelter existed at building 09-42. Only two waste container shelters were constructed at TA-09, former structures 09-206 and 09-207 (LASL 1961, 095144.1). Container storage shelter 09-206 [AOC 09-010(b)] was constructed south of building 09-45 and container storage shelter 09-207 [AOC 09-010(a)] was constructed north of building 09-48.

4.24.2 Previous Investigations

During the 1995 VCA conducted at AOC 09-010(b), structure 09-206 was removed. Storage shelter components, including the four steel pipe posts, corrugated steel siding, and concrete, were field-screened for radioactivity, organic vapors, and HE. Screening results showed no radioactivity detected above instrument background and no detected organic vapors or HE. Depressions from the concrete footings for the steel pipe posts were backfilled with gravel (LANL 1996, 053777). Soil removal and confirmation sampling were not conducted during the VCA. The components of structure 09-206 were disposed of at the Los Alamos County Landfill.

4.24.3 Investigation Objectives

The primary objective of the investigation at AOC 09-010(b) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 10 samples from 5 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC 09-010(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 15 samples from 10 locations were planned to be collected at AOC 09-010(b).

4.24.4 Fieldwork Completed

Sampling was conducted between February 23 and February 28, 2023. A total of 15 samples were collected from 5 locations. Samples were collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at AOC 09-010(b) in FY 2023.

4.25 AOC 09-011(b) – Storage Area

4.25.1 Site Description and Operational History

AOC 09-011(b) is a former storage area located at TA-09, approximately 30 ft southeast of building 09-39 (an HE magazine). The 10-ft² area was used to temporarily stage equipment potentially contaminated with HE before the equipment was cleaned (flashed) and disposed of at TA-16. The area was once fenced and posted with signs (LANL 1993, 020949, p. 5-47). The date when the area was first used for staging equipment is unknown. After 1987, the area functioned as a satellite accumulation area (SAA), which was closed in 1991 (Rodriguez 1998, 058480), and the storage area is no longer used.

4.25.2 Previous Investigations

During the 1994 RFI conducted at AOC 09-011(b), two surface samples were collected next to and downgradient of the former SAA and submitted for analysis of HE. Data from the 1994 RFI are screening level and showed no detected HE.

During the 1997 RFI conducted at AOC 09-011(b), four additional surface samples were collected from a drainage channel that received runoff from the site. Samples were submitted for analysis of HE (LANL 1998, 059686).

4.25.3 Investigation Objectives

The primary objective of the investigation at AOC 09-011(b) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 14 samples from 7 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC 09-011(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 24 samples from 8 locations were planned to be collected at AOC 09-011(b).

4.25.4 Fieldwork Completed

Sampling was conducted between February 23 and March 25, 2023. A total of 24 samples were collected from 8 locations. Samples were collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs within and surrounding the former storage area and downgradient of the storage area. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at AOC 09-011(b) in FY 2023.

4.26 AOC 09-011(c) – Storage Area

4.26.1 Site Description and Operational History

AOC 09-011(c) is a former storage area located at TA-09 approximately 5 ft south of building 09-38 (an HE processing and development building). The storage area consisted of a solvent storage rack that measured approximately 3 ft wide × 8 ft long × 6 ft high (Harris 1993, 014946). The storage rack stored dimethylsulfoxide and isobutyl acetate in support of building 09-38 activities (LANL 1993, 020949). The dates of operation of the storage rack are unknown. The storage rack has been removed (LANL 1993, 020949).

4.26.2 Previous Investigations

During the 1994 RFI conducted at AOC 09-011(c), 12 samples were collected from 6 locations within the former storage area and submitted for analysis of HE, SVOCs, and VOCs. Data from the 1994 RFI are screening level and showed detected HE, bis(2-ethylhexyl)phthalate, and VOCs.

4.26.3 Investigation Objectives

The primary objective of the investigation at AOC 09-011(c) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect two samples from one location (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC 09-011(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 AOC 09-011(c).

4.26.4 Fieldwork Completed

Sampling was conducted on February 23, 2023. A total of 15 samples were collected from 5 locations. Samples were collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs within and surrounding the former storage area. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, PCBs, and pH. Figure 4.1-1 shows locations sampled at AOC 09-011(c) in FY 2023.

4.27 AOC 09-012 – Disposal Pit

4.27.1 Site Description and Operational History

AOC 09-012 is described by the 1990 SWMU Report as a possible waste pit identified in Engineering File 1757 at TA-09 (LANL 1990, 007511). The SWMU Report further states that it is unknown whether the pit was located in the old TA-09 or the new TA-09, or even if the disposal area existed. It had not been found during previous field surveys. Based on this information, the RFI work plan for Operable Unit 1157 proposed the possible location of the AOC 09-012 disposal pit is an area where 15 circular, nonvegetated sites were identified within the Old Anchor East site (old TA-09) (LANL 1993, 020949). The circles begin 200 ft north of building 09-31 and continue north in a basically straight line. The circles are each approximately 6 ft in diameter and are spaced approximately 5 ft apart (LANL 1993, 020949).

4.27.2 Previous Investigations

During the 1994 RFI conducted at AOC 09-012, 18 surface samples were collected from 8 locations within the site and submitted for analysis of TAL metals, herbicides, pesticides, SVOCs, VOCs, and gamma-emitting radionuclides. Data from the 1994 RFI are screening level and showed numerous inorganic chemicals detected above BVs; detected HE, herbicides, pesticides, and acetone; and detected cesium-137 and europium-152 activities above BVs/FVs.

In 1995, two additional RFI samples were collected from two locations at AOC 09-012 and submitted for analysis of TAL metals, total cyanide, herbicides, pesticides, PCBs, SVOCs, VOCs, and gamma-emitting radionuclides. Data from the 1995 RFI samples are decision-level.

4.27.3 Investigation Objectives

The primary objective of the investigation at AOC 09-012 is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 60 samples from 15 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC 09-012 and to determine if the site poses a potential unacceptable risk to human health or the environment. To meet both objectives, a total of 84 samples from 21 locations were planned to be collected at AOC 09-012. Samples were to be collected from 0–1 ft, 4–5 ft, 9–10, and 15–20 ft bgs.

4.27.4 Fieldwork Completed

In the fall of 2022, a utility locate was performed for AOC 09-012. It was determined that the possible location of AOC 09-012 was the location of the TA-09 anode beds, which is part of the existing natural gas utility infrastructure that was installed in 1978. A comparison of the AOC boundary with the utilities information shows that each of the circles identified as the AOC 09-012 boundary is directly associated with individual anode bed structures, and therefore this area is not the location of the purported waste pit. A thorough review of aerial photographs, archival documentation, and engineering drawings has produced no evidence of a waste pit in the former or current TA-09 area. After the location of the anode bed utility, no fieldwork was conducted at AOC 09-012. The AOC will not be sampled; however, it will be included in the investigation report. Figure 4.27-1 shows location of the unit boundary for AOC 09-012, proposed sample locations, and anode bed utility layer overlain to show the spatial relationship.

4.28 AOC 09-014 – Soil Contamination Associated with Former Camera Mount

4.28.1 Site Description and Operational History

AOC 09-014 is the former location of a camera mount building (structure 09-176, formerly NU-6) and associated firing point that were located in the area between former building 09-43 and building 09-48. The camera mount building and firing point were components of the former NU Firing Site that was constructed in 1945. At the time of its construction, NU Site was designated as TA-23. Between 1950 and 1952, NU Site was incorporated into TA-09.

The camera mount building housed cameras that photographed the shots conducted at NU Site from 1945–1950. The building, measuring 15 $\text{ft}^2 \times 8$ ft high, was constructed of reinforced concrete and covered on three sides and on top by an earthen berm (LANL 1993, 014995). The interior of the camera mount building contained a camera chamber equipped with a periscope and an equipment box

(approximately 3 ft wide × 4 ft long × 3 ft high) constructed of reinforced concrete with a ½-in.-thick, steel-plated door (LASL 1947, 110448; LANL 1993, 014995).

The NU Site firing point was to the east of the camera mount building. The firing point consisted of a 3.5-ft-wide × 12–ft-long × 1-ft-thick reinforced concrete apron containing two small firing pits (LANL 1993, 020949). The apron was on the west side of an earthen mound within a loop access road that is visible on 1958 aerial photographs (USAF 1958, 015887). The apron faced toward the camera mount building to the west. The firing point was used from 1945–1950 to test lens charges of up to 135 lb of HE. Smaller shots were conducted in the two firing pits. Shots large enough to damage the apron were occasionally fired in unspecified locations outside the slab but within camera range (LANL 1994, 020949). It is likely that these larger shots took place in the nonforested areas immediately north and south of the apron (USAF 1958, 015887).

All structures associated with the NU Site firing point, including the camera mount building, concrete apron, and earthen mound, were removed in August 1952 (LANL 1993, 014995).

4.28.2 Previous Investigations

During the 1994 RFI conducted at AOC 09-014, 10 surface samples were collected within the site and analyzed for TAL metals and HE. Data from the 1994 RFI are screening level and showed inorganic chemicals detected above BVs; HE was not detected.

4.28.3 Investigation Objectives

The primary objective of the investigation at AOC 09-014 is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 18 samples from 9 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at AOC 09-014 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 planned to be collected at AOC 09-014.

4.28.4 Fieldwork Completed

Sampling was conducted between March 8 and March 10, 2023. A total of 48 samples were collected from 16 locations. Samples were collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs from the two firing points, and at radial distances of 15 ft and 30 ft from the firing points. Samples were also collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs within the footprint and around the perimeter of the former camera mount, and in the drainage north of the firing point. Samples were analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, VOCs (except in surface samples), SVOCs, PCBs, dioxins/furans, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Figure 4.1-1 shows locations sampled at AOC 09-014 in FY 2023.

5.0 SUMMARY OF FIELDWORK COMPLETED IN TA-40 FOR FY 2023

The following section summarizes fieldwork initiated at one SWMU in TA-40 in FY 2023.

5.1 SWMU 40-003(a) – Burn Site

5.1.1 Site Description and Operational History

SWMU 40-003(a), shown in Figure 5.1-1, consists of two former detonation areas located at TA-40. The first site was located 450 ft east of structure 40-15. The detonation area is roughly circular and approximately 30 ft in diameter. Use of the site began in the early 1950s, and detonations were remotely controlled from structure 40-15. In 1958, several instances occurred where intact detonators and pieces of HE were discharged during detonations. Efforts to recover all the scattered detonators and HE were unsuccessful (Anderson and Tucker 1959, 007559). Detonation activities at this first location ceased in the early 1960s when a second open detonation site was developed at a location further to the east.

This second open detonation site is approximately 1300 ft east of structure 40-15, within a natural amphitheater at the end of an unnamed dirt road. At the second site, scrap explosive materials were detonated and controlled remotely from structure 40-15. The detonation area is approximately 90 ft (east-west) by 110 ft (north-south). After each detonation, scattered debris was picked up and transported to an appropriate waste disposal site. Rock rubble and crushed tuff that sloughed from the amphitheater wall was pushed to the south, creating an area of fill that extended nearly to the edge of Pajarito Canyon. The second detonation site was later operated under RCRA interim status. All detonation operations ceased in 1985. The interim status open detonation area underwent RCRA closure from 1992 to 1994. The closure report was approved by NMED in August 1995 (IT Corporation 1995, 057521; NMED 1995, 065408).

The 1990 SWMU report (LANL 1990, 007513) and the Operable Unit 1111 RFI Work Plan (LANL 1993, 026068) both describe SWMU 40-003(a) as being located 450 ft east of structure 40-15 and state that a RCRA closure plan was being developed for the site. Both documents mistakenly identify the location 450 ft east of structure 40-15 as undergoing RCRA closure. The 1991 Final Closure Plan (LANL 1991, 007653) was developed for the second detonation area located 1300 ft east of structure 40-15 and specifically states that the first detonation area located 450 ft east of structure 40-15 would <u>not</u> be addressed under RCRA closure. The first detonation area was omitted from the closure because its period of use occurred before RCRA regulation.

5.1.2 Previous Investigations

The "Closure Certification Report for the Technical Area 40 Scrap Detonation Site (Condensed) (IT Corporation 1995, 057521) documents that in 1990, LANL personnel found the site had been used as a dumping area for construction rubble and debris. The construction debris was removed from the detonation area in April 1992. During removal, all debris was field-screened for HE contamination, and all uncontaminated material was properly disposed of at the Los Alamos County landfill. Debris that showed residual HE contamination was either decontaminated and then disposed of at the landfill or it was collected for additional treatment and subsequent disposal. Along with the construction debris, approximately 177 yd³ of rubble and soil were removed from the area and samples were taken beneath the excavation (IT Corporation 1995, 057521, p. 13).

According to the closure report, silver and thallium were detected above background (IT Corporation 1995, 057521, p.13).

5.1.3 Investigation Objectives

The primary objective of the investigation at SWMU 40-003(a) is to implement the approved "Investigation Work Plan for Starmer/Upper Pajarito Canyon Aggregate Area, Revision 1" and collect 78 samples from 34 locations (LANL 2011, 111794; NMED 2011, 201465). A secondary objective is to ensure a sufficient number of samples are collected to define nature and extent of contamination at SWMU 40-003(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 111 samples from 37 locations were planned to be collected at SWMU 40-003(a). Samples were planned to be collected from 0–1 ft, 4–5 ft, and 9–10 ft bgs at the eastern and western detonation points. Outside the detonation points, samples were planned to be collected south of the eastern detonation area to the edge of the mesa to characterize potential contamination associated with rock debris that was pushed to the south. These samples will be collected from 0–1 ft and 4–5 ft bgs.

5.1.4 Fieldwork Completed

An unexploded ordnance survey was conducted before sampling at SWMU 40-003(a). Sampling was initiated on August 14, 2023. A total of 111 samples from 37 locations have been collected. Samples were collected from 0–1 ft, 4–5 ft, and 9–10 ft bgs at the eastern and western detonation points. Outside the detonation points, samples were collected from 0–1 ft, 2–3 ft, and 4–5 ft bgs at 25-ft stepout locations. Samples were collected south of the eastern detonation area to the edge of the mesa to characterize potential contamination associated with rock debris that was pushed to the south. These samples were collected from 0–1 ft and 4–5 ft bgs. Samples are being analyzed for TAL metals, nitrate, perchlorate, total cyanide, explosive compounds, SVOCs, VOCs (except in surface samples), dioxins/furans, americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, and pH. Of the total samples, 20% are being analyzed for PCBs. Figure 5.1-1 shows locations sampled at SWMU 40-003(a) in FY 2023.

6.0 FY 2023 MILESTONE

The requirement of a progress report summarizing the fieldwork implementation and status of site investigations for the Starmer/Upper Pajarito Canyon Aggregate Area has been met by the completion and submittal of this progress report. Sections 3.0 and 4.0 describe the fieldwork completed in FY 2023.

7.0 PLANNED WORK IN FY 2024

Sampling at AOC 40-003(b) will likely be completed in FY 2023. Fieldwork at Starmer/Upper Pajarito Canyon Aggregate Area will continue in FY 2024. Samples will be collected to define nature and extent of contamination and evaluate risk at the remaining SWMUs and AOCs. Further sampling and/or corrective actions to address unacceptable levels of contamination may be required following an evaluation of analytical data and preliminary risk assessments.

8.0 REFERENCES

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Figure 2.2-1 Locations sampled at SWMU 09-001(d) in FY 2022

• Location sampled FY22

SWMU or AOC

2-ft contour interval

10-ft contour interval

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

rachel.more-hla@em-la.doe.gov Document: map_23-0011-19_09-001(d) 9/11/2023

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Figure 3.1-1 Locations sampled at TA-08 and TA-09 west in FY 2023

Location sampled FY23

SWMU or AOC

Existing structure

Paved parking

2-ft contour interval

- 10-ft contour interval

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

rachel.more-hla@em-la.doe.gov Document: map_23-0011-13a_TA0809_9/11/2023

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0 15 30 60 90 120 1 - H -Feet





Figure 4.1-1 Locations sampled at TA-09 east in FY 2023

• Location sampled FY23

Existing structure

2-ft contour interval

10-ft contour interval

State Plane Coordinate System New Mexico Central Zone, US Survey Feet National Geodetic Vertical Datum 1929

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0 40 80 160 240 320 1 Feet



Figure 4.27-1 AOC 09-012, proposed sample locations, and anode bed utility layer showing spatial relationship

Proposed sample location

2-ft contour interval

10-ft contour interval

National Geodetic Vertical Datum 1929

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0 10 20 40 60 80 1 1 Feet





Figure 5.1-1 Locations sampled at SWMU 40-003(a) in FY 2023

Starmer/Upper Pajarito Canyon Aggregate Area

- Location sampled FY23
 - SWMU or AOC
- SWMU 40-003(a)
- Existing structure
- 2-ft contour interval
- ------ 10-ft contour interval

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

N3B/T2S GIS: R. MORE-HLA rachel.more-hla@em-la.doe.gov Document: map_23-0011-18_40-003(a) 9/11/2023

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45 90 180 l Feet

Starmer/Upper Pajarito Canyon Aggregate Area Progress Report

Technical Area	Sum of Planned Samples	Sum of Retrieved Samples	Sum of Samples Unable to Complete	Remaining Samples	% Complete
08	651	21	0	630	3.2
09	1889	724	9	1165	38.8
22	613	0	0	613	0.0
40	420	74	0	346	7.0
Total	3573	745	9	2828	21.1

Table 2.1-1Summary of Fieldwork Completed atStarmer/Upper Pajarito Canyon Aggregate Area

