LA-UR-06-2465
April 2006
ER2006-0227

Historical Investigation Report for Upper Los Alamos Canyon Aggregate Area

Los Alamos
NATIONAL LABORATORY
EST.1943

CD included with this document

Disclaimer

This document contains data on radioactive materials, including source, special nuclear, and by-product material. The management of these materials is regulated under the Atomic Energy Act and is specifically excluded from regulation under the Resource Conservation and Recovery Act and the New Mexico Hazardous Waste Act. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to the New Mexico Environment Department in accordance with U.S. Department of Energy policy.

Prepared by
Environmental Stewardship Division–
Environmental Remediation and Surveillance Program

LA-UR-06-2465
ER2006-0227

Historical Investigation Report for Upper Los Alamos Canyon Aggregate Area

April 2006

Responsible project leader:

Printed Name	Signature	Title	Organization	Date
Becky Coel-Roback		Project Leader	ENV-ECR	4/25/06

Responsible UC representative:

Printed Name	Signature	Title	Organization	Date
David McInroy		Deputy Program Director	ENV-ERS	4/24/06

Responsible DOE representative:

Printed Name	Signature	Title	Organization	Date
David Gregory	for	Federal Project Director	DOE-LASO	27/04/06

EXECUTIVE SUMMARY

The Upper Los Alamos Canyon Aggregate Area is located within and south of the Los Alamos townsite in Technical Areas (TAs) 00, 01, 03, 32, 41, 43, and 61 at Los Alamos National Laboratory (the Laboratory) and includes a total of 115 solid waste management units (SWMUs) and areas of concern (AOCs). Of these sites, 54 have been previously investigated and/or remediated and have been approved for no further action (NFA); therefore, only brief descriptions of these sites are provided along with documentation leading to NFA. For the remaining 61 sites, details of site description, previous investigation(s), and analytical results are provided.

Of the 61 SWMUs and AOCs in the Upper Los Alamos Canyon Aggregate Area that have not been granted NFA status, 5 fall within TA-00, 34 fall within TA-01, 5 fall within TA-03, 5 fall within TA-32, 6 fall within TA-41, 5 fall within TA-43, and 1 falls within TA-61. These sites include

- septic tanks and outfalls;
- sanitary waste lines and sewage treatment facilities;
- industrial waste lines, drains, and outfalls;
- storm drains and outfalls;
- areas of soil contamination from Laboratory operations;
- landfills and surface disposal areas;
- transformer sites; and
- incinerators.

This historical investigation report provides the background information and supporting data that form the basis for the proposed sampling design necessary to complete the site investigations as presented in the Upper Los Alamos Canyon Aggregate Area investigation work plan.

CONTENTS

Appendixes

Plates

Figures

Tables

1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) and managed by the University of California (UC). The Laboratory is located in north-central New Mexico, approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory site covers 40 mi^2 of the Pajarito Plateau, which consists of a series of fingerlike mesas separated by deep canyons containing perennial and intermittent streams running from west to east. Mesa tops range in elevation from approximately 6200 to 7800 ft. The location of Upper Los Alamos Canyon Aggregate Area with respect to the Laboratory technical areas (TAs) and surrounding land holdings is shown in Figure 1.0-1. Sites within the aggregate area are shown in Plate 1.

The Laboratory's Environmental Stewardship–Environmental Remediation and Surveillance (ENV-ERS) Program, formerly the Environmental Restoration (ER) Project, is participating in a national effort by DOE to clean up sites and facilities formerly involved in weapons research and development. The goal of the ENV-ERS Program is to ensure that past operations do not threaten human or environmental health and safety in and around Los Alamos County, New Mexico. To achieve this goal, the ENV-ERS Program investigates sites potentially contaminated by past Laboratory operations.

The sites addressed in this historical investigation report (HIR) may contain hazardous and/or radioactive constituents. The New Mexico Environment Department (NMED) has authority under the New Mexico Hazardous Waste Act over cleanup of sites with hazardous waste or certain hazardous constituents, including the hazardous waste portion of mixed waste (i.e., waste contaminated with both radioactive and hazardous constituents). DOE has authority over cleanup of sites with radioactive contamination. Radionuclides are regulated under DOE Order 5400.5, "Radiation Protection of the Public and the Environment," and DOE Order 435.1, "Radioactive Waste Management."

A Resource Conservation and Recovery Act (RCRA) Hazardous Waste Facility Permit was issued to the Laboratory by the U.S. Environmental Protection Agency (EPA) in 1989. Under the Hazardous and Solid Waste Amendments (HSWA), EPA issued Module VIII to the Permit in 1990 (EPA 1990, 01585) and revised it in 1994 (EPA 1994, 44146). Module VIII of the Hazardous Waste Facility Permit listed individual sites to be investigated and specified conditions and requirements for cleanup activities. In 1996, regulatory authority for Laboratory cleanup activities was conveyed to NMED, which assumed enforcement of Module VIII of the Hazardous Waste Facility Permit. On March 1, 2005, a Compliance Order on Consent (the Consent Order) was signed by NMED, DOE, and the Regents of UC that addresses corrective-action activities at the Laboratory. In accordance with Consent Order requirements, a permit modification is in progress that replaces the corrective action requirements of Module VIII of the Hazardous Waste Facility Permit with those of the Consent Order.

The sites are presented in this document on the basis of their regulatory status, with sites having been granted no further action (NFA) status by the administrative authority discussed first, then sites that have not been granted NFA status are discussed in numerical order. Table 1.0-1 provides a summary of the sites and their regulatory status.

Section 2.0 provides a brief description of sites within the Upper Los Alamos Canyon Aggregate Area that have been granted NFA status by the administrative authority and documentation of the process leading to NFA and subsequent removal from the Laboratory's permit.

Sections 3.0 through 9.0 of this HIR provide operational histories and summaries of the field investigations and associated usable environmental data collected to date for the solid waste management units (SWMUs) and areas of concern (AOCs) in the Upper Los Alamos Canyon Aggregate Area investigation work plan (LANL 2006, 91916). This HIR provides the background information and the

supporting data for the activities necessary to complete the investigation as presented in the Upper Los Alamos Canyon Aggregate Area investigation work plan.

Appendix A includes a list of acronyms and abbreviations, a glossary, and a metric conversion table. Appendix B presents usable analytical data from past investigations (on CD). Appendix C contains the data source statements for the figures in this report.

2.0 ADMINISTRATIVELY COMPLETE SITES

This section provides a brief description of sites within the Upper Los Alamos Canyon Aggregate Area that have been granted NFA status by the administrative authority and documentation of the process leading to NFA and subsequent removal from the Laboratory's permit. Table 1.0-1 provides a summary of the sites and their regulatory status.

2.1 TA-00

2.1.1 SWMU 00-003, Container Storage Area

SWMU 00-003 was a 100-ft^2 drum storage area located near the east end of the Western Steam Plant. The area was paved and used to store 55-gal. steel drums of boiler water treatment chemicals on wooden pallets (LANL 1990, 07511, p. 0-003).

- 1987: The storage area was decommissioned (LANL 1990, 07511, p. 0-003).
- 1997: A RCRA facility investigation (RFI) was conducted at SWMU 00-003. After data analysis and a screening assessment, no chemicals of potential concern (COPCs) were retained; therefore, NFA was proposed (LANL 1997, 62528, p. 33).
- 2000: Supplemental soil samples were collected as part of a voluntary corrective action (VCA) to address the lateral extent of lead and evaluate potential risks (LANL 2001, 71418, p. 4). The risk evaluation indicated that the site did not pose a potential for adverse impacts to human health or the environment. The VCA completion report recommended NFA (LANL 2001, 71418, pp. v, 26).
- 2002: NMED approved the VCA completion report and the NFA determination (NMED 2002, 73096).
- 2003: NMED removed SWMU 00-003 from Module VIII of the Hazardous Waste Facility Permit on September 5, 2003 (NMED 2003, 78138).

2.1.2 SWMU 00-012, Underground Blow-Off Tank

SWMU 00-012 was a 1000-gal. cylindrical steel underground tank that received blow-down steam and wastewater from boilers at the Western Steam Plant.

- 1949 to 1952: The Western Steam Plant and blow-down tank operated for 3 yr before being placed on standby in 1952 (LANL 1990, 07511, p. 0-012).
- 1997: An RFI was conducted, and the risk evaluation indicated that the site did not pose an unacceptable risk; an NFA was proposed (LANL 1997, 62528, p. ii).
- 2000: In 2000, a VCA was undertaken, and the blow-down tank and associated piping were removed. Soil samples were collected from the bottom of the excavation. An additional risk

evaluation showed that the site did not pose a potential for adverse effects to human health and the environment, and the site was again recommended for NFA (LANL 2001, 71418, p. 53).

- 2002: NMED approved the VCA completion report and the NFA determination (NMED 2002, 73096).
- 2003: NMED removed SWMU 00-012 from Module VIII of the Hazardous Waste Facility Permit on September 5, 2003 (NMED 2003, 78138).

2.1.3 AOC 00-030(i), Septic System

AOC 00-030(i) was a septic tank and associated drain lines located south of Trinity Drive and east of 35th Street (LANL 1990, 07511, p. 0-030). The concrete septic tank, approximately 16.5 ft by 8 ft by 7.5 ft deep, received sanitary wastes from dormitories, barracks, a military post office, an officer's lounge, a post exchange, and apartments (LANL 2001, 71418, pp. 53–54).

- Early-1940s to 1947: The septic system was used until 1947, when the central wastewater treatment plant became operational (LANL 2001, 71418, p. 59).
- 1996: The concrete septic tank was removed as part of a VCA; confirmation samples were collected from the excavation. The VCA completion report proposed NFA (LANL 1996, 62416, pp. ii, 55).
- 2000: The inlet and outlet lines associated with the tank were removed in a second VCA, and additional confirmatory sampling was conducted (LANL 2001, 71418, p. 63). The VCA report recommended NFA for AOC 00-030(i) after determining that the site conditions did not pose an unacceptable risk to human health or the environment; the site was proposed for NFA (LANL 2001, 71418, p. 113).
- 2002: NMED approved the VCA completion report and the NFA determination (NMED 2002, 73096), and DOE concurred (DOE 2002, 73095).

2.1.4 AOC 00-032, Soil Contamination beneath Former Motor Pool

AOC 00-032 was a former vehicle maintenance shop operated by Zia Company, located north of Trinity Drive between 15th and Knecht streets.

- Mid-1940s to mid-1960s: The former vehicle maintenance shop, also called the motor pool facility, operated for approximately 20 yr. It consisted of a maintenance hangar and two buildings used for heavy equipment repairs and vehicle maintenance (LANL 1995, 46051, pp. 1, 4).
- 1962: The automotive maintenance hangar was removed (LANL 1992, 07667, p. 5-123).
- March to April 1995: Phase I RFI at AOC 00-032 was conducted and an underground storage tank (UST), two junction boxes, and an abandoned hydraulic lift were removed and samples were collected (LANL 1995, 46051, pp. 16–22). The site was recommended for NFA (LANL 1995, 46051, p. 34).
- August 1995: An underground stormwater drain line and associated sumps were removed in a VCA (LANL 1996, 53778, p. 2).
- 2005: EPA confirmed the NFA status of AOC 00-032 in a letter to NMED (EPA 2005, 88464, p. 15).

2.1.5 AOC 00-035(a), Surface Disposal

AOC 00-035(a) was a surface disposal area near the base of the Los Alamos Canyon Bridge where a 55-gal. drum was discovered in 1991 during bridge upgrades. The drum contained tar and had not leaked (LANL 1992, 07667, p. 6-5). A section of pipe and a roll of cable were also found in the vicinity.

- 1991: After the drum, pipe section and roll of cable were discovered, an electromagnetic survey was conducted, and no other drums or debris were found (LANL 1992, 07667, p. 6-5).
- 1992: The site was recommended for NFA in the Operable Unit (OU) 1071 RFI work plan (LANL 1992, 07667, p. 6-6). EPA concurred that the site did not appear to require an RFI, and the permit did not need to be modified to include AOC 00-035(a) (EPA 1992, 11810).
- 1995: DOE recommended AOC 00-035(a) for NFA (LANL 1995, 45365, p. 1-10).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 15).

2.2 TA-01, Former Main Technical Area

2.2.1 SWMU 01-001(h), Septic Tank 142

SWMU 01-001(h) was septic tank 142 connected to a latrine in Building 118, which was used by Zia Company townsite shop personnel to maintain townsite residences from 1946 to 1953 (LANL 1993, 62909, Attachment A).

- 1976: The reinforced concrete septic tank (1.5 by 3.0 by 1.8 m) was removed in January 1976. Field screening detected no radioactivity from the tank sludge or from the excavation (Ahlquist et al. 1977, 05710, pp. 119–120).
- 1992 to 1993: SWMU 01-001(h) was recommended for NFA in the OU 1078 RFI work plan (LANL 1992, 43454, p. 2-17) and in the addendum to the work plan (LANL 1993, 62909) because no hazardous or radioactive materials were associated with SWMU 01-001(h).
- 1994: EPA approved the request for NFA (EPA 1994, 38816).
- 1998: NMED removed SWMU 01-001(h) from the DOE/Laboratory RCRA Permit No. NM0890100515 on December 23, 1998 (NMED 1998, 63042).

2.2.2 SWMU 01-001(i), Septic Tank 143

SWMU 01-001(i) was septic tank 143, connected to Warehouse 3 (also known as the J-Division Annex), that was used for materials storage and film calibration. The septic tank operated from 1951 to 1964.

- 1965: Warehouse 3 was removed, and site records indicated that the septic tank also was removed at that time (Ahlquist et al. 1977, 05710, p.135).
- 1975: During the decontamination effort for TA-01 in the mid-1970s, an uncontaminated metal septic tank was encountered near the general area of septic tank 143. The investigators inferred it was the former septic tank and removed it in November 1975 (Ahlquist et al. 1977, 05710, pp. 114, 135). Field screening detected no radioactivity from the tank sludge or from the excavation (Ahlquist et al. 1977, 05710, pp. 119–120).
- 1992 to 1993: SWMU 01-001(i) was recommended for NFA in the addendum to the RFI work plan for OU 1078 (LANL 1993, 62909).

- 1994: The request for NFA was approved by EPA (EPA 1994, 38816).
- 1998: NMED removed SWMU 01-001(i) from the DOE/Laboratory RCRA Permit No. NM0890100515 on December 23, 1998 (NMED 1998, 63042).

2.2.3 SWMU 01-001(j), Septic Tank 149

On the basis of engineering drawings, SWMU 01-001(j) was incorrectly listed as a septic tank located between TA-01 Buildings U and W in the original SWMU report (LANL 1990, 07511, p. 1-001). A further review of engineering drawings and site photographs, as well as interviews with former site workers, determined that the tank was in fact an aboveground tank used for storing dielectric gas used by Van de Graaff generators located in Building W. The engineering drawings used for the initial evaluation did not distinguish between aboveground tanks or underground tanks, which caused the error in the SWMU listing. The history of the aboveground tank is as follows:

- Pre-1953: Tank 149 was an aboveground cylindrical steel tank used to store dielectric gas for the Van de Graaff generators in the W Building at TA-01 (LANL 1993, 62909). In 1953, the tank was relocated to the TA-03 area to be used by the Van de Graaff generators at that location (Ahlquist et al. 1977, 05710, p. 136), indicating that the tank was still sound.
- 1992: SWMU 01-001(j) was recommended for NFA in the OU 1078 RFI work plan (LANL 1992, 43454, p. 2-17) and in the addendum to the work plan (LANL 1993, 62909).
- 1994: EPA approved the NFA recommendation (EPA 1994, 38816).
- 1998: NMED removed SWMU 01-001(j) from DOE/Laboratory RCRA Permit No. NM0890100515 on December 23, 1998 (NMED 1998, 63042).

2.2.4 SWMU 01-001(k), Septic Tank 268

SWMU 01-001(k) was septic tank 268, used for sanitary wastes from the TU Building (LANL 1993, 62909).

- 1964: Septic tank 268 was removed along with the TU Building (LANL 1993, 62909).
- Mid-1970s: Approximately 3700 yd^3 of soil with uranium contamination from drums stored outside the TU Building was removed; soil in the former location of tank 268 was removed as part of this effort (Ahlquist et al. 1977, 05710, p. 114).
- 1992: SWMU 01-001(k) was recommended for NFA in the OU 1078 addendum to the RFI work plan (LANL 1993, 62909).
- 1994: EPA approved the NFA recommendation (EPA 1994, 38816).
- 1998: NMED removed SWMU 01-001(k) from DOE/Laboratory RCRA Permit No. NM0890100515 on December 23, 1998 (NMED 1998, 63042).

2.2.5 SWMU 01-001(l), Septic Tank 269

SWMU 01-001(l) was septic tank 269 that received sanitary wastes from the restroom in Building S-1 from 1943 to 1953.

- 1954: Septic tank 269 was reported to have been removed (LANL 1992, 43454, p. 2-18; Ahlquist et al. 1977, 05710, p. 144).

- 1992: SWMU 01-001(l) was recommended for NFA in the OU 1078 RFI work plan (LANL 1992, 43454, p. 2-18) and in the addendum to the work plan (LANL 1993, 62909).
- 1994: EPA approved the recommendation for NFA (EPA 1994, 38816).
- 1998: NMED removed SWMU 01-001(l) from DOE/LANL RCRA Permit No. NM0890100515 on December 23, 1998 (NMED 1998, 63042).

2.2.6 SWMU 01-001(m), Septic Tank 275

SWMU 01-001(m) was septic tank 275 that received sanitary waste from Warehouse 13 and possibly from Warehouse 18 from 1944 to 1946 (LANL 1992, 43454, p. 2-18).

- Mid-1970s: During the sitewide decontamination of TA-01, it was discovered that the hillside location of septic tank 275 had been bulldozed below the level where the tank should have been; it was believed that the tank had been removed at an earlier time (Ahlquist et al. 1977, 05710, p. 114).
- 1992: SWMU 01-001(m) was recommended for NFA in the OU 1078 RFI work plan (LANL 1992, 43454, p. 2-18).
- October 23, 2000: Evidence was presented to NMED supporting the premise that septic tank 275 was never installed (LANL 2000, 68071).
- 2000: NMED concurred with the finding that septic tank 275 was never installed and that SWMU 01-001(m) was appropriate for an NFA (NMED 2000, 68552).
- 2003: In a letter dated August 6, 1993, NMED granted approval to remove SWMU 01-001(m) from DOE/Laboratory Module VIII Permit (NMED 2003, 78138). It was removed from the permit on September 5, 2003.

2.2.7 SWMU 01-001(n), Septic Tank 276

SWMU 01-001(n) was septic tank 276 that received sanitary waste from the Theta Building from 1944 to 1946.

- 1946: Theta Building was removed in 1946, and the tank was left in place (LANL 1993, 62909).
- 1977: The concrete cast-in-place tank (1.22 m wide by 1.83 m long by 1.22 m high) was located and removed in August 1977. The tank was full of dirt, and no contamination was detected (Ahlquist et al. 1977, 05710, pp. 118–119).
- 1993: SWMU 01-001(n) was recommended for NFA in the addendum to the OU 1078 RFI work plan (LANL 1993, 62909).
- 1994: EPA approved the recommendation for NFA (EPA 1994, 38816).
- 1998: NMED removed SWMU 01-001(n) from Module VIII of the Hazardous Waste Facility Permit on December 23, 1998 (NMED 1998, 63042).

2.2.8 AOC 01-001(p), Septic System

AOC 01-001(p) was a steam tunnel in the central portion of TA-01 incorrectly identified as a sanitary waste line in the original SWMU report (LANL 1990, 07511).

- 1992: The site was correctly identified as a steam tunnel in the RFI work plan for OU 1078 and recommended for NFA (LANL 1992, 43454, pp. 2-23–2-24).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.9 AOC 01-001(q), Septic System

AOC 01-001(q) contained three sanitary waste lines formerly connected to the PX Building, the commercial exchange building that operated in the early days of the Laboratory (LANL 1993, 62909).

- 1992 to 1993: The OU 1078 RFI work plan (LANL 1992, 43454, p. 2-19) and the addendum to the work plan (LANL 1993, 62909) recommended AOC 01-001(q) for NFA.
- 1994: EPA approved the recommendation for NFA (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.10 AOC 01-001(r), Septic System

AOC 01-001(r) was a sanitary waste line connected to E Building, located in the north-central portion of TA-01, that was built in 1944 to house administrative staff and theoretical physicists.

- 1992: The OU 1078 RFI work plan recommended the site for NFA (LANL 1992, 43454, p. 2-19).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.11 AOC 01-001(v), Septic System

AOC 01-001(v) was a sanitary waste line connected to P Building, which housed human resources offices in the early days of the Laboratory (LANL 1992, 43454, p. 2-19).

- 1954: P Building was expanded and a new sanitary sewer line constructed. SWMU 01-001(v) was left in place (LANL 1993, 62909).
- 1992: AOC 01-001(v) was recommended for NFA in the OU 1078 RFI Work Plan (LANL 1992, 43454, pp. 2-19–2-20) and in the addendum to the OU 1078 work plan (LANL 1993, 62909).
- 1994: EPA approved the recommendation for NFA (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.12 AOC 01-001(w), Septic System

AOC 01-001(w) was a sanitary waste line connected to the AP Building that originally housed a barracks and then served as an office building (P Building) and (P-Prime Building) a supply and office building (LANL 1993, 62909).

- 1992: AOC 01-001(w) was recommended for NFA in the OU 1078 RFI work plan (LANL 1992, 43454, p. 2-20) and in the addendum to the OU 1078 work plan because no source of

contamination was found, and no releases could have occurred to the sanitary lines (LANL 1993, 62909).

- 1994: EPA approved the recommendation for NFA (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.13 AOC 01-004(a), Gas-Fired Incinerator

AOC 01-004(a) was a gas-fired incinerator (structure 01-146) used to incinerate nonradioactive trash. The incinerator was installed in 1947 in a 6-ft-tall sheet metal structure between G and H buildings.

- 1957: The incinerator was reported to be free of significant radioactive contamination (LANL 1990, 07511, p. 1-7).
- 1958: The incinerator was removed (LANL 1990, 07511, p. 1-7).
- 1995: AOC 01-004(a) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, pp. 1-10, 2-92 to 2-93) because available information indicated contaminants were not present. AOC 01-004(a) was approved for NFA (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.14 AOC 01-004(b), Gas-Fired Incinerator

AOC 01-004(b) was a gas-fired incinerator (structure 01-147) used to incinerate nonradioactive trash. The incinerator was installed in 1947 in a 6-ft-tall sheet metal structure on the north side of U Building (LANL 1995, 45365, p. 2-93).

- 1957: The incinerator was reported to be free of significant radioactive contamination (LANL 1990, 07511, p. 1-7).
- 1959: The incinerator was removed (LANL 1990, 07511, p. 1-7).
- 1995: AOC 01-004(b) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, pp. 1-10, 2-93) because available information indicated contaminants were not present. AOC 01-004(b) was approved for NFA (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.15 AOC 01-005, Bench-Scale Incinerator

AOC 01-005 was a bench-scale incinerator used to recover uranium from uranium-contaminated combustible items (e.g., paper products and rags). It was housed in TU-1 Building that was built in 1948 to store enriched uranium (LANL 1992, 43454, p. 2-21).

- 1964: Building TU-1 was dismantled, removed to Material Disposal Area (MDA) G (LANL 1995, 45365, p. 2-93) and burned (Ahlquist 1977, 03270, p.126).
- 1995: AOC 01-005 was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, p. 1-10, 2-93) because the incinerator was used for recovering uranium, not for creating waste, and the area was included within another site, AOC 01-007(h).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.16 AOC 01-006(f), Drain Lines and Outfall

AOC 01-006(f) was a storm drain that collected storm runoff from the area around Warehouse 4. The drain discharged near the TU-1 Building (LANL 1992, 43454, p. 2-22).

- 1964: The TU-1 Building was removed, along with the surrounding soil (Ahlquist 1977, 03270, p. 131; LANL 1992, 43454, p. 2-22).
- 1992: AOC 01-006(f) was recommended for NFA in the OU 1078 RFI work plan (LANL 1992, 43454, p. 2-22).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.17 AOC 01-006(i), Drain Lines and Outfall

AOC 01-006(i) was a storm drain installed to prevent stormwater from collecting in the carport of the R Building, which housed glass, cryogenics, model, and carpenter shops. The storm drain was a closed system that took stormwater from above the R Building to a drain outfall.

- 1954: The R Building was removed in 1954 (Ahlquist et al. 1977, 05710, pp. 130-131; LANL 1993, 62909).
- 1992: AOC 01-006(i) was recommended for NFA in the OU 1078 RFI work plan (LANL 1992, 43454, p. 2-22) and in the addendum to the work plan (LANL 1993, 62909).
- 1994: EPA approved the NFA recommendation presented in the addendum (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.18 AOC 01-006(j), Drain Lines and Outfall

SWMU 01-006(j) consists of two storm drains that paralleled the north and south sides of the S Building, and discharged into a drainage to the east of the building (LANL 1992, 43454, p. 2-22).

- 1959: S Building, a general stock warehouse, was removed (Ahlquist et al. 1977, 05710, p. 130).
- 1992: SWMU 01-006(j) was recommended for NFA in the OU 1078 RFI work plan (LANL 1992, 43454, p. 2-23).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.19 AOC 01-006(k), Drain Lines and Outfall

AOC 01-006(k) was a storm drain that channeled stormwater away from building areas between former Warehouse 4 and the J-Division Annex. The annex was used for materials storage and film calibration, and the warehouse was used for materials storage.

- 1954: Warehouse 4 was removed (Ahlquist et al. 1977, 05710, p. 132).
- 1965: J-Division Annex was removed (Ahlquist et al. 1977, 05710, p. 132), and the storm drain was probably removed at that time or during the mid-1970s TA-01 decontamination effort (LANL 1993, 62909).
- 1993: AOC 01-006(k) was recommended for NFA in the addendum to the OU 1078 RFI work plan (LANL 1993, 62909).

- 1994: EPA approved the NFA recommendation (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.20 AOC 01-006(l), Drain Lines and Outfall

AOC 01-006(l) was a 12 in. corrugated storm drain that drained the area between former Warehouse 2 and the J-Division Annex. The annex was used for materials storage and film calibration, and the warehouse was used for materials storage.

- 1954: Warehouse 2 was removed (Ahlquist et al. 1977, 05710, p. 131).
- 1965: J-Division Annex was removed (Ahlquist et al. 1977, 05710, p. 132).
- 1993: AOC 01-006(l) was recommended for NFA in the addendum to the OU 1078 RFI work plan (LANL 1993, 62909).
- 1994: EPA approved the NFA recommendation (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.21 AOC 01-006(m), Drain Lines and Outfall

AOC 01-006(m) consists of three storm drains that were located to the north and west of the Sigma Building.

- 1965: Sigma Building, used to process normal and enriched uranium, was removed (LANL 1993, 62909; Ahlquist et al. 1977, 05710, p. 126). Some or all of the storm drains were probably removed at that time or during the mid-1970s TA-01 decontamination effort.
- 1993: AOC 01-006(m) was recommended for NFA in the addendum to the OU 1078 RFI work plan (LANL 1993, 62909).
- 1994: The NFA recommendation was approved by EPA (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.22 AOC 01-006(p), Storm Drain and Outfall

AOC 01-006(p) consisted of an open storm drain and outfall that collected stormwater from the area south and west of HT Building, channeled it to a storm drain inlet that transported the water under a road in a closed drain, and discharged it toward Los Alamos Canyon.

- 1950: The drain was rerouted after K-1 Building was constructed for graphite machining. The revised drainage discharged to Los Alamos Canyon (LANL 1995, 45365, p. 1-11, 2-37).
- 1995: AOC 01-006(p) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, p. 1-11, 2-37).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.23 AOC 01-006(q), Drain Lines and Outfall

AOC 01-006(q) was a storm drain that extended from the southeast corner of T Building, which housed the Theoretical Division at the Laboratory, to the northeast.

- 1959: T Building was removed (LANL 1992, 43454, p. 2-23; Ahlquist et al. 1977, 05710, p. 131).
- 1992: AOC 01-006(q) was recommended for NFA in the OU 1078 RFI work plan (LANL 1992, 43454, p. 2-23).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.24 AOC 01-006(r), Drain Lines and Outfall

AOC 01-006(r) was a storm drain used to channel stormwater runoff away from the area around the J and X Buildings. J Building housed offices and laboratories where sealed sources were used; X Building housed a cyclotron (LANL 1993, 62909, p. 382).

- 1954: J and X buildings were removed (Ahlquist et al. 1977, 05710, p. 131).
- 1993: AOC 01-006(l) was recommended for NFA in the addendum to the OU 1078 RFI work plan (LANL 1993, 62909).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.25 AOC 01-006(s), Drain Lines and Outfall

AOC 01-006(s) was a storm drain located on the northwest side of P Building, outside of the TA-01 security fence. P Building was used for personnel and general office space.

- 1959: P Building was expanded (LANL 1992, 43454, p. 2-23; Ahlquist et al. 1977, 05710, p. 130).
- 1965: P Building was removed (LANL 1992, 43454, p. 2-23; Ahlquist et al. 1977, 05710, p. 130).
- 1992: AOC 01-006(s) was recommended for NFA in the OU 1078 RFI work plan (LANL 1992, 43454, p. 2-23).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.26 AOC 01-006(t) Drain Lines and Outfall

AOC 01-006(t) was a storm drain that extended from south of C Building to the south-southwest and was designed to channel stormwater away from the concrete apron that surrounded the building (LANL 1993, 62909). The C Building housed the shop departments.

- 1964: C Building was removed (Ahlquist et al. 1977, 05710, p. 130).
- 1993: AOC 01-006(t) was recommended for NFA in the addendum to the OU 1078 RFI work plan (LANL 1993, 62909).
- 1994: EPA approved the recommendation for NFA (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.27 AOC 01-007(f), Suspected Soil Contamination

AOC 01-007(f) consisted of a small spot of uranium contamination found in a surface sample near the west end of the Delta Building (1-16) during the remediation effort in the mid-1970s. It was determined that the concrete slab on the west end of the Delta Building had become contaminated when demolition debris had been stored there temporarily (Ahlquist et al. 1977, 05710, p. 106).

- 1975: The Delta Building excavation was determined to be decontaminated in 1975 because field surveys indicated no radiological activity in the soil (Ahlquist et al. 1977, 05710, p. 107).
- 1995: AOC 01-007(f) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, pp. 1-11, 2-94).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.28 AOC 01-007(g), Soil-Contamination Area

AOC 01-007(g) was a suspected soil-contamination area near Warehouse 19, a storage facility.

- 1965: Warehouse 19 was removed in 1965 (LANL 1992, 43454, p. 1-13; Ahlquist et al. 1977, 05710, p. 133).
- 1993: SWMU 01-007(g) was recommended for NFA in the addendum to the OU 1078 RFI work plan (LANL 1993, 62909, p. 95).
- 1994: EPA approved the recommendation for NFA (EPA 1994, 38816).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.29 AOC 01-007(h), Suspected Soil Contamination

AOC 01-007(h) consisted of an area of suspected subsurface soil contamination near TU and TU-1 Buildings. Building TU was used for processing natural uranium, and TU-1 was used for enriched-uranium storage and recovery.

- 1964: TU Building was moderately contaminated when it was demolished.
- 1995: AOC 01-007(h) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, pp. 1-11, 2-94).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.30 AOC 01-007(i), Suspected Soil Contamination

AOC 01-007(i) consisted of potential subsurface soil radiological contamination near former Warehouse 5 (used for materials storage), Warehouse 6 (used for equipment storage and repair), and Warehouse GR (also used for equipment storage) (Ahlquist et al. 1977, 05710, pp. 129 and 132).

- 1954 to 1955: The warehouses were removed (Ahlquist et al. 1977, 05710, pp. 129, 132).
- 1975 to 1976: The potentially contaminated spots or areas were identified in the 1974–1976 radiological survey. The spots were determined to be decontaminated in 1976 after excavation and a field survey indicated no detectable radiological activity (Ahlquist et al. 1977, 05710, pp. 113, 117–118).

- 1995: AOC 01-007(i) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, pp. 1-11, 2-94).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.31 AOC 01-007(m), Suspected Soil Contamination

AOC 01-007(m) consisted of potential subsurface soil radiological contamination in the Building C footprint. Building C contained a uranium machine shop.

- 1964: Before the building was removed in 1964, it was found to be free of radioactive contamination, except the part of the building associated with the uranium machine shop (LANL 1995, 45365, p. 2-95).
- 1965: The concrete pad was demolished with the contaminated portion of the pad disposed of in a Laboratory MDA (LANL 1995, 45365, p. 2-95).
- 1995: AOC 01-007(m) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, pp. 1-11, 2-95).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.32 AOC 01-007(n), Soil-Contamination Area

AOC 01-007(n) was a suspected subsurface soil contamination area located in the southwest corner of the former J-2 Building, which was used for processing of fission products and plutonium.

- 1958: J-2 Building was removed (Ahlquist et al. 1977, 05710, p. 134).
- 1976: The area was determined to be decontaminated in 1976 after excavation and a field survey indicated no detectable radiological activity (Ahlquist et al. 1977, 05710, p. 92).
- 1993: AOC 01-007(n) was recommended for NFA in the addendum to the OU 1078 RFI work plan (LANL 1993, 62909, p. 95).
- 1995: AOC 01-007(n) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, pp. 1-11, 2-96).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 12).

2.2.33 AOC 01-007(o), Suspected Soil Contamination

AOC 01-007(o) consisted of an area of potential subsurface soil radiological contamination near the historic D-5 Sigma vault, which was used to store uranium-235 and plutonium-239. Minor spills in the building resulted in lasting, low-level contamination on the concrete floors and shelves.

- 1965: D-5 Sigma Building was demolished (Ahlquist et al. 1977, 05710, p. 128).
- 1975 to 1976: D-5 Sigma Building footprint was determined to be decontaminated after excavation and a field survey indicated no detectable radiological activity (Ahlquist et al. 1977, 05710, pp. 99–105).
- 1995: AOC 01-007(o) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, p. 1-11, 2-96).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 13).

2.2.34 AOC 01-007(p), Soil-Contamination Area

AOC 01-007(p) was a suspected soil-contamination area located directly south of the former HT Building that was used for heat treating and machining normal and enriched uranium.

- 1965: HT Building was removed (Ahlquist et al. 1977, 05710, p. 129).
- 1975: During a surface debris cleanup, elevated radiological readings were detected by a field survey at a tuff outcrop just south of the former site of Building HT. After excavation, the area was determined to be decontaminated (Ahlquist et al. 1977, 05710, p. 98).
- 1993: AOC 01-007(p) was recommended for NFA in the addendum to the OU 1078 RFI work plan (LANL 1993, 62909, p. 95).
- 1995: AOC 01-007(p) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, pp. 1-11, 2-96).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 13).

2.3 TA-03, South Mesa Site

2.3.1 AOC 03-001(m), Satellite Accumulation Area

AOC 03-001(m) is a satellite accumulation area established at the Laboratory within Building 03-41 in conformance with 40 CFR 262, “Standards Applicable to Generators of Hazardous Waste,” which currently regulates satellite accumulation and less-than-90-day storage areas. No historical releases are known to have occurred at this site.

- 1993: This AOC was proposed for NFA in the OU 1114 RFI work plan (LANL 1993, 20947, p. 6-4).
- 1994: EPA approved the OU 1114 RFI work plan and the NFA proposal (EPA 1994, 38813).
- 1995: Although not listed in Module VIII, this AOC was included in the September 1995 Request for Permit Modification (LANL 1995, 51878). The AOC was included in the permit modification request for informational purposes only and to provide a complete listing of sites recommended for NFA.
- 1998: AOC 03-001(m) was reviewed for ecological risk in the documentation of the ecological risk assessment, completed in 1998 (LANL 1998, 62760).
- 1999: DOE granted final NFA approval on May 21, 1999 (DOE 1999, 63342).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 2).

2.3.2 SWMU 03-009(b), Surface Disposal Area

SWMU 03-009(b) is a debris pile (consisting of soil, natural tuff rubble, some road-construction debris, including concrete blocks and asphalt chunks, and a few pieces of PVC piping) resulting from preparing to construct a parking lot (LANL 1993, 20947, p. 6-17).

- 1992: An interim action was conducted and it was concluded that no RCRA hazardous waste constituents were detected in levels high enough to be considered a health and safety problem and/or to have any disposal restrictions associated with spoil materials (Fresquez 1993, 21296).

- 1995: SWMU 03-009(b) was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, pp. 1-4, 2-24).
- 1998: SWMU 02-009(b) was removed from the operating permit (LANL 1995, 45365, p. 2-24; NMED 1998, 63042).

2.3.3 SWMU 03-055(d), Storm Drain (Active)

SWMU 03-055(d) was initially identified as an outfall pipe located directly north of Building 3-59 (a sewage lift station) (LANL 1990, 07511, p. 3-055).

- 1995: After inspection, it was determined no pipe exists and this finding is consistent with the fact that lift stations do not have associated outfall piping. The SWMU was recommended for NFA in the addendum to the OU 1114 work plan (LANL 1995, 57590, p. 6-39)
- 2000: SWMU 03-005(d) was included in the supplemental information in support of notice of deficiency (NOD) responses for March 1995, September 1995, and September 1996 requests for permit modification (LANL 2000, 66388).
- 2001: NMED approved SWMU 03-055(d) for NFA and removal from the operating permit (NMED 2001, 70010).

2.4 TA-30, Electronics Test Area

TA-30 was developed as an electronics-testing area during World War II. It was a small site with a single wooden hutment equipped with an oil-burning stove, built in 1945 (Betts 1947, 05581). Engineering records indicate that the hutment was removed in 1946. The site was decommissioned in 1948 (LANL 1993, 20947, p. 2-6).

TA-30 was located in the northwest angle of the intersection of the Old Anchor Ranch Road and West Road. The area is a gently sloping pine forest that has been thinned for firebreak purposes. A short length of culvert and scattered gravel are all that remain of the site (LANL 1993, 20947, p. 2-3). The quarter-acre site lies within the current boundaries of TA-03.

2.4.1 AOC 30-001, Surface Disposal and Landfill

AOC 30-001 was TA-30, a small site now abandoned, approximately 500 ft north of the intersection of West Road and West Jemez Road and about 15 ft north of the intersection of West Road and the Old Anchor Ranch Road.

- 1945: The site was established as an electronics test area. An area approximately 40 ft by 80 ft was cleared to erect a single 16 ft^2 electronics test building. Engineering drawing A5-R35 from 1947 indicates that the building contained only a bench and an oil stove (LASL 1947, 91917). There was no sink. An oil storage tank was located outside of the building (LANL 1993, 20947, pp. 6-37–6-38).
- 1947: Aerial photographs show that the site was cleared before December 1947. The site is now covered with grasses, a few ponderosa pines, and a small scrub oak thicket. Only a few pieces of gravel indicate that the site was ever used. About 150 ft to the north is a pile of gravel that contains cured asphalt chunks; this area may be the “landfill uphill from the site” mentioned in the SWMU report (LANL 1990, 07511, p. 30-001).

- 1995: The DOE concurred with the determination of NFA (DOE 1995, 50023).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 4).

2.5 TA-32, Medical Research Laboratory

2.5.1 AOC C-32-001, Buildings

AOC C-32-001 consists of the soil beneath the former structure locations at TA-32 and is considered an AOC based on the potential for surface spills during past operations at TA-32.

- 1995: AOC C-32-001 was proposed for NFA in the March 1995 permit modification request (LANL 1995, 45365, pp. 1-19, 2-77) citing that contamination in the soil beneath the former structures would have been removed or disturbed beyond the point at which characterization could take place when the site was decommissioned. NFA was proposed because no records exist of any spills of hazardous material occurring at the site (LANL 1995, 45365, p. 2-77).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 8).

2.6 TA-41, W site

2.6.1 SWMU 41-004, Container Storage

SWMU 41-004 was an active satellite container storage area located in Room 319 of Building 41-30 in TA-41. The storage area was used in the past for storage of waste from a photoprocessing laboratory and office machines and for very small quantities of epoxy, epoxy hardener, acetone, ethanol, silicone rubber, and wire hardener (LANL 1993, 15314, p. 8-6).

- 1993: NFA was proposed because there was no evidence that hazardous or radioactive materials were spilled or discharged at this locality; therefore, it was very unlikely that the container storage area is a release site (LANL 1993, 15314, pp. 8-6, 8-8).
- 1993: In a letter regarding the OU 1098 work plan, EPA indicated that the tank did not need to be added to Module VIII of the Hazardous Waste Facility Permit (EPA 1993, 30085).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 16).

2.6.2 AOC C-41-001 Sump (Duplicate of AOC 41-003)

AOC C-41-001 is a duplicate of AOC 41-003, an inactive sump pit (structure 41-10), which is addressed in Section 7.4. AOC 41-003 is distinct from AOC C-41-003, an underground tank (41-W45), discussed in Section 2.6.4. In 2005, EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 16).

2.6.3 AOC C-41-002, Underground Tank

AOC C-41-002 was a 560-gal. underground diesel tank (structure 41-W55) located to the south of the guard station (41-2) measuring 8 ft by 4 ft. The diesel was used to fuel a generator that was a backup system for security lighting and an alarm system for TA-41.

- 1985: The tank was put into place.
- 1992: A 560-gal. replacement tank was installed.

- 1998: The site characterization report concluded that the tank did not appear to have leaked (Benchmark Environmental Corporation 1998, 66170, p. 5).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 16).

2.6.4 AOC C-41-003, Underground Tank

AOC C-41-003 was an industrial waste tank, 41-W45, noted as located 50 ft southwest of Building 41-4. Subsequent structure location maps from the 1950s and 1960s do not identify this tank's location or confirm its existence.

- 1993: NFA was recommended since the location and existence of this AOC are unknown (LANL 1993, 15314, p. 8-10).
- 1993: In a letter regarding the OU 1098 work plan, EPA indicated that the tank did not need to be added to Module VIII of the Hazardous Waste Facility Permit (EPA 1993, 30085).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 16).

2.6.5 AOC C-41-005, Underground Tank (Duplicate of AOC C-41-003)

AOC C-41-005, an underground tank, is a duplicate of AOC C-41-003. In 2005, EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 16).

2.7 TA-43, Health Research Laboratory

2.7.1 AOC 43-001(b1), Outfall

AOC 43-001(b1) was an outfall located in TA-43.

- 1994: EPA indicated that the outfall did not need to be added to Module VIII of the Hazardous Waste Facility Permit (EPA 1994, 40350, p. 2). DOE agreed and advised that the site would not be investigated further (DOE 1994, 40889, p. 8).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 2).

2.7.2 AOC 43-003, Waste Container Storage

AOC 43-003 was a waste container storage area located in TA-43.

- 1994: EPA indicated that the storage area did not need to be added to Module VIII of the Hazardous Waste Facility Permit (EPA 1994, 40350, p. 2), and DOE stated that the site would not be investigated further (DOE 1994, 40889, p. 8).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 2).

2.7.3 AOC 43-004, Carcass Storage

AOC 43-004 was a carcass storage area (freezers) located in TA-43.

- 1994: EPA indicated that the storage area did not need to be added to the Module VIII of the RCRA permit (EPA 1994, 40350, p. 2). DOE agreed and advised that the site would not be investigated further (DOE 1994, 40889, p. 4).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 2).

2.7.4 AOC 43-005, Radioactive Liquid Storage

AOC 43-005 was a radioactive liquid waste storage area located in TA-43.

- 1994: EPA indicated that the storage area did not need to be added to Module VIII of the Hazardous Waste Facility Permit (EPA 1994, 40350, p. 2), and DOE stated that the site would not be investigated further (DOE 1994, 40889, p. 8).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 2).

2.8 TA-61, East Jemez Site

2.8.1 AOC 61-004(b), Septic Tank

AOC 61-004(b) is an inactive septic tank (6 ft by 8 ft by 6 ft deep, with a corrugated tin roof covered with concrete) approximately 1 ft below the surface on the south side of East Jemez Road. The site is located approximately seven-tenths of a mile east of the intersection of East Jemez Road and Diamond Drive. The tank was never removed.

- 1993: AOC 61-004(b) was proposed for NFA in the 1993 RFI work plan for OU 1114 (LANL 1993, 20947, p. 6-42).
- 1994: EPA approved the work plan and NFA proposal (EPA 1994, 38813).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 88464, p. 5).

3.0 TA-00

3.1 Background

TA-00 includes all Laboratory-related operations and sites outside former or current Laboratory boundaries. These sites are geographically separated and scattered across the Pajarito Plateau in the northern part of Los Alamos County and in adjacent Santa Fe County. The TA-00 sites included in Upper Los Alamos Canyon Aggregate Area are located in Los Alamos Canyon and the Los Alamos townsite.

One SWMU and four AOCs located in TA-00 are addressed below.

- SWMU 00-017 consists of industrial waste lines.
- AOC 00-031(a) is the potentially contaminated soil beneath a former service station of the Zia Company.
- AOC 00-031(b) is the potentially contaminated soil beneath two underground storage tanks (USTs) of the former Zia Company motor pool facility.
- AOC 00-034(b) is an aboveground surface disposal area.
- AOC C-00-042 is the site of a 2500-gal. steel waste-oil UST of the former Zia Company motor pool facility.

The SWMU and AOCs in TA-00 are shown in Figure 3.1-1.

3.1.1 Operational History

SWMU 00-017 is part of the underground industrial waste lines, and AOCs 00-031(a), 00-031(b), and C-00-042 are associated with the operations of the Zia Company. Operational history is presented separately for these two categories of sites. No operational history is associated with AOC 00-034(b).

3.1.1.1 Underground Industrial Waste Lines

In 1943, the Laboratory began to install underground industrial waste lines. Throughout the Laboratory, 39,000 ft of underground liquid waste lines and associated sumps and pumps were used to transport waste generated by Laboratory operations to various treatment facilities. The lines and associated structures became contaminated. Leaks occurred in the sumps and waste lines. The estimated operation period for the majority of these waste lines is from 1950s to 1970s.

Two main industrial waste lines were located at TA-00. The first main line originated in TA-01, in the south-central part of the townsite, and ran northward to the TA-45 treatment plant at the rim of Acid Canyon. The second ran from TA-03 down into Los Alamos Canyon under Omega Bridge and up the north side of the canyon. A branch line starting from the north of the Health Research Laboratory (HRL) building ran parallel to the main line and joined the main line near the intersection of Trinity Drive and Diamond Drive. The second main line continued northeast to a point north of Canyon Road, where it turned eastward, eventually terminating at the TA-45 treatment plant. Former lines 167, 170, and 171 are three segments of the industrial waste lines (Elder et al. 1986, 06666, pp. 36–37). Former line 167 ran south to north from TA-03 to the edge of Los Alamos Canyon, then down the canyon side to manhole Unassigned Land Reserve (ULR) 33 located at the bottom of the canyon, and then up the other side of the canyon to the mesa top. Line 170 is a 200-ft section that runs north of the HRL to manhole ULR-61. Line 171 is a 365-ft section that runs from manhole ULR-61 to manhole ULR-60 (Figure 3.2-1).

Initially, the industrial waste lines transported process chemicals and radiochemical wastes to Acid Canyon, a small tributary of Pueblo Canyon (Elder et al. 1986, 06666, pp. 3-6). Starting in 1952, the waste was monitored for gross-alpha activity and was routed to either Acid Canyon or the TA-45 treatment plant, based on its activity level as compared with the then-permissible levels for release to the environment (Elder et al. 1986, 06666, p. 4). Between 1953 and 1963, wastes from TA-03 flowed into the system through line 167; wastes from HRL in TA-43 were piped into the system through lines 170 and 171. During this time, many of the TA-01 facilities were transplanted to TA-03. In 1958, wastes from TA-48, the radiochemistry site south of Los Alamos Canyon, entered the system. After 1963, waste from TA-03 and TA-48 was sent to the new radioactive liquid waste treatment facility at TA-50 [SWMU 50-001(a)]; TA-43 wastes were rerouted to the sanitary sewer system. Decommissioning of TA-01 was completed in 1965. These changes eliminated the need for the industrial wastes lines from TA-03, TA-01, TA-43, and TA-48 to TA-45. These industrial waste lines became inactive.

Plutonium was the primary contaminant from TA-03 and TA-48 that entered the waste line. The radioactive waste generated at HRL in TA-43 did not enter the liquid waste line, except for phosphorus-32, which has a half-life of 14.3 days. Organic chemical wastes that entered the waste line included alcohols and dyes/stains for cells (Wilson 1997, 58983).

Removal of the inactive industrial waste lines began in 1964. In 1964, the industrial waste line along Diamond Drive and at TA-01 was removed. In 1965, the industrial waste line from TA-01 to TA-45 was removed. In 1966 and 1967, most portions of the industrial waste lines on private land between TA-03 and TA-45 were removed (DOE 1979, 08897, p. 7). The line and excavated soil were monitored for alpha radiation. No radiochemical analyses were done on any samples (DOE 1979, 08897, p. 8).

In March 1977, an 11-week project was conducted to remove 1300 ft of waste line and associated structures from the Laboratory and Los Alamos County lands (DOE 1979, 08897, p. 1). The items removed were several manholes, a section of pipe under the north end of Omega Bridge, and a line section from west of the HRL building to a point past the intersection of Trinity Drive and Diamond Drive (DOE 1979, 08897, pp. 24–36). During the removal project, manhole ULR-60 was discovered to be contaminated and was removed (DOE 1979, 08897, p. 35). After decontamination, gross-alpha analyses of soil samples from the excavation were all less than or equal to 25 pCi/g. The inlet pipe from TA-43 had no detectable activity, so it was sealed with a concrete plug. The section between manholes ULR-60 and ULR-61 (line 171) was left in place. Contamination was also found in the base of manhole ULR-61 (DOE 1979, 08897, p. 35). The inlet and outlet pipes were sealed with cement, and manhole ULR-61 was left in place. During the final phase of the removal project, an area of contamination was found near manhole ULR-33, located north of Omega Road in Los Alamos Canyon, and cleanup was recommended (Ahlquist 1977, 09080).

During 1981 and 1986, line 167, the contaminated waste line through Los Alamos Canyon, was removed along with manhole ULR-33 and sections of the waste lines that had been left under roads in TA-00 (Elder et al. 1986, 06666, p. 36). Line 167 was secured to the walls of Los Alamos Canyon with five concrete anchors on each side. The uppermost anchor on the north side was removed, but the other nine anchors were left in place (Cox 1984, 30811; Montoya 1985, 07295). The 3-ft pipe sections between the anchors were removed. Sections of pipe about 3 ft long were left encased in each of the anchors. These sections were decontaminated, the ends were sealed with concrete, and the anchors were covered with soil to a depth of 1 ft above the ends of the sealed pipe. Soil samples were collected between the anchors and analyzed for gross-alpha activity. All levels were below the established industrial waste line guidelines of 25 pCi/g for surface soil (Elder et al. 1986, 06666, p. 8). Embedded alpha activity inside the pipe was also less than 25 pCi/g. Beta and gamma activities were at background levels (Cox 1984, 30811; Montoya 1985, 07295).

After these removal activities described above, lines 170 and 171 were the only sections of the industrial waste line known to remain in the townsite. Former line 167, former manhole ULR-33, and lines 170 and 171 are designated as SWMU 00-017 (LANL 1999, 64029, pp. 4–6).

3.1.1.2 The Zia Company Motor Pool Facility and Service Station

The Zia Company motor pool facility was located between Central Avenue and Trinity Drive east of 15th Street (Figure 3.1-1). In 1958, the motor pool facilities consisted of an automotive maintenance hangar and three other buildings (LANL 1990, 07511; LANL 1995, 46051, pp. 1, 4). Building 1 was the former vehicle maintenance shop, Building 2 was the former heavy equipment maintenance shop, and Building 3 was converted to a service station in 1959. The 1994 RFI discovered that Building 3 was not a service station but a vehicle and machinery maintenance and repair facility. In 1958, a surface storm drainage system was added to the area between the maintenance hangar and Building 1 and drained to the curb along Trinity Drive. The service station operated from approximately 1959 through the mid-1960s. In 1962, the automotive maintenance hangar was decommissioned and removed. The motor pool and service station property ownership was transferred to Los Alamos County in 1967 and later to private ownership between 1978 and 1980. In 1995, the Los Alamos National Bank purchased a majority of the property and began construction of a new bank.

Another service station operated by the Zia Company was located east of the Hilltop House Hotel on Trinity Drive at 4th Street (Figure 3.1-1). The service station operated through the early 1960s until the land was transferred to private ownership.

3.1.2 Data Overview

Samples from previous investigations were analyzed for inorganic chemicals, organic chemicals, and/or radionuclides either on-site by the Chemical Sciences and Technology (CST) Division at the Laboratory, or off-site by fixed laboratories, or both. Data obtained at on-site CST Division laboratories are screening-level quality data and are used only to select sampling locations and analytical suites; these data are not discussed and are not reported. Only data obtained from off-site fixed laboratories are discussed further. Concentrations of detected inorganic chemicals are compared with background values (BVs) and the ranges of the background concentrations (LANL 1998, 59730). The concentrations of detected organic chemicals are presented. The activities of detected radionuclides are compared with BVs or fallout values (FVs) and the ranges of the background/fallout activities for radionuclides (LANL 1998, 59730). These data are presented in their entirety in this report.

The environmental media sampled in previous investigations at TA-00 included soil, fill, sediment, and tuff. The investigation samples were collected in 1994, 1998, and 1999 (Table 3.1-1). Table 3.1-1 also presents each sample location, sampling depth, and suites analyzed.

3.2 SWMU 00-017, Waste Lines

SWMU 00-017 includes former line 167, former manhole ULR-33, and lines 170 and 171 (LANL 1999, 64029, pp. 4–6):

- Former line 167 and former ULR-33: A cast-iron line extended from the south edge of Los Alamos Canyon, just west of Omega Bridge, to former ULR-33 at the bottom of the canyon, then up the north side of the canyon wall. It was completely removed except for nine concrete anchors and 3-ft-long sections of pipe encased in each of the anchors. The anchors and the sections of pipe were left in place in 1984 and 1985 (Cox 1984, 30811; Montoya 1985, 07295) and are still there.
- Line 170: A 200-ft section of vitrified clay pipe (VCP) that runs east of the HRL to manhole ULR-61. It was left in place after the removal operations in 1977.
- Line 171: A 365-ft section of VCP that runs east from ULR-61 under the north wing of the Los Alamos Medical Center (LAMC) and then the parking lot to the location of former manhole ULR-60 (removed in 1977).

The site map of SWMU 00-017 is shown in Figure 3.2-1. Currently, the former location of line 167 on the canyon wall beneath the Omega Bridge is undeveloped. The location of line 170 is covered with asphalt parking lots and narrow landscaped areas in the parking lot medians. The location of line 171 is entirely covered by the parking lot and the LAMC. Both lines lie 15 to 20 ft underground.

3.2.1 Previous Investigations for SWMU 00-017

- 1998 and 1999: Phase I RFI was conducted at lines 170, 171, former line 167, and manhole ULR-33 to accurately determine the design, construction, location, and depth of the remaining sections of industrial waste lines and manholes and to define the nature and extent of contamination. The investigation consisted of a site survey, exploratory trenching, and subsurface and surface sampling. Samples were collected on the mesa top and Los Alamos Canyon portions of SWMU 00-017. During the data review, COPCs were identified separately for the mesa top and the canyon portions of the SWMU. Following the human health and ecological screening assessments, no analytes, except lead that came from the maintenance activity of the Omega Bridge, were retained as COPCs for the canyon portion of the

SWMU was therefore proposed for NFA (LANL 1999, 64029, pp. ES-2, 69). The human health and ecological screening assessments were not performed for the mesa-top portion of SWMU 00-017 because the depth at which the lines were buried precluded complete pathways for exposure to receptors. The mesa-top portion of the SWMU was proposed for NFA (LANL 1999, 64029, pp. ES-2, 68).

- 2000: NMED contended that SWMU 00-017 included only three line sections and ULR-33 but should include the entire underground acid/industrial waste line system (NMED 2000, 64365). The Laboratory withdrew the NFA proposal until the specific location(s) and components of the industrial waste line are identified and documented (LANL 2000, 66408, p. 1).

3.2.2 Data for SWMU 00-017

Forty soil, fill, sediment, and tuff samples were collected from 26 locations at SWMU 00-017 (Figure 3.2-1, Table 3.1-1). Samples from the 11 locations (00-10141, 00-10143 through 00-10146, and 00-10179 through 00-10184) at former line 167 were collected from depths of 0.1 to 9 ft. Samples from the 15 locations at lines 170 and 171 (00-10126 through 00-10140) were collected from depths of 12.5 to 27.5 ft, depending on the depth of the pipe. The suites analyzed for each sample are provided in Table 3.1-1.

Samples from 20 locations (00-10126 through 00-10141 and 00-10143 through 00-10146) were analyzed for cyanide and metals; samples from six locations (00-10179 through 00-10184) were analyzed only for lead. Analytical results indicated that aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, mercury, nickel, and vanadium were detected greater than BVs in at least one sample between 0.1 and 27.5 ft bgs (Figures 3.2-2 and 3.2-3, Table 3.2-1).

- Aluminum was detected at concentrations greater than the range of the background concentrations at eight locations (00-10126, 00-10132, 00-10134, 00-10135, 00-10136, 00-10137, 00-10138, and 00-10139); concentration was greater than the range of background concentrations in the only depth interval sampled at one location (00-10126); concentrations were greater than the range of background concentrations in the deepest interval sampled at six locations (00-10132, 00-10134, 00-10135, 00-10136, and 00-10137 through 00-10139); and concentrations stayed the same with depth at one location (00-10136).
- Antimony was not detected but the detection limits were greater than the range of the background concentrations or BV at 19 locations (00-10126 through 00-10140 and 00-10143 through 00-10146).
- Arsenic, beryllium, chromium, iron, and vanadium were detected within the range of the background concentrations.
- Barium was detected at concentrations greater than the range of the background concentrations at six locations (00-10132, and 00-10135 through 00-10139); concentrations were greater than the range of background concentrations in the deepest interval sampled at five locations (00-10132, 00-10135, and 00-10137 through 00-10139); and concentrations increased with depth at one location (00-10136).
- Cadmium was not detected, but the detection limits were greater than the range of the background concentrations at four locations (00-10143 through 00-10146).
- Calcium was detected at concentrations greater than the range of the background concentrations at four locations (00-10135 and 00-10137 through 00-10139); concentrations were greater than the range of background concentrations in the deepest interval sampled at all four locations.

- Cobalt was detected at concentrations greater than BV at six locations (00-10132 and 00-10135 through 00-10139); concentrations were greater than BV in the deepest interval sampled at five locations (00-10132, 00-10135, and 00-10137 through 00-10139); and concentrations stayed essentially the same with depth at one location (00-10136).
- Copper was detected at concentrations greater than the range of the background concentrations at six locations (00-10132 and 00-10135 through 00-10139); concentrations were greater than the range of background concentrations in the deepest interval sampled at five locations (00-10132, 00-10135 and 00-10137 through 00-10139); and concentrations stayed essentially the same with depth at one location (00-10136).
- Lead was detected at concentrations greater than the range of the background concentrations at 12 locations (00-10132, 00-10135 through 00-10137, 00-10143 through 00-10146, and 00-10180 through 00-10183); concentrations were greater than the range of the background concentrations in the deepest interval sampled at three locations (00-10132, 00-10135, and 00-10137); concentrations increased with depth at one location (00-10136); and concentrations were greater than the range of the background concentrations in the only depth interval sampled at eight locations (00-10143 through 00-10146, and 00-10180 through 00-10183). Lead was detected within the range of background concentrations at three locations (00-10138, 00-10139, and 00-10184).
- Magnesium was detected at a concentration greater than the range of the background concentrations in the deepest interval sampled at one location (00-10139). Magnesium was detected within the range of background concentrations at six locations (00-10132 and 00-10134 through 00-10138).
- Mercury was detected at concentrations greater than BV at three locations (00-10130, 00-10131, and 00-10133); concentrations decreased with depth. Mercury was not detected, but the detection limits were greater than BV at 19 locations (00-10126 through 00-10129, 00-10130 through 00-10132, 00-10134 through 00-10141, and 00-10143 through 00-10146).
- Nickel was detected at concentrations greater than the range of the background concentrations at five locations (00-10135 through 00-10139); concentrations were greater than the range of the background concentrations in the deepest interval sampled at four locations (00-10135, and 00-10137 through 00-10139); and concentrations stayed essentially the same with depth at one location (00-10136).
- Selenium was not detected but the detection limits were greater than the range of the background concentrations at 19 locations (00-10126 through 00-10140, and 00-10143 through 00-10146).
- Silver was not detected, but the detection limits were greater than the range of the background concentrations or BV at all 20 locations (00-10126 through 00-10141 and 00-10143 through 00-10146).
- Thallium was not detected, but the detection limits were greater than the range of the background concentrations or BV at 14 locations (00-10132 through 00-10141 and 00-10143 through 00-10146).

Samples from 20 locations (00-10126 through 00-10141 and 00-10143 through 00-10146) were analyzed polychlorinated biphenyls (PCBs), pesticides, and semivolatile organic compounds (SVOCs); samples from 17 locations (00-10126 through 00-10141, and 00-10146) were analyzed for volatile organic compounds (VOCs). No organic chemicals were detected.

Samples from 20 locations (00-10126 through 00-10141 and 00-10143 through 00-10146) were analyzed by gamma spectroscopy and for isotopic plutonium, isotopic uranium, and tritium. The analytical results indicated that americium-241, plutonium-238, plutonium-239, and tritium (soil FV not available) were detected at depths in soil/fill/tuff where FVs do not apply or were greater than the sediment FV, and uranium-235 was detected greater than BV, in at least one sample between 0.1 and 27.5 ft bgs (Figures 3.2-4 and 3.2-5, Table 3.2-2).

- Americium-241 was detected at one location (00-10131); its activities decreased with depth at this location.
- Plutnonium-238 was detected at two locations (00-10130 and 00-10131); its activities decreased with depth at both locations.
- Plutonium-239 was detected at eight locations (00-10128, 00-10130 through 10133, and 00-10144 through 00-10146); activities decreased with depth at five locations (00-10128, and 00-10130 through 00-10133). Plutonium-239 was also detected at the only depth interval sampled at three locations (00-10144 through 00-10146).
- Tritium was detected at five locations (00-10138, 00-10139, 00-10141, 00-10143, and 00-10145); activities decreased with depth at one location (00-10138); tritium was detected in the only sample measured for tritium at one location (00-10139) and in the only depth interval sampled at three locations (00-10141, 00-10143, and 00-10145).
- Uranium-235 was detected within the range of background activities.

3.3 AOC 00-031(a), Soil Contamination beneath Former Service Station

AOC 00-031(a) was designated as the potentially contaminated soil beneath a former service station east of the Hilltop House Hotel on Trinity Drive at 4th Street. The service station was operated by the Zia Company on property then-owned by the Atomic Energy Commission until the early 1960s (LANL 1990, 07511, p. 0-031; LANL 1992, 07667, p. 5-115). In the 1960s, the land was transferred from the Atomic Energy Commission into private ownership (LANL 1995, 50053). The Hilltop House was renovated in the late 1980s and three fiberglass tanks were installed northwest of the hotel to support new gas pumps at the north end of the hotel.

The Laboratory and DOE sent a letter to EPA in November 1995 requesting a deviation from the OU 1071 work plan (LANL 1994, 07667) for AOC 00-031(a) (LANL 1995, 50053). The letter indicated that an investigation of SWMU 0-031(a) was not warranted because after transfer of the subject land into private ownership, the land was subsequently used commercially for 20 yr (1968 to 1988) for storing substances now regulated by UST laws (LANL 1995, 50053). The EPA responded with a letter to the DOE indicating that AOC 00-031(a) was not listed on Module VIII of the RCRA permit and confirming that it was more appropriate that the UST be addressed by the NMED UST Bureau (EPA 1995, 85498). The Laboratory listed AOC 00-031(a) as one of 73 sites identified for NFA (LANL 1998, 59689, Table 2). The DOE concurred with the NFA recommendation (DOE 1998, 59694).

The site map of AOC 00-031(a) is shown in Figure 3.3-1. Currently, the location of the USTs is completely beneath an asphalt parking lot.

3.3.1 Previous Investigations for AOC 00-031(a)

No previous investigations have been conducted at AOC 00-031(a).

3.3.2 Data for AOC 00-031(a)

No off-site fixed laboratory data are available for this AOC.

3.4 AOC 00-031(b), Soil Contamination beneath Former Motor Pool (Two USTs)

AOC 00-031(b) is the potentially contaminated soil associated with the service station (Building 3) of the Zia Company motor pool facility. The service station, which operated from approximately 1959 through the mid-1960s, was located on Wall St. (currently Knecht Street) between Central Avenue and Trinity Drive. The two USTs were located to the east of the service station at approximately 12 ft below ground surface (bgs). The 1994 RFI determined that Building 3 was not a service station but a vehicle and machinery maintenance and repair facility (LANL 1996, 54913, p. 22).

The site map of AOC 00-031(b) is shown in Figure 3.4-1. Currently, the area formerly occupied by the AOC is located to the east of the Los Alamos National Bank and is covered by asphalt and concrete paving.

3.4.1 Previous Investigations for AOC 00-031(b)

In 1994, the Phase I RFI was conducted at AOC 00-031(b), which consisted of several components: two USTs (UST-1 and UST-2; an auxiliary pipe associated with UST-2; an area of soil bounded by a concrete curb; and a distribution line associated with UST-2. Field investigation included excavation and removal of UST-1 and UST-2 and characterization of the UST-2 auxiliary pipe, the concrete curb, and the UST-2 distribution line. Soils near UST-2 and the associated auxiliary pipe were contaminated with petroleum hydrocarbons and were subsequently excavated. Additional sampling defined the vertical and lateral extent of contamination. Investigation activities also defined the extent of petroleum hydrocarbons near the concrete curb and the distribution line associated with UST-2. The concrete curb area was excavated to remove contaminated soil until the concentrations of organic chemicals were below detection limits, except for benzo(a)pyrene. The excavated area was backfilled and compacted. Additional sampling to the south of the excavated area defined the vertical extent of contamination at the soil/tuff interface. Twelve boreholes were drilled at the distribution line to a maximum depth of 118 ft. Organic vapors were measured continuously, and a minimum of three soil samples was collected from each borehole. The bulk of the contamination was within a 30-ft radius of the source area. The vertical extent of contamination was limited to less than 115 ft bgs. The RFI report recommended NFA for AOC 00-031(b) (LANL 1996, 54913, pp. i, 73).

3.4.2 Data for AOC 00-031(b)

Ten soil and tuff samples were collected from five locations after excavation in the vicinities of the two USTs at depths from 0.33 to 80 ft (Figure 3.4-1, Table 3.1-1). Sampling locations 00-01588 and 00-01589 are located at former UST-2 distribution line. Sampling locations 00-01602, 00-01613, and 00-01614 are located at the concrete curb east of Building 3. The suites analyzed for each sample are provided in Table 3.1-1.

Samples from three locations (00-01588, 00-01589, and 00-01602) were analyzed for lead only, and samples from the other two locations (00-01613 and 00-01614) were analyzed for metals. The analytical results indicated that only cadmium was detected above BV in two samples between 1.8 and 2.2 ft bgs (Figure 3.4-2, Table 3.4-1).

- Antimony was not detected but the detection limits were greater than the range of the background concentrations at two locations (00-01613 and 00-01614).

- Cadmium was detected within the range of the background concentrations at two locations (00-01613 and 01-01614).
- Mercury was not detected, but the detection limit was greater than BV at one location (00-01613).

Samples from two locations (00-01613 and 00-01614) were analyzed for SVOCs. Analytical results indicated that benzo(a)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, fluoranthene, phenanthrene, and pyrene were detected in one sample (Figure 3.4-2, Table 3.4-2); they were detected in the only depth sampled at location 00-01614.

3.5 AOC 00-034(b), Landfill, Western Area

AOC 00-034(b) was a suspected pit identified from a 1946 aerial photograph; it was located on private property between Trinity Drive and Fairway Drive, east of 43rd Street. The pit was included in the OU 1071 RFI work plan, although no Laboratory documentation of the pit was found (LANL 1992, 07667, p. 5-133).

The site map of AOC 00-034(b) is shown in Figure 3.5-1. Currently, the land to the east of 43rd Street, between Trinity Drive and Fairway Drive, is a residential area with several residences built on it.

3.5.1 Previous Investigations for AOC C-00-034(b)

- 1997: An NFA report (LANL 1997, 59367) stated that based on interviews and aerial photograph examination, the identified pit was actually a staging area for soil or tuff fill material used for building roads and home sites in the privately owned western housing area and not used for land disposal of solid waste. The site was recommended for NFA (LANL 1997, 59367. p. 7).
- 1998: The Laboratory listed AOC 00-034(b) in 1998 as one of 73 sites identified for NFA because the site was never used for RCRA solid or hazardous waste or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) substances (LANL 1998, 59689, Table 2). DOE concurred with the NFA recommendations for the 73 sites (DOE 1998, 59694).

3.5.2 Data for AOC C-00-034(b)

No off-site fixed laboratory data are available for this AOC.

3.6 AOC C-00-042, Tank (Formerly Part of AOC 00-032)

AOC C-00-042 was a 2500-gal. steel waste-oil UST associated with the former automotive maintenance hangar at the Zia Company motor pool facility. The facility was located on Trinity Drive between 15th Street and the Los Alamos Credit Union. The automotive maintenance hangar was decommissioned and removed in 1962, and the land subsequently was transferred to Los Alamos County in 1967. After the demolition of the automotive maintenance hangar, the area was covered with fill material and asphalt. The UST was located at approximately 10 ft bgs, adjacent to a building currently on the site, but it was undiscovered until construction activities at the site in 1995 for the building of the Los Alamos National Bank building. There is no indication that subsequent landowners used the UST.

The site map of AOC C-00-042 is shown in Figure 3.4-1. Currently, the area formerly occupied by the AOC is located to the west of the Los Alamos National Bank building and is covered by asphalt and parking lot.

3.6.1 Previous Investigations for AOC C-00-042

In 1995, when discovered in August 1995, the UST was approximately half full of liquid and sludge. Liquid and sludge samples were collected and analyzed at the CST on-site laboratory for inorganic and organic chemicals. Analytical results indicated inorganic and organic chemicals were present in the liquid and sludge. A VCA was conducted to remove the tank. Upon excavation, the tank was found to be in good condition, but staining was observed in surrounding surface soil. Through VOC field-screening and observation, it was determined that the contaminated soil was limited to the west side of the tank. Affected soils were excavated, and soil samples were collected from the limits of the excavation to confirm that all contaminated soils were removed and that the nature and extent of contamination had been properly defined. Five confirmatory samples were collected from five locations at the bottom and sides of the excavation and analyzed at CST on-site laboratory for inorganic and organic chemicals. All analytes detected in confirmation samples were below their respective screening action levels (SALs). Screening samples were collected from the confirmatory sample material and analyzed at the mobile analytical laboratory to verify that contaminated soils had been removed and that the limits of the contamination had been reached. After the tank was removed, the excavation was backfilled with clean fill material and compacted. The UST area was released to the construction contractor following receipt of soil sample analytical results (LANL 1996, 54618, p. 6).

3.6.2 Data for AOC C-00-042

No off-site fixed laboratory data are available for this AOC.

4.0 TA-01, FORMER MAIN TECHNICAL AREA

4.1 Background

TA-01 is located on the southern portion of East Mesa and encompasses a portion of present-day Los Alamos townsite, roughly demarcated by Los Alamos Canyon (on the southern boundary), Central Avenue (on the northern boundary), 15th Street (on the eastern boundary), and the western reach of Timber Ridge Road (on the western boundary). The approximately 50-acre mesa-top area was the location of the initial Los Alamos Scientific Laboratory (LASL) from 1943 to 1965.

Consolidated Unit 01-001(a)-99 consists of 40 SWMUs and AOCs, 9 of which are administratively complete and addressed in Section 2. Thirty-one SWMUs/AOCs of Consolidated Unit 01-001(a)-99, AOC 01-003(c), SWMU 01-003(d), and AOC 01-007(k) are discussed below. The following is a brief description of these sites:

- SWMUs 01-001(a,b,c,d,e,f,g,o,s,t,u) consist of seven septic tanks [01-001(a,b,c,d,e,f,g)] and four sanitary waste lines [01-001(o,s,t,u)].
- SWMU 01-002 is the TA-01 industrial waste line. It consists of an extensive network of underground drains and pipelines that collected fluids from process buildings.
- SWMUs 01-003(a,b,d,e) and AOC 01-003(c) are landfills. SWMU 01-003(a) is the Bailey Bridge landfill, located at the head of Bailey Bridge Canyon. SWMU 01-003(b) and AOC 01-003(c) are surface disposal sites for construction debris that may have been below the north rim of Los Alamos Canyon. SWMU 01-003(d) is the Can Dump Site located on the hillside above the Los Alamos Canyon just south of the current U.S. West Communications Building. SWMU 01-003(e) is the surface disposal site southeast of Los Alamos Inn and is partly on the mesa top and partly on the Los Alamos Canyon hillside.

- SWMUs 01-006(a, b,c,d,h,n,o) and AOCs 01-006(e,g) are drain lines, storm drains, and their outfalls. Five are drain lines [01-006(a,b,c,d,e)], and four are storm drains [01-006(h,g,n,o)]. They either discharged directly into Los Alamos Canyon or released effluent onto the ground surface in the vicinity of the buildings they served.
- SWMUs 01-007(a,b,c,d,e j,l) and AOC 01-007(k) are areas of suspected subsurface soil contamination. Subsurface soil contamination may be present in soil and sediments beneath and adjacent to former TA-01 structures. Most of these locations are currently beneath paved roads, parking lots, commercial buildings, or townhouses, which compose a major portion of the present-day Los Alamos townsite. The suspected contamination may have resulted from original Laboratory operations or from demolition and removal of buildings.

These SWMUs and AOCs in TA-01 are shown in Plate 2.

4.1.1 Operational History

During U.S. participation in World War II (1941–1945), military strategists decided to develop a nuclear fission bomb. In 1942, Robert Oppenheimer was selected to head a developmental laboratory and direct the research effort on this project. Los Alamos, New Mexico, was identified as the location to establish the laboratory. On January 1, 1943, UC was selected to operate then new LASL under a formal, nonprofit contract with the Manhattan Engineer District of the Army Corps of Engineers. The activities to establish the nuclear weapon facility started on March 15, 1943.

Between 1943 and 1965, research work on nuclear weapons was carried out in TA-01. Basic chemical operations that occurred at TA-01 included chemical laboratory wet chemistry experimentation and wet and dry chemistry processing, including purification and recovery processes for uranium and plutonium. TA-01 also housed several physical operations, such as casting, machining, powder metallurgy, and metallurgical and solid materials procedures for shaping metals (radioactive as well as nonradioactive) and high explosives.

Experiments testing radioactive metals with the intent of finding an optimal initiator for a nuclear device were also conducted at TA-01. In the early weapons, polonium, with a half-life of 138 days, proved to be an ideal initiator, and numerous experiments were conducted on this metal. Once World War II ended, Laboratory efforts focused on perfecting fission bombs and investigating the efficacy of the superior fusion bomb. At this time, experimental work on tritium was accelerated at TA-01 with the intent of using it in a fusion bomb.

It was anticipated that facilities at TA-01 would be unable to process larger quantities of uranium and plutonium, so a new processing plant was constructed at Delta Prime (DP) site (TA-21, OU 1106). In September 1945, all plutonium-processing and recovery operations, with the exception of secondary recovery, were relocated to DP site. Large quantities of weapons-grade plutonium were never processed at TA-01.

Activities at TA-01 generated various hazardous and radioactive wastes. The waste management practices during the early years of the Laboratory were in accordance with standard practices of the time. However, the protection measures practiced in the early years of the Laboratory may have produced further radioactive or hazardous waste. Routine protective procedures, such as room air filtration for dust control of hazardous and radioactive particulate matter (including beryllium or plutonium) and the use of lead for shielding radioactivity, generated what are now classified as mixed wastes.

The industrial liquid waste of TA-01 was collected by a dedicated industrial waste line that was separate from sanitary waste lines. The industrial waste line led from TA-01 and discharged directly to Acid Canyon, a small branch of Pueblo Canyon, until 1951 when the waste was rerouted to the newly built TA-45 treatment plant.

The sanitary waste of TA-01 was collected by three sanitary systems that collectively served the western, northern, and eastern sections of TA-01. The western sanitary line system discharged into Acid Canyon and the upper reaches of Pueblo Canyon through septic tank 6 [SWMU 00-030(g)] (LANL 1992, 07667, p. 5-94). The northern sanitary waste line system discharged into Acid Canyon through septic tank 5 [SWMU 00-030(f)] near the industrial waste line outfall (LANL 1992, 07667, p. 5-94). The eastern sanitary waste line system conveyed waste to septic system 1 [SWMU 00-030(b)] located to the east of TA-01 (LANL 1992, 07667, p. 5-11). Additionally, individual septic tanks served several of the outlying buildings and discharged to Los Alamos Canyon.

Nonradioactive solid waste was burned in two on-site incinerators at TA-01. At least one incinerator, located outside TA-01, was used for combustion of TA-01 nonradioactive solid waste. Noncombustible and nonradioactive solid waste was transported to a landfill located outside of TA-01, near the present-day Los Alamos Airport [SWMU 73-001(a)]. No record exists of any radioactive solid waste landfill on the mesa top within the perimeter of TA-01.

From 1945 to 1965, operations at TA-01 gradually were relocated to new TAs. Phased decontamination and decommissioning (D&D) activities began at TA-01 in 1953 and continued through 1976 (Ahlquist et al. 1977, 05710, p. 21). The eastern portion of TA-01 was the first sector to undergo D&D. Structures razed during the 1953 to 1959 D&D effort included Buildings A, D, D-2, E, G, Gamma, H, M, ML, O, P, Q, R, S, T, U, V, W, Z, and Boiler House No. 2. Structures with residual radioactive contamination were removed to MDA C, located at TA-50. In some cases, combustible portions of the buildings were burned at TA-54, MDA G (LASL 1958, 63263; Davis and Miller 1964, 03517). Sections of the industrial waste line in the eastern portion of TA-01 were removed, along with contaminated concrete pads of the buildings associated with the industrial line. This work occurred from January 14 to September 9, 1959 (Buckland 1959, 03426).

Decommissioning and decontamination of the western sector of TA-01 was completed by December 1, 1965 (Ahlquist et al. 1977, 05710, p. 24). All building superstructures were demolished and removed. Contaminated cement flooring was excavated, but uncontaminated slabs and building foundations were monitored and left in place. Uranium-contaminated cement building debris with activity in excess of 2500 cpm was transported to an unspecified area outside of TA-01. Cement debris with activity of 2500 cpm or less was removed to Bailey Bridge Canyon and covered with soil (Buckland 1973, 58138, p. 2). Sections of the industrial waste line in the western portion of TA-01 were removed in 1964 and 1965, including all sections extending north from TA-01 to the Acid Canyon outfall located at TA-45 (Buckland 1973, 58138). By September 28, 1965, removal of the industrial waste line was reported to be complete (Buckland 1973, 58138).

From 1974 to 1979, the Ahlquist Radiological Survey was conducted, and decontamination was carried out in the entire TA-01 area. The final report discussed decontamination operations focused on three areas: areas with plutonium as the principal contaminant, areas related to former industrial waste line locations, and areas with uranium as the principal contaminant (Ahlquist et al. 1977, 05710, pp. 11–13).

Remediated areas with plutonium as the principal contaminant included septic tank 137 [SWMU 01-001(c)], septic tank 138 [SWMU 01-001(d)], vicinities of Buildings D and D-2 [SWMU 01-007(a,b)], and area to the north and west of Building D [SWMU 01-007(c)] (Ahlquist et al. 1977, 05710, pp. 47–80). Both septic tanks and surrounding soils were removed. The areas formerly occupied by the plutonium

chemistry and metallurgical research building (Building D) and the laundry for contaminated clothing (Building D-2) had a wide expanse of radioactive contamination (i.e., plutonium and tritium). Contaminated soil and rock were removed to depths of up to 4.6 m. The total volume of soil removed was approximately 7600 m^3 (Ahlquist et al. 1977, 05710, pp. 47–80). To level the ground after excavation, clean fill was brought in from construction activities at TA-53 and TA-55.

Remediated areas related to former industrial waste line locations included the vicinity of Buildings H and Theta [SWMU 01-007(d)] and eastern and western portions of the main industrial waste line [SWMU 01-002] (Ahlquist et al. 1977, 05710, pp. 80–98). In the vicinity of H Building, fluids from the industrial waste line had overflowed and surfaced. During the Ahlquist Radiological Survey, the area was sampled and excavated until reaching the location of the industrial waste line north of H Building. Two sections of highly contaminated, concrete-encased pipe that had served as lateral connections to the former industrial waste line north of Building H were removed. Approximately 470 m^3 of contaminated soil were removed, which also included excavations in a natural drainage course extending southwest from the vicinity of Buildings H and Theta toward the former location of Bailey Bridge. Because contamination had been detected at Buildings D and H, trenching was performed again at the former industrial waste line location from Building D to Trinity Drive (just north of Sigma Building). An approximate total of 1100 m^3 of contaminated soil was removed from the trench. Three contaminated manholes, or portions of these manholes, were also removed. Additional investigation took place near J-2 Building, which had been used for radiochemistry research on mixed fission products associated with weapons debris. A section of the J-2 Building industrial waste line was located and a 121-ft section of the contaminated pipe was removed. An area of surface contamination attributed to cesium-137 was found at the approximate location of a known leak that had occurred in the industrial waste line running from J-2 Building toward Trinity Drive. A total of approximately 440 m^3 of contaminated soil was removed from the excavation area near J-2 Building to address that leak.

Remediated areas with uranium as the principal contaminant included vicinities of Buildings HT [SWMU 01-007(p)], Sigma [SWMU 01-007(e)], Delta [SWMU 01-007(f)], Warehouse 19 [SWMU 01-007(g)], TU [SWMU 01-007(h)], septic tank 140 [SWMU 01-001(f)], and the warehouse area [AOC 01-007(i)] (Ahlquist et al. 1977, 05710, pp. 98–113). The total volume of soil removed from these areas was approximately 4000 m^3.

The Ahlquist Radiological Survey also located miscellaneous small areas of surface contamination throughout the TA-01 site [SWMU 01-007(j)] (Ahlquist et al. 1977, 05710, p. 13). The contaminated soils were removed by hand-shoveling.

At the end of the Ahlquist Radiological Survey, approximately 15,000 m^3 of materials was removed from all TA-01 excavation and buried at the LASL solid radioactive waste disposal site (Ahlquist et al. 1977, 05710, p. 13). A fence along the DOE property line was constructed to prevent public entry to some contamination remaining on DOE property adjacent to the TA-01 site.

After the 1974–1976 Ahlquist Radiological Survey, increased residential and commercial development formed the townsite of Los Alamos and continues today.

Under new environmental laws and regulations, TA-01 was evaluated to determine the effectiveness of previous Laboratory decontamination efforts. Based on the SWMU report (LANL 1990, 07511), an RFI work plan was completed in 1992, which identified 68 SWMUs and AOCs in TA-01 (LANL 1992, 43454). The goal of the 1992 work plan was to verify the adequacy of past cleanup efforts and to perform a risk-driven, cost-effective investigation that would provide sufficient information for the selection of corrective measures, if necessary. Specifically, the 1992 work plan proposed phased investigation and sequential sampling to first identify SWMUs for sampling, after which quantitative risk assessments based on Phase

I data to initiate Phase II sampling could be performed, if needed. Two sampling strategies were proposed and implemented through the RFI following the work plan. One strategy guided the sampling of SWMUs principally located along the hillsides of Los Alamos Canyon; the other guided the sampling of SWMUs principally located on the mesa top.

The 68 SWMUs identified at TA-01 were organized into 16 aggregates (A through P) based on geographic location, the same conceptual exposure model and receptors, or a common drainage area. During the 1990s, Phase I RFIs were conducted throughout the TA-01 area, and the investigation results were presented in the following RFI reports:

- "RFI Report for Potential Release Sites, Aggregates A, B, H, I, and J," March 1996 (LANL 1996, 54461)
- "RFI Report for Potential Release Sites, Aggregates C and D," March 1996 (LANL 1996, 54467)
- "RFI Report for Solid Waste Management Units, Aggregates E and G," March 1996 (LANL 1996, 54465)
- "RFI Report for Solid Waste Management Units, Aggregate F," August 1995 (LANL 1995, 49703)
- "RFI Report for Potential Release Sites, Aggregates K, L, M, and O," April 1996 (LANL 1996, 54463)
- "RFI Report for Phase II RFI, Aggregates N and P," September 1997 (LANL 1997, 56660.112)

Work in the 1990s also included the following:

- a VCA at the Hillside 140 septic outfall [SWMU 01-001(f)] (LANL 1996, 53797)
- a VCA at Can Dump Site [SWMU 01-003(d)] (LANL 1996, 55029)
- a field summary report of the western sanitary waste line (WSWL), location 1A, SWMU 01-001(s), TA-01 (LANL 1995, 66456)
- an interim action at WSWL [SWMU 01-001(s)] (LANL 1996, 62538)
- an interim action at Hillside 138 [SWMU 01-001(d)] (LANL 1997, 56908)

4.1.2 Data Overview

Samples from previous investigations were analyzed for inorganic chemicals, organic chemicals, and/or radionuclides either on-site by the CST Division at the Laboratory, or off-site by fixed laboratories, or both. Data obtained at on-site CST Division laboratories are screening-level quality data and are used only to select sampling locations and analytical suites; these data are not discussed and are not reported. Only data obtained from off-site fixed laboratories are discussed further. Concentrations of detected inorganic chemicals are compared with BVs and the ranges of the background concentrations (LANL 1998, 59730). Concentrations of detected organic chemicals are presented. Activities of detected radionuclides are compared with BVs or FVs and the ranges of the background/fallout activities for radionuclides (LANL 1998, 59730). These data are presented in their entirety in this report.

The environmental media sampled in previous investigations at TA-01 included soil, fill, sediment, and tuff. The investigation samples were collected in 1992 through 1994, and 1996 (Table 4.1-1). Table 4.1-1 also presents each sample location, sampling depth, and the suites analyzed.

4.2 SWMU 01-001(a), Septic Tank 134

Septic tank 134, 5 ft by 9 ft by 5.67 ft deep, made of reinforced concrete and installed in 1945 (LANL 2001, 69946, p. 35), was located south of the sheet metal shop (01-104). It served Warehouse 19 (01-103) and the sheet metal shop from 1949 to 1964. Two separate sanitary waste lines from the two buildings fed into the septic tank and the effluent discharged through an outfall to Bailey Bridge Canyon. Warehouse 19 was used to store unknown nonradioactive materials. The concrete floor of the sheet metal shop was radioactively contaminated and was removed to Bailey Bridge Canyon and covered with dirt (Montoya 1965, 03711). Part of the floor drain of the sheet metal shop was dug out and found to have no radiological contamination. The rest of the floor drain was left in place (Montoya 1965, 03711).

The site map of SWMU 01-001(a) is shown in Figure 4.2-1. Currently, the location of the former pipelines on mesa top is landscaped with grass and trees.

4.2.1 Previous Investigations for SWMU 01-001(a)

- 1975: The tank had no evidence of any radiological contamination and was removed and disposed of at MDA G in September 1975 (Ahlquist et al. 1977, 05710, p. 119).
- 1992: During the Phase I RFI at the Bailey Bridge Canyon rim, sampling was conducted along the rim. However, all the samples were composite and cannot be used. The outfall area was most likely not sampled because no contamination was found in the tank during the Ahlquist Radiological Survey.
- 1996: The RFI report recommended NFA for SWMU 01-001(a) (LANL 1996, 54461, pp. I, 81).
- 1997: In response to NMED's request for subsurface sampling at the SWMU 01-001(a), the Laboratory agreed to collect subsurface samples near the locations of previous sampling (LANL 1997, 57294, pp. 7–8).

4.2.2 Data for SWMU 01-001(a)

No off-site fixed-laboratory data are available for this SWMU.

4.3 SWMU 01-001(b), Septic Tank 135

Septic tank 135, 7 ft by 3.5 ft by 5 ft deep, made of reinforced concrete, was installed in 1950 (LANL 2001, 69946, p. 35). It served Buildings FP and M-1 through a single sanitary waste line and discharged to Los Alamos Canyon. Building FP, a wood-frame and steel building 40 ft by 122 ft by 20 ft high and constructed in 1945 (LANL 2001, 69946), was a foundry for nonradioactive and nonferrous metals (Ahlquist et al. 1977, 05710, p. 129). Building M-1, 70 ft by 32 ft with a concrete floor (LANL 2001, 69946), was completed in 1950 to machine lithium and later to machine uranium-238 (Ahlquist et al. 1977, 05710, p. 133).

The site map of SWMU 01-001(b) is shown in Figure 4.3-1. Currently, the locations of the branch line and the majority of the main line are under pavement and buildings of Ridge Park Village.

4.3.1 Previous Investigations for SWMU 01-001(b)

- 1964: Building FP was determined to be free of radioactive contamination and removed (Buckland 1964, 04810; Ahlquist et al. 1977, 05710, p. 39). The building superstructure of M-1 was also determined to be free of contamination, but the floor drains were suspected to be

radioactively contaminated (Buckland 1964, 04811; LASL 1964, 04828). The drains were removed and disposed of in an unspecified area outside of TA-01.

- 1974 to 1976: The Ahlquist Radiological Survey found that the sanitary waste line and the tank were not radioactively contaminated. The tank was removed during the survey, but the drain lines were left in place (Ahlquist et al. 1977, 05710, pp. 119–120).
- 1992: Phase I RFI was conducted and three surface soil samples and a quality control (QC) sample were collected from the canyon rim and hillside areas near the outfall of septic tank 135 (Figure 4.3-2). These samples were submitted to off-site fixed laboratories and analyzed for inorganic chemicals, SVOCs, and isotopic plutonium. Although a few polycyclic aromatic hydrocarbons (PAHs) were identified at concentrations greater than SALs, the human risk assessment indicated that these chemicals do not present an unacceptable risk to human health.
- 1996:The RFI Report recommended NFA for SWMU 01-001(b) (LANL 1996, 54467, pp. ii, 84).

4.3.2 Data for SWMU 01-001(b)

Samples analyzed at off-site fixed laboratories include three soil samples collected from three locations at SWMU 01-001(b) (Figure 4.3-1, Table 4.1-1). These locations were clustered around the former septic tank and were sampled from only one depth interval (between 0 and 0.5 ft bgs). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from three locations (01-01162, 01-01168, and 01-01174) were analyzed for metals. Analytical results indicated that chromium, lead, and mercury were detected greater than BVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.3-2, Table 4.3-1).

- Antimony, silver, thallium, and uranium were not detected, but their detection limits were greater than the range of the background concentrations or the soil BV for silver at all three locations (01-01162, 01-01168, and 01-01174).
- Cadmium and selenium were not detected, but their detection limits were within the range of the background concentrations.
- Chromium and lead were detected at concentrations greater than the range of background concentrations in the only depth interval sampled at one location (01-01168).
- Mercury was detected at a concentration greater than BV in the only depth interval sampled at one location (01-01162).

Samples from three locations (01-01162, 01-01168, and 01-01174) were analyzed for SVOCs. Analytical results indicated that acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, methylnaphthalene[2-], naphthalene, phenanthrene, and pyrene were detected in at least one sample between 0 and 0.5 ft bgs (Figure 4.3-2, Table 4.3-2).

- Acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene were detected in the only depth interval sampled at two locations (01-01162 and 01-01168).
- Dibenz(a,h)anthracene and methylnaphthalene[2-] were detected in the only depth interval sampled at one location (01-01168).

Samples from three locations (01-01162, 01-01168, and 01-01174) were analyzed for isotopic plutonium. Isotopic plutonium was not detected or detected greater than FV.

4.4 SWMU 01-001(c), Septic Tank 137

Septic tank 137, 3 ft by 6 ft by 5 ft deep, made of reinforced concrete, was installed in 1947 (LANL 2001, 69946, p. 36; Ahlquist et al. 1977, 05710, p. 49) to serve Building D-2, an electronic shop (Ahlquist et al. 1977, 05710, p. 128). Building D-2 had been used as a laundry for radioactively contaminated clothing and recyclable equipment until the laundry operations were relocated to TA-21 in 1945 (Ahlquist et al. 1977, 05710, p. 49). The outfall discharged over the canyon rim and the hillside is now designated Hillside 137.

The site map of SWMU 01-001(c) is shown in Figure 4.4-1. Currently, this area is undeveloped.

4.4.1 Previous Investigations for SWMU 01-001(c)

- 1975: Septic tank 137 was located and turned out to be a cylindrical metal tank containing water and sludge (Ahlquist et al. 1977, 05710, p. 47). The tank and its outfall pipe were removed and disposed of at MDA G (LASL 1976, 08935, pp. 3, 5). During the excavation and removal of the tank, high levels of gross-alpha activity were detected in the surrounding soil, which led to subsequent removal of surface debris and soil throughout the area around Building D-2 and around septic tank 137 (Ahlquist et al. 1977, 05710, pp. 47-49).
- 1992 and 1993: Phase I RFI activities were conducted and both surface and subsurface samples were collected near the SWMU area. Samples were analyzed at the CST on-site laboratory for silver, uranium, SVOCs, isotopic plutonium, and isotopic uranium. Only inorganic chemicals were analyzed at an off-site fixed laboratory. No constituent was detected at concentrations greater than SAL.
- 1996: The RFI report recommended NFA for SWMU 01-001(c) (LANL 1996, 54465, pp. iv, 119).

4.4.2 Data for SWMU 01-001(c)

Samples analyzed at off-site fixed laboratories included three surface soil and fill samples (0 to 0.5 ft) collected from three locations at SWMU 01-001(c), near the tank and in the outfall area (Figure 4.4-1, Table 4.1-1). These samples were analyzed for metals only.

Samples from three locations (01-03003, 01-03015, and 01-03023) were analyzed for metals. Analytical results indicated that lead and selenium were detected greater than BVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.4-2, Table 4.4-1).

- Antimony and thallium were not detected, but their detection limits were greater than the range of the background concentrations at all three locations (01-03003, 01-03015, and 01-03023).
- Cadmium was not detected, but the detection limits were within the range of the background concentrations.
- Lead was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-03015).
- Selenium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at all three locations (01-03003, 01-03015, and 01-03023).

4.5 SWMU 01-001(d), Septic Tank 138

Septic tank 138, 3 ft by 6 ft by 5 ft deep, made of reinforced concrete, was installed in 1943. It was located southeast of Building Y and served Buildings K, V, and Y. Building K was a chemical stock room that contained a mercury still. Building V housed the original TA-01 uranium and beryllium machine shop. Dry-grinding of boron was also conducted in Building V. Building Y housed a physics laboratory that handled tritium, uranium-238, and polonium-210. The buildings were connected to septic tank 138 by one sanitary waste line. The outfall was located east of Building Y and discharged over the rim of Los Alamos Canyon. This outfall area is known as Hillside 138.

The site map of SWMU 01-001(d) is shown in Figure 4.5-1. Currently, the location of the former pipelines and septic tank is privately owned and commercially developed with buildings and asphalt parking lot. The outfall is undeveloped land owned by DOE.

4.5.1 Previous Investigations for SWMU 01-001(d)

- 1974 to 1976: Septic tank 138 and surrounding soil were removed during the Ahlquist Radiological Survey. No radiological contamination was found in the septic tank, broken pipe shards from the inlet line, or in the outlet line; therefore, the inlet line, located beneath an office building, was left in place (Ahlquist et al. 1977, 05710, p. 79). Samples collected from Hillside 138 indicated elevated levels of plutonium-239 and cesium-137; however, the hillside was not decontaminated during the survey because it was inaccessible. The area was fenced to prevent public access from the mesa top (Ahlquist et al. 1977, 05710, p. 80).
- 1992 to 1994: Both the canyon rim area and Hillside 138 of SWMU 01-001(d) were extensively sampled in the Phase I RFI. The hillside area included the entire Hillside 138 drainage pathway from the mesa top to the canyon bottom. Surface and subsurface soil samples were collected and the majority were analyzed at the CST on-site laboratory for inorganic chemicals, SVOCs, cesium-137, isotopic plutonium, and isotopic uranium. Stormwater samples were also collected and analyzed for selected inorganic chemicals and radionuclides. The human health screening assessment identified five COPCs in the soil (i.e., cesium-137, lead, mercury, plutonium-238, and plutonium-239/240) and four COPCs in the stormwater runoff (i.e., chromium, lead, mercury, and plutonium-239/240). The RFI report recommended NFA for SWMU 01-001(d) because a human health assessment indicated risk below the level of concern (LANL 1995, 49703, pp. vii, 95).
- 1996 and 1997: Interim action activities were implemented to address concerns of the New Mexico Surface Water Quality Bureau regarding water quality near the site (LANL 1997, 56908). This concern was based on the potential for residual contaminants associated with the lower outfall and bench area to migrate to a nearby stormwater drainage that flows to the main watercourse in Los Alamos Canyon. Remediation activities consisted of installing interim stormwater and pollution controls, establishing a correlation between field measurements and analytical data, removing contaminated soil, implementing final stabilization measures, and initiating a stormwater-monitoring program. Approximately 20 yd^3 of mercury-contaminated soil was removed from the cliff below the upper bench area and the lower bench area. Erosion control blankets were put in place over all disturbed areas and an earthen berm was constructed on the down-gradient side of the stabilized site. A monitoring program was initiated during a precipitation event, and samples were collected from the stormwater drainage. Confirmation samples were collected, screened for radiation, and then submitted to an off-site fixed laboratory for analyses of mercury and lead. These confirmation samples resulted in further excavation; therefore, the soil these samples represented is no longer in place. Only one of the confirmation samples contained mercury above the cleanup level. The interim action report concluded that the completion of field

activities greatly reduced the potential migration of contaminants from the site to the stormwater drainage and ultimately to Los Alamos Canyon (LANL 1997, 56908, p. 1).

4.5.2 Data for SWMU 01-001(d)

Among the samples collected in Phase I RFI, three soil samples were analyzed at off-site fixed laboratories. They were collected from two locations in the outfall at SWMU 01-001(d) at depths of 0 to 1.83 ft (Figure 4.5-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1.

The sample from location 01-05028 was analyzed only for mercury. Mercury was not detected at a concentration greater than BV.

Samples from location 01-05219 were analyzed for isotopic plutonium. The analytical results indicated that plutonium-239 was detected greater than FV or at depths where FV does not apply between 0 and 1.83 ft bgs (Figure 4.5-2, Table 4.5-1). Plutonium-239 was detected at an activity greater than the range of the fallout activities and was also detected in a deeper depth interval at this location; its activities decreased with depth.

4.6 SWMU 01-001(e), Septic Tank 139

Septic tank 139, 3 ft by 6 ft by 5 ft deep, made of reinforced concrete and installed in 1944 (LANL 2001, 69946, p. 36), served D-5 Sigma vault, Building I, and Delta Building. D-5 Sigma vault was used to store plutonium-239 and uranium-235. Building I was used to store and machine beryllium between 1947 and 1958. Delta Building was used as a meeting place and a laboratory where fission-product tracers were used. The outfall of the tank discharged southeast of Building I and D-5 Sigma vault at the head of Bailey Bridge Canyon. The tank became inactive and was left in place in 1965 (Ahlquist 1977, 03270, p. 135).

The site map of SWMU 01-001(e) is shown in Figure 4.6-1. Currently, the entire SWMU area is under Oppenheimer Drive or residential buildings and their yards, driveways, and sidewalks.

4.6.1 Previous Investigations for SWMU 01-001(e)

- 1974 to 1976: The tank was not found during the Ahlquist Radiological Survey (Ahlquist 1977, 03270, p. 113). The survey showed minimal radiological contamination near the former D-5 Sigma vault, and no more soil was removed. The Ahlquist Report concluded that the tank had been removed; the records were incorrect because an outlet pipe was located where the tank should have been located and the earth appeared to be fill material (Ahlquist 1977, 03270, p. 113).
- 1996: Phase I RFI was not conducted at SWMU 01-001(e) because the SWMU is under one of the Los Arboles condominium buildings. Also, because the Ahlquist report concluded that the tank had been removed, the RFI report recommended NFA for SWMU 01-001(e) (LANL 1996, 54461, pp. i, 81).
- 1997: NMED requested sampling at the outfall area and the tank's associated pipe line (LANL 1997, 57294, p. 11). The Laboratory's response stated that the area is inaccessible because the outfall area was covered with several feet of fill, and housing was built over the outfall area and the area the tank and lines once occupied. If the pipe was not removed in 1976, it may have been removed during the construction of the condominium buildings. Additionally, two soil samples were collected in 1976 adjacent to and downstream from the outfall area, and all constituents in those samples were detected at levels less than SALs (LANL 1997, 57294, p. 11).

4.6.2 Data for SWMU 01-001(e)

No off-site fixed-laboratory data are available for this SWMU.

4.7 SWMU 01-001(f), Septic Tank 140

Septic tank 140 was 3 ft by 6 ft by 5 ft deep, made of reinforced concrete, and installed in 1945 (LANL 2001, 69946, p. 36); it was located west of Building K-1 and served Buildings HT and FP. Building HT was used to heat-treat and machine natural and enriched uranium. The heat treatment operations could have contributed radioactive waste to the tank. Building FP was a foundry for nonradioactive and nonferrous metals and was not radiologically contaminated (Buckland 1964, 04810; Ahlquist et al. 1977, 05710, p. 39). The septic system outfall discharged into Los Alamos Canyon to an area known as Hillside 140.

The site map of SWMU 01-001(f) is shown in Figure 4.7-1. Currently, the entire mesa-top area of the SWMU is developed, and the locations of the former pipelines are under the pavement and buildings of Ridge Park Village. Currently, the location of the former septic tank is partially covered by a building. The outfall is undeveloped land owned by DOE.

4.7.1 Previous Investigations for SWMU 01-001(f)

- 1974 to1976: During the Ahlquist Radiological Survey, the tank was found to be filled with sludge that had 60,000 cpm of uranium activity (Ahlquist et al. 1977, 05710, p. 111). Both inlet and outlet lines were contaminated. The tank, its inlet and outlet lines, and approximately 351 yd^3 of surrounding soil were removed in 1975 (Ahlquist et al. 1977, 05710, pp. 40, 111). Associated contaminated soil was removed to below phoswich-detection limits. Of the 56 soil samples taken from the pit or trenches, only 5 had gross-alpha activity > 20 pCi/g, with maximum activity being 48 pCi/g. Although the mesa-top area of septic tank 140 was determined to be decontaminated, steep terrain prevented the removal of all known contamination to the west of the outlet excavation (Ahlquist et al. 1977, 05710, p. 111).
- 1992 and 1993: Both the canyon rim area and Hillside 140 of SWMU 01-001(f) were extensively sampled during the Phase I RFI activities. The hillside area included the entire drainage pathway for Hillside 140 from the mesa top to the canyon bottom. Samples were analyzed at the CST on-site laboratory for inorganic chemicals, SVOCs, cesium-137, isotopic plutonium, and isotopic uranium. Samples were also analyzed at off-site laboratories for inorganic chemicals, SVOCs, and isotopic plutonium. Stormwater samples were collected along the primary drainage pathway of Hillside 140 and analyzed for selected inorganic chemicals and radionuclides. Ten COPCs in soil samples [total uranium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, uranium-234, uranium-235, and uranium-238] and two in stormwater samples (lead and total uranium) were identified. The results of human health risk screening assessment indicated that potential exposure to COPCs (lead and uranium) in soils at Hillside 140 should not result in adverse noncarcinogenic health effects. The dose estimates are below the target dose limit of 15 mrem/yr, indicating that exposure to isotopic uranium by a trail user at Hillside 140 does not pose an unacceptable dose (LANL 1996, 54467, p. 84).
- 1996: The RFI report recommended NFA for SWMU 01-001(f) (LANL 1996, 54467, pp. ii, 84).
- 1996: Although the RFI report concluded that the elevated total uranium concentrations do not pose any risk to human health, a VCA was conducted at the outfall area of SWMU 01-001(f) as a

best management practice (BMP) because of the site's proximity to the Ridge Park Village condominiums. The site was first surveyed for radiation, and a correlation was then established between uranium concentrations and the Ludlum radiation detection instrument. A cleanup level of 6000 cpm (as measured by the Ludlum instrument) was used in the field. The contaminated soil identified by real-time screening was excavated. Excavation was conducted at the surface and at depths where contamination was found. The total volume of soil removed from Hillside 140 was approximately 15 yd^3. Verification sampling was not required because cleanup activities were driven by the use of real-time radiological screening data. The VCA report formally requested that this site no longer be considered a SWMU (LANL 1996, 53797, p. 3).

4.7.2 Data for SWMU 01-001(f)

Among the samples collected in the Phase I RFI, six surface soil samples collected from six locations in the outfall area of SWMU 01-001(f) at depths of 0 to 0.5 ft were analyzed at off-site fixed laboratories. (Figure 4.7-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1. These sample locations were not excavated during the 1996 VCA activities.

Samples from six locations (01-01083, 01-01090, 01-01095, 01-01096, 01-01110, and 01-01112) were analyzed for metals. Analytical results indicated that cadmium, lead, mercury, selenium, thallium, and uranium were detected greater than BVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.7-2, Table 4.7-1).

- Antimony and silver were not detected, but their detection limits were greater than the range of the background concentrations or BV at all six locations (01-01083, 01-01090, 01-01095, 01-01096, 01-01110, and 01-01112).
- Cadmium was detected within the range of the background concentrations at one location (01-01110).
- Lead was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at two locations (01-01095 and 01-01110).
- Mercury was detected at a concentration greater than BV in the only depth interval sampled at all six locations (01-01083, 01-01090, 01-01095, 01-01096, 01-01110, and 01-01112).
- Selenium was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-01110). Selenium was not detected, but the detection limits were greater than the range of the background concentrations at two locations (01-01083 and 01-01095).
- Thallium was not detected but the detection limits were greater than the range of the background concentrations at three locations (01-01083, 01-01090, and 01-01096). Thallium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at three locations (01-01095, 01-01110, and 01-01112).
- Uranium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at four locations (01-01095, 01-01096, 01-01110, and 01-01112). Uranium was not detected, but the detection limits were greater than the range of the background concentrations at two locations (01-01083 and 01-01090).

Samples from six locations (01-01083, 01-01090, 01-01095, 01-01096, 01-01110, and 01-01112) were analyzed for SVOCs, and none were detected.

Samples from three locations (01-01083, 01-01090, and 01-01110) were analyzed for isotopic plutonium. Analytical results indicated that plutonium-239 was detected greater than FV in one sample between 0 and 0.5 ft bgs (Figure 4.7-3, Table 4.7-2). It was detected at an activity greater than the range of the fallout activities in the only depth interval sampled at one location (01-01110).

4.8 SWMU 01-001(g), Septic Tank 141

Septic tank 141, 3 ft by 6 ft by 5 ft deep and installed in 1943 (LANL 2001, 69946, p. 37), was located south of Building X near the edge of Los Alamos Canyon and served Building X. Radioactive targets were tested in Building X. The tank received sanitary waste from Building X through one sanitary waste line. The outfall discharged over the rim of the canyon.

The site map of SWMU 01-001(g) is shown in Figure 4.8-1. Currently, the location of the former inlet pipeline is under a building of the Los Arboles condominiums, and the outfall area is undeveloped land owned by DOE.

4.8.1 Previous Investigations for SWMU 01-001(g)

- 1974 to 1976: During the Ahlquist Radiological Survey, the tank, the sludge it contained, and the surrounding soil tested free of radioactive contamination (Ahlquist et al. 1977, 05710, p. 119). Subsequently, the tank, sludge, outlet line, and approximately 151 ft of the inlet line were removed in 1975 (Ahlquist et al. 1977, 05710, pp. 113–114).
- 1992: Phase I RFI was conducted, and samples were collected along the canyon rim and at hillside areas close to Building X and Cooling Tower 80. These samples were field-screened for radiological activity and organic vapors and then sent to either an on- or off-site laboratory for further analyses. Based on the site investigation results, no COPCs were identified.
- 1996: The RFI report recommended NFA for SWMU 01-001(g) (LANL 1996, 54465, p iii, 49).

4.8.2 Data for SWMU 01-001(g)

The sample analyzed at an off-site fixed laboratory is a surface fill sample (0 to 0.5 ft) collected near the location of the former septic tank (Figure 4.8-1, Table 4.1-1). It was analyzed for metals.

The sample from one location (01-06069) was analyzed for metals. No metal was detected (Table 4.8-1).

- Antimony and thallium were not detected, but their detection limits were greater than the range of the background concentrations at this location.
- Cadmium was not detected, but the detection limit was within the range of the background concentrations at this location.

4.9 SWMU 01-001(o), Sanitary Waste Line

SWMU 01-001(o) is the former sanitary waste line located east of Bailey Bridge and served Buildings J and ML. Building J housed a laboratory, and ML was a medical laboratory. The line discharged directly into Bailey Bridge Canyon.

The site map of SWMU 01-001(o) is shown in Figure 4.9-1. Currently, the locations of the pipelines run across Loma Vista Drive and under a building of the Los Arboles condominiums.

4.9.1 Previous Investigations for SWMU 01-001(o)

- 1955 to 1959: Accidents in 1955 and 1957 resulted in radioactive contamination in Building ML. Decontamination activities were not totally successful after the 1957 accident because floor areas remained contaminated. Some of the floor was painted and covered with cardboard until the building was demolished in December 1958 (LASL 1957, 00377). In 1958, Building ML was demolished and disposed of at MDAs C and G. Concrete with gross-alpha activities less than 2500 cpm was disposed of in Bailey Bridge Canyon (Buckland 1973, 58138, p. 2). In 1959, monitoring of the sanitary waste systems indicated that the drain from Buildings J and ML was contaminated with between 500 to 4000 cpm of gross-alpha activities. The sanitary waste line was removed in 1959 (Buckland 1959, 03426).
- 1974 to 1976: The Ahlquist Radiological Survey indicated part of the line still existed and was subsequently removed (Ahlquist et al. 1977, 05710, p. 126).
- 1992: Phase I RFI was conducted at the outfall area of SWMU 01-001(o). Surface samples were collected and analyzed at the CST on-site laboratory for inorganic chemicals, SVOCs, and isotopic plutonium. Six samples were analyzed at off-site laboratories for inorganic chemicals, SVOCs, and isotopic plutonium. No COPCs were identified.
- 1996: The RFI report recommended NFA for SWMU 01-001(o) (LANL 1996, 54461, pp. I, 81).

4.9.2 Data for SWMU 01-001(o)

Samples analyzed at off-site fixed laboratories include six surface soil, fill, and sediment samples (0 to 0.5 ft) collected from six locations at SWMU 01-001(o) (Figure 4.9-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from six locations (01-02064, 01-02073, 01-02075, 01-02080, 01-02095, and 01-02096) were analyzed for metals. Analytical results indicated that chromium, lead, mercury, nickel, silver, and uranium were detected greater than BVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.9-2, Table 4.9-1).

- Antimony and thallium were not detected, but their detection limits were greater than the range of the background concentrations in soil or BV in sediment at all six locations (01-02064, 01-02073, 01-02075, 01-02080, 01-02095, and 01-02096).
- Cadmium was not detected, but the detection limits were greater than the range of the background concentrations at two locations (01-02075 and 01-02095).
- Chromium was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-02075).
- Lead was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at four locations (01-02075, 01-02080, 01-02095, and 01-02096). Lead was detected within the range of background concentrations at one location (01-02073).
- Mercury was detected at concentrations greater than BV in the only depth interval sampled at five locations (01-02073, 01-02075, 01-02080, 01-02095, and 01-02096).
- Nickel was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-02095).
- Selenium was not detected, but the detection limits were greater than the range of the background concentrations at three locations (01-02073, 01-02075, and 01-02095).

- Silver was detected at a concentration greater than BV at one location (01-02075). Silver was not detected, but the detection limits were greater than the range of the background concentrations in sediment or BV in soil at five locations (01-02064, 01-02073, 01-02080, 01-02095, and 01-02096).
- Uranium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at four locations (01-02064, 01-02073, 01-02075, and 01-02095). Uranium was not detected but the detection limits were greater than the range of the background concentrations at two locations (01-02080 and 01-02096).

Samples from six locations (01-02064, 01-02073, 01-02075, 01-02080, 01-02095, and 01-02096) were analyzed for SVOCs. Analytical results indicated that anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene were detected in at least one sample between 0 and 0.5 ft bgs (Figure 4.9-2, Table 4.9-2).

- Anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, indeno(1,2,3-cd)pyrene, and phenanthrene were detected in the only depth interval sampled at one location (01-02075).
- Benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene were detected in the only depth interval sampled at two locations (01-02073 and 01-02075).

Samples from six locations (01-02064, 01-02073, 01-02075, 01-02080, 01-02095, and 01-02096) were analyzed for isotopic plutonium. Analytical results indicated that plutonium-239 was detected greater than FVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.9-3, Table 4.9-3). Plutonium-239 was detected at activities greater than the range of the fallout activities in the only depth interval sampled at five locations (01-02064, 01-02075, 01-02080, 01-02095, and 01-02096).

4.10 SWMU 01-001(s) Western Sanitary Waste Line, Main Line

SWMUs 01-001(s and u) constitute the WSWL. The buildings served by SWMU 01-001(s) housed most of the processing and production operations in the early days of the Laboratory. SWMU 01-001(s) served Buildings A, B, Buildings C, D, G, M, V, Boiler House 2, and Sigma.

- Building A housed administrative offices.
- Building B had administrative offices and electronic and metallurgical laboratories. Small amounts of radionuclide foils were stored in a concrete vault in the building (Ahlquist et al. 1977, 05710, p. 128).
- Building C had a uranium machine shop and other machining (e.g., graphite machining) operations. Before its removal in 1964, Building C was found free of radioactive contamination, except for the concrete building pad. The contaminated concrete pad was removed to an unspecified MDA.
- Building D was used to process plutonium.
- Building G housed the Sigma Pile, a small pile of graphite and uranium. Leak-testing of radium sources was also performed in Building G. In 1959, the building structure was found to be uncontaminated and was removed. The concrete floor was found to be slightly contaminated with radioactivity and, along with drain lines, was taken to an unspecified MDA (Ahlquist et al. 1977, 05710, p. 125).
- Building M was used to process and recover enriched uranium.

- Building V contained offices and toolmaker's shop. It was the original machine shop for machining uranium and beryllium and for dry-grinding boron at TA-21.
- Boiler House 2 supplied steam to TA-01 buildings.
- The Sigma Building was used for machining radionuclides for casting and powder metallurgy.

SWMU 01-001(s) exited from Building D, ran parallel to most of the main industrial waste line [SWMU 01-002], and passed near the southwest corner of Building C. It then proceeded west along the former Finch Street and turned north between former Buildings T-221 and T-225. This sanitary waste line connected to septic tank 6 [SWMU 00-030(g)] and discharged into Acid Canyon.

The site map of SWMU 01-001(s) is shown in Figure 4.10-1. Currently, the entire SWMU area has been developed. The location of the majority of the western section of SWMU 01-001(s) is under the Trinity Village apartments. The location of the eastern section of SWMU 01-001(s) is under a number of streets and various buildings.

4.10.1 Previous Investigations for SWMU 01-001(s)

- 1973: A memorandum from C. Buckland reported the removal of a sanitary sewer leading from "C" shop to as far west as the east end of the eastern building of the Trinity Village apartments (Buckland 1973, 58138). The grading plan and the building foundation plan for Trinity Village indicated that the sanitary line would have been removed beneath the central and western Trinity Village buildings before construction. However, the pipe beneath the eastern Trinity Village building may still be there.
- 1994 and 1996: Thirteen locations (Figure 4.10-1) were physically accessible for field investigation when the sampling and analysis plan was prepared (LANL 1993, 38753, pp. 8–9). Intrusive field activities were conducted at five locations, numbered 1A, 2, 8, 10, and 13, along the WSWL (LANL 1995, 66456, section 3.0; LANL 1997, 56660.112, pp. 36–60). The field investigations were conducted in two phases. The objectives of the first phase were to locate the WSWL and to assess any residual contamination associated with the soils surrounding locations 1A, 2, 8, and 13. The objectives of the second phase were to characterize any contamination inside and outside the WSWL and to remove and dispose of sections of WSWL at locations 1A, 10, 11, and 13. Surface and subsurface samples were collected and analyzed at the CST on-site laboratory for inorganic chemicals, VOCs, and SVOCs, and analyzed at off-site laboratories for inorganic chemicals, VOCs, SVOCs, PCBs, pesticides, cesium-137, tritium, isotopic plutonium, and isotopic uranium. No COPCs were detected at concentrations sufficient to indicate adverse human health effects.
- 1996: An interim action was completed for SWMU 01-001(s) at locations 1A, 9, 10, and 11 (LANL 1996, 62538). The activities included removing and disposing of VCP and associated structures (e.g., manholes), collecting confirmation samples from materials underlying VCP sections to evaluate potential releases to the surrounding soil, and collecting samples from materials within VCP sections to provide additional RFI characterization data for the WSWL. Approximately 250 ft of the WSWL was removed from locations 9, 10, and 11. An additional 12 ft of the WSWL was removed from location 1A. Confirmation samples were collected from materials underlying VCP sections, and characterization samples were collected from materials contained within VCP sections. Analytical results from samples analyzed at the CST on-site laboratory indicated that no significant releases had occurred at locations 1A, 9, 10, and 11. The interim action report concluded that the potential for release and migration of inorganic and radioactive constituents had been eliminated at locations 1A, 9, 10, and 11 (LANL 1996, 62538, p.1). Consequently, the

risk of exposure to potential contamination through future excavation at this site had also been eliminated.

- 1997: The RFI report recommended NFA for SWMU 01-001(s) (LANL 1997, 56660.112, pp. ii, 131). Although radionuclides are likely to be present in the remaining VCP beneath residential or commercial structures, the quantities are insufficient to pose an unacceptable human health risk. Also, currently no complete pathway exists for the exposure to potential contaminants.
- 2000: NMED issued final approval that no additional investigation is needed at the location 1A portion of the WSWL (NMED 2000, 68647). The approval, however, does not grant NFA for the entire SWMU 01-001(s).

4.10.2 Data for SWMU 01-001(s)

Samples analyzed at off-site fixed laboratories include four soil samples collected from four locations along the pipeline path at SWMU 01-001(s) at depths of 0 to 7.5 ft (Figure 4.10-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from three locations (01-04109, 01-04120, and 01-04260) were analyzed for metals. Analytical results indicated that copper, lead, and mercury were detected greater than BVs in at least one sample between 0 and 7.5 ft bgs (Figure 4.10-2, Table 4.10-1).

- Antimony was not detected, but the detection limits were greater than the range of the background concentrations at two locations (01-04109 and 01-04120).
- Cadmium was not detected above BV, and the detection limit at one location (01-04109) was above BV but within the range of the background concentrations.
- Copper was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-04260).
- Lead was detected within the range of the background concentrations at one location (01-04109).
- Mercury was detected at a concentration greater than BV in the only depth interval sampled at one location (01-04109).
- Silver was not detected, but the detection limit was greater than BV at one location (01-04109).
- Thallium was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-04109) and within the range of background concentrations at another (01-04260).

A sample from one location (01-04105) was analyzed for PCBs and pesticides; a sample from another location (01-04260) was analyzed for PCBs, pesticides, and SVOCs. No organic chemicals were detected.

Samples from two locations (01-04105 and 01-04109) were analyzed for isotopic plutonium and isotopic uranium, and a sample from location 01-04260 was analyzed by gamma spectroscopy and for isotopic plutonium, isotopic uranium, and tritium. Analytical results indicated that plutonium-238 and plutonium-239 were detected at depths where FVs do not apply, and uranium-234 was detected greater than BV in at least one sample between 0 and 6.5 ft bgs (Figure 4.10-3, Table 4.10-2).

- Plutonium-238 was detected in the only depth interval sampled at one location (01-04260).
- Plutonium-239 was detected in the only depth interval sampled at all three locations (01-04105, 01-04109, and 01-04260).

- Uranium-234 was detected at an activity greater than the range of the background activities at one location (01-04109).

4.11 SWMU 01-001(t), Eastern Sanitary Waste Line

SWMU 01-001(t), known as the eastern sanitary waste L

line (ESWL), served the Gamma, M, P-Prime, R, S, S-1, T, U, V, W, and Z buildings.

- Gamma housed offices and a physics laboratory.
- M was used to process and recover enriched uranium.
- P-Prime was used for supply and property offices.
- R housed electrical, glass blowing, carpentry, and plumbing shops.
- S was used as a technical warehouse and stock building.
- S-1 served as Garage 1 and later was used to store nonradioactive materials.
- T housed the Theoretical Division and contained offices, a silver-soldering operation, and a photography laboratory.
- U contained physics laboratories where radionuclides were used.
- V contained offices and toolmaker's shop. It was the original TA-01 machine shop for machining uranium and beryllium and for dry-grinding boron.
- W housed the Van de Graaff accelerator.
- Z housed two high-voltage accelerators that were used for research on atomic nuclei.

Pipelines from the buildings connected to septic tank 1 [SWMU 00-030(b)] that discharged to a drain field southeast of the intersection of DP Road and Trinity Drive. Later, effluent was routed to the Central Wastewater Treatment Plant until it was decommissioned and then to other Los Alamos County treatment plants. TA-01 was fully decommissioned by 1966, and the ESWL was left in place.

The site map of SWMU 01-001(t) is shown in Figure 4.11-1. Currently, the entire SWMU area is either landscaped (around Ashley Pond) or lies beneath various streets, parking lots, and commercial buildings.

4.11.1 Previous Investigations for SWMU 01-001(t)

- 1993: Phase I RFI was conducted at SWMU 01-001(t) in 1993. Subsurface samples were collected during the construction of office buildings west of the Los Alamos Inn to determine if any contamination was present that could adversely affect the construction project. These samples were analyzed at the CST on-site laboratory for inorganic chemicals, isotopic uranium, and tritium. The sample data indicated that COPCs are not present or present at concentrations that do not pose an unacceptable level of risk.
- 1996: Based on the archival information and results of the Phase I RFI, the RFI report recommended NFA for SWMU 01-001(t) (LANL 1996, 54463, pp. I, 55).
- 1997: In a letter to DOE-LAO and the Laboratory dated November 18, 1997, NMED rejected the RFI report for SWMUs that included SWMU 01-001(t) (NMED 1997, 57000).

4.11.2 Data for SWMU 01-001(t)

No off-site fixed-laboratory data are available for this SWMU.

4.12 SWMU 01-001(u), Western Sanitary Waste Line, Branch line

SWMU 01-001(u) is a branch of the WSWL that served Building J-2. Building J-2 was built in 1949 for radiochemistry work and was connected to the main WSWL [SWMU 01-001(s)] through SWMU 01-001(u). SWMU 01-001(u) was not removed during TA-01 D&D because it was not considered contaminated based on the soil sample data and portable beta-gamma instrument survey (Ahlquist et al. 1977, 05710, pp. 92, 127).

The site map of SWMU 01-001(u) is shown in Figure 4.12-1. Currently, the location of the southern portion of the pipeline is under a building of the Timber Ridge condominiums, the middle section is at a wooded area behind the condominium, and the northern portion of the pipeline is under the parking lot and between two buildings of the Trinity Village apartments.

4.12.1 Previous Investigations for SWMU 01-001(u)

- 1970s: The Timber Ridge condominiums were built over and around SWMU 01-001(u). A comparison of the sanitary line elevations with the present elevation contours indicates that the pipe would have been removed for most of its length during the Timber Ridge construction (LANL 1997, 56660.112, p. 36).
- 1994: Geophysical survey and borehole drilling were conducted at SWMU 01-001(u) (location 2 in Figure 4.12-1). No piping associated with the WSWL was encountered. Borehole samples were collected and were submitted for radiological activity screening and x-ray fluorescence (XRF) analysis at CST. One sample was sent to off-site fixed laboratories and analyzed for inorganic chemicals, VOCs, SVOCs, PCBs, pesticides, isotopic plutonium, and isotopic uranium. Based on sample results, no COPCs were detected at concentrations to indicate adverse human health effects.
- 1997: The RFI report recommended NFA for SWMU 01-001(u) (LANL 1997, 56660.112, pp. ii, 131).

4.12.2 Data for SWMU 01-001(u)

A soil sample collected from the location in the wooded area behind a condominium at SWMU 01-001(u) (01-04129) at the depth interval from 1 to 3 ft was analyzed at off-site fixed laboratories (Figure 4.12-1, Table 4.1-1) for metals, PCBs, pesticides, SVOCs, VOCs, isotopic plutonium, and isotopic uranium.

The analytical results indicated that lead was detected greater than BV between 1.0 and 3.0 ft bgs (Figure 4.12-2, Table 4.12-1).

- Antimony, cadmium, and mercury were not detected. However, the detection limits of antimony were greater than the range of the background concentrations and the detection limits of mercury were above BV. The detection limit of cadmium was within the range of the background concentrations.
- Lead was detected within the range of the background concentrations.

This sample was analyzed for PCBs, pesticides, SVOCs, and VOCs. Only acetone was detected between 1.0 and 3.0 ft bgs (Figure 4.12-2, Table 4.12-2).

This sample was analyzed for isotopic plutonium and isotopic uranium. No radionuclides were detected or detected greater than BV/FV.

4.13 SWMU 01-002, Industrial Waste Line

SWMU 01-002 is located in the southern and western portion of TA-01. From 1943 to 1951, chemical and radioactive process wastes passed through this section of pipe en route to discharge to Acid Canyon, a small branch of Pueblo Canyon. SWMU 01-002 includes the area around former Boiler House 2, Buildings D, H, J-2, M, ML, Q, Sigma, and several properties north of Trinity Drive extending to Canyon Road (near the location of TA-45). These buildings were the sources of major process discharges from TA-01 (Ahlquist et al. 1977, 05710, p. 15).

- Boiler House 2 supplied steam for TA-01.
- Building D was used to process plutonium.
- Building H was used for source preparation of polonium-210.
- Building J-2 was used for radiochemistry work.
- Building M was used to recover enriched uranium-235.
- Building ML was a medical laboratory.
- Building Q was used to calibrate laboratory equipment using radium-226 as a check source.
- Sigma Building was used for machining radionuclides for casting and powder metallurgy.

The industrial waste line had two sections: The main industrial waste line south of Trinity Drive ran from Building D, and the western industrial waste line ran from Building J-2 to its junction with the main industrial waste line outside the TA-01 boundary. From the junction, the line ran north as a single unit to the TA-45 waste treatment plant.

The site map of SWMU 01-002 is shown in Figure 4.12-1. Currently, the entire SWMU area has been developed. The location of the western section is under pavement and buildings of the Timber Ridge condominiums. The location of the eastern section is under pavement and various commercial and residential buildings.

4.13.1 Previous Investigations for SWMU 01-002

- 1974 to 1976: During the Ahlquist Radiological Survey, attempts were made to verify that the main industrial waste line had been completely removed (Ahlquist et al. 1977, 05710. p. 83). During the survey, extensive trenching was done at the location of the former D Building and in the vicinity of the H and Theta buildings because substantial soil contamination was discovered. Approximately 1600 m^3 of contaminated soil was removed from the area of the main industrial waste line and disposed of at MDA G. In the western portion of the industrial waste line, additional trenching was conducted along the J-2 building industrial waste line to remove cesium-137-contaminated soil. Much of the contaminated soil was removed from the trench; however, activity to a level of 168 pCi/g was left in the floor of the trench in one location because of the depth of the trench (approximately 4 m deep) (Ahlquist et al. 1977, 05710, p. 94). Approximately 440 m^3 of contaminated soil was removed from the area of the western industrial waste line and disposed of at MDA G. At a meeting on July 28, 1976, both the main and the western segment of the industrial waste line were considered decontaminated based on field-screening results and soil sample data (Ahlquist et al. 1977, 05710, pp. 83, 90, 92, 94).

- 1985: The last remnants of the industrial waste line between TA-01 and the Acid Canyon outfall near TA-45 were removed (Elder et al. 1986, 06666, p. 37).
- 1990: Interim action verification sampling was conducted at the route of the former industrial waste line between Central Avenue and Rose Street, at the Central School site, in response to a request from Los Alamos County schools (LANL 1990, 07501). Five core samples were collected along the route of the previously excavated industrial waste line, and one core sample was collected from a borehole located east of the former waste line to determine local background levels. VOCs, SVOCs, and PCBs were not detected. In addition, all RCRA metal concentrations were below EPA's threshold criteria for the presence of toxicity characteristics. Gross radioactive screening of the samples indicated no gross levels of radioactivity above background, and cesium-137 levels were well within background (LANL 1990, 07501).
- 1993 to 1994: Phase I RFI was conducted and sampling activities were performed during two investigations near the main industrial waste line: the investigation of the subsurface soil contamination associated with former Buildings D, U, M, and Z in January and March 1993, and the investigation of Loma Vista Drive properties in August and September 1994. Samples were analyzed at the CST on-site laboratory for inorganic chemicals, tritium, and isotopic plutonium, and analyzed at off-site laboratories for inorganic chemicals, SVOCs, and radionuclides that included isotopic plutonium, isotopic uranium, americium-241, cesium-137, cobalt-60, europium-152, ruthenium-106, sodium-22, and tritium. The RFI results confirmed that the 1970s remediation of this SWMU met the standards for both RCRA and radiological constituents.
- 1996: Based on the archival information and the results of the Phase I RFI, the RFI report recommended NFA for SWMU 01-002 (LANL 1996, 54463, pp. I, 44).
- 1997:In a letter to DOE-Los Alamos Area Office (LAAO) and the Laboratory dated November 18, 1997, NMED rejected the RFI report for SWMUs that included 01-002 (NMED 1997, 57000).

4.13.2 Data for SWMU 01-002

Samples analyzed at off-site fixed laboratories include 17 soil, fill, and tuff samples collected from 11 locations along the path of the pipeline at SWMU 01-002 at depths of 1.42 to 20.5 ft (Figure 4.12-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from eight locations (01-04219, 01-04220, and 01-04222 through 01-04227) were analyzed for metals. Analytical results indicated that barium, calcium, lead, mercury, uranium, zinc were detected greater than BVs in at least one sample between 1.42 and 20.5 ft bgs (Figure 4.13-2, Table 4.13-1).

- Antimony was not detected but the detection limits were greater than the range of the background concentrations at two locations (01-04226 and 01-04227).
- Barium was detected at concentrations greater than the range of background concentrations at one location (01-04220); its concentrations decreased with depth.
- Cadmium and cobalt were not detected, but their detection limits were within the range of the background concentrations.
- Calcium was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-04226) and within the range of background concentrations at another (01-04220).

- Lead was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-04219) and within the range of background concentrations at another (01-04220).
- Mercury was detected at concentrations greater than BV at six locations (01-04219, 01-04220, 01-04222, and 01-04224 through 01-04226); it was detected greater than BV in the only depth interval sampled at two locations (01-04219 and 01-04226); concentrations increased with depth at two locations (01-04220 and 01-04225); concentrations decreased with depth at one location (01-04222); and concentrations stayed the same at one location (01-04224). Mercury was not detected but the detection limits were greater than BV at three locations (01-04223, 01-04225, and 01-04227).
- Nickel was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-04224).
- Selenium was not detected, but the detection limits were greater than the range of the background concentrations at four locations (01-04222 through 01-04225).
- Thallium was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-04220).
- Uranium was detected at a concentration within the range of the background concentrations in the only sample analyzed for uranium at one location (01-04222).
- Zinc was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-04219) and within the range of background concentrations at another (01-04220).

Samples from six locations (01-04219, 01-04220, and 01-04222 through 01-04225) were analyzed for SVOCs. Analytical results indicated that only bis(2-ethylhexyl)phthalate was detected in the deepest depth interval sampled (between 9.0 and 9.5 ft bgs) at location 01-04220 (Figure 4.13-2, Table 4.13-2).

Samples from three locations (01-04021, 01-04022, and 01-04026) were analyzed for isotopic plutonium and isotopic uranium and a sample from one location (01-04222) was analyzed by gamma spectroscopy. Analytical results indicated that only plutonium-239 was detected where FV does not apply in the only depth interval sampled (between 4.0 and 8.0 ft bgs) at one location (01-04026) (Figure 4.13-3, Table 4.13-3).

4.14 SWMU 01-003(a), Bailey Bridge Landfill

Bailey Bridge landfill was used between 1959 and 1978 for the disposal of demolition debris. A September 1964 Zia Company memorandum regarding disposal of TA-01 debris from demolition activities specified that concrete walls and flooring from Sigma Building with activity less than 2500 cpm of surface alpha contamination were broken up and disposed of in Bailey Bridge Canyon, and the disposed concrete was covered with 4 ft of earthen fill (Hill 1964, 04821). Additional fill was deposited when the area was developed for housing. Demolition debris with less than 2500 cpm of surface alpha contamination from several other buildings (the D-5 vault, HT, Warehouse 19, and the sheet metal shop) located in the western portion of TA-01 was also disposed of in Bailey Bridge Canyon and covered with soil (Ahlquist et al. 1977, 05710, p. 122; DOE 1987, 08662).

The site map of SWMU 01-003(a) is shown in Figure 4.14-1. The Bailey Bridge no longer exists and the head of Bailey Bridge Canyon (the location of the landfill) has received fill material and has been regraded. The mesa-top portion of the SWMU is under pavement and one building of the Loma Vista townhouses. The area downslope of the landfill is undeveloped DOE land.

4.14.1 Previous Investigations for SWMU 01-003(a)

- 1988: An ER Program site reconnaissance survey noted radiation readings greater than 25 microRoentgens/hr in the Bailey Bridge Canyon area (Bone 1988, 41147, p. 103).
- 1992: Phase I RFI was conducted and surface soil samples were collected at the landfill and downgradient of the hillside all the way to the canyon bottom. Samples were analyzed at the CST on-site laboratory for inorganic chemicals, SVOCs, isotopic plutonium, and isotopic uranium. Five samples located at the landfill and immediately downgradient of SWMU 01-003(a) were analyzed at off-site laboratories for inorganic chemicals, isotopic plutonium, and isotopic uranium. Elevated concentrations were detected for three inorganic chemicals (antimony, lead, and mercury), six PAHs, and uranium-234. The RFI report stated that an evaluation of the entire dataset indicates that the concentrations do not pose an unacceptable risk to human health.
- 1994: Debris mapping and screening was conducted by the Laboratory's Environmental Surveillance Group personnel. Field-characterization results indicated that none of the concrete debris exhibited radioactivity greater than background (200–400 cpm). No metal or organic staining was evident. As a result, it was not necessary to collect samples of the concrete debris for fixed-laboratory analysis.
- 1996: The RFI report recommended NFA for SWMU 01-003(a) (LANL 1996, 54461, pp. i, 81).

4.14.2 Data for SWMU 01-003(a)

Samples analyzed at off-site fixed laboratories include five surface soil, fill, and sediment samples (0–0.5 ft) collected from five locations within and downslope of SWMU 01-003(a) (Figure 4.14-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from five locations (01-02058, 01-02114, 01-02122, 01-02133, and 01-06064) were analyzed for metals. Analytical results indicated that antimony, cadmium, lead, mercury, and selenium were greater than BVs in at least one sample collected between 0 and 0.5 ft bgs (Figure 4.14-2, Table 4.14-1).

- Antimony was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-06064). Antimony was not detected but the detection limits were greater than the range of the background concentrations in soil or greater than BV in sediment at four locations (01-02058, 01-02114, 01-02122, and 01-02133).
- Arsenic was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-02122).
- Cadmium was not detected at three locations with the detection limit greater than the range of background concentrations at one location (01-02122) and within the range of background concentrations at two locations (01-02058 and 01-02133). Cadmium was also detected at two locations within the range of background concentrations (01-02114 and 01-06064).
- Lead was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at three locations (01-02114, 01-02122, and 01-02133) and within the range of background concentrations at one location (01-02058).
- Mercury was detected at concentrations greater than BV in the only depth interval sampled at two locations (01-02058 and 01-06064).
- Selenium was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-02122).

- Silver was not detected, but the detection limit was greater than BV at one location (01-02058).
- Thallium was not detected, but the detection limits were greater than the range of the background concentrations or BV at all five locations (01-02058, 01-02114, 01-02122, 01-02133, and 01-06064).
- Uranium was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-02058).

A sample from one location (01-02058) was analyzed for SVOCs, and none were detected.

A sample from one location (01-02058) was analyzed for isotopic plutonium, and samples from three locations (01-02114, 01-02122, and 01-02133) were analyzed for isotopic plutonium and isotopic uranium. The analytical results indicated that plutonium-238 and plutonium-239 were detected greater than FVs, and uranium-234 and uranium-238 were detected greater than BVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.14-3, Table 4.14-2).

- Plutonium-238 was detected at an activity greater than the range of the fallout activities in the only depth interval sampled at one location (01-02114).
- Plutonium-239 was detected at an activity greater than the range of the fallout activities in the only depth interval sampled at three locations (01-02114, 01-02122, and 01-02133).
- Uranium-234 and uranium-238 were detected at activities greater than the range of the background activities in the only depth interval sampled at one location (01-02114).

4.15 SWMU 01-003(b), Surface Disposal Area

SWMU 01-003(b) is the former surface disposal site for construction debris reported to be below the north rim of Los Alamos Canyon, approximately 450 ft east of Bailey Bridge Canyon (LANL 1990, 07511, p. 1-003).

The approximate location of SWMU 01-003(b) is shown in Figure 4.15-1. Currently, the area is undeveloped DOE land.

4.15.1 Previous Investigations for SWMU 01-003(b)

- 1992: During the preparation of the work plan, several trips were made to locate the site, but the disposal area was not evident although several pieces of metal piping were found. The pipes appeared to be components of the aboveground carriage supporting the steam lines that once traversed TA-01. The site was proposed for NFA in the work plan (LANL 1992, 43454, p. 2-20).
- 1996: During the preparation of the RFI report, several additional attempts were made to locate this site. A few objects were found scattered over more than an acre on the hillside, and the portable beta/gamma instruments used to screen each object registered only background radiation. No evidence of objects that contain hazardous constituents was found. Therefore, SWMU 01-003(b) was proposed for NFA in the RFI report (LANL 1996, 54465, pp. iii, 49).

4.15.2 Data for SWMU 01-003(b)

No off-site fixed laboratory data are available for this SWMU.

4.16 AOC 01-003(c), Surface Disposal Site

AOC 01-003(c) was a surface disposal area located below the north rim of Los Alamos Canyon and west of Bailey Bridge Canyon (LANL 1990, 07511).

The approximate location of AOC 01-003(c) is shown in Figure 4.16-1. Currently, the area is behind the backyard of a condominium on the hillside of Los Alamos Canyon.

4.16.1 Previous Investigations for AOC 01-003(c)

- 1988: A site visit was conducted and no debris was observed. According to the OU 1078 RFI work plan, no record of any radioactive waste disposal at AOC 01-003(c) existed. Therefore, the site was recommended for NFA (LANL 1992, 43454, p. 2-20).
- 1996: Phase I RFI did not locate the surface disposal site. An area to the southeast of the originally described site location was identified. The RFI report for AOC 01-003(c) stated that a few scattered pieces of solid, nonhazardous debris were found at a site near the canyon rim, but the site did not qualify as a SWMU. Therefore, the site was proposed for NFA (LANL 1996, 54467, pp. ii, 27).
- 1998: In a letter to DOE, the Laboratory listed AOC 01-003(c) as one of 73 sites that met the criteria for NFA (LANL 1998, 59689, Table 2). The site was never listed on Module VIII of the Hazardous Waste Facility Permit.

4.16.2 Data for AOC 01-003(c)

No off-site fixed laboratory data are available for this AOC.

4.17 SWMU 01-003(d), Surface Disposal Site

SWMU 01-003(d), also known as Can Dump Site, was used for surface disposal of empty solvent and paint cans during the operations of Zia Company (paint, carpentry, furniture repair, and sign shops). No radioactive materials were handled in these warehouses because they were outside the TA-01 security fence. The SWMU is located on the undeveloped hillside of Los Alamos Canyon just south of the current U.S. West Communications Building.

The site map of SWMU 01-003(d) is shown in Figure 4.17-1. Currently, the area is undeveloped DOE land.

4.17.1 Previous Investigations for SWMU 01-003(d)

- 1992: Phase I RFI was conducted and surface soil samples (mostly composite) were collected across the entire area of the SWMU. All samples were screened for gross-alpha/beta and gamma activity at an on-site laboratory. Three samples that were not composites were sent to off-site fixed laboratories and analyzed for inorganic chemicals, SVOCs, and isotopic plutonium. The screening assessment identified antimony as the only COPC.
- 1995: A VCA was conducted to remove decomposing paint cans. The cans were removed, and confirmatory soil sampling was not required because remediation was accomplished by removing all visible cans and associated debris. A large paint spill was discovered along the northern slope and the upper cliff face of Los Alamos Canyon. Both paint and soil samples beneath the paint

spill were collected, and the analytical results indicated that cleanup of the spill area was necessary. The topography of the location made it unsafe to remove all the paint; however, most of the paint and contaminated soil was excavated and removed from the site. Some of the material, which was considered unsafe to remove, remains on the upper slope and was covered with erosion control matting to minimize migration. Approximately 12 yd^3 of empty cans was taken to the Los Alamos County landfill for disposal. Approximately 8500 lb hazardous waste (mixture of soil and dried paint) was sent off-site for disposal.

- 1996: Based on the results of the human risk assessment, the VCA report concluded that potential exposure to COPCs in soil at the paint-spill area should not result in adverse noncarcinogenic health effects or unacceptable cancer risk to trail users. The submission letter for the VCA report requested NMED concurrence to remove SWMU 01-003(d) from Module VIII of the Laboratory's Hazardous Waste Facility Permit (LANL 1996, 55029, p. 1).

4.17.2 Data for SWMU 01-003(d)

Samples analyzed at off-site fixed laboratories include three surface soil samples (0 to 0.5 ft) collected from three locations on the hillside within SWMU 01-003(d) (Figure 4.17-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from three locations (01-06005, 01-06014, and 01-06023) were analyzed for metals. Analytical results indicated that antimony, barium, lead, mercury, and uranium were detected greater than BVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.17-2, Table 4.17-1).

- Antimony and lead were detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at one location (01-06014). Antimony was not detected, but the detection limits were greater than the range of the background concentrations at two locations (01-06005 and 01-06023).
- Barium was detected within the range of the background concentrations at one location (01-06014).
- Cadmium and selenium were not detected, but the detection limits were within the range of the background concentrations.
- Mercury was detected at a concentration greater than the BV in the only depth interval sampled at one location (01-06005).
- Silver and thallium were not detected, but the detection limits for silver were greater than the BV and greater than the range of the background concentrations for thallium at all three locations (01-06005, 01-06014, and 01-06023).
- Uranium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at all three locations (01-06005, 01-06014, and 01-06023).

Samples from three locations (01-06005, 01-06014, and 01-06023) were analyzed for SVOCs, and none were detected.

Samples from three locations (01-06005, 01-06014, and 01-06023) were analyzed for isotopic plutonium. Analytical results indicated that plutonium-239 was detected greater than the range of the fallout activities in the only depth interval sampled between 0 and 0.5 ft bgs at one location (01-06023) (Figure 4.17-3, Table 4.17-2).

4.18 SWMU 01-003(e), Surface Disposal Site Southeast of Los Alamos Inn

SWMU 01-003(e) was located along the northern wall of Los Alamos Canyon. In the early 1990s, the private landowner greatly altered the original canyon rim landscape by pushing the rim farther south using fill material. Before the alteration, discarded materials observed at the disposal area included utility boxes, concrete construction debris, piping, and other miscellaneous objects (DOE 1987, 08662). No documentation on radioactive contamination is available.

The site map of SWMU 01-003(e) is shown in Figure 4.18-1. Currently, a major portion of this SWMU is under the fill material, and the mesa-top portion of the SWMU does not contain any of the previously discarded materials.

4.18.1 Previous Investigations for SWMU 01-003(e)

- 1992: Phase I RFI was conducted at SWMU 01-003(e) and sampling activities focused on the upper portion of the hillside area, which is the area down to the first bench. Samples were collected across the SWMU area. They were analyzed at the CST on-site laboratory for inorganic chemicals and SVOCs and at off-site laboratories for inorganic chemicals, SVOCs, isotopic plutonium, and isotopic uranium. No COPCs were found at this SWMU.
- 1996: The RFI report recommended NFA for SWMU 01-003(e) (LANL 1996, 54461, pp. i, 92).
- 1997: NMED requested both vertical and horizontal sampling at this SWMU to evaluate the extent of contamination. The Laboratory agreed to collect surface and subsurface samples at previous sampling locations to better characterize lead concentrations because lead was detected at a concentration greater than BV in a composite sample (LANL 1997, 57294, p. 14).

4.18.2 Data for SWMU 01-003(e)

Samples analyzed at off-site fixed laboratories include two surface samples (0-0.5 ft), one soil and one sediment, collected from two locations immediately downslope of SWMU 01-003(e) (Figure 4.18-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from two locations (01-05041 and 01-05046) were analyzed for metals. Analytical results indicated that cadmium and lead were detected greater than BVs in one sample between 0 and 0.5 ft bgs (Figure 4.18-2, Table 4.18-1).

- Antimony and thallium were not detected, but their detection limits were greater than the range of the background concentrations or BV at both locations (01-05041 and 01-05046).
- Cadmium and lead were detected within the range of the background concentrations at one location (01-05041). Cadmium was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-05046).

Two samples from two locations (01-05041 and 01-05046) were analyzed for isotopic plutonium and isotopic uranium. No radionuclides were detected greater than FV/BV.

4.19 SWMU 01-006(a), Cooling Tower Drain Line and Outfall

SWMU 01-006(a) served Cooling Tower 80. The drain line and outfall were located on the east side of the cooling tower and south of Building X near the north rim of Los Alamos Canyon.

The site map of SWMU 01-006(a) is shown in Figure 4.19-1. Currently, the location of the former pipeline is under a building of the Los Arboles condominiums. Although no record can be found on the removal of the pipeline, it probably was removed during the construction of the residential building.

4.19.1 Previous Investigations for SWMU 01-006(a)

- 1987: One soil sample was collected during the DOE verification survey because it was speculated that biocides containing chromium may have been added to Cooling Tower 80. The sample results indicated that no metal or radionuclide was detected at a concentration greater than BV/FV, and no organic compound was detected (LANL 1987, 02956, p. 4).
- 1992: Phase I RFI was conducted at the canyon rim and hillside near the outfall of SWMU 01-006(a). Samples collected were analyzed at the CST on-site laboratory for inorganic chemicals, SVOCs, and isotopic plutonium and at an off-site laboratory for inorganic chemicals. No COPCs were identified associated with this SWMU.
- 1996: The RFI report recommended NFA for SWMU 01-006(a) (LANL 1996, 54465, pp. iii, 49).

4.19.2 Data for SWMU 01-006(a)

Among the samples collected in Phase I RFI, three surface soil samples (0 to 0.5 ft) were analyzed at off-site fixed laboratories. They were collected from three locations in the drainage downgradient of SWMU 01-006(a) (Figure 4.19-1, Table 4.1-1). These samples were analyzed for metals.

Samples from three locations (01-03083, 01-03088, and 01-03093) were analyzed for metals. The analytical results indicated that antimony, lead, and selenium were detected greater than BVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.19-2, Table 4.19-1).

- Antimony was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-03093). Antimony was not detected, but the detection limits were greater than the range of the background concentrations at two locations (01-03088 and 01-03083).
- Cadmium was not detected, and the detection limits were within the range of the background concentrations.
- Lead was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-03093). Lead was detected within the range of background concentrations at another (01-03088).
- Selenium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at two locations (01-03083 and 01-03093). Selenium was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-03088).
- Thallium was not detected, but the detection limits were greater than the range of the background concentrations at all three locations (01-03083, 01-03088, and 01-03093).

4.20 SWMU 01-006(b), Drain Line and Outfall

SWMU 01-006(b) served Building D, which was primarily used to process plutonium. The drain line exited the southwest side of the building and extended southwest and then south before discharging into Los Alamos Canyon. The types and quantities of fluids handled by this drain line are unknown. During the

excavation of Buildings D and D-2 areas, all drain lines were removed along with areas of elevated radioactivity (Ahlquist et al. 1977, 05710, p. 64).

The site map of SWMU 01-006(b) is shown in Figure 4.20-1. Currently, the area is undeveloped and privately owned.

4.20.1 Previous Investigations for SWMU 01-006(b)

- 1974 to 1976: During the Ahlquist Radiological Survey, the contaminated soil was excavated in Buildings D and D-2 areas until the areas were decontaminated (Ahlquist et al. 1977, 05710, pp. 64–70).
- 1992 and 1993: Phase I RFI was conducted in the area of SWMU 01-007(a), within which SWMU 01-006(b) lies. Only one subsurface sample was collected at SWMU 01-006(b), and it was analyzed at the CST on-site laboratory for inorganic chemicals, cesium-137, plutonium-238, and plutonium-239. No COPCs were identified in these SWMUs.
- 1996: The RFI report recommended NFA for SWMU 01-006(b) (LANL 1996, 54465, pp. iii, 119).

4.20.2 Data for SWMU 01-006(b)

No off-site fixed-laboratory data are available for this SWMU.

4.21 SWMU 01-006(c), Drain Lines and Outfalls

SWMU 01-006(c) consists of possibly four drain lines and outfalls that served Building D-2. The drain lines exited the southwest side of the building and discharged directly onto Hillside 137. The two drain lines at the southeast end of the building were indicated on engineering drawings but were not located when trenching was conducted in the area of Building D-2 (Ahlquist et al. 1977, 05710, p. 49). The two drain lines at the southwest end of the building were encountered during trenching (Ahlquist et al. 1977, 05710, p. 49). All four drain lines are shown in Figure 4.21-1.

The site map of SWMU 01-006(c) is shown in Figure 4.21-1. Currently, the site has been covered with fill material by the private owner in anticipation of redevelopment.

4.21.1 Previous Investigations for SWMU 01-006(c)

- 1974 to 1976: During the Ahlquist Radiological Survey, trenching activities detected significant radiological contamination in one trench located at the ends of two outfall drain lines extending from the southwest end of the building (Ahlquist et al. 1977, 05710, p. 49). The two contaminated outfall drain lines were removed and disposed of at MDA G (Ahlquist et al. 1977, 05710, p. 64). Contaminated soil was also excavated in the area of Buildings D and D-2 until the areas were decontaminated (Ahlquist et al. 1977, 05710, pp. 64–70).
- 1992 and 1993: Phase I RFI was conducted at the areas of SWMUs 01-006(c) and 01-007(a,b,c). No COPCs were identified at this SWMU. However, no sample was near SWMU 01-006(c).
- 1996: The RFI report recommended NFA for SWMU 01-006(c) (LANL 1996, 54465, pp. iv, 119).

4.21.2 Data for SWMU 01-006(c)

No off-site fixed-laboratory data are available for this SWMU.

4.22 SWMU 01-006(d), Drain Line and Outfall

SWMU 01-006(d) served Building D-3 and discharged to Hillside 137 in the same area as the D-2 drain lines [SWMU 01-006(c)]. Activities at D-3 included counting radioactive filter papers from Building H-1 (Ahlquist et al. 1977, 05710, p. 128). During the decontamination of areas of Buildings D and D-2, all drain lines were removed along with areas of elevated radioactivity (Ahlquist et al. 1977, 05710, p. 64). Because the main portion of the drain line of Building D-3 was located in the D-2 area, this drain line was most likely removed during the excavation of Buildings D and D-2.

The site map of SWMU 01-006(d) is shown in Figure 4.22-1. Currently, the area is undeveloped and privately owned.

4.22.1 Previous Investigations for SWMU 01-006(d)

- 1992 and 1993: Phase I RFI was conducted at the area of SWMU 01-007(b) within which SWMU 01-006(d) lies. No COPCs were identified in these SWMUs.
- 1996: The RFI report recommended NFA for SWMU 01-006(d) (LANL 1996, 54465, pp. iii, 119).

4.22.2 Data for SWMU 01-006(d)

No off-site fixed-laboratory data are available for this SWMU.

4.23 AOC 01-006(e), Drain Lines and Outfalls to Ashley Pond

AOC 01-006(e) consists of two drain lines and two outfalls to Ashley Pond. One drain line originated at Building P (structure 01-46); the other drain line served the cleaning plant. Building P was used for personnel offices, and no radioactive materials or hazardous chemicals, except toluene, were used in the building. Cleaning solvents were probably used at the cleaning plant. Building P drain line was a 4-in.-diameter pipe that extended northeast from the building for approximately 100 ft underground to the southwest side of the pond. The drain line from the cleaning plant originated at the northwest corner of the building and extended underground to the southeast side of the pond. The cleaning plant was replaced by a parking lot during early D&D activities in the 1960s (LANL 1992, 43454, pp. 6-46–6-47).

The site map of AOC 01-006(e) is shown in Figure 4.23-1. Currently, the locations of former pipelines are either landscaped or under pavement. The site is currently owned and operated by Los Alamos County.

4.23.1 Previous Investigations for AOC 01-006(e)

- 1960: The banks of Ashley Pond were resloped (IT 1991, 04816).
- 1961: An asphalt sidewalk was constructed around the perimeter of the pond (IT 1991, 04816).
- 1966–1991: The pond has been cleaned four or five times since 1966. The cleaning involved pumping out the pond water to the storm-drain system for disposal and refilling with fresh water. During one of the pond cleanings (probably during the 1975–1976 rehabilitation), approximately 6 in. of soil was removed from the pond bottom and replaced with a layer of sand (IT 1991, 04816).
- 1975 to 1976: The concrete sidewalk surrounding the pond was constructed (IT 1991, 04816).
- 1992: Surface water and bottom sediment samples were collected from Ashley Pond in September to determine the presence of radiological and/or hazardous contaminants in the water

and/or sediment (LANL 1996, 54461, pp. 110–112). Six sludge and six water samples were collected from ten locations and submitted to fixed laboratories and analyzed for isotopic plutonium, total uranium, target analyte list (TAL) metals, SVOCs, and VOCs. Sample data indicated that COPCs detected at a concentration greater than SAL.

- 1996–: The RFI report recommended NFA for AOC 01-006(e) (LANL 1996, 54461, pp. i, 122). Additionally, because this mesa-top site is a developed, disturbed area, no suitable habitat exists for threatened and endangered species.

4.23.2 Data for AOC 01-006(e)

The 1996 RFI report compared sludge results with LANL soil BVs (LANL 1996, 54461, pp. 112–121). Inorganic chemicals, plutonium-238, and plutonium-239/240 were detected at concentrations greater than their soil BVs/FVs. Acetone, 2-butanone, and 1,2,3- trimethylbenzene were detected. The results of water samples were compared with applicable regulatory levels at that time, and no constituents exceeded those levels (LANL 1996, 54461, pp. 118–120).

4.24 AOC 01-006(g), Stormwater-Drainage System

AOC 01-006(g) is the stormwater-drainage system that served Buildings ML, Q, X, D, D-4, and D-7.

- ML was a medical laboratory.
- Q was used to calibrate equipment, using radium-226 as a check source.
- X was used to test radioactive targets.
- D was used primarily to process plutonium.
- D-4 was storage.
- D-7 was used for hydrofluoric gas analysis.

The storm drain system consisted of three buried conduits that emptied into one open north-south main drain. The main drain discharged approximately 20 ft south of the east side of Building X into Los Alamos Canyon.

The site map of AOC 01-006(g) is shown in Figure 4.24-1. Currently, the locations of the pipelines are either under pavement or residential buildings.

4.24.1 Previous Investigations for AOC 01-006(g)

- 1974 to 1976: The Ahlquist Radiological Survey found no radioactive contamination in the water drainage areas near Buildings ML, Q, X, D, D-4, and D-7 (Ahlquist et al. 1977, 05710, p. 42).
- 1992: Phase I RFI was conducted downgradient of AOC 01-006(g) at the canyon rim and the outfall area on the hillside. No COPCs were identified in these areas.
- 1996: The RFI report recommended NFA for AOC 01-006(g) (LANL 1996, 54465, pp. iii, 49).

4.24.2 Data for AOC 01-006(g)

No off-site fixed-laboratory data are available for this AOC.

4.25 SWMU 01-006(h), Stormwater-Drainage System

SWMU 01-006(h) is the stormwater-drainage system that served the northwest side of Building R and the east side of Building Y. Building R housed model, glass, carpentry, and plumbing shops. Building Y housed a physics laboratory that handled tritium, uranium-238, and polonium-210. The outfall was located 25 ft south of Building Y on the north rim of Los Alamos Canyon, immediately west of Hillside 138.

The site map of SWMU 01-006(h) is shown in Figure 4.25-1. Currently, the entire SWMU area is under commercial buildings.

4.25.1 Previous Investigations for SWMU 01-006(h)

- 1974 to 1976: The Ahlquist Radiological Survey found no radioactive contamination in the water drainage areas near Buildings R and Y (Ahlquist et al. 1977, 05710, p. 42). The survey found the storm drains when trenching the mesa top area of septic tank 138. The report did not mention any action on the storm drains encountered (Ahlquist et al. 1977, 05710, p. 79).
- 1992 and 1993: This SWMU was not sampled during the Phase I RFI in part because of inaccessibility along the majority of the former storm drain and outfall, and also because results of the investigation conducted on Hillside 138 [the outfall area of SWMU 01-001(d)] would reveal any potential contamination (LANL 1995, 49703, p. 30).
- 1995: The RFI report recommended NFA for SWMU 01-006(h) because human health assessment and ecotoxicological screening assessment in SWMU 01-001(d) indicated no potential unacceptable risk (LANL 1995, 49703, pp. vii, 93-95).
- 1996: NMED issued an NOD on the 1995 RFI report. The Laboratory's response to NOD stated that SWMU 01-006(h)

  > was not sampled during the Phase I Site Investigations conducted for Aggregate F in part because archival information indicated that the site had not received RCRA solid or hazardous wastes or hazardous substances. It will be proposed for NFA based on Criterion 1, the PRS has never been used for the management of RCRA solid or hazardous wastes or hazardous substances. PRS 1-006(h) was not proposed for NFA in the RFI Work Plan for Operable Unit (OU) 1078 (LANL 1992, 43454) because of a report that puddles of mercury were found in an excavated portion. That information was later found to be in error, so no sample locations were planned for PRS 1-006(h). In addition, development of a motel and office buildings at the site radically altered the terrain. Any portion of the drain that had been an open channel was regraded or buried with fill, and portions that were buried conduits were, for the most part, buried deeper and/or built over. (LANL 1996, 53854, pp. 1–2)

  Note: The Ahlquist Radiological Survey found small puddles of elemental mercury in a 0.31-m-diameter concrete pipe in trenches around Building Y (Ahlquist et al. 1977, 05710, pp. 79, 82). This concrete pipe is not part of the storm drain.

4.25.2 Data for SWMU 01-006(h)

No off-site fixed-laboratory data are available for this SWMU.

4.26 SWMU 01-006(n), Stormwater-Drainage System

SWMU 01-006(n) is the stormwater-drainage system that served Building D, which was used to process plutonium. It originated near the east corner of the building and extended along the southeast side of the building to an outfall into Los Alamos Canyon. No information on the excavation of this specific drain line can be located, although during the D&D of Buildings D and D-2 areas, all drain lines were removed along with areas of elevated radioactivity (Ahlquist et al. 1977, 05710, p. 64).

The site map of SWMU 01-006(n) is shown in Figure 4.26-1. Currently, the location of the pipeline is under a paved parking lot.

4.26.1 Previous Investigations for SWMU 01-006(n)

- 1974 to 1976: The Ahlquist Radiological Survey found no radioactive contamination in the water drainage area near Building D (Ahlquist et al. 1977, 05710, p. 42). During the survey, contaminated soil was removed from the area of Building D (Ahlquist et al. 1977, 05710, p. 11). The soil was monitored with gross-alpha instruments and excavated until the remaining soil showed gross-alpha activity level less than 20 pCi/g.
- 1992 and 1993: Phase I RFI activities were conducted at the area of adjacent SWMU 01-007(a) that is downgradient of SWMU 01-006(n). No COPCs were identified on the mesa-top portion of SWMU 01-007(a) (LANL 1996, 54465, p. 110).
- 1996: The RFI report recommended NFA for SWMU 01-006(n) (LANL 1996, 54465, pp. iv, 118-119).

4.26.2 Data for SWMU 01-006(n)

No off-site fixed-laboratory data are available for this SWMU.

4.27 SWMU 01-006(o), Stormwater Drainage System

SWMU 01-006(o) is the stormwater-drainage system that served Buildings A, B, C, H, and Sigma 4. Buildings A and B contained administrative offices, C was used as shops, H was used for preparing polonium-210, and Sigma 4 was used for storage. In 1964, the foundation of Building C was determined to be radiologically contaminated and was subsequently demolished and disposed of at an unspecified MDA. The storm drain near the H-Theta area was excavated (Ahlquist et al. 1977, 05710, p. 83). The entire area has been completely regraded and rebuilt.

The site map of SWMU 01-006(o) is shown in Figure 4.27-1. Currently, the majority of the SWMU area is under pavement and residential buildings.

4.27.1 Previous Investigations for SWMU 01-006(o)

- 1974 to 1976: The Ahlquist Radiological Survey found no radioactive contamination in the water drainage areas near Buildings A, B, C, and Sigma 4 (Ahlquist et al. 1977, 05710, p. 42). During the survey, the water drainage from the H-Theta area was contaminated with up to 74 pCi/g of gross-alpha activity; surface spots were excavated. Exploratory excavations unearthed the storm drain, which was removed because of its potential for contamination (Ahlquist et al. 1977, 05710, p. 83).

- 1992: Phase I RFI was conducted at SWMU 01-003(a), which is downgradient of SWMU 01-006(o). SWMU 01-006(o) itself was not sampled because the discharge end of the drainage system lies beneath the Los Arboles condominiums and several feet of fill material (LANL 1996, 54461, p. 50).
- 1996: The RFI report recommended NFA for SWMU 01-006(o) (LANL 1996, 54461, pp. I, 81).

4.27.2 Data for SWMU 01-006(o)

No off-site fixed-laboratory data are available for this SWMU.

4.28 SWMU 01-007(a), Suspected Subsurface Soil Radiological Contamination

SWMU 01-007(a) is the area of suspected subsurface soil radiological contamination near Building D, which was primarily used for processing plutonium (Ahlquist et al. 1977, 05710, p. 11)

The site map of SWMU 01-007(a) is shown in Figure 4.28-1. Currently, the mesa-top portion of the SWMU area is a parking lot and the hillside portion is undeveloped.

4.28.1 Previous Investigations for SWMU 01-007(a)

- 1974 to 1976: During the Ahlquist Radiological Survey, almost 9000 m^3 of soil was removed from the Buildings D and D-2 areas (Ahlquist et al. 1977, 05710, p. 40). The soil was monitored with gross-alpha instruments until the excavated soil gross-alpha activity was below the detection limit of 25 pCi/g. Clean fill material was used as backfill (Ahlquist et al. 1977, 05710, p. 36).
- 1992 and 1993: Phase I RFI was conducted at the mesa-top area of the former Building D footprint and the hillside downgradient of the SWMU. Surface and subsurface samples collected were analyzed at the CST on-site laboratory for inorganic chemicals, SVOCs, and radionuclides including cesium-137, isotopic plutonium, and isotopic uranium. Samples were analyzed at off-site laboratories for inorganic chemicals, isotopic plutonium, and isotopic uranium. Some inorganic chemicals, SVOCs (mostly PAHs), and radionuclides were identified as COPCs. However, the human health risk assessment showed that these chemicals do not present an unacceptable risk to human health.
- 1996: The RFI report recommended NFA for SWMU 01-007(a) (LANL 1996, 54465, pp. iv, 119).

4.28.2 Data for SWMU 01-007(a)

Samples analyzed at off-site fixed laboratories include 16 soil, fill, and sediment samples collected from 16 locations on the mesa top and hillside area downgradient of SWMU 01-007(a) at depths of 0 to 12 ft (Figure 4.28-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from 10 of the 16 locations (01-03053, 01-03065, 01-03069, 01-03074, 01-03081, 01-03103, 01-03106, 01-03113, 01-03114, and 01-03117) were analyzed for metals. Analytical results indicated that antimony, cadmium, lead, selenium, and thallium were detected greater than BVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.28-2, Table 4.28-1).

- Antimony was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at four locations (01-03103, 01-03113, 01-03114, and 01-03117). Antimony was not detected, but the detection limits were greater than the range of background concentrations at six locations (01-03053, 01-03065, 01-03069, 01-03074, 01-03081, and 01-03106).

- Arsenic was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-03117).
- Cadmium was detected at a concentration greater than the range of background concentrations in the only depth interval sample at one location (01-03117) and within the range of background concentrations at another (01-03069). Cadmium also had detection limits within the range of background concentrations at eight locations (01-03053, 01-03065, 01-03074, 01-03081, 01-03103, 01-03106, 01-03113, and 01-03114).
- Lead was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at five locations (01-03053, 01-03106, 01-03113, 01-03114, and 01-03117).
- Selenium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at nine locations (01-03053, 01-03065, 01-03069, 01-03081, 01-03103, 01-03106, 01-03113, 01-03114, and 01-03117). Selenium was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-03074).
- Thallium was detected at concentrations greater than the range of the background concentrations or BV in the only depth interval sampled at three locations (01-03106, 01-03113, and 01-03117). Thallium was not detected, but the detection limits were greater than the range of the background concentrations at seven locations (01-03053, 01-03065, 01-03069, 01-03074, 01-03081, 01-03103, and 01-03114).

Samples from six of the 16 locations (01-04024, 01-04025, 01-04027, 01-04029, 01-04030, and 01-04035) were analyzed for isotopic plutonium and isotopic uranium. Analytical results indicated that only plutonium-239 was detected in at least one sample between 2.0 and 12.0 ft bgs where FVs do not apply (Figure 4.28-3, Table 4.28-2). Plutonium-239 was detected in the only depth interval sampled at five locations (01-04024, 01-04025, 01-04029, 01-04030, and 01-04035).

4.29 SWMU 01-007(b), Suspected Subsurface Soil Radiological Contamination

SWMU 01-007(b) is the area of suspected subsurface soil radiological contamination associated with the drain lines and outfalls from the Building D-2 laundry facility (Ahlquist et al. 1977, 05710, p. 11). Building D-2 served as the facility for laundering radioactively contaminated clothing and recyclable equipment for the entire technical area from 1943 to 1945, when the laundry facility was moved to TA-21. Drain lines from the laundry facility discharged directly onto Hillside 137 southwest of Building D-2.

The site map of SWMU 01-007(b) is shown in Figure 4.29-1. Currently, the mesa-top portion of the site has been covered with fill material by the private owner in anticipation of redevelopment.

4.29.1 Previous Investigations for SWMU 01-007(b)

- 1974 to 1976: During the Ahlquist Radiological Survey, contaminated soil was excavated in Buildings D and D-2 areas until the areas were decontaminated based on rationale consented at that time (Ahlquist et al. 1977, 05710, pp. 64–70).
- 1992 and 1993: Phase I RFI was conducted at the mesa-top area of former Building D-2 footprint and the hillside downgradient of the SWMU. Both surface and subsurface samples were collected. Samples were analyzed at the CST on-site laboratory for inorganic chemicals, SVOCs, isotopic plutonium, and isotopic uranium. Samples were analyzed at an off-site laboratory for inorganic chemicals.

- 1996: The RFI report recommended NFA for SWMU 01-007(b) (LANL 1996, 54465, pp. iv, 119).

4.29.2 Data for SWMU 01-007(b)

Samples analyzed at off-site fixed laboratories include 12 soil, fill, and sediment surface samples (0 to 0.5 ft) collected from 12 locations at SWMU 01-007(b) (Figure 4.29-1, Table 4.1-1). These samples were analyzed for metals.

Samples from 12 locations (01-03007, 01-03033, 01-03045, 01-03051, 01-03110, 01-03124 through 01-03128, 01-06073, and 01-06074) were analyzed for metals. Analytical results indicated that antimony, arsenic, barium, cadmium, lead, mercury, and selenium were detected greater than BVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.29-2, Table 4.29-1).

- Antimony was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at five locations (01-03033, 01-03045, 01-03124, 01-03126, and 01-06073). Antimony was not detected, but the detection limits were greater than the range of the background concentrations at seven locations (01-03007, 01-03051, 01-03110, 01-03125, 01-03127, 01-03128, and 01-06074).
- Arsenic was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (01-03127). Arsenic was not detected, but the detection limits were greater than the range of the background concentrations at three locations (01-03124 through 01-03126).
- Barium was detected at concentrations within the range of the background concentrations.
- Cadmium was not detected, but the detection limits were greater than the range of the background concentrations at three locations (01-03124 through 01-03126), and the detection limits were within the range of background concentrations at seven locations (01-03007, 01-03033, 01-03045, 01-03051, 01-03110, 01-06073, and 01-06074). Cadmium was detected within the range of background concentrations at one location (01-03128).
- Lead was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at four locations (01-03007 and 01-03026 through 01-03028). Lead was detected within the range of background concentrations at two locations (01-03124 and 01-03125).
- Mercury was detected at concentrations greater than BV in the only depth interval sampled at five locations (01-03124, 01-03126 through 01-03128, and 01-06074).
- Selenium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at nine locations (01-03007, 01-03033, 01-03045, 01-03110, and 01-03124 through 01-03128). Selenium was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-03051).
- Thallium was not detected, but the detection limits were greater than the range of the background concentrations at all 12 locations (01-03007, 01-03033, 01-03045, 01-03051, 01-03110, 01-03124 through 01-03128, 01-06073, and 01-06074).

4.30 SWMU 01-007(c), Suspected Subsurface Soil Radiological Contamination

SWMU 01-007(c) is an area of spotty, shallow, gross-alpha soil contamination north and west of Building D (Ahlquist et al. 1977, 05710, p. 11).

The site map of SWMU 01-007(c) is shown in Figure 4.30-1. Currently, the entire area is under pavement and residential buildings.

4.30.1 Previous Investigations for SWMU 01-007(c)

- 1974 to 1976: During the Ahlquist Radiological Survey, plutonium contamination was discovered at SWMU 01-007(c) (Ahlquist et al. 1977, 05710, pp. 70–77). Approximately 1300 m^3 of soil and clay-tile waste line from Building D was removed from this area and taken to an unspecified location (Ahlquist et al. 1977, 05710, p. 40). This clay-tile pipe was a portion of SWMU 01-001(s) and was addressed in Section 4.10.
- 1992 and 1993: Phase I RFI was conducted at the mesa-top area of the former Building D footprint and its vicinity. Although no samples were collected within the boundary of SWMU 01-007(c), samples collected downgradient in SWMU 01-007(a,b) identified no COPCs.
- 1996: The RFI report recommended NFA for SWMU 01-007(c) (LANL 1996, 54465, pp. iv, 119).

4.30.2 Data for SWMU 01-007(c)

No off-site fixed-laboratory data are available for this SWMU.

4.31 SWMU 01-007(d), Suspected Subsurface Soil Radiological Contamination

SWMU 01-007(d) refers to four areas of subsurface soil radiological contamination between Buildings H and Theta and west of Theta because of an overflow of an industrial waste line in 1946. After the overflow, all the contaminated soil that could be removed was removed, and a load of gravel and binder was spread to a depth of 4 in. over the area (Ahlquist et al. 1977, 05710, p. 80).

The site map of SWMU 01-007(d) is shown in Figure 4.31-1. Currently, the two areas to the west are landscaped with grass and trees, and the two areas to the east are under pavement and buildings of Los Ventanas.

4.31.1 Previous Investigations for SWMU 01-007(d)

- 1974 to 1976: Because of the history of contamination in this area, an intensive investigation of the area was completed during the Ahlquist Radiological Survey (Ahlquist et al. 1977, 05710, pp. 80, 83). Gross-alpha activity (primarily indicating plutonium) was measured at approximately 200 pCi/g during the excavation in the area of the former industrial waste line. Two contaminated lateral connections from Building H to the main line were removed and, along with approximately 610 yd^3 of contaminated soil, disposed of at MDA G.
- 1994: SWMU 01-007(d) was sampled as part of the Phase I RFI of the Loma Vista Drive property. Samples were collected and analyzed at off-site laboratories for inorganic chemicals and SVOCs. Fixed laboratory analyses for radionuclides were not preformed because field-screening results indicated no elevated radiation. Results of the site investigation confirmed that the remediation performed at SWMU 01-007(d) during the 1974–1976 Ahlquist Radiological Survey met standards for both RCRA and radiological constituents (LANL 1996, 54461, p. 45). No COPCs were identified at this SWMU.
- 1996: The RFI report recommended NFA for SWMU 01-007(d) (LANL 1996, 54461, pp. i, 45).

4.31.2 Data for SWMU 01-007(d)

Samples analyzed at off-site fixed laboratories include 13 soil, fill, and tuff samples collected from 9 locations at SWMU 01-007(d) at depths of 2.67 to 20 ft (Figure 4.31-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from nine locations (01-04211 through 01-04218, and 01-04221) were analyzed for metals. Analytical results indicated that aluminum, calcium, chromium, copper, lead, and mercury were detected greater than BVs in at least one sample between 2.67 and 20.0 ft bgs (Figure 4.31-2, Table 4.31-1).

- Aluminum was detected within the range of the background concentrations at one location (01-04212).
- Antimony was not detected, but the detection limits were greater than the range of the background concentrations at six locations (01-04211 through 01-04216).
- Cadmium and thallium were not detected, but the detection limits were within the range of the background concentrations.
- Calcium, chromium, and copper were detected at concentrations greater than the range of the background concentrations in the deepest depth interval sampled at one location (01-04212).
- Lead was detected at concentrations greater than the range of the background concentrations at two locations (01-04217 and 01-04221); its concentrations decreased with depth at one location (01-04217) and increased with depth at the other location (01-04221). Lead was within the range of background concentrations at three locations (01-04215, 01-04216, and 01-04218).
- Mercury was detected at concentrations greater than BV at three locations (01-04217, 01-04218, and 01-04221); its concentrations decreased with depth at one location (01-04217) and increased with depth at the other two locations (01-04218 and 01-04221). Mercury was not detected, but the detection limit was greater than BV at one location (01-04217).
- Selenium was not detected, but the detection limit was greater than the range of the background concentrations at one location (01-04212).

Samples from one location (01-04221) were analyzed for SVOCs, and none were detected.

4.32 SWMU 01-007(e), Suspected Subsurface Soil Radiological Contamination

SWMU 01-007(e) is the suspected subsurface soil radiological contamination in the former Sigma Building footprint (Ahlquist et al. 1977, 05710, p. 12). Sigma Building was used for machining plutonium, uranium, and thorium and for casting and metallurgy.

The site map of SWMU 01-007(e) is shown in Figure 4.32-1. Currently, the entire area is under pavement and residential buildings.

4.32.1 Previous Investigations for SWMU 01-007(e)

- 1974 to 1976: During the Ahlquist Radiological Survey, SWMU 01-007(e) was determined to contain uranium contamination (Ahlquist et al. 1977, 05710, pp. 99, 105). Approximately 150 m^3 of contaminated soils was excavated from three small areas in the Sigma Building footprint area and disposed of at an unspecified MDA (Ahlquist et al. 1977, 05710, p. 40).
- 1994: During the Phase I RFI, SWMU 01-007(e) was not sampled because it was located beneath buildings and was not accessible (LANL 1996, 54461, p. 30). The Ridge Park Village

development substantially altered the site, and two multiple-unit condominiums now share the footprint of this SWMU. (The Phase I RFI did not include the subarea under Oppenheimer Drive, shown in Figure 4.32-1.)

- 1996: The RFI report recommended NFA for SWMU 01-007(e) because it was investigated under the same protocol as SWMU 01-007(d) during the 1974–1976 survey and the 1996 RFI results of SWMU 01-007(d) confirmed that remediation during the 1974–1976 survey met the standards for RCRA and radiological constituents (LANL 1996, 54461, p. 45). The RFI report recommended NFA for SWMU 01-007(e) (LANL 1996, 54461, pp. i, 45)
- 1997: NMED requested confirmation sampling to support the NFA proposal and contended that no analogy could be made between SWMUs 01-007(e) and 01-007(d) because they have different suspected contaminants. The Laboratory's response stated that the Ahlquist Radiological Survey excavated all areas of SWMU 01-007(e), and the gross-alpha activity was reduced to less than 20 pCi/g (except in two samples). The highest radioactivity in all areas was at the surface, indicating that the contamination had been disposed of on the surface. Excavated areas were backfilled with clean soil in 1976. The response also stated that the Laboratory believes the most relevant relationship between SWMUs that have been remediated is the effectiveness of excavation, not a method of release or a difference in suspected contaminants (LANL 1997, 57294, pp. 4–5).

4.32.2 Data for SWMU 01-007(e)

No off-site fixed-laboratory data are available for this SWMU.

4.33 SWMU 01-007(j), 12 Areas of Suspected Subsurface Soil Radiological Contamination

SWMU 01-007(j) consists of 12 areas of suspected subsurface soil radiological contamination. These areas, which were called "spots" when they were located during the Ahlquist Radiological Survey, are isolated small areas across TA-01. Toward the end of the TA-01 D&D, a radiological survey of the entire TA-01 area was undertaken to determine whether any spots of contamination had been missed in preceding cleanup operations. The survey was conducted in March and April 1976 using a phosphor sandwich (phoswich) detector, and 17 contaminated spots (numbered 1 through 17) were located (Ahlquist et al. 1977, 05710, p. 113).

Three spots (nos. 10, 11, and 12; Ahlquist et al. 1977, 05710, p. 118) were designated as AOC 01-007(i) (LANL 1992, 43454, p. 6-18). AOC 01-007(i) was granted NFA status in 1994 (Section 2.2.30) (NMED 2005, 88464, p. 12).

Two spots (Nos. 16 and 17, Ahlquist et al. 1977, 05710, p. 118) were determined to be the result of false-positive readings during the survey (Ahlquist et al. 1977, 05710, p.117).

SWMU 01-007(j) consists of the remaining 12 spots (nos. 1 through 9 and 13 through 15), and they are described in the following sections along with the operations conducted in nearby buildings as they are relevant to the SWMU descriptions. Figure 4.33-1 shows the 12 areas of SWMU 01-007(j). Currently, these spots are in an area highly developed with buildings, sidewalks, and roads.

4.33.1 Previous Investigations and Current Status of SWMU 01-007(j)

Spots no. 1 and 8 are two areas of soil contamination northeast of Building J-2, near the industrial waste line SWMU 01-002. One area of contamination resulted from a leak in the industrial waste line from

Building J-2 in 1957. An unspecified quantity of plutonium-contaminated soil was removed from the area immediately after the leak and the line were repaired.

- 1974 to 1976: During the Ahlquist Radiological Survey, cesium-137 was found at the same location where the leak occurred (Ahlquist et al. 1977, 05710, pp. 92–94). During the survey, a 121-ft section of the line located beneath a paved parking lot was removed. Additional trenching was conducted along the J-2 Building industrial waste line trench to remove cesium-137-contaminated soil. Much of the contaminated soil was removed from the trench; however, soil containing activity to a level of 168 pCi/g was left in the floor of the trench in one location because of the depth of the trench (approximately 4 m deep) prevented removal with available equipment (Ahlquist et al. 1977, 05710, p. 94). Contamination was confined to a 10-cm-wide, soil-filled fracture that did not extend up the trench walls.
- 1992: These areas were not sampled during the RFI because buildings make the site no longer accessible, and related drainage and outfall area samples indicated no potential contamination (LANL 1996, 54467, pp. 87–88).
- 1996: The RFI report recommended NFA for this portion of SWMU 01-007(j) (LANL 1996, 54467, pp. ii, 84).
- Present: Spot no. 1 is completely overlaid by a building. Spot no. 8 has also been regraded and developed: part of it is under a residential building and associated landscaping, and the rest of it is under a parking lot.

Spots no. 2 through 7 are six small areas of uranium-238 soil contamination, which are located north and northwest of the Sigma Building footprint.

- 1974 to 1976: The contaminated soil was removed by hand-shoveling and disposed of at MDA G during the Ahlquist Radiological Survey (Ahlquist et al. 1977, 05710, p. 113).
- 1994: These areas were not sampled during the Phase I RFI because they had been remediated during the Ahlquist Radiological Survey (LANL 1996, 54461, p. 30).
- 1996: The RFI report recommended NFA for this portion of SWMU 01-007(j) (LANL 1996, 54467, pp. ii, 102).
- Present: This part of the SWMU has been regraded and under either buildings or pavement.

Spot no. 9 is the area of soil contamination located west of the Building K-1 footprint.

- 1974 to 1976: During the Ahlquist Radiological Survey, one area showed phoswich activity of 5000 cpm and gross-alpha activity of 980 pCi/g (Ahlquist et al. 1977, 05710, p. 117). The source was suspected to be the residual uranium from septic tank 140 excavation and cleanup. The soil was removed by hand shoveling.
- 1992: This area was not sampled during the RFI because an existing structure overlies the SWMU location (LANL 1996, 54467, p. 28).
- 1996: The RFI on Hillside 140, which is downgradient of spot no. 9, identified lead, total uranium, and isotopic uranium as COPCs. The results of the human risk assessment indicated that potential exposure to COPCs in soil at Hillside 140 should not result in adverse noncarcinogenic health effects or an unacceptable radiation dose to trail users (LANL 1996, 54467, p. 84). The RFI report recommended NFA for this portion of SWMU 01-007(j) (LANL 1996, 54467, pp. ii, 84).

- 1996: A VCA was conducted on Hillside 140, which is immediately downslope of spot no. 9, to remove total uranium at the outfall area of SWMU 01-001(f) as a BMP because of the site's proximity to the Ridge Park Village condominiums. The contaminated soil identified by real-time screening was excavated. Excavation was conducted at the surface and at depths where contamination was found. The total volume of soil removed from Hillside 140 was approximately 15 yd^3. The VCA report formally requested that 01-001(f) no longer to be considered a SWMU (LANL 1996, 53797, p. 3).
- Present: This area is completely overlaid by a building.

Spots no. 13, 14 and 15 are scattered contamination areas located on the mesa top near Bailey Bridge Canyon: 13 is located approximately 200 ft southwest of the D-5 Sigma vault footprint, 14 is approximately 70 ft south of the footprint of Building D-5, and 15 is approximately 85 ft northeast of the footprint of Building D-5.

- 1974 to 1976: These areas were excavated and the soil was disposed of at MDA G during the Ahlquist Radiological Survey (Ahlquist et al. 1977, 05710, p. 113).
- 1992: These areas were not sampled during the Phase I RFI at the Bailey Bridge Canyon area because sampling of downgradient SWMU 01-003(a) would reveal any potential contamination and because these areas were remediated during the Ahlquist Radiological Survey (LANL 1996, 54461, p. 50). Samples were also collected along the Bailey Bridge Canyon rim, which is downgradient of spot no. 13.
- 1996: The RFI report recommended NFA for this portion of SWMU 01-007(j) (LANL 1996, 54461, p. 80).
- Present: These areas are completely overlaid by buildings.

4.33.2 Data for SWMU 01-007(j)

Samples analyzed at off-site fixed laboratories include four surface fill samples (0 to 0.5 ft) collected from four locations downslope of SWMU 01-007(j) (Figure 4.33-1, Table 4.1-1). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from four locations (01-02034 through 01-2036, and 01-02038) were analyzed for metals. Analytical results indicated that chromium and uranium were detected greater than BVs in at least one sample between 0 and 0.5 ft bgs (Figure 4.33-2, Table 4.33-1).

- Antimony, silver, and thallium were not detected, but their detection limits were greater than the range of the background concentrations or BV at all four locations (01-02034 through 01-2036, and 01-02038).
- Cadmium and selenium were not detected, but their detection limits were within the range of the background concentrations.
- Chromium was detected within the range of the background concentrations at one location (01-02038).
- Uranium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at two locations (01-02035 and 01-02036). Uranium was not detected, but the detection limits were greater than the range of the background concentrations at two locations (01-02034 and 01-02038).

Samples from four locations (01-02034 through 01-2036, and 01-02038) were analyzed for SVOCs. Analytical results indicated that only butylbenzylphthalate was detected in one sample between 0 and 0.5 ft bgs at one location (01-02038) (Figure 4.33-2, Table 4.33-2).

Samples from four locations (01-02034 through 01-2036, and 01-02038) were analyzed for isotopic plutonium. No isotopic plutonium was detected greater than FV.

4.34 AOC 01-007(k), Soil-Contamination Area

AOC 01-007(k) was a suspected soil-contamination area located near the U and W Buildings (LANL 1992, 43454, p. 1-13). In 1959, Buildings U and W were removed from service (Ahlquist et al. 1977, 05710, p. 131).

The site map of AOC 01-007(k) is shown in Figure 4.34-1. Currently, the area is developed with the structures and parking lots of the Los Alamos Inn.

4.34.1 Previous Investigations for AOC 01-007(k)

In 1993, the site was investigated as part of the SWMU 01-001(t) sampling activities (LANL 1996, 54463, p. 49). SWMU 01-007(k) was subsequently recommended for NFA in the RFI report (LANL 1996, 54463, p. 63). The report concluded that this site did not need to be added to the Module VIII of the Hazardous Waste Facility Permit. In 1998, the DOE granted NFA status to AOC 01-007(k) (DOE 1998, 59694).

4.34.2 Data for AOC 01-007(k)

No off-site fixed laboratory data are available for this AOC.

4.35 SWMU 01-007(l), Suspected Subsurface Soil Contamination

SWMU 01-007(l) is the fill material under Trinity Drive that is bounded by 24th Street to the east and the road into the Timber Ridge condominiums development to the west. The fill material is suspected to contain construction debris and other potentially contaminated fill from the Building D area. A worker at the site reported that approximately 1000 to 2000 m^3 of fill and other debris had been transported from the former location of Building D during the Trinity Drive widening and repaving project in 1966 (Ahlquist et al. 1977, 05710, pp. 120–121). Because Building D housed a facility for plutonium chemistry, metallurgy, and processing, the fill, which contained soil, concrete fragments, pipe insulation, other debris, may be contaminated with uranium, fission products, and plutonium.

The site map of SWMU 01-007(l) is shown in Figure 4.35-1. Currently this site is overlain with the pavement of Trinity Drive.

4.35.1 Previous Investigations for SWMU 01-007(l)

- 1974 to 1976: The pavement prevented sampling during the Ahlquist Radiological Survey, but it also precludes any potential radioactivity in the fill from being manifested at the surface. The Ahlquist report concluded that any remaining concentrations of potentially contaminated soil used as fill material for the 1966 Trinity Drive project would have been greatly reduced by mixing the fill material from the Building D area with the fill material from off-site sources (Ahlquist et al. 1977, 05710, p. 121).
- 1993 and 1996: The 1993 Phase I RFI was conducted as the opportunity became available during construction activities along the south side of Trinity Drive. Three subsurface grab samples

were collected and field screened for radiation and organic vapors. No elevated levels of radiological activity or organic chemicals were detected. During 1996 Phase I RFI, four subsurface samples were collected at three locations from depth intervals associated with fill material. Field screening for radiation was also conducted, and no elevated levels of radioactivity were detected. The RFI found no COPCs in concentrations sufficient to indicate adverse human health effects.

- 1997: The RFI report recommended NFA for SWMU 01-007(l) (LANL 1997, 56660.112, pp. ii, 142). Any potential contamination contained in the layer of fill beneath the pavement and concentrations of the contaminants were below SALs.

4.35.2 Data for SWMU 01-007(l)

Three soil samples collected during the 1996 Phase I RFI were analyzed at off-site fixed laboratories. They were collected from three locations under the pavement of Trinity Drive (0.5 to 4 ft) at SWMU 01-007(l) (Figure 4.35-1, Table 4.1-1). The RFI report indicated that these depths were associated with the fill material (LANL 1997, 56660.112, p. 134). The suites analyzed for each sample are provided in Table 4.1-1.

Samples from three locations (01-10131 through 01-10133) were analyzed for metals. Analytical results indicated that cadmium, calcium, chromium, copper, lead, mercury, nickel, silver, and thallium were detected greater than BVs in at least one sample between 0.5 and 4.0 ft bgs (Figure 4.35-2, Table 4.35-1).

- Antimony was not detected, but the detection limits were greater than the range of the background concentrations at all three locations (01-10131 through 01-10133).
- Cadmium was detected within the range of the background concentrations at three locations (01-10131 through 01-10133).
- Calcium was detected within the range of the background concentrations at one location (01-10133).
- Chromium, copper, lead, and nickel were detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at one location (01-10131).
- Mercury and silver were detected at concentrations greater than BV in the only depth interval sampled at all three locations (01-10131 through 01-10133).
- Thallium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at all three locations (01-10131 through 01-10133).

Samples from three locations (01-10131 through 01-10133) were analyzed by gamma spectroscopy, and for isotopic plutonium and isotopic uranium. Analytical results indicated that americium-241 and plutonium-239 were detected in at least one sample between 0.5 and 4.0 ft bgs where FVs do not apply (Figure 4.35-3, Table 4.35-2).

- Americium-241 was detected in the only depth interval sampled at one location (01-10131).
- Plutonium-239 was detected in the only depth interval sampled at two locations (01-10131 and 01-10132).

5.0 TA-03, SOUTH MESA SITE

5.1 Background

TA-03 is located on the western end of South Mesa and is almost completely developed. It contains the core of operational facilities at the Laboratory. Several buildings dominate the site: the Administrative Building (03-043), the Otowi Building (03-261), the Chemistry and Metallurgy Research (CMR) Building (03-029), the Physics Building complex (03-040 and -215), the main shops building (03-039), and the central warehouse (03-030). Medium-sized and smaller buildings and transportable buildings are interspersed throughout the site. A gas-fired electrical generating plant, gas station and garage, and sewage treatment plant are also located at TA-03.

Four SWMUs and one AOC located in TA-03 are addressed below.

- SWMU 03-009(j) is a surface disposal site under a parking lot of the Laboratory's Wellness Center.
- SWMU 03-038(a) is the site of a pump house and two concrete underground tanks that was the central collection point for industrial wastes from various Laboratory buildings.
- SWMU 03-038(b) is the site of a 28,500-gal. steel waste-holding tank north of the pump house. SWMUs 03-038(a,b) make up Consolidated Unit 03-038(a)-00.
- SWMU 03-055(c) is the outfall of an active storm-drain system near the fire station.
- AOC 03-008(a) was a decommissioned firing site.

The SWMUs and AOC in TA-03 are shown in Figure 5.1-1.

5.1.1 Operational History

TA-03 was originally built as a firing site before 1945. The site was decommissioned and cleared in 1949. In the summer of 1950, construction began on the major buildings at the South Mesa site, which was built to replace the operational facilities in Los Alamos townsite (i.e., TA-01). The buildings became operational between summer 1950 and autumn 1952, including the Van de Graaff accelerator building, the communication buildings, and the CMR Building. The initial development of TA-03 also included the general warehouse, the chemical warehouse, the cryogenics facility, shops, a fire station, and the Physics Building. A wastewater treatment plant, service station and maintenance garage, and a gas-fired electrical generating plant were constructed to service facilities in TA-03. An asphalt concrete plant was moved to TA-03 in 1953. The Administrative Building was completed in 1956. The Sigma Building was completed in 1959. Construction of new facilities continued through the 1960s and 1970s. Office buildings, shops, storage areas, an addition to the wastewater treatment plant, a cement batch plant, and numerous transportable buildings filled the areas between the initial buildings. More recent constructions included the Oppenheimer Study Center in 1977, the Otowi Building, an annex to the Administrative Building, in 1981, a computer facility, and several national centers for various scientific activities in the 1990s.

5.1.2 Data Overview

No off-site fixed-laboratory data are available for TA-03.

5.2 AOC 03-008(a), Firing Site

AOC 03-008(a) was a decommissioned firing site located at the original LASL South Mesa site (LANL 1990, 07511, p. 3-008). Between 1943 and1949, the area housed a production shop, a storage building, hutments, and magazines and was used to manufacture and test detonators (LANL 1990, 07511, p. 3-008; LANL 1995, 57590, p. 6-38).

The site map of AOC 03-008(a) is shown in Figure 5.2-1. Currently, the area is a developed commercial and residential area.

5.2.1 Previous Investigations for AOC 03-008(a)

In 1995, during the research for the writing of the addendum to the RFI work plan for OU 1114 (LANL 1995, 57590), engineering drawings, and aerial photographs were reviewed, and it was concluded that the site would have been located near the current intersection of Diamond Drive and West Jemez Road and that the site is no longer discernible. Therefore, AOC 03-008(a) was proposed for NFA (LANL 1995, 57590, p. 6-38).

5.2.2 Data for SWMU 03-008(a)

No off-site fixed laboratory data are available for this AOC.

5.3 SWMU 03-009(j), Surface Disposal Site

SWMU 03-009(j) was a soil-fill area located west of a warehouse (03-142). Interviews with site workers indicated that the soil fill contained construction debris consisting of tuff, concrete, rock, and other construction-related items (Griggs 1993, 76167). The SWMU report notes that an old water tank may also have been used for fill material (LANL 1990, 07511). The site was never used to manage hazardous wastes or constituents, and no suspected contaminants are suspected at the site.

SWMU 03-009(j) was proposed for NFA in the addendum to the OU 1114 RFI work plan (LANL 1995, 57590, p. 6-4). NMED requested a sampling and analysis plan to confirm that hazardous waste was not disposed of at the site (NMED 1997, 56369). The Laboratory withdrew the NFA proposal for SWMU 03-009(j) in a letter to NMED dated February 11, 2002 (LANL 2002, 71447).

The site map of SWMU 03-009(j) is shown in Figure 5.3-1. Currently, the area is partially under a paved road/parking to the Laboratory's Wellness Center (03-1663).

5.3.1 Previous Investigations for SWMU 03-009(j)

No field investigations were previously conducted at SWMU 03-009(j).

5.3.2 Data for SWMU 03-009(j)

No off-site fixed laboratory data are available for this SWMU.

5.4 SWMUs 03-038(a,b), Acid Tanks

SWMUs 03-038(a,b) comprise the Consolidated Unit 03-038(a)-00, which is located near the southwest end of Omega Bridge. SWMU 03-038(a) is the site of the acid-neutralizing and pumping building (former

03-700). The building was constructed in 1952 and consisted of a 16-ft by 22-ft by 11-ft concrete-block pump house and two 14-ft by 22-ft by 14-ft concrete underground tanks. The pumping building was the central collection point for industrial wastes from the CMR Building (29), the Sigma Building (66), and other Laboratory buildings. Once collected, wastes were pumped from the tanks into a waste line (line 167 of SWMU 00-017) leading to the TA-50 radioactive liquid waste treatment facility. Building 700 with associated portions of waste lines, manholes, the pump station, and the underground concrete tanks was removed in 1981 and 1982 as part of the radioactive liquid waste lines removal project of 1981 to 1986 and disposal of at TA-54 (Elder et al. 1986, 06666, p. 41).

SWMU 03-038(b) is the site of a 28,500-gal. steel waste-holding tank (structure 03-738) located north of former Building 03-700. The tank was constructed in 1952 and it was 11 ft in diameter and 44 ft long and was partially buried on the upper south wall of Los Alamos Canyon. The tank was removed as a single unit in 1982 as part of the radioactive liquid waste lines removal project of 1981 to 1986 (Elder et al. 1986, 06666, p. 41). The tank apparently did not leak; soil samples collected beneath the tank were below guidelines (Elder et al. 1986, 06666, p. 41).

The site map of SWMUs 03-038(a,b) is shown in Figure 5.4-1. Currently, the site is undeveloped.

5.4.1 Previous Investigations for SWMUs 03-038(a,b)

Previous investigations were conducted concurrently for SWMU 03-038(a) and SWMU 03-038(b):

- 1975 and 1976: The areas around Building 03-700 and structure 03-738 were remediated by the Zia Company in 1975 (LANL 1993, 20947, p. 6-8). In 1976, radioactive contamination was discovered near Building 03-700. Soil was tested for radionuclides; one-third of the 72 samples taken from the west, south, and east sides of the building were positive for gross-alpha. The values ranged from 27 to 170 pCi/g. It was estimated that 95% of the contamination was from plutonium-239. Portions of the site were excavated before sampling (Stoker 1976, 04118).
- 1982: As part of the industrial waste line removal project between 1981 and 1986, the tanks and building of the two SWMUs were removed and taken to TA-54 for disposal in 1982. The tanks had never leaked; soil samples taken beneath them were below guideline levels. All pipelines leading into and out of the SWMUs were removed, except for 100 ft and 150 ft sections of 8-in.-diameter VCP, which were left under the West Jemez Road at the Diamond Drive intersection. The pipe under the road was filled with an asphalt emulsion and capped at each end with 1 to 2 yd^3 of Tigercrete, a quick-setting, hard-curing formulation of concrete with an adhesive additive. Brass monument warning plates were placed at each end of the pipes. Manhole 03-703 and part of manhole 03-702 were removed. Pits measuring 9 ft by 9 ft by 17 ft deep were excavated at each end of the pipe sections of the two manholes. Contaminated soil around the manholes was removed until the gross-alpha counts ranged from 78 to 255 pCi/g at the bottom of the pit. All pits were backfilled with uncontaminated soil and landscaped (Elder et al. 1986, 06666, pp. 41, A-4). Guideline levels for soil cleanup were specified, but the lowest level for subsurface contamination, 75 pCi/g, could not be reached (LANL 1993, 20947, p. 6-8). The upper limits were applied on a case-by-case basis to keep radiation exposure to the public to as low as reasonably achievable (Elder et al. 1986, 06666, pp. 66, A-4).
- 1993: The RFI work plan for OU 1114 recommended both SWMUs for deferred action because the site is beneath an active area that has no credible off-site pathways and because disturbance of the site may result in unnecessary exposure to the public (LANL 1993, 20947, p. 6-9).

5.4.2 Data for SWMU 03-038(a)

No off-site fixed laboratory data are available for these SWMUs.

5.5 SWMU 03-055(c), Outfall

SWMU 03-055(c) is identified as an outfall located northeast of the fire station (03-41). This system channels stormwater toward Los Alamos Canyon. Previously, the storm drain was connected to building floor drains but currently it collects and channels only stormwater runoff from parking lots located in the northern portion of TA-03.

The addendum to the RFI work plan for OU 1114 states that no outfall but only a stormwater-drainage channel was observed during a site visit. The site map of SWMU 03-055(c) is shown in Figure 5.5-1. Currently, the site is in an undeveloped wooded area.

5.5.1 Previous Investigations for SWMU 03-055(c)

- 1992: The stormwater-drainage channel was sampled as part of a reconnaissance survey associated with the construction of the Industrial Partnership Center at TA-03. Two surface-soil samples were screened for gross-alpha, beta, and gamma radioactivity before being analyzed for VOCs, SVOCs, PCBs, and heavy metals at the Laboratory. Only one SVOC and heavy metals were detected and were below EPA action levels. No RCRA hazardous-waste constituents were detected in levels high enough to be considered a health and safety problem (Fresquez 1993, 21296).
- 1995: SWMU 03-009(j) was proposed for NFA in the addendum to the OU 1114 RFI work plan based on the rationale that no outfall exists in the identified location (LANL 1995, 57590, p. 6-39).
- 1996: NMED rejected the NFA proposal (NMED 1996, 65591).

5.5.2 Data for SWMU 03-055(c)

No off-site fixed laboratory data are available for this SWMU.

6.0 TA-32, MEDICAL RESEARCH LABORATORY

6.1 Background

The site of former TA-32 is located on the south side of East Mesa at an elevation of 7260 ft. The site is bounded approximately by 9th Street to the east, Knecht Street to the west, Trinity Drive to the north, and rim of Los Alamos Canyon to the south. Between 1944 and 1954, the medical research and training facilities for the Laboratory were located at TA-32. The area consisted of laboratories, an office building, warehouses, an incinerator, two septic tanks, a valve house, and a transformer station. All of the structures at TA-32 were removed after 1954. The Los Alamos County Roads Division currently uses the site to store equipment and materials for road work and road maintenance.

Three SWMUs and two AOCs located in TA-32 are addressed below.

- SWMU 32-001 is the former location of the incinerator.
- SWMU 32-002(a) is the former septic tank and its associated drain line.

- SWMU 32-002(b) is the other former septic tank and its associated drain line and outfall.
- AOC 32-003 is the former location of the transformer station.
- AOC 32-004 is a former drain line and outfall.

These SWMUs and AOCs are shown in Figure 6.1-1.

6.1.1 Operational History

The Medical Research Facility was established in 1944 to develop a urinalysis method to monitor radionuclide accumulation in Laboratory personnel. The research group expanded and performed research investigations into the metabolism of plutonium in animals (LASL 1950, 04681). The research group activities included organic chemistry, radiobiology, and biochemistry. Besides radionuclide and chemical wastes from research activities, other potential waste streams include animal carcasses and their excrement after they were used in experiments. Contaminated waste was picked up from TA-32 on an "on-call" basis by Group H-1. Types of waste picked up included animal carcasses and lab pack material. The standard waste container for disposal was a cardboard box sealed with 2-in. masking tape (IT 1991, 02084). Between 1948 and 1953, waste from TA-32 was taken to pits 1, 2, and 3 in MDA C at TA-50. Because the Laboratory did not identify radioactive isotopes associated with waste disposal activities until approximately 1954, radioactive isotopes associated with these wastes were not identified. It is possible that the animal carcasses and excrement waste streams were incinerated at the on-site incinerator (SWMU 32-001, structure 32-9). In addition, electronic and radiation survey equipment was calibrated at TA-32 in the late 1940s (LANL 1989, 11975).

In 1953, operations were moved to the HRL at TA-43. TA-32 was decommissioned in 1954. However, SWMU 32-002(a), the septic system (32-7) was thought to have been left at the site (LANL 1990, 07513). All structures were razed by a contractor, Bert G. Clark, as part of the 1954 site clearing. A documented site investigation of TA-32 was performed by the 1987 Comprehensive Environmental Assessment and Response Program Survey, Phase I. This survey included only visual inspection, which indicated that both septic tanks were near the edge of the mesa top (DOE 1987, 08662). SWMU 32-002(b) (structure 32-8) was removed in 1988. Before it was removed, samples of sludge in the tank were collected and analyzed. While the sample analyses indicated no radioactive contamination, the analyses detected ppb concentrations of volatile organics, with the exception of ppm concentrations of methylene chloride and chloroform. The analyses also indicated ppb concentrations of semivolatile compounds (phenols) and high levels of lead and chromium. The septic tank and sludge contents were disposed of in MDA L at TA-54.

The Los Alamos County Roads Division currently uses to store equipments and materials for road work and road maintenance.

6.1.2 Data Overview

Samples from previous investigations were analyzed for inorganic chemicals, organic chemicals, and/or radionuclides either on-site by the CST Division at the Laboratory, or off-site by fixed laboratories, or both. Data obtained at on-site CST Division laboratories are screening-level quality data and are used only to select sampling locations and analytical suites; these data are not discussed and are not reported. Only data obtained from off-site fixed laboratories are discussed further. Concentrations of detected inorganic chemicals are compared with BVs and the ranges of the background concentrations (LANL 1998, 59730). Concentrations of detected organic chemicals are presented. Activities of detected radionuclides are

compared with BVs or FVs and the ranges of the background/fallout activities for radionuclides (LANL 1998, 59730). These data are presented in their entirety in this report.

The environmental media sampled in previous investigations at TA-32 included soil, fill, and tuff. The investigation samples were collected in 1996 (Table 6.1-1). Table 6.1-1 also presents each sample location, sampling depth, and suites analyzed.

6.2 SWMU 32-001, Incinerator

This SWMU is the former location of an incinerator that adjoined the northeast corner of the medical research and training facility's main building (32-1). The incinerator was constructed of brick and was 2.5 ft wide by 2.5 ft long by 10 ft high (LANL 1990, 07513, p. 32-2). The incinerator received combustible wastes from the medical research facility, and the ash was disposed of off-site by the Zia Company (LANL 1996, 52928, p. 10). The operation period of the incinerator was from 1948 to 1954; it was removed in 1954.

The site map of SWMU 32-001 is shown in Figure 6.2-1. Currently, SWMU 32-001 is located beneath asphalt in the current working area of the Los Alamos County Public Works Department Pavement Management Division.

6.2.1 Previous Investigations for SWMU 32-001

- 1993: Phase I RFI was conducted to determine if residual soil contamination was associated with the incinerator. Two soil samples were collected at locations corresponding to fractures in the asphalt pavement: one was beneath the former base of the incinerator and one located downslope (ICF Kaiser Engineers 1993, 85513, p. 6). These samples were field screened for radiation and organic vapors and then submitted to an off-site fixed laboratory for a suite of analyses that included inorganic chemicals, VOCs, SVOCs, and PCBs (LANL 1995, 48944, p. 21). If radioactivity had been detected during the field screening, the sample was submitted for radionuclide analysis. The sampling results indicated that some inorganic chemicals were present at concentrations slightly greater than background, and trace concentrations of two VOCs were detected. Results also indicated low levels of PCBs at 11 in. bgs, and a Phase II sampling investigation was recommended to determine the extent of PCB contamination (LANL 1995, 48944, p. viii).
- 1996: EPA issued an NOD on the RFI report (EPA 1995, 63033). In 1996 a Phase II RFI was conducted to determine the extent of PCB contamination and confirm that the former incinerator location had been adequately characterized. Eighteen samples from nine locations (0 to 10 in. and 10-15 in.-depth intervals) were analyzed for PCBs at the on-site mobile chemistry analytical laboratory (MCAL). The results were all less than 1 mg/kg or nondetects (LANL 1996, 59178, p. 6). However, the QC documentation for these analyses is not available. Two additional samples were collected downgradient of the incinerator (2- to 10-in.- and 2- to 11-in.-depth intervals) and analyzed at the mobile radiological analytical laboratory (MRAL) for gross radiation and tritium and also submitted to an off-site fixed laboratory for analysis of VOCs, SVOCs, and TAL metals (LANL 1996, 59178, p. 8). The analytical results indicated that some inorganic chemicals were present at concentrations slightly greater than background and three organic chemicals were detected. The Phase II and VCA report recommended NFA (LANL 1996, 59178, p. 13).

6.2.2 Data for SWMU 32-001

One fill sample and one soil sample collected during the Phase II RFI were analyzed at off-site fixed laboratories. They were collected from two locations immediately downslope of the incinerator location at SWMU 32-001 at depths of 0.17 to 0.92 ft (Figure 6.2-1, Table 6.1-1). The suites analyzed for each sample are provided in Table 6.1-1.

Samples from two locations (32-06446 and 32-06447) were analyzed for metals. Analytical results indicated that cobalt, copper, lead, manganese, mercury, sodium, and zinc were detected greater than BVs in at least one sample between 0.17 and 0.92 ft bgs (Figure 6.2-2, Table 6.2-1).

- Antimony was not detected, but the detection limits were greater than the range of the background concentrations at both locations (32-06446 and 32-06447).
- Cadmium was not detected, but the detection limits were within the range of the background concentrations.
- Cobalt was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (32-06447).
- Copper and zinc were detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (32-06446).
- Lead and manganese were detected within the range of the background concentrations at two locations (32-06446 and 32-06447).
- Mercury was detected at concentrations greater than BV at both locations (32-06446 and 32 06447).
- Silver was not detected, but the detection limits were greater than BV at both locations (32-06446 and 32-06447).
- Sodium was detected within the range of the background concentrations at two locations (32-06446 and 32-06447).

Samples from two locations (32-06446 and 32-06447) were analyzed for SVOCs and VOCs. Analytical results indicated that [cis-1,2-]dichloroethene, methylene chloride, and trichloroethene were detected in at least one sample between 0.17 and 0.92 ft bgs (Figure 6.2-2, Table 6.2-2).

- Dichloroethene[cis-1,2-] and trichloroethene were detected in the only depth interval sampled at both locations (32-06446 and 32-06447).
- Methylene chloride was detected in the only depth interval sampled at one location (32-06447).

6.3 SWMU 32-002(a), Septic Tank (Former Location) and Drain Lines

SWMU 32-002(a) is a septic tank (32-7) of wood-frame construction, 4 ft by 8 ft by 4 ft deep (LANL 1990, 07513, p. 32-3). The septic tank received waste from a laboratory (32-01) through a 6-in. septic line constructed of orangeburg (a material similar to tar paper) as well as cast iron and VCP (LANL 1996, 59178, p. 1). Research activities at the site involved plutonium-238, plutonium-239, americium-241, and carbon-14. Inorganic and organic chemicals also may have been used at the facility. The laboratory (32-01) operated from 1944 to 1953 and was decommissioned in 1954. The septic tank was initially thought to have been left in place and was removed sometime later. No archival records are available that indicate the deposition of the tank. The 4-in.-diameter VCP outfall pipe was left in place at the edge of Los Alamos Canyon. It discharged directly onto the hillside (LANL 1996, 59178, p.2).

The site map of SWMU 32-002(a) is shown in Figure 6.3-1. Currently, the mesa-top portion of the SWMU (inlet-line footprint) is located beneath asphalt in the current working area of the Los Alamos County Public Works Department Pavement Management Division, and the septic tank area is on the undeveloped hillside.

6.3.1 Previous Investigations for SWMU 32-002(a)

- 1993: Phase I RFI was conducted and samples were collected in a drainage that was thought to be the SWMU 32-002(a) outfall area. However, the location of SWMU 32-002(a) was later identified through engineering drawings as being significantly southeast of the location where the samples had been collected. Information regarding the samples collected in the drainage is presented in the discussion of AOC 32-003. Therefore, no samples were collected at the actual location of SWMU 32-002(a) in 1993.
- 1996: Phase II and VCA were conducted at the corrected location.

  Drain lines. Exploratory trenches were excavated to locate drain lines. The drain line immediately north of the septic tank footprint was never located during trenching, confirming that the portion of the drain line immediately north of the septic tank had been previously removed. Based on visual inspection, field-screening results, and confirmation sampling results, no evidence was found that releases occurred from the drain line. Approximately 195 ft of drain line and its contents were removed during the VCA (LANL 1996, 59178, p. 12). Nine confirmation soil samples, collected at 25-ft intervals in the base of the trench beneath the drain line, were submitted to an off-site fixed laboratory for TAL metal, SVOC, VOC, isotopic plutonium, isotopic uranium, tritium, and gamma spectrometry analysis.

  Septic tank. Four samples were collected at the corners of the septic tank footprint and screened at the MCAL for PCBs and the MRAL for gross-alpha, beta-, and gamma-radioactivity, and analyzed at an off-site fixed laboratory for TAL metals and SVOCs. The results indicated gross-alpha contamination and mercury (greater than SAL) were present. Four additional samples were collected just outside the septic tank footprint to bound the extent of contamination. These samples were screened at the MCAL for metals and at the MRAL for gross-alpha, beta-, and gamma- radioactivity. Remedial activities included excavating to a depth of approximately 18 in. bgs and removing approximately 4 yd^3 of soil from an area of 12 ft by 8 ft that included the Phase II sampling locations. Two confirmation samples and one duplicate sample were collected from the base of the excavation and sent to an off-site, fixed laboratory for analysis of TAL metals, isotopic plutonium, isotopic uranium, and gamma spectrometry (LANL 1996, 59178, pp. 25–26). Restoration activities included backfilling the excavation with clean fill material obtained from the Los Alamos County landfill stockpile. The fill was compacted using the backhoe bucket, and native grass seed and mulch were distributed over the area (LANL 1996, 59178, p 26).

  Outfall area. The previous outfall investigation is presented in the SWMU 32-002(b) section as SWMUs 32-002(a,b) share the same outfall.

6.3.2 Data for SWMU 32-002(a)

Ten soil and tuff samples collected from 10 locations at the base of the pipeline trench at SWMU 32-002(a) at depths of 0 to 4.67 ft during the Phase II RFI were analyzed at off-site fixed laboratories (Figure 6.3-1, Table 6.1-1). The suites analyzed for each sample are provided in Table 6.1-1.

Samples from 10 locations (32-06367 through 32-06375 and 32-06380) were analyzed for metals. Analytical results indicated that aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, mercury, nickel, silver, sodium, and zinc were detected greater than BVs in at least one sample between 0 and 4.67 ft bgs (Figure 6.3-2, Table 6.3-1).

- Aluminum and nickel were detected within the range of the background concentrations at one location each (32-06372 and 32-06373), respectively.
- Antimony was not detected, but the detection limits were greater than the range of the background concentrations at all 10 locations (32-06367 through 32-06375 and 32-06380).
- Arsenic was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (32-06373).
- Barium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at six locations (32-06367 through 32-06370, 32-06372, and 32-06373).
- Beryllium and cadmium were not detected, but their detection limit was greater than the range of the background concentrations at one location (32-06373).
- Calcium was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (32-06372) and within the range of background concentrations at another (32-06373).
- Chromium and iron were detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at one location (32-06373).
- Cobalt was detected at concentrations greater than BV in the only depth interval sampled at two locations (32-06369 and 32-06372).
- Copper was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at two locations (32-06372 and 32-06373).
- Lead was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at seven locations (32-06367 through 32-06370, 32-06372, 32-06373, and 32-06375) and within the range of background concentrations at one location (32-06374).
- Mercury was detected at concentrations greater than the BV in the only depth interval sampled at two locations (32-06373 and 32-06374). Mercury was not detected, but the detection limits were greater than BV at five locations (32-06367 through 32-06369, 32-06372, and 32-06375).
- Sodium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at three locations (32-06373, 32-06375, and 32-06380) and within the range of background concentrations at two locations (32-06372 and 32-06374).
- Silver was detected at a concentration greater than BV in the only depth interval sampled at one location (32-06373), and the detection limits were greater than BV at seven locations (32-06367 through 32-06369, 32-06372, 32-06374, 32-06375, and 32-06380).
- Thallium was not detected, but the detection limits were greater than the range of the background concentrations at one location (32-06375).
- Zinc was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (32-06373) and within the range of background concentrations at two locations (32-06374 and 32-06375).

Samples from nine locations (32-06367 through 32-06372, 32-06374, 32-06375, and 32-06380) were analyzed for SVOCs and VOCs. Analytical results indicated that acenaphthene, acetone, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, dibenzofuran, dichlorodifluoromethane, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, methylene chloride, naphthalene, phenanthrene, pyrene, and trichlorofluoromethane were detected in at least one sample between 0 and 4.67 ft bgs (Figure 6.3-2, Table 6.3-2).

- Acenaphthene, dibenzofuran, fluorene, and naphthalene were detected in the only depth interval sampled at one location (32-06371).
- Acetone was detected in the only depth interval sampled at two locations (32-06372 and 32-06375).
- Anthracene was detected in the only depth interval sampled at four locations (32-06367, 32-06369, 32-06371, and 32-06380).
- Benzo(a)anthracene was detected in the only depth interval sampled at seven locations (32-06367 through 32-06372, and 32-06380).
- Benzo(a)pyrene was detected in the only depth interval sampled at seven locations (32-06367 through 32-06369, 32-06371, 32-06372, 32-06374, and 32-06380).
- Benzo(b)fluoranthene and chrysene were detected in the only depth interval sampled at eight locations (32-06367 through 32-06372, 32-06374, and 32-06380).
- Benzo(g,h,i)perylene was detected in the only depth interval sampled at six locations (32-06367 through 32-06369, 32-06371, 32-06374, and 32-06380).
- Benzo(k)fluoranthene was detected in the only depth interval sampled at six locations (32-06367 through 32-06369, 32-06371, 32-06374, and 32-06380).
- Carbazole was detected in the only depth interval sampled at four locations (32-06367 through 32-06369, and 32-06371).
- Dibenz(a,h)anthracene was detected in the only depth interval sampled at two locations (32-06367 and 32-06371).
- Dichlorodifluoromethane was detected in the only depth interval sampled at one location (32-06380).
- Fluoranthene was detected in the only depth interval sampled at nine locations (32-06367 through 32-06372, 32-06374, 32-06375, and 32-06380).
- Indeno(1,2,3-cd)pyrene was detected in the only depth interval sampled at six locations (32-06367 through 32-06369, 32-06371, 32-06374, and 32-06380).
- Methylene chloride and trichlorofluoromethane were detected in the only depth interval sampled at one location (32-06369).
- Phenanthrene was detected in the only depth interval sampled at six locations (32-06367 through 32-06371, and 32-06380).
- Pyrene was detected in the only depth interval sampled at eight locations (32-06367 through 32-06372, 32-06375, and 32-06380).

Samples from seven locations (32-06367 through 32-06372 and 32-06374) were analyzed by gamma spectroscopy and for isotopic uranium; samples from nine locations (32-06367 through 32-06372,

32-06374, 32-06375, and 32-06380) were analyzed for isotopic plutonium and tritium. The analytical results indicated that plutonium-238, plutonium-239, and tritium (soil FV not available) were detected greater than FVs, detected at depths where FVs do not apply, or in tuff, and uranium-235 was detected greater than BV, in at least one sample between 0 and 4.67 ft bgs (Figure 6.3-3, Table 6.3-3).

- Plutonium-238 was detected at an activity greater than the range of the fallout activities in the only depth interval sampled at one location (32-06374).
- Plutonium-239 was detected at an activity greater than the range of the fallout activities in the only depth interval sampled at one location (32-06374); it was detected in tuff in the only depth interval sampled at three more locations (32-06369 through 32-06371).
- Tritium was detected in the only depth interval sampled at one location (32-06375).
- Uranium-235 was detected greater than the range of the background activities in the only depth interval sampled at one location (32-06372).

6.4 SWMU 32-002(b), Septic System

SWMU 32-002(b) is a former reinforced concrete tank (32-8), 9 ft wide by 5 ft long by 6 ft deep, as well as the associated drain line and outfall. The septic tank and influent drain line from Building 32-2 were installed when the SWMU 32-002(a) septic system could no longer meet the usage requirement of the Laboratory (32-1). The influent septic line for septic tank 32-7 was then diverted to septic tank 32-8. The outfall was at the edge of Los Alamos Canyon. Septic tank 32-8 was decommissioned in 1954 (LANL 1992, 07668, p. 3-73). In 1988, septic tank 32-8 was removed to MDA L and later pulverized and disposed of at MDA G. The sludge was disposed of at MDA L (LANL 1992, 07668, p. 3-71). The drain lines remained in place (LANL 1990, 07513, p. 32-3). The Phase II and VCA report for TA-32 recommended NFA (LANL 1996, 59178, p. iv).

The site map of SWMU 32-002(b) is shown in Figure 6.4-1. Currently, the mesa-top portion of the SWMU (inlet-line footprint) is located beneath asphalt in the current working area of the Los Alamos County Public Works Department Pavement Management Division, and the septic tank and outfall areas are on an undeveloped hillside.

6.4.1 Previous Investigations for SWMU 32-002(b)

- 1988: Before the tank was removed, samples of the sludge and liquid in the tank were collected and analyzed (LANL 1992, 07668, p. 3-71).
- 1993: A Phase I RFI was conducted.

  Septic tank. Four soil samples were collected from the location of the former septic tank; three at the soil/bedrock interface (approximately 4 to 6 in. bgs), and one at the surveyed septic tank point (ICF Kaiser Engineers 1993, 85513, p. 3).

  Outfall. One sample was collected at the mouth of the 4-in.-diameter VCP assumed to be the discharge point from SWMU 32-002(b), and six samples were collected from sediment traps in the outfall.

  Drain lines. Trenches were excavated to the soil/tuff interface to locate the septic system inlet lines. Three samples were collected from trench 1, located approximately 35 ft north of the septic tank location; however, no pipe was found in trench 1. Three samples were collected from trench 2, located approximately 40 ft north of trench 1; two samples were collected beneath a seam in a steel pipe and one sample was collected from within the clean-out extension (LANL

1995, 48944, pp. 35–37). The samples were analyzed at an off-site fixed laboratory for TAL metals, PCBs, SVOCs, and with the exception of three outfall locations, VOCs and analyzed for radionuclides at the on-site mobile laboratory.

- 1996: Phase II RFI and VCA were conducted.

  Septic tank. No samples were collected.

  Outfall area. Twelve samples were collected from nine locations in the outfall shared by SWMUs 32-002(a) and 32-002(b) and analyzed at an off-site, fixed laboratory for TAL metals, SVOCs, isotopic plutonium, isotopic uranium, americium-241, and tritium. Five of those samples were screened for PCBs, and none were detected (LANL 1996, 59178, p.28). Because the outfall area is a steep cliff (38 to 74 degrees) located on DOE property, the risk assessment considered a recreational exposure scenario and not a residential exposure scenario. Results from the risk assessment conducted on the Phase II RFI data indicated that no remediation was warranted based on human health concerns. However, since the PCB Aroclor-1260 was detected during the Phase I RFI at 17 mg/kg near the mouth of the outfall pipe, and because the area of PCB contamination was very small (1 ft^3), and easily accessible, 1 ft^3 of soil was removed and the mouth of the outfall pipe was grouted. Two confirmation samples were collected from the base of the small excavation (0 to 10 in. and 10 to 12 in.) and analyzed at the MCAL for PCBs. The screening level data from the MRAL indicated that no PCBs remain in the surface soils at levels greater than the 1-mg/kg cleanup level.

  Drain line. Phase II characterization at the SWMU 32-002(b) drain line confirmed the presence of elevated levels of hazardous and radiological constituents in the contents of the drain line (dry sludge). A VCA was conducted to remove the drain line. The drain line was excavated to depths of approximately 3.5-4.5 ft. The majority of the drain line was composed of VCP. The northernmost 12 ft of pipe, which was originally the connection to Building 32-2, was composed of cast iron. A total of 116 ft of drain line was removed (LANL 1996, 59178, p.13). Five confirmation soil samples were collected at 25-ft intervals in the base of the trench beneath the SWMU 32-002(b) drain line and submitted to an off-site fixed laboratory for analysis of TAL metals, SVOCs, VOCs, isotopic plutonium, isotopic uranium, tritium, and gamma spectrometry.

6.4.2 Data for SWMU 32-002(b)

Sixteen soil and tuff samples collected during the Phase II RFI were analyzed at off-site fixed laboratories. They were collected from 14 locations either in the base of the trench beneath the drain line or in the outfall area at SWMU 32-002(b) at depths of 0 to 5.5 ft (Figure 6.4-1, Table 6.1-1). The suites analyzed for each sample are provided in Table 6.1-1.

Samples from 14 locations (32-06312 through 32-06315, 32-06323, 32-06325, 32-06342, 32-06344, 32-06353, 32-06357, 32-06358, 32-06365, 32-06366, and 32-06377) were analyzed for metals. The analytical results indicated that arsenic, barium, cadmium, calcium, chromium, cobalt, copper, lead, manganese, mercury, selenium, silver, thallium, and zinc were detected greater than BVs in at least one sample between 0 and 5.25 ft bgs (Figure 6.4-2, Table 6.4-1).

- Antimony was not detected, but the detection limits were greater than the range of the background concentrations at all 14 locations.
- Arsenic was detected within the range of the background concentrations at one location (32-06312).

- Barium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at three locations (32-06353, 32-06365, and 32-06377).
- Cadmium was detected within the range of the background concentrations at two locations (32-06313 and 32-06344). The detection limits were within the range of background concentrations at five locations (32-06315, 32-06323, 32-06325, 32-06342, and 32-06357).
- Calcium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at two locations (32-06353 and 32-06366).
- Chromium was detected at concentrations greater than the range of the background concentrations at two locations (32-06312 and 32-06313); concentrations decreased with depth at both locations. Chromium was detected within the range of background concentrations at three locations (32-06312, 32-06313, and 32-06325).
- Cobalt was detected at concentrations greater than BV in the only depth interval sampled at two locations (32-06365 and 32-06377).
- Copper was detected at concentrations greater than the range of the background concentrations at three locations (32-06312, 32-06313, and 32-06353); concentrations decreased with depth at two locations (32-06312 and 32-06313); it was detected in the only depth interval sampled at one location (32-06353). Copper was detected within the range of background concentrations at three locations (32-06365, 32-06366, and 32-06377).
- Lead was detected at concentrations greater than the range of the background concentrations at 10 locations (32-06312, 32-06313, 32-06315, 32-06325, 32-06353, 32-06342, 32-06344, 32-06357, 32-06365, and 32-06377); concentrations decreased with depth at two locations (32-06312 and 32-06313; it was detected in the only depth interval sampled at eight locations (32-06315, 32-06325, 32-06342, 32-06344, 32-06353, 32-06357, 32-06365, and 32-06377).
- Manganese was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (32-06353).
- Mercury was detected at concentrations greater than BV at 10 locations (32-06312 through 32-06314, 32-06315, 32-06325, 32-06342, 32-06344, 32-06353, 32-06357, and 32-06365); concentrations decreased with depth at two locations (32-06312 and 32-06313); and it was detected in the only depth interval sampled at eight locations (32-06314, 32-06315, 32-06325, 32-06342, 32-06344, 32-06353, 32-06357, and 32-06365). Mercury was not detected, but the detection limit was greater than BV at two locations (32-06323 and 32-06366).
- Selenium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at two locations (32-06353 and 32-06377). Selenium was not detected, but the detection limits were greater than the range of the background concentrations at four locations (32-06312 through 32-06314, and 32-06358).
- Silver was detected at concentrations greater than the range of the background concentrations or BV at four locations (32-06312, 32-06313, 32-06315, and 32-06325); concentrations decreased with depth at two locations (32-06312 and 32-06313); and it was detected in the only depth interval sampled at two locations (32-06315 and 32-06325). Silver was not detected, but the detection limits were greater than the range of the background concentrations or BV at 10 locations (32-06314, 32-06323, 32-06342, 32-06344, 32-06353, 32-06357, 32-06358, 32-06365, 32-06366, and 32-06377).
- Thallium was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at one location (32-06344) and within the range

of background concentrations at one location (32-06353). Thallium was not detected, but the detection limits were greater than the range of the background concentrations at seven locations (32-06312, 32-06313, 32-06315, 32-06323, 32-06325, 32-06342, and 32-06357).

- Zinc was detected at concentrations greater than the range of the background concentrations at three locations (32-06312, 32-06313, and 32-06365); concentrations decreased with depth at two locations (32-06312 and 32-06313); it was detected in the only depth interval sampled at one location (32-06365). Zinc was detected within the range of background concentrations at two locations (32-06325 and 32-06344).

Samples from 10 locations (32-06312, 32-06313, 32-06315, 32-06323, 32-06325, 32-06342, 32-06344, 32-06365, 63-06366, and 32-06377) were analyzed for SVOCs; and samples from three locations (32-06365, 32-06366, and 32-06377) were analyzed for VOCs. Analytical results indicated that anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, benzoic acid, bis(2-ethylhexyl)phthalate, carbazole, chrysene, di-n-butylphthalate, fluoranthene, indeno(1,2,3-cd)pyrene, methylene chloride, phenanthrene, pyrene, and trichlorofluoromethane were detected in at least one sample between 0 and 5.25 ft bgs (Figure 6.4-2, Table 6.4-2).

- Anthracene, carbazole, and phenanthrene were detected in the only depth interval sampled at one location (32-06366).
- Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, and indeno(1,2,3-cd)pyrene were detected in the only depth interval sampled at two locations (32-06366 and 32-06377).
- Benzoic acid and bis(2-ethylhexyl)phthalate were detected in the only depth interval sampled at one location (32-06377).
- Di-n-butylphthalate was detected in the only depth interval sampled at two locations (32-06365 and 32-06366).
- Methylene chloride was detected in the only depth interval sampled at two locations (32-06365 and 32-06377).
- Pyrene was detected in the only depth interval sampled at three locations (32-06365, 32-06366, and 32-06377).
- Trichlorofluoromethane was detected in the only depth interval sampled at two locations (32-06365 and 32-06366).

Samples from five locations (32-06312, 32-06313, 32-06315, 32-06323, and 32-06325) were analyzed for americium-241; samples from seven locations (32-06314, 32-06353, 32-06357, 32-06358, 32-06365, 32-06366, and 32-06377) were analyzed by gamma spectroscopy; samples from all 14 locations (32-06312 through 32-06315, 32-06323, 32-06325, 32-06342, 32-06344, 32-06353, 32-06357, 32-06358, 32-06365, 32-06366, and 32-06377) were analyzed for isotopic plutonium; and samples from eight locations (32-06312, 32-06313, 32-06315, 32-06323, 32-06325, 32-06365, 63-06366, and 32-06377) were analyzed for isotopic uranium and tritium. Analytical results indicated that americium-241, cesium-137, plutonium-239, and tritium were detected greater than soil FVs or detected at depths where soil FVs do not apply or detected in tuff. Uranium-234 and uranium-238 were detected greater than BVs, in at least one sample between 0 and 5.25 ft bgs (Figure 6.4-3, Table 6.4-3).

- Americium-241 was detected at activities greater than the range of the fallout activities at three locations (32-06312, 32-06313, and 32-06325); activities decreased with depth at two locations

(32-06312 and 32-06313); it was detected in the only depth interval sampled at one location (32-06325).

- Cesium-137 was detected in tuff or at an activity greater than the range of the fallout activities in the only depth interval sampled at four locations (32-06314, 32-06353, 32-06357, and 32-06358).
- Plutonium-239 was detected at activities greater than the range of the fallout activities at six locations (32-06312, 32-06313, 32-06315, 32-06323, 32-06325, and 32-06357), detected in tuff at six locations (32-06312 through 32-06314, 32-06353, 32-06365, and 32-06377), and detected at depth where soil FVs do not apply at two locations (32-06342 and 32-06344). Activities decreased with depth at two locations (32-06312 and 32-06313); it was detected in the only depth interval sampled at 10 locations (32-06314, 32-06315, 32-06323, 32-06325, 32-06342, 32-06344, 32-06353, 32-06357, 32-06365, and 32-06377).
- Tritium was detected in tuff in the only depth interval sampled at one location (32-06377).
- Uranium-234 and uranium-238 were detected greater than the range of the background activities at one location (32-06313); activities decreased with depth at this location.

6.5 AOC 32-003, Transformer Site

AOC 32-003, the location of a former transformer station (32-10), consists of three transformers on a wooden platform, approximately 20 ft aboveground on poles (LASL 1948, 91749). AOC 32-003 was discovered in 1993 during a Phase I RFI in the immediate area.

The site map of SWMU 32-003 is shown in Figure 6.5-1. Currently, the former transformer location is beneath the asphalt parking area of the Los Alamos County Roads Division.

6.5.1 Previous Investigations for AOC 32-003

- 1993: AOC 32-003 was discovered during a Phase I RFI in the immediate area. Two soil samples were collected at the site immediately above the bedrock, 0 to 4 in., and analyzed for TAL metals, VOCs, SVOCs, and PCBs. Three additional samples were collected from areas where sediment had accumulated in the drainage immediately downslope and analyzed for TAL metals, SVOCs, and PCBs (all were screening-level data). The human health and ecological screening assessments retained Aroclor-1260 as a COPC and recommended the collecting additional samples to define the extent of PCB contamination (LANL 1995, 48944, p. 34).
- 1996: Phase II RFI was conducted to determine the extent of PCB contamination. Seven soil samples were collected (0 to 5 in. depth) and screened at the MCAL for PCBs. Based on those results, a VCA was conducted, removing approximately 100 yd^3 of contaminated soil from a 38 ft by 30 ft area. The depth of excavation area ranged from 2 to 5 ft with a narrow zone along the west, north, and east sides of the main excavation removed down to approximately 10 in. bgs (LANL 1996, 59178, p. 50). A total of 37 confirmation samples were collected in a hexagonal, equidistant grid pattern as proposed in the EPA guidance document “Verification of PCB Spill Cleanup by Sampling and Analysis” (EPA 1985, 08026). The results of the VCA confirmation sampling indicated that the PCB cleanup goal of 10 mg/kg had been met (LANL 1996, 59178, p. 51). The excavation was backfilled with clean fill material from the Los Alamos County landfill stockpile.

6.5.2 Data for AOC 32-003

No off-site fixed-laboratory data are available for this AOC.

6.6 AOC 32-004, Drain Line and Outfall

AOC 32-004 is a former drain line and outfall from a former office building (32-03). Building 32-03 included a vault room where a radioactive source was stored. The drain line led directly to an outfall located at the edge of the mesa and not did pass through a septic tank. AOC 32-004 was discovered in 1993 during a Phase I RFI in the immediate area, and further investigation was recommended (LANL 1995, 48944, p. 52).

The site map of AOC 32-004 is shown in Figure 6.6-1. Currently, the mesa-top portion of the AOC is beneath the asphalt parking area of the Los Alamos County Roads Division, and the outfall portion of the AOC is located on undeveloped DOE property.

6.6.1 Previous Investigations for AOC 32-004

- 1993: AOC 32-004 was discovered during a Phase I RFI in the immediate area, and further investigation was recommended (LANL 1995, 48944).
- 1996: The Phase II RFI (LANL 1996, 59178, p. 54) was divided into three areas: the former radiation source vault location, drain line location, and outfall area.

  Former radiation source vault location. The radiation source vault was located, the area was screened for radioactivity, and four surface soil samples were collected from the corners of the vault footprint (0 to 1 ft depth) and submitted to the MRAL for analysis for radioactivity. The screening-level analytical results indicated that no radioactive contamination existed at the site.

  Drain line. A VCA was conducted to remove the drain line and to determine if releases had occurred from the pipe. Exploratory trenching located the drain line that extended from the edge of former Building 32-03 to the edge of Los Alamos Canyon. The line was field screened for organic chemicals and radioactivity, and no evidence of contamination was found. The pipe interior was swipe-sampled because no sludge was found inside the pipe. The drain line was excavated and removed. Two confirmatory samples were collected beneath the removed pipe and submitted for off-site fixed-laboratory analysis for TAL metals, VOCs, SVOCs, isotopic plutonium, isotopic uranium, and tritium. Restoration activities involved backfilling the trench with material removed during excavation, compacting the area, and placing an asphalt patch over the trench. Because no contamination was found within the drain line that was removed, the portion of the drain line on DOE property (approximately 50 ft) was left in place, and each end was grouted as a BMP (LANL 1996, 59178, p. 58).

  Outfall. The outfall area was investigated to determine the nature and extent of contamination. The investigation addressed the drainage pathway from the mesa edge to the bottom of the hillside in Los Alamos Canyon, focusing on the upper portion of the hillside near the mouth of the outfall pipe. Seven samples from five locations were submitted for off-site laboratory analysis of inorganic chemicals, SVOCs, isotopic plutonium, isotopic uranium, americium-241, and tritium. To address potential contamination from an industrial area along Knecht Street (including two auto repair shops, a car wash, a gas station, and a paint, and body shop) northwest and upgradient of the site, one sample was collected upgradient of the outfall pipe and analyzed at an off-site fixed laboratory for TAL metals and SVOCs. The mouth of the AOC 32-004 outfall pipe was grouted as a BMP, and no further remediation was conducted in the outfall area.

6.6.2 Data for AOC 32-004

The Phase II RFI and VCA samples analyzed at off-site fixed laboratories included eight soil and tuff samples collected from six locations at AOC 32-004 (Figure 6.6-1, Table 6.1-1). The suites analyzed for each sample are provided in Table 6.1-1.

Samples from seven locations (32-06326, 32-06331, 32-06336, 32-06338, 32-06340, 32-06363, and 32-06364) were analyzed for metals. Analytical results indicated that cadmium, chromium, copper, lead, mercury, silver, and zinc were detected greater than the BVs in at least one sample between 0 and 1.0 ft bgs (Figure 6.6-2, Table 6.6-1).

- Antimony was not detected, but the detection limits were greater than the range of the background concentrations at all six locations.
- Cadmium was detected within the range of the background concentrations at two locations (32-06338 and32-06340). It was detected within the range of background concentrations at six locations (32-06326, 32-06331, 32-06336, 32-06338, 32-06363, and 32-06364).
- Chromium was detected within the range of the background concentrations at one location (32 06338).
- Copper was detected at concentrations greater than the range of the background concentrations at one location (32-06340) and within the range of background concentrations at another (32-06338).
- Lead was detected at concentrations greater than the range of the background concentrations at four locations (32-6326, 32-06331, 32-06338, and 32-06340); concentrations decreased with depth at two locations (32-6326 and 32-06338); and it was detected in the only depth interval sampled at one location (32-06331).
- Mercury was detected at a concentration greater than BV at three locations (32-06338, 32-06363, and 32-06364); concentration trend is unclear at one location (32-06338); and it was detected in the only depth interval sampled at two locations (32-06363 and 32-06364). Mercury was not detected, but the detection limits were greater than BV at three locations (32-06326, 32-06338, and 32-06340).
- Selenium was not detected, but the detection limit was greater than the range of the background concentrations at one location (32-06326).
- Silver was detected at a concentration greater than BV at one location (32-06338); concentrations decreased with depth at this location. Silver was not detected but the detection limits were greater than the range of the background concentrations or BV at five locations (32-06326, 32-06331, 32-06336, 32-06338, and 32-06340).
- Thallium was not detected, but the detection limits were greater than the range of the background concentrations or BV at five locations (32-06326, 32-06331, 32-06336, 32-06338, and 32-06340).
- Zinc was detected at concentrations greater than the range of the background concentrations at three locations (32-6326, 32-06338, and 32-06364); and it was detected within the range of background concentrations at two locations (32-06331 and 32-06363). Its concentrations decreased with depth at two locations (32-6326 and 32-06338); it was detected in the only depth interval sampled at one location (32-06364).

Samples from six locations (32-06326, 32-06331, 32-06336, 32-06338, 32-06363, and 32-06364) were analyzed for SVOCs; samples from two locations (32-06363 and 32-06364) were analyzed for VOCs. Analytical results indicated that acenaphthene, acetone, benzo(a)anthracene, benzo(a)pyrene,

benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, chrysene, di-n-octylphthalate, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene were detected in at least one sample between 0 and 1.0 ft bgs (Figure 6.6-2, Table 6.6-2).

- Acenaphthene, fluorene, and naphthalene were detected in the only depth interval sampled at one location (32-06331).
- Acetone and di-n-octylphthalate were detected in the only depth interval sampled at one location (32-06364).
- Anthracene was detected at three locations (32-06326, 32-06331, and 32-06340); concentrations decreased with depth at one location (32-06326); it was detected in the only depth interval sampled at one location (32-06331).
- Benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, chrysene, and indeno(1,2,3-cd)pyrene were detected at five locations (32-06326, 32-06331, 32-06338, 32-06340, and 32-06364); concentrations decreased with depth at two locations (32-06326 and 32-06338); they were detected in the only depth interval sampled at two locations (32-06331 and 32-06364).
- Benzo(b)fluoranthene, phenanthrene, and pyrene were detected at six locations (32-06326, 32-06331, 32-06338, 32-06340, 32-06363, and 32-06364); concentrations decreased with depth at two locations (32-06326 and 32-06338); and they were detected in the only depth interval sampled at four locations (32-06331, 32-06340, 32-06363, and 32-06364).
- Fluoranthene was detected at all seven locations; concentrations decreased with depth at two locations (32-06326, 32-06338, 32-06340); it was detected in the only depth interval sampled at five locations (32-06331, 32-06336, 32-06340, 32-06363, and 32-06364).

Samples from four locations (32-06326, 32-06331, 32-06336, and 32-06338) were analyzed for americium-241; samples from two locations (32-06363 and 32-06364) were analyzed by gamma spectroscopy; and samples from six locations (32-06326, 32-06331, 32-06336, 32-06338, 32-06363, and 32-06364) were analyzed for isotopic plutonium, isotopic uranium, and tritium. Analytical results indicated that only americium-241 was detected greater than FV in one sample between 0 and 0.5 ft bgs (Figure 6.6-3, Table 6.6-3). Americium-241 was detected at an activity greater than the range of the fallout activities at location 32-06326; activities decreased with depth at this location.

7.0 TA-41, W SITE

7.1 Background

TA-41 is located in Los Alamos Canyon at elevations between 6900 and 7000 ft. Los Alamos Canyon is approximately 1350 ft wide at the top and varies in depth from 350 ft to 360 ft. The sides of the canyon are rough and rocky and are partially covered by trees, particularly on the south canyon walls. The bottom of the canyon is wooded and relatively flat with a width of approximately 400 to 460 ft. A small stream passes along the bottom of the canyon. The Los Alamos Canyon Reservoir, located upstream from TA-41, provides a source of surface water to the stream. Los Alamos Canyon also receives intermittent stream flow from snowmelt and rainfall. Infiltration of treated effluents and natural run-off maintains a shallow body of water in the alluvium of Los Alamos Canyon. A paved road, Omega Road, provides access to TA-41.

Four SWMUs and two AOCs located in TA-41 are addressed below.

- SWMU 41-001 is a septic system that served a guardhouse from 1949 to 1953.
- SWMUs 41-002(a), 41-002(b), and 41-002(c) are the Imhoff tank, the chlorine contact tank, and the sludge drying bed, respectively, of the wastewater treatment facility. SWMUs 41-002(a,b,c) make up Consolidated Unit 41-002(a)-99.
- AOC 41-003 is an inactive sump pit that discharged to Los Alamos Canyon.
- AOC C-41-004 is a storm-drain system surrounding a laboratory (41-004).

These SWMUs and AOCs are shown in Figure 7.1-1.

7.1.1 Operational History

TA-41 has been continuously used from the early 1940s to present for testing, monitoring, assembling, and storing nuclear weapon components, for weapons subsystems and boosting systems development, and for long-term studies on weapons subsystems. Most of the past work with plutonium at TA-41 involved metal alloys that were clad with an inert metal so no alpha activity could escape. From 1954 to 1973, isotopic analyses of Nevada Test Site samples containing plutonium and uranium were performed at TA-41 with two mass spectrometers located on the bottom floor at the west and east ends of Building 41-004. In addition to these radioactive samples, isotopic analyses were also performed on plutonium-238, resulting in several instances of contamination, primarily in the hood area. One of the original mass spectrometers became alpha-contaminated and was removed. Operations at TA-41 required using radioactive materials, toxic gases, mercury, and various organic chemicals. Materials used or stored at the site included uranium, plutonium, tritium, lithium isotopes, mercury, beryllium, lead, and cadmium for shielding, nickel-cadmium and mercury batteries, explosives, and thermite-type heat generators. Office and photographic laboratory facilities were also located in the area.

7.1.2 Data Overview

Samples from previous investigations were analyzed for inorganic chemicals, organic chemicals, and/or radionuclides either on-site by the CST Division at the Laboratory, or off-site by fixed laboratories, or both. Data obtained at on-site CST Division laboratories are screening-level quality data and are used only to select sampling locations and analytical suites; these data are not discussed and are not reported. Only data obtained from off-site fixed laboratories are discussed further. Concentrations of detected inorganic chemicals are compared with BVs and the ranges of the background concentrations (LANL 1998, 59730). Concentrations of detected organic chemicals are presented. Activities of detected radionuclides are compared with BVs or FVs and the ranges of the background/fallout activities for radionuclides (LANL 1998, 59730). These data are presented in their entirety in this report.

The environmental media sampled in previous investigations at TA-41 included soil, sediment, and tuff. The investigation samples were collected in 1995 (Table 7.1-1). Table 7.1-1 also presents each sample location, sampling depth, and suites analyzed.

7.2 SWMU 41-001, Septic System

SWMU 41-001 is an inactive septic tank (structure 41-11) that received sanitary waste from a guardhouse (41-2) from 1949 to 1953. The tank is connected to the guardhouse by a 4-in. VCP. The original guardhouse has been replaced, but the sewer pipe and septic tank are believed to remain in place. The overflow from the tank emptied into a single 4-in. drain-tile line that is approximately 60 ft long. The drain-tile line runs from west to east, beginning at the fence gate to the west. Archival information from 1986

indicates that a septic tank at TA-41 was contaminated with plutonium, uranium, and tritium (Balo and Warren 1986, 07419, p. 61). It is not known if the septic tank referred to was structure 41-11 or another septic tank at TA-41. It is unlikely that sewage from a guardhouse would contain radioactive contamination. It is more likely that contamination was affiliated with Building 41-004 where radioactive material was handled. It appears that fill has been placed over the septic system area (LANL 1993, 15314, p. 7-14.1).

The site map of SWMU 41-001 is shown in Figure 7.2-1. Currently, the guardhouse is not being used and is designated as a historical building. The pipeline path is partially under asphalt pavement, partially in undeveloped land, and the septic tank is in undeveloped land. The nearby Building 41-004 and the underground storage vault (41-1) are used daily.

7.2.1 Previous Investigations for SWMU 41-001

- 1995: Phase I RFI was conducted. Two surface soil samples and four subsurface samples were collected at two sample locations in 1995. These samples were analyzed at the CST on-site laboratory for inorganic chemicals and analyzed at off-site laboratories for organic chemicals and radionuclides. No chemicals were detected above SAL.
- 2000: A surface radiation survey was conducted in or adjacent to the eastern portion of TA-41 on October 17 and 18, 2000. The surveys did not reveal elevated surface contamination (LANL 2000, 91505).

7.2.2 Data for SWMU 41-001

Samples analyzed at off-site fixed laboratories include five tuff samples collected from two locations adjacent to or downgradient of the septic tank (Figure 7.2-1, Table 7.1-1). The suites analyzed for each sample are provided in Table 7.1-1.

Samples from two locations (41-01007 and 41-01008) were analyzed for SVOCs and VOCs. Analytical results indicated that di-n-butylphthalate, fluoranthene, indeno(1,2,3-cd)pyrene, pyrene, and toluene were detected in at least one sample between 0 and 10.0 ft bgs (Figure 7.2-2, Table 7.2-1).

- Di-n-butylphthalate and toluene were detected at both locations (41-01007 and 41-01008); concentrations increased with depth at one location (41-01007) and decreased with depth at the other location (41-01008).
- Fluoranthene was detected at one location (41-01008); concentrations decreased with depth.
- Indeno(1,2,3-cd)pyrene was detected at one location (41-01007); concentrations decreased with depth to nondetect.
- Pyrene was detected at both locations (41-01007 and 41-01008); concentrations decreased with depth.

Samples from two locations (41-01007 and 41-01008) were analyzed for isotopic plutonium, isotopic uranium, and tritium. Analytical results indicated that plutonium-239 and tritium were detected in tuff in at least one sample between 0 and 10.0 ft bgs (Figure 7.2-3, Table 7.2-2). Plutonium-239 and tritium were detected at both locations (41-01007 and 41-01008); activities stayed essentially the same at one location (41-01007) and decreased with depth at the other location (41-01008).

7.3 SWMUs 41-002(a), SWMU 41-002(b), and SWMU 41-002(c), TA-41 Sewage Treatment Plant

SWMUs 41-002(a), 41-002(b), and 41-002(c) make up Consolidated Unit 41-002(a)-99. SWMU 41-002(a) consists of an Imhoff tank and a 10 ft by 8 ft by 10 ft chlorinator (structure 41-7). SWMU 41-002(b) is a chlorine contact tank (structure 41-8). SWMU 41-002(c) is a sludge drying bed (41-9). These SWMUs were components of a small sanitary sewage treatment plant at TA-41. The treatment plant was built in 1951 and received sanitary waste from TA-41 and TA-02 until 1987. It discharged to Los Alamos Canyon via National Pollutant Discharge Elimination System (NPDES)-permitted outfall SSS06S (removed from the Laboratory's NPDES permit effective December 14, 1990). The plant received sewage from TA-02 from the mid-1970s until 1987. After 1987, wastes were pumped to TA-03 for treatment [Consolidated Unit 03-014(a)-99] until 1992 and to TA-46 after that. The TA-41 treatment plant was retained as a standby unit in case of the lift pump failed. These SWMUs are all components of the treatment plant and are interconnected by a network of drain lines. They were consolidated in 1999 and are completely inactive.

The site map of SWMUs 41-002(a,b,c) is shown in Figure 7.3-1. Currently, the sewage treatment plant is located on DOE property behind locked gates.

7.3.1 Previous Investigations for SWMUs 41-002(a,b,c)

- 1955: Samples were collected from wastes entering the Imhoff tank and exiting the chlorine contact tank in 1955. Sample results showed alpha-radiation counts ranging from 216 to 244 dpm/L (Buckland 1955, 07686).
- 1978 to 1986: No records have been found on the toxics and heavy metals testing of the sludge from TA-41 (LANL 1993, 15314, p. 7-15.1). However, detailed records have been found on radiation testing of the liquid effluent and dried sludge from 1978 to 1986; results are summarized below (LANL 1993, 15314, pp. 7.15-1, 7.15-2).
    - December 1979: Gamma measurements on liquid effluent averaged approximately 50 pCi/L, with levels as high as 1443 pCi/L; sludge samples averaged 7 NCPM/g (net counts per minute), with levels as high as 30 NCPM/g.
    - January 1981: Alpha/beta levels on dried sludge samples averaged approximately 8 pCi/g, with levels as high as 140 pCi/g (background for alpha/beta is approximately 20 pCi/g for sediments).
    - December 1982: Beta measurements on dried sludge averaged approximately 10 pCi/g, with levels as high as 80 pCi/g.
    - January 1983: Beta measurements on liquid effluents averaged approximately 6 pCi/L, with levels as high as 156 pCi/L.
    - February 1984: Alpha measurements on liquid effluents were generally less than 2 pCi/L with levels as high as 7 pCi/L.
    - Tritium levels in the liquid effluent were highly variable but generally ranged between 100 and 5000 pCi/L (background for groundwater in the main aquifer within Santa Fe Group sediment is less than 50 pCi/L). Tritium levels in sludge samples ranged from 1300 pCi/L up to 3,100,000 pCi/L.
- 1995: Phase I RFI was conducted at SWMUs 41-002(a,b,c). Twenty-five soil samples were collected and submitted to CST on-site laboratory for analysis for inorganic chemical and to off-site laboratories for analysis of total uranium, organic chemicals, and radionuclides.

- 2000: A radiation walkover survey was conducted in or adjacent to the eastern portion of TA-41 on October 17 and 18, 2000. The surveys did not reveal elevated surface contamination (LANL 2000, 91507; LANL 2000, 91508; LANL 2000, 91509).

7.3.2 Data for SWMUs 41-002(a, b, c)

Data for SWMU 41-002(a)

Samples collected during the Phase I RFI and analyzed at off-site fixed laboratories include 11 soil samples collected from 6 locations at SWMU 41-002(a) (Figure 7.3-1, Table 7.1-1). The suites analyzed for each sample are provided in Table 7.1-1.

Samples from six locations (41-01009 through 41-01012, 41-01025, and 41-01026) were analyzed for total uranium. Analytical results indicated that uranium was detected greater than BV in at least one sample between 0 and 10.0 ft bgs (Figure 7.3-2, Table 7.3-1). Uranium was detected at concentrations greater than the range of the background concentrations at all six locations; concentrations stayed essentially the same at two locations (41-01009 and 41-01010); it was detected in the only depth interval sampled at three locations (41-01011, 41-01025, and 41-01026); and concentrations increased at one location (41-01012).

Samples from five locations (41-01009 through 41-01011, 41-01025, and 41-01026) were analyzed for SVOCs. Analytical results indicated that bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, phenanthrene, and pyrene were detected in at least one sample between 0 and 10.0 ft bgs (Figure 7.3-2, Table 7.3-2).

- Bis(2-ethylhexyl)phthalate was detected in the only depth interval sampled at one location (41-01025).
- Chrysene and phenanthrene were detected in the only depth interval sampled at one location (41-01011).
- Fluoranthene and pyrene were detected at two locations (41-01009 and 41-01011); concentrations decreased with depth at one location (41-01009), and they were detected in the only depth interval sampled at the other location (41-01011).

Samples from six locations (41-01009 through 41-01012, 41-01025, and 41-01026) were analyzed by gamma spectroscopy and for isotopic plutonium, isotopic uranium, and tritium. Analytical results indicated that plutonium-238, plutonium-239, and tritium (soil FV not available) were detected at depths where FVs do not apply or in tuff. Uranium-234 was detected greater than BV in at least one sample between 0 and 10.0 ft bgs (Figure 7.3-3, Table 7.3-3).

- Plutonium-238 was detected at two locations (41-01009 and 41-01010); activities decreased with depth at one location (41-01109) and increased with depth at the other location (41-01010).
- Plutonium-239 was detected at all six locations; activities decreased with depth at two locations (41-01009, 41-01012); activities stayed essentially the same at one location (41-01010); and it was detected in the only depth interval sampled at three locations (41-01011, 41-01025, and 41-01026).
- Tritium was detected in all six locations; activities increased at three locations (41-01009, 41-01010, and 41-01012); it was detected in the only depth interval sampled at the other three locations (41-01011, 41-01025, and 41-01026).

- Uranium-234 was detected at an activity greater than the range of the background activities at one location (41-01010); activities decreased with depth.

Data for SWMU 41-002(b)

Samples collected during the Phase I RFI and analyzed at off-site fixed laboratories include six soil samples collected from six locations at SWMU 41-002(b) (Figure 7.3-1, Table 7.1-1). The suites analyzed for each sample are provided in Table 7.1-1.

Samples from six locations (41-01019 through 41-01024) were analyzed for total uranium. Analytical results indicated that uranium was detected greater than BV in at least one sample between 0 and 1.0 ft bgs (Figure 7.3-2, Table 7.3-4). Uranium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at five locations (41-01019 through 41-01023) and within the range of background concentrations at one location (41-01024).

Samples from six locations (41-01019 through 41-01024) were analyzed for SVOCs. Analytical results indicated that benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene were detected in at least one sample between 0 and 1.0 ft bgs (Figure 7.3-2, Table 7.3-5).

- Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, phenanthrene, and pyrene were detected in the only depth interval sampled at one location (41-01023).
- Fluoranthene was detected in the only depth interval sampled at two locations (41-01022 and 41-01023).

Samples from six locations (41-01019 through 41-01024) were analyzed by gamma spectroscopy and for isotopic plutonium, isotopic uranium, and tritium. The analytical results indicated that plutonium-239 and tritium (soil FV not available) were detected at depths in the only depth interval sampled between 0 and 1.0 ft bgs at all six locations (41-01019 through 41-01024) (Figure 7.3-3, Table 7.3-6).

Data for SWMU 41-002(c)

Samples collected during the Phase I RFI and analyzed at off-site fixed laboratories include seven soil samples collected from six locations at SWMU 41-002(c) (Figure 7.3-1, Table 7.1-1). The suites analyzed for each sample are provided in Table 7.1-1.

Samples from six locations (41-01013 through 41-01018) were analyzed for total uranium. The analytical results indicated that only uranium was detected greater than BV in at least one sample between 0 and 3.0 ft bgs (Figure 7.3-2, Table 7.3-7). Uranium was detected at concentrations greater than the range of the background concentrations at all six locations; concentrations decreased with depth at one location (41-01013); it was detected in the only depth interval sampled at the other five locations (41-01014 through 41-01018).

Samples from six locations (41-01013 through 41-01018) were analyzed for SVOCs. No SVOCs were detected.

Samples from six locations (41-01013 through 41-01018) were analyzed by gamma spectroscopy and for isotopic plutonium, isotopic uranium, and tritium. Analytical results indicated that plutonium-239 and tritium (soil FV not available) were detected at depths where soil FVs do not apply in at least one sample between 0 and 3.0 ft bgs (Figure 7.3-3, Table 7.3-8). Both radionuclides were detected at all six locations;

activities decrease with depth at one location (41-01013); and they were detected in the only depth interval sampled at the other five locations (41-01014 through 41-01018).

7.4 AOC 41-003, Sump

AOC 41-003 is an inactive sump pit (structure 41-10) that discharged to Los Alamos Canyon. The pit measured 3.66 ft by 2 ft by 2.5 ft deep. It received effluent from floor and sink drains at the underground storage vault (41-1), stormwater, and rinse water from the storage tunnel. The tunnel was occupied in 1949 and used to store transuranic (TRU) wastes and tritium. In 1988, the sump and associated pipes were excavated, removed, and reburied approximately 20 ft south of their original location to make room for a concrete pad, retaining wall, and structures supporting a ventilation-system upgrade for Building 41-1.

The site map of AOC 41-003 is shown in Figure 7.4-1. Currently, the location of the former sump is beneath the ventilation system, which is situated on concrete.

7.4.1 Previous Investigations for AOC 41-003

- 1988: The sump and associated pipes were excavated, removed, and reburied about 20 ft south of their original location to make room for a concrete pad, retaining wall, and structures supporting a ventilation system upgrade for Building 41-1. At the time the sump was excavated, the drain sump lines exterior to Building 41-1 and the sump structure were monitored and were not found to be radioactively contaminated. Subsequently, the drain lines were extended to the new location where the sump structure was placed (Larson 1992, 44022).
- 1995: Phase I RFI was conducted. Five surface soil samples and three subsurface samples (including one duplicate) were collected. The samples were submitted to the CST on-site laboratory for analysis for inorganic chemicals and to off-site laboratories for analysis of total uranium and radionuclides.
- 2000: A radiation walkover survey was conducted in or adjacent to the eastern portion of TA-41 on October 17 and 18, 2000. The surveys did not reveal elevated surface contamination. (LANL 2000, 91510).

7.4.2 Data for AOC 41-003

Samples analyzed at off-site fixed laboratories include seven soil samples collected from seven locations downgradient of AOC 41-003 at depths of 0 to 9.5 ft (Figure 7.4-1, Table 7.1-1). The suites analyzed for each sample are provided in Table 7.1-1.

Samples from seven locations (41-01027 through 41-01033) were analyzed for total uranium. Analytical results indicated that total uranium was detected greater than BV in at least one sample between 0 and 9.5 ft bgs (Figure 7.4-2, Table 7.4-1). Uranium was detected at concentrations greater than the range of the background concentrations in the only depth interval sampled at four locations (41-01027 through 41-01029, and 41-01031) and within the range of background concentrations at three locations (41-01030, 41-01032, and 41-01033).

Samples from seven locations (41-01027 through 41-01033) were analyzed for isotopic plutonium and tritium. Analytical results indicated that plutonium-239 and tritium (soil FV not available) were detected at depths where FVs do not apply in at least one sample between 0 and 9.5 ft bgs (Figure 7.4-3,

Table 7.4-2). Plutonium-239 was detected in the only depth interval sampled at one location (41-01033). Tritium was detected in the only depth interval sampled at all seven locations.

7.5 AOC C-41-004, Storm Drains

AOC C-41-004 is the storm-drain system surrounding a laboratory (Building 41-004). The system has seven storm-drainage catch basins/manholes (structures 41-22 through 41-28). No indications of contaminant releases to the system were found, and no monitoring of the storm drains or outfalls has been done in the past. Operational tritium releases from the emission stacks located between Buildings 41-004 and 41-30 (an office building) may have resulted in surface contamination of the storm drain system.

The site map of AOC C-41-004 is shown in Figure 7.5-1. Currently, Building 41-4 is in use and the catch basins/manholes are located within and under the asphalt pavement that surrounds the building.

7.5.1 Previous Investigations for AOC C-41-004

In 1995, a Phase I RFI was conducted. Three sediment and one soil samples were collected at the storm-drain catch basin. All were analyzed at CST on-site laboratory for inorganic chemicals. The sediment sample at location 41-01034 was also analyzed at off-site laboratories for total uranium, isotopic plutonium, and tritium.

7.5.2 Data for AOC C-41-004

Sample analyzed at off-site fixed laboratories is a surface sediment sample (0 to 1 ft) that was collected at the storm drain outfall (Figure 7.5-1, Table 7.1-1). It was analyzed for total uranium, isotopic plutonium, and tritium.

This sample from location 41-01034 was analyzed for total uranium. Analytical results indicated that uranium was detected greater than BV between 0 and 1.0 ft bgs (Figure 7.5-2, Table 7.5-1). Uranium was detected at a concentration greater than the range of the background concentrations in the only depth interval sampled at this location.

This sample from location 41-01034 was analyzed for isotopic plutonium and tritium. Analytical results indicated that plutonium-239 and tritium were detected greater than FV between 0 and 1.0 ft bgs (Figure 7.5-3, Table 7.5-2). Both radionuclides were detected at activities greater than the range of the fallout activities in the only depth interval sampled at this location.

8.0 TA-43, HEALTH RESEARCH LABORATORY

8.1 Background

TA-43 is on the north rim of Los Alamos Canyon, bounded on the north and west by Diamond Drive and on the east by the parking lot between the HRL and the Los Alamos Medical Center. The area is paved except for a maintained lawn and natural vegetation along the canyon edge.

Two SWMUs and three AOCs located in TA-43 are addressed below.

- SWMU 43-001(a1) is the sanitary-waste line that served the HRL before 1981.
- SWMU 43-002 is an incinerator used at the HRL.

- AOC 43-001(a2) is the sanitary-waste system that has been serving TA-43 since 1981.
- AOC 43-001(b2) is a storm-drain outfall that was permitted in the mid-to-late 1970s under NPDES permit (Outfall 03A040).
- AOC C-43-001 is a storm drain outfall that collects runoff from the HRL building (43-01) loading dock and functions as the overflow from the lift station (structure 43-10).

These SWMUs and AOCs are shown in Figure 8.1-1.

8.1.1 Operational History

TA-43 was established in 1953 when the Laboratory's former H Division, which conducted biomedical and industrial hygiene research, first occupied the HRL (Building 43-1) (DOE 1987, 08662). The work conducted at the HRL was a mixture of basic and applied research to assess health effects of radiation and materials associated with Laboratory operations (DOE 1987, 08662). Experiments were conducted using carbon-14 (half-life of 5.73 thousand yr), cobalt-60 (half-life of 5.271 yr), phosphorus-32 (half-life of 14.29 d), plutonium-238 (half-life of 87.75 yr), plutonium-239 (half-life of 24.131 1000 yr), polonium-210 (half-life of 138.378 d), promethium-147 (half-life of 2.623 yr), sulphur-35 (half-life of 87.44 d), tritium (half-life of 12.28 yr), ethanol, toluene, phenol-chloroform, and xylene (Potter 1994, 58454). While all of the materials were disposed of by packaging as radioactive waste and shipped to TA-54, it is possible some of the waste could have been disposed of in the drains (Potter 1994, 58454).

Industrial hygiene activities were relocated to TA-59 in 1966. Since then, the focus at the HRL has been on biomedical research conducted by the Life Sciences (LS) Division [now Bioscience (B) Division]. In 1973, the HRL was listed as having low-level contamination of transuranics, fission products, and tritium. For some years, wastes in the sewer lines were composite-sampled and analyzed for radioactivity three times a week. Radioactivity was found to be less than 1/10 of the Table II Atomic Energy Commission Manual 0524 guidelines. In 1975, containers for radioactive wastes were placed in laboratories that generated such wastes. The wastes were sent to TA-50 for treatment. In 1979, the HRL was found to be one of the Laboratory's major generators of nonradioactive chemical wastes. Waste management activities involved sorting, packaging, and transporting chemicals to disposal areas. Chemicals were not disposed of through the sanitary system.

8.1.2 Data Overview

No off-site fixed-laboratory data are available for TA 43.

8.2 SWMU 43-001(a1), Waste Lines (Pre-1981)

SWMU 43-001(a1) is a disconnected 4-in. cast-iron sanitary sewer line that served the Health Research Laboratory building (43-1), now called the HRL. The line runs from a lift station (structure 43-10) at the south side of the HRL to a Los Alamos County manhole 315 ft to the northeast. The sewer line is approximately 30 ft bgs at structure 43-10 and reaches a joint to the east at a depth of approximately 10 ft, where gravity carries the effluent to the county manhole. This SWMU addresses the sewer line until 1981 when the sewer lines were redirected to the TA-03 sanitary sewer system (Emility 1981, 08081). AOC 43-001(a2) addresses the sewer line post-1981.

The site map of SWMU 43-001(a1) is shown in Figure 8.2-1. Currently, the site is under pavement at the HRL and under the Los Alamos Medical Center building (see Figure 3.2-2 a).

8.2.1 Previous Investigations for SWMU 43-001(a1)

No investigations have been conducted previously at SWMU 43-001(a1).

8.2.2 Data for SWMU 43-001(a1)

No off-site fixed laboratory data are available for this SWMU.

8.3 AOC 43-001(a2), Waste Lines (Post-1981)

AOC 43-001(a2) is the post-1981 sanitary waste disposal system serving TA-43. In 1981, the effluent flow was redirected from the Los Alamos County treatment facility in Bayo Canyon to the Laboratory's TA-03 sanitary sewer system. After 1987, recovery units, collection points, and the types of photochemicals being used were upgraded in an attempt to eliminate hazardous constituents. However, some photography chemicals were still discharged to the sanitary sewer (LANL 1990, 07513, p. 43-3)

In 1992, sanitary waste was redirected to the Laboratory's sanitary waste system consolidation facility (LANL 1994, 34754, p. 6-3). Effluent in the system included sanitary waste, once through cooling water, treated cooling water, and photoprocessing chemicals.

This AOC was proposed for deferred action in the 1994 OU 1136 work plan (LANL 1994, 34754, p. 6-4), pending site decommissioning because the existing sanitary-waste collection and disposal system is part of and serves an active experimental site. In addition, there are no known documented leaks in the sanitary waste line that currently serve TA-43 and the site does not present a human health or environmental risk (LANL 1993, 26078).

The site map of AOC 43-001(a2) is shown in Figure 8.3-1. Currently, the lines are located under pavement of the HRL.

8.3.1 Previous Investigations for AOC 43-001(a2)

No investigations have been conducted previously at AOC 43-001(a2).

8.3.2 Data for AOC 43-001(a2)

No off-site fixed laboratory data are available for this AOC.

8.4 AOC 43-001(b2), Outfall

AOC 43-001(b2) is a storm-drain outfall that was permitted in the mid-to-late 1970s under NPDES permit Outfall 03A040 and removed from the Laboratory's NPDES permit on January 11, 1999. The outfall received effluent from six floor drains in the subbasement at the HRL (43-1), blow-down from the evaporative cooler, and stormwater from 13 roof drains on the west side of the HRL (Santa Fe Engineering 1992, 58455). The effluents discharged west of the HRL through a 130-ft-long, 12-in.-diameter corrugated metal pipe to Los Alamos Canyon. The outfall may have historically discharged radioactively contaminated water and/or once-through and treated cooling water (DOE 1987, 08662). No quantitative information is available about possible residual contamination as a result of the discharges from this outfall.

The site map of AOC 43-001(b2) is shown in Figure 8.4-1. Currently, the outfall is located on the undeveloped slope west of the HRL.

8.4.1 Previous Investigations for AOC 43-001(b2)

No investigations have been conducted previously at AOC 43-001(b2).

8.4.2 Data for AOC 43-001(b2)

No off-site fixed laboratory data are available for this SWMU.

8.5 SWMU 43-002, Incinerator

SWMU 43-002 was an incinerator installed in Room B-137 of the HRL (43-1) to dispose of wastes generated by health research activities in 1952. It was a 400,000-BTU/hr gas burner with a 100-lb/hr pathological organic waste capacity. Daily throughput was 5 to 10 lb of rats and mice and 8 to 12 lb of paper with small amounts of animal-cage wood shavings (Mitchell 1967, 08074). The animal carcasses were contaminated with tracer quantities of nontransuranic isotopes. A number of isotopes were used (antimony, arsenic, barium, cadmium, cesium, cobalt, copper, gallium, iron, lead, mercury, nickel, niobium, rubidium, selenium, silver, strontium, thallium, tin, yttrium, and zinc) in pCi quantities (10^{-12}) over a period of approximately 15 yr between 1960 and 1975 (Watanabe 1993, 58460; Watanabe 1993, 58452).

The incinerator was removed in 1992 (Watanabe 1993, 58453) and Room B-137 was remodeled. During remodeling, the room was submitted to a swipe survey. The health monitor found 1000 dpm fixed on the interior surfaces (direct frisk), and the large area swipes indicated no detectable activity (LANL 1992, 58457). The passage to the stack was sealed off with concrete mortar, and the top of the stack was blocked with a stack cover. The ash pit remains, and the cleanout door is located on the east wall of the HRL. The ash was analyzed by the Laboratory's Analytical Chemistry Group, and the results indicated the presence of cesium-137 (Watanabe 1993, 58464).

The OU 1136 work plan recommended deferred action at SWMU 43-002 until the site is decommissioned because the remaining system components (the stack and the ash pit) are within an active Laboratory site and within Building 43-1 (LANL 1994, 34754, p. 6-5). Characterization of the inactive SWMU would disrupt active operations, and neither the stack nor the ash pit presents a human health or environmental risk.

The site map of SWMU 43-002 is shown in Figure 8.5-1. Currently, the location of the removed incinerator is inside an active facility.

8.5.1 Previous Investigations for SWMU 43-002

No previous investigations have been conducted previously at SWMU 43-002.

8.5.2 Data for SWMU 43-002

No off-site fixed laboratory data are available for this SWMU.

8.6 AOC C-43-001, Outfall

AOC C-43-001 is a storm-drain outfall that flows into Los Alamos Canyon. It collects runoff from the HRL (Building 43-1) loading dock and also functions as the overflow from the lift station (structure 43-10). The overflow line is an 8-in.-diameter VCP that extends from structure 43-10 130-ft south to a manhole. A

12-in.-diameter corrugated metal pipe, which receives discharge from two storm drains and any effluent from the overflow, flows southwest for 160 ft and drains into the canyon south of the HRL. The sanitary waste lines for the HRL [SWMU 43-001(a1) and AOC 43-001(a2)] may have become clogged at some time, causing an overflow. Any sanitary waste carried through the sewer lines could have discharged into the storm drains. Although no documentation was found about any routine releases into the storm drains, the outfall may have received radioactive, nonsanitary cooling water.

The site map of AOC C-43-001 is shown in Figure 8.6-1. Currently, the outfall is located on the undeveloped north slope of Los Alamos Canyon.

8.6.1 Previous Investigations for AOC C-43-001

No investigations have been conducted previously at AOC C-43-001.

8.6.2 Data for AOC-43-001

No off-site fixed laboratory data are available for this AOC.

9.0 TA-61, EAST JEMEZ SITE

9.1 Background

TA-61 is bounded on the north by Los Alamos Canyon and on the south by Sandia Canyon. East Jemez Road traverses the north edge of the site near the rim of Los Alamos Canyon. A major feature at TA-61 is the Los Alamos County municipal sanitary landfill, which is still in use. A few small support buildings are located at the northern end of TA-61. The privately owned 1 mi^2 of land for the Royal Crest Trailer Court, established when Los Alamos became a permanent community after World War II, is located at the northeast corner of TA-61. Two privately owned cement-mixing plants operate on land leased from DOE. The remainder of TA-61 is naturally vegetated with ponderosa pine forest.

Only one SWMU is addressed below. SWMU 61-007 is a former transformer-staging site along the south side of East Jemez Road. SWMU 61-007 is shown in Figure 9.1-1.

9.1.1 Operational History

TA-61 was created during the Laboratory's TA redesignation in 1989. TA-61 is used for physical support and infrastructure facilities, including the municipal sanitary landfill. Nine facilities are located at TA-61, including sewer pump stations, computer model shop, general storage sheds, blower house, and general warehouse storage for maintenance activities performed throughout the laboratory.

9.1.2 Data Overview

No off-site fixed-laboratory data are available for SWMU 61-007.

9.2 SWMU 61-007, Transformer Site—Systematic Leak—PCB-Only Site

SWMU 61-007 is thought to be the location of a transformer-staging site of an electrical contracting firm that once operated in the vicinity. The firm is no longer in existence, and its years of operation are not known. While excavating a trench for a new sewer line along the south side of East Jemez Road, approximately 0.75 mi east of the intersection of East Jemez Road and Diamond Drive in 1989, workers

detected an organic odor. A chemical analysis of the soil determined that the soil was contaminated with PCBs and 1,2,4-trichlorobenzene (a VOC) (LANL 1989, 62843).

The site map of SWMU 61-007 is shown in Figure 9.2-1. Currently, the site is under a dirt road/parking lot area and is not occupied or near any industrial area or residence.

9.2.1 Previous Investigations for SWMU 61-007

- 1989: Soil was removed to the point that PCB concentrations were less than 10 ppm or below the detection limit (LANL 1990, 07511, p. 61-8).
- 1997: The site was cleaned up under the Toxic Substances Control Act, and regulatory closure was verbally approved by EPA Region 6 (LANL 1997, 55510, Attachment L).
- 1995: NFA was recommended for SWMU 61-007 in the September 1995 permit modification request because the site has undergone regulatory closure under another authority. NMED denied the September 1995 permit modification NFA request, requiring written documentation of closure approval from EPA (NMED 1996, 55815, p. A-1). The NFA request to NMED was withdrawn by the Laboratory (LANL 2002, 71447, p.2).

9.2.2 Data for SWMU 61-007

No off-site fixed-laboratory data are available for this SWMU.

10.0 REFERENCES

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author, publication date, and ER identification (ID) number. This information is also included in text citations. ER ID numbers are assigned by the ENV-ERS Program Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the ENV-ERS Program master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau; the U.S. Department of Energy–Los Alamos Site Office; the U.S. Environmental Protection Agency, Region 6; and the ENV-ERS Program. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

Ahlquist A. J., July 20, 1977. “Contamination near ULR-33,” Los Alamos Scientific Laboratory memorandum H8-77-555 from A.J. Ahlquist, Los Alamos, New Mexico. (Ahlquist 1977, 09080)

Ahlquist, A.J., September 1977. “Removed Structures, TA-1,” Los Alamos Scientific Laboratory memorandum H8-77-740 from A. J. Ahlquist to J. B. Montoya, Los Alamos, New Mexico. (Ahlquist 1977, 03270)

Ahlquist, A.J., A.K. Stoker, L.K. Trocki, December 1977. “Radiological Survey and Decontamination of the Former Main Technical Area (TA-1) at Los Alamos, New Mexico,” Los Alamos Scientific Laboratory report LA-6887, Los Alamos, New Mexico. (Ahlquist et al. 1977, 05710)

Balo, K.A., and J. L. Warren, March 1986. “1985 Waste Management Site Plan,” Los Alamos National Laboratory document, Los Alamos, New Mexico. (Balo and Warren 1986, 07419)

Benchmark Environmental Corporation, August 24, 1998. "Soils Investigation for TA-41-76 Underground Diesel Fuel Storage Tank Final Report," Benchmark Environmental Corporation, Los Alamos, New Mexico. (Benchmark Environmental Corporation 1998, 66170)

Betts, A.W., September 11, 1947. "General Background Data Concerning the Los Alamos Scientific Laboratory," Los Alamos Scientific Laboratory memorandum LAB-A-5 to the Manager, U.S. Atomic Energy Commission, Office of Santa Fe Directed Operations, from A.W. Betts (Associate Director, LANL) Los Alamos, New Mexico. (Betts 1947, 05581)

Bone, M., July 1988. "Miscellaneous Small Projects & ER Program," Laboratory Notebook Control #24, Los Alamos, New Mexico. (Bone 1988, 41147)

Buckland, C. W. March 15, 1955. "Results of Sewage Samples from W-1 Site," Los Alamos Scientific Laboratory memorandum to E. MacMann from C. Buckland, Los Alamos, New Mexico. (Buckland 1955, 07686)

Buckland, C.W., September 15, 1959. "Final Radioactive Contamination Health Clearance of the Eastern Sector of TA-1 South of Trinity Drive and the J-2 Area," Los Alamos Scientific Laboratory memorandum from C. Buckland to J. Hill, Los Alamos, New Mexico. (Buckland 1959, 03426)

Buckland, C.W., April 21, 1964. "Final Radioactive Contamination Survey of Certain Structures in TA-1," Los Alamos Scientific Laboratory memorandum to S. E. Russo (ENG-3) from C. Buckland (H-1), Los Alamos, New Mexico. (Buckland 1964, 04810)

Buckland, C.W., May 11, 1964. "Final Radioactive Contamination Survey Clearance on Certain Structures in TA-1," Los Alamos Scientific Laboratory memorandum to S. E. Russo from C. Buckland, Los Alamos, New Mexico. (Buckland 1964, 04811)

Buckland, C.W., February 16, 1973. "Summary of Records Search for Radioactivity Remaining in TA-1, Acid Waste Lines, TA-10, TA-45, and Acid Canyon Below TA-45," Los Alamos Scientific Laboratory memorandum to D. D. Meyer from C. Buckland, Los Alamos, New Mexico. (Buckland 1973, 58138)

Cox, J., July 3, 1984. "Line 167: Concrete Anchors Left in Place on North Side of Los Alamos Canyon," Los Alamos National Laboratory memorandum to R. Garde from J. Cox, Los Alamos, New Mexico. (Cox 1984, 30811)

Davis C.E., and R.L. Miller, September 1-3, 1964. "Health Protection Survey Report," Los Alamos Scientific Laboratory, Los Alamos, New Mexico. (Davis and Miller 1964, 03517)

DOE (U.S. Department of Energy), April 1979. "Formerly Utilized MED AEC Sites Remedial Action Program, Removal of a Contaminated Industrial Waste Line, Los Alamos, New Mexico." Los Alamos Scientific Laboratory document prepared for the U.S. Department of Energy, Division of Environmental Control Technology, Los Alamos, New Mexico. (DOE 1979, 08897)

DOE (U.S. Department of Energy), October 1987. "Phase I: Installation Assessment, Los Alamos National Laboratory," Vol. 1 of 2 (Draft), Comprehensive Environmental Assessment and Response Program report, Albuquerque Operations Office, Albuquerque, New Mexico. (DOE 1987, 08662)

DOE (U.S. Department of Energy), September 9, 1994. "Response to Notice of Deficiency (NOD) for OU 1136 RCRA Facility Investigation (RFI) Work Plan," U.S. Department of Energy letter to W. K. Honker (EPA, Region 6) from T.J. Taylor, (DOE LAAO), Los Alamos, New Mexico. (DOE 1996, 40889)

DOE (U.S. Department of Energy), October 11, 1995. "NFA Permit Modification, March 1995 (DOE Concurrence in Determination of NFA for AOCs Non-HSWA Units)," U.S. Department of Energy memorandum LAAMEP:CGF:NFA Approval to H. Jansen (EM/ER) from T. Taylor (DOE LAAO), Los Alamos, New Mexico. (DOE 1995, 50023)

DOE (U.S. Department of Energy), September 21, 1998. "Acceptance of Performance Measures, (Reference: Memo EM/ER:98-356, Dated September 15, 1998)," U.S. Department of Energy memorandum to J. Canepa (EM/ER) from T. Taylor (DOE LAAO), Los Alamos, New Mexico. (DOE 1998, 59694)

DOE (U.S. Department of Energy), May 21, 1999. "Acceptance of Performance Measures, Reference Memorandum EM/ER:99-034, Dated February 11, 1999," U.S. Department of Energy memorandum to J. Canepa (EM/ER) from T. J. Taylor (DOE LAAO), Los Alamos, New Mexico. (DOE 1999, 63342)

DOE (U.S. Department of Energy), February 6, 2002. "VCA Completion Report for Consolidated Unit 00-003-99 (PRS 0-003, PRS 0-012, and PRS 0-030 (l)," U.S. Department of Energy memorandum to J. Canepa (EM/ER) from M. Johansen (DOE LAAO), Los Alamos, New Mexico. (DOE 2002, 73095)

Elder, J.C., E.J. Cox, D.P. Hohner, and A.M. Valentine, September 1986. "Radioactive Liquid Waste Lines Removal Project at Los Alamos (1981–1986)," Los Alamos National Laboratory report LA-10821-MS, Los Alamos, New Mexico. (Elder et al. 1986, 06666)

Emility, L.A., December 15, 1981. "Monthly Major Achievements Report, Group H-7," Los Alamos National Laboratory memorandum to G.A. Voelz (H-DO), from L.A. Emility (H-7), Los Alamos, New Mexico. (Emility 1981, 08081)

EPA (U.S. Environmental Protection Agency), August 1, 1985. "Verification of PCB Spill Cleanup by Sampling and Analysis," U.S. Environmental Protection Agency report EPA-560/5-85-026, Washington, D.C. (EPA 1985, 08026)

EPA (U.S. Environmental Protection Agency), April 10, 1990. "Module VIII of RCRA Permit No. NM0890010515, EPA Region VI," Issued to Los Alamos National Laboratory, Los Alamos, New Mexico, effective May 23, 1990, EPA Region VI, Hazardous Waste Management Division, Dallas, Texas. (EPA 1990, 01585)

EPA (U.S. Environmental Protection Agency), October 16, 1992. "RFI Work Plan for OU 1071, Los Alamos National Laboratory, NM0890010515," U.S. Environmental Protection Agency letter from W.K. Honker (EPA, Region 6) to J.L. Bellows (DOE LAAO), Dallas, Texas. (EPA 1992, 11810)

EPA (U.S. Environmental Protection Agency), September 28, 1993. "Notice of Deficiency for RFI Work Plan for Operable Unit 1098 Notice of Deficiency," U.S. Environmental Protection Agency memorandum to J.C. Vozella (DOE LAAO) from W. Honker (EPA, Region 6), Los Alamos, New Mexico. (EPA 1993, 30085)

EPA (U.S. Environmental Protection Agency), January 7, 1994. "Approval of RFI Work Plan for OU 1114, Los Alamos National Laboratory, NM0890010515," U.S. Environmental Protection Agency letter from to J.C. Vozella (DOE LAAO) from A.M. Davis (EPA, Region 6), Dallas Texas. (EPA 1994, 38813)

EPA (U.S. Environmental Protection Agency), January 28, 1994. "24 No Further Action Proposals LANL NM890010515," U.S. Environmental Protection Agency letter to J. C. Vozella (DOE LAAO) from W. K. Honker (EPA, Region 6), Dallas Texas. (EPA 1994, 38816)

EPA (U.S. Environmental Protection Agency), April 19, 1994. Module VIII of RCRA Permit No. NM0890010515, EPA Region VI, New Requirements Issued to Los Alamos National Laboratory, Los Alamos, New Mexico, Effective May 19, 1994, EPA, Region 6, Hazardous Waste Management Division, Dallas, Texas. (EPA 1994, 44146)

EPA (U.S. Environmental Protection Agency), August 8, 1994. "RFI Work Plan OU 1136, Los Alamos National Laboratory, NM0890010515," U.S. Environmental Protection Agency letter to J. Vozella (DOE LAAO) from W. Honker (EPA, Region 6), Dallas, Texas. (EPA 1994, 40350)

EPA (U.S. Environmental Protection Agency), November 20, 1995. "Notice of Deficiency, RFI Report for Technical Area 32, Notice of Deficiency, Los Alamos National Laboratory, NM0890010515," U.S. Environmental Protection Agency letter to T.J. Taylor (DOE, LAAO) from D.W. Neleigh (EPA, Region 6), Dallas, Texas. (EPA 1995, 63033)

EPA (U.S. Environmental Protection Agency), December 6, 1995. "Operable Unit 1071, SWMU 0-031(a), Los Alamos National Laboratory (NM0890010515)," U.S. Environmental Protection Agency letter to T. Taylor (DOE LAAO) from D. Neleigh (EPA, Region 6), Dallas, Texas. (EPA 1995, 85498)

EPA (U.S. Environmental Protection Agency), January 21, 2005. "EPA's Prior Decisions on SWMU/AOC Sites at Los Alamos National Laboratory (LANL), the Revised List Now Contains 542 AOCs," U.S. Environmental Protection Agency letter 90-7-3-16854 to J. Bearzi (NMED HWB) from L.F. King, (EPA, Region 6), Dallas, Texas. (EPA 2005, 88464)

Fresquez, P. January 25, 1993. "Results of an Interim Action Associated with the Industrial Partnership Center at TA-3," Los Alamos National Laboratory memorandum EM-8:92-1094 to C. Loggains (ENG-1) from P. Fresquez (EM-8), Los Alamos, New Mexico. (Fresquez 1993, 21296)

Griggs, E. June 2, 1993. "Debris Piles East of TA-3-170 and Northwest of TA-3-142," Los Alamos National Laboratory memorandum CLS-ER/EG-93:061 to M. Bailey (JCI/JENV) from E. Griggs (CLS-DO), Los Alamos, New Mexico. (Griggs 1993, 76167)

Hill, J.F., September 15, 1964. "Disposal of Debris from TA-1 Demolition," Zia Company memorandum ZTA-3103 from J. F. Hill (Zia Company), Los Alamos, New Mexico. (Hill 1964, 04821)

ICF Kaiser Engineers, October 1993. "Field Sampling Activities at TA-32," ICF Kaiser Engineers report, prepared for Los Alamos National Laboratory, Los Alamos, New Mexico. (ICF Kaiser Engineers 1993, 85513)

IT (International Technology Corporation), October 21, 1991. "Ashley Pond Chronology", IT Corporation letter to R. Conrad (EM-8) from. P.S. Den-Baars (IT Corporation), Los Alamos, New Mexico. (IT 1991, 04816)

IT (International Technology Corporation), March 25, 1991. "Telephone Conversation between K. Highum and J. Enders", International Technology Corporation Record, Los Alamos, New Mexico. (IT 1991, 02084)

LANL (Los Alamos National Laboratory), May 1987. "Analytical Results of Verification Sampling Former Main Technical Area (TA-1) Los Alamos National Laboratory," Environmental Surveillance Group (HSE-8) and Health and Environmental Chemistry Group (HSE-9) report, Los Alamos, New Mexico. (LANL 1987, 02956)

LANL (Los Alamos National Laboratory), August 1989. "Release Site Database, Task 40, TA-32, Working Draft," prepared by Roy F. Weston, Inc., for the U.S. Department of Energy, Environmental Restoration Program, Los Alamos, New Mexico. (LANL 1989, 11975)

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Vol. I of IV (TA-0 through TA-9), Los Alamos National Laboratory document LA-UR-90-3400, prepared by International Technology Corporation under Contract 9-XS8-0062R-1, Los Alamos, New Mexico. (LANL 1990, 07511)

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Vol. III of IV (TA-26 through TA-50), Los Alamos National Laboratory document LA-UR-90-3400, prepared by International Technology Corporation under Contract 9-XS8-0062R-1, Los Alamos, New Mexico. (LANL 1990, 07513)

LANL (Los Alamos National Laboratory), March 1990. "Report of Results from Verification Sampling at Old Central School Site," Los Alamos National Laboratory document LA-UR-90-939, Los Alamos, New Mexico. (LANL 1990, 07501)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1071," Los Alamos National Laboratory document LA-UR-92-810, Los Alamos, New Mexico. (LANL 1992, 07667)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1078," Los Alamos National Laboratory document LA-UR-92-838, Los Alamos, New Mexico. (LANL 1992, 43454)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1079," Los Alamos National Laboratory document LA-UR-92-850, Los Alamos, New Mexico. (LANL 1992, 07668)

LANL (Los Alamos National Laboratory), September 1992. "Large Area Swipe Survey Report," Los Alamos National Laboratory document, Los Alamos, New Mexico. (LANL 1992, 58457)

LANL (Los Alamos National Laboratory), June 1993. "RFI Work Plan for Operable Unit 1098," Los Alamos National Laboratory document LA-UR-92-3825, Los Alamos, New Mexico. (LANL 1993, 15314)

LANL (Los Alamos National Laboratory), July 1993. "RFI Work Plan for Operable Unit 1114," Los Alamos National Laboratory document LA-UR-93-1000, Los Alamos, New Mexico. (LANL 1993, 20947)

LANL (Los Alamos National Laboratory), August 1993. "Addendum I to RFI Work Plan for Operable Unit 1078," Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1993, 62909)

LANL (Los Alamos National Laboratory), August 1993. "Western Sanitary Waste Line Sampling Plan for FY 93," Environmental Restoration Program, RCRA Facility Investigation Operable Unit 1078 (TA-1), Los Alamos National Laboratory report, Los Alamos, New Mexico. (LANL 1993, 38753)

LANL (Los Alamos National Laboratory), November 1993. "Installation Work Plan for Environmental Restoration, Vol. II, Revision 3," Los Alamos National Laboratory document LA-UR-93-3987, Los Alamos, New Mexico. (LANL 1993, 26078)

LANL (Los Alamos National Laboratory), May 1994. "RFI Work Plan for Operable Unit 1136," Los Alamos National Laboratory document LA-UR-94-1244, Los Alamos, New Mexico. (LANL 1994, 34754)

LANL (Los Alamos National Laboratory), March 1995. "Request for Permit Modifications Units Proposed for NFA," Los Alamos National Laboratory document LA-UR-95-767, Los Alamos, New Mexico. (LANL 1995, 45365)

LANL (Los Alamos National Laboratory), April 7, 1995. "RCRA Facility Investigation Sampling Program Field Unit 1, Technical Area 1, SWMU 1-001(s), Western Sanitary Waste Line Location 1A, Summer 1994 Field Summary Report," prepared by ERM Program Management Company and Golder Federal Services for Los Alamos National Laboratory, Environmental Restoration Program, Los Alamos, New Mexico. (LANL 1995, 66456)

LANL (Los Alamos National Laboratory), May 3, 1995. "Resource Conservation and Recovery Act Facility Investigation Report for Potential Release Site 0-032," Los Alamos National Laboratory document LA-UR-95-932, Los Alamos, New Mexico. (LANL 1995, 46051)

LANL (Los Alamos National Laboratory), June 30, 1995. "Resource Conservation and Recovery Act Facility Investigation Report for Potential Release Sites 32-001, 32-002(a,b), 32-003, 32-004, Field Unit 1," Los Alamos National Laboratory document LA-UR-95-2231, Los Alamos, New Mexico. (LANL 1995, 48944)

LANL (Los Alamos National Laboratory), July 1995. "RFI Work Plan for Operable Unit 1114, Addendum 1," Los Alamos National Laboratory document LA-UR-95-731, Los Alamos, New Mexico. (LANL 1995, 57590)

LANL (Los Alamos National Laboratory), July 27, 1995. "RFI Report for Solid Waste Management Units, TA-1, Aggregate F, Field Unit 1," Los Alamos National Laboratory document LA-UR-95-2680, Los Alamos, New Mexico. (LANL 1995, 49703)

LANL (Los Alamos National Laboratory), September, 1995. "Request for Permit Modification, Units Proposed for NFA," Los Alamos National Laboratory document LA-UR-95-3319, Los Alamos, New Mexico. (LANL 1995, 51878)

LANL (Los Alamos National Laboratory), November 9, 1995. "Operable Unit (OU) 1071, Solid Waste Management Unit (SWMU) 0-031(a), Request for Work Plan Deviation," Los Alamos National Laboratory letter to D. Neleigh (EPA, Region 6) from J. Jansen (ER Project) and T. Taylor (DOE LAAO), Los Alamos, New Mexico. (LANL 1995, 50053)

LANL (Los Alamos National Laboratory), January 1996. "Voluntary Corrective Action Completion Report for PRS 0-032 Former Zia Motor Pool Storm Water Drainline Field Unit 1, Los Alamos National Laboratory document LA-UR-96-432, Los Alamos, New Mexico. (LANL 1996, 53778)

LANL (Los Alamos National Laboratory), February 1996. "NOD Response for TA-1, Aggregate F," Los Alamos National Laboratory document LA-UR-96-258, Los Alamos, New Mexico. (LANL 1996, 53854)

LANL (Los Alamos National Laboratory), February 1996. "Voluntary Corrective Action Completion Report for Potential Release Site 1-001(f), Hillside 140 Septic Outfall," Los Alamos National Laboratory document LA-UR-96-473, Los Alamos, New Mexico. (LANL 1996, 53797)

LANL (Los Alamos National Laboratory), February 27, 1996. "Response to the Notice of Deficiency (NOD) for Operable Unit (OU) 1079 Concerning 32-001, 32-002(a,b), 32-003, and 32-004," Los Alamos National Laboratory letter EM/ER:96-086 to B. Driscoll (EPA, Region), from J. Jansen (EM/ER) and T. Taylor (DOE LAAO), Los Alamos, New Mexico. (LANL 1996, 52928)

LANL (Los Alamos National Laboratory), March 1996. "RFI Report for Potential Release Sites 1-007(d), 1-007(e), 1-007(j), 1-001(a), 1-001(e), 1-001(o), 1-003(a), 1-006(o), 1-003(e), 1-001(m), 1-003(d), 1-006(e), Aggregates A, B, H, I, J, Former Operable Unit 1078, Field Unit 1," Los Alamos National Laboratory document LA-UR-95-3379, Los Alamos, New Mexico. (LANL 1996, 54461)

LANL (Los Alamos National Laboratory), March 1996. "RFI Report for Potential Release Sites 1-001(b,d), 1-003(c), and 1-007(j), TA-1, Aggregates C and D, Field Unit 1," Los Alamos National Laboratory document LA-UR-96-962, Los Alamos, New Mexico. (LANL 1996, 54467)

LANL (Los Alamos National Laboratory), March 1996. "RFI Report for Potential Release Sites 1-001(g), 1-001(c), 1-003(b), 1-006(b), 1-006(a), 1-006(c), 1-006(g), 1-006(d), 1-006(n), 1-007(a), 1-007(b), 1 007(c), 1-007(j), Aggregates E, G, Field Unit 1," Los Alamos National Laboratory document LA-UR-96-1019, Los Alamos, New Mexico. (LANL 1996, 54465)

LANL (Los Alamos National Laboratory), April 1996. "RFI Report for Potential Release Sites, 1-002, 1-001(t), 1-007(k), TA-1, Aggregates K, L, M, and O, Field Unit 1," Los Alamos National Laboratory document LA-UR-96-1264, Los Alamos, New Mexico. (LANL 1996, 54463)

LANL (Los Alamos National Laboratory), April 30, 1996. "Voluntary Corrective Action Completion Report for Potential Release Site C-0-042, Zia Motor Pool Waste Oil Underground Storage Tank, Field Unit 1," Los Alamos National Laboratory document LA-UR-96-1319, Los Alamos, New Mexico. (LANL 1996, 54618)

LANL (Los Alamos National Laboratory), August 1996. "RFI Report for Potential Release Sites in TA-0, 0-031(b), Former Zia Motor Pool Area (Located in Former Operable Unit 1071), Field Unit 1," Los Alamos National Laboratory document LA-UR-96-2746, Los Alamos, New Mexico. (LANL 1996, 54913)

LANL (Los Alamos National Laboratory), August 1996. "Voluntary Corrective Action Report for Solid Waste Management Unit 1-003(d) at TA-1, Can Dump Site, Field Unit 1," Los Alamos National Laboratory document LA-UR-96-1561, Los Alamos, New Mexico. (LANL 1996, 55029)

LANL (Los Alamos National Laboratory), September 1996. "Interim Action Report for a Potential Release Site at TA-1, 1-001(s), Western Sanitary Waste Line, Locations 9, 10, 11, and 1A, Field Unit 1," Los Alamos National Laboratory document LA-UR-96-3352, Los Alamos, New Mexico. (LANL 1996, 62538)

LANL (Los Alamos National Laboratory), September 1996. "Phase II and Voluntary Corrective Action Report for Potential Release Sites at TA-32," Los Alamos National Laboratory document LA-UR-96-3128, Los Alamos, New Mexico. (LANL 1996, 59178)

LANL (Los Alamos National Laboratory), September 1996. "Voluntary Corrective Action Completion Report for Potential Release Sites 0-030(h,i,n,o,p), Group 0-3, Septic Tanks, Field Unit 1," Los Alamos National Laboratory document LA-UR-96-3351, Los Alamos, New Mexico. (LANL 1996, 62416)

LANL (Los Alamos National Laboratory), January 1997. "Interim Action Report for Potential Release Site 1-001(d) at TA-1, Hillside 138, Field Unit 1," Los Alamos National Laboratory document LA-UR-97-1363, Los Alamos, New Mexico. (LANL 1997, 56908)

LANL (Los Alamos National Laboratory), March 5, 1997. "Response to Notice of Determination for Requests for Permit Modification: Units Proposed for No Further Action, March and September 1995," Los Alamos National Laboratory document LA-UR-97-763, Los Alamos, New Mexico. (LANL 1997, 55510)

LANL (Los Alamos National Laboratory), September 1997. "NFA Report for Potential Release Sites 0-034(a), 0-034(b), 73-001(b), 73-004(c), 73-004(d)," Los Alamos National Laboratory document LA-UR-97-3864, Los Alamos, New Mexico. (LANL 1997, 59367)

LANL (Los Alamos National Laboratory), September 1997. "RFI Report for Potential Release Sites 0-003 and 0-012, Field Unit 1, Environmental Restoration Project," Los Alamos National Laboratory document LA-UR-97-3828, Los Alamos, New Mexico. (LANL 1997, 62528)

LANL (Los Alamos National Laboratory), August 1997. "RFI Report for Phase I Investigation, TA-1 Aggregates N and P," Los Alamos National Laboratory document LA-UR-97-3320, Los Alamos, New Mexico. (LANL 1997, 56660.112)

LANL (Los Alamos National Laboratory), December 19, 1997. "Response to Request for Supplemental Information for RFI Report for TA-1, Aggregates A, B, H, I, and J (Former OU 1078)," Los Alamos National Laboratory letter EM/ER:97-487 to R. Dinwiddie (NMED-HRMB) from J. Canepa (ER) and T. Taylor (DOE LAAO), Los Alamos, New Mexico. (LANL 1997, 57294)

LANL (Los Alamos National Laboratory), September 15, 1998. "Documentation of Ecological Risk Assessment and Other Applicable Regulations and Standards for 73 Administrative NFA Proposals (Functional Area A.2 Performance Measure)," Los Alamos National Laboratory letter to T. Taylor (DOE LAAO) from J. Canepa (ER), Los Alamos, New Mexico. (LANL 1998, 59689)

LANL (Los Alamos National Laboratory), September 22, 1998. "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730)

LANL (Los Alamos National Laboratory), February 11, 1999. "Documentation of Ecological Risk Assessment and Other Applicable Regulations and Standards for 37 Administrative NFA Proposals (Functional Area A.1.2 Performance Measure)," Los Alamos National Laboratory letter from J. Canepa (ER) to T. Taylor (DOE LAAO), Los Alamos, New Mexico. (LANL 1999, 62760)

LANL (Los Alamos National Laboratory), July 1, 1999, "RFI Report for Potential Release Site 0-017 (Former Line 167, Line 170, Line 171)," Los Alamos National Laboratory document LA-UR-99-3354, Los Alamos, New Mexico. (LANL 1999, 64029)

LANL (Los Alamos National Laboratory), March 2000. "Environmental Restoration (ER) Project Cerro Grande Fire Accelerated Action Information Sheet, Potential Release Site (PRS) 41-002(a) Wastewater Treatment Facility," Los Alamos National Laboratory report LA-LP-00-206, Los Alamos, New Mexico. (LANL 2000, 91507)

LANL (Los Alamos National Laboratory), March 2000. "Environmental Restoration (ER) Project Cerro Grande Fire Accelerated Action Information Sheet, Potential Release Site (PRS) 41-002(b) Wastewater Treatment Facility," Los Alamos National Laboratory report LA-LP-00-207, Los Alamos, New Mexico. (LANL 2000, 91508)

LANL (Los Alamos National Laboratory), 2000. "Environmental Restoration (ER) Project Cerro Grande Fire Accelerated Action Information Sheet, Potential Release Site (PRS) 41-002(c) Wastewater Treatment Facility," Los Alamos National Laboratory report LA-LP-00-208, Los Alamos, New Mexico. (LANL 2000, 91509)

LANL (Los Alamos National Laboratory), March 2000. "Environmental Restoration (ER) Project Cerro Grande Fire Accelerated Action Information Sheet, Potential Release Site (PRS) 41-003 Sump," Los Alamos National Laboratory report LA-LP-00-209, Los Alamos, New Mexico. (LANL 2000, 91510)

LANL (Los Alamos National Laboratory), April 2000, "Submittal of Response to Request or Supplemental Information for the RCRA Facility Investigation for Potential Release Site 0-017." Los Alamos National Laboratory letter to J. Kieling (NMED-HRMB) from J. Canepa (E/ER) and T. Taylor (DOE LAAO), Los Alamos, New Mexico. (LANL 2000, 66408)

LANL (Los Alamos National Laboratory), April 19, 2000. "Submittal of Supplemental Information in Support of NOD Responses for March 1995, September 1995, and September 1996 Requests for Permit Modification," Los Alamos National Laboratory letter to J. Kieling (NMED HWB) from J. Canepa (E/ER) and T. Taylor, (DOE LAAO), Los Alamos, New Mexico. (LANL 2000, 66388)

LANL (Los Alamos National Laboratory), August 2000. "Environmental Restoration (ER) Project Cerro Grande Fire Accelerated Action Information Sheet, Potential Release Site (PRS) 41-001 Septic System," LA-LP-00-205, Los Alamos, New Mexico. (LANL 2000, 91505)

LANL (Los Alamos National Laboratory), October 23, 2000. "Additional Information for Potential Release Site (PRS) 01-001(m), Septic Tank 275, on Rollin Jones Property," Los Alamos National Laboratory letter to J. Young (NMED HWB) from J. Canepa (E/ER) and T. Taylor, (DOE LAAO), Los Alamos, New Mexico. (LANL 2000, 68071)

LANL (Los Alamos National Laboratory), May 21, 2001. "Los Alamos National Laboratory Structure History Book TA-1," Los Alamos, New Mexico. (LANL 2001, 69946)

LANL (Los Alamos National Laboratory), May, 2001. "VCA Completion Report for Consolidated Unit 00-003-99 (PRS 0-003 and PRS 0-012) and PRS 0-030(i)," Los Alamos National Laboratory document LA-UR-01-2034, Los Alamos, New Mexico. (LANL 2001, 71418)

LANL (Los Alamos National Laboratory), February 11, 2002. "Withdrawal of SWMUs from the March 1995, September 1995, and September 1996 Requests for Permit Modification (LA-UR-95-767, LA-UR-95-3319, and LA-UR-96-3357, Respectively)," Los Alamos National Laboratory letter to J. Young (NMED HWB) from J. A. Canepa (E/ER) and M. Johanson (DOE LAAO), Los Alamos, New Mexico. (LANL 2002, 71447)

LANL (Los Alamos National Laboratory), April 2006. "Investigation Work Plan for Upper Los Alamos Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-06-2464, Los Alamos, New Mexico. (LANL 2006, 91916)

Larson, R. E., October 6, 1992. "Solid Waste Management Unit (SWMU) 41-003," Los Alamos National Laboratory memorandum WX-5-92-0807-U to P. A. Longmire, INC-9, from R. E. Larson, EX-5 Los Alamos National Laboratory, Los Alamos, New Mexico. (Larson 1992, 44022)

LASL (Los Alamos Scientific Laboratory), August 11, 1947. Plot Plan and Building Detail ETA-1, TA-30, Engineering Drawing A5-R357, Los Alamos, New Mexico. (LASL 1947, 91917)

LASL (Los Alamos Scientific Laboratory), April 9, 1948. The TA-32-2 MRL-2 Electrical Plan and Details, Medical Research Annex, Engineering Drawing A5-C117, Los Alamos, New Mexico. (LASL 1948, 91749)

LASL (Los Alamos Scientific Laboratory), February 28, 1950. "Health Division Annual Report, 1949," Los Alamos Scientific Laboratory report LA-1072, Los Alamos, New Mexico. (LASL 1950, 04681)

LASL (Los Alamos Scientific Laboratory), September 1957. "H-Division Progress Report August 20-September 20, 1957," H-Division, Los Alamos Scientific Laboratory, Los Alamos, New Mexico. (LASL 1957, 00377)

LASL (Los Alamos Scientific Laboratory), August 1958. "H-Division Progress Report July 20–August 20, 1958," Los Alamos Scientific Laboratory document, Los Alamos, New Mexico. (LASL 1958, 63263)

LASL (Los Alamos Scientific Laboratory), October 8, 1964. "Transfer of TA-1 Structures: TA-1-96, 98, 103, 104, and 131," Los Alamos Scientific Laboratory memorandum from Engineering Department to the Zia Company, Los Alamos, New Mexico. (LASL 1964, 04828)

LASL (Los Alamos Scientific Laboratory), January 1976. "Status and Plans Report for Former Technical Area One at Los Alamos Scientific Laboratory," Los Alamos Scientific Laboratory document, Los Alamos, New Mexico. (LASL 1976, 08935)

Mitchell, R.N., April 20, 1967. "Incinerator, Health Research Laboratory Bldg TA-43," Los Alamos Scientific Laboratory memorandum to H.F. Schulte (H-5) from R.N. Mitchell (H-5). Los Alamos, New Mexico. (Mitchell, 1967, 08074)

Montoya, T., October 11, 1965. "Removal of Radioactive Contaminated Concrete and Drain Pipe from TA-1-104," Los Alamos Scientific Laboratory memorandum to C. Buckland from T. Montoya, Los Alamos, New Mexico. (Montoya 1965, 03711)

Montoya, G.M., November 25, 1985. "Line 167: Concrete Anchors Left in Place on South Side of Los Alamos Canyon," Los Alamos National Laboratory memorandum to A. Valentine from G. M. Montoya, Los Alamos, New Mexico. (Montoya 1985, 07295)

NMED (New Mexico Environment Department), December 10, 1996. "Notice of Determination, Requests for Permit Modification, Units Proposed for No Further Action, March and September, 1995," New Mexico Environment Department letter to T. Taylor (DOE LAAO) and J. Jansen, (ER) from R. Dinwiddie (NMED), Santa Fe, New Mexico. (NMED 1996, 55815)

NMED (New Mexico Environment Department), August 26, 1996. "Disapproval of the RCRA Facility Investigation Work Plan Operable Unit 1114," New Mexico Environment Department letter to T. Todd, (DOE LAAO) from E. Kelley, Director (NMED), Santa Fe, New Mexico. (NMED 1996, 65591)

NMED (New Mexico Environment Department), June 9, 1997. "Notice of Determination; Notice of Deficiency and Approval Requests for Permit Modification Units Proposed for No Further Action September 1996 Los Alamos National Laboratory," New Mexico Environment Department letter to J. Jansen (ER) and T. Taylor (DOE LAAO) from B. Garcia (NMED HRMB), Santa Fe, New Mexico. (NMED 1997, 56369)

NMED (New Mexico Environment Department), November 18, 1997. "Rejection of RCRA Facility Investigation Report Potential Release Sites 1-002, 1-001(t) & 1-007(k), Technical Area 1, Aggregates K, L, M & O," New Mexico Environment Department letter to T. Taylor (DOE LAAO) and S. Hecker (LANL) from R. Dinwiddie (NMED HRMB), Santa Fe, New Mexico. (NMED 1997, 57000)

NMED (New Mexico Environment Department), December 23, 1998. "Approval: Class III Permit Modification to Remove Ninety-Nine (99) Solid Waste Management Units from the Department of Energy/Los Alamos National Laboratory RCRA Permit NM 0890010515," New Mexico Environment Department letter to T. Taylor (DOE LAAO) and J. Browne (LANL) from E. Kelley (NMED), Santa Fe, New Mexico. (NMED 1998, 63042)

NMED (New Mexico Environment Department), March 3, 2000. "Request for Supplemental Information RFI Report PRS 0-017, Los Alamos National Laboratory, NM0899910515, HRMB-LANL-99-003," New Mexico Environment Department letter to T. Taylor (DOE LAAO) and J. Browne (LANL) from J. Kieling (NMED HRMB), Santa Fe, New Mexico. (NMED 2000, 64365)

NMED (New Mexico Environment Department), August 28, 2000. "Final Approval of the Location 1A Portion of the RFI Report for Phase II RFI of TA-1 Aggregates N and P for the Potential Release Site 1-001(s)," New Mexico Environment Department letter to J. Browne (LANL) and T. Taylor (DOE LAAO) from J. Kieling (NMED HWB), Santa Fe, New Mexico. (NMED 2000, 68647)

NMED (New Mexico Environment Department), November 29, 2000. "Approval of No Further Action for Potential Release Site 01-001(m), Septic Tank 275, Los Alamos National Laboratory," New Mexico Environment Department letter to J. Browne (LANL) and T. Taylor (DOE LAAO) from J. Young (NMED HWB), Santa Fe, New Mexico. (NMED 2000, 68552)

NMED (New Mexico Environment Department), May 2, 2001. "Approval of Class III Permit Modification to Remove Thirty (30) Solid Waste Management Units from the Department of Energy/Los Alamos National Laboratory RCRA Permit NM 0890010515," New Mexico Environment Department letter to D. Gurule (DOE LAAO) and J. Browne (LANL) from G. Lewis (NMED), Santa Fe, New Mexico. (NMED 2001, 70010)

NMED (New Mexico Environment Department), January 30, 2002. "Approval of VCA Completion Report for Consolidated Unit 00-003-99 (PRS 0-003 and PRS 0-012) and PRS 0-030(i)," New Mexico Environment Department letter to J. Browne (LANL) and M. Johansen (DOE LAAO) from J. Young, (NMED HWB), Santa Fe, New Mexico. (NMED 2002, 73096)

NMED (New Mexico Environment Department), August 6, 2003. "Approval of Class III Permit Modification to Remove Seven (7) Solid Waste Management Units from the Department of Energy/Los Alamos National Laboratory RCRA Permit NM0890010515," New Mexico Environment Department letter from C. Lundstrom (NMED HWB) to R. Erickson (DOE LAAO) and G. Pete Nanos (LANL), Santa Fe, New Mexico. (NMED 2003, 78138)

Potter, E., January 1994. "Interview with J. Wilson, HRL," Los Alamos National Laboratory memorandum from E. Potter (ESH-12) to ESH-12 file, Los Alamos, New Mexico. (Potter 1994, 58454)

Santa Fe Engineering, Ltd., November 1992. "Wastewater Stream Characterization for TA-43 at Los Alamos National Laboratory–An Environmental Study, Draft," prepared by Santa Fe Engineering, Ltd., under Contract 9-XG8-2874P-1, Santa Fe, New Mexico. (Santa Fe Engineering. 1992, 58455)

Stoker, A. K., July 14, 1976. "SM-700 Soil Sample Results," Los Alamos Scientific Laboratory memorandum H8-330-76 to L. Emelity (H-7) from A. K. Stoker (H-8), Los Alamos, New Mexico. (Stoker 1976, 04118)

Watanabe, S., January 15, 1993. "Interview with J. Wilson Concerning SWMU 43-003 Photo Processor and 43-002 Incinerator TA-43, OU1136," Los Alamos National Laboratory memorandum to file from S. Watanabe (CLS-ER), Los Alamos, New Mexico. (Watanabe 1993, 58460)

Watanabe, S., January 12, 1993. "Removal of Incinerator TA-43, 43-002, OU 1136," Los Alamos National Laboratory memorandum to file from S. Watanabe (CLS-ER), Los Alamos, New Mexico. (Watanabe 1993, 58453)

Watanabe, S., January 25, 1993. “Interview with J. Wilson Concerning SWMU 43-002 Incinerator,” Los Alamos National Laboratory memorandum to file from S. Watanabe (CLS-ER), Los Alamos, New Mexico. (Watanabe 1993, 58452)

Watanabe, S., September 9, 1993. “Incinerator Summaries: 43-002,” Los Alamos National Laboratory memorandum to file from S. Watanabe (CLS-ER), Los Alamos, New Mexico. (Watanabe 1993, 58464)

Wilson, J., May 1997. TA-43 Waste Streams. Email message to R. Blegen (ERM Golder) from J. Wilson, Los Alamos, New Mexico. (Wilson 1997, 58983)