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Investigation Work Plan for North Ancho Canyon Aggregate Area

Los Alamos
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EXECUTIVE SUMMARY

This investigation work plan presents the proposed investigation activities at solid waste management units (SWMUs) and areas of concern (AOCs) located within North Ancho Canyon. The purpose of the investigation is to determine the nature and extent of potential contamination at these sites and to excavate waste and soil previously investigated with postexcavation confirmation sampling.

This investigation work plan for the North Ancho Canyon contains information specified in the Compliance Order on Consent for aggregate areas and in the New Mexico Environment Department (NMED)-required outline for this document. Detailed site descriptions and potential contaminants, operations, and historical investigations for each SWMU and AOC are included in the associated historical investigation report.

North Ancho Canyon consists primarily of firing sites used for testing high explosives, support facilities, and waste disposal areas. Active facilities include firing sites, storage areas, administrative offices, workshops, sewage disposal facilities and supporting infrastructure. Inactive facilities include firing sites, storage areas, waste disposal areas, and sewage and chemical disposal facilities. Cleanup at some SWMUs and AOCs has been completed.

North Ancho Canyon consists of 26 individual SWMUs and AOCs in Technical Area 39. Of the 26 SWMUs and AOCs, 10 are included in this work plan but are not proposed for investigation due to their regulatory status. The current status of these sites is as follows.

- Two sites were removed from Module VIII of the Laboratory's Hazardous Waste Facility Permit by NMED [SWMUs 39-003 and 39-006(b)].
- Five sites have no further action (NFA) approval by the U.S. Environmental Protection Agency (EPA) [AOCs 39-002(g), 39-007(b), 39-007(c), 39-007(e), and 39-009].
- Three sites are deferred from investigation pursuant to Table IV-2 of the Consent Order [SWMUs 39-004(a), 39-004(b), and 39-004(e)].

The following sites are described in this work plan; however, no characterization is proposed at these sites for the following reasons.

- Two sites are active open detonation Resource Conservation and Recovery Act units per Table IV-1 of the Consent Order [SWMUs 39-004(c) and 39-004(d)].
- Three sites are storage areas collocated with active firing sites [AOCs 39-002(b), 39-002(c), and 39-002(f)].
- Two sites [AOCs 39-002(d) and 39-002(e)] are satellite accumulation areas regulated under 40 CFR 262 and 20.4.1 New Mexico Administrative Code. These sites are appropriate for NFA. The statement of basis describing the rationale for NFA and a request for a certificate of completion for each of these AOCs will be submitted with the investigation report associated with this work plan.
- One site is an active firing facility with limited access. This site would pose a significant health and safety risk to investigation teams (SWMU 39-008).

Sites that are not deferred per Table IV-2 of the Consent Order but that are collocated with active firing sites [AOCs 39-002(b), 39-002(c), and 39-002(f)] are within the radius of influence of the activities at the firing sites. These sites therefore continue to be exposed to contaminant deposition from the ongoing testing conducted at these sites. Additionally, the historical contaminants suspected to be at these nondeferred sites are the same or similar to those deposited from continued firing activities. Thus, attribution of contaminants present in the environmental media to a particular SWMU or AOC is not possible. For these reasons, this work plan proposes delaying the investigation of nondeferred sites collocated with firing sites and influenced by firing site depositions until firing site operations cease.

The following seven SWMUs and one AOC are proposed for characterization or cleanup under this investigation work plan:

- SWMU 39-002(a) Area 1
- SWMU 39-005
- SWMU 39-007(a)
- SWMU 39-010
- SWMU 39-001(a)
- SWMU 39-001(b)
- SWMU 39-006(a)
- AOC 39-007(d)

This work plan also proposes the investigation of potential contamination of canyon alluvial sediment outside and downgradient of North Ancho Canyon SWMUs and AOCs to where the South Canyon's investigation areas extend.

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1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) and managed by Los Alamos National Security (LANS), LLC. The Laboratory is located in north-central New Mexico, approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory 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 between 6200 and 7800 ft above mean sea level (amsl).

The Laboratory's Environmental Programs (EP) Directorate, formerly the Environmental Restoration 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 EP Directorate 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 EP Directorate is currently investigating sites potentially contaminated by past Laboratory operations. The sites under investigation are designated as either solid waste management units (SWMUs) or areas of concern (AOCs).

The SWMUs and AOCs addressed in this investigation work plan are potentially contaminated with both hazardous and radioactive components. The New Mexico Environment Department (NMED), pursuant to the New Mexico Hazardous Waste Act, regulates cleanup of hazardous wastes and hazardous constituents. The DOE regulates cleanup of radioactive contamination, pursuant to DOE Order 5400.5, "Radiation Protection of the Public and the Environment," and DOE Order 435.1, "Radioactive Waste Management." Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with DOE policy.

Corrective actions at the Laboratory are subject to the March 1, 2005, Compliance Order on Consent (the Consent Order). This work plan describes proposed work activities that will be executed and completed in accordance with the Consent Order.

This investigation work plan for the North Ancho Canyon Aggregate Area contains all information specified in the Consent Order for aggregate areas. Site descriptions and operations and historical investigations for each SWMU and AOC are included in a separate historical investigation report (HIR) and are summarized herein (LANL 2007, 098281).

This investigation work plan describes investigation and cleanup activities to be implemented to meet requirements of the Consent Order (NMED 2006, 093017) for the North Ancho Canyon Aggregate Area. The North Ancho Canyon Aggregate Area comprises the former Operable Unit (OU) 1132 and includes Technical Area (TA) 39 and portions of TA-49. The TA-49 sites are not discussed in this work plan but will be addressed in the TA-49 sites within the nuclear environmental site (NES) boundary investigation work plan or in the TA-49 sites outside the NES site boundary investigation work plans and are not discussed in this investigation work plan. Figure 1.0-1 shows the location of the North Ancho Canyon Aggregate Area. Topographically, the area consists of the alluvial floodplain and hill slopes of North Ancho Creek, an intermittent stream. Figure 1.0-2 shows the local topography of TA-39. All SWMUs and AOCs within North Ancho Canyon are depicted in Figures 1.1-1 to 1.1-3.

General site information is presented in section 1.1 of this investigation work plan. A general conceptual site model (CSM) for the North Ancho Canyon Aggregate Area is presented in section 1.2. The overall scope and objectives of the investigation are discussed in section 1.3. The background, operational history, previous investigations, available data and site-specific CSM for each site in the North Ancho Canyon Aggregate Area are presented in section 2.0. General site conditions of the North Ancho Canyon are presented in section 3.0. The investigation objectives and strategies of the investigation work plan are presented in section 4.0, while the investigation and cleanup activities are described in section 5.0. Ongoing monitoring and sampling programs in North Ancho Canyon are presented in section 6.0, and the schedule is presented in section 7.0. All figures and tables are at the end of the main document. Appendix A contains the list of acronyms and abbreviations used in this investigation work plan, in addition to a glossary, a metric conversion table, and a data qualifier definition table. Appendix B contains the management plan for investigation-derived waste (IDW).

1.1 General Site Information

The North Ancho Canyon Aggregate Area is primarily composed of firing sites for testing of high explosives (HE), support facilities, and waste disposal areas. Active facilities include firing sites, storage areas, administrative offices, workshops, sewage disposal facilities, and supporting infrastructure. Inactive facilities include firing sites, storage areas, waste disposal areas, and sewage and chemical disposal facilities. Cleanup at some SWMUs and AOCs has been completed. Table 1.0-1 lists North Ancho Canyon Aggregate Area SWMUs and AOCs, describes their regulatory status, and references the sections within the work plan where the sites are discussed.

1.1.1 Sites Not Proposed for Investigation

Sites that are not proposed for investigation in this work plan include the following:

- Two sites that have been removed from Module VIII of the Laboratory's Hazardous Waste Facility Permit (HWFP) by NMED [SWMUs 39-003 and 39-006(b)] (NMED 1998, 063042; NMED 2001, 070010)
- Five sites with no further action (NFA) approval by the U.S. Environmental Protection Agency (EPA) [AOCs 39-002(g), AC 39-007(b), 39-007(c), 39-007(e), and 39-009] (EPA 2005, 088464)
- Three sites deferred from investigation pursuant to Table IV-2 of the Consent Order [SWMU39-004(a), SWU 39-004(b), and 39-004(e)]
- Two active open detonation (OD) Resource Conservation Recovery Act (RCRA)-regulated units per Table IV-1 of the Consent Order [SWMU 39-004(c) and SWMU 39-004(d)]
- Three sites that are storage areas collocated with active firing sites [AOCs 39-002(b), 39-002(c), 39-002(f)] (LANL 1995, 046190, pp. 4-1 to 4-32)
- Two sites [AOCs 39-002(d) and 39-002(e)] are satellite accumulation areas regulated under 40 CFR 262 and 20.4.1 New Mexico Administrative Code (NMAC). These sites are appropriate for NFA. The statement of basis describing the rationale for NFA and a request for a certificate of completion for each of these AOCs will be submitted with the investigation report associated with this work plan
- One active firing facility with limited access and significant health and safety concerns for investigation teams (SWMUs 39-008) (LANL 1997, 055633p. ii))

Sites that are not deferred per Table IV-2 of the Consent Order but that are collocated with active firing sites [AOCs 39-002(b), 39-002(c), and 39-002(f)] are within the radius of influence of the activities at the firing sites. These sites therefore continue to be exposed to contaminant deposition from the ongoing testing conducted at these sites. Additionally, the historical contaminants suspected to be at these nondeferred sites are the same or similar to those deposited from continued firing activities. Thus, attribution of contaminants present in the environmental media to a particular SWMU or AOC is not possible. For these reasons, this work plan proposes delaying the investigation of nondeferred sites collocated with firing sites and influenced by firing site depositions until firing site operations cease. Additionally, the active septic system components of SWMU 39-006(a) are not proposed for investigation.

These sites are described in the "Historical Investigation Report for North Ancho Canyon Aggregate Area," and a summary of the activities and regulatory status of these sites is included this investigation work plan (LANL 2007, 098281).

1.1.2 Sites Proposed for Investigation or Corrective Action

This work plan proposes to implement characterization, cleanup, and confirmatory sampling at the following sites as part of this investigation work plan: SWMU 39-001(a), landfill; SWMU 39-001(b), disposal trenches; and SWMU 39-006(a) inactive septic tank, inactive chemical seepage pit, inactive sand filter and inactive vitrified-clay pipe (VCP) drain line. These sites are candidates for cleanup under the investigation work plan based on previous characterization, their locations in the canyon stream floodplains, the potential for contaminant migration in surface water during flooding, the desirability of an overall reduction in the footprint of contaminated areas at the Laboratory, and the ability to implement cleanup relatively quickly. Additionally, preliminary characterization of SWMU 39-010, the excavated soil dump is proposed.

Further characterization of SWMUs 39-002(a), 39-005, 39-007(a), and AOC 39-007(d) are proposed in this investigation work plan to delineate the nature and extent of contamination.

1.2 Conceptual Site Model

Existing knowledge about a site and its potential contaminants is used to develop a CSM. Items included in a CSM include the environmental media to which receptors may be exposed, media through which chemicals may be transported to potential receptors, and any currently uncontaminated media that may become contaminated in the future resulting from contaminant migration (EPA 1989, 008021, p. 4-10). In general, while the source of contamination is specific to each site, the transport mechanisms and potential receptors for each CSM are similar for all subaggregates in North Ancho Canyon as discussed below. A graphical CSM is provided for each general type of site to be investigated, including storage areas, landfill/disposal trenches, soil piles, firing sites, and seepage pit/septic systems in Figures 1.2.1 to 1.2-5.

Typical experiments conducted at these remote test-firing facility were designed to expend all HE in the device. If a shot failed so that not all the HE was spent, an effort was made to pick up and destroy the unexploded HE. A typical shot carries 10–100 lb of explosives, but on occasion, up to 1000 lb may be used. Signs of impact are generally noticeable only within a 200-ft radius around firing pads.

1.2.1 Transport Mechanisms

The following primary or secondary transport mechanisms may lead to the exposure of human and/or ecological receptors:

- Dissolution and/or particulate transport of surface contaminants during rainfall and snowmelt runoff events (surface soil only)
- Dissolution and/or particulate transport of surface contaminants to deeper subsurface soils
- Airborne transport of contaminated surface soil through the dispersion of fugitive dust
- Volatilization of contaminants during excavation of subsurface soils

- Continued dissolution and advective/dispersive transport of chemical and radiological contaminants contained in surface/subsurface soil
- Biotic and anthropogenic excavation and translocation of contaminants in subsurface soil

1.2.2 Potential Receptors

On-site workers are the current and potential human receptors reasonably expected to be present at North Ancho Canyon.

Industrial soil screening levels (SSLs) for the North Ancho Canyon chemicals are summarized in Table 4.1-2. The industrial SSLs were obtained from NMED guidance (NMED 2006, 092513) EPA Region 6 (EPA 2006, 094321), or EPA Region 9 (http://www.epa.gov/region09/waste/sfund/prg/index.html#prgtable) guidance. For chemicals without NMED SSLs, the EPA Region 6 screening levels (EPA 2006, 094321) or EPA Region 9 preliminary remediation goals (PRGs) were used. For radionuclides, Laboratory screening action levels (SALs) were used (LANL 2005, 088493).

The potential pathways for on-site worker exposure to surface soil are incidental soil ingestion, dermal contact, external irradiation, and inhalation of vapors and particulates. Pathways from subsurface contamination to potential on-site workers would be complete only if contaminated subsurface soil were excavated and brought to the surface. Potential exposure pathways for excavated subsurface soils would then be similar to those of a surface soil release (e.g., inhalation of vapors or fugitive dust, dermal contact, and incidental soil ingestion).

Terrestrial ecological receptors are expected to be present at North Ancho Canyon. For ecological receptors, exposure pathways from potential contaminants in surface soil include incidental ingestion of soil, dermal contact, root uptake by plants, and food web transport. Exposure pathways from subsurface contamination to potential surface-dwelling animals would be complete only if contaminated subsurface soil or tuff were excavated and brought to the surface. Pathways from subsurface releases may be complete for plants and burrowing animals, including the uptake of contaminants by plant roots and the exposure of burrowing animals, incidental ingestion of soil, dermal contact, and food web transport.

Exposure to regional alluvial groundwater at North Ancho Canyon is an incomplete pathway for both human and ecological receptors due to the depth of groundwater (approximately 550 ft), the lack of drinking water wells on-site and the lack of groundwater daylighting in surface streams. Because no perennial surface-water bodies exist on-site and precipitation events result in short-term intermittent surface-water ponds or streams, exposure to surface water is an incomplete pathway for human receptors and likely insignificant for ecological receptors.

1.3 Objectives

The objectives of this investigation are to (1) determine the nature and extent of contamination at the sites included in this work plan, (2) obtain general site characterization data for the evaluation of remedial alternatives, (3) implement corrective actions at selected sites, and (4) conduct confirmatory sampling following corrective actions at selected sites.

To meet these objectives, this investigation work plan

- identifies additional characterization data requirements based upon a review of SWMU and AOC historical data;
- establishes the rationale for characterization, data collection, and analysis;

- determines appropriate methods and protocols for sample collection and analysis to finalize the characterization of each SWMU and AOC;
- identifies sites proposed for corrective action and describes corrective action procedures; and
- describes protocols for removal actions at selected SWMUs and AOCs and subsequent confirmatory sampling.

2.0 BACKGROUND

This section describes existing site information including operational history, current operations, and locations of surface and subsurface features for each SWMU or AOC. Sites are grouped into three subaggregate areas based on location: Subaggregate Area 1, northern section; Subaggregate Area 2, central section; and Subaggregate Area 3, southern section. The locations of these subaggregate areas are presented in Figures 1.1-1 to 1.1-3.

Historical investigation sample locations are shown on a site plan when decision-level data were available for each site. The data-quality assessment from the HIR is summarized. As stated in the HIR, screening-level data include on-site Chemical Sciences and Technology (CST) Division, CST Mobile Chemical Analytical Laboratory, CST Mobile Radiological Analysis Laboratory, and samples shipped directly to the laboratory without processing through the Sample Management Office (SMO). Screening-level data were not used in the development of this investigation work plan. Decision-level data include CST off-site data of samples shipped to off-site fixed laboratories through the SMO that have been reviewed by examining the original data packages and by validating and qualifying the reported results. Only from late 1995 to the present have samples been shipped through the SMO to off-site contract laboratories (LANL 2007, 098281).

Decision-level data are tabulated and presented for each individual SWMU and AOC in the applicable tables at the end of this document. Sample locations with decision-level data and analytical results for each SWMU and AOC on a site location map are also presented (see appropriate sections of the text for figure references for each SWMU and AOC). Accompanying text in each section discusses available site-specific information for each SWMU or AOC, including types and characteristics of contaminants potentially released, potential transport pathways, and potential receptors.

2.1 Subaggregate Area 1: Northern Section of North Ancho Canyon Aggregate Area

Figure 1.1-1 shows the location of Subaggregate Area 1 and the associated SWMUs and AOCs, which include SWMUs 39-004(a), 39-004(b), 39-004(d), 39-004(e), and 39-010 and AOCs 39-002(d), and 39-002(f).

2.1.1 SWMUs 39-004(a) and 39-004(d), Firing Sites

SWMU 39-004(a) (structure 39-7) and SWMU 39-004(d) (structure 39-57) are active firing sites. The site location maps for SWMUs 39-004(a) and 39-004(d) are shown in Figures 2.1-1 and 2.1-2, respectively.

2.1.1.1 Background and Operational History

SWMU 39-004(a) (structure 39-7) and SWMU 39-004(d) (structure 39-57) are active firing sites located along the northern tributary of the upper reach of Ancho Canyon at TA-39 (Figure 1.1-1). SWMU 39 004(a) is an active firing site deferred per Table IV-2 of the Consent Order. SWMU 39-004(d) is a firing site and an active RCRA operating unit that is subject to RCRA closure requirements and not Consent Order requirements.

Both of these firing pads are located in the canyon bottom between a diverted ephemeral stream and the canyon wall. SWMU 39-004(a) was constructed in 1953 as a remote test firing facility to test materials (ICF Kaiser Engineers 1997, 097812, pp. 4-5). SWMU 39-004(d) is located approximately 75 ft southeast from SWMU 39-004(a). The firing sites are within the fall zone of a high cliff that erodes when explosives experiments are conducted at the site. Directly west of the firing pad at SWMU 39-004(a), there is a talus pile or debris mound at the base of the canyon wall (LANL 2007, 098281).

2.1.1.2 Previous Investigations

Planned historical investigations at these sites attempted to differentiate between the two firing sites, but due to the nature of activities in this area, SWMUs 39-004(a) and 39-004 (d) were sampled as one site. Phase I RCRA facility investigation (RFI) activities were completed at SWMUs 39-004(a) and 39-004(d) in 1995(ICF Kaiser Engineers 1997, 097812, pp. 4-5). Investigations were planned and conducted in two parts.

Initial sampling involved the collection of samples from within the physical boundary of the firing pads (approximately within a 100-ft-diameter circle from a central point between the two firing pads). Radiation surveys and x-ray fluorescence (XRF) screening were conducted at both firing pads as a guide to sample location selection. Where possible, sample locations were selected from the location of the two highest radiation and XRF survey locations. Twelve surface samples were collected from 12 locations at SWMUs 39-004(a) and 39-004(d) within the firing pad area, including two samples that were collected from the talus pile, west of the pad at SWMU 39-004(a) (LANL 2007, 098281).

Eighteen samples were also collected from the adjacent stream channel in nine locations. Typically, each location was sampled in two depth intervals. The first sample was collected from the surface (0–0.5 ft) and the second from the 0.5–0.83-ft interval (LANL 2007, 098281).

The firing site also was sampled along three lines radiating outward from the pad. In previous historical documents, these lines are referred to as transects. To characterize the extent of contamination dispersion beyond the firing pads, three transects were sampled, using a central point between the two firing pads as the hub. The transects radiated outward from the 100-ft-diameter circle encompassing the firing pads to a distance of approximately 600 ft. Sixteen samples were collected from nine locations from the transects at SWMU 39-004(a) and SWMU 39-004(d). The transect sampling, conducted at all firing sites in the northern subaggregate area, is shown in Figure 2.1-3.

2.1.1.3 Data for SWMU 39-004(a) and SWMU 39-004(d)

Decision-level data are summarized in Tables 2.1-1 to 2.1-3 for SWMUs 39-004(a) and 39-004(d). Sample locations with decision-level data are presented in Figures 2.1-4 to 2.1-6. Data indicate inorganic chemicals and radionuclides as potential contaminants (ICF Kaiser Engineers 1997, 097812).

2.1.1.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2; the CSM for firing sites is shown in Figure 1.2-1. The remaining data issues for this site include nature and extent of contamination after current firing site operations cease.

2.1.2 AOC 39-002(d), Storage Area

AOC 39-002(d) is a former satellite accumulation area (SAA) that is collocated with an active RCRA -regulated firing site SWMU 39-004(d). The site location map for AOC 39-002(d) is shown in Figure 2.1-7.

2.1.2.1 Background and Operational History

AOC 39-002(d) is a former SAA located on a gravel pad on the outside, southwest corner of a blockhouse (structure 39-57) for a firing site [SWMU 39-004(d)] (Figure 2.2-1). The SAA consisted of a 5-ft × 5-ft × 4-ft electrical closet placed on an unpaved gravel pad. From the late 1980s through the 1990s, this SAA was used to store photographic wastes, cloth, and paper contaminated with various substances (acetone, ethanol, transformer oil, trichloroethane, vacuum grease, and copper sulfate) (LANL 1993, 015316, p. 5-18). This SAA was removed from service, and the area is no longer used for storage.

2.1.2.2 Previous Investigations

Previous investigations at AOC included the collection of two surface samples from within the footprint of the storage area in 1993 (LANL 1995, 046190, p. 4-20). Sampling was performed to determine possible impacts from adjacent firing sites. Samples were collected but are only screening-level data. Therefore, these data are not discussed or reported (LANL 2007, 098281).

2.1.2.3 Data for AOC 39-002(d)

All analytical data were deemed to be screening level; therefore, no historical data are presented for AOC 39-002(d) (LANL 2007, 098281).

2.1.3 SWMU 39-004(b), Firing Site

SWMU 39-004(b) is a firing site on standby status (structure 39-08), collocated with active firing. The site location map for SWMU 39-004(b) is shown in Figure 2.1-8.

2.1.3.1 Background and Operational History

SWMU 39-004(b) is a firing site on standby status (structure 39-08) located in the western tributary of the upper reach of North Ancho Canyon. SWMU 39-004(b) is deferred for investigation per Table IV-2 of the Consent Order. The firing pad is located in the canyon bottom between an ephemeral stream and the northern canyon wall. Similar to SWMU 39-004(a), there is a talus pile or debris mound directly north of the site. Activities at this site were discontinued in 1980 because of the constant hazard of falling debris from the nearby cliff (LANL 1993, 015316, p. 5-23). This SWMU is influenced by firing site activities at SWMUs 39-004(a), 39-004(d), and 39-004(e).

2.1.3.2 Previous Investigations

The Phase I RFI at SWMU 39-004(b) was concluded in 1995 (LANL 2007, 098281). To determine potential contaminant dispersion and migration from an explosives site, the investigation was conducted in two segments: firing pad areas and transects from the firing pads along the adjacent hillsides and mesa top. Preliminary sampling involved the collection of samples from within the physical boundary of the firing pad (within an approximate 100-ft-diameter circle). Then a grid was established over the firing pad on 20-ft centers. Radiation surveys and XRF screening were conducted at each grid point. Where possible, sample locations were selected from the location of the two highest radiation and XRF survey locations. Six surface soil samples were collected from locations around the firing pad at SWMU 39-004(b), including two samples that were collected from the talus mound, at the base of the slope north of the pad (LANL 2007, 098281).

Fourteen samples were collected from seven locations along the adjacent stream channel. Typically, each location was sampled in two depth intervals. The first sample was collected from the surface (0–0.5 ft) and the second from the 0.5 to 0.83-ft interval (LANL 2007, 098281).

To characterize the extent of contamination dispersion beyond the firing pad, three transects were established, using the firing pad as the hub. The transects radiated outward from the 100-ft-diameter circle encompassing the firing pad to a distance of 600 ft from the pad. In total, 11 samples were collected from eight locations along the transects at this site (LANL 2007, 098281). The firing site transects and initial 100-ft radius radiation survey areas are depicted in Figure 2.1-3.

2.1.3.3 Data for SWMU 39-004(b)

Decision-level data are summarized in Tables 2.1-4 to 2.1-6. Sample locations with decision-level data are presented in Figures 2.1-9 to 2.1-11. Data indicated elevated inorganic chemicals, organic chemicals, and radionuclides as potential contaminants (ICF Kaiser Engineers 1997, 097812).

2.1.3.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2, while the CSM for firing sites is shown in Figure 1.2-1. The remaining data issues for this site include nature and extent of contamination after current firing site operations cease.

2.1.4 AOC 39-002(f), Storage Area

AOC 39-002(f) is a former SAA collocated with an active firing site, SWMU 39-004(e). The site location map for AOC 39-002(f) is shown in Figure 2.1-12. This AOC is within the deposition area of SWMUs 39-004(a), 39-004(b), and 39-004(d).

2.1.4.1 Background and Operational History

AOC 39-002(f) is a former SAA that was located on the asphalt driveway outside the northeast corner of a support structure (structure 39-88) for an active firing site [SWMU 39-004(e)] (Figure 2.1-12). Before this area became an SAA, it was used to store small quantities of waste solvents (ethanol, acetone, and trichloroethane), copper sulfate, transformer oil, vacuum grease, and photographic wastes (LANL 1993, 015316, p. 5-18).

2.1.4.2 Previous Investigations

Previous investigations at AOC 39-002(f) included the collection of two surface samples from within the footprint of the storage area in 1993 (LANL 1995, 046190, p. 4-29). Sampling was performed to determine possible impacts from adjacent firing sites. Samples were collected but are only screening-level data. Therefore, these data are not discussed or reported (LANL 2007, 098281).

2.1.4.3 Data for AOC 39-002(f)

All analytical data were deemed to be screening-level quality; therefore, no historical data are presented for AOC 39-002(f) (LANL 2007, 098281).

2.1.4.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2, while the CSM for storage areas is shown in Figure 1.2-2. The remaining data issues for this site include nature and extent of contamination after current firing site operations cease at the adjacent firing sites.

2.1.5 SWMU 39-004(e), Firing Site

SWMU 39-004(e) is deferred per Table IV-2 of the Consent Order. The site location map for SWMU 39-004(e) is shown in Figure 2.1-13.

2.1.5.1 Background and Operational History

SWMU 39-004(e) is an active firing site at TA-39 (structure 39-88) that is deferred for investigation per Table IV-2 of the Consent Order. This site has been in use since its construction in 1978 as a remote test firing facility to test materials (Figure 2.1-13). SWMU 39-004(e) is located in the western tributary of the upper reach of Ancho Canyon on the same tributary as SWMU 39 004(b). This SWMU is within the deposition area of SWMUs 39-004(a), 39-004(b), and 39 004(d).

2.1.5.2 Previous Investigations

The Phase I RFI at SWMU 39-004(e) was implemented in 1995 (ICF Kaiser Engineers 1997, 097812, p. 54). To determine potential contaminant dispersion and migration from an explosives site, the investigation was conducted in two segments: firing pad areas and transects from the firing pads along the adjacent hillsides and mesa top.

Preliminary sampling involved the collection of samples from within the physical boundary of the firing pad (within an approximate 100-ft-diameter circle). To accomplish this, a grid was established over the firing pad on 20-ft centers. Radiation surveys and XRF screening were conducted at each grid point. Sample locations were then selected, where possible, from the location of the two highest radiation and XRF survey locations. Five surface soil samples were collected from four locations at the firing pad at SWMU 39-004(e) (LANL 2007, 098281).

Ten samples were collected from five locations along the adjacent stream channel. Typically, each location was sampled in two depth intervals. The first sample was collected from the surface (0–0.5 ft) and the second from the 0.5 to 0.83-ft interval (LANL 2007, 098281).

To characterize the extent of contamination dispersion beyond the firing pad, three transects were established at the site, using the firing pad as the hub. The transects radiated outward from the 100-ft-diameter circle encompassing the firing pad to a distance of 600 ft from the pad. In total, 25 samples were collected from 14 locations along transects established at this site (LANL 2007, 098281). The firing site transects and initial 100-ft radius radiation survey areas are depicted in Figure 2.1-3.

2.1.5.3 Data for SWMU 39-004(e)

Decision-level results are summarized in Tables 2.1-7 to 2.1-9. Sample locations with decision-level data are presented in Figures 2.1-14 to 2.1-16. Inorganic chemicals, organic chemicals, and radionuclides are potential contaminants (ICF Kaiser Engineers 1997, 097812).

2.1.5.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2, while the CSM for firing sites is shown in Figure 1.2-1. The remaining data issues for this site include nature and extent of contamination after current firing site operations cease.

2.1.6 SWMU 39-010, Excavated Soil Dump

SWMU 39-010 is an area that was used for staging soil during the 1978 construction of SWMU 39-004(e). The map for SWMU 39-010 is shown in Figure 2.1-17.

2.1.6.1 Background and Operational History

SWMU 39-010 is an area that was used for staging soil excavated during the 1978 construction of SWMU 39-004(e), located at the south end of Subaggregate Area 1. During the construction of the most recent firing site at TA-39 [SWMU 39-004(e)], large quantities of earth were removed and deposited in the canyon east of the firing site SWMU 39-004(e) forming SWMU 39-010 (LANL 1993, 015316). This soil dump, which covers about 76,200 ft^2, was not identified in the 1990 SWMU report (LANL 1990, 007512). However, it was noted in both the RFI work plan (LANL 1993, 015316, p. 5-24) and described in a new SWMU notification letter to NMED (LANL 2001, 071215).

No data are available concerning the nature and extent of contamination of the excavated soil dump, but potential contaminants at this site are expected to be similar to the potential contaminants at SWMU 39-004(e) (e.g., HE, radionuclides, and inorganic chemicals) because the soils placed in this pile came from an area within the deposition zones of SWMUs 39-004(a), 39-004(b), and 39-004(d) firing sites (LANL 1993, 015316, p. 5-26).

2.1.6.2 Previous Investigations

SWMU 39-010 has not been previously investigated.

2.1.6.3 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. The CSM for soil piles is shown in Figure 1.2-5. The remaining data issues for this site include nature and extent of contamination and fate and transport of potential contaminants.

2.2 Subaggregate Area 2: Central Section of North Ancho Canyon Aggregate Area

Figure 1.1-2 shows the location of Subaggregate Area 2 and the associated SWMUs and AOCs, which include SWMUs 39-001(b), 39-004(c), 39-007(a), and 39-008, and AOCs 39-002(b), 39-002(c), and 39-007(d).

2.2.1 SWMU 39-001(b), Disposal Trenches

SWMU 39-001(b) consists of three pits that were used to dispose of office waste and debris from firing range SWMU 39-008 ((LANL 1993, 015316). The map for SWMU 39-001(b) is shown in Figure 2.2-1.

2.2.1.1 Background and Operational History

SWMU 39-001(b) was reported to have consisted of three pits that were used to dispose of office waste and debris from a firing range (SWMU 39-008) (Figure 2.2-1). Pit 1, which was originally known as Material disposal Area (MDA) Y, was excavated in the late 1960s. Pit 2, which was excavated parallel and adjacent to Pit 1, was in use from 1976 to 1981. Pit 3, directly south of the other two, was in use from 1981 to 1989 (Figure 3.1-1). All pits were closed and covered by May 1989. Debris from firing sites, empty chemical containers, and office waste were reportedly disposed at this site (LANL 1993, 015316, p. 5-6).

2.2.1.2 Previous Investigations

A series of geophysical and radiation surveys were conducted over the disposal pit locations SWMU 39-001(b) in 1993 (LANL 1997, 055633, p. 1-6). The most probable location of the disposal pits was estimated using data compiled from historical documents, surface radiation surveys, and the geophysical surveys. Results of the geophysical survey indicated the disposal area was more amorphous than the three distinct disposal trenches that had been previously reported (LANL 1997, 055633, p. 5-30).

During the 1994, two field efforts were initiated to determine if contaminants had migrated from the disposal area. The first of these activities consisted of sampling the adjacent stream channel and surrounding area to determine if contaminants were migrating from the SWMU. The second activity involved the installation of vertical monitoring wells upstream and downstream of the landfill (LANL 1997, 055633, p. 5-31).

Field activities in 1996 consisted of establishing a grid over the suspected landfill area and sampling down through the landfill contents. Thirteen test pits were excavated within the two amorphous waste disposal areas to depths between 12 and 16 ft below ground surface (bgs); samples were collected and the pits were backfilled. No evidence of waste was observed in test pit locations 39-01391 and 39-01394 (LANL 1997, 055633, p. 5-33).

2.2.1.3 Data for SWMU 39-001(b)

Decision-level results are summarized in Tables 2.2-1 to 2.2-3. Sample locations with decision-level data are presented in Figures 2.2-2 to 2.2-4. Thirty-three soil samples were collected from 13 locations at SWMU 39-001(b). Uranium, uranium-235, and thorium isotopes were detected at concentrations above background. Thirty-three organic chemicals, including polycholinated biphenyls (PCBs), HE, pesticides, polycyclic aromatic hydrocarbons (PAHs), and other organic chemicals were detected. Analytical results indicated that antimony, cadmium, calcium, chromium, copper, cobalt, total cyanide, iron, lead, mercury, nickel, silver, thallium, total uranium, vanadium, and zinc were detected above background values (BVs) in at least one sample (LANL 1997, 055633, pp. 5-42 to 5-65; LANL 2007, 098281).

2.2.1.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. Figure 1.2-3 shows the CSM for buried materials including SWMU 39-001(b) based on site conditions, operational history, and previous investigations. Chemicals of potential concern (COPCs) in buried waste are subject to release to secondary sources or exposures to receptors, as follows.

- Erosion, runoff, and contamination of downstream soils and sediments: This release mechanism was evaluated in the RFI by sampling stream channel and two stream-bank biased locations. Mercury and uranium were detected in stream-bank deposits and were attributed to upstream firing sites. No metals, radionuclides, or organic chemicals were detected in downstream stream-channel deposits. Contamination of surface water has not occurred, based on surface-water monitoring downgradient of SWMU 39-001(a) (LANL 1997, 055633, pp. 5-42 to 5-65).

- Leaching and sorption and contamination of soil and sediment: This release mechanism was evaluated in the RFI by five boreholes angle-drilled at 45 degrees with a run length of 80 ft under the landfill. Metals, uranium-235, thorium isotopes, and organic chemicals were detected in cores obtained from beneath the landfill (LANL 1997, 055633, pp. 5-42 to 5-65).
- Leaching and infiltration to groundwater: This release mechanism was evaluated in the RFI by completing three boreholes as monitoring wells. No saturated zone was intercepted in any of the wells. Additional review of current fiscal year (FY) 2006 groundwater-monitoring data indicates no contamination of the regional aquifer in the vicinity beneath or downgradient of TA-39 attributable to sources there (LANL 2006, 094043, pp. 7-1 to 7-9). Monitoring locations in Ancho Canyon are situated near or downstream from areas of past Laboratory weapons-testing activities. Most monitoring locations in Ancho Canyon access the regional aquifer. Three decades of water-quality records from regional wells in this area (DT-5A, DT-9, and DT-10) and recent data from R-31 show no substantial changes in water chemistry or the presence of Laboratory contaminants in the regional aquifer (LANL 2006, 094043, p. 7-2; LANL 2007, 095364).
- Volatilization to the atmosphere: This release mechanism was evaluated by trenching through the landfill contents and sampling for volatile organic compounds (VOCs). VOCs were not detected (LANL 1997, 055633, pp. 5-42 to 5-65).
- Releases of contaminants during excavation by future workers were evaluated by risk assessment (LANL 1997, 055633, pp. 5-42 to 5-65).
- Releases of contaminants during excavation were evaluated (LANL 1997, 055633, pp. 5-42 to 5-65).
- Based on this evaluation, it was determined that no significant releases to the environment from the landfill have occurred, based on the lack of distribution of COPCs in stream sediments downgradient of the landfill. Evaluation of contaminant transport in erosion and runoff was limited to only four samples, but any contamination from the landfill would be difficult to discern from contamination originating upstream. Visual evidence indicates no significant erosion of the soil cover. To expedite remediation of the landfill it is proposed that excavation of wastes, waste characterization, waste disposition and confirmation sampling should be conducted concurrently (section 4.0).

2.2.2 SWMU 39-008, Gas-Gun Site

SWMU 39-008 is an area of potential soil contaminant from gas-gun firing near a Morgan shed (building 39-137). The site map for SWMU 39-008 is presented in Figure 2.2-5.

2.2.2.1 Background and Operational History

SWMU 39-008 is an area of potential soil contamination from a gas-gun firing site near a Morgan shed (building 39-137) (Figure 2.2-5), that houses a single-stage gas gun with a 6-in.-diameter barrel. The gas gun is used for outdoor experiments, using gas as a propellant to fire depleted uranium projectiles at targets on the cliff face (LANL 1993, 015316, p. 5-26). Most of the debris from these firings is scattered over the area just west of the building, but occasionally projectiles and target fragments hit the cliff face, some 200 ft west of another building associated with this experimental gun (building 39-56). Photographic evidence shows that the area between the buildings and the cliff was leveled, and the removed surface materials were pushed into a mound on the south side of the test area. Testing at this site was conducted from 1960 to 1975, was suspended for 13 yr, and then resumed in 1988 (LANL 1993, 015316, p. 5-26). The gas gun is currently used for experimental purposes and housed within building 39-137.

2.2.2.2 Previous Investigations

During the 1993 Phase I RFI, a grid was established over the entire site, and a radiation survey was conducted (ICF Kaiser Engineers 1997, 097812, p. 94). Results from the radiation survey were used to guide sample collection at SWMU 39-008 in 1995. The objective of the investigation was to determine if contaminants were present in the soil between the gas-gun building (building 39-137), the leveled area, the cliff backstop, and debris mound.

Surface (0–6-in.) and near-surface (6–10-in.) soil samples were collected from six locations between the gas-gun building and the cliff face (leveled area). Sampling locations based upon elevated radiation readings included locations 39-01349 and 39-01352. The remaining sample locations (39-01347, 39-01348, 39-01350 and 39-01351) were evenly spaced between the gas-gun building and the cliff face. Four sample locations (39-01355, 39-01356, 39-01357, and 39-01358) were established on the debris mound (ICF Kaiser Engineers 1997, 097812, p. 95) and also sampled in two depth intervals. One surface sample was collected from a local drainage at the northern end of the site.

Samples were analyzed at an off-site contract laboratory for SVOCs, inorganic chemicals, cyanide, total uranium, isotopic thorium, isotopic plutonium, and by gamma spectroscopy. Only samples from locations 39-01349 and 39-01352 were analyzed for HE because HE was not expected to be present at the site (ICF Kaiser Engineers 1997, 097812, p. 96).

2.2.2.3 Data for SWMU 39-008

Decision-level results are summarized in Tables 2.2-4 to 2.2-6. Sample locations with decision-level data are presented in Figures 2.2-6 to 2.2-8. Sampling data showed inorganic chemicals, organic chemicals, and radionuclides as potential contaminants (ICF Kaiser Engineers 1997, 097812).

2.2.2.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. The CSM for the gas-gun site is similar to that for firing sites, shown in Figure 1.2-1. The remaining data issues for this site include nature and extent of contamination after current firing site operations cease.

2.2.3 AOC 39-002(c), Storage Area

AOC 39-002(c) is a former outdoor SAA collocated with an active firing site SWMU 39-008. The site location map for AOC 39-002(c) is presented in Figure 2.2-9.

2.2.3.1 Background and Operational History

AOC 39-002(c) is a former outdoor SAA that was located on an asphalt paved area adjacent to the southwest corner of the gas-gun support structure (structure 39-56) (Figure 2.2-9). This SAA was used only as needed to store waste paper and rags contaminated with solvents (ethanol, acetone, and trichloroethane) and vacuum grease. The SAA was located adjacent to a gas-gun firing site from which depleted uranium projectiles are fired into the cliff face to the west (SWMU 39-008) (LANL 2007, 098281).

2.2.3.2 Previous Investigations

During the Phase I RFI conducted in 1993, two surface samples were collected from two locations at AOC 39-002(c) (LANL 1995, 046190, p. 4-15). One sample was collected near the southeastern corner of structure 39-56 from surface soil immediately adjacent to the storage area, and the other sample was collected 15 ft north from soil closest to the asphalt pad. Based on the Phase I RFI data, which showed PCBs, lead, and uranium above screening levels, the site was recommended for a voluntary corrective action (VCA) (LANL 1995, 046190, p. 4-20).

The VCA was conducted at this site in 1995. Before the start of the VCA, two additional areas of potential contamination associated with structure 39-56 were identified. The first was located on the southwest corner of the building and consisted of oil-stained soil beneath an air compressor. The second area was located on the west side of the building and consisted of a small area contaminated with depleted uranium. Because the areas were small and distinct, they were addressed as part of the VCA conducted at AOC 39-002(c). The VCA consisted of soil removal and confirmation sampling in four localized areas, the two RFI sampling locations and the two additional areas identified during the walkover of the site before the commencement of the remedial activities (LANL 1996, 054401, p. 1). Following soil removal, two confirmation samples were collected from each of the four excavated areas and the excavations were backfilled with clean fill.

2.2.3.3 Data for AOC 39-002(c)

Decision-level results are summarized in Tables 2.2-7 to 2.2-8. Sample locations with decision-level data are presented in Figures 2.2-10 to 2.2-11.

2.2.3.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. The CSM for storage areas is shown in Figure 1.2-2. The remaining data issues for this site include nature and extent of contamination after current firing site operations cease.

2.2.4 SWMU 39-004(c), Firing Site

SWMU 39-004(c) is an active firing site and active operating RCRA OD site (structure 39-06) subject to RCRA closure requirements and not Consent Order requirements. The site map for SWMU 39-004(c) is presented in Figure 2.2-12.

2.2.4.1 Background and Operational History

SWMU 39-004(c) is an active firing site and active operating RCRA OD (structure 39-06) subject to RCRA closure requirements and not Consent Order requirements. This site is located in the southernmost western tributary of Ancho Canyon in the canyon bottom between an ephemeral stream, a steep hill slope to the north, and a steep hill slope to the south (Figure 2.2-12). This site is used for both experimental purposes and for treatment of hazardous waste by OD; use of this site began when TA-39 was established in 1953 as a remote test firing facility. The experiments conducted at this firing site are designed to expend all HE in the device.

2.2.4.2 Previous Investigations

The Phase I RFI at SWMU 39-004(c) was implemented in 1995 (ICF Kaiser Engineers 1997, 097812, p. 74). To determine potential contaminant dispersion and migration from an explosives site, the investigation was conducted in two segments: firing pad areas and transects from the firing pads along the adjacent hillsides and mesa top.

Preliminary sampling involved the collection of samples from within the physical boundary of the firing pad (within an approximate 100-ft-diameter circle). Radiation surveys and XRF screening were conducted at the firing pad as a guide to sample location selection. Sample locations were then selected, where possible, from the location of the two highest radiation and XRF survey locations. A total of four surface sample locations were selected from locations around the firing pad at SWMU 39-004(c) (LANL 2007, 098281).

Twenty samples were collected from 10 locations along the adjacent stream channel, north and east of the site. Typically, each location was sampled in two depth intervals. The first sample was collected from the surface (0–0.5 ft) and the second from the 0.5–0.83-ft interval (LANL 2007, 098281).

To characterize the extent of contamination dispersion beyond the firing pad, three transects were established at the site. Using the firing pad as the hub, the three transects were sampled outward to a distance of approximately 600 ft from the pad. In total, 17 samples were collected from 10 locations along transects at this site (Figure 2.2-13) (LANL 2007, 098281).

2.2.4.3 Data for SWMU 39-004(c)

Decision-level results are summarized in Tables 2.2-9 to 2.2-11. Sample locations with decision-level data are presented in Figures 2.2-14 to 2.2-16. Data indicate that inorganic chemicals, organic chemicals, and radionuclides are potential contaminants (ICF Kaiser Engineers 1997, 097812).

2.2.4.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. The CSM for firing sites is shown in Figure 1.2-1. The remaining data issues for this site include nature and extent of contamination after current firing site operations cease.

2.2.5 AOC 39-002(b), Storage Area

AOC 39-002(b) was previously used as a storage area and is currently an active SAA adjacent to a firing site support building (structure 39-06) and an active firing site [SWMU 39-004(c)]. The site location map for AOC 30-002(b) is presented in Figure 2.2-17.

2.2.5.1 Background and Operational History

AOC 39-002(b) was previously used as a storage area and is currently an active satellite waste accumulation area on a 5-ft × 5-ft concrete pad adjacent to a firing site support building (structure 39-06) and an active firing site [SWMU 39-004(c)] (Figure 2.2-17). This site lies within the testing hazard zones of SWMU 39-004(c). Nothing is stored here presently, but the area remains available for use as needed (LANL 1993, 015316, p. 5-16).

2.2.5.2 Previous Investigations

During the 1993 RFI, two surface samples were collected from two locations at AOC 39-002(b). One sample was collected from the closest point to the storage area (adjacent to the concrete pad) and the second sample was collected 10 ft northeast of the concrete pad in a localized drainage. PCBs and inorganic chemicals were detected in the samples collected (LANL 1995, 046190, p. 4-10).

2.2.5.3 Data for AOC 39-002(b)

Because the CST off-site data packages are not available to revalidate the 1993 RFI data for AOC 39-002(b), no historical data are presented for this site (LANL 2007, 098281).

2.2.5.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. The CSM for storage areas is shown in Figure 2.1-6. The remaining data issues for this site include nature and extent of contamination after current firing site operations cease.

2.2.6 SWMU 39-007(a), Storage Area

SWMU 39-007(a) is a former storage area located on a concrete pad under a covered porch outside the northeast corner of an equipment shelter (structure 39-63) at TA-39. The site map for SWMU 39-007(a) is presented in Figure 2.2-18.

2.2.6.1 Background and Operational History

SWMU 39-007(a) is a former storage area located on a concrete pad under a covered porch outside the northeast corner of an equipment shelter (structure 39-63) (Figure 2.2-18). The dates of operation of the storage area are unknown. Used oil, containing lead and solvents, was stored at this SWMU. The area around the concrete pad is relatively flat but slopes eastward to a local drainage near the adjacent road.

2.2.6.2 Previous Investigations

During the 1993 Phase I RFI, three surface samples (0–0.5 ft) were collected from three locations within a few feet of the concrete pad(LANL 1995, 046190, p. 4-32). One sample was collected at the southeast corner of the building, and two samples were collected from the area most likely to receive runoff from the pad. PCBs (Aroclor-1248, Aroclor-1254, and Aroclor-1260) were detected at the site, and a VCA was recommended in the 1995 RFI report(LANL 1995, 046190, p. 4-36).

A VCA was conducted at this site in 1995 to remediate PCB contamination detected during the 1993 Phase I RFI (LANL 1996, 053786, p. 1). A portion of the site was excavated, and confirmation samples were collected within and adjacent to the excavated area. Confirmation sampling results showed that PCB contamination was still present above PRGs; additional excavation was conducted in the localized area. Confirmation samples were collected following the second excavation at the site, and these sample results show that the VCA was successful, resulting in PCB concentrations less than 1.0 mg/kg at the site (LANL 1996, 053786, p. 2). Following the VCA, the site was backfilled and seeded with native grasses.

In 2001, five surface soil samples were collected from five locations (LANL 2001, 084329, p. 2-4; LANL 2001, 084330, p. 2-4). PCBs were detected in the sampling data. Documentation is not available for this investigation; however, these samples were collected at this SWMU and the analytical results are presented in the data tables.

2.2.6.3 Data for SWMU 39-007(a)

Fourteen soil and fill samples were collected from SWMU 39-007(a) in 1995. All samples were analyzed for inorganic chemicals, and analytical results show that antimony, cadmium, calcium, copper, mercury, and zinc were detected at greater than BVs in at least one sample. Five surface samples were analyzed for PCBs in 2001, and Aroclor-1254 and Aroclor-1260 were detected. Decision-level results are summarized in Tables 2.2-12 and 2.2-13. Sample locations with decision-level data are presented in Figures 2.2-19 to 2.2-20.

2.2.6.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. A general CSM for storage areas is provided in Figure 1.2-2, including SWMU 39-007(a) based on site conditions, operational history, and previous investigations. Contaminants are subject to release to secondary sources or exposures to receptors as follows.

- Excavation to surface soils: Release of contaminants during excavation was not evaluated in the RFI because only surface samples (0–6 in.) were collected. None of the contaminants detected are expected to migrate due to surface-water intrusion.
- Erosion, runoff, and contamination of downstream soil and sediment: This release mechanism was evaluated in the RFI at the edge of the concrete pad most likely to receive runoff from the site. PCBs were detected at the site, and a VCA was conducted in 1995 to remove the PCB contaminated soil.
- Leaching and infiltration to groundwater: This release mechanism was not evaluated; however, review of current FY 2006 groundwater-monitoring data (LANL 2007, 095364, p. 7-1 to 7-7) indicates no contamination of the regional aquifer in the vicinity beneath or downgradient of TA-39 attributable to sources there, as discussed previously for SWMU 39-001(b).
- Based on this evaluation, releases to the environment have occurred from the SWMU 39-007(a) storage area. Depth of contamination and potential contamination outside the boundary of the RFI sampling limits have not been determined. Before the VCA in 1995, the PCB and arsenic concentrations exceeded screening levels in the surface soil (0–6 in.). While confirmation samples were taken during and after the VCA, the total depth and horizontal extent of the contamination have not been determined. Therefore, data issues remaining for this site include nature and extent of contamination.

2.2.7 AOC 39-007(d), Storage Area

AOC 39-007(d) is an active storage area (structure 39-142). The site location map for AOC 39-007(d) is presented in Figure 2.2-21.

2.2.7.1 Background and Operational History

AOC 39-007(d) is a storage area (structure 39-142) consisting of a bermed asphalt pad covered with a metal roof located at the south end of Subaggregate Area 2 (Figure 2.2-21). A valved drainpipe discharges stormwater from the bermed area across the access road toward the Ancho Road drainage. The storage area was initially used for storage of metal and an occasional drum of silicon transformer oil. Later, it became an SAA where chemicals were stored at the site including dielectric fluid, ethylene glycol, solvents, and kerosene. The SAA was removed in the 1990s (exact date unknown). But the storage area continues to be used for the storage of nonhazardous materials, such as cable and wire. A valved drainpipe discharges stormwater from the bermed area across the access road toward the Ancho Road drainage (LANL 1993, 015316, p. 5-20)

2.2.7.2 Previous Investigations

In 1993, five surface soil samples were collected and submitted to an off-site analytical laboratory for analysis of organic chemicals, inorganic chemicals, and radionuclides (LANL 1995, 046190, p. 4-37). No inorganic chemicals were detected above BVs. One organic chemical was detected. One radionuclide was detected above FV.

2.2.7.3 Data for AOC 39-007(d)

Because the CST off-site data packages are not available to revalidate the 1993 RFI data for AOC 39-007(d), no historical data are presented for this site (LANL 2007, 098281).

2.2.7.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. A general CSM for storage areas is provided in Figure 1.2-2, including 39-007(d) based on site conditions, operational history, and previous investigations. Contaminants are subject to release to secondary sources or exposures to receptors as follows.

- Erosion, runoff, and contamination of downstream soil and sediment: This pathway was evaluated in the 1995 RFI through collection of samples at the edge of the asphalt pad and downgradient of the storage area(LANL 1995, 046190, pp. 4-37 to 4-40). If releases of contaminants from storage containers occurred, surface-water flow could transport contaminants to downstream soils and sediment.
- Excavation to surface soils: This pathway was not evaluated in the 1995 RFI (LANL 1995, 046190, p. 4-637 to 40); however, some of the contaminants identified at the site may be fairly mobile in the environment. Therefore, characterization of the distribution of potential contaminant vertically is required.
- Leaching and infiltration to groundwater: This release mechanism was not evaluated; however, review of current FY 2006 groundwater-monitoring data indicates no contamination of the regional aquifer in the vicinity beneath or downgradient of TA-39 attributable to sources there, as discussed previously for SWMU 39-001(b).

Based on the RFI, releases to the environment have not likely occurred from the AOC 39-007(d) storage area. However, because the data were not available to revalidate the 1993 RFI data, investigation is warranted(LANL 2007, 098281). Therefore, data issues for this site include the nature and extent of contamination.

2.3 Subaggregate Area 3: Southern Section of North Ancho Canyon Aggregate Area

Figure 2.3-1 shows the location of Subaggregate Area 3 and the associated SWMUs and AOCs. The SWMUs and AOCs in Subaggregate Area 3 include SWMUs 39-001(a), 39-002(a), 39-005, and 39-006(a), and AOC 39-002(e).

2.3.1 SWMU 39-005, Former HE Seepage Pit

SWMU 39-005 was a HE seepage pit used for the disposal of HE-contaminated decant from operations at an explosives operations building (39-4). The site location map for SWMU 39-005 is shown in Figure 2.3-1.

2.3.1.1 Background and Operational History

SWMU 39-005 is the site of a former HE seepage pit used for the disposal of HE-contaminated decant from operations at an explosives operations building (building 39-04) (Figure 2.3-1). The seepage pit measured about 5 ft × 5 ft × 7 ft. The bottom was not lined or otherwise contained. The gravel and HE-contaminated soil that comprised the pit were removed in 1986 (LANL 1993, 015316, p. 5-42).

2.3.1.2 Previous investigations

An RFI was conducted at SWMU 39-005 in 1993(LANL 1995, 046190, p. 4-66). Although the seepage pit had been removed, the area was sampled to ensure that no residual HE materials were present. Because the precise location of the former pit was not known, samples were collected from the location thought to have been the most likely site of the pit and from a location downgradient of the presumed location. Two locations were sampled at 3-ft intervals down to a depth of 12 ft, for a total of 10 samples. These samples were analyzed for HE. No HE was detected in any of the samples collected at this site (LANL 1995, 046190, p. 4-66).

2.3.1.3 Data for SWMU 39-005

Because the CST off-site data packages are not available to revalidate the 1993 RFI data for SWMU 39-005, historical data are not available for this site (LANL 2007, 098281).

2.3.1.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. Figure 2.3-3 shows the CSM for liquid release sites, including SWMU 39-005 based on site conditions, operational history, and previous investigations. Contaminants are subject to release to secondary sources or exposures to receptors as follows.

- Erosion, runoff, and contamination of downstream soil and sediment: It is unlikely that contaminants discharged to a seepage pit would be affected by surface-water runoff unless flooding conditions were present, allowing HE contaminated materials to be transported with or dissolved into flood water.
- Leaching and sorption and contamination of soil: This is the primary release mechanism in which contaminants in the seepage pit water would enter the environment. Seepage pit water will slowly percolate into the soil, making up and surrounding the pit, and will sorb to soil within and adjacent to the seepage pit.
- Leaching and infiltration to groundwater: Review of current FY 2006 groundwater-monitoring data indicates no contamination of the regional aquifer in the vicinity beneath or downgradient of TA-39 attributable to sources there, as discussed previously for SWMU 39-001(b). Therefore, it is not necessary to evaluate this release pathway (LANL 2007, 095364, p. 7-1).
- Excavation to surface soil: Releases of contaminants during excavation by future workers is a potentially complete exposure pathway.
- Release of contaminants by burrowing, biological uptake, or other ecological exposure routes: Release of contaminants by biota is a potentially complete exposure pathway; however, the depth of the contamination should be determined before concluding that this is a complete exposure pathway (e.g., burrowing animals will typically burrow to depths of 6 ft).

Because the data were not available for validation, major data issues remaining for this site include nature and extent of contamination. A thorough investigation of SWMU 39-005 is proposed because the 1993 characterization efforts were insufficient to adequately determine the location of and the potential for migration of contaminants from the HE seepage pit. In addition, the data are not available for validation.

2.3.2 SWMU 39-001(a), Landfill

SWMU 39-001(a) is an inactive landfill east and north of the light gas-gun facility (building 39-69). The site location map for SWMU 39-001(a) is shown in Figure 2.3-2.

2.3.2.1 Background and Operational History

SWMU 39-001(a) is an inactive landfill consisting of two disposal pits located east and north of the light gas-gun facility (building 39-69) (Figure 2.3-2). The exact boundaries of the pits are unknown, but it is believed that each pit measures approximately 80 ft × 20 ft × 10 ft deep. Interviews of site workers indicate that the landfill was used for disposal from 1953 to 1979 (LANL 1993, 015316, p. 5-2). Portions of the pits may be covered by building 39-69 and a concrete pad east of the building. Materials disposed of in the pits include firing site debris, empty chemical containers, and office waste.

2.3.2.2 Previous Investigations

A series of geophysical and radiation surveys were conducted over the disposal pit locations SWMU 39-001(a) in 1993 (LANL 1997, 055633, p. 5-2). The most probable location of the disposal pits was estimated using data compiled from historical documents, surface radiation surveys, and the geophysical surveys. Survey results indicated that this site may be an amorphous disposal area and not two specific disposal pits. During the 1994 RFI, two separate field activities were initiated to determine if contaminants had migrated from the disposal area. The first of these activities consisted of sampling in the adjacent stream channel and surrounding area. The second activity involved the installation of vertical monitoring wells upstream and downstream of the landfill. The data collected during the 1993 field activities guided subsequent RFI activities conducted in 1994, which consisted of surface and subsurface sampling from angle and vertical boreholes, trenching and sampling within the landfill area, and installing three monitoring wells in and around SWMU 39-001(a). In 1996, seven test pits were excavated in the area north and northeast of building 39-69 to depths between 12 and 15 ft bgs, samples were collected, and the pits were backfilled. No evidence of waste was observed in three of the test pits (LANL 1997, 055633, pp. 5-13 to 5-23).

2.3.2.3 Data for SWMU 39-001(a)

The results of the 1994 and the 1996 field activities were summarized in the RFI report (LANL 1997, 055633, pp. 5-13 to 5-29)and are provided in Tables 2.3-1 to 2.3-3. Sample locations with decision-level data are presented in Figures 2.3-3 to 2.3-5. Organic chemicals including DDE[4,4'-], DDT[4,4'-], methoxychlor[4,4'-], trimethylbenzene[1,2,4-] and trimethylbenzene[1,3,5-], di-n-butylphthalate, and Aroclor-1254 were detected. The analytical results indicated that europium-152 (soil BV/fallout value [FV] not available) was detected. Uranium-238 was detected above BVs in one location. Analytical results indicated that antimony, cadmium, copper, total cyanide, mercury, silver, total uranium, and zinc were detected above BVs in at least one sample (LANL 2007, 098281).

2.3.2.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. Figure 1.2-3 shows the CSM for buried materials, including SWMU 39-001(a), based on site conditions, operational history, and previous investigations. COPCs in buried waste are potentially subject to release to secondary sources or exposures to receptors, as follows.

- Erosion, runoff, and contamination of downstream soil and sediment: This release mechanism was evaluated in the RFI by sampling two stream channels and two stream-bank biased locations, which were determined to not contain COPCs. However, COPCs were detected above background in soil samples from the downgradient monitoring well locations 400 ft south of the landfill, including cyanide, mercury, and uranium (LANL 1997, 055633, pp. 5-13 to 5-23).

- Ancho Canyon surface-water flow is monitored at the base-flow station, Ancho at Rio Grande: The Ancho Canyon watershed shows no apparent impact from Laboratory activities conducted at technical areas within and around the Ancho Canyon watershed (LANL 2006, 094043).
- Leaching and sorption and contamination of soil and sediment: This release mechanism was evaluated in the RFI using five boreholes angle-drilled at 45 degrees with a run length of 80 ft under the landfill. Samples collected from 10-ft core intervals were determined to not contain COPCs (LANL 1997, 055633, pp. 5-13 to 5-23).
- Leaching and infiltration to groundwater: This release mechanism was evaluated in the RFI by completing three boreholes as monitoring wells. No saturated zone was intercepted in any of the wells. Review of current FY 2006 groundwater-monitoring data indicates no contamination of the regional aquifer in the vicinity beneath or downgradient of TA-39 attributable to sources there, as discussed previously for SWMU 39-001(b). Therefore, it is not necessary to evaluate this release pathway (LANL 2007, 095364).
- Volatilization to the atmosphere: This release mechanism was evaluated by trenching through the landfill contents and sampling for VOCs. No VOCs were detected (LANL 1997, 055633, pp. 5-13 to 5-23).
- Releases of contaminants during excavation were evaluated by comparing landfill contents samples with BVs. Samples were determined to contain COPC above BV and FV (LANL 1997, 055633, pp. 5-13 to 5-23).
- Release of contaminants by burrowing, biological uptake, or other ecological exposure routes were not evaluated in the RFI report (LANL 1997, 055633, pp. 5-13 to 5-23).

Based on this evaluation, no significant releases to the environment from the landfill have occurred. Evaluation of contaminant transport in erosion and runoff was limited to only four samples, but contamination from the landfill would be difficult to discern from contamination originating upstream. Visual evidence indicates no significant erosion of the soil cover.

The majority of the RFI results are not decision level based on the HIR data assessment (LANL 2007, 098281). To expedite remediation of the landfill excavation of materials, it was proposed that waste characterization, waste disposition and confirmation sampling should be conducted concurrently (section 4.0).

2.3.3 AOC 39-002(e), Storage Area

AOC 39-002(e) is a former SAA with no known releases of contaminants. The site location map of AOC 39-002(e) is presented in Figure 2.3-6.

2.3.3.1 Background and Operational History

AOC 39-002(e) is a former SAA located at the south end of the gas-gun facility (building 39-69) on a concrete pad under a breezeway that connects building 39-69 to building 39-89, a gas-gun support building (Figure 2.3-6). Waste materials from gas-gun experiments, including aluminum, lead, carbon dust, ethanol, brass, paraffin, stainless steel, quartz, nylon, WD-40, Gunk, Polaroid film, and Fantastik cleaner, were stored in this location ((LANL 1993, 015316, p. 5-18). This SAA was removed and this area ceased being used for storage.

2.3.3.2 Previous Investigations

During a 1993 RFI (LANL 1995, 046190, p. 4-24), two surface samples were collected from two locations from the unpaved drainage area closest to the site. Samples were sent to a laboratory and analyzed for inorganic chemicals, organic chemicals, PCBs, radionuclides, HE, and total petroleum hydrocarbons (TPH). No PCBs or HE were detected. Lead and uranium were detected above BVs.

2.3.3.3 Data for AOC 39-002(e)

All analytical data were deemed to be screening-level quality; therefore, no historical data are presented for AOC 39-002(e) (LANL 2007, 098281).

2.3.4 SWMU 39-002(a), Storage Area

SWMU 39-002(a) consists of three areas of interest: an inactive outdoor storage area (Area 1), an inactive indoor SAA (Area 2), and an active outdoor SAA and holding/receiving area (Area 3). The site location map for SWMU 39-002(a) is shown in Figure 2.3-7.

2.3.4.1 Background and Operational History

SWMU 39-002(a) consists of three areas of interest.

Area 1 was an outdoor storage area located adjacent to the northwest corner of building 39-02 (Figure 2.3-7). The storage area measured approximately 25 ft × 30 ft and was unpaved and not protected by any type of roof or walls; the storage area was bounded by various structures on the north, south, and east and an asphalt ramp was located in the east-central portion of the storage area (LANL 2007, 098281). This site was used for approximately 10 yr. At one time, this site contained a 30-gal. drum that held small quantities of solvents and adhesives along with rags and paper wipes contaminated with solvents or adhesives. Solvents accumulated at this site included acetone and ethanol. The area was also used to store lead-containing materials and damaged capacitors and transformers that may have contained PCBs. The area has not been used for waste accumulation since 1993 (LANL 2007, 098281).

Area 2 was an indoor SAA (inside Room 18-A of building 39-02) that has been removed. It was in use for approximately 10 yr and stored waste chemicals from photographic processing. There are no known or documented releases associated with this SAA. Because the site was located inside a building, there was no potential for a release to the environment (LANL 2007, 098281).

Area 3 was an outdoor SAA and holding/receiving area located on the asphalt driveway at the north end of the loading dock on the southeast side of building 39-02. This area is no longer used for waste storage (LANL 2007, 098281).

2.3.4.2 Previous Investigations

During the 1993 Phase I RFI, five samples were collected from two locations in Area 1 (LANL 1995, 046190, p. 4-2). Area 2 was not sampled because it was located inside an office/laboratory building, (building 39-02). Area 3, located on asphalt pavement, was not sampled because it was being used for product storage. The results for the samples collected from Area 1 showed inorganic chemicals, SVOCs, HE, and radionuclides. This site was recommended for corrective action in the 1995 RFI report (LANL 1995, 046190, p. 4-10).

As part of preliminary fieldwork for the VCA, the site was resampled in 1995 for inorganic chemicals and total uranium (LANL 1997, 056758, p. 3). Twenty-five locations were sampled at multiple depths and the samples were field screened using XRF. In addition, two surface soil samples were collected and submitted to a fixed analytical laboratory. The results from these samples did not reproduce the inorganic chemical and total uranium results from the 1993 Phase I RFI (LANL 1997, 056758, p. 3). As a result, the proposed VCA activities included further site characterization to more clearly define the nature and extent of potential contamination at the site (LANL 1997, 056758, p. 4).

In 1997, as part of the VCA activities, a sampling grid was established over the site. Soil samples were collected from the center of each grid at a depth of 0–0.5 ft bgs for a total of nine samples from nine locations. Three additional locations were sampled at a depth of 1–1.5 ft bgs (LANL 1997, 056758, p. 17).

2.3.4.3 Data for SWMU 39-002(a)

Decision-level data from previous investigations are summarized in Tables 2.3.4 to 2.3.6. Sample locations with decision-level data are presented in Figures 2.3-8 to 2.3-10. Analytical results indicated that antimony, cadmium, copper, lead, mercury, nickel, silver, thallium, total uranium, and zinc were detected at greater than BVs in at least one sample. Analytical results indicate that 19 PAHs were detected in the majority of the surface samples collected at Area 1. Amino-2,6-dinitrotoluene[4-], bis(2 ethylhexyl)phthalate, tetryl, di-n-butylphthalate, and 2,4,6-trinitrotoluene (TNT) were each detected in one sample. Di-n-butylphthalate was also detected at three locations. Aroclor-1254 was detected at concentrations below 1 mg/kg in 11 samples from 11 locations. TPH-diesel range organic (DRO) was detected in all 14 samples. Uranium-238 was detected at concentrations above BV two locations (LANL 1995, 046190, pp. 4-1 to 4-10; LANL 1997, 056758).

2.3.4.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. A general CSM for storage areas is provided in Figure 1.2-2, including 39-002(a) based on site conditions, operational history, and previous investigations. Figures 2.3-8 to 2.3-10 show detections of organic chemicals, inorganic chemicals, and radionuclides above BVs in samples collected at the perimeter of the sampling area and at maximum sampling depths, indicating that the areal and vertical extent of contamination in soils were not completely determined (LANL 2007, 098281). Contaminants are subject to release to secondary sources or exposures to receptors as follows.

- Excavation to surface soil: This pathway was not evaluated in the 1995 RFI. Therefore, characterization of the distribution of potential contaminant vertically is required (LANL 1995, 046190, pp. 4-1 to 4-10).
- Erosion, runoff, and contamination of downstream soil and sediment: This pathway was evaluated in the 1995 RFI by sampling surface soil. Evaluation of the horizontal extent of potential contamination is required (LANL 1995, 046190, pp. 4-1 to 4-10).
- Leaching and infiltration to groundwater: This release mechanism was not evaluated; however, review of current FY 2006 groundwater-monitoring data indicates no contamination of the regional aquifer in the vicinity beneath or downgradient of TA-39 attributable to sources there, as discussed previously for SWMU 39-001(b) (LANL 2007, 095364, p. 7-1).

Based on the RFI, it was determined that releases to the environment have occurred from the SWMU 39-002(a) storage area. Depth of contamination and potential contamination outside the boundary of the RFI sampling limits have not been determined. Therefore, data issues for this site include the nature and extent of contamination.

2.3.5 SWMU 39-006(a), Septic System

SWMU 39-006(a) consists of an outfall, an inactive septic tank (structure 39-12); an inactive chemical seepage pit; an inactive sand filter; an active septic system (structure 39-104), operating under a permit; an active sand filter that replaced the inactive septic system; and an active outfall. The site location map for SWMU 39-006(a) is shown in Figure 2.3-11.

2.3.5.1 Background and Operational History

SWMU 39-006(a) consists of an outfall, an inactive septic system (structure 39-12), a chemical seepage pit, an active septic system (structure 39-104), and an active sand filter that replaced the inactive septic system (Figure 2.3-11). The inactive septic system was constructed in 1952 and was connected only to building 39-02, which housed offices, a laboratory, and a shop (LANL 1993, 015316, p. 5-40).

SWMU 39-006(a) is an 1800-gal. reinforced concrete septic tank (structure 39-12), associated drainlines, and an inactive subsurface sand filter that was constructed to dispose of photographic-processing chemicals. The tank was connected to the now inactive sand filter by approximately 260 ft of VCP, which discharged to an outfall in Ancho Canyon. The sand filter is adjacent to the east side of the ephemeral stream channel in an open area south of the new (active) septic tank (structure 39-104) (LANL 2007, 098281).

Photographic-processing chemicals were routinely disposed of into the system at a rate of about 65 gal./yr, which eventually caused it to malfunction. To correct the problem, a separate seepage pit for the photographic-processing chemicals was put into use in 1973. The chemical seepage pit was an open pit approximately 12 ft deep and filled with cobble. A corrugated pipe approximately 1 ft in diameter runs vertically through the center of the seepage pit. This seepage pit handled approximately 75 gal. of photographic wastes per year until 1992 (LANL 2007, 098281).

Septic tank 39-12 was enlarged at this time, and a new subsurface sand filter was installed on the south side of State Highway 4. Use of the old sand filter was discontinued at that time. By 1978, the new sand filter became clogged and was replaced. In 1985, use of septic tank 39-12 was discontinued. Waste was removed from the tank, and the tank was filled with sand. A new 2500-gal. precast concrete septic tank (structure 39-104) and drainline were installed, with the new drainline running through the original tank (structure 39-12). This new septic system serves several buildings at TA-39 in addition to building 39-02. At the same time, the sand filter south of State Highway 4 was redesigned and replaced, which was the second sand filter replacement in 12 yr. New piping was added (the 4-in. line under State Highway 4 was retained to avoid tearing up the road, and the new pipe was tied into the existing line). In approximately 1989, the outfall from the new sand filter was plugged, eliminating the discharge into the canyon (LANL 1995, 046190, pp. 4-41 to 4-45).

2.3.5.2 Previous Investigations

During the 1993 RFI, each of the components of this SWMU was sampled (LANL 1995, 046190, pp. 4-41 to 4-66). The active and inactive sand filters were sampled in three locations at three depths (0–0.5 ft, 4 ft, and 6 ft) along the center line of the sand filter, resulting in a total of nine samples collected from each sand filter. The active septic tank (structure 39-104) was sampled by drilling a borehole adjacent to and downgradient of the tank. Samples were collected from three depths: at the surface (0–1.5 ft.) and at 9 ft and 11 ft bgs.

The inactive septic tank (structure 39-12) is partially underneath building 39-100, and the active sewer line to septic tank 39-104 runs through the inactive tank, which prevented sampling the tank contents.

Four surface samples were collected from four locations, and one borehole was drilled and two additional samples were collected from 9 ft to 11 ft (LANL 2007, 098281).

The outfall was sampled at two locations in the drainage channel: 6 ft and 15 ft south of the discharge point. Outfall samples were collected from both the surface soil and from 4 ft bgs in the drainage channel (LANL 2007, 098281).

The chemical seepage pit is filled with cobble; sampling was conducted using a combination of surface and borehole sampling. Surface samples were collected from three locations, approximately 10 ft south, east, and north of the discharge pipe in the center of the seepage pit. Boreholes were drilled at these three locations, and subsurface samples were collected from depths of 3 ft, 6 ft, 9 ft, and 12 ft bgs (LANL 1995, 046190, p. 4-67).

In October 1995, a borehole was advanced through the center of culvert pipe in the chemical seepage pit (ICF Kaiser Engineers 1995, 062968). Two samples were collected from two depth intervals (11.29-12.83 ft bgs and 12.83–15.33 ft bgs) beneath the concrete plug at the bottom of the seepage pit at location 39-01474. In response to an NMED notice of disapproval, a borehole was advanced adjacent to inactive septic tank 39-02, and samples were collected to determine if there had been a release from the septic tank (EPA 1995, 052268; LANL 1996, 054333).

2.3.5.3 Data for SWMU 39-006(a)

A majority of the CST off-site data packages are not available to revalidate the 1993 RFI data for SWMU 39-006(a). The only data presented are for the two samples collected beneath the chemical seepage pit in 1995 and the data for the sample collected in 1996 adjacent to the inactive septic tank. Decision-level data are summarized in Tables 2.3-7 to 2.3-8. Sample locations with decision level data are presented in Figures 2.3-12 to 2.3-13. In the two samples collected beneath the chemical seepage pit, data indicate antimony, mercury, and thallium were detected, but the detection limits were greater than the range of the background concentrations. Cadmium was detected at concentrations above BV but less than the maximum soil background concentration. Silver was detected at concentrations above the range of the background concentrations; however, silver concentrations did decrease with depth. In the sample collected from 8 to 9 ft bgs adjacent to the septic tank, benzene and phenol were detected at low levels. Additionally, historical level data indicate that PCBs were detected within the inactive sand filter (LANL 2007, 098281).

2.3.5.4 Conceptual Site Model

The general CSM for the North Ancho Canyon Aggregate Area is discussed in section 1.2. Figure 1.2-4 shows the CSM for liquid release sites, including SWMU 39-006(a) based on site conditions, operational history, and previous investigations. Contaminants are subject to release to secondary sources or exposures to receptors as follows.

- Erosion, runoff, and contamination of downstream soil and sediment: This release mechanism was evaluated in the RFI only for the outfall. Contaminants discharged below grade at the septic tanks, sand filters, and chemical seepage pit would not be affected by surface-water runoff (LANL 1995, 046190, pp/ 4-41 to 4-46).
- Leaching and sorption and contamination of soil and sediment: This release mechanism was evaluated in the RFI by boreholes outside the SWMU 39-006(a) inactive septic tank and chemical seepage pit. Samples were not collected outside the inactive sand filters. Silver and di-n-butylphthalate were detected in soil outside the limits of the chemical seepage pit. No samples were collected along the inactive VCP drainline (LANL 1995, 046190, pp. 4-41 to 4-61).

- Leaching and infiltration to groundwater: This release mechanism was not evaluated; however, review of current FY 2006 groundwater-monitoring data indicates no contamination of the regional aquifer in the vicinity beneath or downgradient of TA-39 attributable to sources there, as discussed previously for 39-001(b) (LANL 2007, 095364, p. 7-1).
- Volatilization to the atmosphere: This release mechanism was evaluated by sampling for VOCs (LANL 1995, 046190, pp. 4-41 to 4-46).
- Excavation to surface soil: Releases of contaminants during excavation were evaluated by sampling at depth. Inorganic chemicals and organic chemicals were detected in the inactive sand filter and the septic tank (LANL 1995, 046190, pp. 4-41 to 4-46).

Based on this evaluation, it was determined that release to the environment has occurred in liquid effluent discharges at the chemical seepage pit. Depth of contamination and potential contamination outside the pit have not been determined. The cobble rock inside the pit has not been sampled. The drainline that connects to the pit has not been investigated.

PCBs were detected within the inactive sand filter in samples collected at 6 ft bgs. The depth of contamination inside the inactive sand filter and potential contamination outside the filter has not been determined. Inactive septic tank contents have not been sampled, neither has the subsurface beneath the tank. The VCP connecting the septic tank and sand filter was not investigated.

The majority RFI results are not considered decision-level based on the HIR data assessment. Data issues remaining for this site therefore include nature and extent of contamination. To expedite remediation of the landfill excavation of wastes, it is proposed that waste characterization, waste disposition and confirmation sampling should be conducted concurrently (section 4.0).

2.4 SWMUs and AOCs for Which NFA Has Been Approved

The sites described below are not proposed for investigation under this investigation work plan based on their approved NFA status or their having been removed from the Module VIII of the HWFP. SWMUs and AOCs included in this section are SWMUs 39-003 and 39-006(b), and AOCs 39-002(g), 39-007(b), 39-007(c), 39-007(e), and 39-009. The locations of these sites are presented in Figures 2.1-1, 2.2-1, and 2.3-1.

2.4.1 AOC 39-002(g), Storage Area

2.4.1.1 Site Description

AOC 39-002(g) is a former SAA formerly located inside of building 39-98, which is an active shop. This storage area has been removed.

- 1993: AOC 39-002(g) was proposed for NFA in the OU 1132 RFI work plan (LANL 1993, 015316, p. 6-3).
- 1994: EPA approved the OU 1132 RFI work plan and the NFA proposal (EPA 1994, 042818).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 088464).

2.4.2 SWMU 39-003, Incinerator

2.4.2.1 Site Description

SWMU 39-003 is a former incinerator that was located between the south wall of building 39-02 and the south perimeter security fence. The incinerator was used to burn office waste only from 1955 to 1977. In 1977, the incinerator was removed and buried in one of the TA-39 landfill pits. SWMU 39-003 was never used to manage RCRA solid or hazardous wastes and/or constituents.

- 1995: SWMU 39-003 was proposed for removal from the permit in the March 1995 Request for Permit Modification (LANL 1995, 045365).
- 1998: NMED removed SWMU 39-003 from Module VIII of the Hazardous Waste Facility Permit on December 23, 1998 (NMED 1998, 063042).

2.4.3 SMWU 39-006(b), Septic System

2.4.3.1 Site Description

SWMU 39-006(b) is an active septic system that serves building 39-111 (the Pulsed Power Assembly Building) and was part of the original construction of the building in 1989. It is located northwest of building 39-111 and consists of a 1000-gal. reinforced concrete septic tank (structure 39-132), a distribution box, and a leach field.

- 1995: SWMU 39-006(b) was proposed for removal from the permit in the March 1995 Request for Permit Modification (LANL 1995, 045365).
- 1998: NMED removed SWMU 39-006(b) from Module VIII of the Hazardous Waste Facility Permit on December 23, 1998 (NMED 1998, 063042).

2.4.4 AOC 39-007(b), Storage Area

2.4.4.1 Site Description

AOC 39-007(b) is a former temporary storage area.

- 1993: AOC 39-007(b) was proposed for NFA in the OU 1132 RFI work plan (LANL 1993, 015316, p. 6-3).
- 1994: EPA approved the OU 1132 RFI work plan and the NFA proposal (EPA 1994, 042818).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 088464).

2.4.5 AOC 39-007(c), Storage Area

2.4.5.1 Site Description

AOC 39-007(c) is a former storage area for blueprint machine fluid that was located in the former building 39-103. Both the machine and the stored fluids have been removed from this area.

- 1993: AOC 39-007(c) was proposed for NFA in the OU 1132 RFI work plan (LANL 1993, 015316, p. 6-4).
- 1994: EPA approved the OU 1132 RFI work plan and the NFA proposal (EPA 1994, 042818).

- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 088464).

2.4.6 AOC 39-007(e), Storage Area

2.4.6.1 Site Description

AOC 39-007(e) is a former storage area, consisting of an open-front metal shed measuring about 8 ft × 4 ft, located between Pits 2 and 3 of SWMU 39-001(b); it received hazardous waste inappropriate for disposal at the landfills. The entire structure was removed in the late 1980s.

- 1993: AOC 39-007(e) was proposed for NFA in the OU 1132 RFI work plan (LANL 1993, 015316, p. 6-4).
- 1994: EPA approved the OU 1132 RFI work plan and the NFA proposal (EPA 1994, 042818).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 088464).

2.4.7 AOC 39-009, Outfall

2.4.7.1 Site Description

AOC 39-009 consists of an outfall from building 39-69, that drained water used for cooling three pieces of equipment (a LASER power supply, a Stokes vacuum pump, and a diffusion pump). The cooling water, which comes from a potable water supply, circulated through cooling coils that are in contact with the three pieces of equipment. It discharged via the drainline onto the asphalt parking lot east of the building.

- 1993: AOC 39-009 was proposed for NFA in the OU 1132 RFI work plan (LANL 1993, 015316, p. 6-4).
- 1994: EPA approved the OU 1132 RFI work plan and the NFA proposal (EPA 1994, 042818).
- 2005: EPA confirmed the NFA status in a letter to NMED (EPA 2005, 088464).

3.0 SITE CONDITIONS

3.1 Current Site Usage

The North Ancho Canyon Aggregate Area comprises the former OU 1132 and includes TA-39 and portions of TA-49. Site conditions for the North Ancho Canyon Aggregate Area are summarized in this section, based on information provided in the HIR, the OU 1132 RFI work plan (LANL 1993, 015316), and the OU 1132 RFI reports (LANL 1995, 046190; LANL 1997, 055633). TA-39 is located in the southeast portion of the Laboratory. TA-39 was established in 1953 as a remote HE firing site for experiments related to equation-of-state research, shock wave phenomena, development of implosion systems, development and application of explosively produced pulses of electrical power, and production of high magnetic fields. There are five outdoor firing sites at TA-39, four of which are still active. In addition, there are two gas guns, a single-stage, and a two-stage. All of the facilities at TA-39 are in the lower section of the northern branch of Ancho Canyon.

The firing site experiments have generated most of the waste at this site. A significant portion of this waste has been disposed of in landfills on-site. Potential chemicals of concern include inorganic chemicals, organic chemicals, HE, and radionuclides. Mercury and depleted uranium are no longer used at this site. Two RFIs for the former OU 1132 were performed in 1995 and 1997 (LANL 1995, 046190;

LANL 1997, 055633). The majority of the results of sampling and analysis from these investigations are not currently considered to be decision-level quality data (LANL 2007, 098281).

North Ancho Canyon was not burned during the Cerro Grande fire of May 2000.

3.2 Surface Conditions and Topography

OU 1132 contains only one technical area, TA-39, which is located in the southeastern portion of the Laboratory and is bordered on the south by Bandelier National Monument (Figure 1.0-1). TA-39 covers about 3.8 mi^2 and ranges in elevation from 6300 to 6960 ft amsl. A number of canyons dissect the area, including Water Canyon, Ancho Canyon, and Indio Canyon. All of the TA-39 facilities are located in the north fork of Ancho Canyon. Most if not all of the disturbance associated with TA-39 activities (site development, open-air explosions, waste generation and disposal) has been in this canyon. Topographically, the area consists of the alluvial floodplain and hill slopes of North Ancho Creek, an intermittent stream. Figure 1.0-2 shows the local topography of TA-39.

The surface vegetation at TA-39 consists of species typical of the Rocky Mountain montane conifer forest. The dominant trees within the overstory vegetation of OU 1132 are one-seed juniper (*Juniperus monosperma*), piñon pine (*Pinus edulis*), and ponderosa pine (*Pinus ponderosa*). Dominant forbs and grasses include blue grama (*Eouteloua gracilis*), Mountain muhly (*Muhlenbergia montana*), snakeweed (*Guterrezia sarothrae*), and bitterweed (*Hymenoxys richardsonii*). In canyon bottom areas that have been disturbed by activity, the dominant vegetation includes several species characteristic of such environments, such as cheat grass (*Eromus tectorum*) and false tarragon sagebrush (*Allemisia dracunculus*). In the westernmost portions of the OU, near the boundary with TA-49, the north-facing slopes of Frijoles Mesa display an occasional Douglas fir (*Pseudotsuga menziesii*) and white fir (*Abies concolor*). At these higher elevations, ponderosa pine becomes the dominant overstory species (LANL 1993, 015316, p. 3-5). Within the OU there are an estimated 175 species of plants, 71 species of nesting birds, 22 species of mammals, and 8 species of reptiles and amphibians (LANL 1993, 015316, p. 3-6)

3.3 Surface Water

North Ancho Canyon is drained by several intermittent streams, which are tributaries of the main stream channel that eventually joins Ancho Canyon beyond the boundary of the aggregate area. Ancho Canyon joins the Rio Grande in White Rock Canyon. All North Ancho Canyon stream channels carry intermittent flow. When runoff does occur in these alluvial channels, it is produced by intense summer thunderstorms, as demonstrated in summer 1991, when roads and buildings at TA-39 were flooded. Other than these intermittently active stream channels, there are no other surface-water sources or accumulations at TA-39. Floodplain maps indicate that a floodplain does exist within Ancho Canyon (LANL 1993, 015316, p. 3-6).

Surface water is ephemeral in the North Ancho Canyon watershed. No springs are present in the watershed. Surface water in the North Ancho Canyon Aggregate Area consists of stormwater, snowmelt runoff, and spring flow in small drainages. This canyon contains flowing water during snowmelt and storm events. The following permanent gauging stations are located at the junction of North Ancho and South Ancho Canyons: E274 and E273 (LANL 2006, 093713, plate 1). The location of the gauging stations is presented in Figure 3.1-1.

Site-specific stormwater-runoff monitoring is conducted by the Federal Facility Compliance Agreement/Administrative Order for sites at site-monitoring area sampling locations. Site-specific monitoring is required for sites with a medium or high potential for constituents in surface water and/or sediment in stormwater runoff to migrate off the site and impact surface-water quality. Sites with an erosion matrix score between 40 and 60 are considered to have a medium potential. Sites with an erosion matrix score greater than 60 are considered to have a high potential. The specific sites monitored in North Ancho Canyon Aggregate Area that have erosion matrix scores greater than 60 are the firing sites SWMUs 39-004(a), 39-004(b), 39-004(c), 39-004(d), and 39-004(e).

Surface-water runoff and associated infiltration into soil are probably the most important hydrologic transport pathways at North Ancho Canyon Aggregate Area. HE, inorganic chemicals, and radionculides, which are the principal potential contaminants of concern at North Ancho Canyon Aggregate Area, are variably soluble and may be transported in surface water. The following six aspects of the surface hydrology at North Ancho Canyon Aggregate Area may be relevant to contaminant transport (EPA 1989, 008021):

- Location of surface-water runoff and associated sediment deposition
- Rates of soil erosion, transport, and sedimentation
- Effects of operational or fire disturbances on surface hydrology
- Relative importance of surface runoff versus infiltration as transport pathways in different soil types
- Solubility and sorption behavior of the potential contaminants of concern
- Ultimate fate of surface water at North Ancho Canyon Aggregate Area

Surface-water runoff, alluvial-water flow, and associated sediment transport represent key potential migration pathways by which contaminants may be transported off-site.

3.4 Hydrogeology

3.4.1 Perched Groundwater

The vadose zone of the Pajarito Plateau is very thick and consists mostly of Bandelier Tuff. The vadose zone of most interest is the unsaturated alluvium of the canyon bottoms because all of the North Ancho Canyon SWMUs and AOCs potentially affect this zone. Three exploratory boreholes (locations 39-1120, 39-1134, and 39-1135) ranging in depth from 25 to 126 ft were drilled in the vicinity of the two landfills [SWMUs 39-001(a) and 39-001(b)] during the 1997 RFI (LANL 1997, 055633, pp. 5-1 to 5-7) and completed as monitoring wells. No formation water has been observed in these wells, indicating that no perched-alluvial groundwater is present in these areas. However, saturated conditions were observed in three angled boreholes (ASC-15, ASC-16, and ASC-18) beneath SWMU 39-001(b), indicating a buried stream channel deposit that could potentially be a perched-intermediate groundwater body under the landfills (LANL 1997, 055633, p. 2-3). None of the other boreholes drilled to similar depths indicated saturated conditions; therefore, any perched intermediate groundwater is not likely extensive.

The following conditions are necessary to support perched groundwater (Collins et al. 2005, 092028, pp. 2-97 to 2-100).

- A surface source, either natural or anthropogenic, must exist, that supplies water to alluvial systems. The alluvial groundwater acts as storage for groundwater entering underlying bedrock units at high infiltration rates. There are no springs or other perennial sources of water present in North Ancho Canyon to supply the alluvial systems.
- In addition to high local infiltration rates, low-permeability barriers to downward vertical flow are required to induce perched groundwater. Deep, perched groundwater occurs most frequently in the Puye Formation and the Cerros del Rio basalt, but some of the thickest and/or most laterally

extensive zones involve units of the Bandelier Tuff. Perching horizons include a wide variety of layered geologic lithologies, including unfractured basalt flows; clay-rich interflow zones in basalt; buried soil and other fine-grained deposits in fanglomerate; clay-altered, tuffaceous sediment; and lake deposits. An alternative hypothesis is that the deepest perched water occurrences are a manifestation of complex groundwater flow within the phreatic zone at the top of the regional aquifer.

3.4.2 Regional Groundwater

The regional aquifer of the Pajarito Plateau is the groundwater zone most directly accessible to humans through municipal water-supply wells or springs issuing to the Rio Grande. Additionally, it is a major source of drinking water and agricultural water supply for northern New Mexico (Collins et al. 2005, 092028, p. 2-103; LANL 2006, 091698). The regional aquifer, extending throughout the Española Basin (an area of roughly 6000 km^2), consists of basin-fill sediments reaching a maximum thickness near the basin axis (>9800 ft in thickness, Cordell 1979, 076049, p. 61). The aquifer is predominantly composed of Santa Fe Group rocks, which are weakly consolidated basin-fill sediment more than 3000 m thick (Collins et al. 2005, 092028, 2-103).

Depths to the regional aquifer range from approximately 1300 ft bgs (along the western edge of the plateau) to 600 ft bgs (to the east). During installation of well R-31 within North Ancho Canyon, groundwater was encountered between 521 and 537 ft bgs (Vaniman et al. 2002, 072615). The location of well R-31 within North Ancho Canyon is depicted on Figure 3.1-1.

3.4.3 Infiltration

Surface-water infiltration is a potential mechanism for surface-contaminant migration into subsurface soil and tuff and eventually into perched or regional aquifers. In general, the hydrologic conditions on the surface and within the mesas of the Pajarito Plateau lead to slow, unsaturated flow and transport. The mesas shed precipitation as surface runoff to the surrounding canyons such that most deep infiltration occurs episodically following snowmelt. Much of the water entering the soil zone is lost through evapotranspiration. As a result, annual net infiltration rates for dry mesas are less than 10 mm/yr and are more often estimated to be on the order of 1 mm/yr or less. Flow is likely to be matrix-dominated as a result of the nonwelded to moderately welded tuffs with low water content that are located near the surface of the mesa (Collins et al. 2005, 092028, p. 2-89).

Anthropogenic discharges and surface disturbances resulting from Laboratory operations can drive infiltration rates higher in usually dry mesas. In some cases, multiple disturbances of mesa sites through liquid waste disposal, asphalt covers, and/or devegetation have caused mesa infiltration rates to temporarily increase to near-wet canyon levels. Fracture flow has occurred in a few instances beneath long-term liquid disposal sites with ponded conditions; however, fracture flow ceases once liquid releases stop. Infiltration rates return to low, near-background levels when the surface and vegetation return to normal conditions (Collins et al. 2005, 092028, p. 2-89).

3.5 Geology

Surface soil in North Ancho Canyon include those associated with mesa tops, canyon walls, and the canyon bottom. Eroded sediments are moved by stream flow and deposit along the stream banks during flooding events. The landfills [SWMUs 39-001(a) and SWU 39-001(b)] are in an area of historic sediment deposition. The mesa top soil is represented by the Hackroy and Nyjac series and range from 10 cm thick near the mesa edges to several feet thick near the centers of the mesas. Hackroy soils are classified as

Alfisols, in part reflecting the clayey subsurface horizon, and are described in “Soil Survey of Los Alamos County, New Mexico” as, “The surface layer of the Hackroy soils is a brown sandy loam, or loam, about 10 cm thick. The subsoil is a reddish brown clay, gravelly clay, or clay loam about 20 cm thick. The depth to tuff bedrock and effective rooting depth is 20–50 cm” (Nyhan et al. 1978, 005702). Typic Eutroboralfs, fine-loamy soil consists of deep, well-drained soil that formed in material weathered from tuff. Intermixed with the Hackroy soil on the mesa tops are small areas of deeper loams of the Nyjack series and patches of bedrock. The Nyjack soil is texturally similar to Hackroy soil but is thicker (2–4 ft) and frequently exhibits pumice fragments in the lower levels. Soil texture, depth, and degree of development will vary according to distance from canyon walls (LANL 1993, 015316, p. 3-12).

Canyon walls adjacent to the firing sites may be very steep with no soil accumulation or less steep with colluvium, undeveloped soil material deposits interspersed among large blocks of Bandelier Tuff sloughed from the canyon walls. Canyon bottom soil is poorly developed and is typical of the deep, well-drained Tolavi series having a gravelly loamy-sand or sandy-loam texture.

The canyon and its tributaries contain alluvium of varying thickness. Some subsurface data on the long-term history of the canyon bottom sediment were obtained from examining cores obtained from the landfill areas during the 1997 RFI (LANL 1997, 055633, pp. 5-1 to 5-86). Data indicate the presence of very old sediment buried beneath part of the canyon bottom and relatively long-term stability of much of the canyon bottom, indicating a tendency for net deposition of sediment and relatively little potential for deep scour and significant channel migration over short time periods (tens to hundreds of years).

Geological units encountered in the well R-31 installation include, in descending order, alluvium; the Otowi Member of the Bandelier Tuff including the basal Guaje Pumice Bed; sediment beneath the Bandelier Tuff; lavas, interflow units, and subflow deposits of the Cerros del Rio volcanic field; and deposits of the Puye Formation including both fanglomerates and river gravels. The alluvium in R-31 extended from 0 to 24 ft bgs and consists of detritus derived from the Bandelier Tuff and from lava domes of predominantly dacitic composition in the Tschicoma Formation. The ash flows of the Otowi Member of the Bandelier Tuff extend from 24 to 264 ft bgs and consists of nonwelded vitric tuff with abundant phenocrysts of feldspar and bipyramidal euhedral quartz. The Guaje Pumice bed of the Otowi Member extends from 264 to 280 ft bgs and is a vitric pumice airfall. Clay-rich sediment beds were encountered in the interval from 280 to 285 ft bgs. Cuttings from the sediment beds included abundant, dark, earth-brown clay, with basalt fragments. The Cerros del Rio lavas, interflow units, and subflow deposits of the Cerros del Rio volcanic field extend from 285 to 710 ft bgs. The Puye Formation fanglomerates extend from 710 to 780 ft bgs; the clasts consist entirely of volcanic lithologies, and the matrix includes glassy shards and pumice derived from volcanic sources. The quartzite-bearing river gravels of the Puye Formation, interspersed with fanglomerate type dacitic detrius, extend from 780 to 1103 ft bgs (Vaniman et al. 2002, 072615). The specific geological units observed in R-31 are discussed below.

3.5.1 Otowi Member of the Bandelier Tuff

The Otowi Member of the Bandelier Tuff consists of a pumice-fall deposit (Guaje Pumice Bed) overlain by thin surge beds and by massive pyroclastic flow units. The age of this eruption is ~1.5 million years ago. The pumice-fall deposit is absent or only a few inches thick in the area of TA-39. The orange-tan, nonwelded ignimbrite contains abundant lithic clasts, pumice clasts, and phenocrysts of mostly sanidine and quartz in a vitric-crystal or crystal-vitric ash matrix. Lithic clasts make up from a trace to 30% of the tuff and phenocrysts 30%–35%. The Otowi Member tuff can be seen along State Highway 4, about 100 yd west of the entrance to TA-39, where an erosional remnant of the massive ignimbrite is exposed (LANL 1993, 015316, p. 3-11).

3.5.2 Basalt Flows of the Cerros del Rio

Basaltic deposits of the Cerros del Rio volcanic field, a field of late tertiary basaltic volcanoes that extends from near the Santa Fe Airport to the Pajarito Plateau, underlie the Bandelier Tuff at TA-39. These deposits include the well-jointed basaltic lava flows visible at the surface in Water Canyon, along the northeast margin of TA-39, and cropping out within a few hundred yards of the southeast margin of the site in lower Ancho Canyon; 350 ft of basaltic lava and interbedded hydrovolcanic tuff and stream gravels exposed at the intersection of Ancho and White Rock Canyons; and a scoria cone over 300 ft thick exposed in Chaqehui Canyon, the next canyon south of TA-39 (the northern flank of this cone should underlie Ancho Canyon within TA-39). Outcrops visible down to an elevation of 5500 ft within White Rock Canyon show interbedded Puye Conglomerate, Santa Fe Group sandstones and conglomerates, and mote basalt or basaltic andesite flows (LANL 1993, 015316, pp. 3-11 to 3-12).

3.5.3 Puye Formation Fanglomerates

The Puye Formation fanglomerates at well R-31 are similar to the succession at well R-25 and are alluvial fan deposits made up primarily of coarse, clastic rocks derived from the rhyodacite units of the Tschicoma Formation that crop out in the Jemez Mountains west of the Pajarito fault. Because of the proximity of these source rocks, these fanglomerate deposits consist of poorly consolidated and poorly sorted boulders, cobble, gravels, and sands (Vaniman et al. 2002, 072615, pp. 36-41)

4.0 INVESTIGATION OBJECTIVES AND STRATEGIES

Investigation objectives and strategies for each North Ancho Canyon site are described in this section. Table 4.0-1 summarizes the investigation strategies. Of the 26 SWMUs and AOCs within the North Ancho Canyon Aggregate Area, 18 are not proposed for characterization. The sites not proposed for characterization include the following.

- Two sites are removed from Module VIII of the Laboratory's HWFP by NMED [SWMUs 39-003 and 39-006(b)] (NMED 1998, 063042; NMED 2001, 070010).
- Five sites have NFA approval by the EPA [e.g., AOCs 39-002(g), 39-007(b), 39-007(c), 39-007(e), and 39-009] (EPA 2005, 088464).
- Three sites are deferred from investigation pursuant to Table IV-2 of the Consent Order [SWMUs 39-004(a), 39-004(b), and 39-004(e)].
- Two are active OD RCRA-regulated units per Table IV-1 of the Consent Order [SWMUs 39-004(c) and 39-004(d)].
- Three sites are storage areas collocated with active firing sites [AOCs 39-002(b), 39-002(c), and 39-002(f)] (LANL 1995, 046190, pp. 4-1 to 4-32).
- Two sites [AOCs 39-002(d) and 39-002(e)] are SAAs regulated under 40 CFR 262 and 20.4.1 NMAC. These sites are appropriate for NFA. The statement of basis describing the rationale for NFA and a request for a certificate of completion for each of these AOCs will be submitted with the investigation report associated with this work plan.
- One site is an active firing facility with limited access and significant health and safety concerns for investigation teams (SWMU 39-008) (LANL 1997, 055633, p. ii).

Five sites [SWMUs 39-002(a) Area 1, 39-005, 39-007(a), AOC 39-007(d), and SWMU 39-010] are proposed for characterization. Three sites [SWMUs 39-001(a), 39-001(b), and 39-006(a) inactive components] are proposed for cleanup under this investigation work plan and confirmation sampling.

Cleanup levels proposed for the excavation sites are presented in Table 4.1-2 and are based on industrial SSLs from NMED, EPA Region 9, EPA Region 6, or SALs from LANL (LANL 2005, 088493; EPA 2006, 094321; NMED 2006, 092513).

4.1 SWMU 39-004(a), Firing Site

SWMU 39-004(a) is an active firing site and was identified as a deferred site in Table IV-2 of the Consent Order. SWMU 39-004(a) is not proposed for investigation under this work plan.

4.2 SWMU 39-004(d), Firing Site

SWMU 39-004(d) is a firing site and an active RCRA operating unit that is subject to RCRA closure requirements and not Consent Order requirements. SWMU 39-004(d) is not proposed for investigation under this work plan.

4.3 AOC 39-002(d), Storage Area

AOC 39-002(d) is a former SAA regulated under 40 CFR 262 and 20.4.1 NMAC. As such, it is appropriate for NFA. A statement of basis describing the rationale for NFA and a request for a certificate of completion for this AOC will be submitted with the investigation report associated with this investigation work plan.

4.4 SWMU 39-004(b), Firing Site

SWMU 39-004(b) is a firing site on standby status and was identified as a deferred site in Table IV-2 of the Consent Order. SWMU 39-004(b) is collocated with active firing sites and is not proposed for investigation under this investigation work plan.

4.5 AOC 39-002(f), Storage Area

AOC 39-002(f) is a former SAA collocated with an active firing site, SWMU 39-004(e). AOC 39-002(f) will continue to be affected by the ongoing firing activities, and potential contaminants from the blasting activities will continue to be dispersed periodically over the aerial extent of this AOC. The active firing site may release contaminants that are similar to those suspected to be present at the AOC, making attribution of contamination difficult. Therefore, investigation of AOC 39-002(f) is proposed to be delayed until such time as operations at the active firing point have ceased.

4.6 SWMU 39-004(e), Firing Site

SWMU 39-004(e) is an active firing site and is deferred per Table IV-2 of the Consent Order. SWMU 39-004(e) is not proposed for investigation under this work plan.

4.7 SWMU 39-010, Soil Dump

Investigation of the nature and extent of contamination for SWMU 39-010 is proposed. The need for subsequent corrective actions will be determined based on the results of the characterization. Nature and extent of contamination in alluvium outside the SWMU boundaries will be resolved by the “South Canyons Investigation Work Plan “ (LANL 2006, 093713) and through sampling of the extended drainages in North Ancho Canyon as presented in this work plan (section 4.20).

Potential corrective action activities based on the results of this preliminary characterization may include waste and soil excavation, characterization, transportation and off-site disposal, confirmatory sampling, and backfilling and revegetation.

Investigation objectives and methods for preliminary characterization are described below. Sampling methods for all sites are described in section 5.1.

4.7.1 Investigation Objectives

SWMU 39-010 has not been previously sampled. The soil pile is proposed for characterization with cleanup decisions based on the results. The data issues to be resolved by the investigation are nature and extent of contamination within the SWMU 39-010 disposal area boundaries.

4.7.2 Determine Nature and Extent of Contamination

The area is discernible by the hummocky appearance of the dumped soil piles. The average elevation of natural grade and approximate waste boundaries will be determined in an initial geodetic survey. A systematic grid sampling approach was used to determine number and locations of samples. The required number of sample locations was determined using EPA's "Data Quality Objectives Process for Hazardous Waste Site Investigation" (EPA 2000, 098258), the size of the site, previous sampling data, and knowledge of the fate and transport of COPCs at the site. Figure 4.7-1 shows 30 proposed sampling locations based on existing approximate boundaries of waste. The sampling area will extend at least 10 ft beyond the estimated waste boundaries on all sides. The sampling locations will be revised if the actual limits of soil pile vary significantly from those shown in Figure 4.7-1. Samples will be collected from existing ground surface to 1 ft, 1–2 ft, and 2–3 ft below average natural grade by the use of hand augers and power augers, due to the irregular terrain.

Potential contaminants include HE, radionuclides, inorganic chemicals, and organic chemicals. Samples will be submitted for analyses listed in Table 4.3-1. Samples will be field screened for alpha, beta, and gamma radiation as per Standard Operating Procedure (SOP) 10.14. Samples with radiation readings more than 2 times background levels will be submitted for alpha and gamma spectroscopy. Sample will also be screened for metals by XRF per SOP-10.08, RDX by D TECH immunoassay test kits, and for PCBs per SOP-10.01. Any sample showing detection of metals above BVs, HE, or PCBs will be sent to an off-site laboratory for analysis. At a minimum, 30% of the field screened samples will be sent to an off-site laboratory for analysis.

4.8 SWMU 39-001(b), Disposal Trenches

Extensive characterization of SWMU 39-001(b) was conducted in 1993, 1994, and 1996 (LANL 1995, 046190; LANL 1997, 055633). Previous characterization efforts are fully discussed in section 2.2.1.2. These investigations included geophysical and radiation surveys, surface sampling for contaminant migration, installation of vertical monitoring wells up and downstream of the landfills, and excavation and sampling of 13 test pits down to 12–16 ft bgs. Historical investigation activities are sufficient to determine the nature and extent of contamination at SWMU 39-001(b). Because SWMU 39-001(b) is located in a floodplain and historical data indicate that organic chemicals are present and inorganic chemicals and radionuclides are above BVs and FVs, excavation of the landfill is appropriate. Therefore, this site is proposed for corrective action under this investigation work plan. Activities will include waste and soil/fill excavation, characterization, transportation and off-site disposal, confirmatory sampling, and backfilling and revegetation. Nature and extent of contamination outside the SWMU limits will be resolved by the

"South Canyons Investigation Work Plan" (LANL 2006, 093713) and through sampling of the extended drainages in North Ancho Canyon as presented in this work plan (section 4.20).

Investigation objectives and methods are described below. Corrective action methods (e.g., cleanup activities) for all sites are described in section 5.2.

4.8.1 Investigation Objectives

No preliminary characterization is required before cleanup, based on evaluation of historical investigation results. Historical data are adequate to establish approximate SWMU boundaries. The methodology to meet waste disposition data requirements is described in Appendix B and will be further detailed in the investigation report (LANL 2007, 098281).

The data issues to be resolved by sampling are confirmation that all residual contamination has been removed from within excavation limits, relative to industrial soil cleanup levels. The proposed investigation strategy to meet confirmation sampling requirements for SWMU 39-001(b) is described below.

4.8.2 Confirmation Sampling

The confirmation sampling approach will be implemented within excavation limits using the sampling methods described in section 5.1. A systematic grid sampling approach will be used to determine the number and locations of samples after final excavation limits are surveyed. An example of the sample locations is depicted in Figure 4.8-1. The actual location of the confirmation samples will be subject to change, and the final sample locations will be identified in the investigation report. The total number of confirmation samples will be greater than or equal to 30 samples for the first confirmation sampling event to ensure adequate confidence that potentially contaminated areas are not missed during the excavation.

Samples will be collected at the excavated surface at depths of 0–6 in. and 6–12 in. bgs with scoops and shovels. Samples will be submitted for the analyses presented in Table 4.1-1. Analyses were selected based on past operations and historical data.

Samples will be field screened for alpha, beta, and gamma radiation as per SOP-10.14. Samples with radiation readings more than 2 times background levels will be submitted for alpha and gamma spectroscopy. All other samples will be submitted to a fixed laboratory for analysis as appropriate for confirmation sampling efforts.

4.9 SWMU 39-008, Firing Site

SWMU 39-008 is an area of potential soil contamination from gas-gun firing. Aboveground, airborne releases of contaminants from the active firing site may continually disperse contamination across the aerial extent of this SWMU. Therefore, due to the ongoing use of the firing site which limits access to conduct a sampling investigation and provides significant health and safety concerns to the investigation team, the investigation at SWMU 39-008 is proposed to be delayed until such time as the operations at the firing site have ceased.

4.10 AOC 39-002(c), Storage Area

AOC 39-002(c) is a former outdoor SAA collocated with an active firing site SWMU 39-008. Due to the proximity of AOC 39-002(c) with the firing site SWMU 39-008, it is plausible that some materials from the firing activities may be dispersed to this AOC. AOC 39-002(c) will continue to be affected by the ongoing firing activities: potential contaminants from the blasting activities will continue to be dispersed periodically over the aerial extent of this AOC. The active firing site may release contaminants that are similar to those suspected to be present at the AOC. Therefore, investigation of this AOC is proposed to be delayed until such time as operations at the active firing point have ceased.

4.11 SWMU 39-004(c), Firing Site

SWMU 39-004(c) is an active firing site and active operating RCRA OD site (structure 39-06) subject to RCRA closure requirements and not Consent Order requirements. SWMU 39-004(c) is not proposed for investigation under this work plan.

4.12 AOC 39-002(b), Storage Area

AOC 39-002(b) was previously used as a storage area and is currently an active SAA adjacent to a firing site support building (structure 39-06) and an active firing site [SWMU 39-004(c)]. Due to the proximity of AOC 39-002(b) with the firing site SWMU 39-004(c), it is plausible that some materials from the firing activities may be dispersed to this AOC. AOC 39-002(b) will continue to be affected by the ongoing firing activities: potential contaminants from the blasting activities will continue to be dispersed periodically over the aerial extent of this AOC. The active firing site may release contaminants that are similar to those suspected to be present at the AOC. Therefore, investigation of this AOC is proposed to be delayed until operations at the active firing point have ceased.

4.13 SWMU 39-007(a), Storage Area

SWMU 39-007(a), a former storage area, is proposed for investigation based upon the historical data-quality assessment results. A VCA was conducted at this SWMU in 1995 to remediate PCB contamination detected during the RFI (LANL 1996, 053786). Confirmation sampling will be repeated for the SWMU and the VCA cleanup area. Nature and extent of contamination outside the SWMU boundaries will be resolved by the “South Canyons Investigation Work Plan” (LANL 2006, 093713) and through sampling of the extended drainages in North Ancho Canyon as presented in this work plan (section 4.20).

4.13.1 Investigation Objectives

The data issues to be resolved by the proposed investigation are nature and extent of contamination within the approximate SWMU 39-007(a) VCA cleanup area.

4.13.2 Determine Nature and Extent of Contamination

A systematic grid sampling approach was used to determine number and locations of samples. The required number of sample locations was determined using EPA’s “Data Quality Objectives Process for Hazardous Waste Site Investigation” (EPA 2000, 098258), the size of the site, previous sampling data, and knowledge of the fate and transport of COPCs at the site. Figure 4.13-1 shows proposed sampling locations based on approximate previous VCA cleanup area limits. The sampling area will extend at least 10 ft beyond the estimated SWMU 39-007(a) and VCA cleanup area on all sides or as far as necessary to define nature and extent of contamination based on screening data.

The approximate boundaries of SWMU 39-007(a) and the VCA cleanup area (LANL 1996, 053786), as determined in the RFI report (LANL 1995, 046190) and as reported in the HIR, will be surveyed and staked. Samples will be collected at the locations shown using direct-push equipment from ground surface to 3 ft bgs at 13 specified locations and submitted for analysis parameters listed in Table 4.3-1.

Potential contaminants, based on historical operations, include solvents, metals, and PCBs. Samples will be field screened for alpha, beta, and gamma radiation as per SOP-10.14. Samples with radiation readings more than 2 times background levels will be submitted for alpha and gamma spectroscopy. Sample will also be screened for PCBs and metals by XRF per SOP-10.01 and SOP-10.08, respectively. Any sample showing detection of metals above BVs or PCBs will be sent to an off-site laboratory for analysis. At a minimum, 30% of the field screened samples will be sent to an off-site laboratory for analysis.

4.14 AOC 39-007(d), Storage Area

AOC 39-007(d), anactive storage area, is proposed for investigation based upon the historical data-quality assessment results. Sampling in 1993 indicated that organic chemicals are present at the site, and inorganic chemicals and radionuclides are present at concentrations just above their BVs. Nature and extent of contamination outside the AOC boundaries will be resolved by the “South Canyons Investigation Work Plan” (LANL 2006, 093713) and through sampling of the extended drainages in North Ancho Canyon as presented in this work plan (section 4.20).

4.14.1 Investigation Objectives

The data issues to be resolved by the investigation are nature and extent of contamination adjacent to and immediately downgradient of the AOC 39-007(d) storage area.

4.14.2 Determine Nature and Extent of Contamination

A total of 11 samples will be taken to characterize the nature and extent of contamination at AOC 39-007(d). Eight samples will be taken 2 ft from the edge of the asphalt pad. An additional three samples will be taken downgradient of the storage pad, one at the center line of an unpaved road and two on either side of the road in transect. Figure 4.14-1 shows proposed sampling locations. Samples will be collected from surface to 1.0 ft bgs and from 1.0 to 2.0 ft bgs using scoops and shovels at 11 locations.

Potential contaminants, based on historical operations, include solvents, radionuclides, inorganic chemicals, and organic chemicals. Samples will be submitted for analyses listed in Tables 4.0-1 and 4.3-1, Samples will be field screened for alpha, beta, and gamma radiation as per SOP-10.14. Samples with radiation readings more than 2 times background levels will be submitted for alpha and gamma spectroscopy.

4.15 SWMU 39-005, Seepage Pit

SWMU 39-005 is proposed for investigation, based upon the historical data-quality assessment. Nature and extent of contamination outside the SWMU 39-005 boundaries will be resolved by the “South Canyons Investigation Work Plan” (LANL 2006, 093713) and through sampling of the extended drainages in North Ancho Canyon as detailed in this work plan (section 4.20).

4.15.1 Investigation Objectives

The data issues to be resolved by the proposed investigation are nature and extent of contamination within the approximate SWMU 39-005 boundaries.

4.15.2 Determine Nature and Extent of Contamination

A systematic grid sampling approach was used to determine the number and locations of samples. The required number of sample locations was determined using EPA's "Data Quality Objectives Process for Hazardous Waste Site Investigation" (EPA 2000, 098258), the size of the site, previous sampling data, and knowledge of the fate and transport of COPCs at the site. Figure 4.16-1 shows proposed sampling locations based on the approximate SWMU boundaries shown in the HIR. The sampling area will extend at least 20 ft beyond the estimated SWMU 39-005 boundaries on all sides, due to uncertainty in the location of the HE seepage pit and previous cleanup area.

The sampling area boundaries and sampling locations will be surveyed and staked. Samples will be collected from the surface to 10 ft bgs using direct-push equipment at eight specified locations. The samples will be collected from 0 to 1.0 ft, 1.0 to 2.0 ft, and every 2 ft beyond 2.0 ft bgs until 10 ft bgs (Table 4.0-1). The approximate boundaries of SWMU 39-005, as determined in the RFI report (LANL 1995, 046190) and as reported in the HIR, will be surveyed and staked.

Potential contaminants, based on historical operations, include HE. Samples will be submitted for analyses listed in Table 4.3-1, including HE, radionuclides, inorganic chemicals, and organic chemicals. Samples will be field screened for alpha, beta, and gamma radiation as per SOP-10.14. Samples with radiation readings more than 2 times background levels will be submitted for alpha and gamma spectroscopy. Samples will be field screened for metals by XRF and for RDX by D TECH immunoassay test kits. Any sample showing detection of metals above BVs or HE will be sent to an off-site laboratory for analysis. At a minimum, 30% of the field screened samples will be sent to an off-site laboratory for analysis.

4.16 SWMU 39-001(a), Landfill

Extensive characterization of SWMU 39-001(a) was conducted in 1993, 1994, and 1996 (LANL 1997, 055633). Previous characterization efforts are fully discussed in section 2.3.2.2. These investigations included geophysical and radiation surveys, surface sampling for contaminant migration, installation of vertical monitoring wells up and downstream of the landfills, trenching within the landfill area and excavation, and sampling of 13 test pits down to 12–15 ft bgs. Historical investigation activities are sufficient to determine the nature and extent of contamination at SWMU 39-001(a). Because SWMU 39-001(a) is located in a floodplain and historical data indicate that organic chemicals are present and inorganic chemicals and radionuclides are above BVs and FVs, excavation of the landfill is appropriate. Therefore, SWMU 39-001(a) is proposed for corrective action (e.g., cleanup activities) under this investigation work plan. Activities will include waste and soil excavation, characterization, transportation and off-site disposal, confirmatory sampling, and backfilling and revegetation. Nature and extent of contamination outside the SWMU limits will be resolved by the "South Canyons Investigation Work Plan" (LANL 2006, 093713) and through sampling of the extended drainages in North Ancho Canyon as presented in this investigation work plan (section 4.20).

Investigation objectives and methods are described below. Corrective action methods (e.g., cleanup activities) are described in section 5.2.

4.16.1 Investigation Objectives

No preliminary characterization is required before cleanup, based on evaluation of historical investigation results. Historical data are adequate to establish approximate SWMU boundaries. The methodology to meet waste disposition data requirements is described in Appendix B and will be further detailed in the investigation report.

The data issues to be resolved by sampling are confirmation that all residual contamination has been removed from within excavation limits, relative to industrial soil cleanup levels. The proposed investigation strategy to meet confirmation sampling requirements for SWMU 39-001(a) is described below.

4.16.2 Confirmation Sampling

The confirmation sampling approach will be implemented within the excavation limits using the sampling methods described in section 5.1. A systematic grid sampling approach will be used to determine the number and locations of samples after final excavation limits are surveyed. An example of the sample locations is depicted in Figure 4.1-1. The actual location of the confirmation samples will be subject to change, and the final sample locations will be identified in the investigation report. The total number of confirmation samples will be greater than or equal to 30 samples to ensure adequate confidence that potentially contaminated areas are not missed during the excavation.

Samples will be collected at the excavated surface at a depth of 0–6 in. and 6–12 in. bgs with scoops and shovels. Samples will be submitted for the analyses listed in Tables 4.0-1 and 4.1-1. Analyses were selected based on past operations and historical data. Results will be used to direct further excavation and resampling as necessary.

Samples will be field screened for alpha, beta, and gamma radiation as per SOP-10.14. Samples with radiation readings more than 2 times background levels will be submitted for alpha and gamma spectroscopy. All other samples will be submitted to a fixed laboratory for analysis as appropriate for confirmation sampling activities.

4.17 AOC 39-002(e)

AOC 39-002(e) is a former SAA regulated under 40 CFR 262 and 20.4.1 NMAC. As such it is appropriate for NFA. A statement of basis describing the rationale for NFA and a request for a certificate of completion for this AOC will be submitted with the investigation report associated with this investigation work plan.

4.18 SWMU 39-002(a), Storage Area

SWMU 39-002(a) Area 1 is proposed for investigation, based upon the historical data-quality assessment. SWMU 39-002(a) Area 2 is not proposed for investigation because it is an indoor storage area with no potential for releases to the environment. SWMU 39-002(a) Area 3 is not proposed for investigation because it is an active RCRA-regulated SAA and holding/receiving area. The nature and extent of contamination outside the SWMU 39-002(a) limits will be resolved by the “South Canyons Investigation Work Plan” (LANL 2006, 093713) and through sampling of the extended drainages in North Ancho Canyon as presented in this work plan (section 4.20).

4.18.1 Investigation Objectives

The data issues to be resolved by the proposed investigation are nature and extent of contamination within the approximate SWMU 39-002(a) boundaries. The proposed investigation strategy to resolve the data issues for SWMU 39-002(a) Area 1 is described below.

4.18.2 Determine Nature and Extent of Contamination

A systematic grid sampling approach will be used to determine the number and locations of samples. Figure 4.18-1 shows proposed sampling locations. The SWMU limits and sampling locations will be surveyed and staked. Samples will be collected from surface to 3 ft bgs in 1-ft increments using direct-push equipment at 25 specified locations. The sampling area will extend to the unpaved road on the west, at least 10 ft beyond the estimated SWMU 39-002(a) boundaries on the north, and to the storm drain on the east.

Potential contaminants, based on historical operations, include solvents, radionuclides, inorganic chemicals, and organic chemicals. Samples will be submitted for analyses listed in Tables 4.0-1 and 4.3-1, including HE, radionuclides, and inorganic and organic chemicals. Samples will be field screened for alpha, beta, and gamma radiation as per SOP-10.14. Samples with radiation readings more than 2 times background levels will be submitted for alpha and gamma spectroscopy. Samples will be field screened for metals by XRF and for research department explosive (RDX) by D TECH immunoassay test kits. Any sample showing a detection of metals above BVs or HE will be sent to an off-site laboratory for analysis. A minimum of 30% of samples will be sent to an off-site laboratory for analysis.

4.19 SWMU 39-006(a), Septic System, Inactive Components

SWMU 39-006(a) inactive components are proposed for removal and sampling under this work plan, as discussed previously. No preliminary characterization is required based on evaluation of historical investigation results. Historical data are adequate to establish approximate SWMU boundaries. The methodology to meet waste dispositioning data requirements is described in Appendix B. Nature and extent of contamination in alluvium outside the SWMU boundaries will be resolved by the "South Canyons Investigation Work Plan" (LANL 2006, 093713) and through sampling of the extended drainages in North Ancho Canyon as presented in this work plan (section 4.20).

4.19.1 Investigation Objectives

The data issues to be resolved by sampling are confirmation that all residual contamination has been removed from within excavation limits, relative to industrial soil cleanup levels. The proposed investigation strategy to resolve the data issues for SWMU 39-006(a) inactive components is described below.

4.19.2 Confirmation Sampling

The confirmation sampling approach will be implemented within excavation limits using the sampling methods described in section 5.1. Samples will be collected after removal of the inactive septic tank, chemical seepage pit, sand filter VCP, and field screened for gamma radiation, silver, PCBs, and HE to determine required depth and extent of the excavation before confirmation sampling. Samples will be collected at the excavated surface using scoops and shovels. Field-screening results will be compared with industrial soil cleanup levels to determine whether further excavation is required.

When screening results indicate that cleanup is complete, a statistically based sampling approach for confirmation sampling will be implemented within waste boundaries based on the results of the screening level data. For instance, the program Visual Sampling Plan that follows the guidance presented in EPA's "Data Quality Objectives Process for Hazardous Waste Site Investigations" (EPA 2000, 098258) could be used to determine the number of samples statistically required to ensure an adequate number of confirmation samples are collected. A systematic grid sampling approach will be used to determine the number and locations of samples after final excavation limits are surveyed. An example of the sample locations is depicted in Figure 4.19-1. The actual location of the confirmation samples will be subject to change, and the final sample locations will be identified in the investigation report. Sampling locations will be identified in the investigation report.

Samples will be collected at the excavated surface at a depth of 0–6 in. and 6–12 in. bgs with scoops and shovels. Samples will be submitted for the analyses presented in Table 4.1-1. Analyses were selected based on past operations and historical data. Results will be used to direct further excavation and resampling as necessary.

4.20 Extended Drainages

The scope of the North Ancho Canyon Aggregate Area Investigation Work Plan overlaps the "South Canyons Investigation Work Plan" (LANL 2006, 093713). As stated in the Consent Order section IV.B relating to the Canyon Watersheds investigations, "The general investigation activities required for each canyon watershed shall primarily focus on fate and transport of contaminants from the point of origin to each canyon watershed drainage system and, if necessary, to the regional aquifer and to the Rio Grande. Canyon watershed investigations shall be conducted in accordance with this Consent Order and the canyon-specific investigation work plans approved by the Department." In general, the South Canyons Investigation Work Plan (LANL 2006, 093713) will "address the sources of contamination and the nature and extent of contamination in sediments, surface water of the active stream channel, and groundwater beneath the canyon floor in the south canyons system. The scope of the South Canyons investigation includes sampling and analysis of canyons media from the watersheds associated with Cañon de Valle and Ancho, Chaquehui, Fence, Indio, Potrillo and Water Canyons." Additionally, the South Canyons Investigation Work Plan states that "Representative sections of canyon floors (canyon reaches) will be investigated to evaluate contaminant concentrations and distributions as a function of proximity to SWMUs, AOCs, consolidated units, depositional environments, sediment grain size, and age of sediment deposits. Data obtained from adjacent reaches are expected to bound the range of contaminant concentrations in the unsampled areas between the reaches."

Three reaches are proposed for sampling and characterization along the North Ancho Canyon reach as depicted in Figure 4.20-1. To ensure that surface-water transport of contaminants to areas downstream of the SWMU's is not occurring, sediment samples within the ephemeral stream drainage channel will be collected as diagramed in Figure 4.8-1. The North Ancho Canyon reach adjacent to and below the most upgradient SWMUs [e.g., SWMUs 39-004(a) and 39-004(b)] is approximately 9675 ft to the confluence of the North Ancho Canyon and Ancho Canyon reaches. A total of 147 screening samples are proposed (one location every 200 ft of reach) to define the nature and extent of contamination within these drainages along approximately 9700 ft of reach. At each location, three samples will be taken in transect along the width of the channel (e.g., one on each stream bank and on along the center line of the channel). A minimum of 30% of the samples will be sent for analytical laboratory verification: 10% of the samples will be randomly selected; and 20% of the samples will be chosen based on a predetermined set of biased sampling criteria (e.g., at the confluence of two stream channels or just downgradient of a SWMU). The biased sampling will ensure that the confluences of drainages and tributaries are targeted for analytical laboratory verification.

4.20.1 Investigation Objectives

The data issues to be resolved by the proposed investigation are nature and extent of contamination resulting from the surface-water transport of contaminants from the various SWMUs and AOCs within the North Ancho Canyon Aggregate Area.

4.20.2 Determine Nature and Extent of Contamination

Contaminants present in the samples could include HE, radionuclides, PCBs, organic chemicals, and metals. It is unlikely that VOCs will be present in the samples due to extensive volatilization possible during the transport of the sediment and contaminants in during stream flow. Samples will be field screened for alpha, beta, and gamma radiation as per SOP-10.14. Samples with radiation readings more than 2 times background levels will be submitted for alpha and gamma spectroscopy. Samples will also be field screened for PCBs using a semiquantitative RaPID assay enzyme immunoassay test kit (or equivalent) per SOP-10.01, for HE using the Strategic Diagnostics, Inc., D TECH RDX immunoassay test kits and metals by XRF per SOP-10.08.

Samples will be collected at a depth of 0–6 in. and 6–12 in. with scoops and shovels and submitted for analyses listed in Tables 4.0-1 and 4.1-1. Final sampling locations will be identified in the Investigation Report.

5.0 SCOPE OF ACTIVITIES

This section describes in general the activities to be performed under this work plan including investigation and cleanup. Applicable LANL SOPs and Consent Order requirements are referenced.

5.1 Investigation Activities

This section describes methods for sampling and analysis of soil and sediment, land surveying, geophysical surveying, borehole abandonment, and health and safety practices. The most current versions of SOPs are applicable to the investigations proposed in this investigation work plan and are listed below. A summary of each procedure referenced below is provided in Table 5.0-1. These SOPs are available at http://www.lanl.gov/environment/all/qa.shtml. Additional procedures may be added as necessary to describe and document quality-affecting activities.

- SOP-01.01 General Instructions for Field Investigations
- SOP-01.02 Sample Containers and Preservation
- SOP-01.03 Handling, Packaging, and Shipping of Samples
- SOP-01.04 Sample Control and Field Documentation
- SOP-01.05 Field Quality Control Samples
- SOP-01.06 Management of Environmental Restoration Project Waste
- SOP-01.08 Field Decontamination of Drilling and Sampling Equipment
- SOP-01.10 Waste Characterization
- SOP-02.01 Surface Water Site Assessments
- SOP-03.11 Coordinating and Evaluating Geodetic Surveys
- SOP-04.01 Drilling Methods and Drill Site Management
- SOP-04.04 Contract Geophysical Logging
- SOP-05.07 Operation of LANL-Owned Borehole Logging Trailer
- SOP-06.09 Spade and Scoop Method for the Collection of Soil Samples
- SOP-06.10 Hand Auger and Thin-Wall Tube Sampling

- SOP-06.24 Sample Collection from Split-Spoon Samplers and Shelby Tube Samplers
- SOP-10.01 Screening for Polychlorinated Biphenyls in Soil
- SOP-10.08 Operation of the Spectrace 9000 Field-Portable X-Ray Fluorescence Instrument
- SOP-10.14 Performing and Documenting Gross Gamma Radiation Scoping Surveys
- SOP-12.01 Field Logging, Handling, and Documentation of Borehole Materials

Chemical analyses will be performed in accordance with Section IX.C of the Consent Order and all applicable SOPs. Accredited contract laboratories will use the most recent EPA and industry-accepted extraction and analytical methods for chemical analyses for analytical suites. Requirements for laboratory quality assurance/quality control (QA/QC), QA procedures, and equipment calibration will be performed as documented in the Consent Order.

5.1.1 Sampling Methods

5.1.1.1 Excavations

Excavations will be completed using a track excavator or backhoe. Excavated soil will be staged a minimum of 3 ft from the edge of the excavation, and excavations deeper than 4 ft bgs will be properly benched to allow access and egress, if necessary. After field screening, confirmatory sampling, and any necessary over excavation work are completed, the excavations and/or trenches will be backfilled with clean fill material. Excavators may also be used to collect grab samples for those locations where hand augers or power augers encounter refusal before the maximum proposed sample depth.

5.1.1.2 Spade-and-Scoop Sediment Collection

The spade-and-scoop method is typically used to collect shallow samples. This method involves digging a hole to the desired depth and collecting a discrete sample. The sample will be placed in a clean stainless-steel bowl for transfer into various sample containers. Sample collection will be consistent with SOP-06.09, Spade and Scoop Method for the Collection of Soil Samples. Requirements for sample volume, containerization, holding times, and detection limits are provided in the Analytical Services Statement of Work (LANL 2000, 071233).

5.1.1.3 Hand Auger

Hand augers may be used to bore shallow holes (0–15 ft). The hand auger is advanced by turning or pounding the auger into the soil until the barrel is filled. The auger is then removed, and the sample is dumped out. Motorized units for one or two operators may be used and can reach depths up to 30 ft under certain conditions. Hand augering will be conducted in accordance with SOP-04.01.

5.1.1.4 Hollow-Stem Auger

The hollow-stem auger consists of a hollow-steel shaft with a continuous spiraled steel flight welded onto the exterior of the stem. The stem is connected to an auger bit; when rotated, it transports cuttings to the surface. The hollow stem of the auger allows insertion of drill rods, split-spoon core barrels, Shelby tubes, and other samplers through the center of the auger so that samples may be retrieved during drilling operations. The hollow stem also acts to case the borehole core temporarily so that a well casing (riser) may be inserted down through the center of the auger once the desired depth is reached, thus minimizing the risk of possible collapse of the borehole. A bottom plug or pilot bit can be fastened onto the bottom of the auger to keep out most of the soils and/or water that have a tendency to clog the bottom of the augers during drilling. Drilling without a center plug is acceptable if the soil plug, formed in the bottom of the auger, is removed before sampling or installing a well casing. The soil plug can be removed by washing out the plug using a side-discharge rotary bit or auguring out the plug with a solid-stem auger bit sized to fit inside the hollow-stem auger. Hollow-stem augering will be conducted in accordance with SOP-04.01.

5.1.1.5 Direct Push

Direct push is a subsurface sampling method that pushes a tool string into the ground using the weight of a truck in combination with a hydraulic ram or hammer. Various tool strings can be used for obtaining discrete samples, continuous samples, both discrete and continuous samples, and groundwater samples.

The direct-push core samples collected in this investigation will be continuous. The inside of the continuous sampler is exposed to the subsurface environment while it is advanced to the sample interval. This is a dual-tube sampler, so named because it uses two sets of rods to collect soil cores. The outer rods receive the driving force from the hydraulic pushing method and provide a sealed hole from which soil samples may be recovered without the threat of cross-contamination or cave-in. The inner set of rods is placed within the outer rods and holds a sampler in place as the outer rods are driven to the sample interval. The inner rods are then retracted to retrieve the soil core.

The direct-push methods will follow the American Society of Testing and Materials (ASTM) D18 Subcommittee on Direct Push Sampling (D18.21.01). Direct-push methods will be conducted in accordance with SOP-04.01.

5.1.1.6 Quality Assurance/Quality Control

QA/QC samples will include (1) field duplicate samples to evaluate the reproducibility of the sampling technique, (2) rinsate blanks to evaluate the effectiveness of decontamination procedures, and (3) trip blanks to assess laboratory handling of the samples. These samples will be collected following the current version of SOP-01.05 and will comply with a field-duplicate collection frequency of 10% of total samples collected and a rinsate blank collection frequency of 10% of total samples collected. Trip blanks will be supplied by the SMO before the start of each field day and will remain with analytical samples when collecting samples for VOC analysis.

5.1.2 Field Screening

Field-screening to be used for soil and sediment samples may include (1) visual examination, (2) radiological screening, (3) vapor screening for VOCs, (4) PCB screening, (5) HE screening, and (6) metals screening by XRF. Field screening will be in accordance with applicable SOPs.

5.1.2.1 Radiological Screening

Radiological screening will target gross alpha-, beta-, and gamma-emitting radionuclides. Field screening will be conducted within 1-in. of sample material by the on-site radiological control technician from surface, shallow subsurface, and subsurface material in core or in the sample mixing bowl before material is placed in sample jars. All radiological screening will be conducted using an Eberline E-600 radiation meter with an SHP-380AB alpha/beta scintillation detector, or equivalent. This equipment consists of a dual phosphor plate covered by two mylar windows housed in a light-excluding metal body. The phosphor plate is a plastic scintillator for the detection of beta emissions and is thinly coated with zinc sulfide for detecting alpha emissions. The operational range varies from trace emissions to 1-mil disintegrations per minute.

If a sample indicates a result greater than 2 times the instrument background level for the site, a sample will be collected for laboratory analysis of alpha and gamma spectroscopy. Instrument background levels will be collected, at a minimum, twice daily, once in the morning and once in the afternoon. If more than one site is visited in a day, background levels will be calculated before work begins at each new site. Background will be measured from 10 locations surrounding the site and away from known or suspected areas of radiological contamination. An average will be calculated to determine the instrument background level for the site. Radiological field screening will be conducted in accordance with SOP-10.14. All instrument background checks, background ranges, and calibration procedures will be documented daily in the field logbook in accordance with the current version SOP-12.01.

Boreholes completed using mechanical drilling methods will be advanced 25 ft beyond elevated field-screening results. If elevated field-screening results are recorded within 25 ft of the target depth, the borehole will be advanced using mechanical drilling methods in 5-ft intervals until no elevated field-screening results are recorded over a 25-ft interval.

5.1.2.2 Vapor Screening for VOCs

Organic vapor screening of subsurface core will conducted using a MiniRAE 2000 portable VOC monitor model PGM-7600 photoionization detector (PID), or equivalent, and will be equipped with an 11.7-electron volt lamp and sensitivity reading to 1 part per million (ppm). Before each day's fieldwork begins, the PID will be calibrated to the manufacturer's standard for instrument operation (all daily calibration results will be documented in the field logbook). Field screening for VOCs will be accomplished by headspace analysis at 5-ft intervals in each borehole in accordance with SOP-06.33. The maximum observed value and ambient-air temperature will be recorded in the field borehole or test pit log for each sample. A VOC field-screening result that exceeds the ambient background measurement is defined as greater than 2 times the measured background value. Ambient background measurement is collected by setting aside an empty, sealed plastic bag for no longer than 5 min and collecting the measurement from inside the plastic bag. Field screening for VOCs should be taken in the same manner but with the sample in a new, sterile bag between each interval. This value will be recorded in the lithologic log at the interval collected.

Boreholes completed using mechanical drilling methods will be advanced 25 ft beyond elevated field-screening results for any field screen. If elevated field-screening results are recorded within 25 ft of the target depth, the borehole will be advanced using mechanical drilling methods in 5-ft intervals until no elevated field-screening results are recorded over a 25-ft interval.

Based on this field screening, samples with the highest field-screening results and with the deepest detected field-screening results will be submitted for laboratory analysis. Samples collected at key locations (e.g., below the base of waste units, fracture zones, total depth) will also be submitted for laboratory analysis, regardless of screening results.

5.1.2.3 Metals Field Screening

A Spectrace 9000 (or similar make and model) field-portable XRF instrument will used to field screen for metals such as barium and silver in accordance with SOP-10.08. An elevated detection for XRF analysis is defined as an instrument reading that exceeds 2 times the background value of the sample matrix. The XRF field-screening results will be recorded on the field boring or test pit logs.

5.1.2.4 PCB Field Screening

A semiquantitative RaPID assay enzyme immunoassay test kit (or equivalent) will be used to screen samples for the presence of PCBs, specifically Aroclor-1254 as an indicator chemical. The test kit minimum detection limit and quantitation limit for Aroclor-1254 are 0.2 mg/kg and 0.5 mg/kg, respectively. All assays will be conducted following the manufacturer's instructions, including equipment calibration, use, and sample dilution, and reagent storage, and according to SOP-10.01. Immunoassay field-screening results will be recorded in the field boring or test pit logs.

5.1.2.5 HE (RDX) Screening

The Strategic Diagnostics, Inc., D TECH RDX immunoassay test kits will be used to field screen quantitatively for RDX and TNT. All assays will be conducted following the manufacturer's instructions, including equipment calibration, equipment use, sample dilution, and reagent storage. An elevated immunoassay result is defined as 2 times the estimated quantitation limit (approximately 2 ppm).

Immunoassay field-screening results will be recorded on the field boring or test pit logs.

5.1.3 Analytical Methods

All required laboratory analytical suites are presented in the statement of work for analytical laboratories (LANL 2000, 071233). Sample collection and analysis will be coordinated with the SMO. Complete lists of all fixed laboratory analytical methods are provided in Tables 4.1-1 and 4.3-1.

5.1.4 Land Survey Methods

Land surveys will be performed in accordance with SOP-03.11, Coordinating and Evaluating Geodetic Surveys. Sample locations will be located using a global positioning system, an electronic total station, or a combination of both surveying systems.

Geophysical and geochemical investigations will include the collection of core and open-hole geophysical measurements from each boring to meet the Consent Order requirement as stated in section III.A. The horizontal and vertical coordinates of the top of each core hole will be determined by a registered New Mexico professional land surveyor in accordance with the State Plane Coordinate System. The surveys will be conducted in accordance with sections 500.1–500.12 of the Regulations and Rules of the Board of Registration for Professional Engineers and Surveyors Minimum Standards for Surveying in New Mexico. Horizontal positions will be measured to the nearest 0.1 ft, and vertical elevations will be measured to the nearest 0.01 ft.

5.1.5 Geophysical Survey Methods

Geophysical survey methods used to determine limits of waste will be identified through performance-based contracts. Potential survey methods may include electromagnetics, ground penetrating radar, seismic or others.

5.1.6 Borehole Abandonment

All boreholes will be abandoned by one of the following methods.

- Shallow boreholes, with a total depth of 20 ft or less, will be abandoned by filling the borehole with bentonite chips and subsequently hydrated: The borehole will be visually inspected while the bentonite chips are being added to ensure that bridging does not occur.
- Intermediate and deep boreholes, greater than 20 ft in depth, will be pressure-grouted from the bottom of the borehole to the surface using the tremie pipe method. Acceptable grout materials include cement or bentonite grout, neat cement, or concrete.

All boreholes will be properly abandoned according to the most recent version of SOP-5.03, Monitoring Well and RFI Borehole Abandonment. The use of backfill materials such as bentonite and concrete will be documented in a field logbook with regard to volume (calculated and actual), intervals of placement, and additives used to enhance backfilling. All cuttings will be managed as IDW, as specified in Appendix B of this document. All borehole abandonment information will be provided in the investigation report.

5.1.7 Equipment Decontamination

Before and after drilling and sampling activities, all equipment used for drilling and sampling will be decontaminated. Residual material adhering to equipment will be removed using dry decontamination methods such as the use of wire brushes and scrapers according to SOP-01.08. If equipment cannot be free-released using dry-decontamination methods, wet-decontamination methods will be used. The equipment will be pressure-washed with a high-density polyethylene liner on a temporary decontamination pad. Cleaning solutions and wash water will be collected and contained for proper disposal. Decontamination solutions will be sampled and analyzed to determine the final disposition of the wastewater and the effectiveness of the decontamination procedures. All parts of the drilling equipment, including the undercarriage, wheels, tracks, chassis, and cab, will be thoroughly cleaned. Air filters on equipment operating in the exclusion zone will be considered contaminated and will be removed and replaced before the equipment leaves the site. Sites identified as radiological control areas based upon surface radiological surveys will have all equipment surveyed by a Health and Safety Radiation Control Division technician before it is released from the site.

5.1.8 Health and Safety

The field investigations described in this investigation work plan will comply with all applicable requirements pertaining to worker health and safety. An integrated work document and a site-specific health and safety plan will be in place before conducting fieldwork.

5.1.9 Investigation-Derived Waste Management

Management of investigation waste is described in Appendix B.

5.2 Cleanup Activities

SWMUs 39-001(a), 39-001(b), 39-006(a) inactive components, and potentially SWMU 39-010 are proposed for cleanup under this investigation work plan. Excavation at SWMU 39-010, if necessary, will proceed after determination of the nature and extent contamination. Excavation of contaminated media, waste disposition, and confirmation sampling will be similar to the activities proposed at SWMUs 39-001(a), 39-001(b), and 39-006(a) inactive components. This section summarizes proposed cleanup activities.

5.2.1 Description of the Proposed Actions

The general sequence of activities for waste excavation, transportation, disposal, and confirmation sampling is summarized below. Specific details are provided for each site in section 4.

5.2.1.1 Preliminary Sampling and Characterization

No preliminary characterization is proposed for SWMUs 39-001(a), 39-001(b), and 39-006(a) inactive components. Preliminary sampling and characterization will be performed at SWMU 39-010 to determine the nature and extent of contamination. These results will be used to determine whether cleanup is merited.

5.2.1.2 Removal of Surficial and Buried Waste, Inactive Units, Contaminated Soil and Sediment

The general sequence of waste-removal activities is summarized below:

- Mobilization
    - ❖ Assemble construction documents
    - ❖ Conduct construction readiness assessment
    - ❖ Conduct preconstruction meeting
    - ❖ Construct access roads
    - ❖ Construct staging area
    - ❖ Install temporary field trailers
    - ❖ Determine limits of waste. First, the original waste limit coordinates determined in the RFI report and reported in the HIR will be surveyed and staked. Next, excavation and potholing with visual examination using methods cited in section 5.1 will be used to establish or to confirm waste limits only where the original limits are inadequately defined to implement cleanup.
    - ❖ Mobilize heavy equipment to site
    - ❖ Identify underground utilities
- Site preparation
    - ❖ Install fencing
    - ❖ Install stormwater controls
    - ❖ Abandon monitoring wells
    - ❖ Abandon/relocate utilities
    - ❖ Preexcavation survey
- Removal of waste
    - ❖ Excavate waste
    - ❖ Stockpile and load roll-offs
    - ❖ Characterization for dispositioning
    - ❖ Transport to off-site disposal facility
    - ❖ Survey limits of excavation
    - ❖ Confirmation sampling
    - ❖ Establish subgrade and survey

- Backfill
    - ❖ Backfill and compact
    - ❖ Vegetate surface
    - ❖ Survey finished surface
- Demobilization

5.2.1.3 Waste Management and Disposal

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

5.2.1.4 Transportation

All waste will be hauled in roll-off containers directly to the selected disposal facility.

5.2.1.5 Confirmation Sampling

Confirmation sampling will be performed at all cleanup sites. Details are described in section 4.

5.2.1.6 Health and Safety

Applicable Laboratory procedures will be referenced.

6.0 MONITORING AND SAMPLING PROGRAM

Ongoing groundwater-monitoring activities in the Ancho Canyon Watershed includes semiannual monitoring near or downstream from areas of past laboratory weapons-testing activities. These monitoring locations include three regional wells (e.g., DT-5A, DT-9, and DT-10), two alluvium wells (e.g., 39-UM-3 and 39-DM-6) and one intermediate well (e.g., R-31). If additional groundwater-monitoring wells are installed, a formal groundwater-monitoring program will be developed and submitted to NMED for approval. The locations of the surface water and groundwater sampling locations in North Ancho watershed are depicted in Figure 3.1-1.

7.0 SCHEDULE

The North Ancho Canyon Aggregate Area investigation work plan will be submitted to NMED on September 30, 2007. The notice schedule for NMED comments or approval of the work plan is January 13, 2008. Administrative activities for the subaggregate area will begin after the work plan is submitted. Field activity preparation will begin after NMED approves the work plan. Based upon site-access restrictions, all three TA-39 subaggregate areas will be investigated and reported on in one investigation report. The investigation report will present information for individual SWMUs and AOCs, as appropriate.

8.0 REFERENCES AND MAP DATA SOURCES

8.1 References

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

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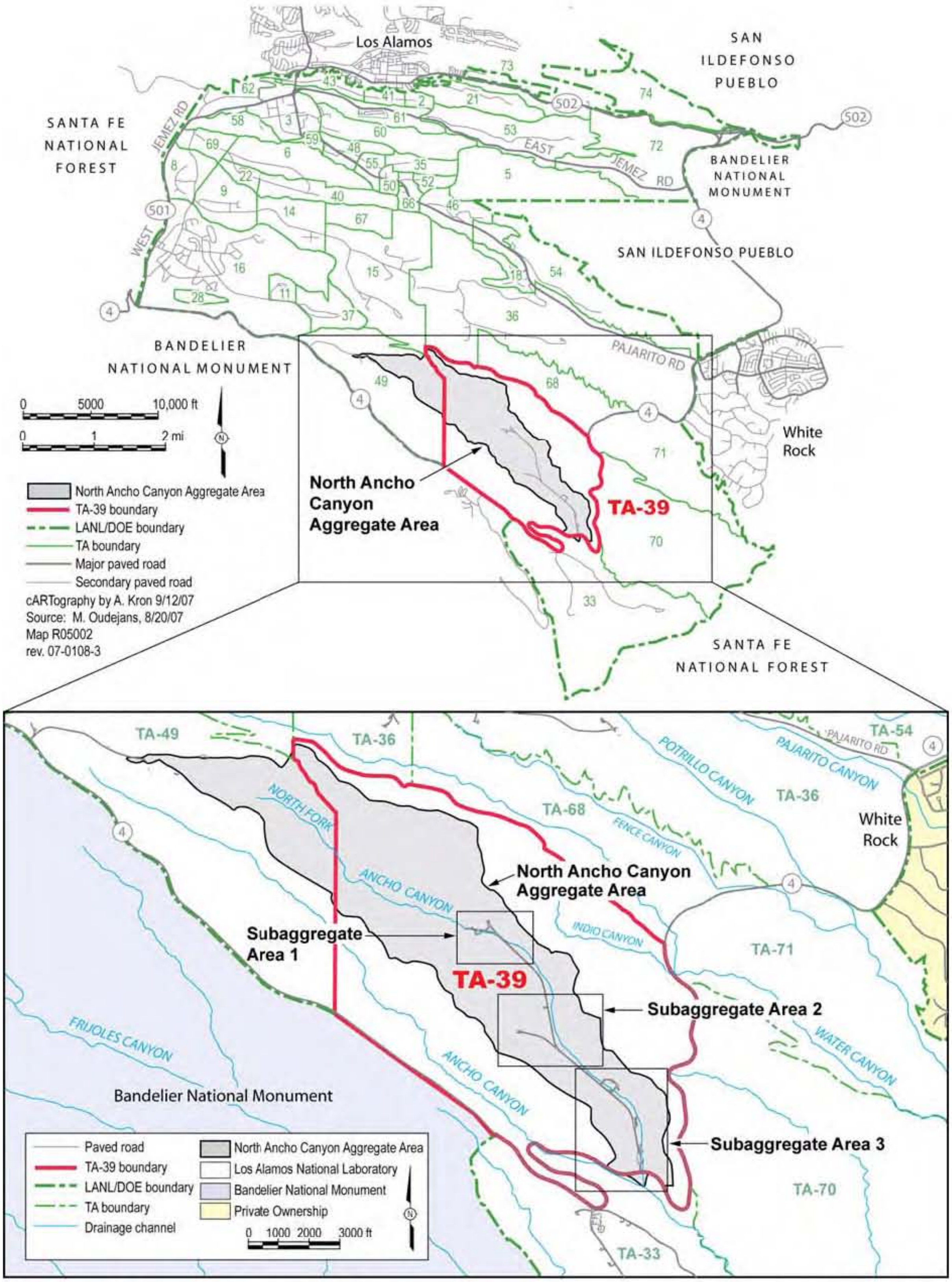


Figure 1.0-1 Location of North Ancho Aggregate Area with respect to Laboratory technical areas and surrounding land holdings

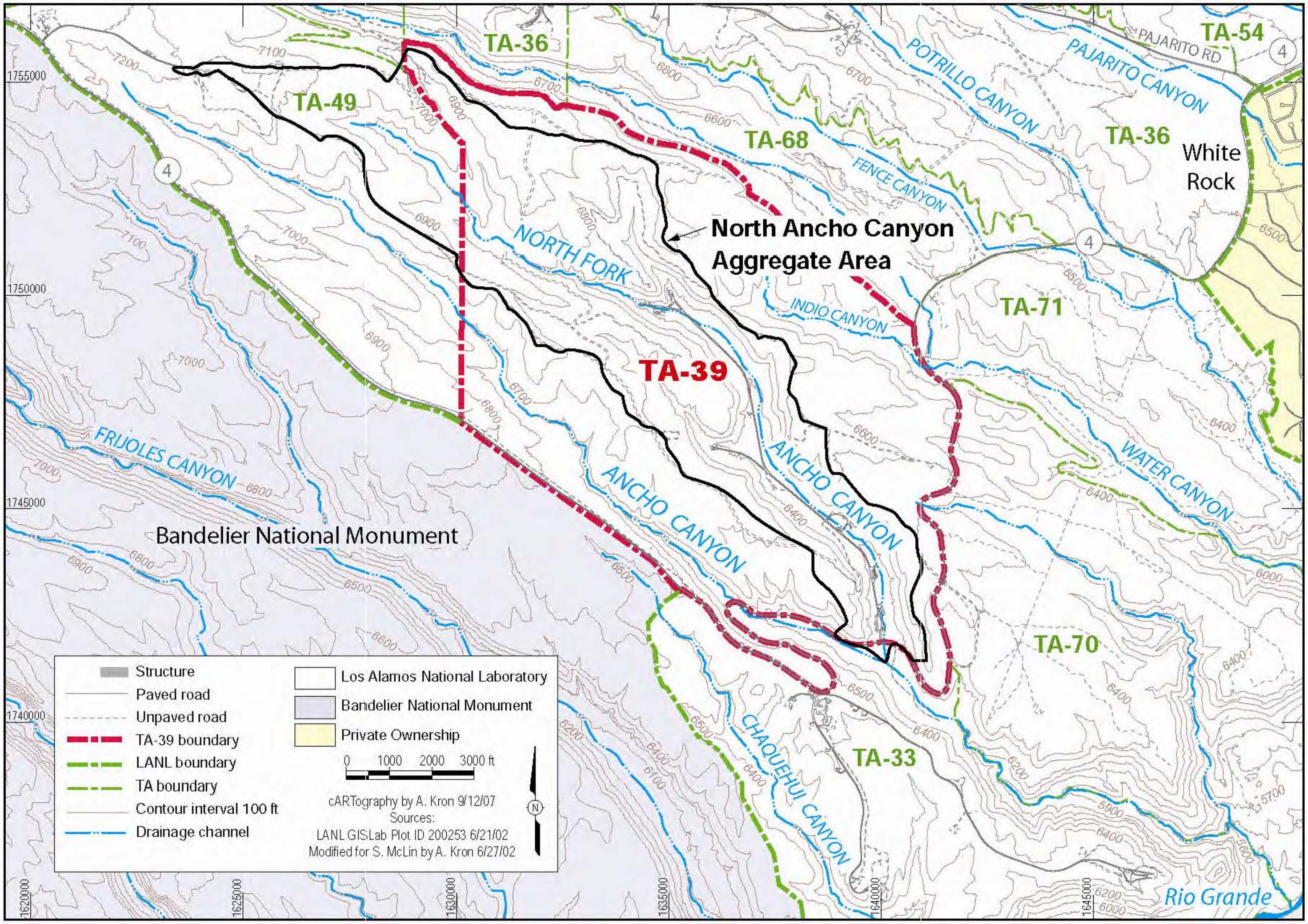


Figure 1.0-2 Topography of TA-39

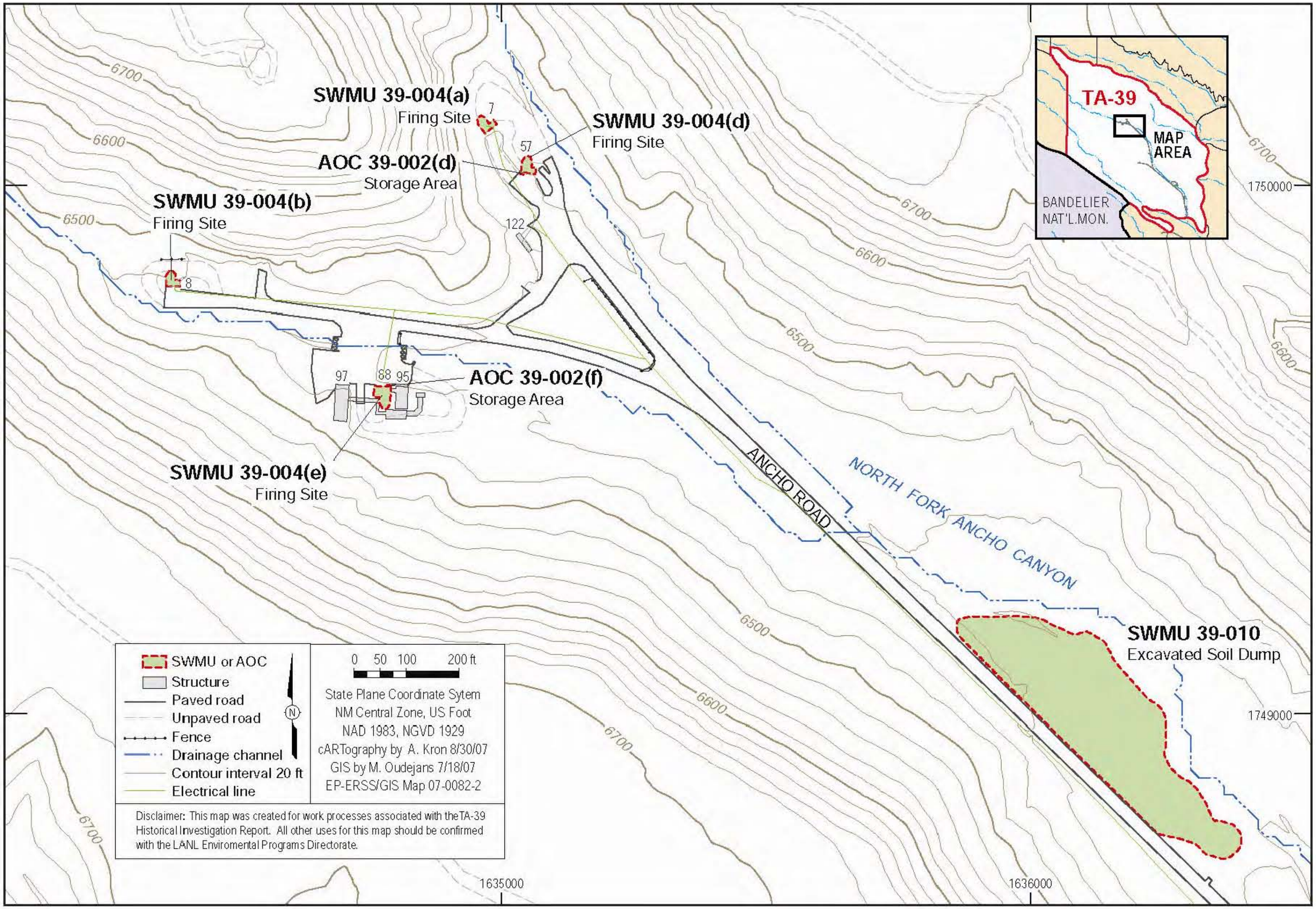


Figure 1.1-1 Location of Subaggregate Area 1

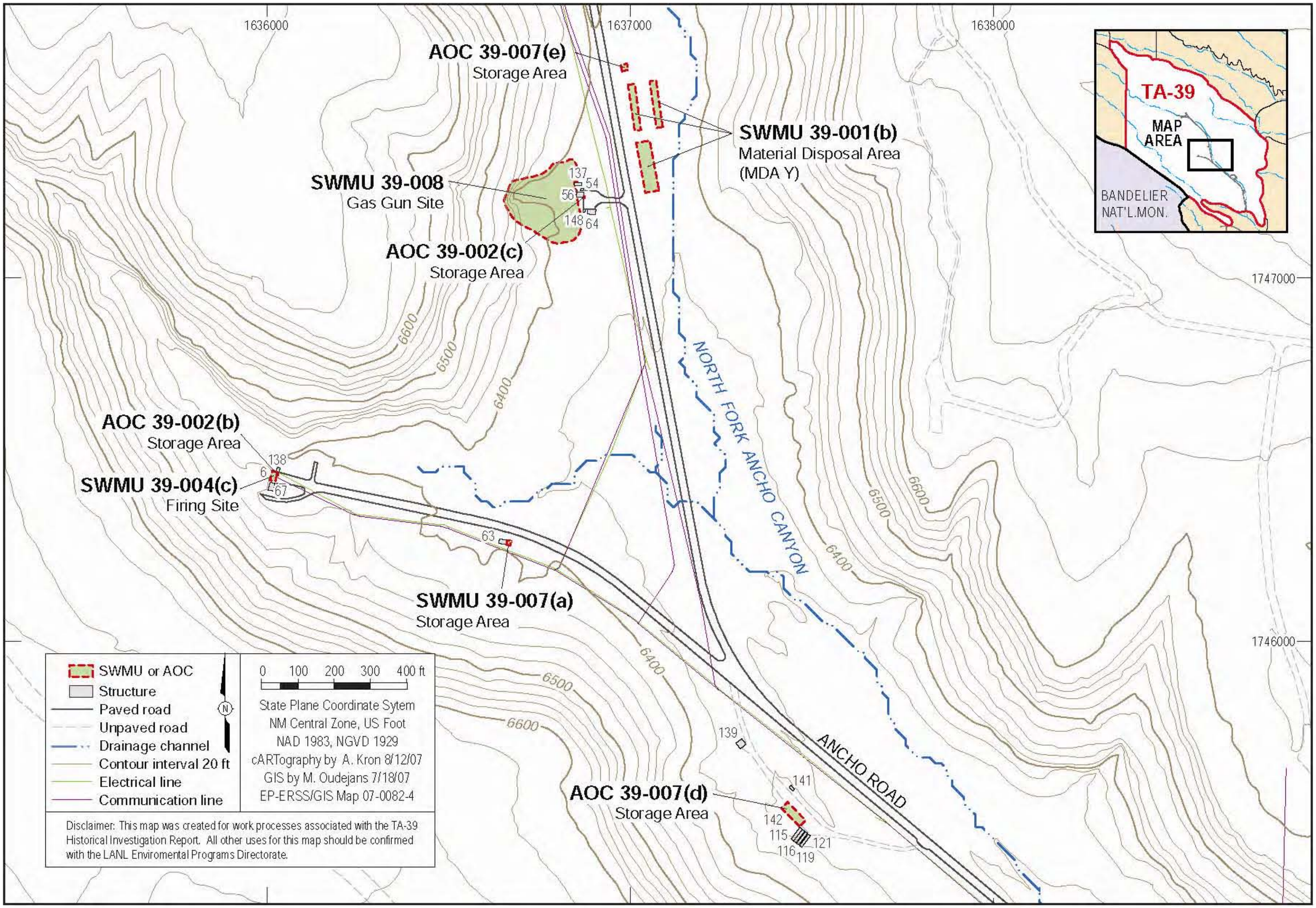


Figure 1.1-2 Location of Subaggregate Area 2

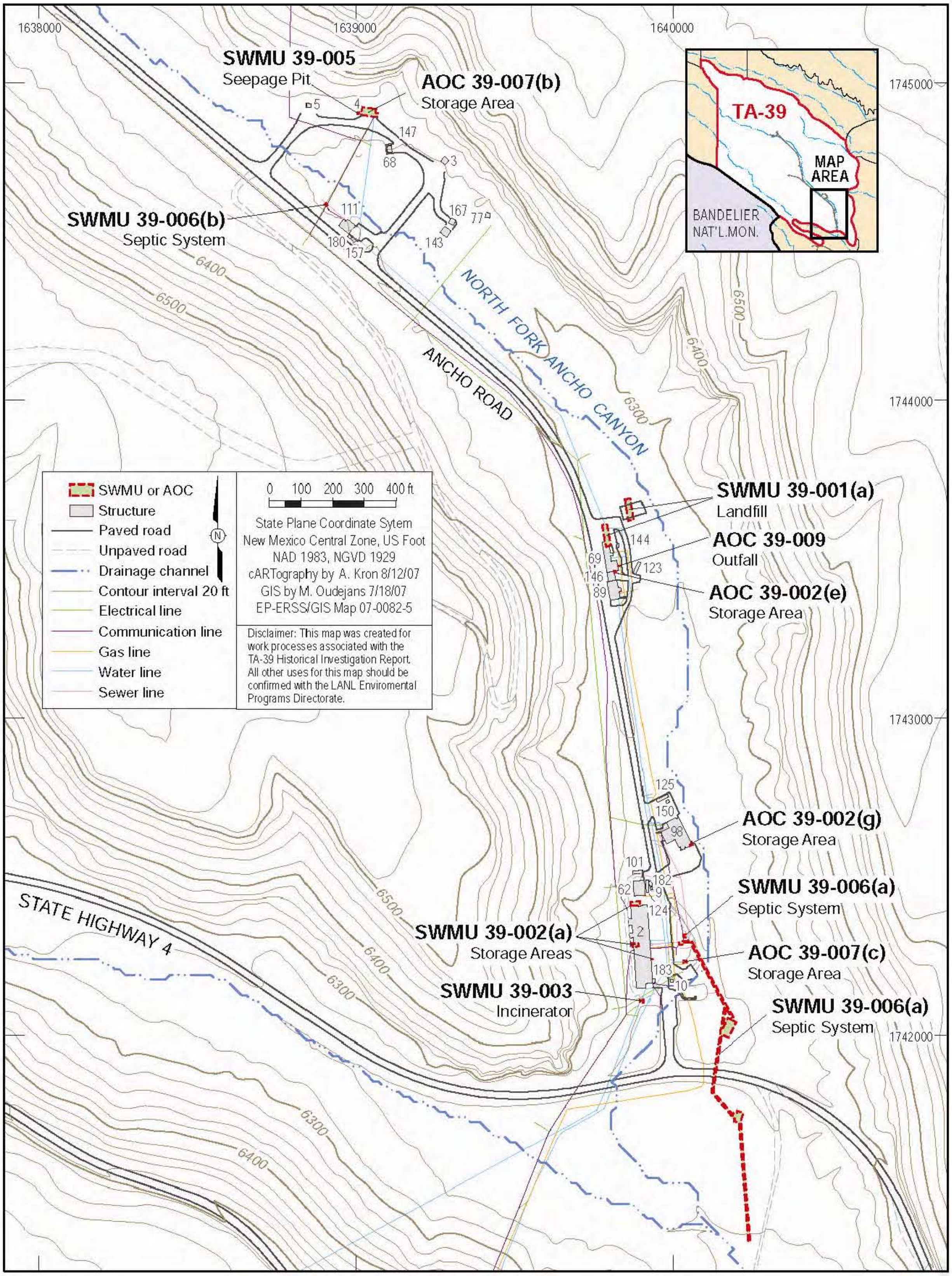


Figure 1.1-3 Location of Subaggregate Area 3

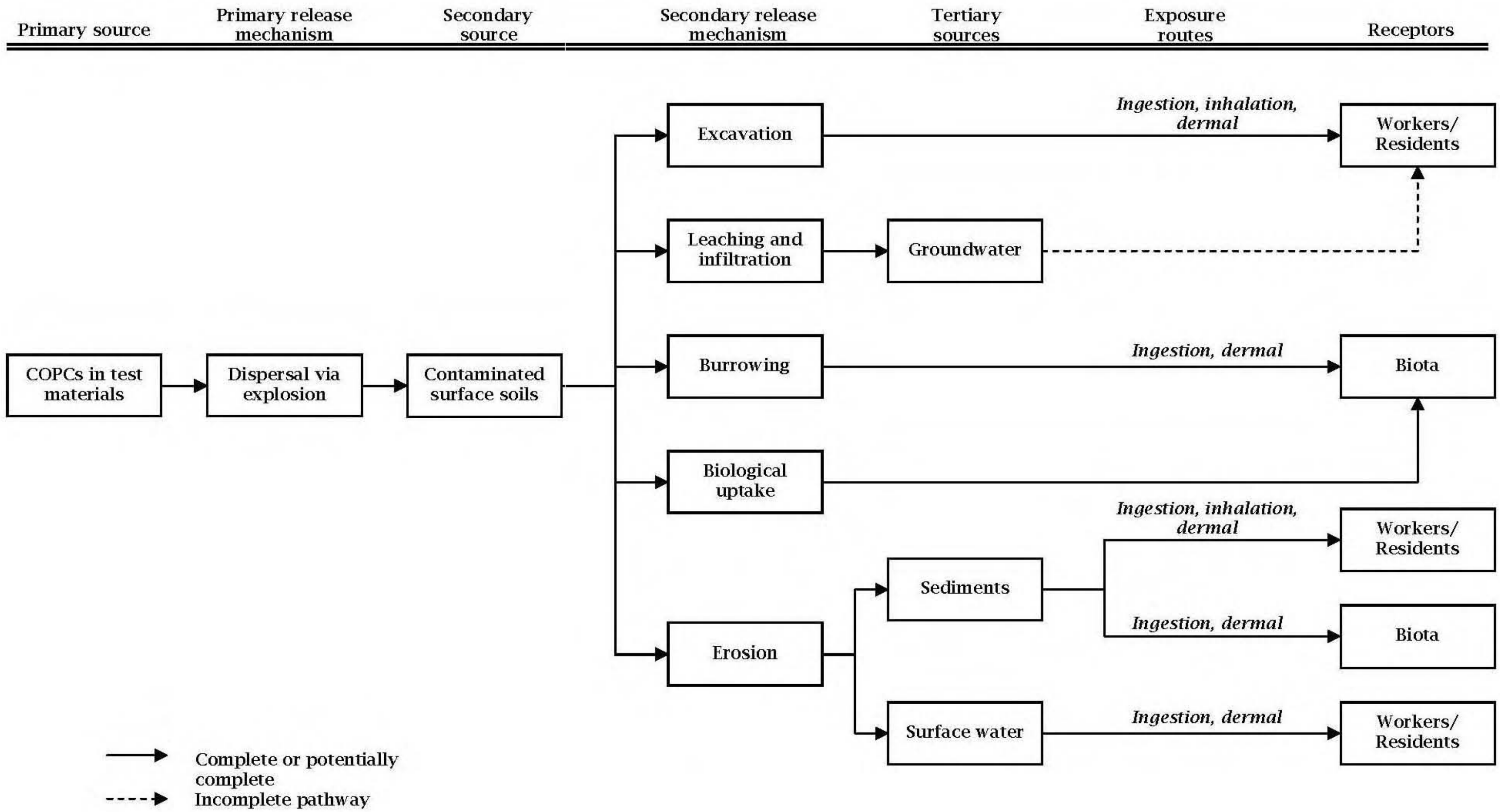


Figure 1.2-1 CSM for firing sites

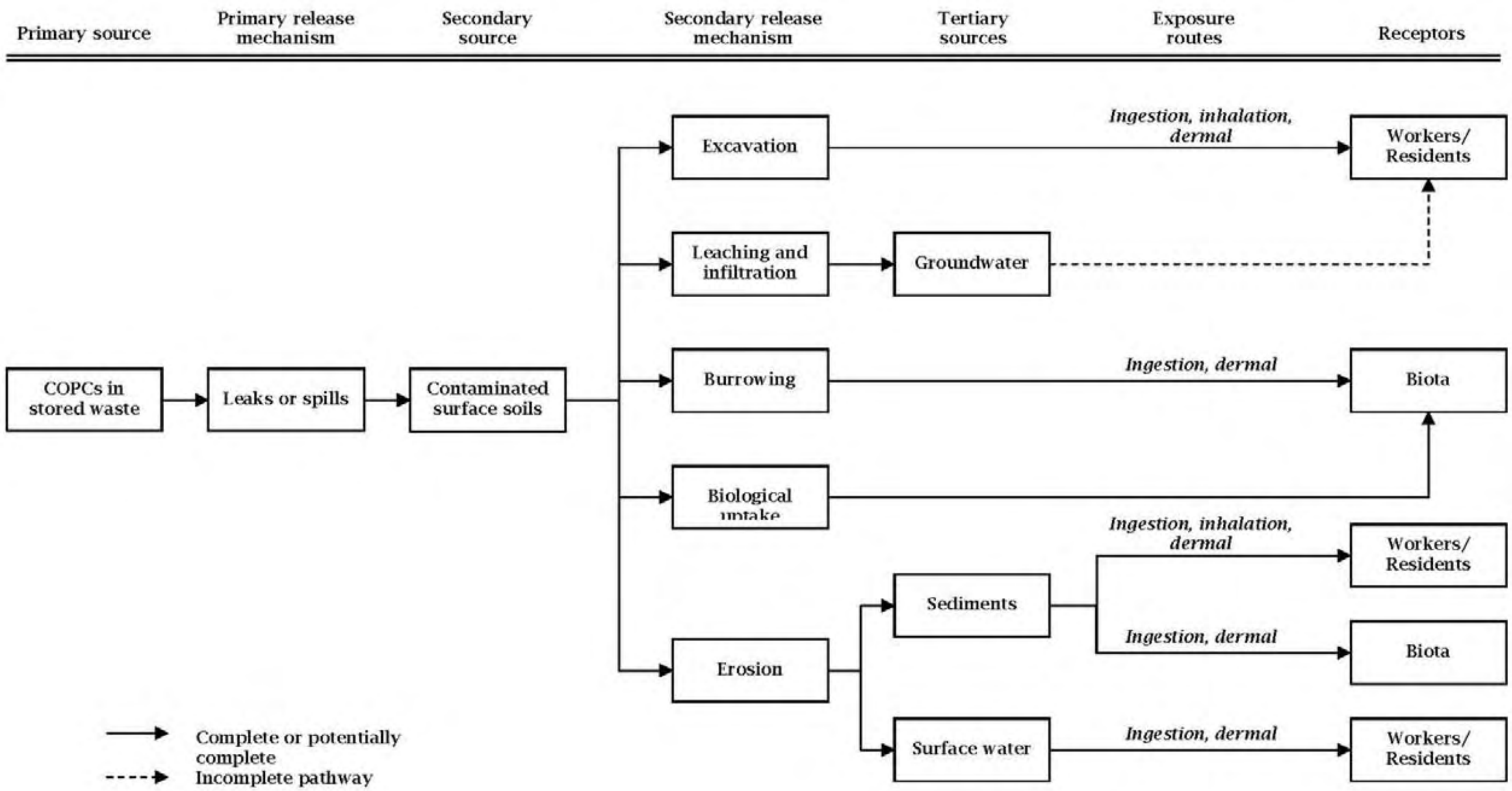


Figure 1.2-2 CSM for storage areas

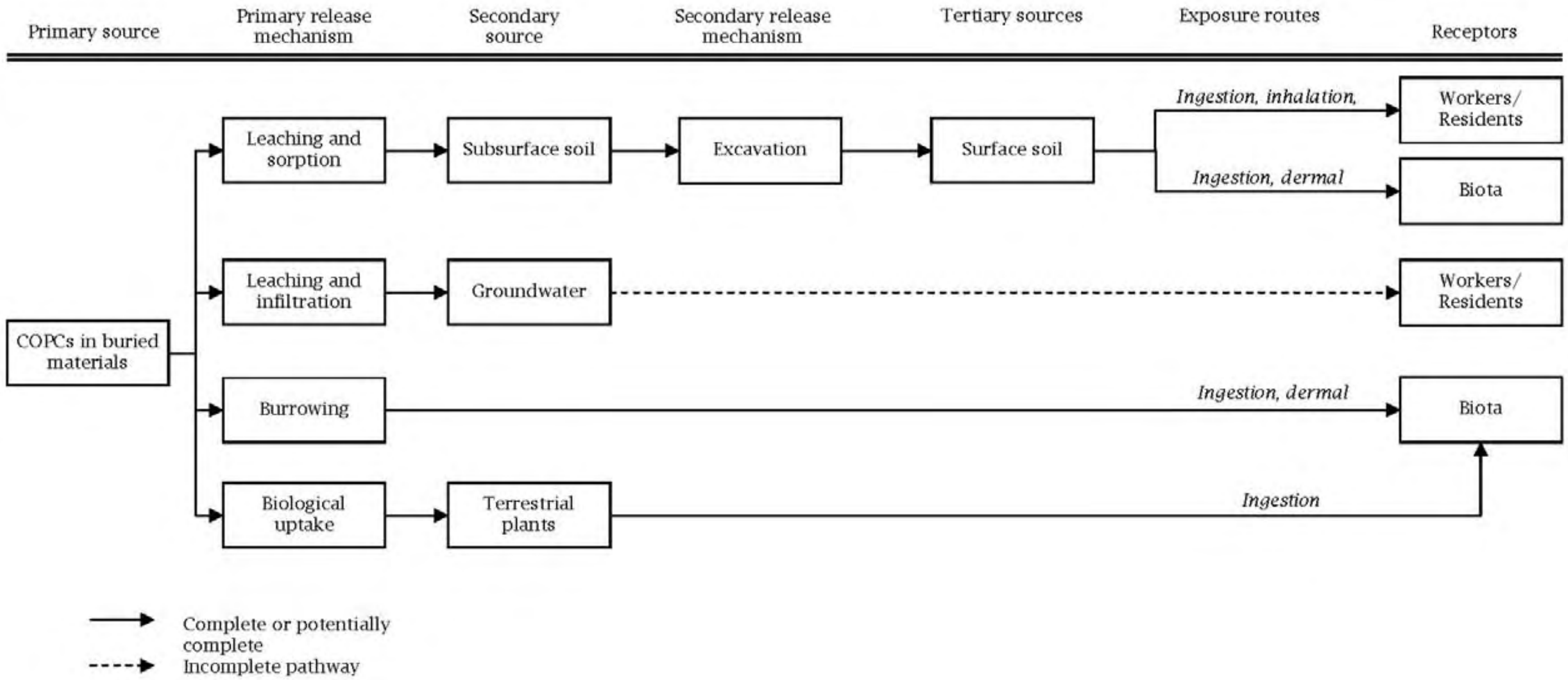


Figure 1.2-3 CSM for buried material sites

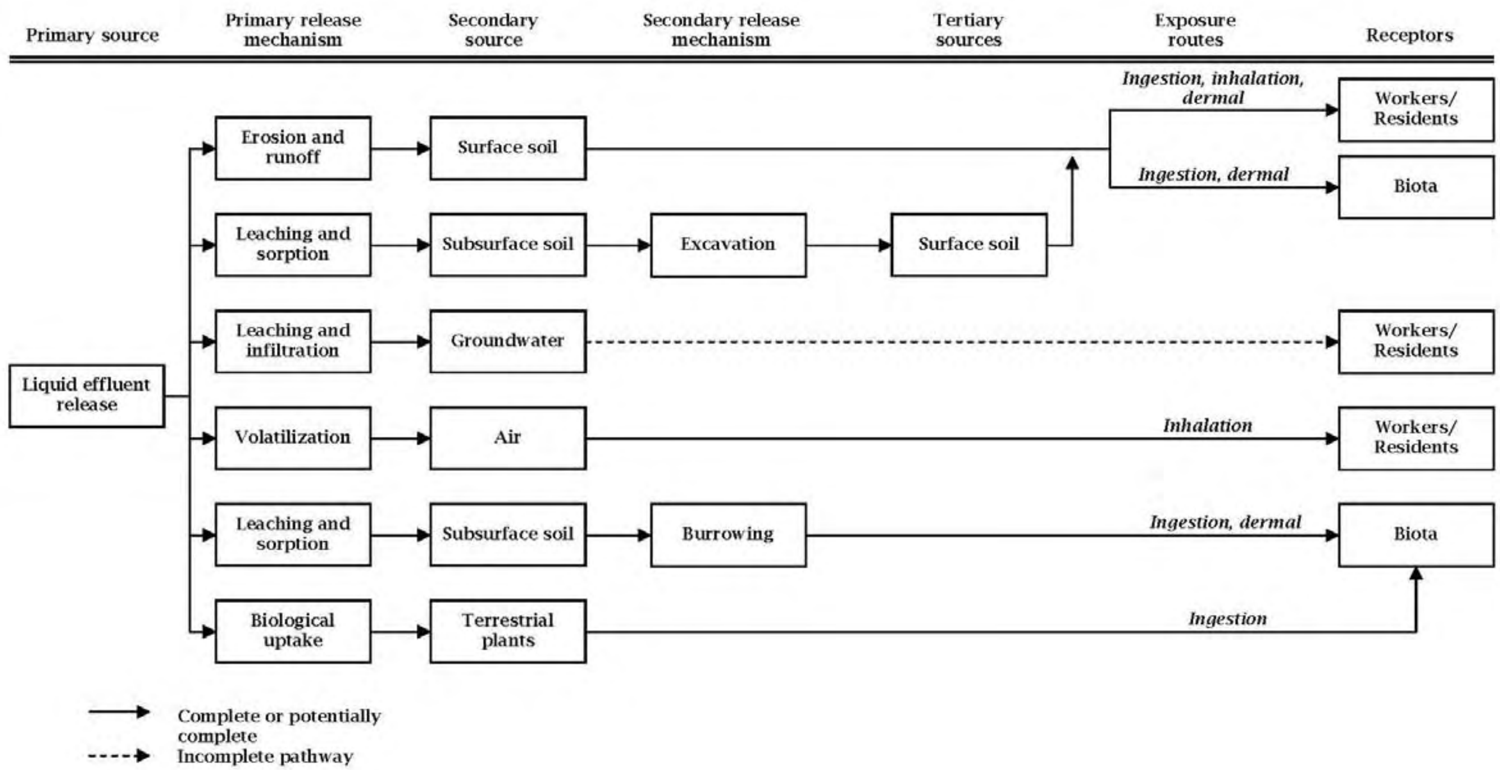


Figure 1.2-4 CSM for liquid effluent release sites

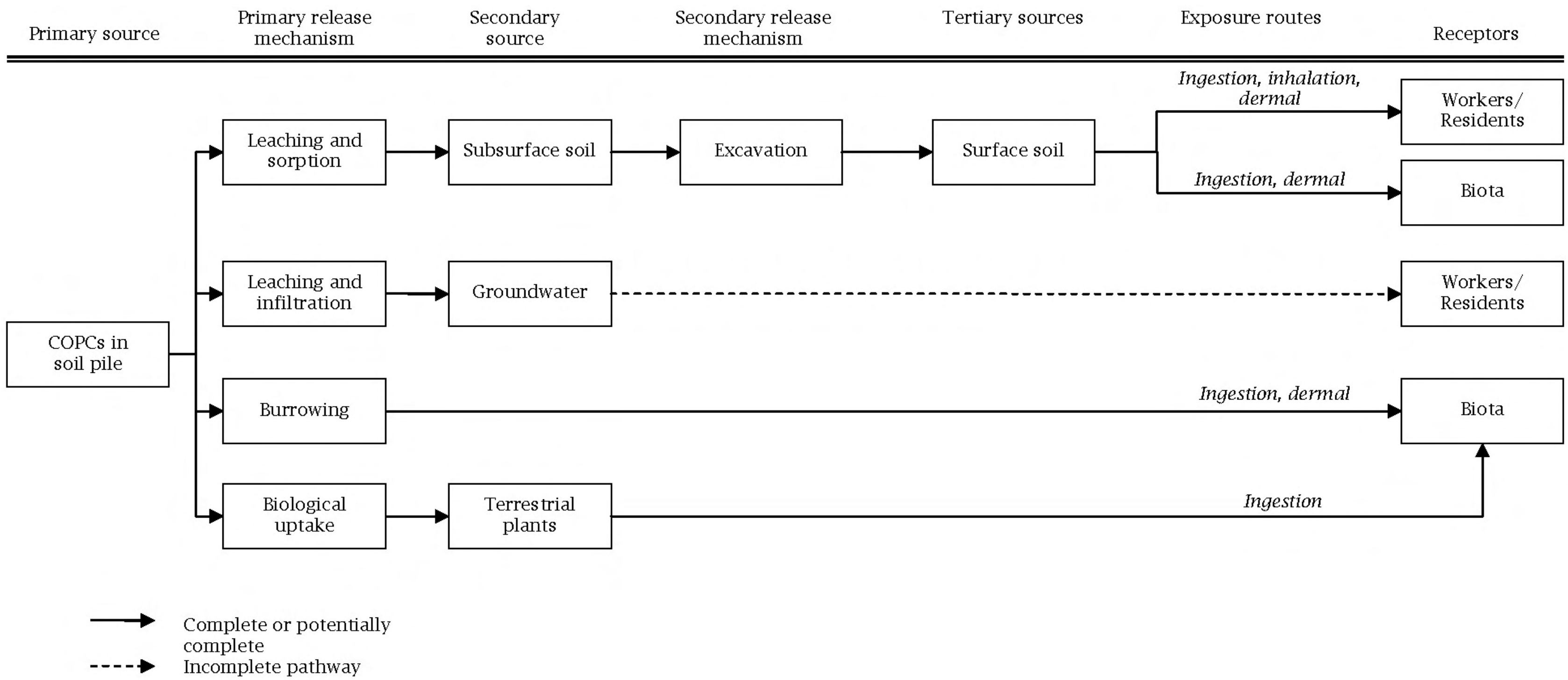


Figure 1.2-5 CSM for soil piles

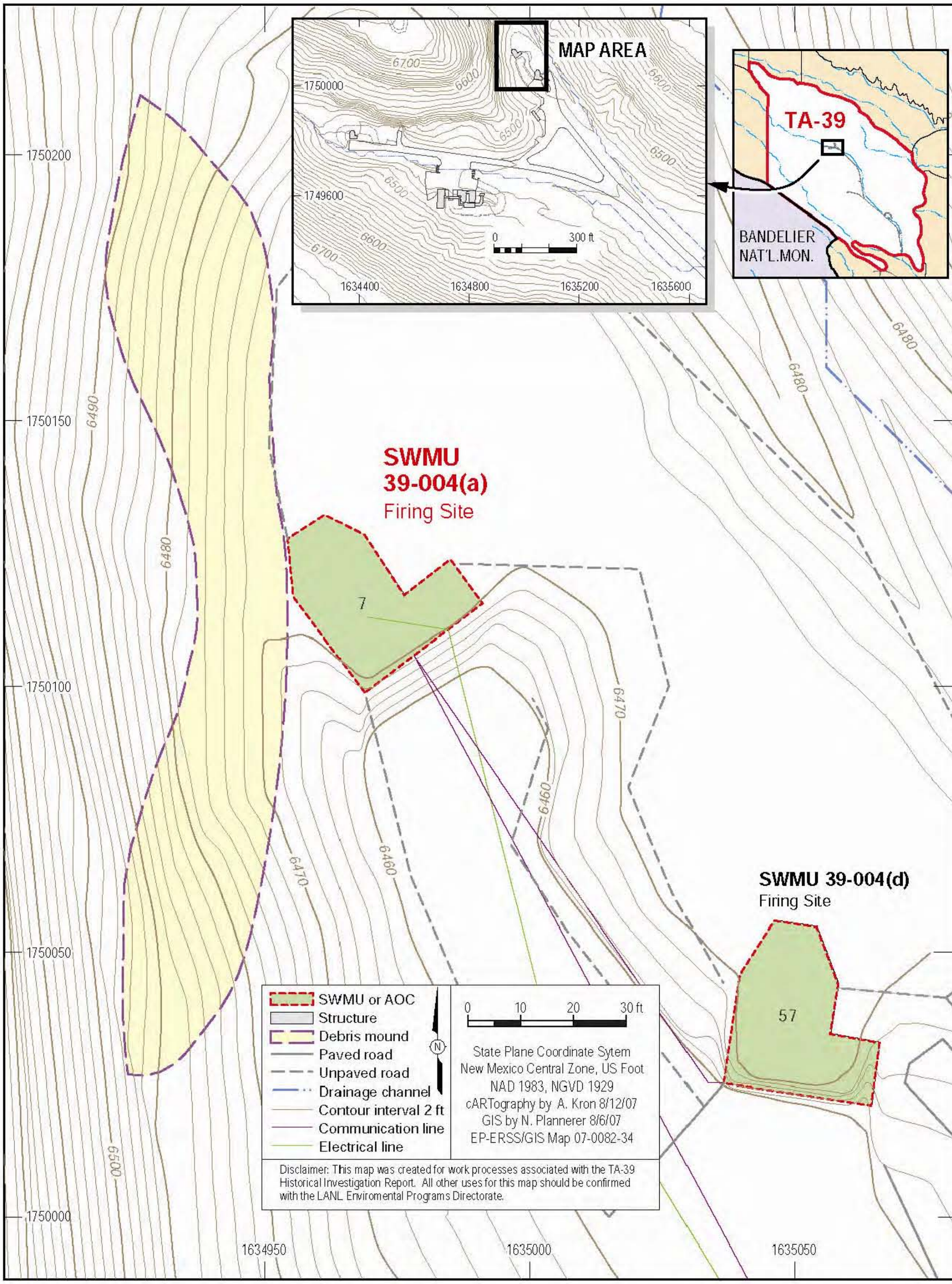


Figure 2.1-1 Location of SWMU 39-004(a), firing site

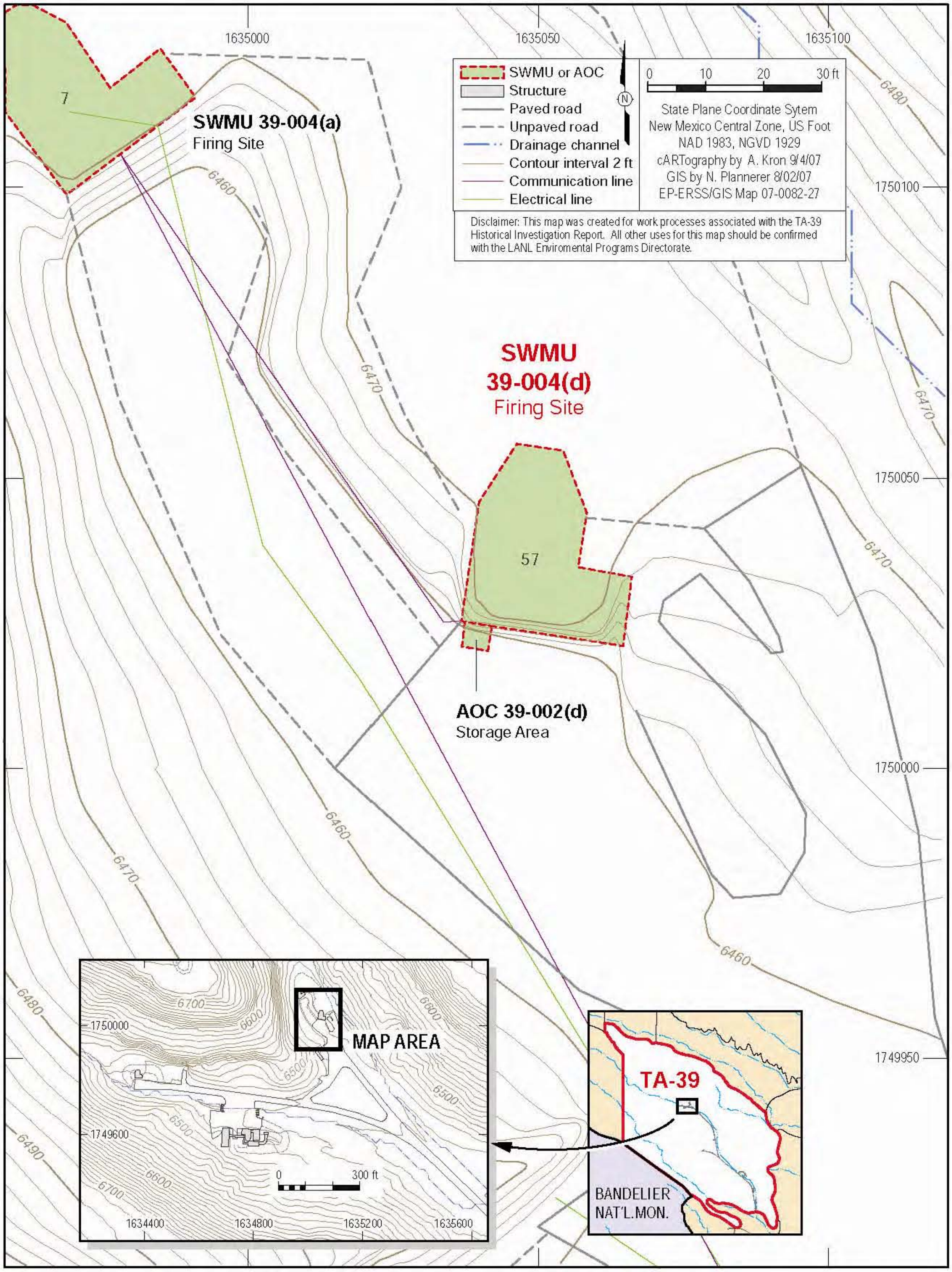


Figure 2.1-2 Location of SWMU 39-004(d), firing site

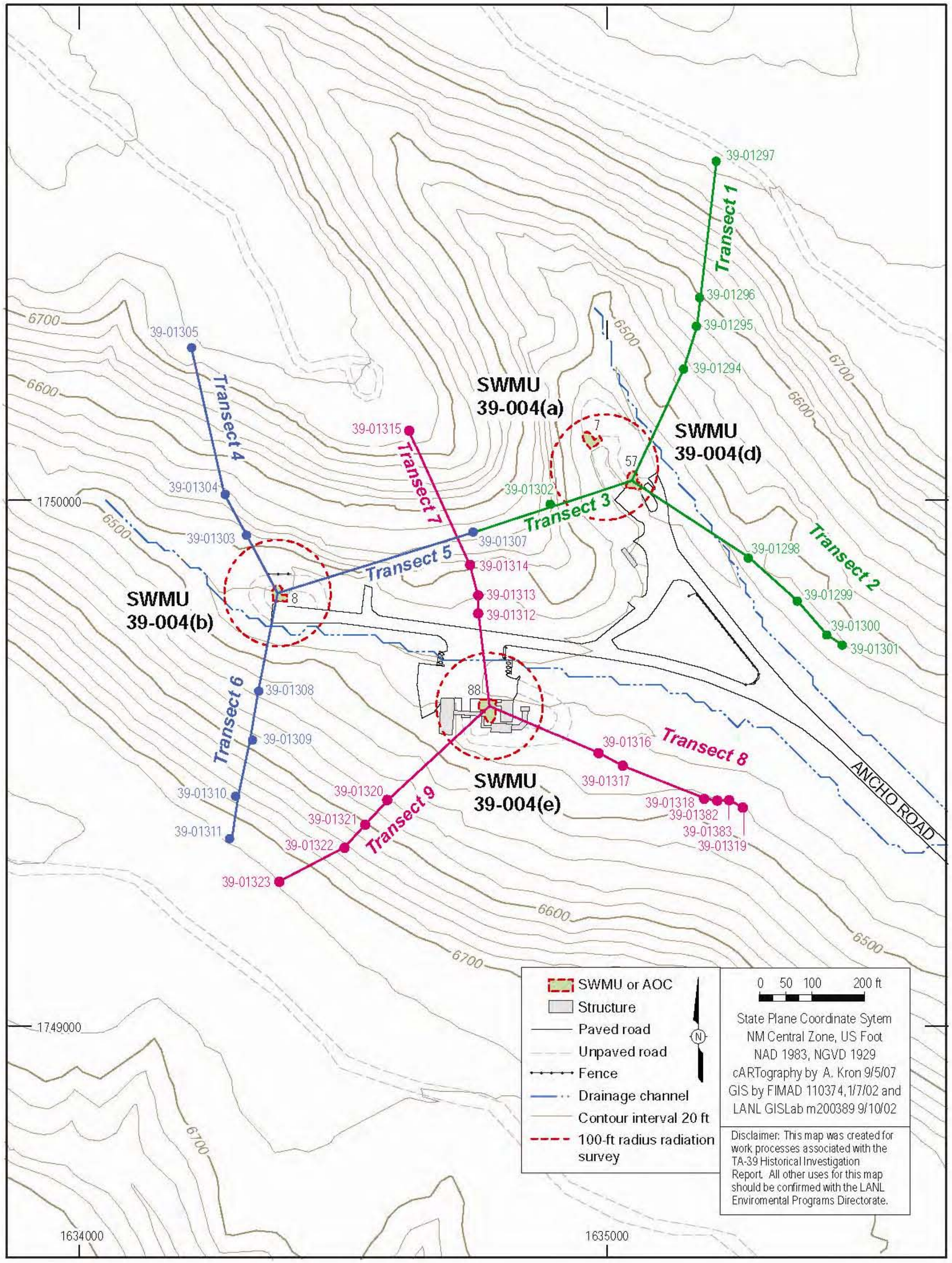


Figure 2.1-3 Transect sampling locations for firing sites SWMU-39-004(a), SWMU-39-004(b), SWMU-39-004(d), and SWMU-39-004(e)

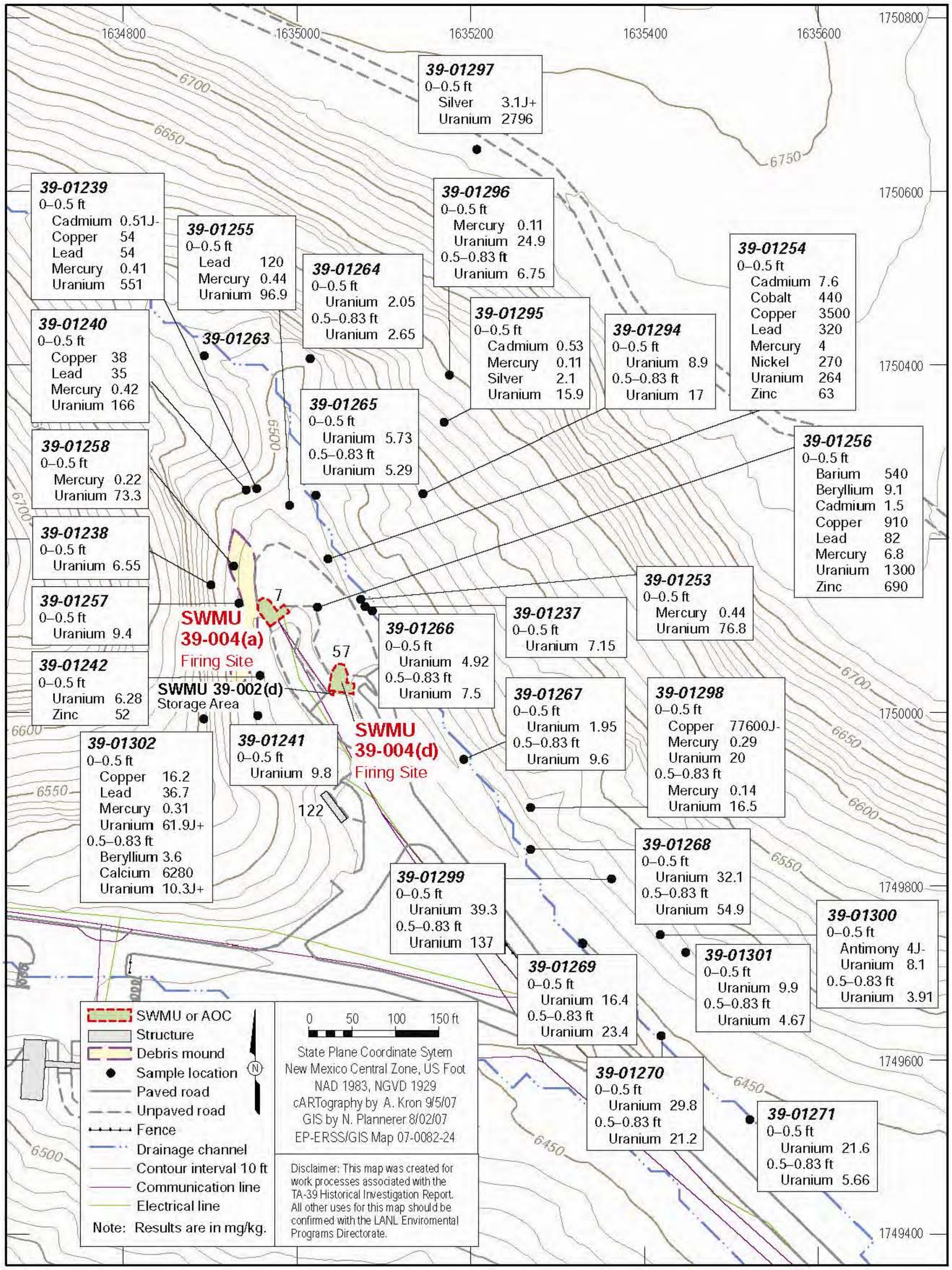


Figure 2.1-4 Inorganic chemicals detected above BVs at SWMU 39-004(a) and SWMU 39-004(d)

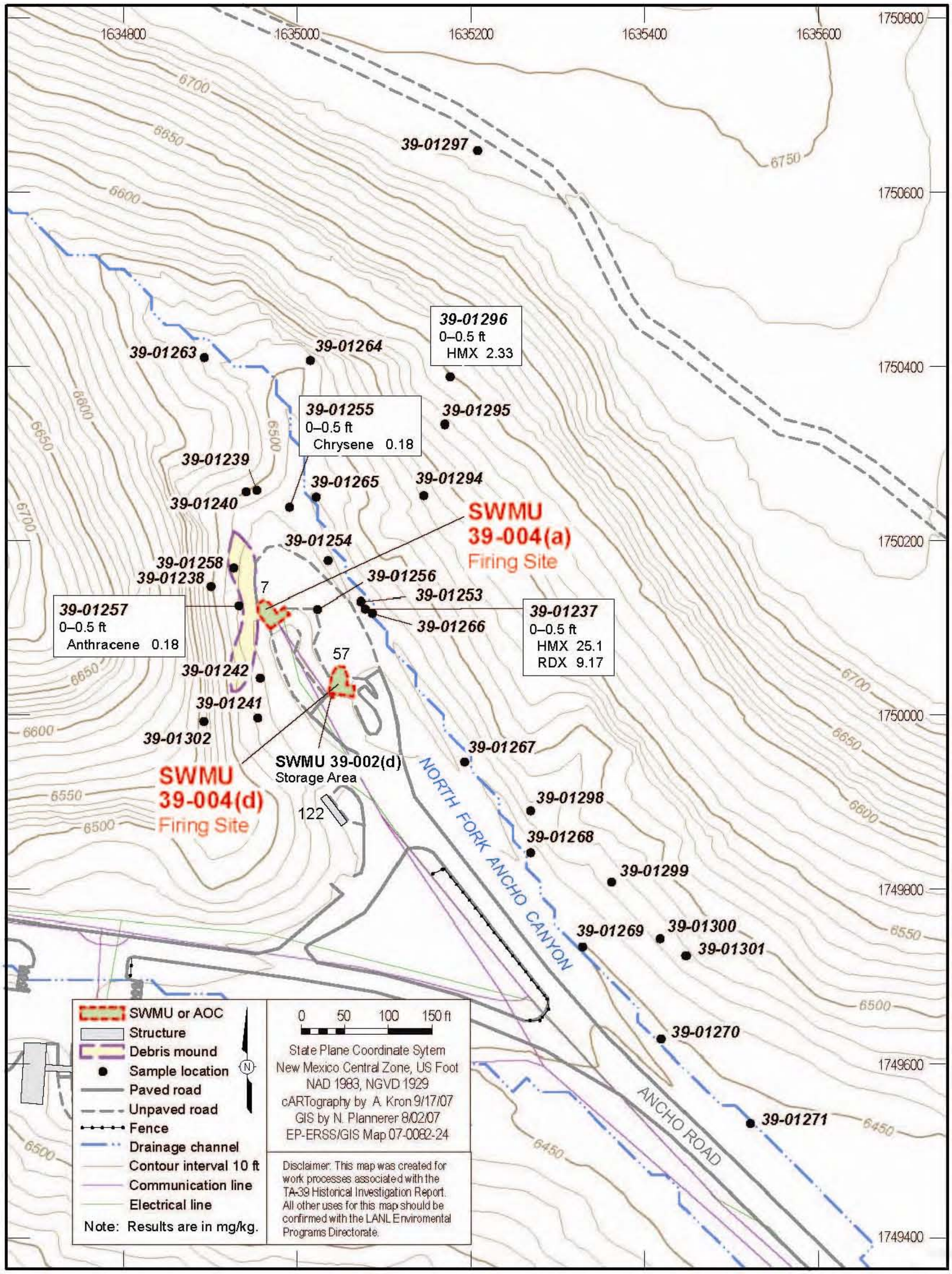


Figure 2.1-5 Organic chemicals detected at SWMU 39-004(a) and SWMU 39-004(d)

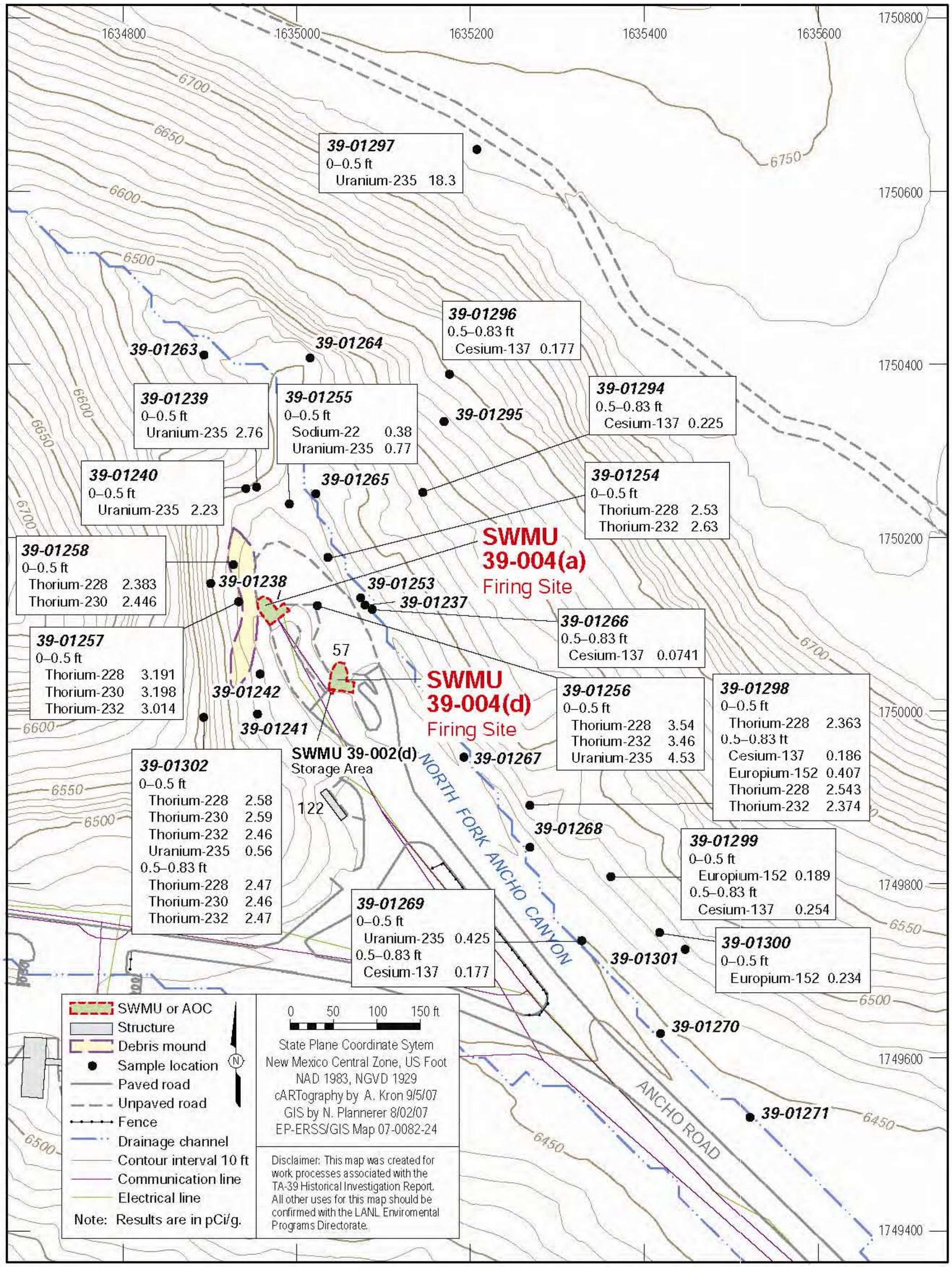


Figure 2.1-6 Radionuclides detected or detected above BVs/FVs at SWMU 39-004(a) and SWMU 39-004(d)

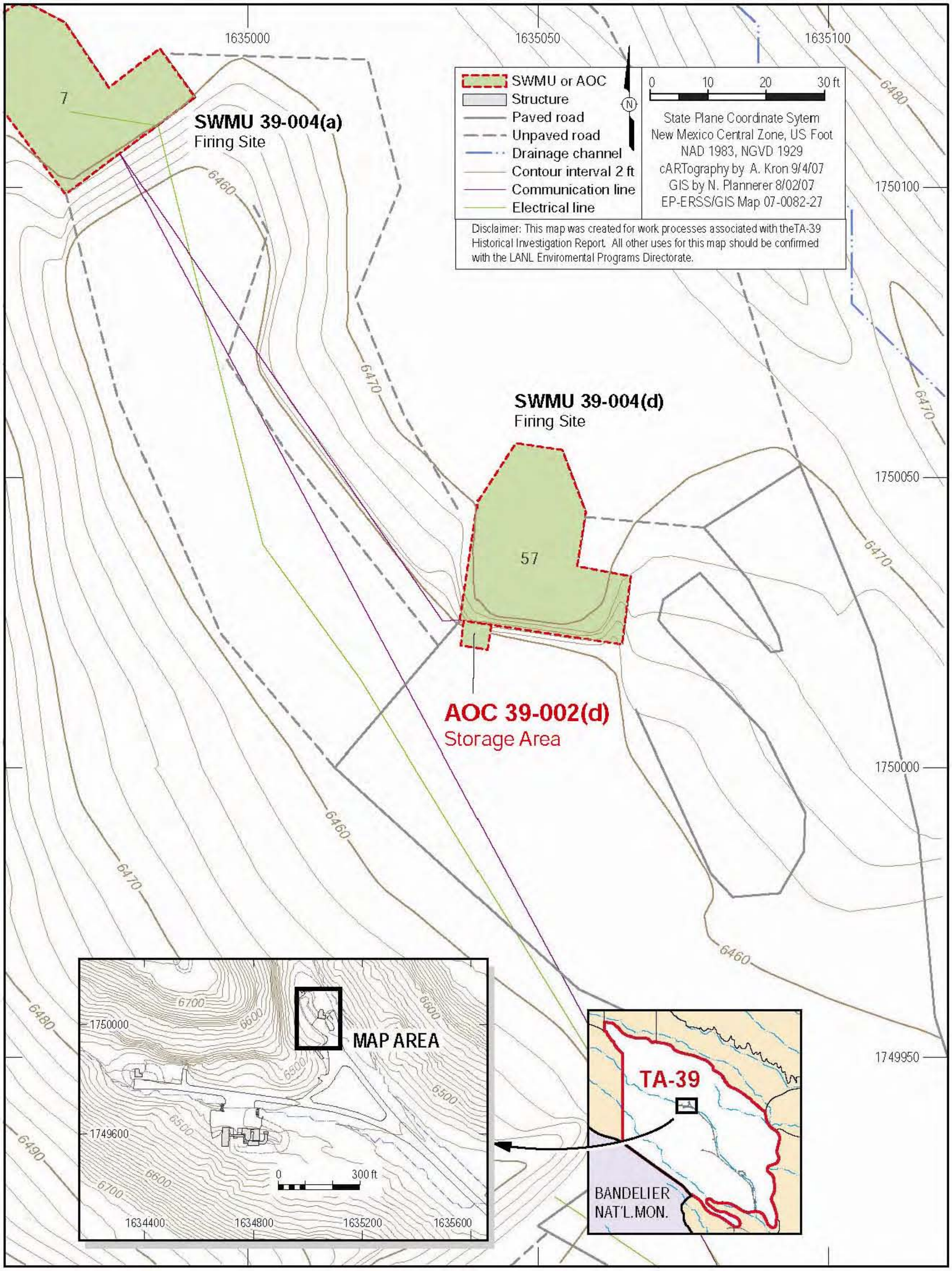


Figure 2.1-7 Location of AOC 39-002(d), storage area

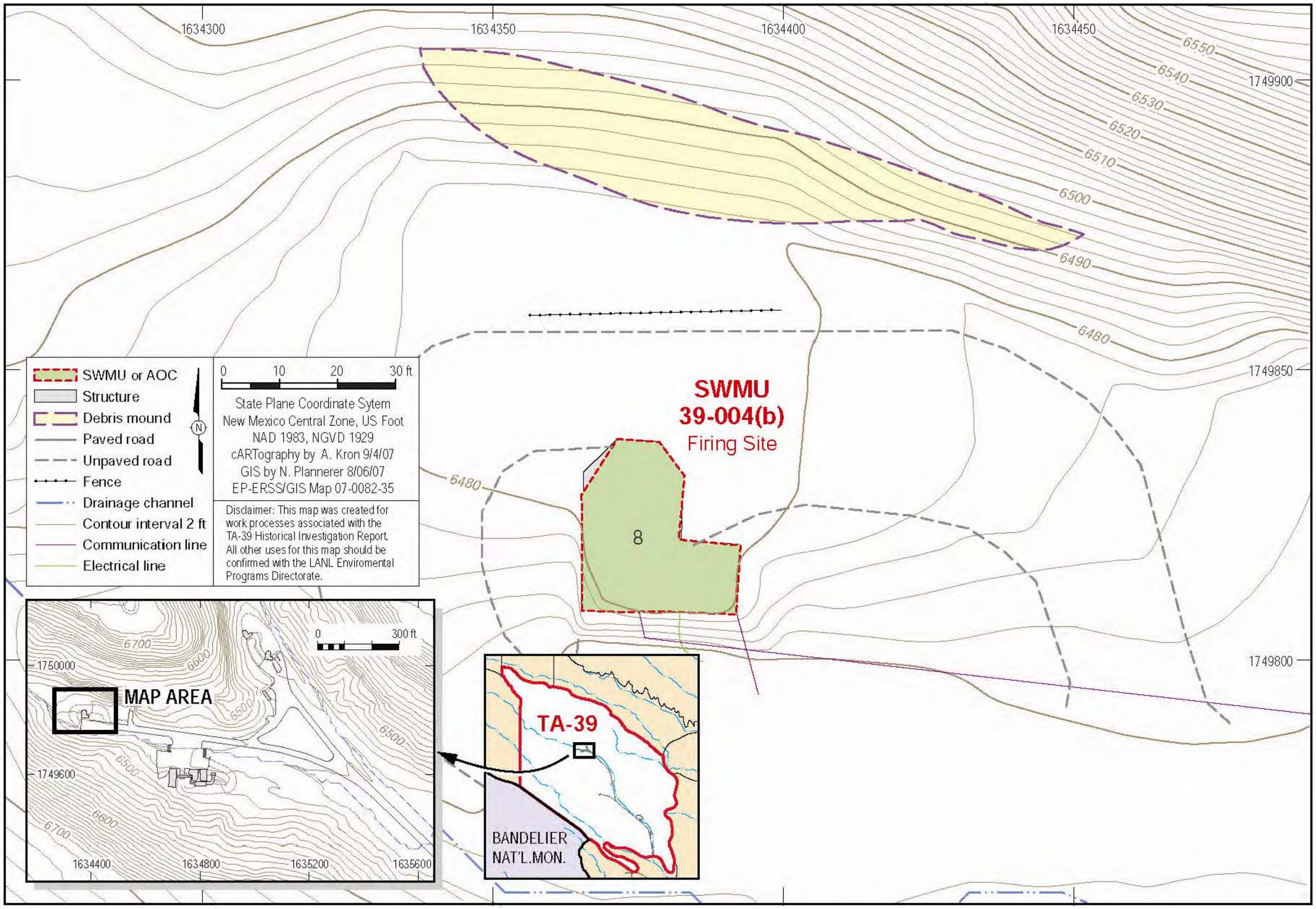


Figure 2.1-8 Location of SWMU 39-004(b), firing site

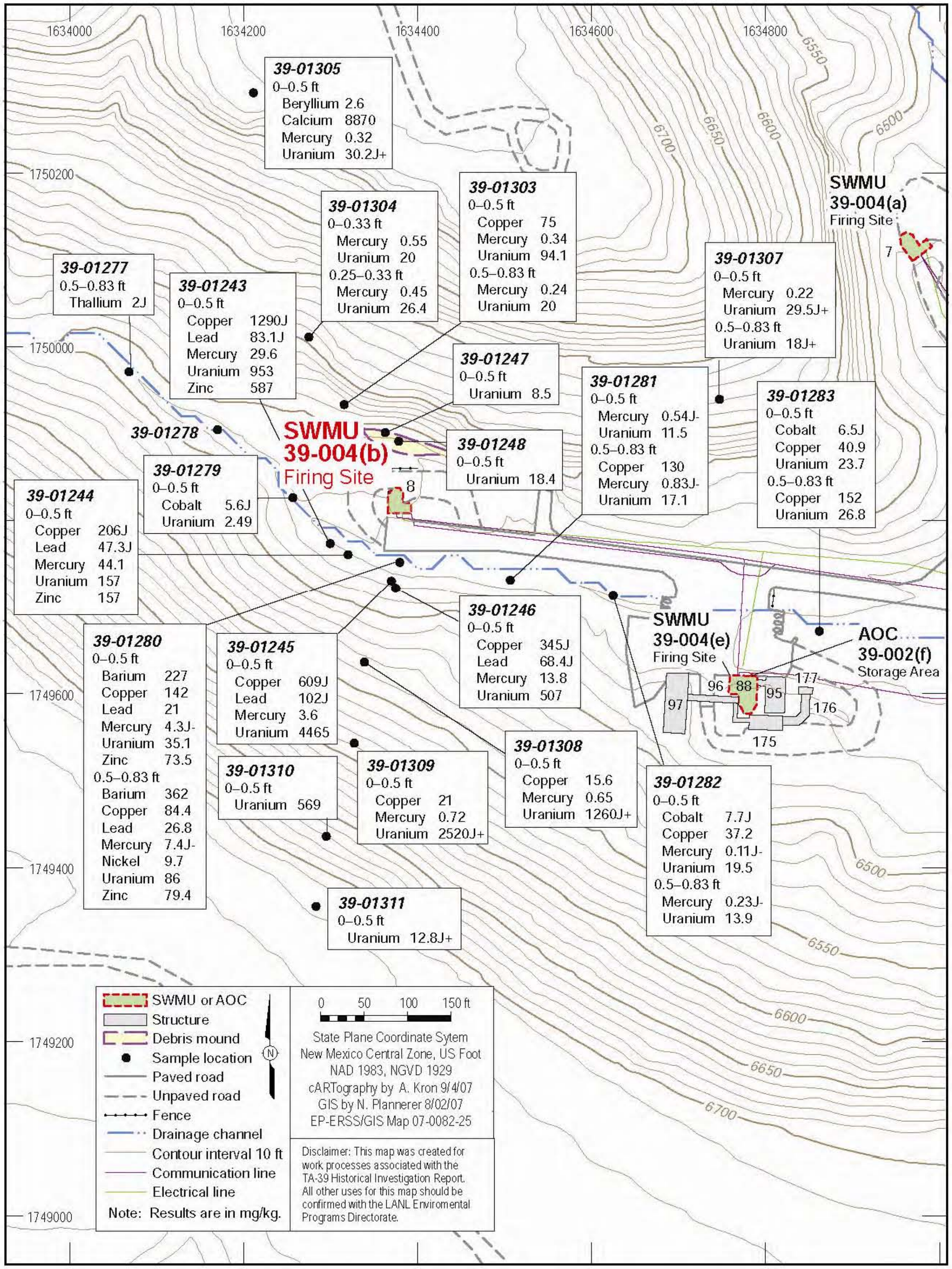


Figure 2.1-9 Inorganic chemicals detected above BVs at SWMU 39-004(b)

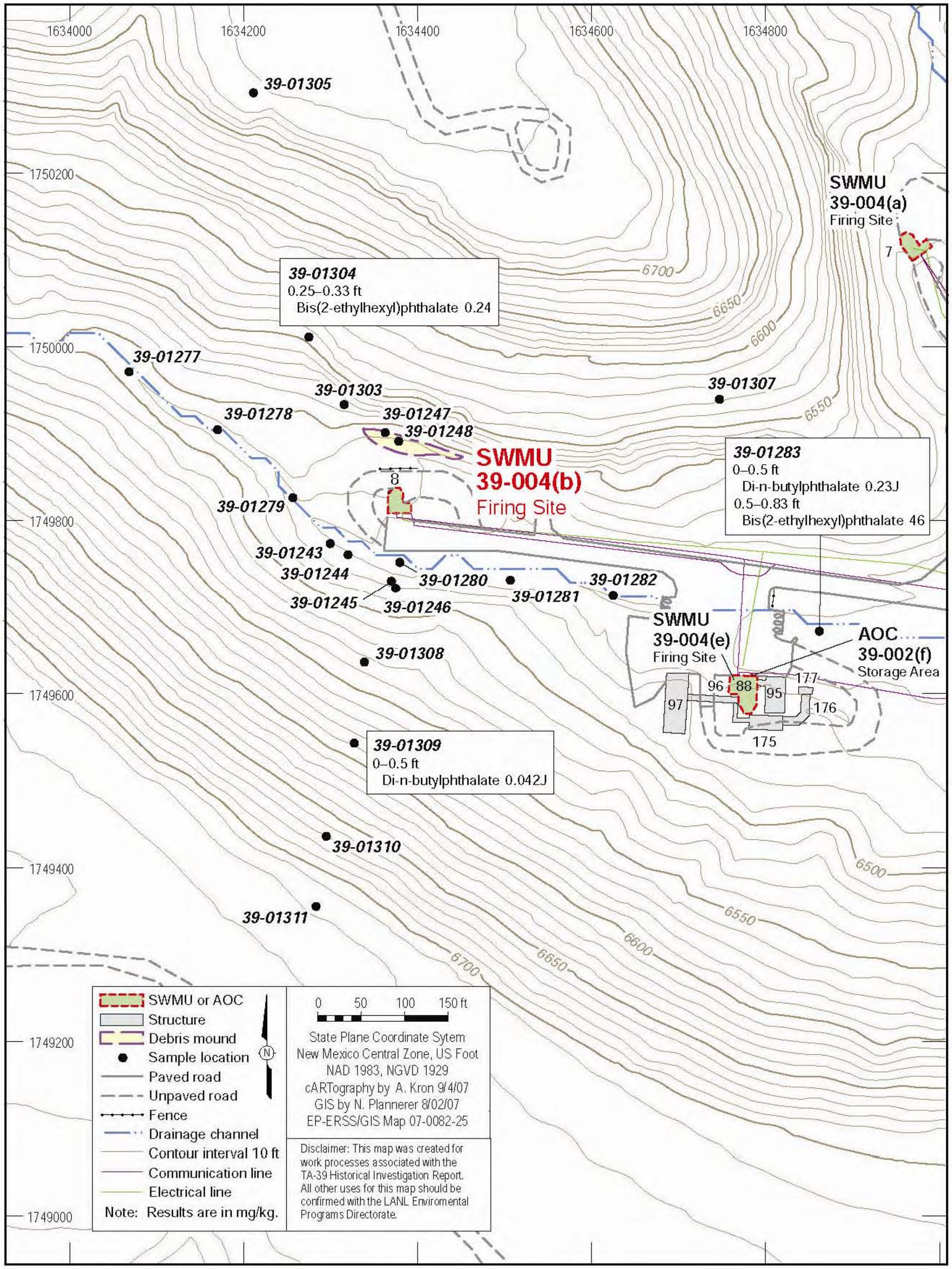


Figure 2.1-10 Organic chemicals detected at SWMU 39-004(b)

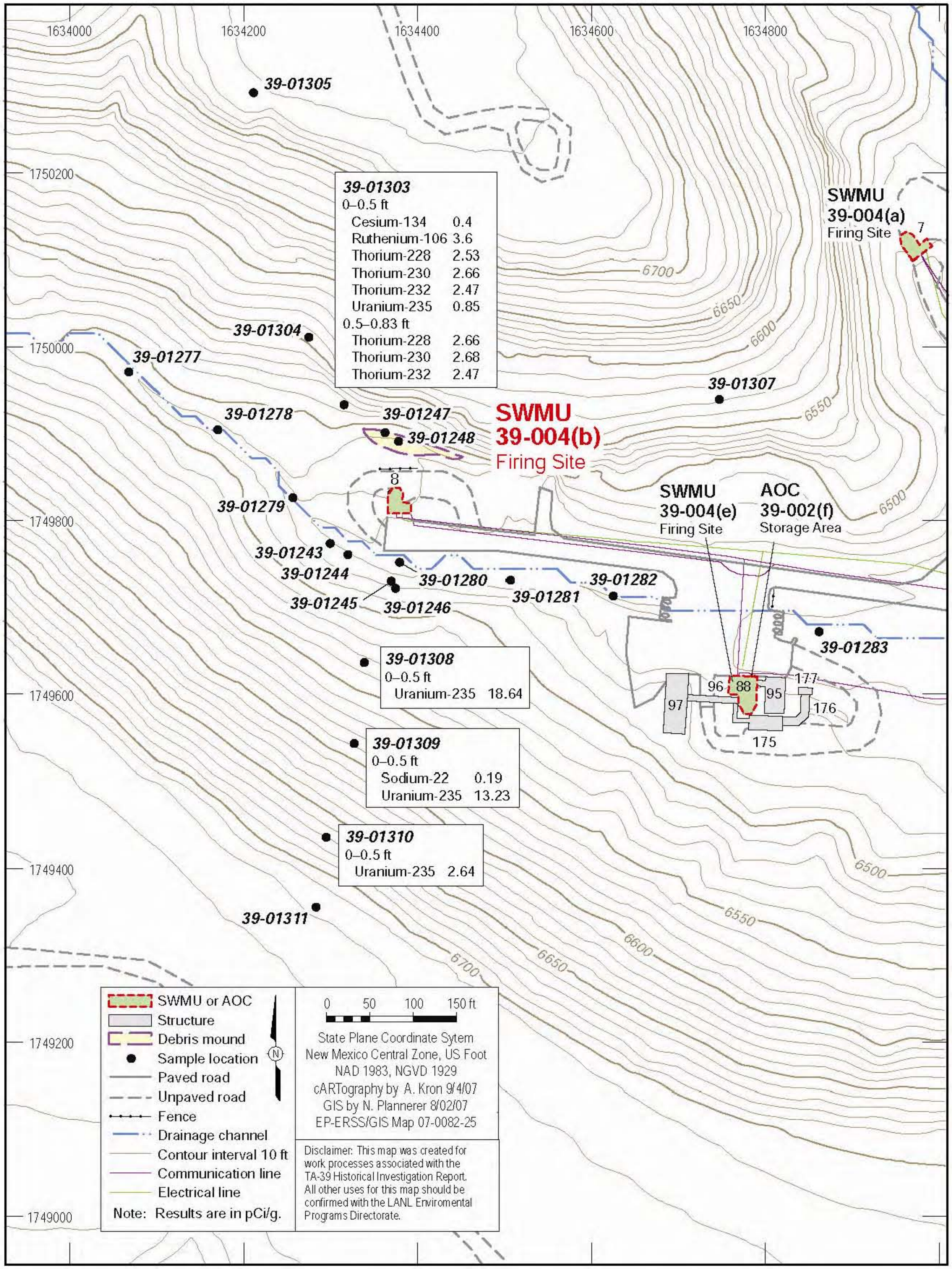


Figure 2.1-11 Radionuclides detected or detected above BVs/FVs at SWMU 39-004(b)

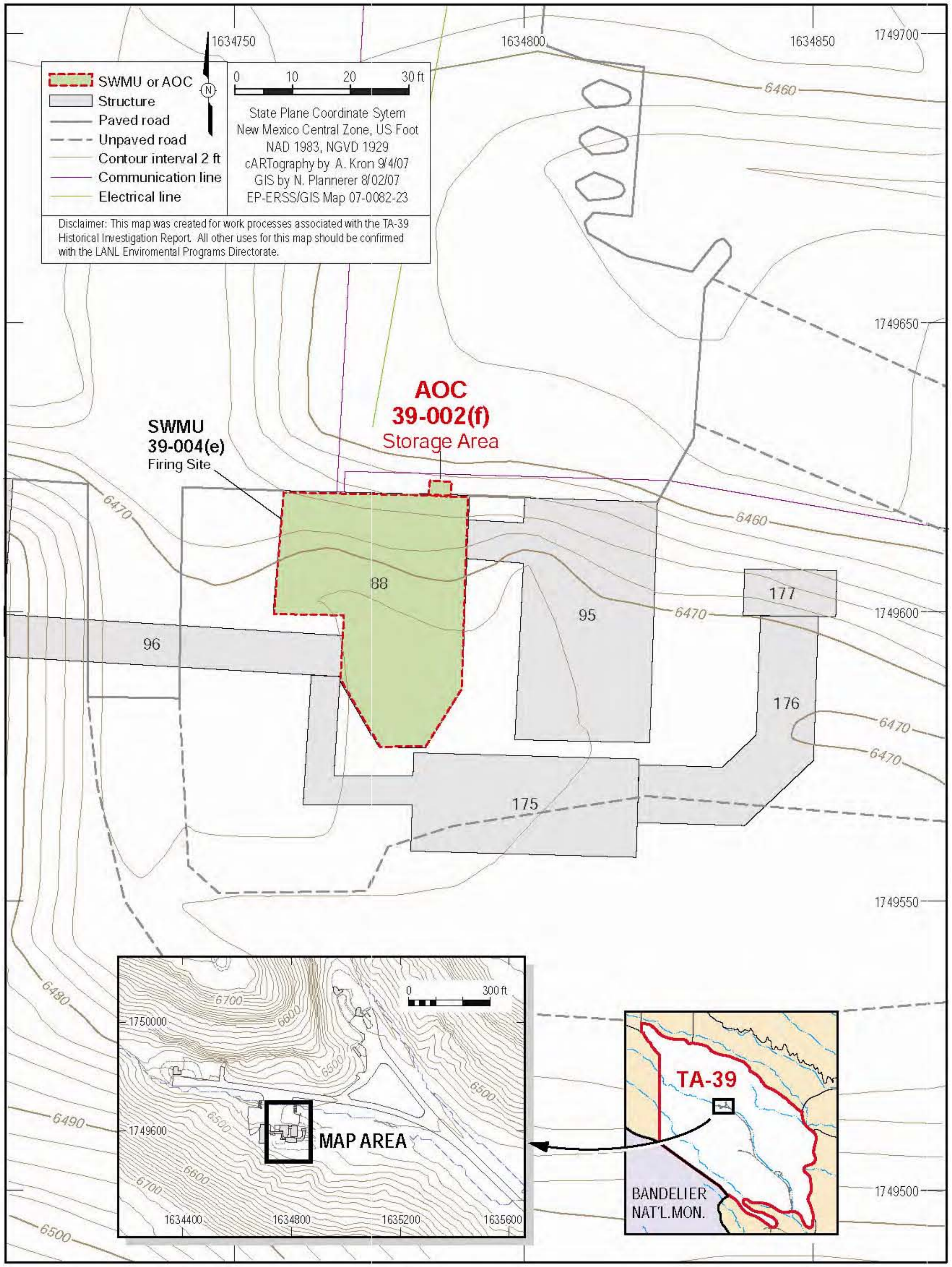


Figure 2.1-12 Location of AOC 39-002(f), storage area

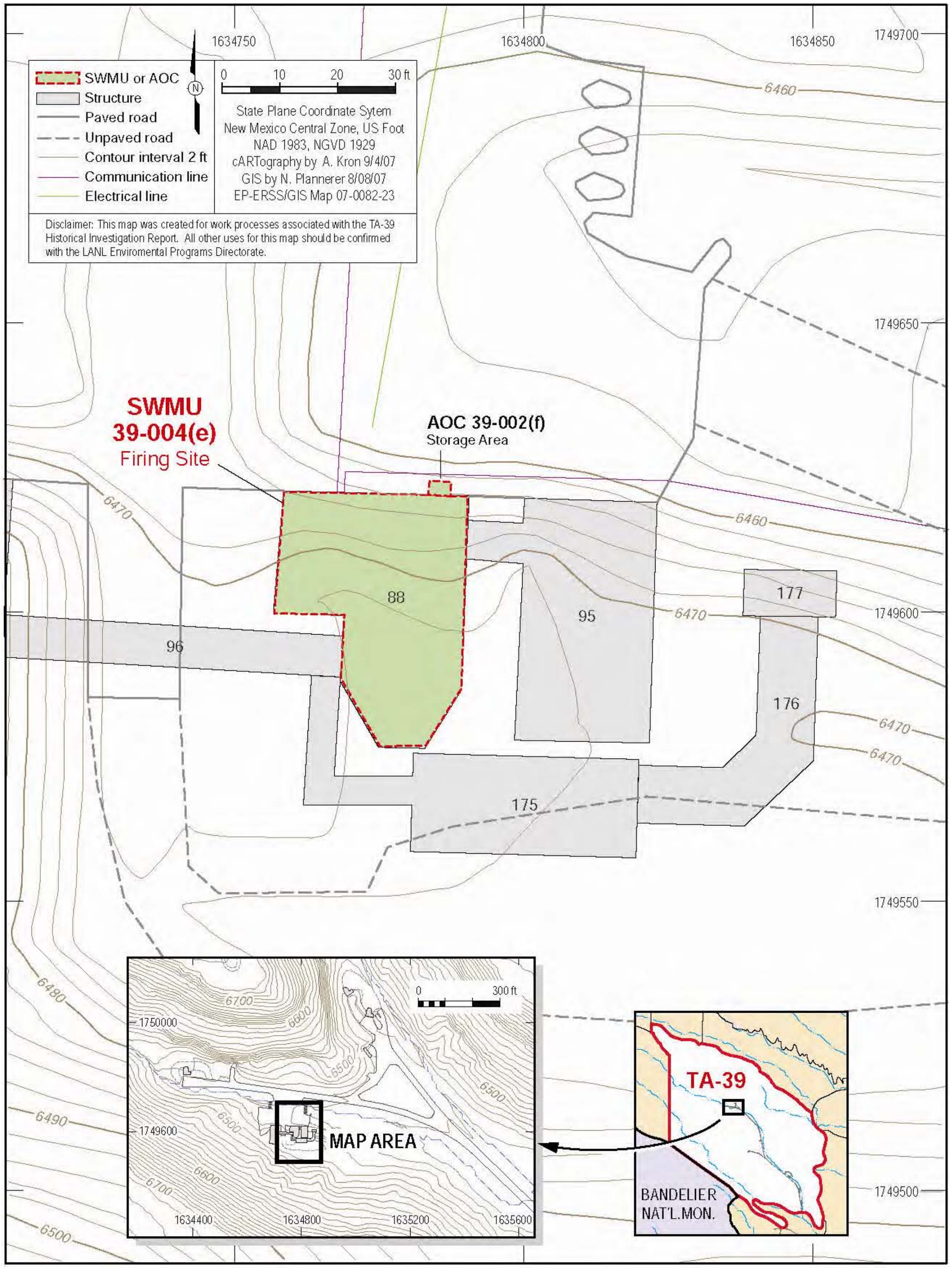


Figure 2.1-13 Location of SWMU 39-004(e), firing site

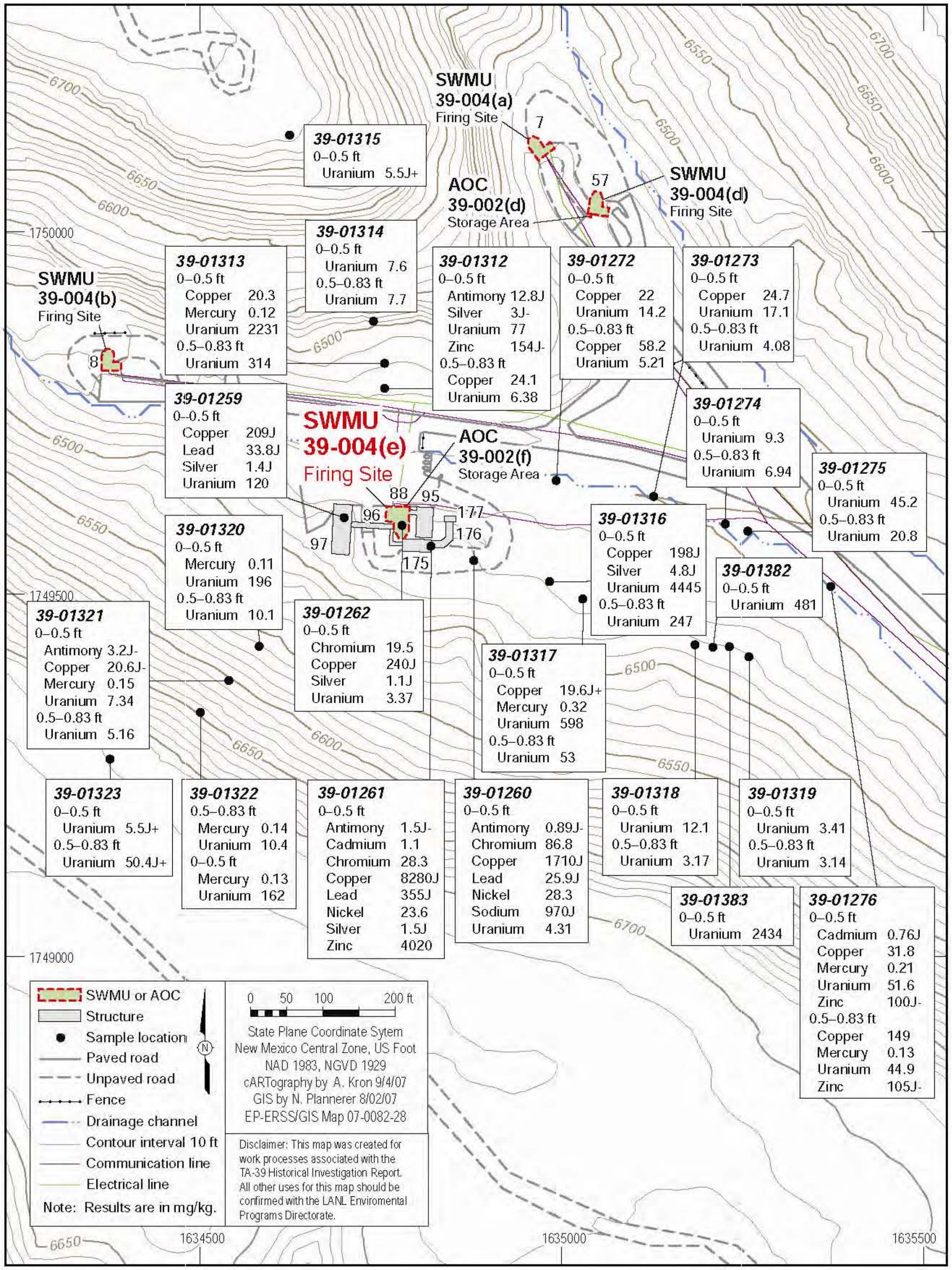


Figure 2.1-14 Inorganic chemicals detected above BVs at SWMU 39-004(e)

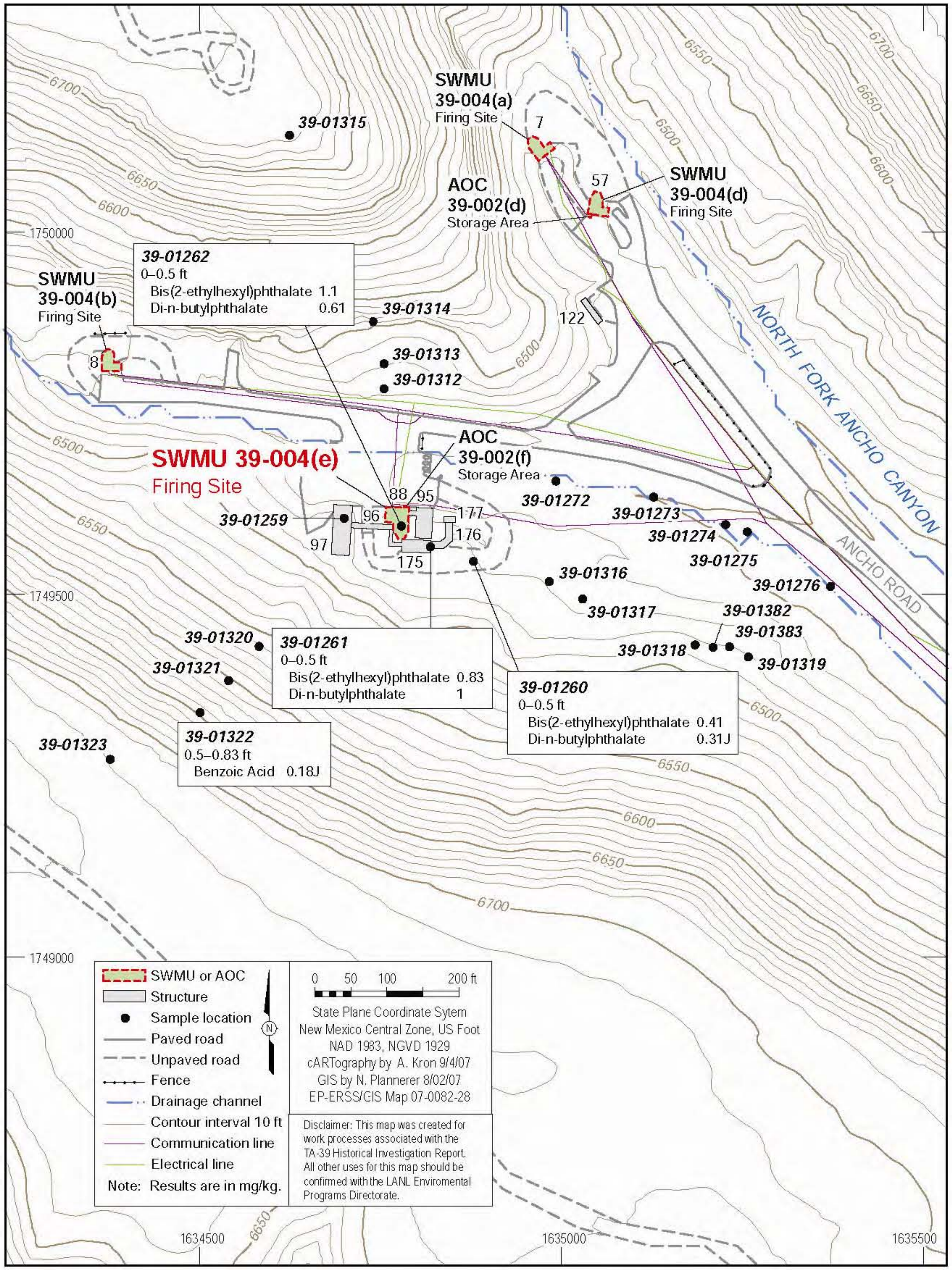


Figure 2.1-15 Organic chemicals detected at SWMU 39-004(e)

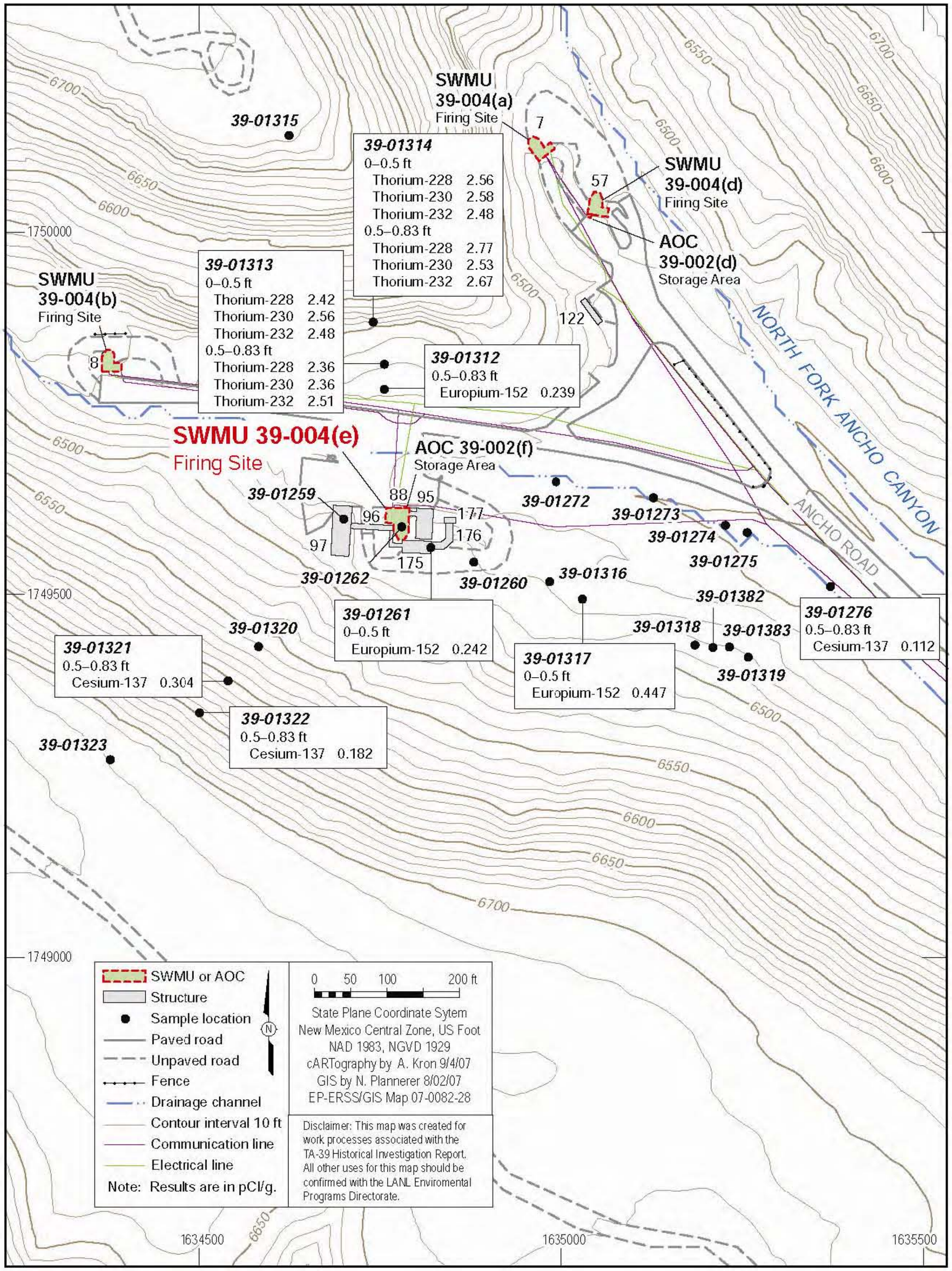


Figure 2.1-16 Radionuclides detected or detected above BVs/FVs at SWMU 39-004(e)

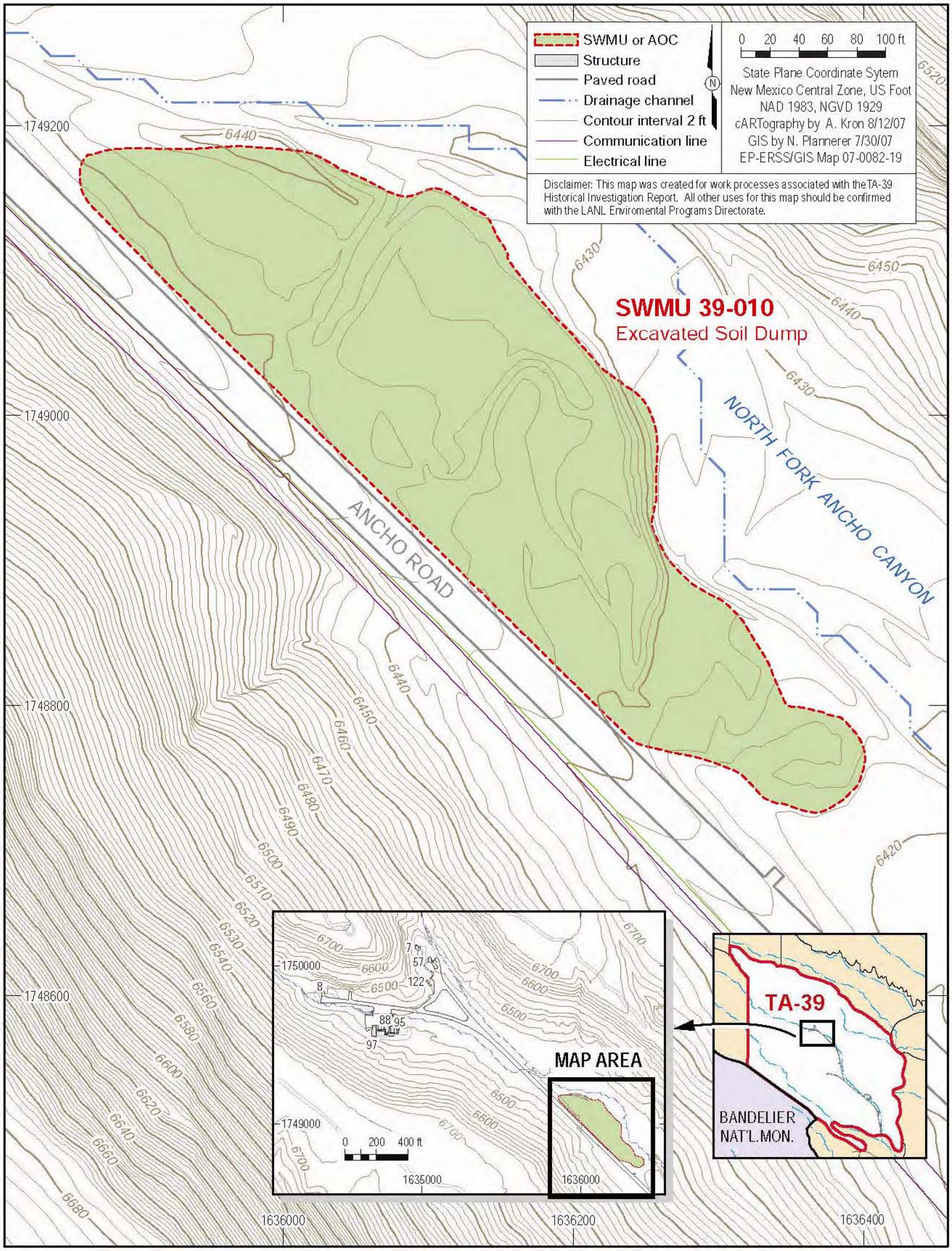


Figure 2.1-17 Location of SWMU 39-010, excavated soil dump

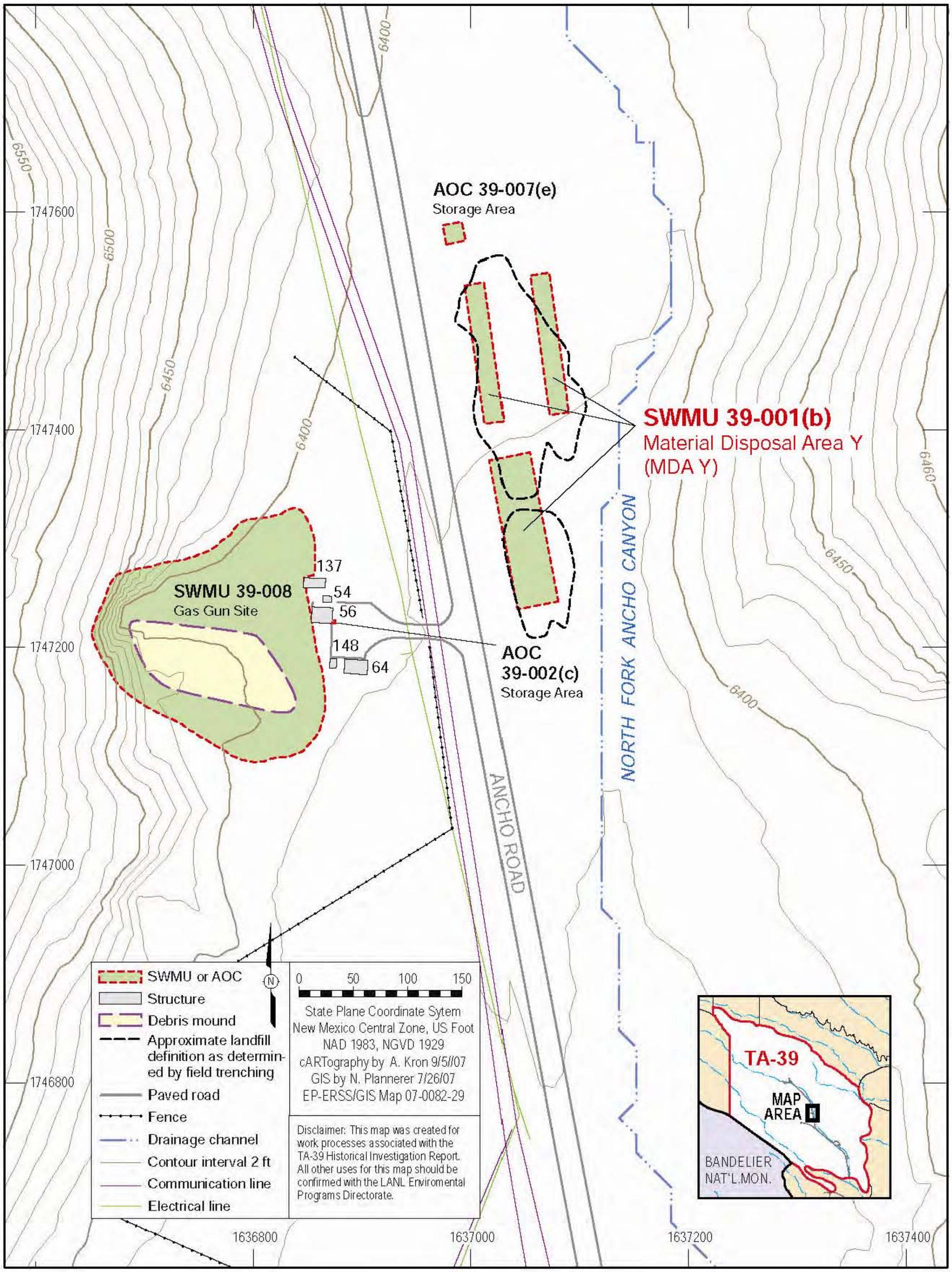


Figure 2.2-1 Location of SWMU 39-001(b), MDA Y

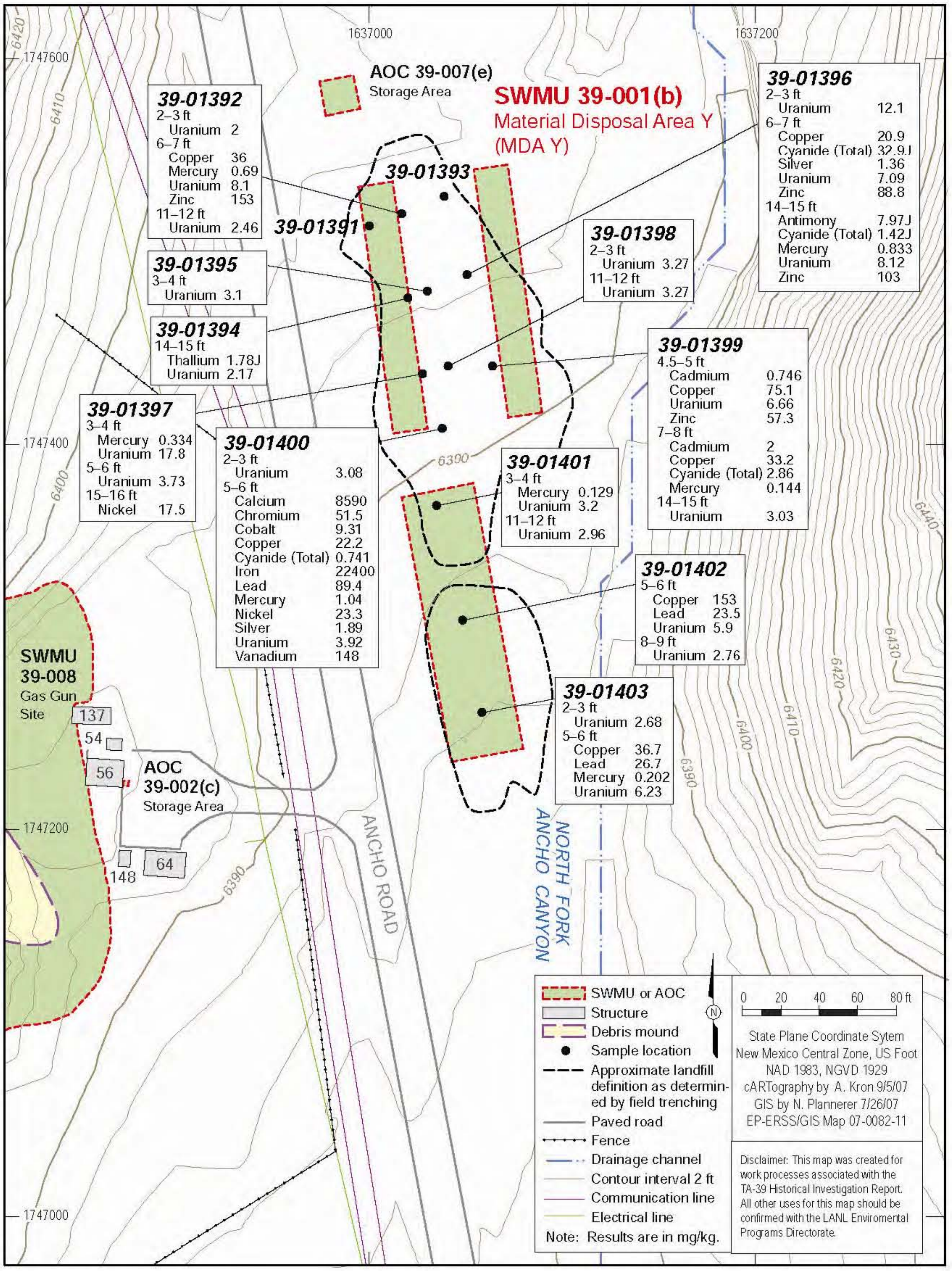


Figure 2.2-2 Inorganic chemicals detected above BVs at SWMU 39-001(b)

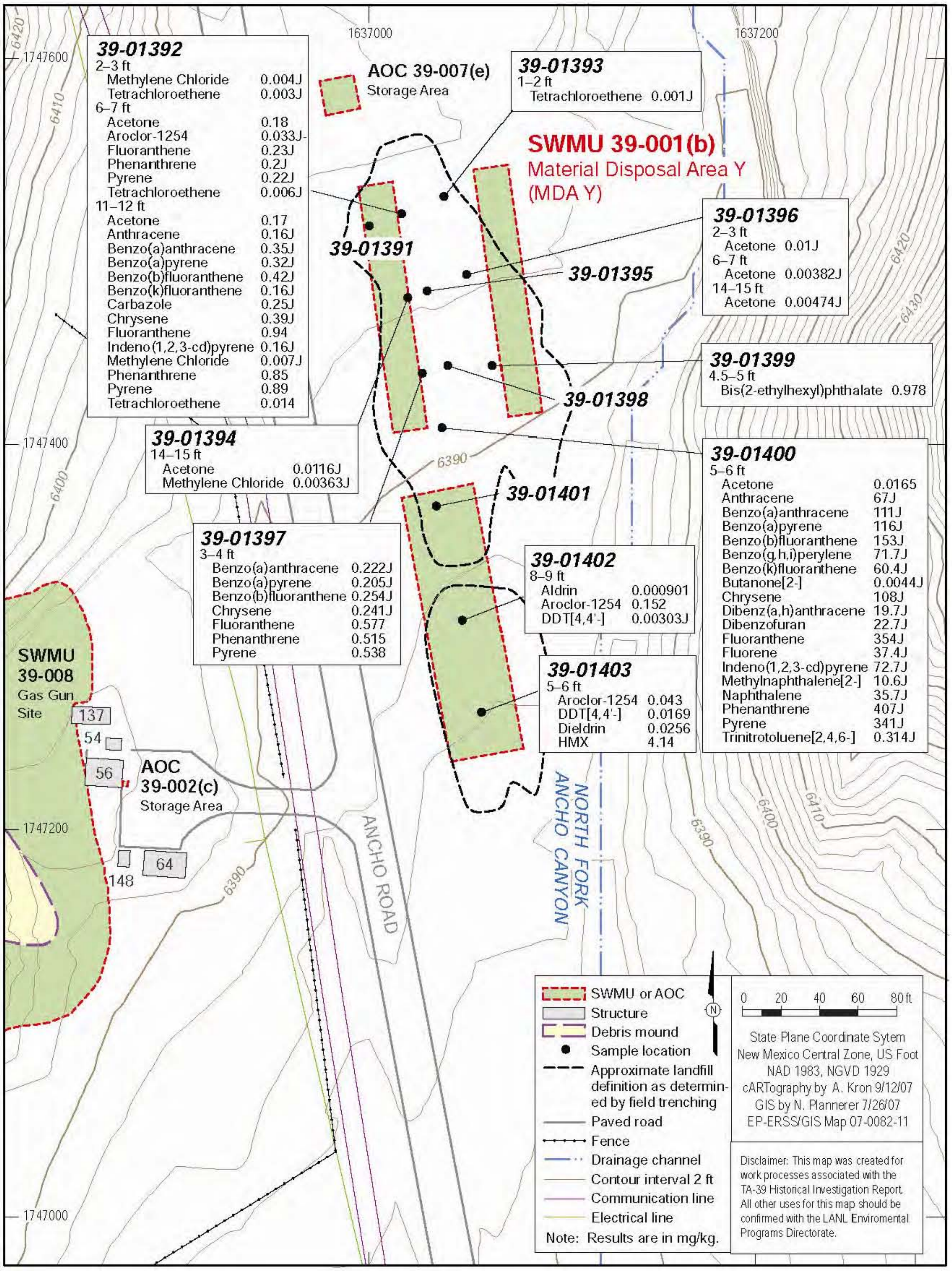


Figure 2.2-3 Organic chemicals detected at SWMU 39-001(b)

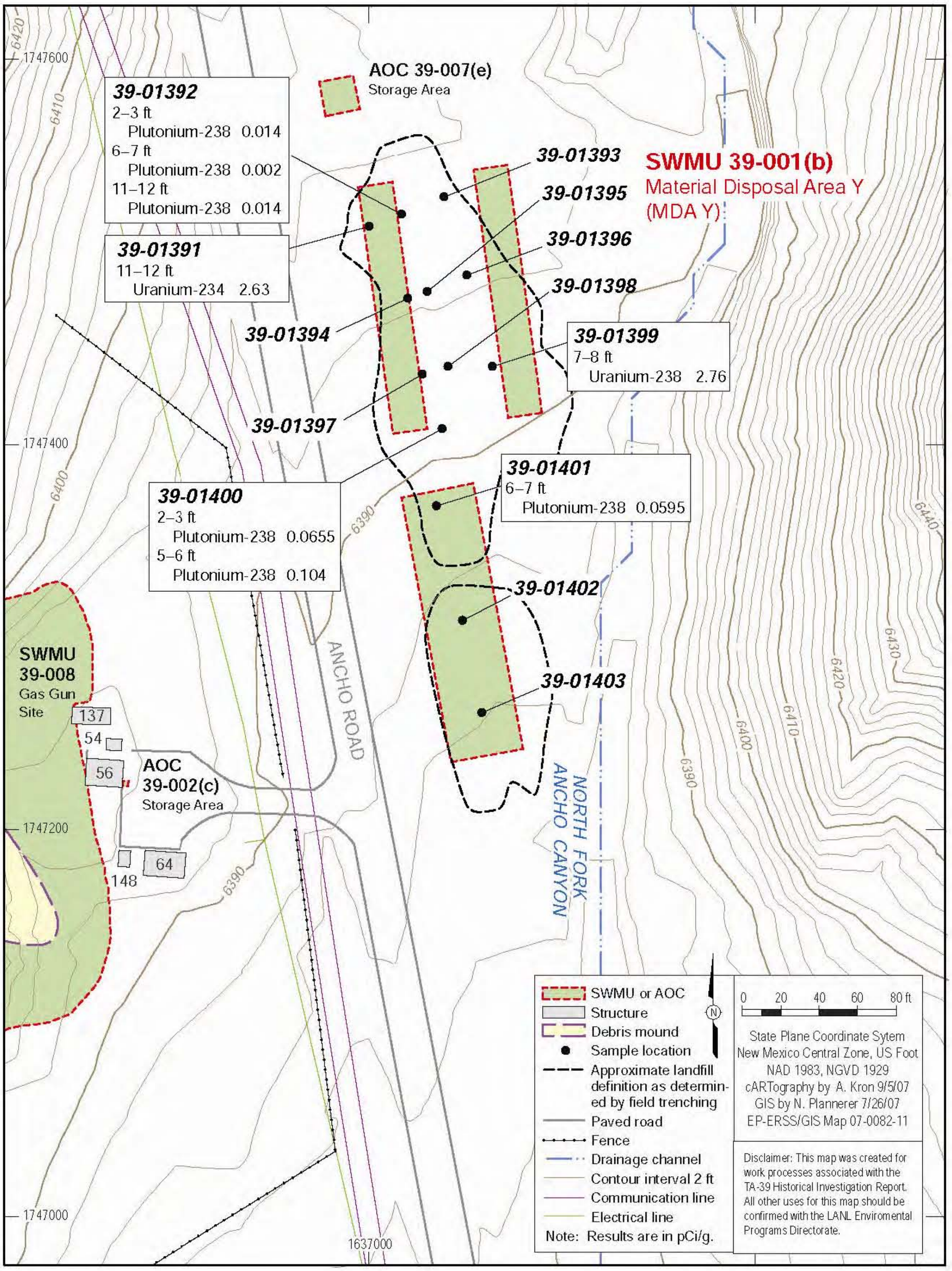


Figure 2.2-4 Radionuclides detected or detected above BVs/FVs at SWMU 39-001(b)

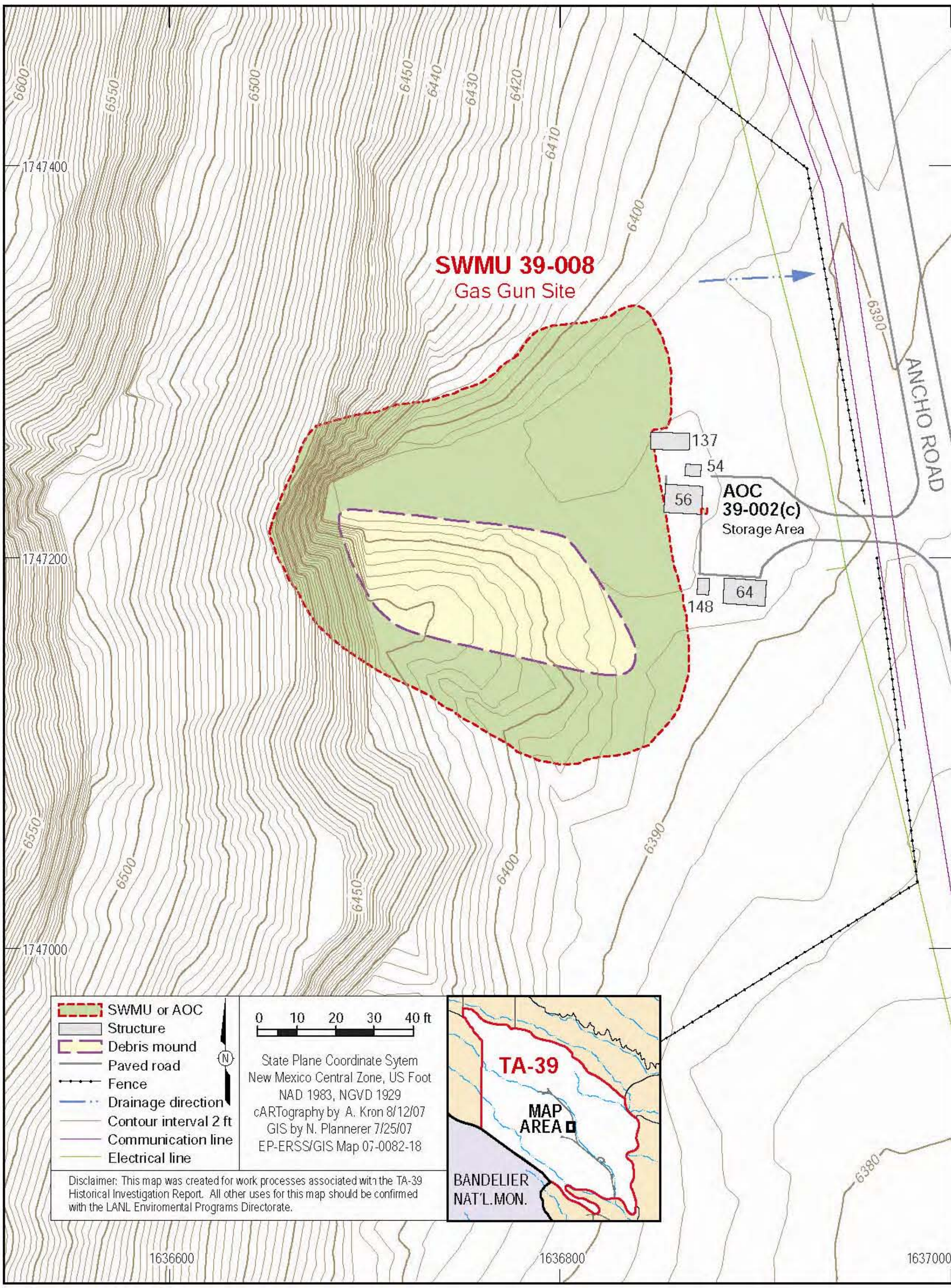


Figure 2.2-5 Location of SWMU 39-008, gas-gun site

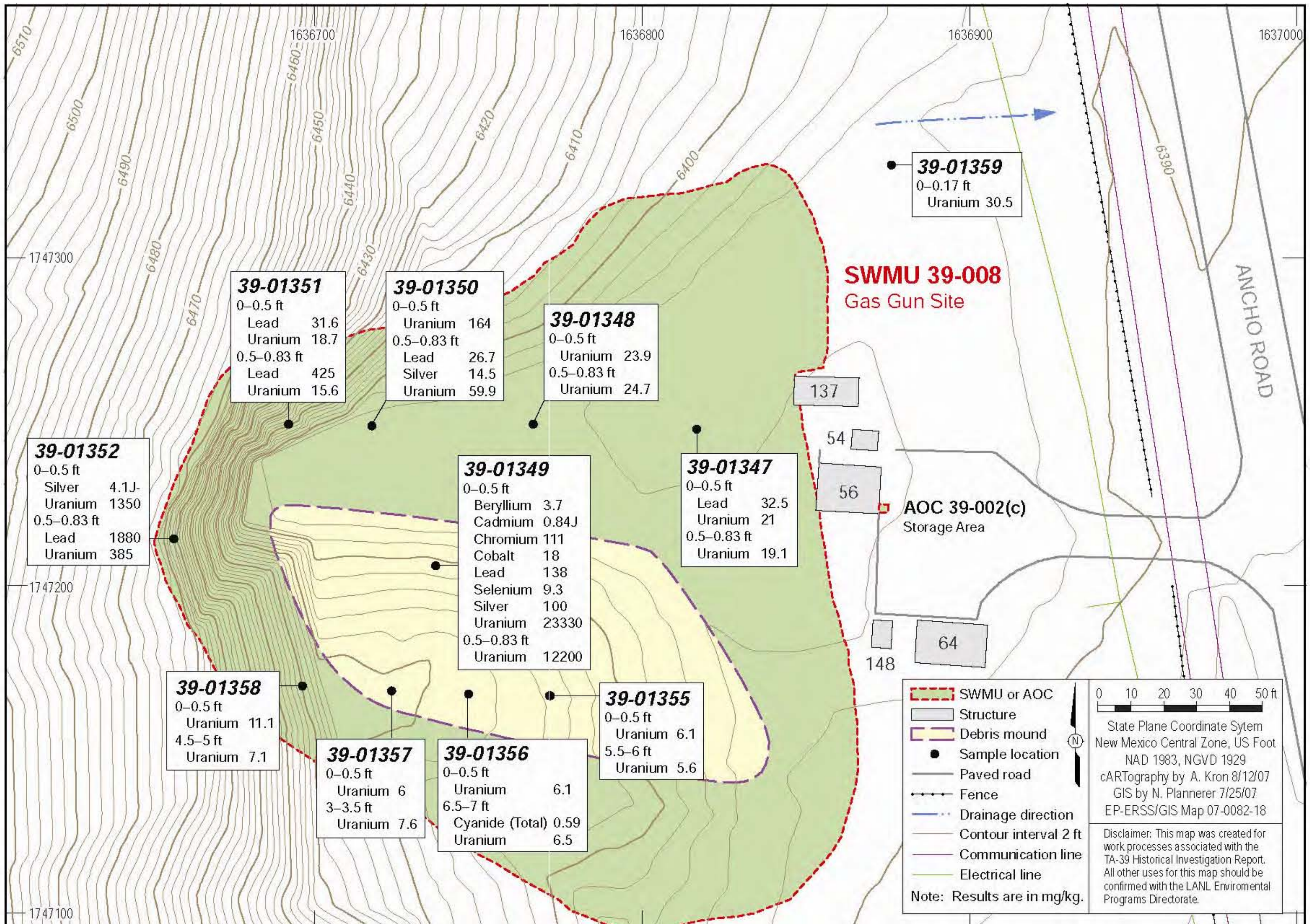


Figure 2.2-6 Inorganic chemicals detected above BVs at SWMU 39-008

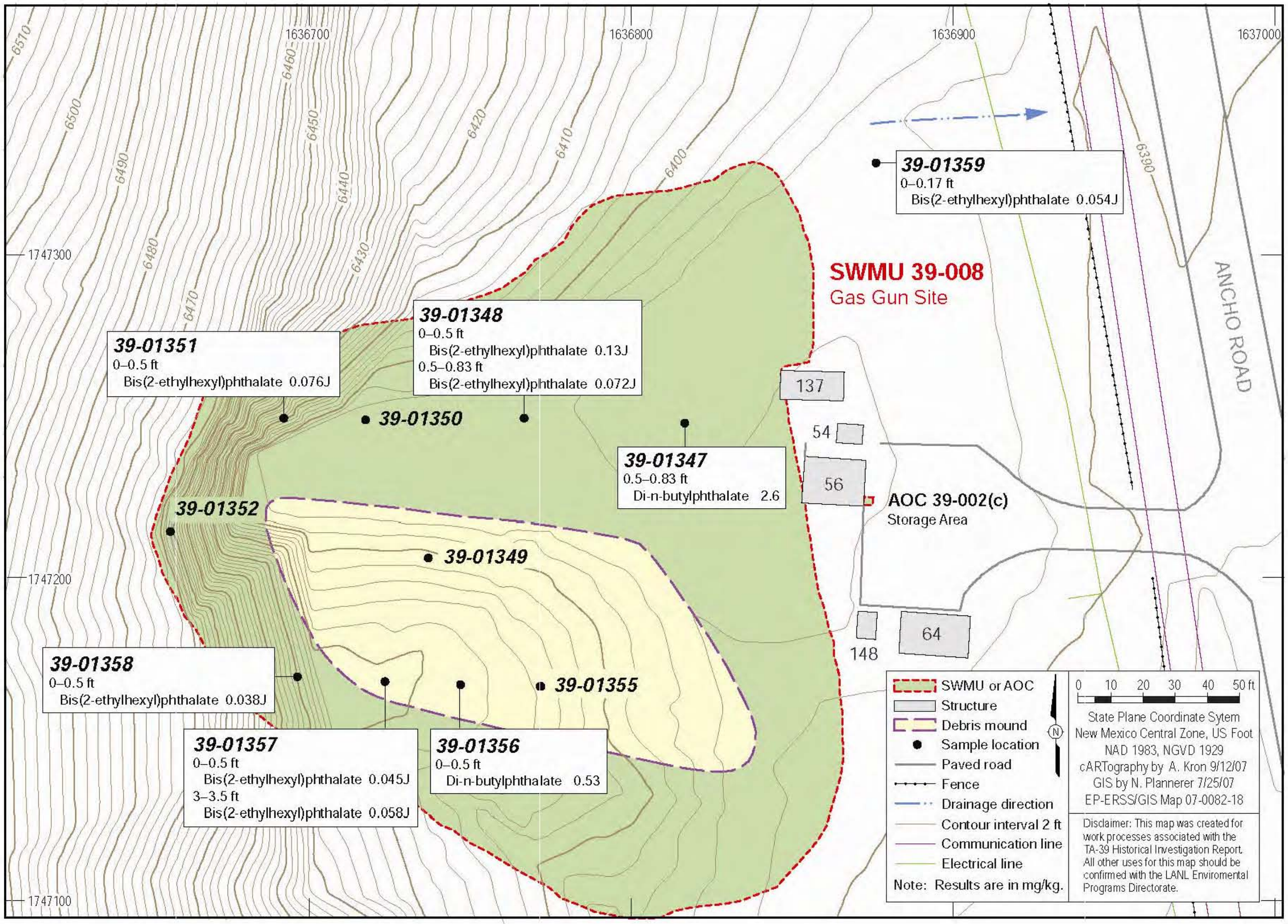


Figure 2.2-7 Organic chemicals detected at SWMU 39-008

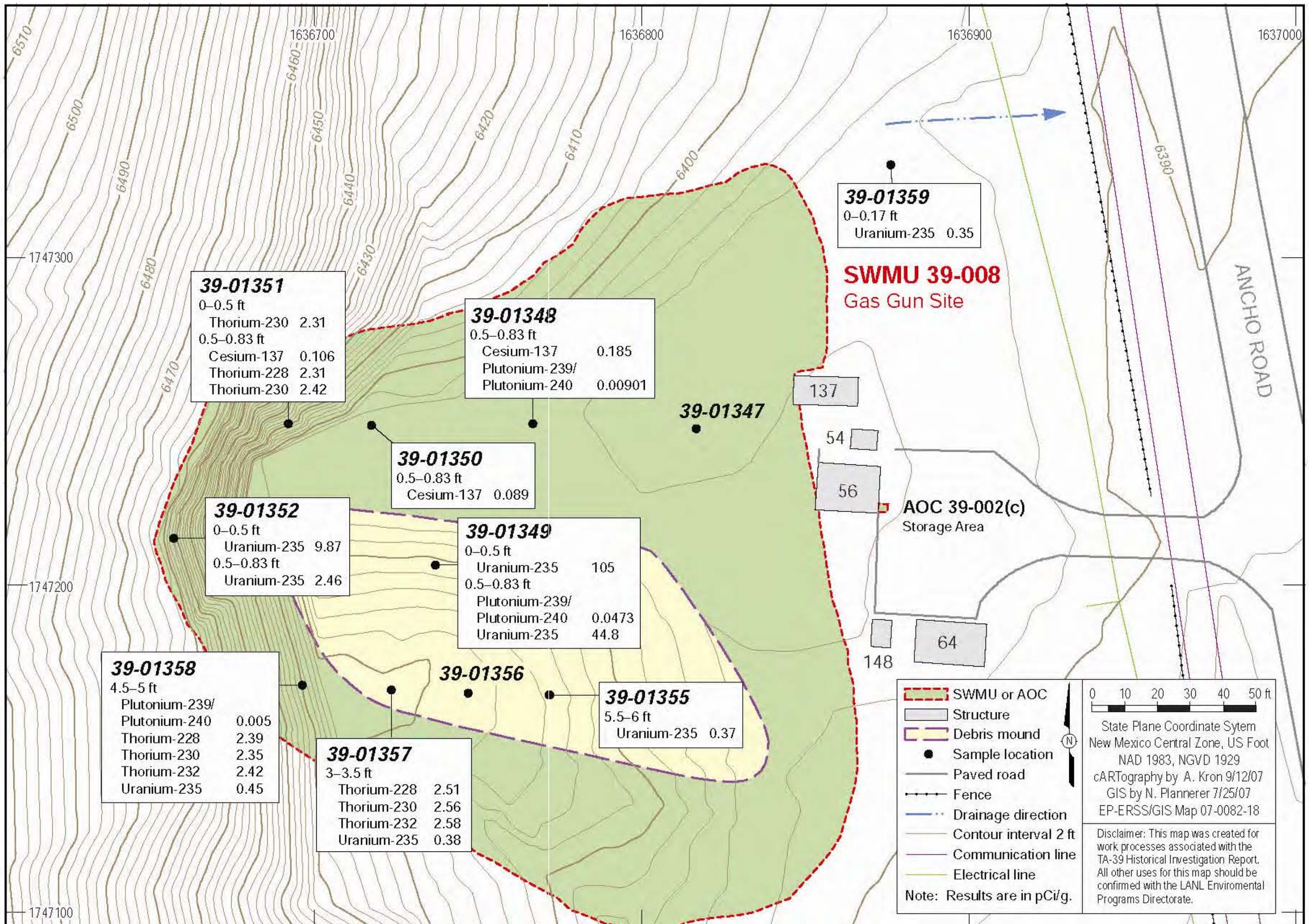


Figure 2.2-8 Radionuclides detected or detected above BVs/FVs at SWMU 39-008

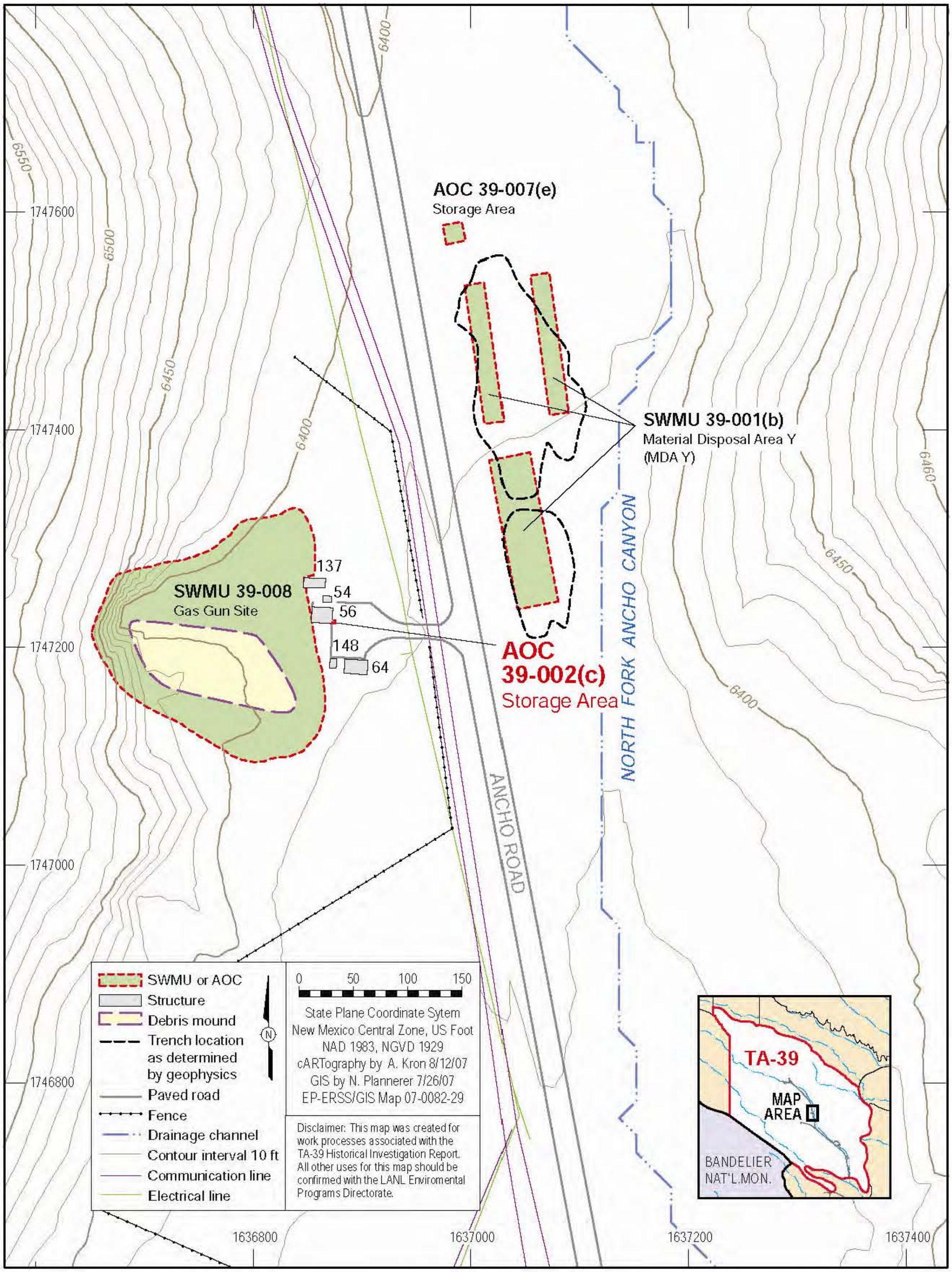


Figure 2.2-9 Location of AOC 39-002(c), storage area

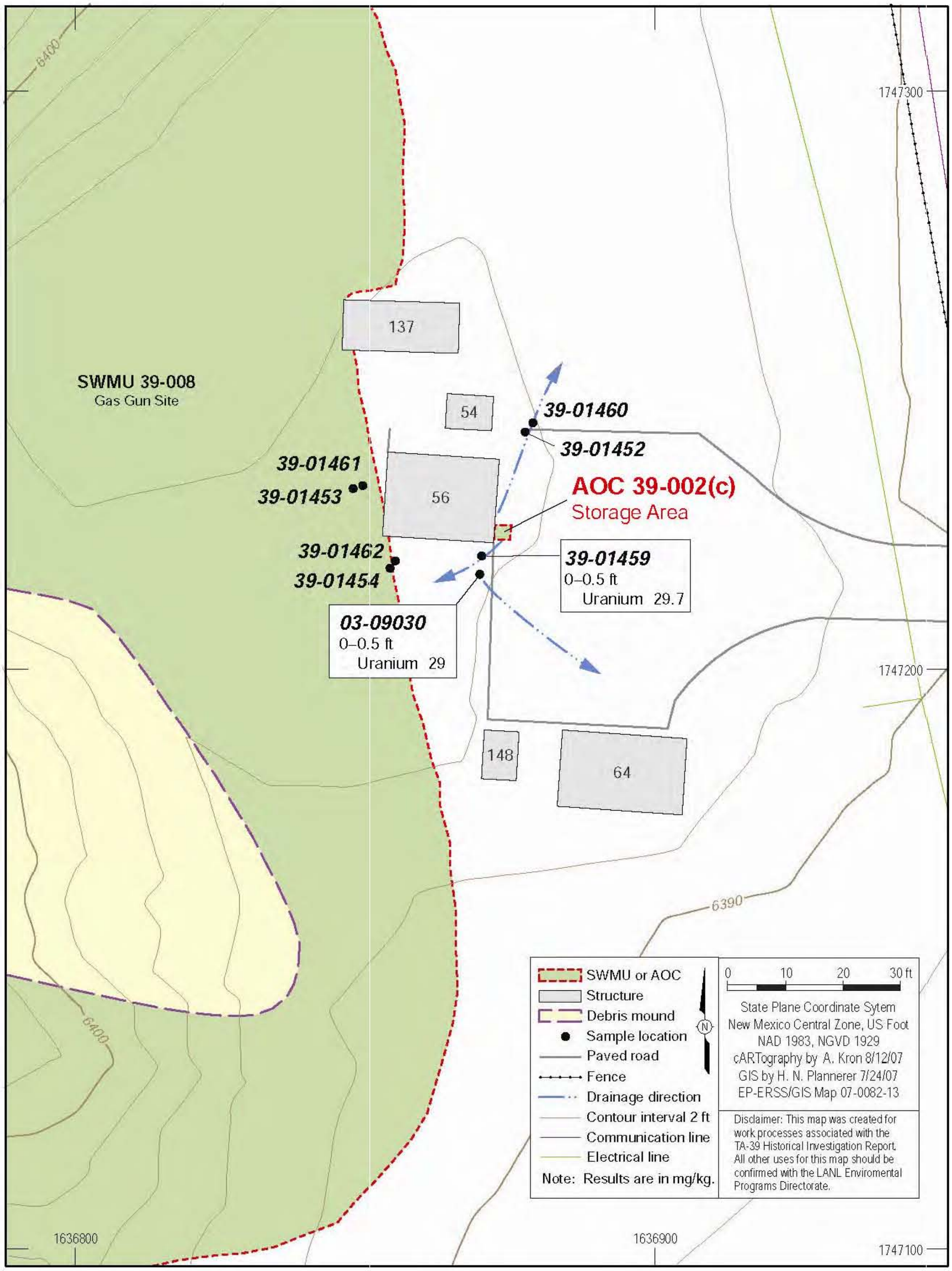


Figure 2.2-10 Inorganic chemicals detected above BVs at AOC 39-002(c)

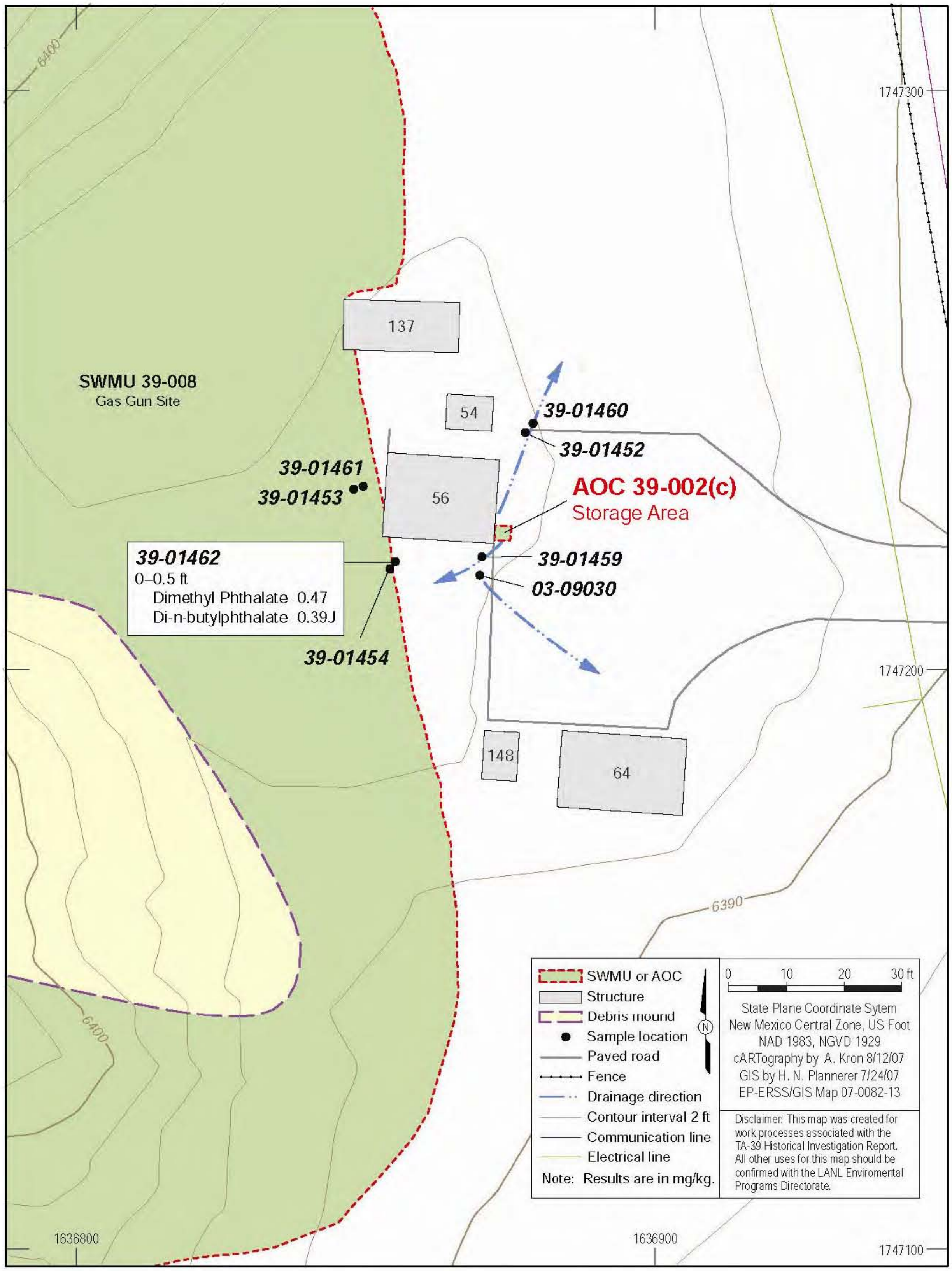


Figure 2.2-11 Organic chemicals detected at AOC 39-002(c)

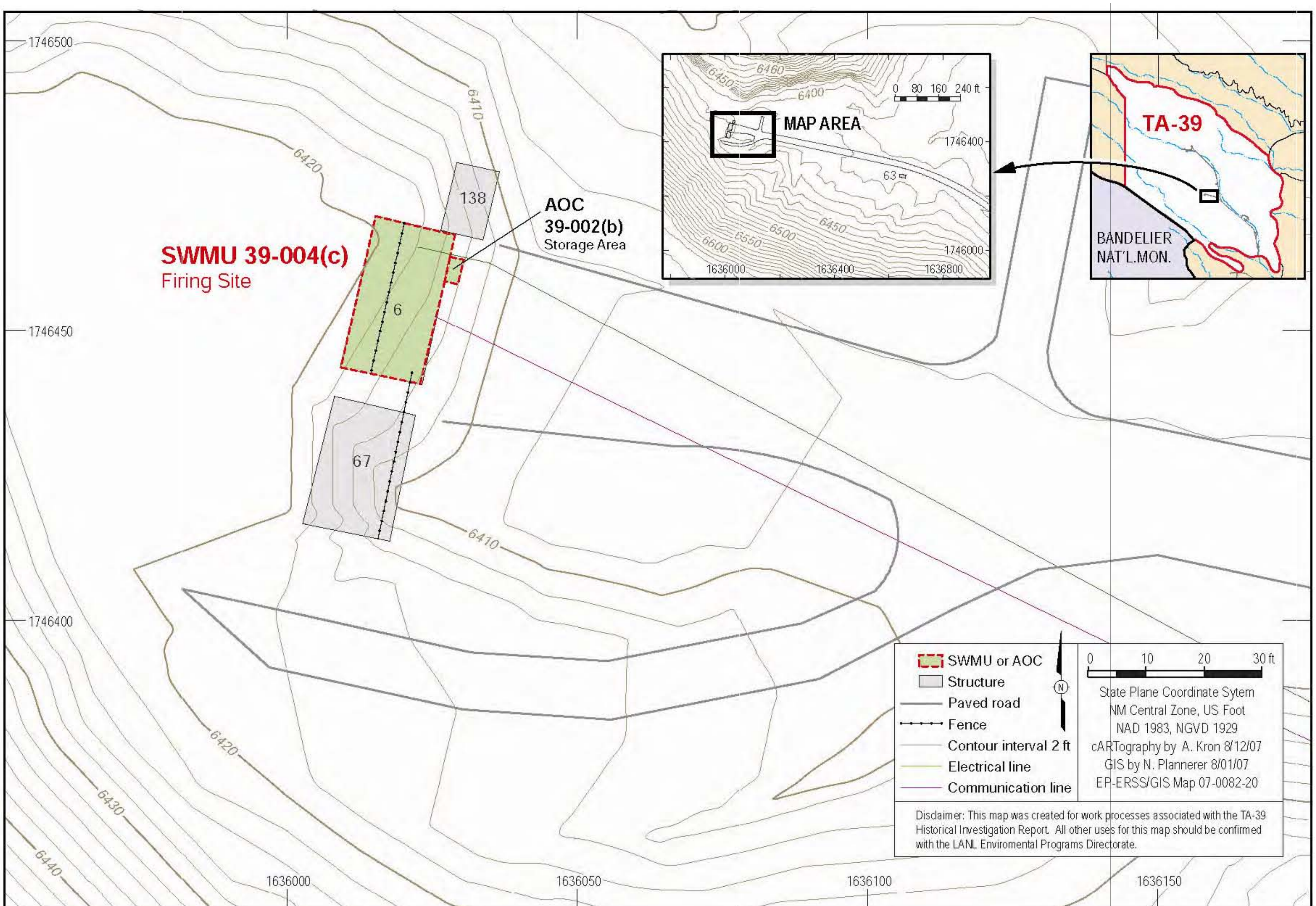


Figure 2.2-12 Location of SWMU 39-004(c), firing site

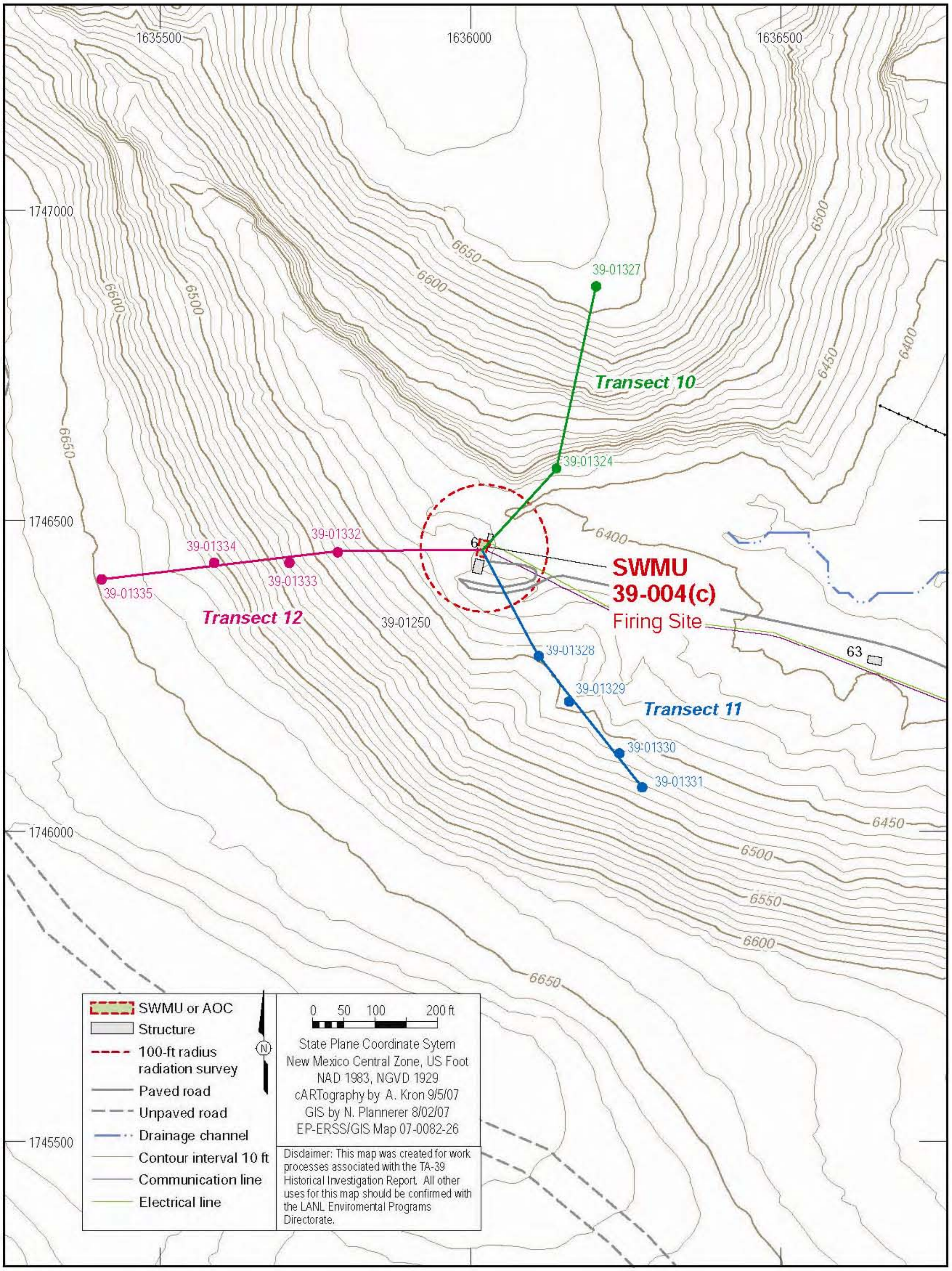


Figure 2.2-13 Transect sampling at the firing site in Subaggregate Area 2

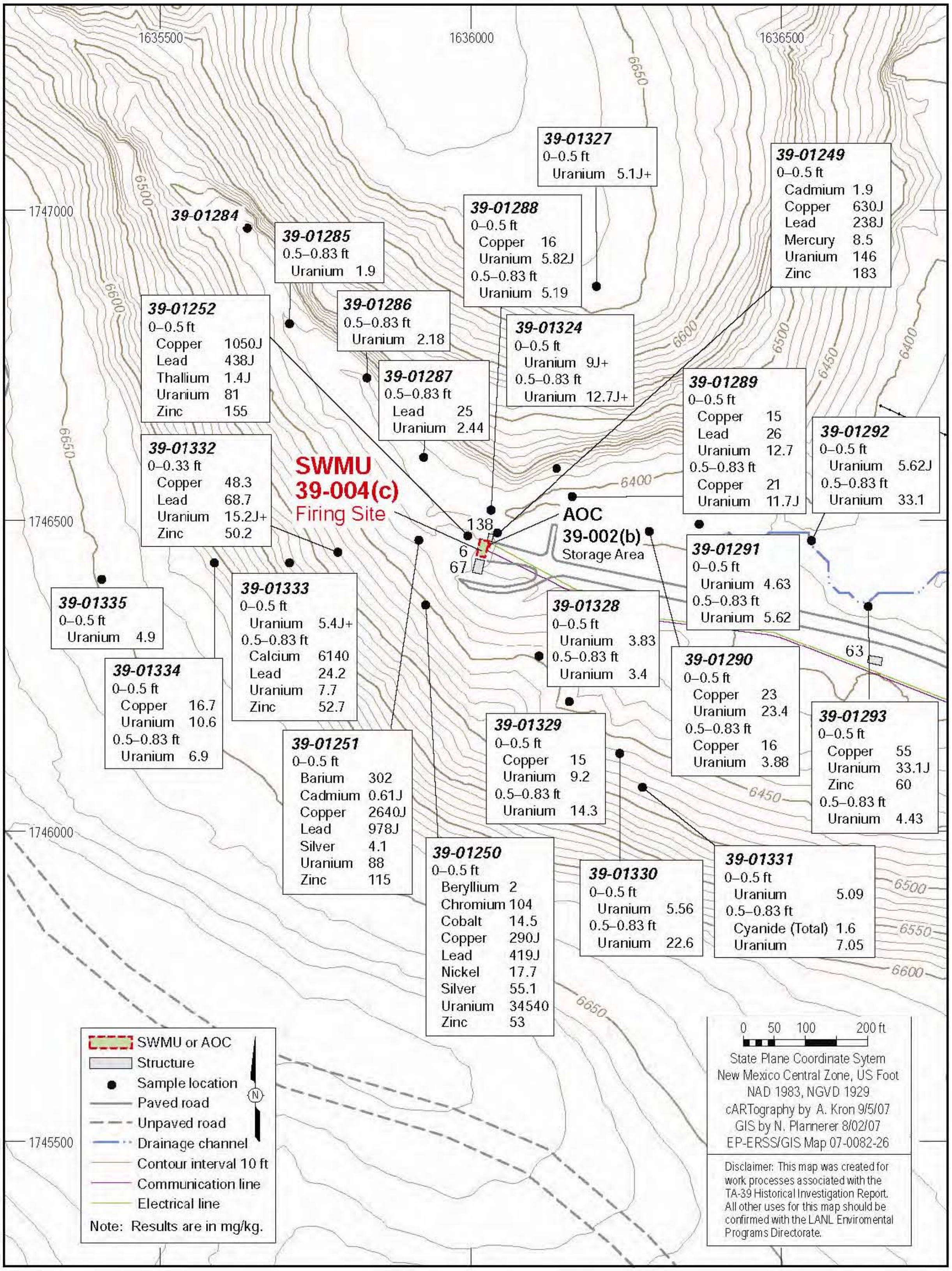


Figure 2.2-14 Inorganic chemicals detected above BVs at SWMU 39-004(c)

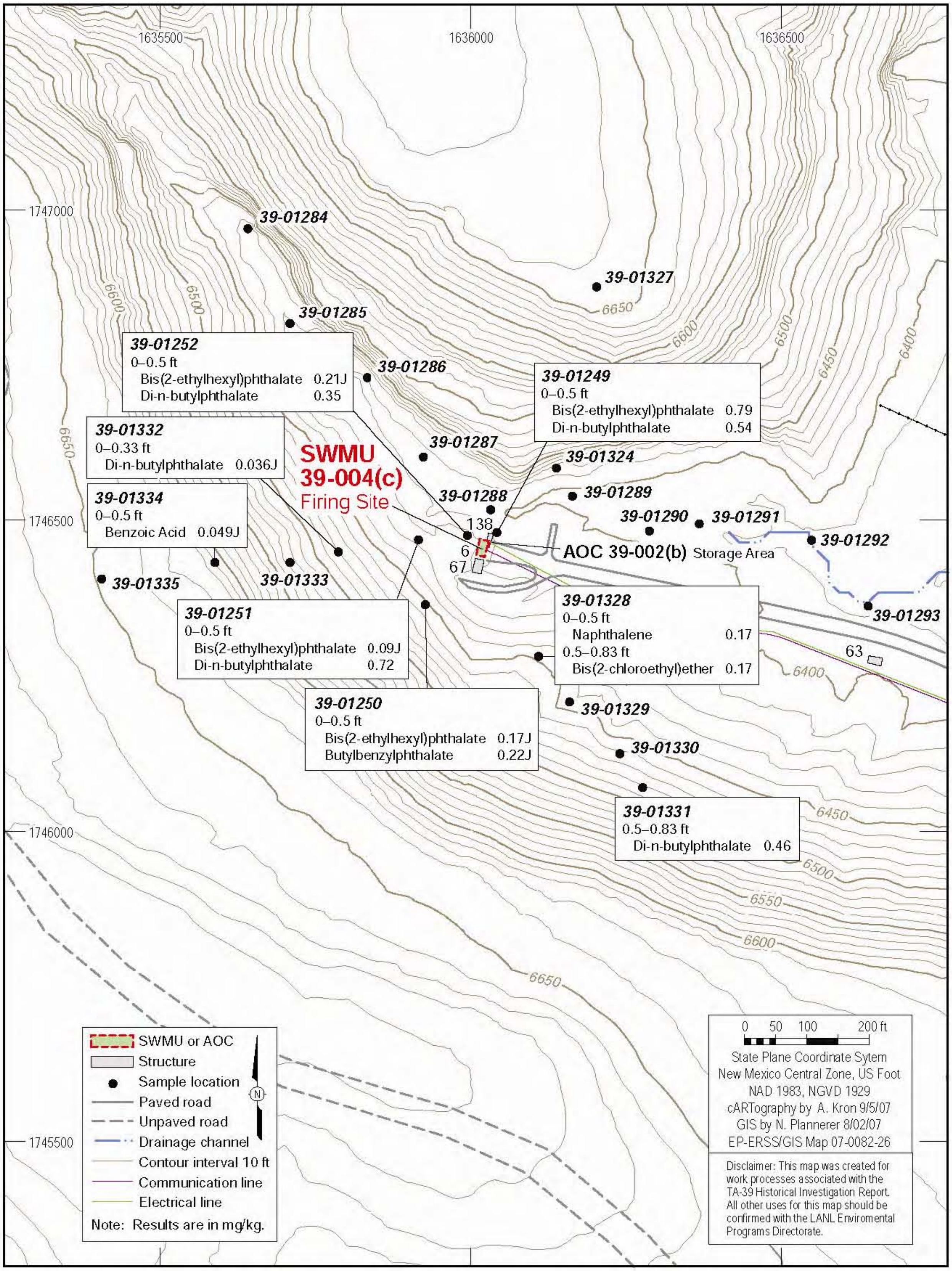


Figure 2.2-15 Organic chemicals detected at SWMU 39-004(c)

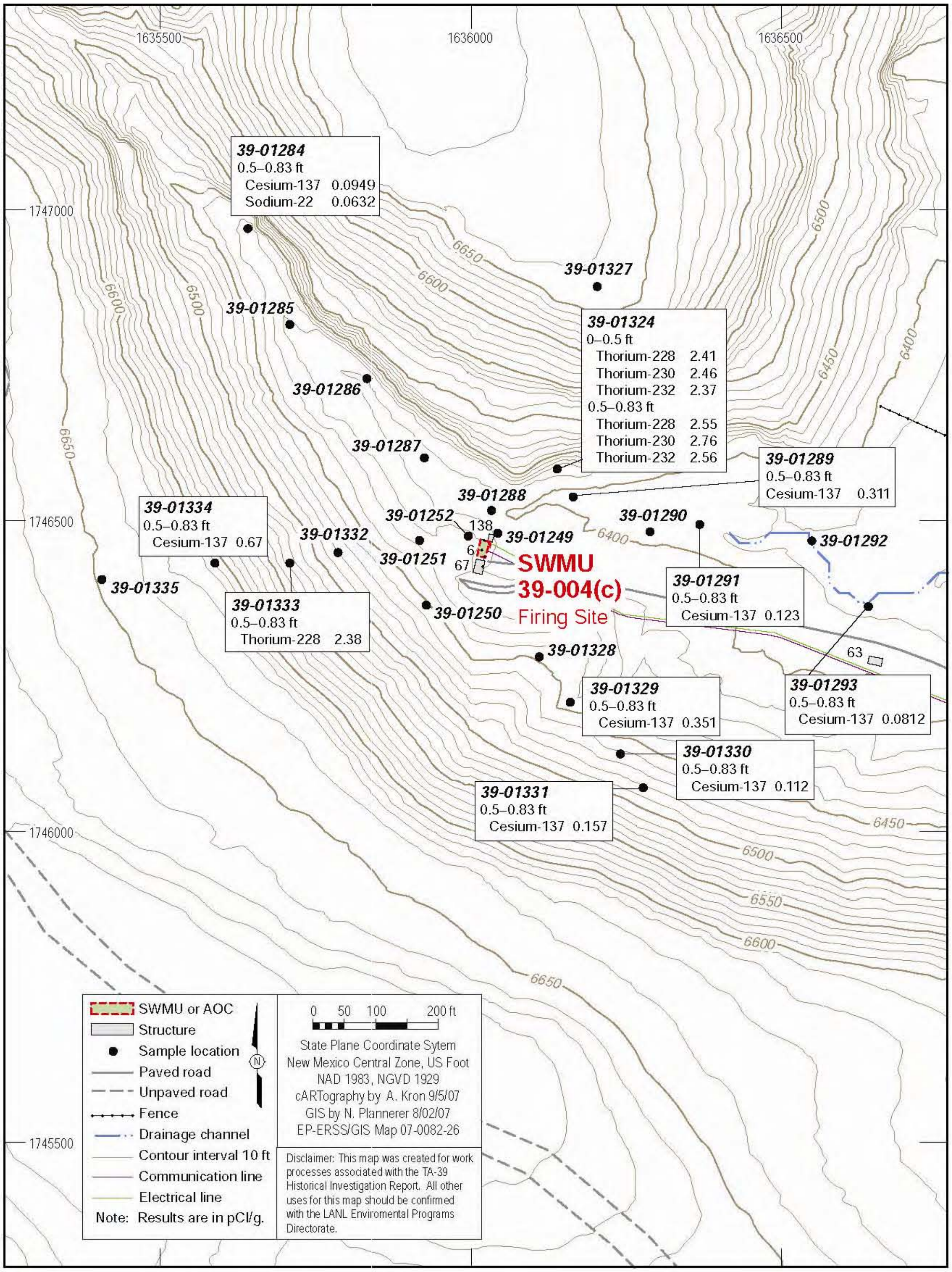


Figure 2.2-16 Radionuclides detected or detected above BVs/FVs at SWMU 39-004(c)

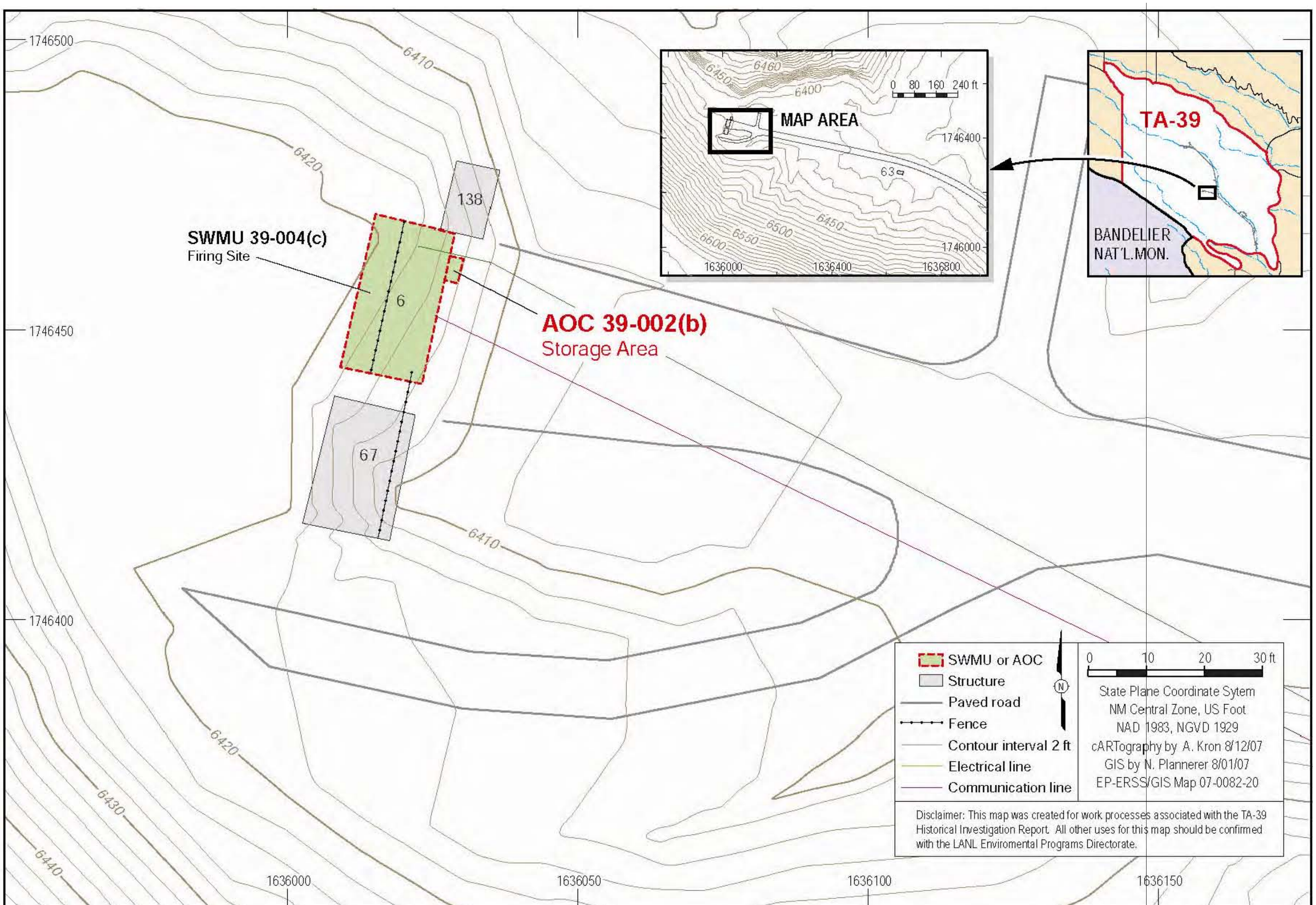


Figure 2.2-17 Location of AOC 39-002(b), storage area

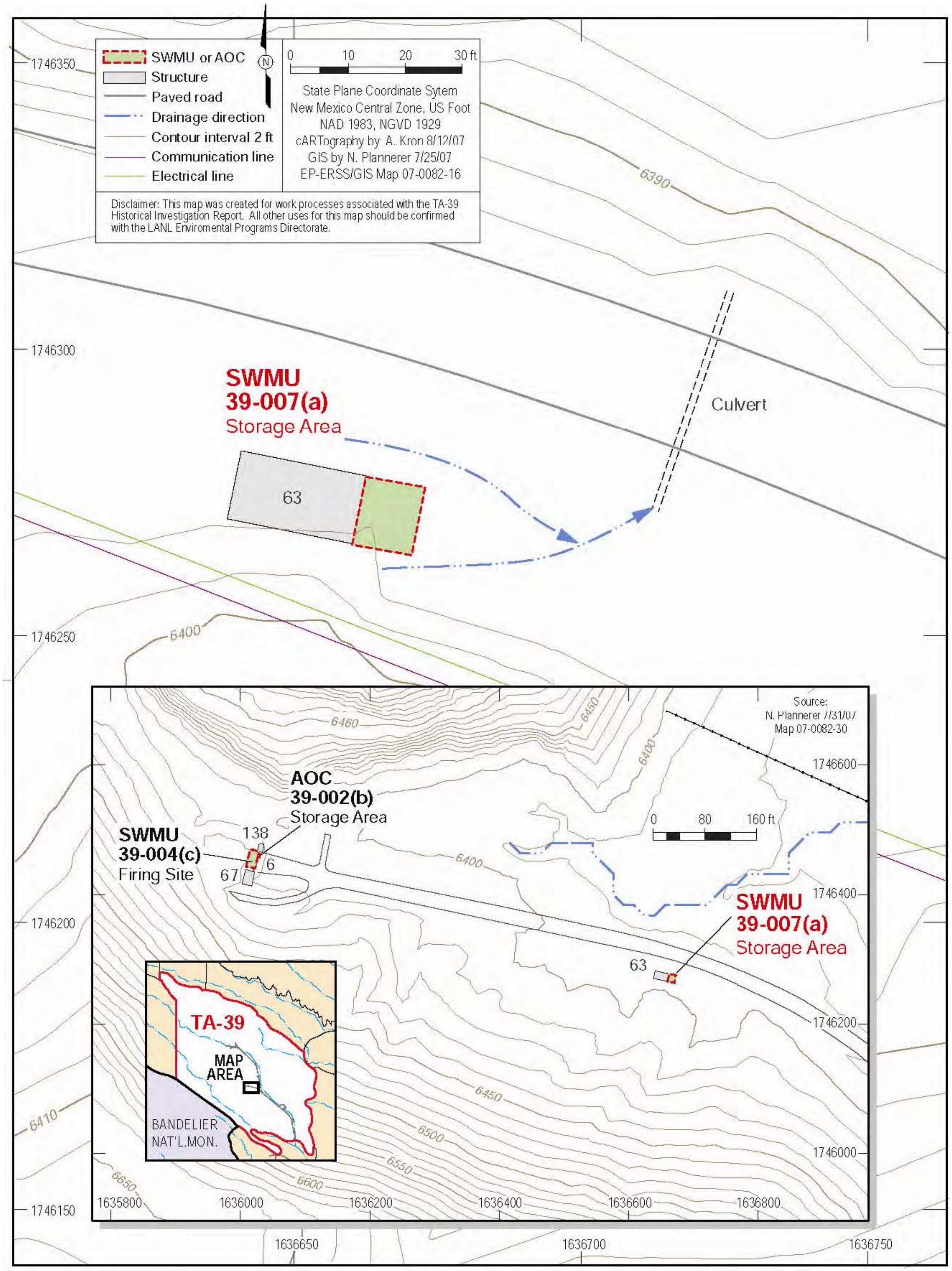


Figure 2.2-18 Location of SWMU 39-007(a), storage area

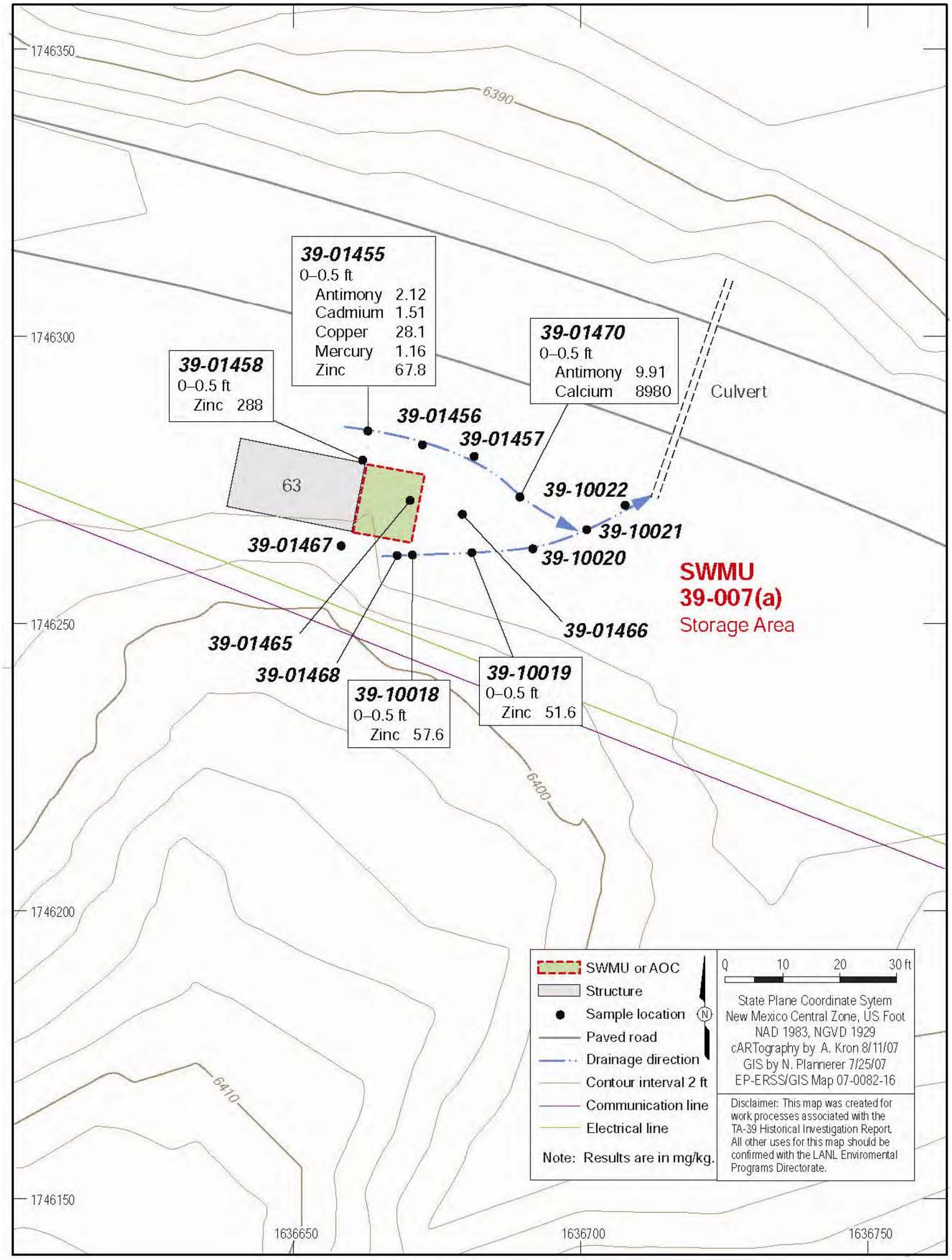


Figure 2.2-19 Inorganic chemicals detected above BVs at SWMU 39-007(a)

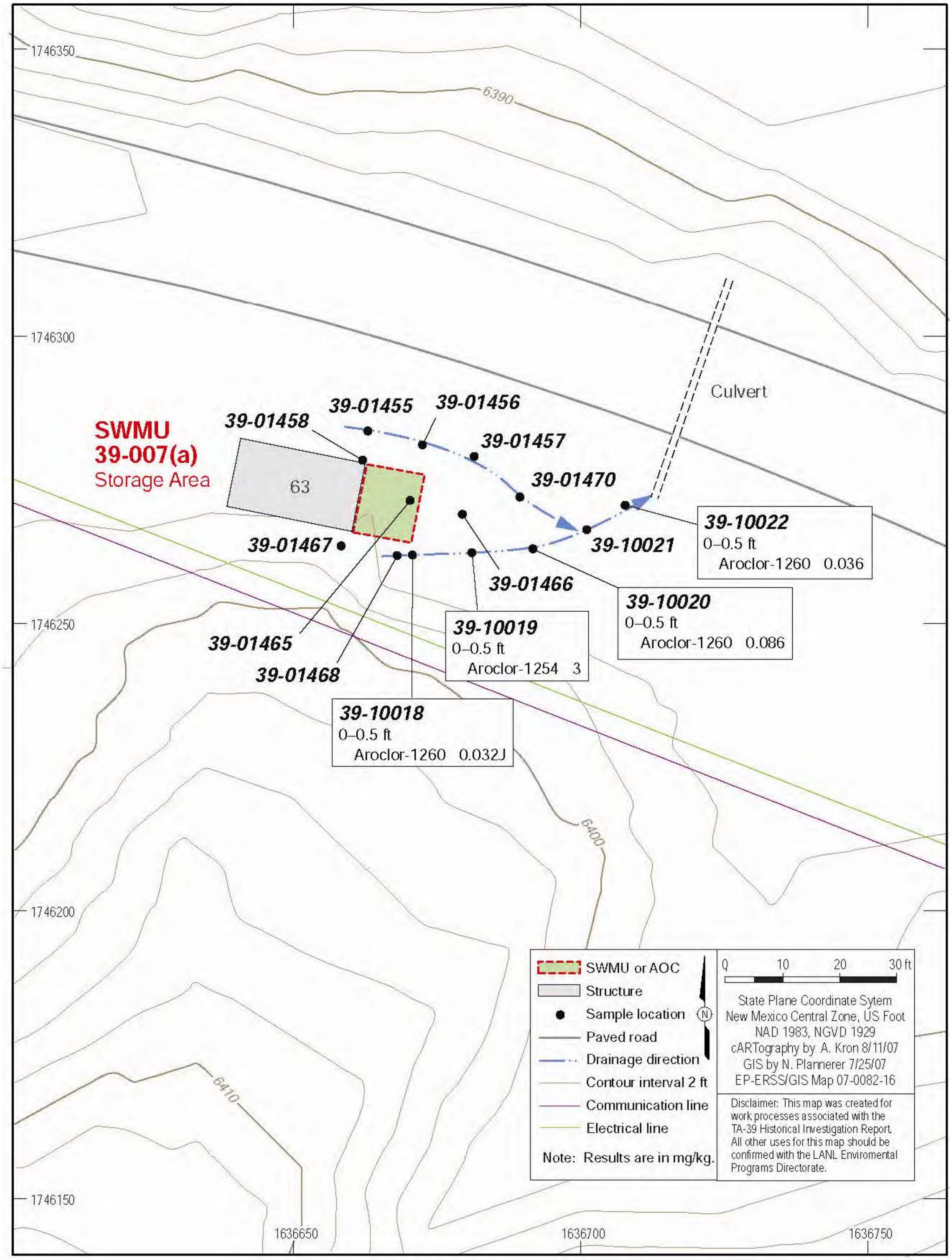


Figure 2.2-20 Organic chemicals detected at SWMU 39-007(a)

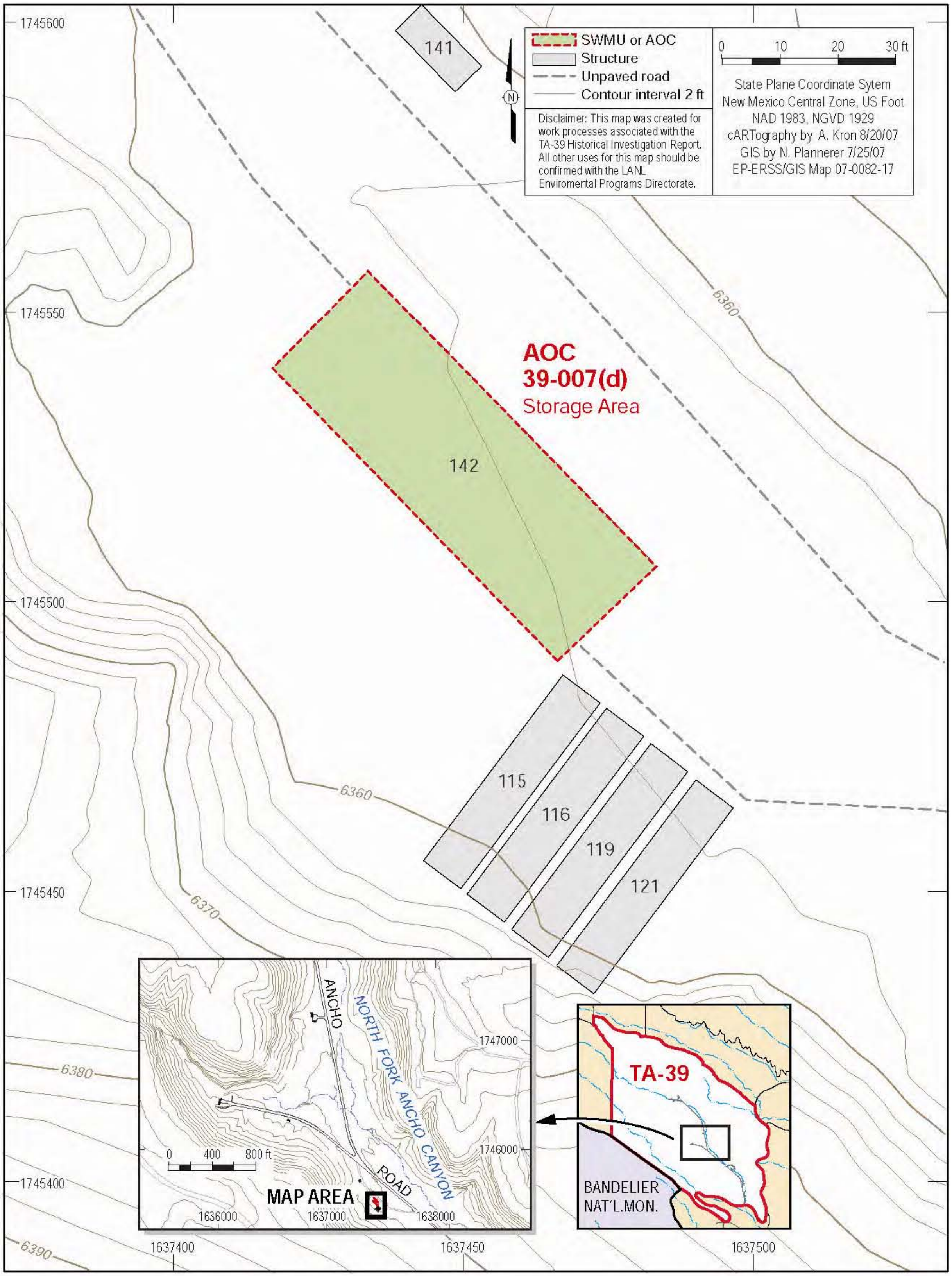


Figure 2.2-21 Location of AOC 39-007(d), storage area

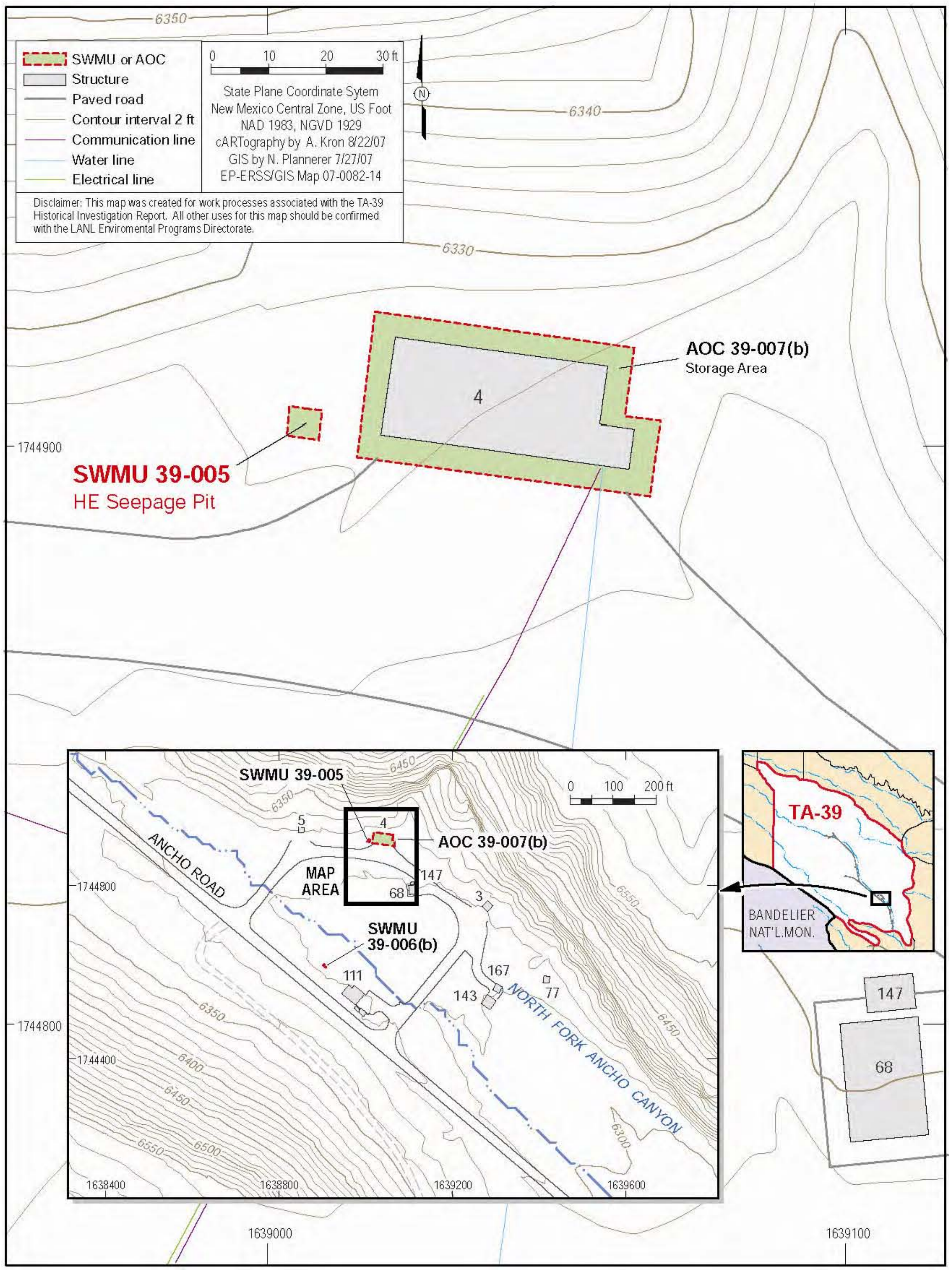


Figure 2.3-1 Location of SWMU 39-005, HE seepage pit

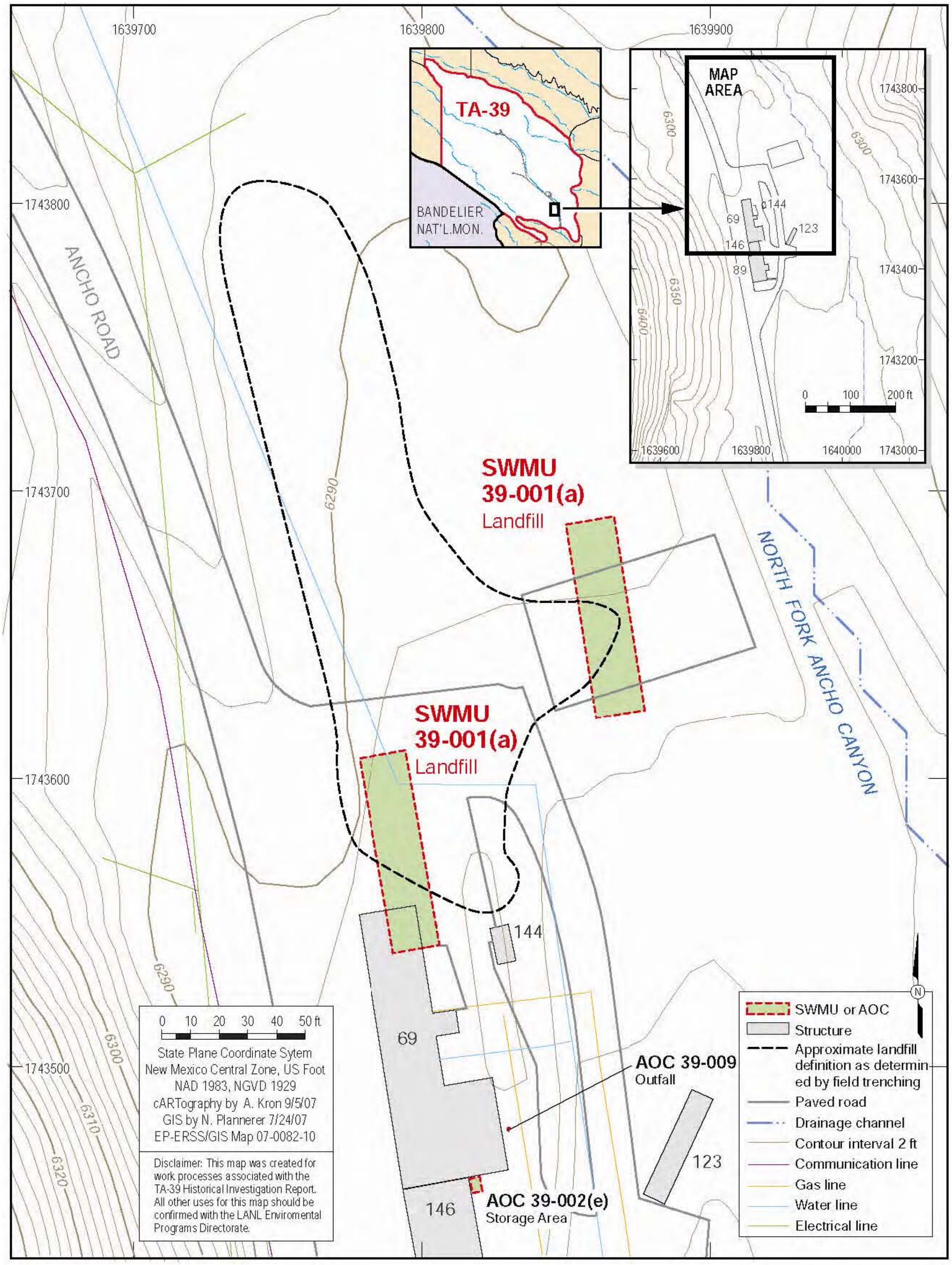


Figure 2.3-2 Location of SWMU 39-001(a), landfill

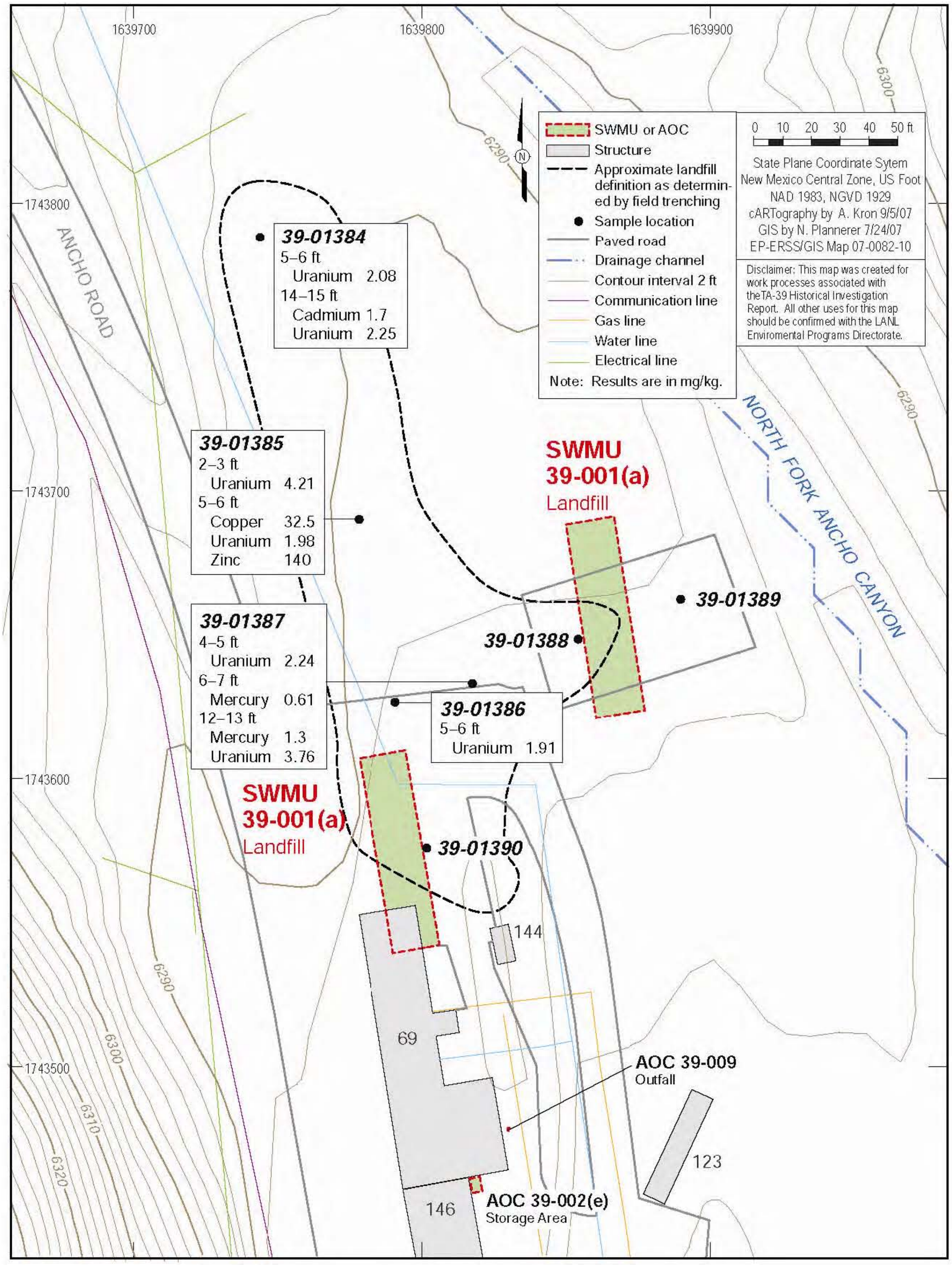


Figure 2.3-3 Inorganic chemicals detected above BVs at SWMU 39-001(a)

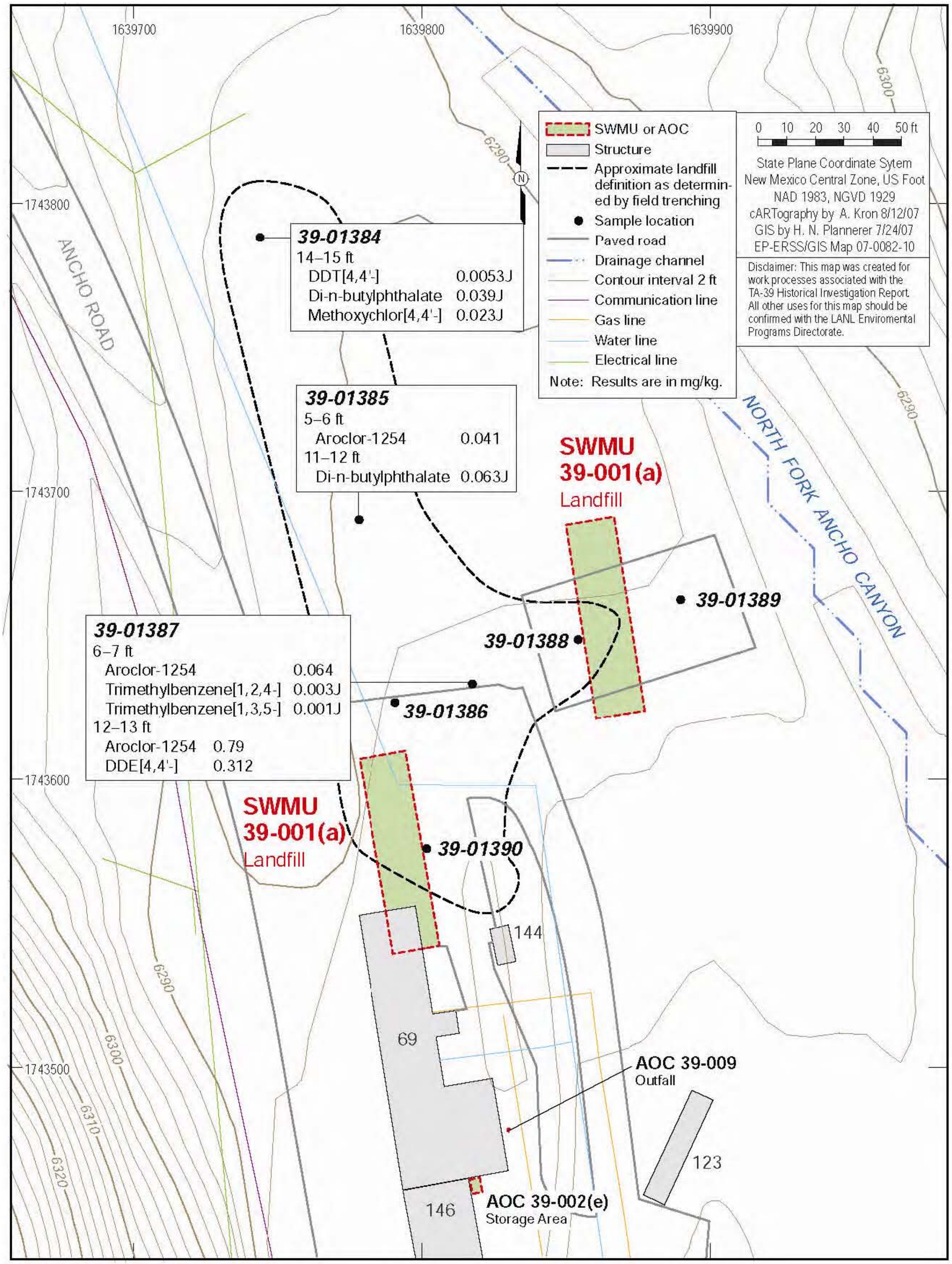


Figure 2.3-4 Organic chemicals detected at SWMU 39-001(a)

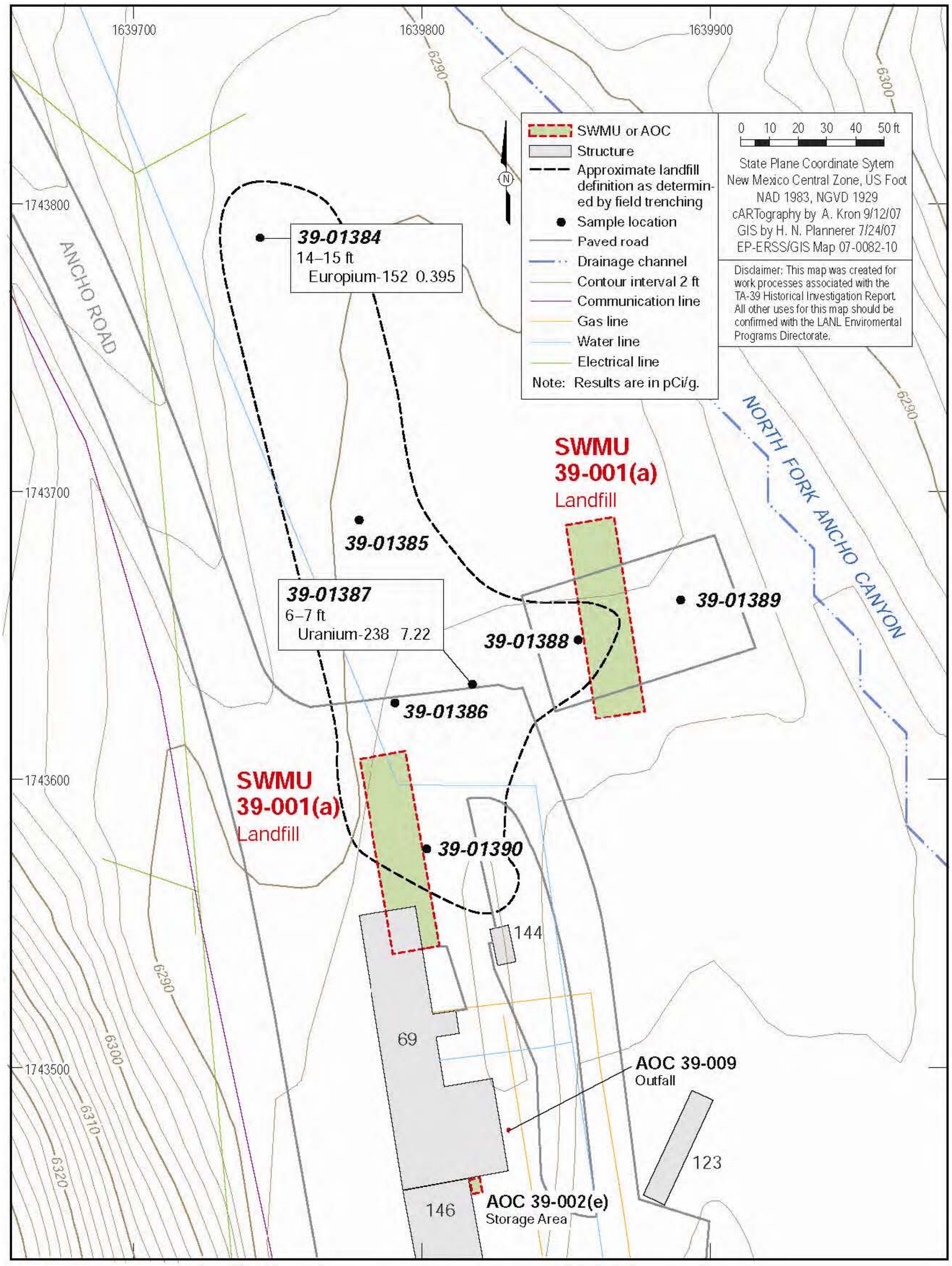


Figure 2.3-5 Radionuclides detected or detected above BVs/FVs at SWMU 39-001(a)

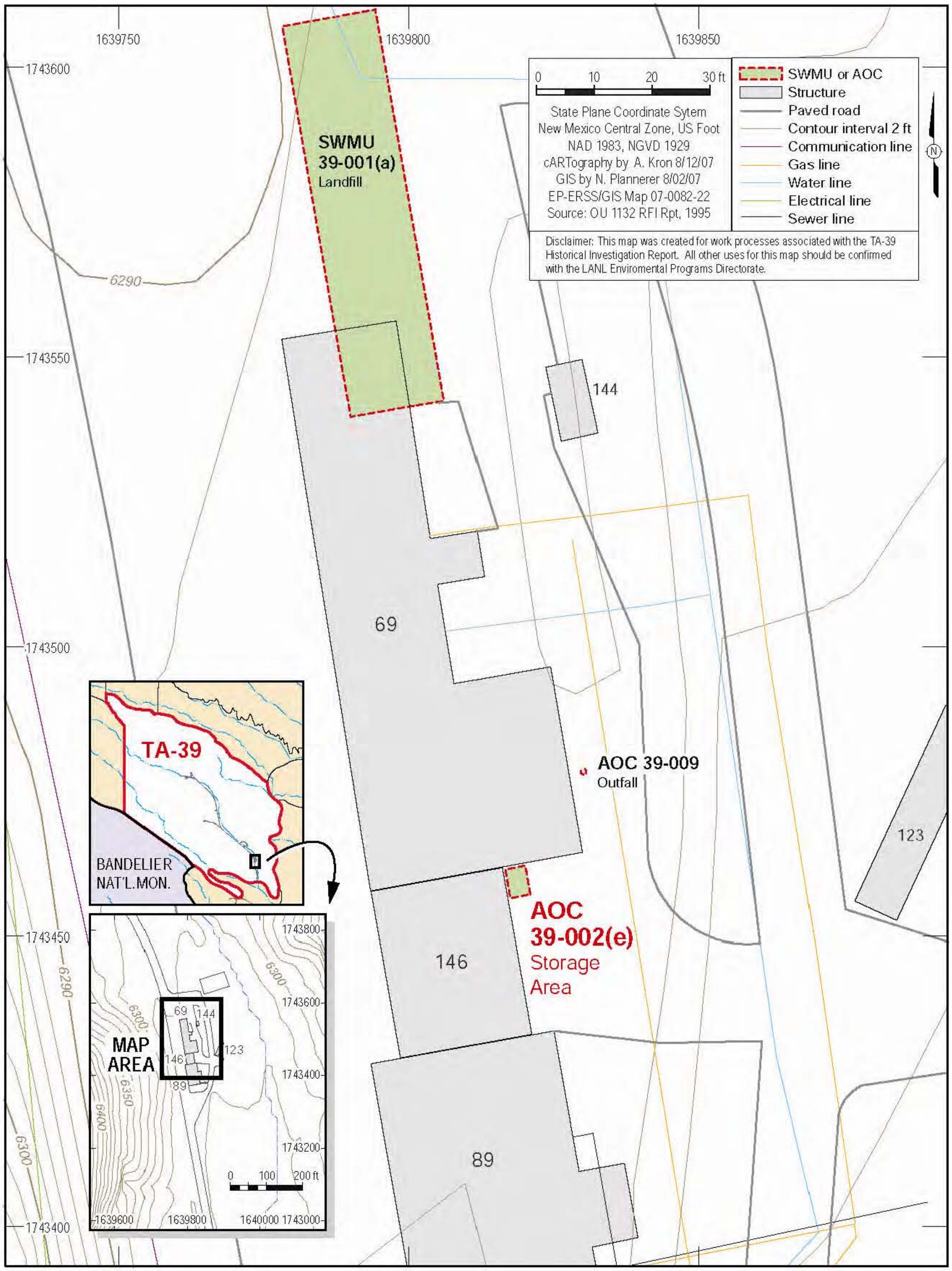


Figure 2.3-6 Location of SWMU 39-002(e), storage area

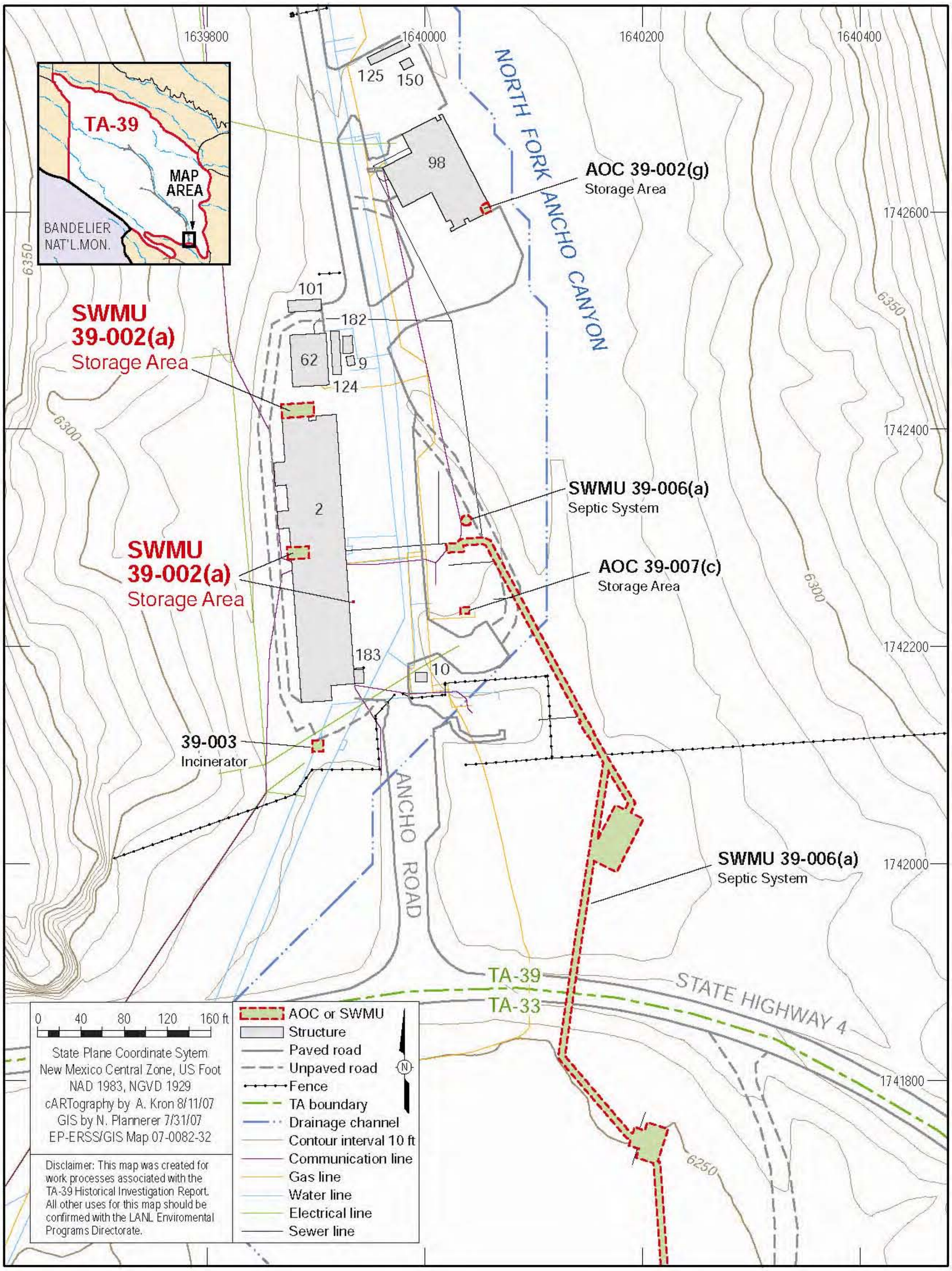


Figure 2.3-7 Location of SWMU 39-002(a), storage area

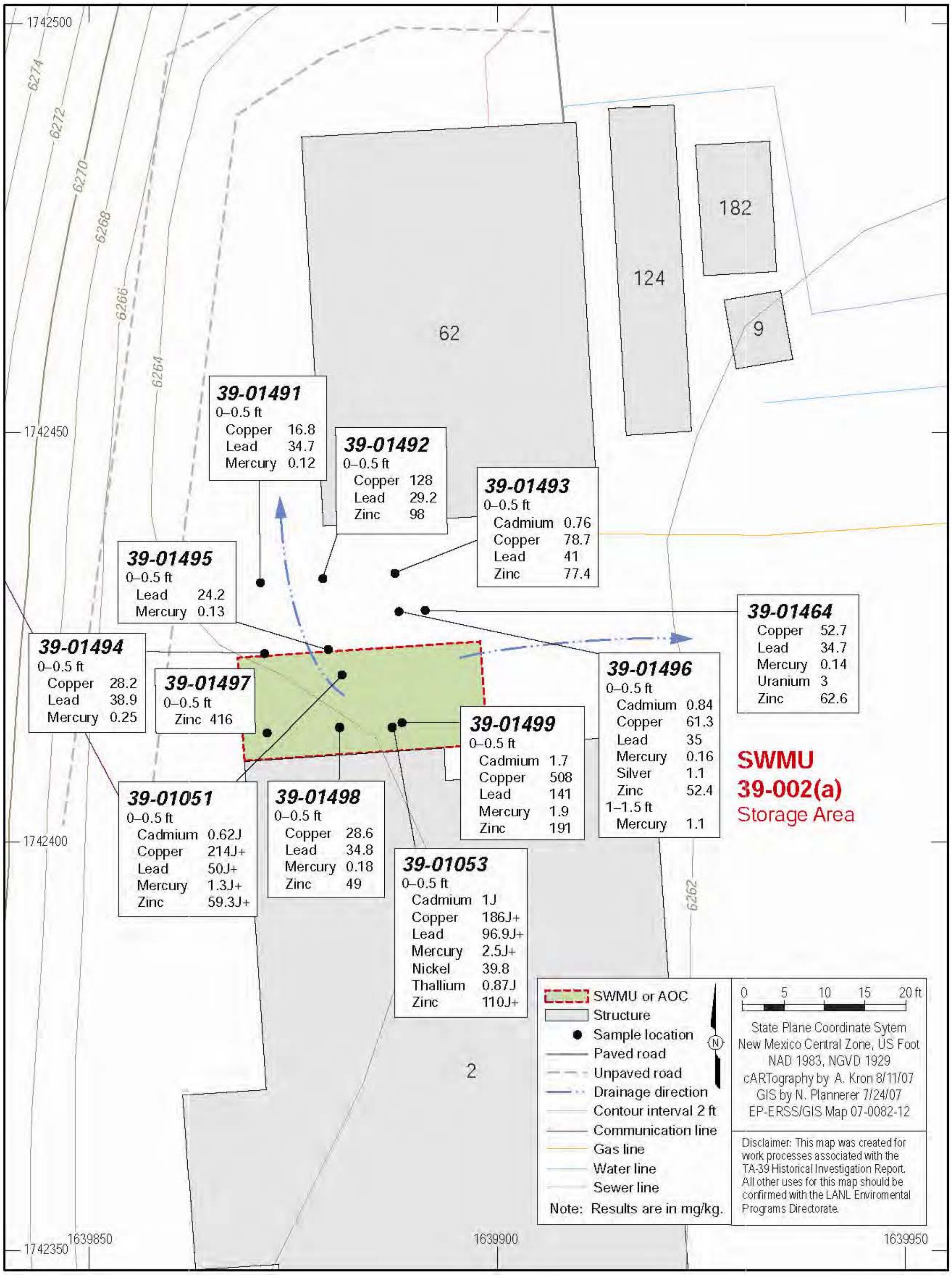


Figure 2.3-8 Inorganic chemicals detected above BVs at SWMU 39-002(a)

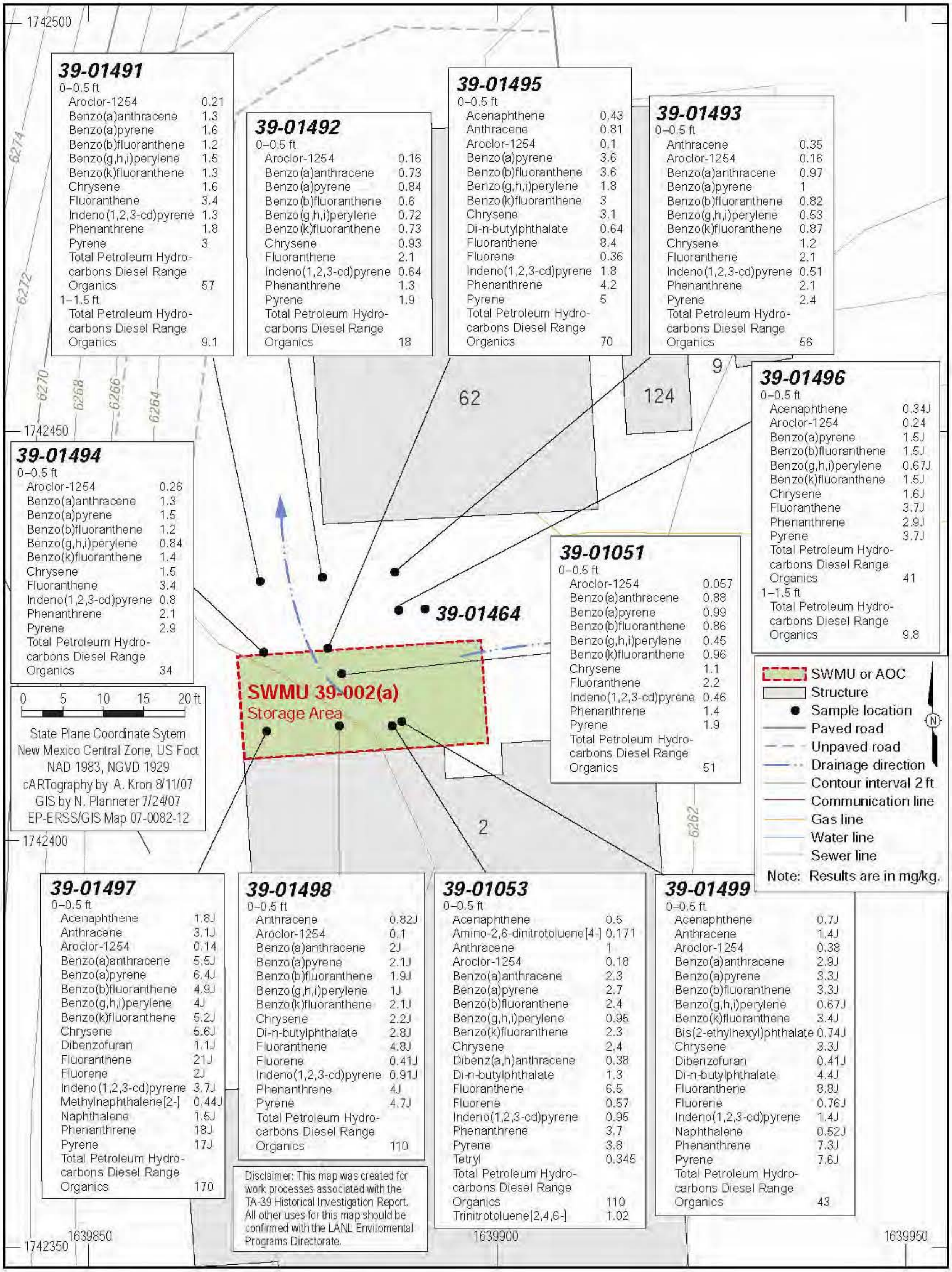


Figure 2.3-9 Organic chemicals detected at SWMU 39-002(a)

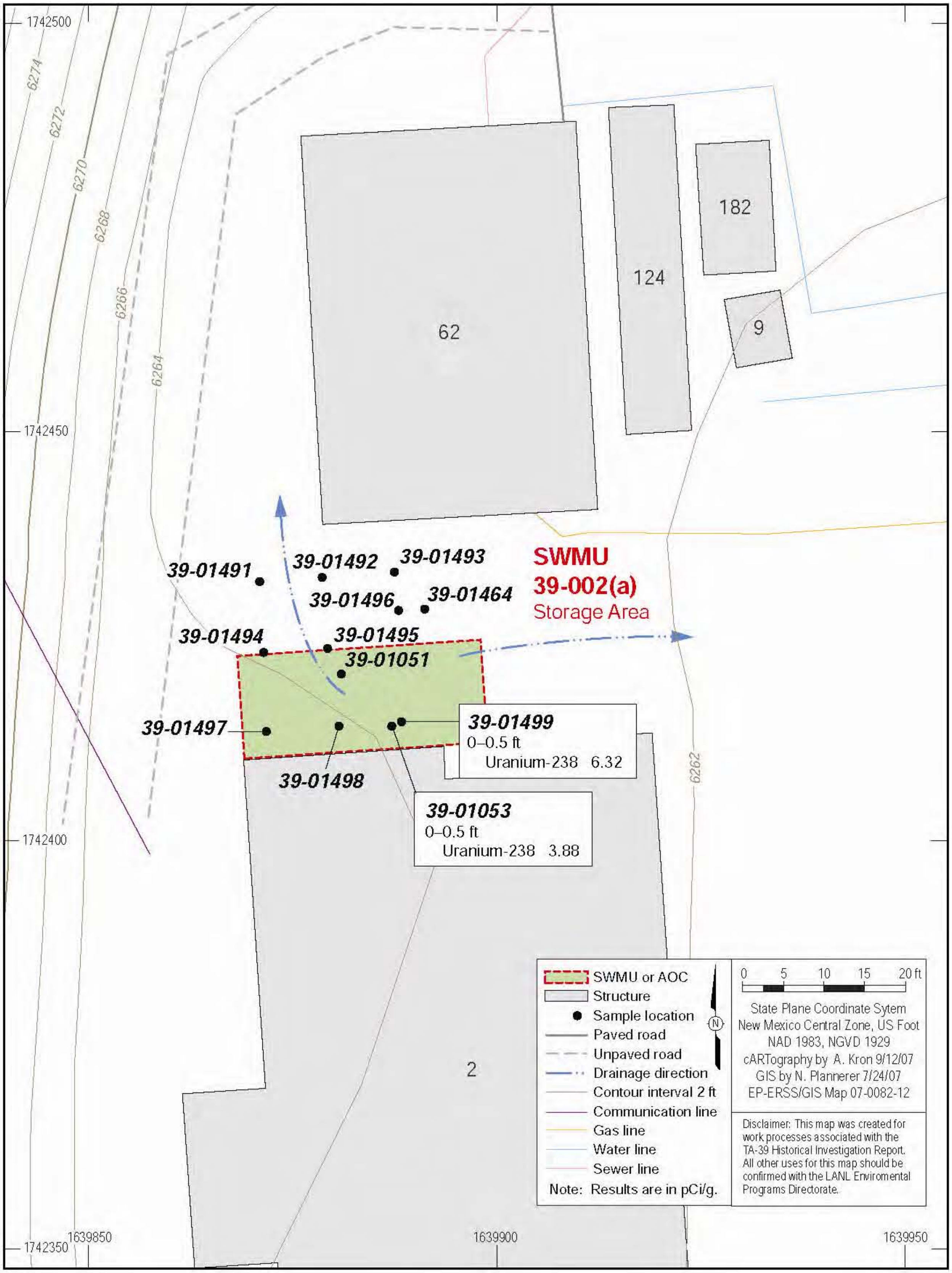


Figure 2.3-10 Radionuclides detected or detected above BVs/FVs at SWMU 39-002(a)

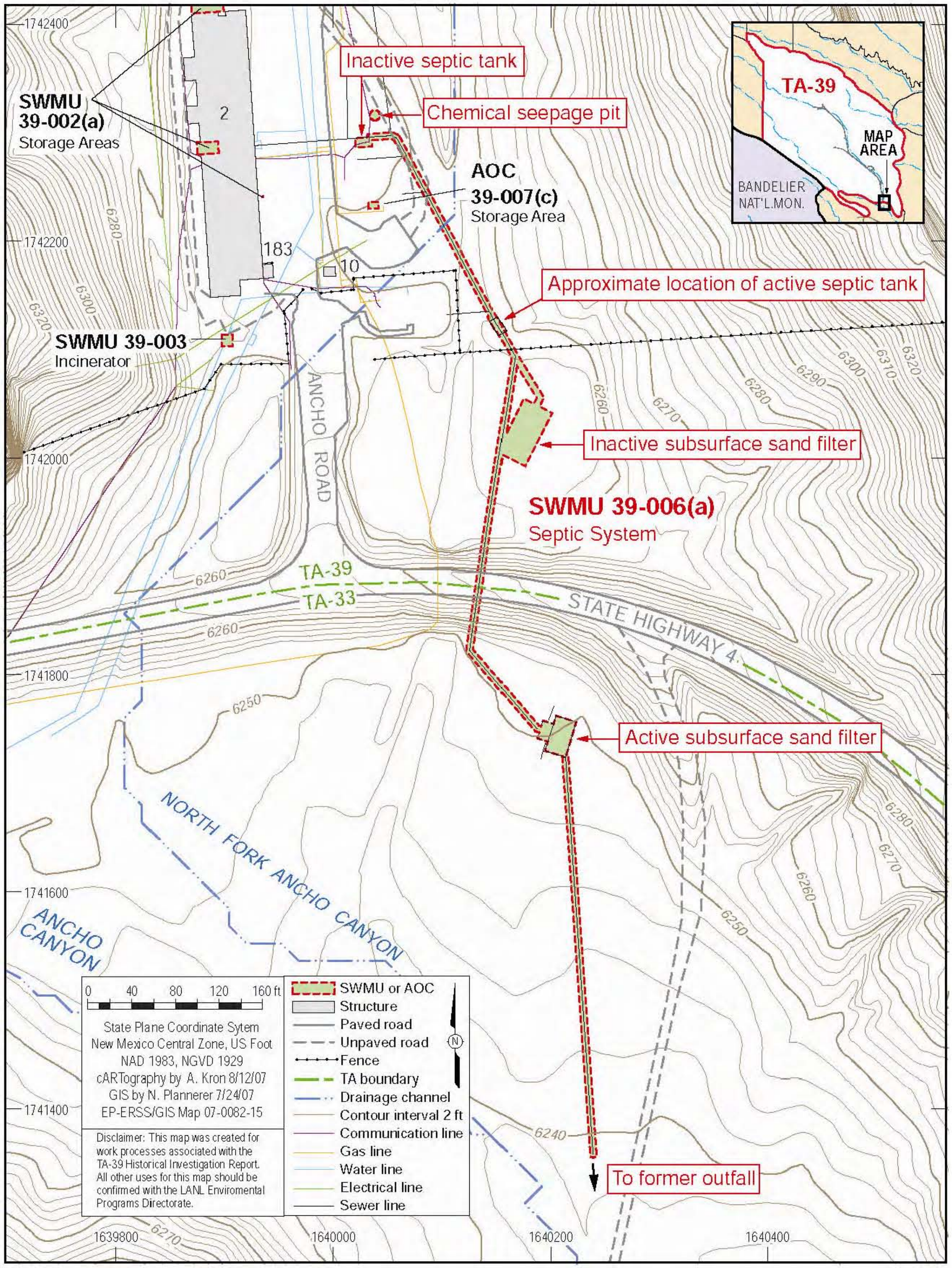


Figure 2.3-11 Location of SWMU 39-006(a), septic system

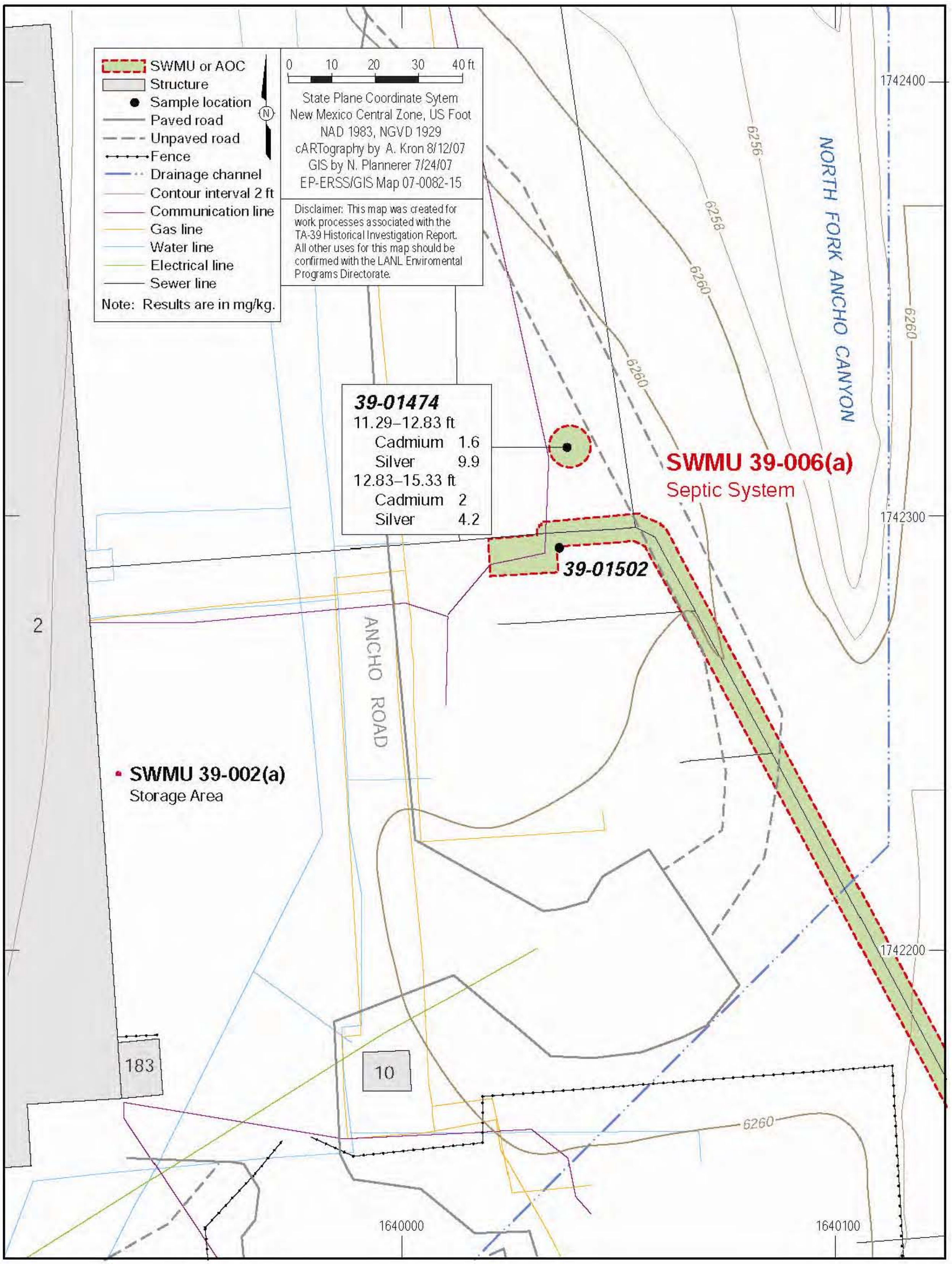


Figure 2.3-12 Inorganic chemicals detected above BVs at SWMU 39-006(a)

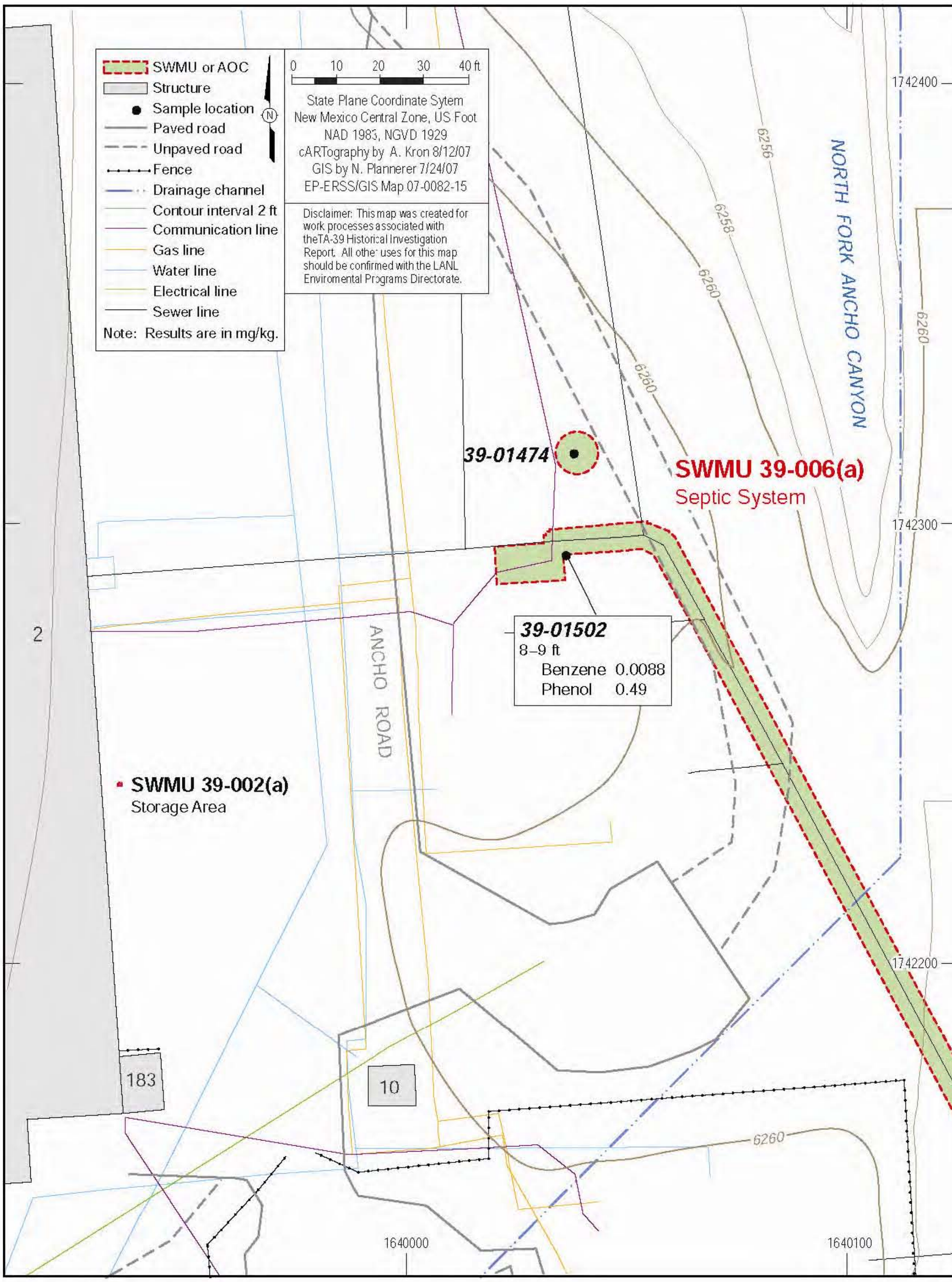


Figure 2.3-13 Organic chemicals detected at SWMU 39-006(a)

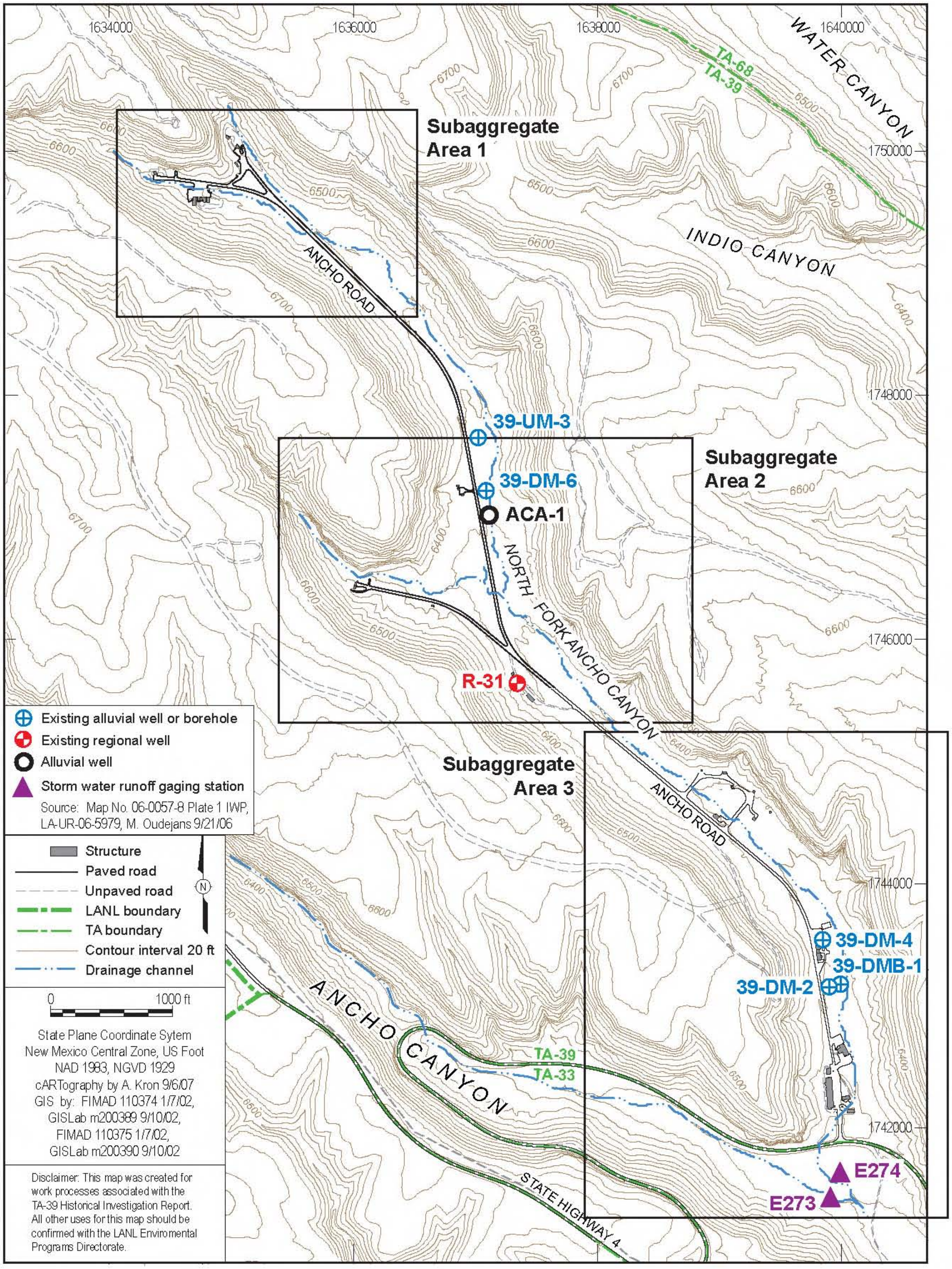
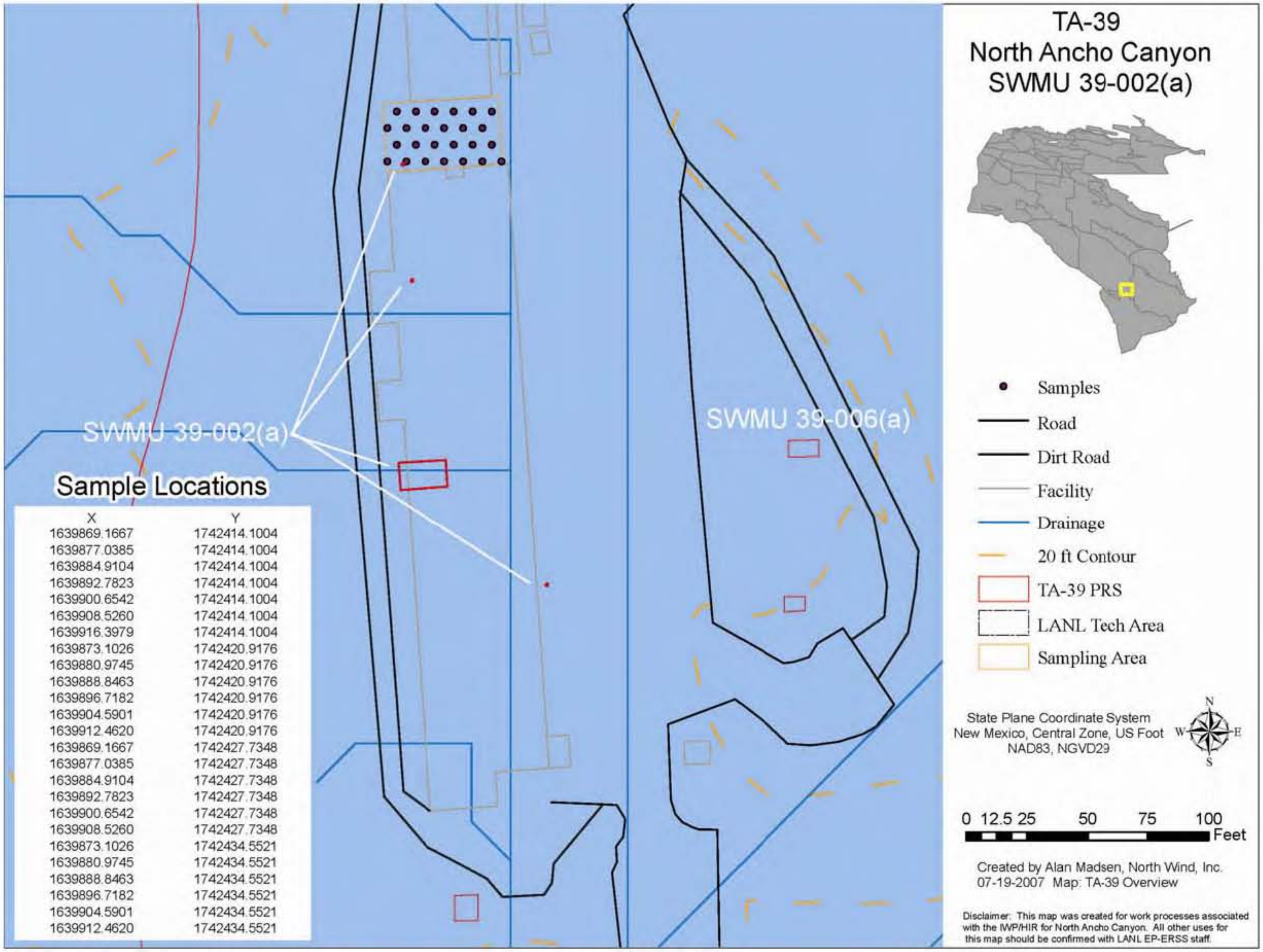
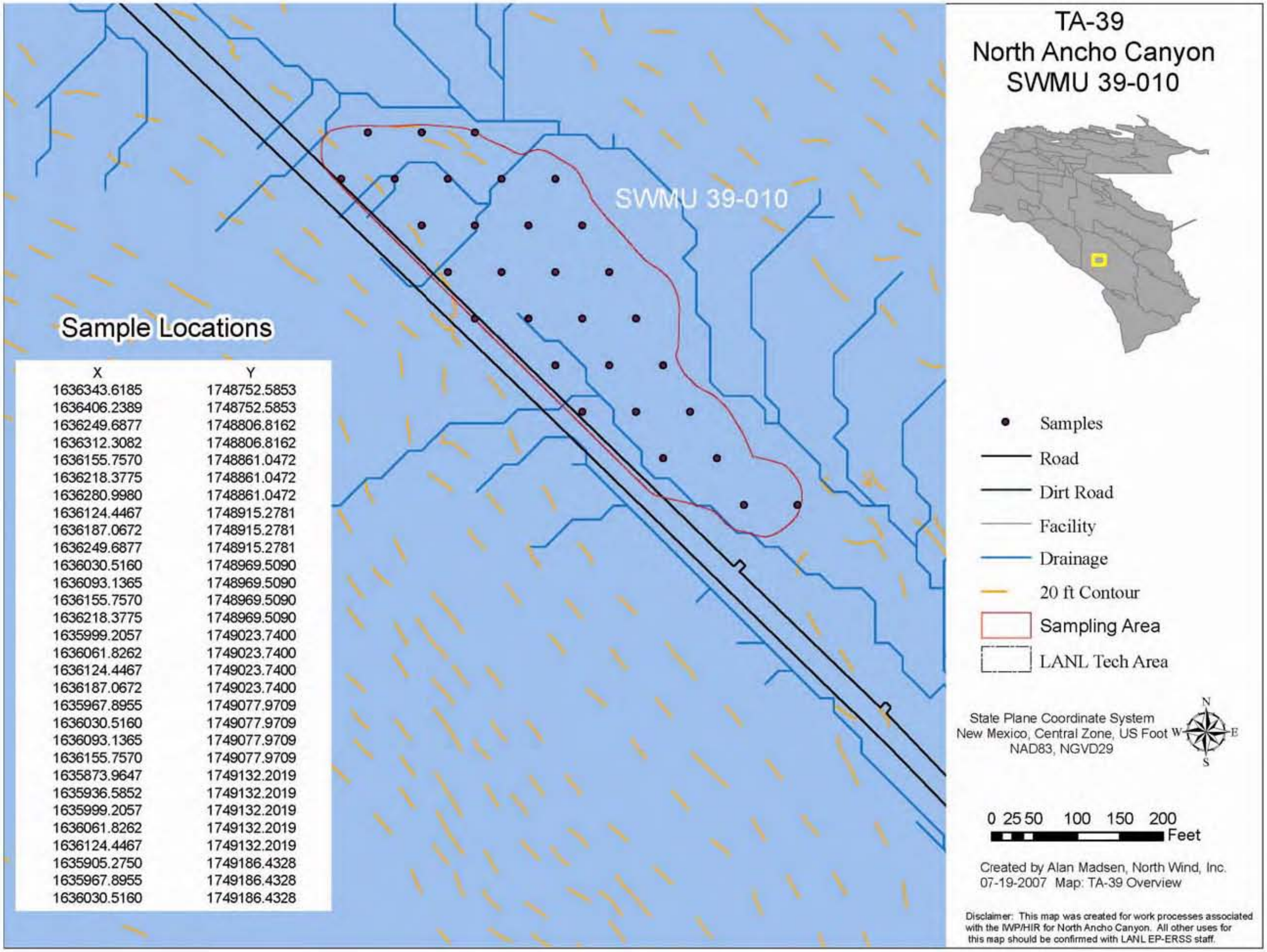


Figure 3.1-1 Groundwater wells and surface-water gauging stations in North Ancho Canyon



X	Y
1639869.1667	1742414.1004
1639877.0385	1742414.1004
1639884.9104	1742414.1004
1639892.7823	1742414.1004
1639900.6542	1742414.1004
1639908.5260	1742414.1004
1639916.3979	1742414.1004
1639873.1026	1742420.9176
1639880.9745	1742420.9176
1639888.8463	1742420.9176
1639896.7182	1742420.9176
1639904.5901	1742420.9176
1639912.4620	1742420.9176
1639869.1667	1742427.7348
1639877.0385	1742427.7348
1639884.9104	1742427.7348
1639892.7823	1742427.7348
1639900.6542	1742427.7348
1639908.5260	1742427.7348
1639873.1026	1742434.5521
1639880.9745	1742434.5521
1639888.8463	1742434.5521
1639896.7182	1742434.5521
1639904.5901	1742434.5521
1639912.4620	1742434.5521

Figure 4.3-1 Proposed sampling locations for the SW 39-002(a) storage area preliminary characterization



X	Y
1636343.6185	1748752.5853
1636406.2389	1748752.5853
1636249.6877	1748806.8162
1636312.3082	1748806.8162
1636155.7570	1748861.0472
1636218.3775	1748861.0472
1636280.9980	1748861.0472
1636124.4467	1748915.2781
1636187.0672	1748915.2781
1636249.6877	1748915.2781
1636030.5160	1748969.5090
1636093.1365	1748969.5090
1636155.7570	1748969.5090
1636218.3775	1748969.5090
1635999.2057	1749023.7400
1636061.8262	1749023.7400
1636124.4467	1749023.7400
1636187.0672	1749023.7400
1635967.8955	1749077.9709
1636030.5160	1749077.9709
1636093.1365	1749077.9709
1636155.7570	1749077.9709
1635873.9647	1749132.2019
1635936.5852	1749132.2019
1635999.2057	1749132.2019
1636061.8262	1749132.2019
1636124.4467	1749132.2019
1635905.2750	1749186.4328
1635967.8955	1749186.4328
1636030.5160	1749186.4328

Figure 4.7-1 Proposed sampling locations for SWMU 39-010 preliminary characterization

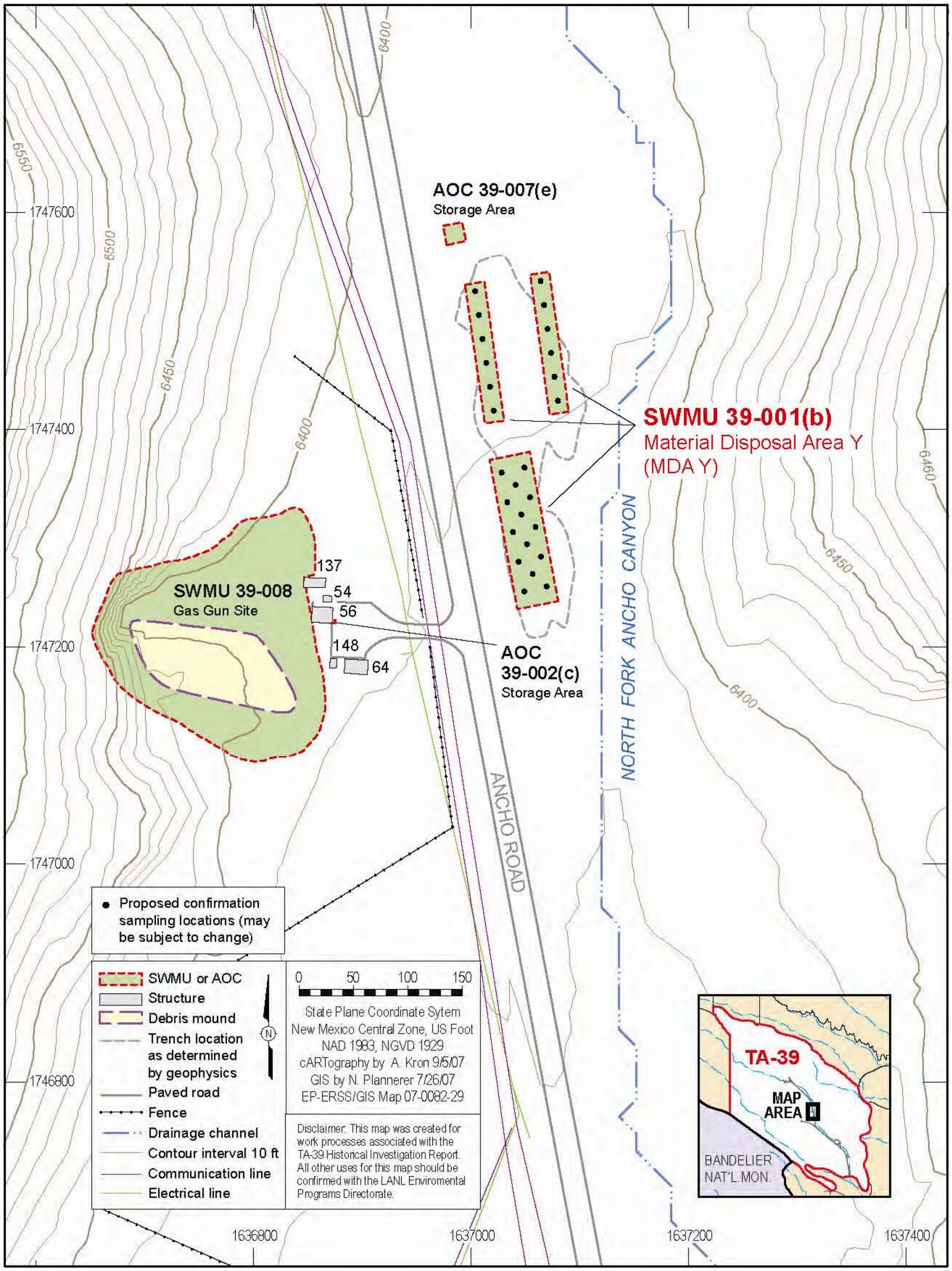
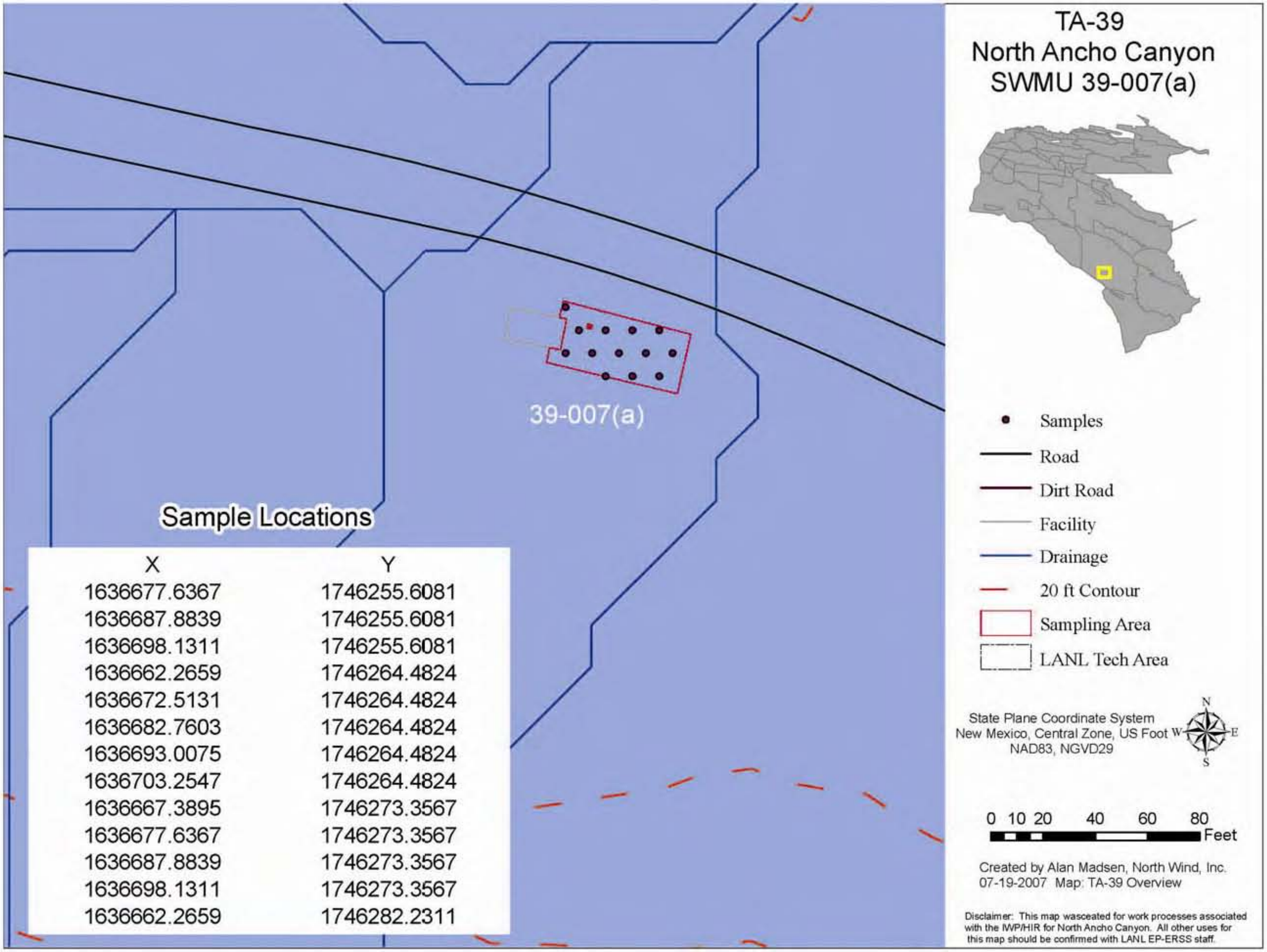


Figure 4.8-1 Proposed confirmation sampling locations for SWMU 39-001(b) excavation activities



X	Y
1636677.6367	1746255.6081
1636687.8839	1746255.6081
1636698.1311	1746255.6081
1636662.2659	1746264.4824
1636672.5131	1746264.4824
1636682.7603	1746264.4824
1636693.0075	1746264.4824
1636703.2547	1746264.4824
1636667.3895	1746273.3567
1636677.6367	1746273.3567
1636687.8839	1746273.3567
1636698.1311	1746273.3567
1636662.2659	1746282.2311

Figure 4.13-1 Proposed sampling locations for SWMU 39-007(a) preliminary characterization

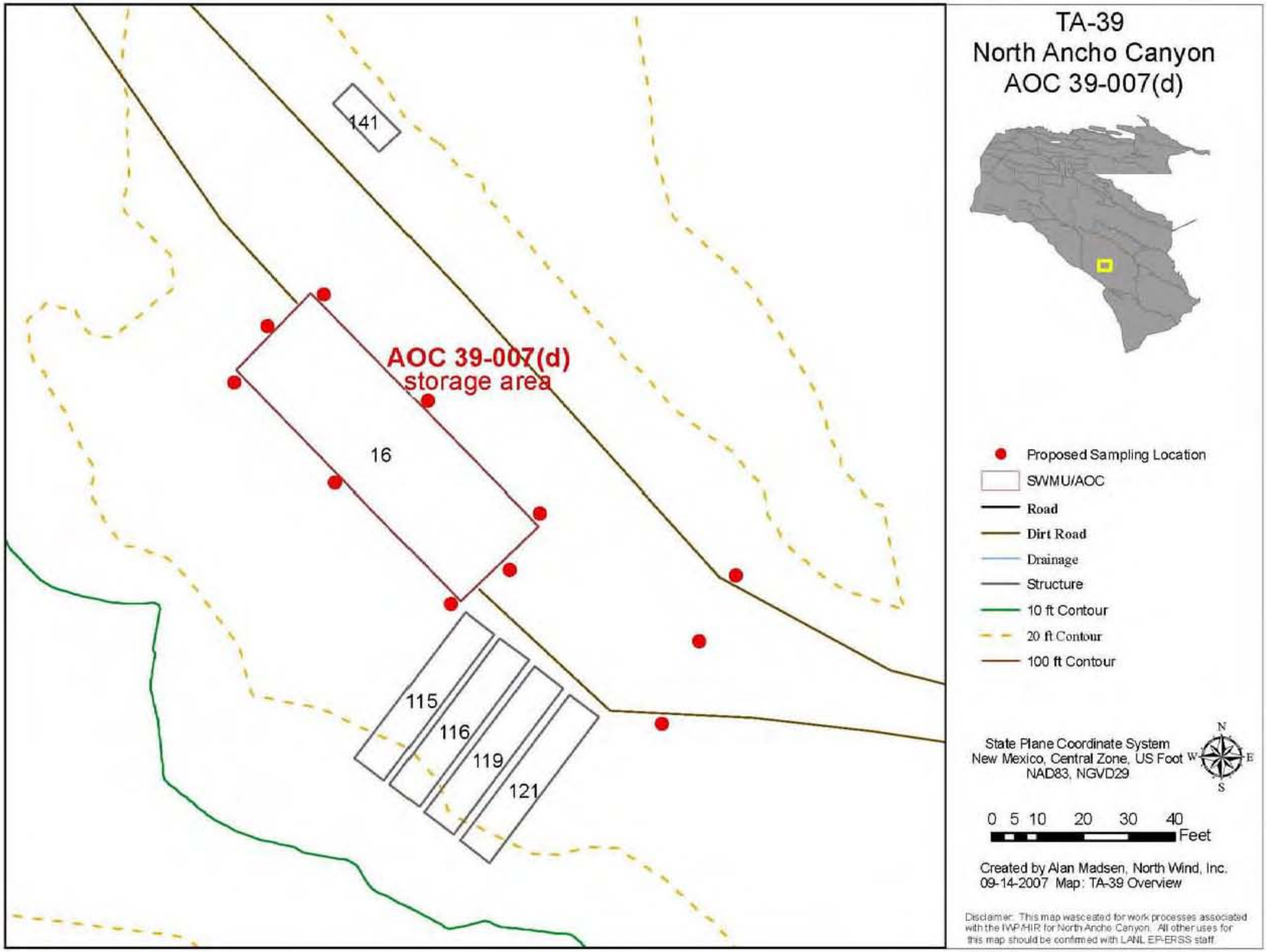
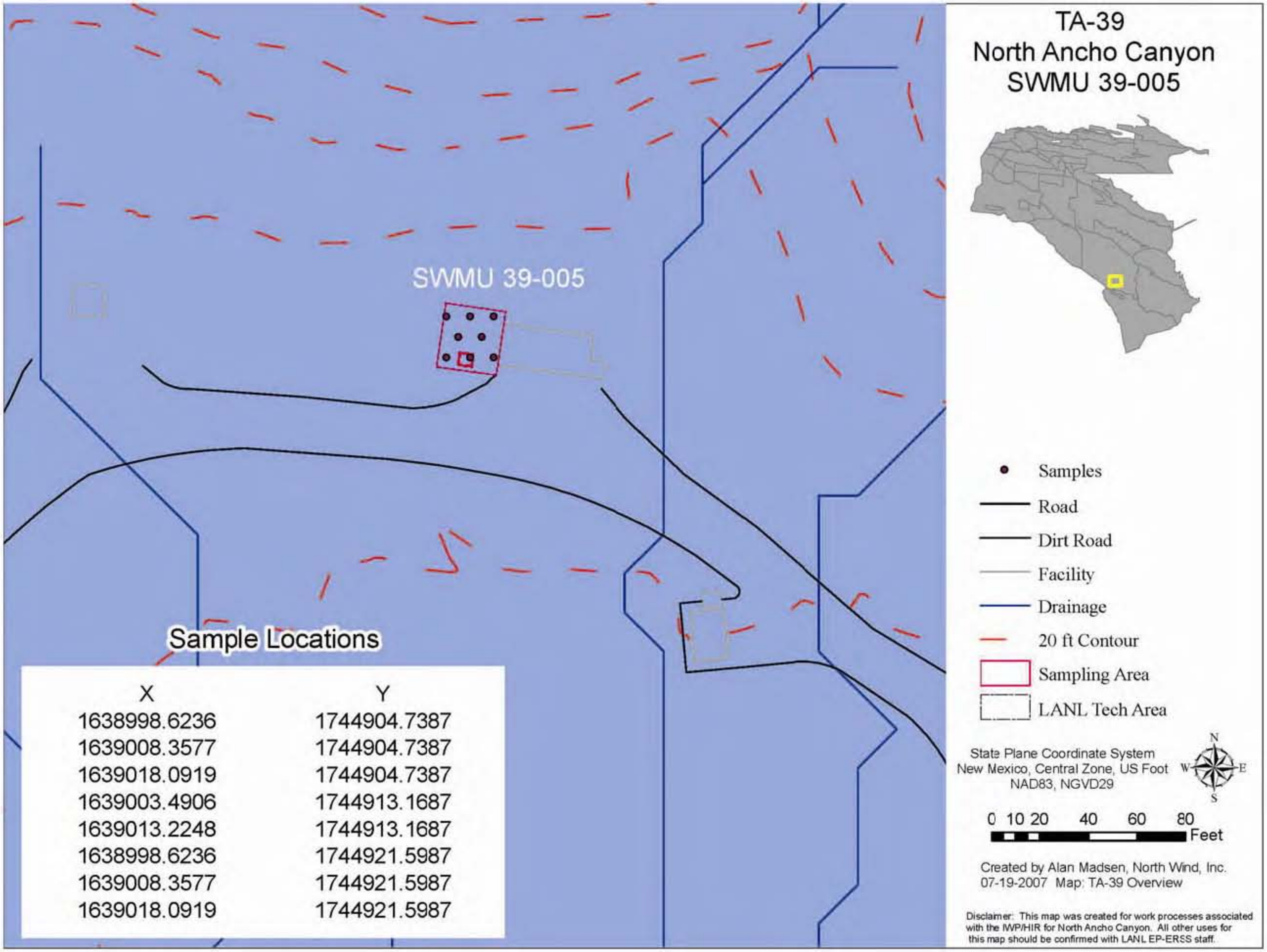


Figure 4.14-1 Proposed sampling locations for AOC 39-007(d) preliminary characterization



X	Y
1638998.6236	1744904.7387
1639008.3577	1744904.7387
1639018.0919	1744904.7387
1639003.4906	1744913.1687
1639013.2248	1744913.1687
1638998.6236	1744921.5987
1639008.3577	1744921.5987
1639018.0919	1744921.5987

Figure 4.15-1 Proposed sampling locations for SWMU 39-005 preliminary characterization

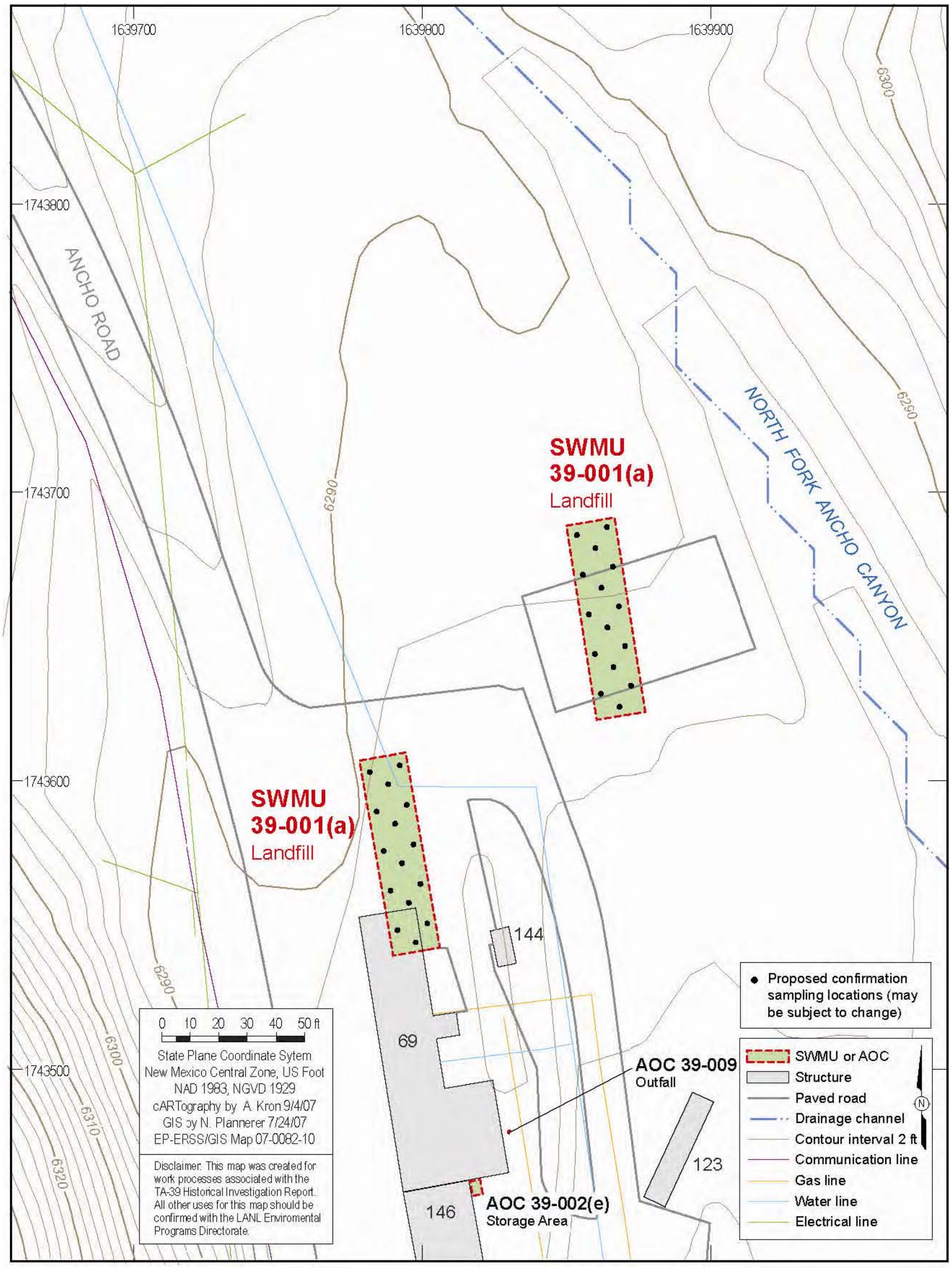


Figure 4.16-1 Proposed confirmation sampling locations for SWMU 39-001(a) excavation activities

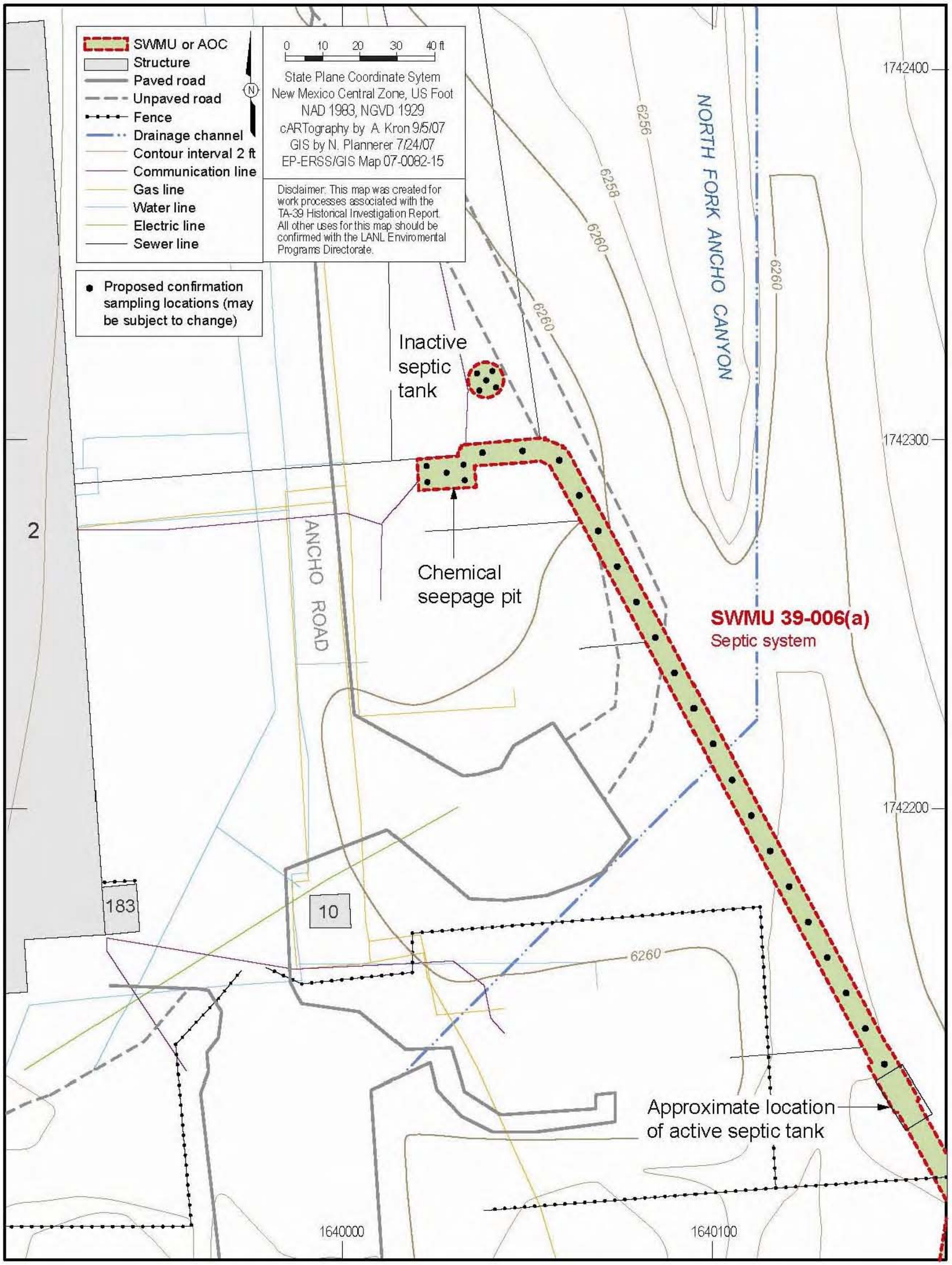


Figure 4.19-1 Proposed confirmation sampling locations for SWMU 39-006(a) excavation activities

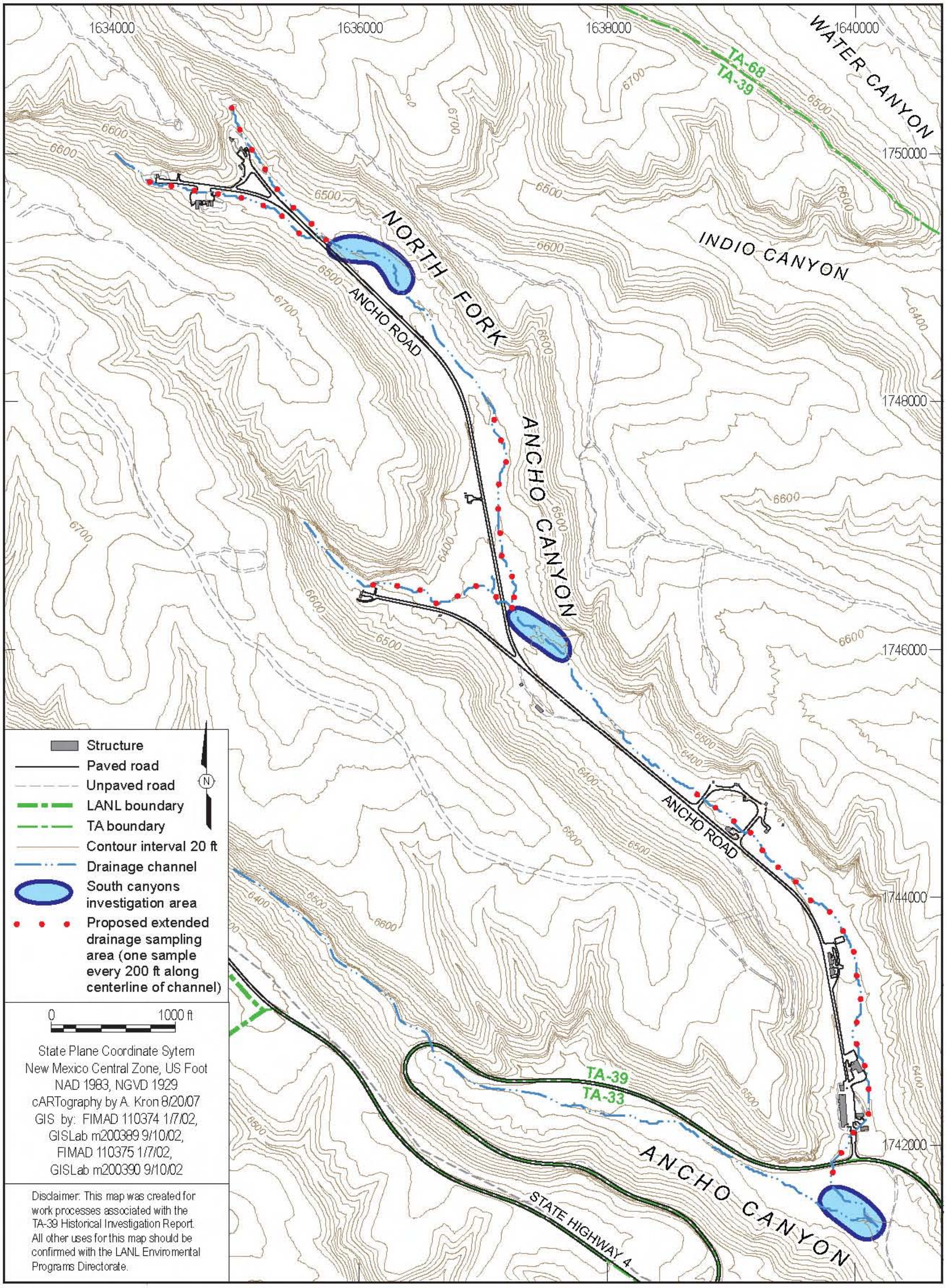


Figure 4.20-1 Proposed sampling areas for the extended drainages preliminary characterization

Table 1.0-1
North Ancho Canyon Aggregate Area List of SWMUs and AOCs

SWMU/AOC	Subaggregate Area	Description	Comment	Reference/ Location	Proposed Activity	Description of Proposed Activities
SWMU 39-001(a)	3	Inactive landfill	This site is included in the work plan.	Investigation work plan, section 2.3.2	Excavation, material characterization, waste disposition, confirmation sampling	Investigation work plan, section 4.16
SWMU 39-001(b)	2	Inactive disposal area	This site is included in the work plan.	Investigation work plan, section 2.2.1	Excavation, material characterization, waste disposition, confirmation sampling	Investigation work plan, section 4.8
SWMU 39-002(a)	3	Area 1–Inactive outdoor storage area at structure 39-2, near exit door at NW corner	This site is included in the work plan.	Investigation work plan, section 2.3.4	Investigation sampling	Investigation work plan, section 4.18
SWMU 39-002(a)	3	Area 2–Indoor SAA at structure 39-2, room 18-A	This site is an indoor RCRA-regulated SAA inside a building with no potential for releases to the environment. This site is described in the work plan.	Investigation work plan, section 2.3.4	No characterization is proposed because this is a RCRA regulated SAA that is subject to RCRA closure requirements and not Consent Order requirements.	n/a*
SWMU 39-002(a)	3	Area 3–Outdoor SAA and holding/receiving area at structure 39-2, north end of loading dock	This site is described in the work plan.	Investigation work plan, section 2.3.4	No characterization is proposed because this is a RCRA regulated SAA that is subject to RCRA closure requirements and not Consent Order requirements.	n/a
AOC 39-002(b)	2	Former storage area and active SAA; collocated with structure 39-6 and SWMU 39-004(c)	This site is a former storage area and active RCRA-regulated SAA that is collocated with an active firing site. This site is described in the work plan.	Investigation work plan, section 2.2.5	Characterization of this site is proposed to be delayed until firing activities at the collocated firing site cease.	Investigation work plan, section 4.12
AOC 39-002(c)	2	Former SAA; collocated with structure39-56 and SWMU 39-008	This site is a former SAA that is collocated with an active firing site. This site is described in the work plan.	Investigation work plan, section 2.2.3	Characterization of this site is proposed to be delayed until firing activities at the collocated firing site cease.	Investigation work plan, section 4.10

Table 1.0-1 (continued)

SWMU/AOC	Subaggregate Area	Description	Comment	Reference/ Location	Proposed Activity	Description of Proposed Activities
AOC39-002(d)	1	Former SAA; collocated with structure 39-57 [firing site 39-004(d) blockhouse) and 39-004(d)]	This site is a former RCRA-regulated SAA that is collocated with an active firing site. This site is described in the work plan.	Investigation work plan, section 2.1.2	This AOC is a former SAA regulated under 40 CFR 262 and 20.4.1 NMAC. As such it is appropriate for NFA. A statement of basis describing the rationale for NFA and a request for a certificate of completion for this site will be submitted with the investigation report associated with this work plan.	Investigation work plan, section 4.3
AOC 39-002(e)	3	Former SAA at structure 39-69 and structure 39-89; concrete pad under breezeway between buildings	This site is a former RCRA-regulated SAA. This site is described in the work plan.	Investigation work plan, section 2.3.3	This AOC is a former SAA regulated under 40 CFR 262 and 20.4.1 NMAC. As such it is appropriate for NFA. A statement of basis describing the rationale for NFA and a request for a certificate of completion for this site will be submitted with the investigation report associated with this work plan.	Investigation work plan, section 4.17
AOC 39-002(f)	1	Former RCRA-regulated SAA at structure 39-88; collocated with SWMU 39-004(e)	This site is a former RCRA-regulated SAA that is collocated with an active firing site. This site is described in the work plan.	Investigation work plan, section 2.1.4	Characterization of this site is proposed to be delayed until firing activities at the collocated firing site cease.	Investigation work plan, section 4.5
AOC 39-002(g)	n/a	Storage area	This site has been approved for NFA by EPA. The site is presented in the work plan solely to document the current site status.	EPA 2005, 088464; Investigation work plan, section 2.4.1	No characterization is required at this site as it has been approved for NFA.	n/a

Table 1.0-1 (continued)

SWMU/AOC	Subaggregate Area	Description	Comment	Reference/ Location	Proposed Activity	Description of Proposed Activities
SWMU 39-003	n/a	Incinerator	This site has been removed from Module VIII of the Laboratory's HWFP. The site is presented in the work plan solely to document the current site status.	NMED 1998, 063042 (Table A1, 12/23/98); Investigation work plan, section 2.4.2	No characterization is required at this site because it has been removed from Module VIII of the Laboratory's HWFP.	n/a
SWMU 39-004(a)	1	Active firing site; collocated with SWMUs 39-004(a) 39-004(b), 39-004(d), and 39-004(e)	The investigation of this site has been deferred as specified in the Consent Order. The site is presented in the work plan to document the current site status and as it influences other sites that are non-deferred within North Ancho Canyon.	March 1, 2005, Consent Order, Table IV-2; investigation work plan, section 2.1.1	No characterization is required at this site because it is deferred per the Consent Order	Investigation work plan section 4.1
SWMU 39-004(b)	1	Firing site on standby status; collocated with SWMUs 39-004(a) 39-004(b), 39-004(d), and 39-004(e)	The investigation of this site has been deferred as specified in the Consent Order. The site is presented in the work plan to document the current site status and as it influences other sites that are non-deferred within North Ancho Canyon	March 1, 2005, Consent Order, Table IV-2; investigation work plan, section 2.1.3	No characterization is required at this site because it is deferred per the Consent Order	Investigation work plan section 4.4
SWMU 39-004(c)	2	Active firing site; collocated with structure 39-6	This site is identified as an active RCRA-regulated unit in the Consent Order. The site is presented in the work plan to document the current site status and as it influences other sites that are non-deferred within North Ancho Canyon.	March 1, 2005, Consent Order; investigation work plan, section 2.2.4	No characterization is required at this site because it is an active RCRA-regulated unit per the Consent Order	Investigation work plan section 4.11
SWMU 39-004(d)	1	Active firing site 39-57; collocated with SWMUs 39-004(a) 39-004(b), 39-004(d), and 39-004(e)	This site is identified as an active RCRA-regulated unit in the Consent Order. The site is presented in the work plan to document the current site status and as it influences other sites that are non-deferred within North Ancho Canyon.	March 1, 2005, Consent Order; investigation work plan, section 2.1.1	No characterization is required at this site because it is an active RCRA-regulated unit per the Consent Order	Investigation work plan section 4.2

Table 1.0-1 (continued)

SWMU/AOC	Subaggregate Area	Description	Comment	Reference/ Location	Proposed Activity	Description of Proposed Activities
SWMU 39-004(e)	1	Active firing site; collocated with SWMUs 39-004(a) 39-004(b), 39-004(d), and 39-004(e)	The investigation of this site has been deferred as specified in the Consent Order. The site is presented in the work plan to document the current site status and as it influences other sites that are non-deferred within North Ancho Canyon.	March 1, 2005, Consent Order, Table IV-2; investigation work plan, section 2.1.5	No characterization is required at this site as it is deferred per the Consent Order	Investigation work plan section 4.6
SWMU 39-005	3	HE seepage pit	This site is included in the investigation work plan.	Investigation work plan, section 2.3.1	Investigation sampling	Investigation work plan section 4.15
SWMU 39-006(a)	3	Active septic system—outfall, active sand filter, active septic tank	This site is described in the investigation work plan.	Investigation work plan, section 2.3.5	No characterization of the active septic system units is proposed in this investigation work plan	n/a
SWMU 39-006(a)	3	Inactive septic system—inactive sand filter, inactive septic tank, inactive chemical seepage pit	This site is included in the investigation work plan.	Investigation work plan, section 2.3.5	Excavation, material characterization, waste disposition, confirmation sampling	Investigation work plan section 4.19
SWMU 39-006(b)	3	Septic system	This site has been removed from Module VIII of the Laboratory's HWFP. The site is presented in the work plan solely to document the current site status.	NMED 1998, 063042 (Table A1, 12/23/98); Investigation work plan, section 2.4.3	No characterization is required at this site as it has been removed from Module VIII of the Laboratory's HWFP.	n/a
SWMU 39-007(a)	2	Former SAA at structure 39-63	This site is included in the investigation work plan.	Investigation work plan, section 2.2.6	Investigation sampling	Investigation work plan section 4.13
AOC 39-007(b)	n/a	Storage area	This site has been approved for NFA by EPA. The site is presented in the work plan solely to document the current site status.	EPA 2005, 088464; Investigation work plan, section 2.4.5	No characterization is required at this site as it has been approved for NFA	n/a
AOC 39-007(c)	n/a	Storage area	This site has been approved for NFA by EPA. The site is presented in the work plan solely to document the current site status.	EPA 2005, 088464; Investigation work plan, section 2.4.5	No characterization is required at this site as it has been approved for NFA	n/a
AOC 39-007(d)	2	Active storage area at structure 39-142	This site is an active storage area. This site is included in the investigation work plan.	Investigation work plan, section 2.2.7	Investigation sampling	Investigation work plan section 4.14

Table 1.0-1 (continued)

SWMU/AOC	Subaggregate Area	Description	Comment	Reference/ Location	Proposed Activity	Description of Proposed Activities
AOC 39-007(e)	n/a	Storage area	This site has been approved for NFA by EPA. The site is presented in the work plan solely to document the current site status.	EPA 2005, 088464; investigation work plan section 2.4.5	No characterization is required at this site because it has been approved for NFA.	n/a
SWMU 39-008	2	Area of potential soil contamination from an active gas-gun firing site.	This site is an active firing site. The site is presented in the work plan to document the current site status and as it influences other sites that are within North Ancho Canyon.	Investigation work plan, section 2.2.2	No characterization is proposed at this site as it is an active firing site.	Investigation work plan section 4.9
AOC 39-009	n/a	Outfall	This site has been approved for NFA by EPA. The site is presented in the work plan solely to document the current site status.	EPA 2005, 088464; investigation work plan, section 2.4.7	No characterization is required at this site because it has been approved for NFA.	n/a
SWMU 39-010	1	Excavated soil dump from construction of the recent firing site SWMU 39-004(e).	This site is included in the investigation work plan.	Investigation work plan, section 2.1.6	Investigation sampling	Investigation work plan section 4.7
Extended drainages	n/a	Drainages downgradient of North Ancho Canyon SWMUs and AOCs to the South Canyons investigation areas	These drainages are included in this work plan.	n/a	Investigation sampling	Investigation work plan section 4.20
SWMU 49-001(a)	n/a	MDA AB experimental shafts	This site will be discussed in the TA-49 site NES work plan and HIR.	n/a	n/a	n/a
SWMU 49-001(b)	n/a	MDA AB experimental shafts	This site will be discussed in the TA-49 NES work plan and HIR.	n/a	n/a	n/a
SWMU 49-001(c)	n/a	MDA AB experimental shafts	This site will be discussed in the TA--49 NES work plan and HIR.	n/a	n/a	n/a
SWMU 49-001(d)	n/a	MDA AB experimental shafts	This site will be discussed in the TA -49 NES work plan and HIR.	n/a	n/a	n/a
SWMU 49-001(e)	n/a	MDA AB experimental shafts	This site will be discussed in the TA-49 NES work plan and HIR.	n/a	n/a	n/a

Table 1.0-1 (continued)

SWMU/AOC	Subaggregate Area	Description	Comment	Reference/ Location	Proposed Activity	Description of Proposed Activities
SWMU 49-001(f)	n/a	MDA AB experimental shafts	This site will be discussed in the TA-49 NES work plan and HIR.	n/a	n/a	n/a
SWMU 49-001(g)	n/a	MDA AB surface soil contamination	This site will be discussed in the TA-49 NES work plan and HIR.	n/a	n/a	n/a
AOC 49-002	n/a	Operational facility (Area 10 underground chamber)	This site will be discussed in the TA-49 non NES work plan and HIR.	n/a	n/a	n/a
SWMU 49-003	n/a	Leach field (Area 11)	This site will be discussed in the TA-49 NES work plan and HIR.	n/a	n/a	n/a
SWMU 49-005(a)	n/a	Disposal area (east of Area 10)	This site will be discussed in the TA-49 non NES work plan and HIR.	n/a	n/a	n/a
AOC 49-005(b)	n/a	Disposal area (in Area 5)	This site will be discussed in the TA-49 non NES work plan and HIR.	n/a	n/a	n/a
SWMU 49-006	n/a	Sump	This site will be discussed in the TA-49 non NES work plan and HIR.	n/a	n/a	n/a
AOC 49-007(b)	n/a	Septic system (HDT area)	This site has been approved for NFA by EPA.	n/a	n/a	n/a
AOC 49-008(a)	n/a	Soil contamination (Area 5)	This site will be discussed in the TA-49 non NES work plan and HIR.	n/a	n/a	n/a
AOC 49-008(b)	n/a	Soil contamination (Area 6)	This site will be discussed in the TA-49 non NES work plan and HIR.	n/a	n/a	n/a
AOC 49-008(c)	n/a	Soil contamination (Area 11)	This site will be discussed in the TA-49 NES work plan and HIR.	n/a	n/a	n/a
AOC 49-008(d)	n/a	Bottle house and cable pull test facilities	This site will be discussed in the TA-49 NES work plan and HIR.	n/a	n/a	n/a
AOC 49-009	n/a	Former aboveground tank	This site has been approved for NFA by the EPA.	n/a	n/a	n/a

*n/a = Not applicable.

Table 2.1-1
Inorganic Chemicals above BV at SWMU 39-004(a) and SWMU 39-004(d)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Beryllium	Cadmium	Calcium	Cobalt	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Silver	Thallium	Uranium	Zinc
Soil BV[a]				0.83	295	1.83	0.4	6120	8.64	14.7	0.5	22.3	0.1	15.4	1	0.73	1.82	48.8
0239-95-0099	39-01237	0.00–0.50	Soil	11 (UJ)	—[b]	—	0.55 (UJ)	—	—	—	0.55 (U)	—	0.11 (U)	—	2.2 (U)	1.1 (U)	7.15	—
0239-95-0100	39-01238	0.00–0.50	Soil	11 (UJ)	—	—	0.54 (UJ)	—	—	—	0.54 (U)	—	0.11 (U)	—	2.2 (U)	1.1 (U)	6.55	—
0239-95-0101	39-01239	0.00–0.50	Soil	10 (UJ)	—	—	0.51 (J-)	—	—	54	0.51 (U)	54	0.41	—	2 (U)	1 (U)	551	—
0239-95-0103	39-01240	0.00–0.50	Soil	11 (UJ)	—	—	0.53 (UJ)	—	—	38	0.53 (U)	35	0.42	—	2.1 (U)	1.1 (U)	166	—
0239-95-0104	39-01241	0.00–0.50	Soil	—	—	—	0.57 (U)	—	—	—	0.57 (U)	—	0.11 (U)	—	2.3 (U)	1.1 (U)	9.8	—
0239-95-0107	39-01242	0.00–0.50	Soil	—	—	—	0.59 (U)	—	—	—	0.59 (U)	—	0.12 (U)	—	2.4 (U)	1.2 (U)	6.28	52
0239-95-0089	39-01253	0.00–0.50	Soil	11 (UJ)	—	—	1.4 (U)	—	—	—	0.55 (U)	—	0.44	—	2.2 (U)	—	76.8	—
0239-95-0090	39-01254	0.00–0.50	Soil	11 (UJ)	—	—	7.6	—	440	3500	0.55 (U)	320	4	270	2.2 (U)	—	264	63
0239-95-0091	39-01255	0.00–0.50	Soil	11 (UJ)	—	—	0.78 (U)	—	—	—	0.56 (U)	120	0.44	—	2.2 (U)	—	96.9	—
0239-95-0092	39-01256	0.00–0.50	Soil	11 (UJ)	540	9.1	1.5	—	—	910	0.53 (U)	82	6.8	—	2.1 (U)	1.1 (U)	1300	690
0239-95-0093	39-01257	0.00–0.50	Soil	13 (UJ)	—	—	0.65 (UJ)	—	—	—	0.65 (U)	—	0.13 (U)	—	2.6 (U)	1.3 (U)	9.4	—
0239-95-0096	39-01258	0.00–0.50	Soil	11 (UJ)	—	—	0.56 (UJ)	—	—	—	0.56 (U)	—	0.22	—	2.2 (U)	1.1 (U)	73.3	—
0239-95-0110	39-01263	0.00–0.50	Soil	10 (U)	—	—	0.52 (U)	—	—	—	0.52 (U)	—	—	—	2.1 (U)	—	—	—
0239-95-0111	39-01263	0.50–0.83	Soil	11 (U)	—	—	0.53 (U)	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	—	—	—
0239-95-0112	39-01264	0.00–0.50	Soil	11 (U)	—	—	0.53 (U)	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	—	2.05	—
0239-95-0113	39-01264	0.50–0.83	Soil	11 (U)	—	—	0.54 (U)	—	—	—	0.54 (U)	—	0.11 (U)	—	2.2 (U)	—	2.65	—
0239-95-0114	39-01265	0.00–0.50	Soil	11 (U)	—	—	0.54 (U)	—	—	—	0.54 (U)	—	0.11 (U)	—	2.2 (U)	—	5.73	—
0239-95-0115	39-01265	0.50–0.83	Soil	11 (U)	—	—	0.56 (U)	—	—	—	0.56 (U)	—	0.11 (U)	—	2.2 (U)	—	5.29	—
0239-95-0116	39-01266	0.00–0.50	Soil	11 (U)	—	—	0.53 (U)	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	—	4.92	—
0239-95-0118	39-01266	0.50–0.83	Soil	11 (U)	—	—	0.54 (U)	—	—	—	0.54 (U)	—	0.11 (U)	—	2.2 (U)	—	7.5	—
0239-95-0119	39-01267	0.00–0.50	Soil	11 (U)	—	—	0.53 (U)	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	—	1.95	—
0239-95-0120	39-01267	0.50–0.83	Soil	11 (U)	—	—	0.53 (U)	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	—	9.6	—
0239-95-0121	39-01268	0.00–0.50	Soil	11 (U)	—	—	0.54 (U)	—	—	—	0.54 (U)	—	0.11 (U)	—	2.2 (U)	—	32.1	—
0239-95-0122	39-01268	0.50–0.83	Soil	11 (U)	—	—	0.54 (U)	—	—	—	0.54 (U)	—	0.11 (U)	—	2.2 (U)	—	54.9	—
0239-95-0123	39-01269	0.00–0.50	Soil	11 (U)	—	—	0.54 (U)	—	—	—	0.54 (U)	—	0.11 (U)	—	2.2 (U)	—	16.4	—

Table 2.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Beryllium	Cadmium	Calcium	Cobalt	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Silver	Thallium	Uranium	Zinc
Soil BV[a]				0.83	295	1.83	0.4	6120	8.64	14.7	0.5	22.3	0.1	15.4	1	0.73	1.82	48.8
0239-95-0124	39-01269	0.50–0.83	Soil	11 (U)	—	—	0.53 (U)	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	—	23.4	—
0239-95-0125	39-01270	0.00–0.50	Soil	10 (UJ)	—	—	0.52 (UJ)	—	—	—	0.52 (U)	—	—	—	2.1 (U)	1 (U)	29.8	—
0239-95-0126	39-01270	0.50–0.83	Soil	11 (UJ)	—	—	0.53 (UJ)	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	1.1 (U)	21.2	—
0239-95-0127	39-01271	0.00–0.50	Soil	10 (UJ)	—	—	0.52 (UJ)	—	—	—	0.52 (U)	—	—	—	2.1 (U)	1 (U)	21.6	—
0239-95-0128	39-01271	0.50–0.83	Soil	11 (UJ)	—	—	0.53 (UJ)	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	1.1 (U)	5.66	—
0239-95-0129	39-01294	0.00–0.50	Soil	11 (UJ)	—	—	0.53 (UJ)	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	1.1 (U)	8.9	—
0239-95-0130	39-01294	0.50–0.83	Soil	10 (UJ)	—	—	0.52 (UJ)	—	—	—	0.52 (U)	—	—	—	2.1 (U)	1 (U)	17	—
0239-95-0131	39-01295	0.00–0.50	Soil	11 (UJ)	—	—	0.53	—	—	—	0.53 (U)	—	0.11	—	2.1	1.1 (U)	15.9	—
0239-95-0133	39-01296	0.00–0.50	Soil	11 (UJ)	—	—	0.53 (UJ)	—	—	—	0.53 (U)	—	0.11	—	2.1 (U)	1.1 (U)	24.9	—
0239-95-0134	39-01296	0.50–0.83	Soil	10 (UJ)	—	—	0.52 (UJ)	—	—	—	0.52 (U)	—	—	—	2.1 (U)	1 (U)	6.75	—
0239-95-0135	39-01297	0.00–0.50	Soil	10 (UJ)	—	—	0.52 (UJ)	—	—	—	0.52 (U)	—	—	—	3.1 (J+)	1 (U)	2796	—
0239-95-0137	39-01298	0.00–0.50	Soil	2.8 (UJ)	—	—	0.47 (U)	—	—	77600 (J-)	0.51 (U)	—	0.29	—	1.2 (U)	—	20	—
0239-95-0138	39-01298	0.50–0.83	Soil	2.8 (UJ)	—	—	—	—	—	—	0.51 (U)	—	0.14	—	—	—	16.5	—
0239-95-0139	39-01299	0.00–0.50	Soil	2.9 (UJ)	—	—	—	—	—	—	0.53 (U)	—	—	—	—	—	39.3	—
0239-95-0140	39-01299	0.50–0.83	Soil	2.9 (UJ)	—	—	—	—	—	—	0.53 (U)	—	—	—	—	—	137	—
0239-95-0141	39-01300	0.00–0.50	Soil	4 (J-)	—	—	—	—	—	—	0.52 (U)	—	—	—	—	—	8.1	—
0239-95-0142	39-01300	0.50–0.83	Soil	2.8 (UJ)	—	—	—	—	—	—	0.51 (U)	—	—	—	—	—	3.91	—
0239-95-0143	39-01301	0.00–0.50	Soil	2.8 (UJ)	—	—	—	—	—	—	0.52 (U)	—	—	—	—	—	9.9	—
0239-95-0144	39-01301	0.50–0.83	Soil	2.9 (UJ)	—	—	0.42 (U)	—	—	—	0.53 (U)	—	—	—	—	—	4.67	—
0239-95-0145	39-01302	0.00–0.50	Soil	5.6 (U)	—	—	0.7 (U)	—	—	16.2	—	36.7	0.31	—	1.2 (U)	—	61.9 (J+)	—
0239-95-0147	39-01302	0.50–0.83	Soil	5.2 (U)	—	3.6	0.66 (U)	6280	—	—	—	—	—	—	1.2 (U)	—	10.3 (J+)	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

[a] Background values from LANL (1998, 059730).

[b] — = If analyzed, sample result is not detected.

Table 2.1-2
Detected Organic Chemicals at SWMU 39-004(a) and SWMU 39-004(d)

Sample ID	Location ID	Depth (ft)	Media	Anthracene	Chrysene	HMX	RDX
SWMU 39-004(a)							
0239-95-0099	39-01237	0.00–0.50	Soil	—*	—	25.1	9.17
0239-95-0091	39-01255	0.00–0.50	Soil	—	0.18	—	—
0239-95-0093	39-01257	0.00–0.50	Soil	0.18	—	—	—
0239-95-0133	39-01296	0.00–0.50	Soil	—	—	2.33	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

* — = If analyzed, sample result is not detected.

Table 2.1-3
Radionuclides Detected above BV at SWMU 39-004(a) and SWMU 39-004(d)

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Europium-152	Sodium-22	Thorium-228	Thorium-230	Thorium-232	Uranium-235
Soil BV[a,b]				**1.65**	**n/a**[c]	**n/a**	**2.28**	**2.29**	**2.33**	**0.2**
0239-95-0101	39-01239	0.00–0.50	Soil	—[d]	—	—	—	—	—	2.76
0239-95-0103	39-01240	0.00–0.50	Soil	—	—	—	—	—	—	2.23
0239-95-0090	39-01254	0.00–0.50	Soil	—	—	—	2.53	—	2.63	—
0239-95-0091	39-01255	0.00–0.50	Soil	—	—	0.38	—	—	—	0.77
0239-95-0092	39-01256	0.00–0.50	Soil	—	—	—	3.54	—	3.46	4.53
0239-95-0093	39-01257	0.00–0.50	Soil	—	—	—	3.191	3.198	3.014	—
0239-95-0096	39-01258	0.00–0.50	Soil	—	—	—	2.383	2.446	—	—
0239-95-0118	39-01266	0.50–0.83	Soil	0.0741	—	—	—	—	—	—
0239-95-0123	39-01269	0.00–0.50	Soil	—	—	—	—	—	—	0.425
0239-95-0124	39-01269	0.50–0.83	Soil	0.117	—	—	—	—	—	—
0239-95-0130	39-01294	0.50–0.83	Soil	0.225	—	—	—	—	—	—
0239-95-0134	39-01296	0.50–0.83	Soil	0.177	—	—	—	—	—	—
0239-95-0135	39-01297	0.00–0.50	Soil	—	—	—	—	—	—	18.3
0239-95-0137	39-01298	0.00–0.50	Soil	—	—	—	2.363	—	—	—
0239-95-0138	39-01298	0.50–0.83	Soil	0.186	0.407	—	2.543	—	2.374	—
0239-95-0139	39-01299	0.00–0.50	Soil	—	0.189	—	—	—	—	—

Table 2.1-3 (continued)

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Europium-152	Sodium-22	Thorium-228	Thorium-230	Thorium-232	Uranium-235
Soil BV [a,b]				**1.65**	**na**[c]	**na**	**2.28**	**2.29**	**2.33**	**0.2**
0239-95-0140	39-01299	0.50–0.83	Soil	0.254	—	—	—	—	—	—
0239-95-0141	39-01300	0.00–0.50	Soil	—	0.234	—	—	—	—	—
0239-95-0145	39-01302	0.00–0.50	Soil	—	—	—	2.58	2.59	2.46	0.56
0239-95-0147	39-01302	0.50–0.83	Soil	—	—	—	2.47	2.46	2.47	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in pCi/g.

[a] Background values from LANL (1998, 059730).

[b] The fallout values are only applicable for samples from 0 to 0.5 ft.

[c] na = Not available.

[d] — = If analyzed, sample result is not detected.

Table 2.1-4
Inorganic Chemicals above BVs at SWMU 39-004(b)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Beryllium	Cadmium	Calcium	Cobalt	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Uranium	Zinc
Soil BV[a]				**0.83**	**295**	**1.83**	**0.4**	**6120**	**8.64**	**14.7**	**0.5**	**22.3**	**0.1**	**15.4**	**0.3**	**1**	**0.73**	**1.82**	**48.8**
Sediment BV[a]				**0.83**	**127**	**1.31**	**0.4**	**4420**	**4.73**	**11.2**	**0.82**	**19.7**	**0.1**	**9.38**	**0.3**	**1**	**0.73**	**2.22**	**60.2**
0239-95-0048	39-01243	0.00–0.50	Soil	—[b]	—	—	—	—	—	1290 (J)	0.602 (U)	83.1 (J)	29.6	—	—	—	1.4 (U)	953	587
0239-95-0049	39-01244	0.00–0.50	Soil	—	—	—	—	—	—	206 (J)	0.579 (U)	47.3 (J)	44.1	—	—	—	1.4 (U)	157	157
0239-95-0050	39-01245	0.00–0.50	Soil	—	—	—	—	—	—	609 (J)	0.566 (U)	102 (J)	3.6	—	—	—	1.4 (U)	4465	—
0239-95-0052	39-01246	0.00–0.50	Soil	—	—	—	—	—	—	345 (J)	0.562 (U)	68.4 (J)	13.8	—	—	—	1.3 (U)	507	—
0239-95-0053	39-01247	0.00–0.50	Soil	—	—	—	—	—	—	—	0.567 (U)	—	0.11 (U)	—	—	—	1.4 (U)	8.5	—
0239-95-0056	39-01248	0.00–0.50	Soil	—	—	—	—	—	—	—	0.609 (U)	—	0.12 (U)	—	—	—	1.5 (U)	18.4	—
0239-95-0008	39-01277	0.00–0.50	Sediment	—	—	—	—	—	—	—	—	—	—	—	0.76 (U)	—	1.3 (U)	—	—
0239-95-0009	39-01277	0.50–0.83	Sediment	—	—	—	—	—	—	—	—	—	—	—	0.75 (U)	—	2 (J)	—	—
0239-95-0010	39-01278	0.00–0.50	Sediment	—	—	—	—	—	—	—	—	—	—	—	0.77 (U)	—	1.3 (U)	—	—
0239-95-0011	39-01278	0.50–0.83	Sediment	—	—	—	—	—	—	—	—	—	—	—	0.76 (U)	—	1.3 (U)	—	—
0239-95-0012	39-01279	0.00–0.50	Sediment	—	—	—	—	—	5.6 (J)	—	—	—	0.11 (UJ)	—	0.75 (U)	—	1.3 (U)	2.49	—
0239-95-0013	39-01279	0.50–0.83	Sediment	—	—	—	—	—	—	—	—	—	—	—	0.76 (U)	—	1.3 (U)	—	—
0239-95-0014	39-01280	0.00–0.50	Sediment	—	227	—	—	—	—	142	—	21	4.3 (J-)	—	0.86 (U)	—	1.7 (U)	35.1	73.5
0239-95-0015	39-01280	0.50–0.83	Sediment	—	362	—	—	—	—	84.4	—	26.8	7.4 (J-)	9.7	0.84 (U)	—	1.4 (U)	86	79.4
0239-95-0016	39-01281	0.00–0.50	Sediment	—	—	—	—	—	—	—	—	—	0.54 (J-)	—	0.74 (U)	—	1.2 (U)	11.5	—
0239-95-0017	39-01281	0.50–0.83	Sediment	—	—	—	—	—	—	130	—	—	0.83 (J-)	—	0.74 (U)	—	1.2 (U)	17.1	—
0239-95-0018	39-01282	0.00–0.50	Sediment	—	—	—	—	—	7.7 (J)	37.2	—	—	0.11 (J-)	—	0.74 (U)	—	1.2 (U)	19.5	—
0239-95-0020	39-01282	0.50–0.83	Sediment	—	—	—	—	—	—	—	—	—	0.23 (J-)	—	0.73 (U)	—	1.2 (U)	13.9	—
0239-95-0021	39-01283	0.00–0.50	Sediment	—	—	—	—	—	6.5 (J)	40.9	—	—	—	—	0.75 (U)	—	1.3 (U)	23.7	—
0239-95-0022	39-01283	0.50–0.83	Sediment	—	—	—	—	—	—	152	—	—	0.11 (UJ)	—	0.74 (U)	—	1.2 (U)	26.8	—
0239-95-0070	39-01303	0.00–0.50	Soil	11 (UJ)	—	—	0.57 (U)	—	—	75	0.57 (U)	—	0.34	—	—	2.3 (U)	—	94.1	—
0239-95-0072	39-01303	0.50–0.83	Soil	12 (UJ)	—	—	0.59 (U)	—	—	—	0.59 (U)	—	0.24	—	—	2.4 (U)	—	20	—
0239-95-0073	39-01304	0.00–0.33	Soil	11 (UJ)	—	—	0.55 (U)	—	—	—	0.55 (U)	—	0.55	—	—	2.2 (U)	—	20	—
0239-95-0074	39-01304	0.25–0.33	Soil	11 (UJ)	—	—	0.56 (U)	—	—	—	0.56 (U)	—	0.45	—	—	2.2 (U)	—	26.4	—
0239-95-0075	39-01305	0.00–0.50	Soil	5.6 (U)	—	2.6	0.7 (U)	8870	—	—	0.56 (U)	—	0.32	—	—	1.2 (U)	—	30.2 (J+)	—
0239-95-0079	39-01307	0.00–0.50	Soil	5 (U)	—	—	0.63 (U)	—	—	—	0.51 (U)	—	0.22	—	—	1.1 (U)	—	29.5 (J+)	—
0239-95-0080	39-01307	0.50–0.83	Soil	5.1 (U)	—	—	0.64 (U)	—	—	—	0.52 (U)	—	—	—	—	1.1 (U)	—	18 (J+)	—
0239-95-0081	39-01308	0.00–0.50	Soil	5.2 (U)	—	—	0.65 (U)	—	—	15.6	0.53 (U)	—	0.65	—	—	1.2 (U)	—	1260 (J+)	—
0239-95-0083	39-01309	0.00–0.50	Soil	5.2 (U)	—	—	0.66 (U)	—	—	21	0.53 (U)	—	0.72	—	—	1.2 (U)	—	2520 (J+)	—
0239-95-0085	39-01310	0.00–0.50	Soil	5.2 (U)	—	—	0.65 (U)	—	—	—	0.52 (U)	—	—	—	—	1.2 (U)	—	569	—
0239-95-0087	39-01311	0.00–0.50	Soil	5.6 (U)	—	—	0.7 (U)	—	—	—	0.56 (U)	—	—	—	—	1.2 (U)	—	12.8 (J+)	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

[a] Background values from LANL (1998, 059730).

[b] — = If analyzed, sample result is not detected.

Table 2.1-5
Detected Organic Chemicals at SWMU 39-004(b)

Sample ID	Location ID	Depth (ft)	Media	Bis(2-ethylhexyl)phthalate	Di-n-butylphthalate
0239-95-0021	39-01283	0.00–0.50	Sediment	—[*]	0.23 (J)
0239-95-0022	39-01283	0.50–0.83	Sediment	46	—
0239-95-0074	39-01304	0.25–0.33	Soil	0.24	—
0239-95-0083	39-01309	0.00–0.50	Soil	—	0.042 (J)

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

* — = If analyzed, sample result is not detected.

Table 2.1-6
Radionuclides Detected above BV at SWMU 39-004(b)

Sample ID	Location ID	Depth (ft)	Media	Cesium-134	Ruthenium-106	Sodium-22	Thorium-228	Thorium-230	Thorium-232	Uranium-235
Soil Background Value[a, b]				**na[c]**	**na**	**na**	**2.28**	**2.29**	**2.33**	**0.2**
0239-95-0070	39-01303	0.00–0.50	Soil	0.4	3.6	—[d]	2.53	2.66	2.47	0.85
0239-95-0072	39-01303	0.50–0.83	Soil	—	—	—	2.66	2.68	2.47	—
0239-95-0081	39-01308	0.00–0.50	Soil	—	—	—	—	—	—	18.64
0239-95-0083	39-01309	0.00–0.50	Soil	—	—	0.19	—	—	—	13.23
0239-95-0085	39-01310	0.00–0.50	Soil	—	—	—	—	—	—	2.64

Note: Data qualifiers are presented in Appendix A; all analytical results are in pCi/g.

[a] Background values from LANL (1998, 059730).

[b] The fallout values are only applicable for samples from 0 to 0.5 ft.

[c] na = Not available.

[d] — = If analyzed, sample result is not detected.

Table 2.1-7
Inorganic Chemicals above BVs at SWMU 39-004(e)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Selenium	Silver	Sodium	Thallium	Uranium	Zinc
Soil BV[a]				0.83	0.4	19.3	14.7	0.5	22.3	0.1	15.4	0.3	1	915	0.73	1.82	48.8
Sediment BV[a]				0.83	0.4	10.5	11.2	0.82	19.7	0.1	9.38	0.3	1	1470	0.73	2.22	60.2
0239-95-0003	39-01259	0.00–0.50	Soil	—[b]	—	—	209 (J)	0.514 (U)	33.8 (J)	—	—	—	1.4 (J)	—	1.2 (U)	120	—
0239-95-0004	39-01260	0.00–0.50	Soil	0.89 (J-)	—	86.8	1710 (J)	0.523 (U)	25.9 (J)	—	28.3	—	—	970 (J)	1.3 (U)	4.31	—
0239-95-0005	39-01261	0.00–0.50	Soil	1.5 (J-)	1.1	28.3	8280 (J)	0.522 (U)	355 (J)	—	23.6	—	1.5 (J)	—	1.3 (U)	—	4020
0239-95-0006	39-01262	0.00–0.50	Soil	—	—	19.5	240 (J)	0.516 (U)	—	—	—	—	1.1 (J)	—	1.2 (U)	3.37	—
0239-95-0059	39-01272	0.00–0.50	Soil	5.9 (U)	0.62 (U)	—	22	0.54 (U)	—	—	—	—	—	—	—	14.2	—
0239-95-0060	39-01272	0.50–0.83	Soil	5.8 (U)	0.62 (U)	—	58.2	0.53 (U)	—	—	—	—	—	—	—	5.21	—
0239-95-0061	39-01273	0.00–0.50	Soil	5.8 (U)	0.62 (U)	—	24.7	0.53 (U)	—	—	—	—	—	—	—	17.1	—
0239-95-0062	39-01273	0.50–0.83	Soil	5.8 (U)	0.62 (U)	—	—	0.53 (U)	—	—	—	—	—	—	—	4.08	—
0239-95-0063	39-01274	0.00–0.50	Soil	5.8 (U)	0.62 (U)	—	—	0.53 (U)	—	—	—	—	—	—	—	9.3	—
0239-95-0065	39-01274	0.50–0.83	Soil	5.7 (U)	0.6 (U)	—	—	0.52 (U)	—	—	—	—	—	—	—	6.94	—
0239-95-0066	39-01275	0.00–0.50	Soil	5.9 (U)	0.63 (U)	—	—	0.54 (U)	—	—	—	—	—	—	—	45.2	—
0239-95-0067	39-01275	0.50–0.83	Soil	5.7 (U)	0.61 (U)	—	—	0.53 (U)	—	—	—	—	—	—	—	20.8	—
0239-95-0068	39-01276	0.00–0.50	Soil	5.7 (U)	0.76 (J)	—	31.8	0.53 (U)	—	0.21	—	—	—	—	—	51.6	100 (J-)
0239-95-0069	39-01276	0.50–0.83	Soil	6.1 (U)	0.65 (U)	—	149	0.56 (U)	—	0.13	—	—	—	—	—	44.9	105 (J-)
0239-95-0023	39-01312	0.00–0.50	Sediment	12.8 (J)	0.64 (U)	—	—	—	—	—	—	0.33 (U)	3 (J-)	—	—	77	154 (J-)
0239-95-0024	39-01312	0.50–0.83	Soil	5.7 (U)	0.6 (U)	—	24.1	0.52 (U)	—	—	—	—	—	—	—	6.38	—
0239-95-0025	39-01313	0.00–0.50	Soil	6 (U)	0.64 (U)	—	20.3	0.55 (U)	—	0.12	—	—	—	—	—	2231	—
0239-95-0026	39-01313	0.50–0.83	Soil	5.7 (U)	0.6 (U)	—	—	0.52 (U)	—	—	—	—	—	—	—	314	—

Table 2.1-7 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Chromium	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Selenium	Silver	Sodium	Thallium	Uranium	Zinc
Soil BV[a]				**0.83**	**0.4**	**19.3**	**14.7**	**0.5**	**22.3**	**0.1**	**15.4**	**0.3**	**1**	**915**	**0.73**	**1.82**	**48.8**
Sediment BV[a]				**0.83**	**0.4**	**10.5**	**11.2**	**0.82**	**19.7**	**0.1**	**9.38**	**0.3**	**1**	**1470**	**0.73**	**2.22**	**60.2**
0239-95-0027	39-01314	0.00–0.50	Soil	5.7 (U)	0.61 (U)	—	—	0.53 (U)	—	—	—	—	—	—	—	7.6	—
0239-95-0028	39-01314	0.50–0.83	Soil	5.6 (U)	0.59 (U)	—	—	0.51 (U)	—	—	—	—	—	—	—	7.7	—
0239-95-0029	39-01315	0.00–0.50	Soil	5.1 (U)	0.64 (U)	—	—	0.52 (U)	—	—	—	—	1.1 (U)	—	—	5.5 (J+)	—
0239-95-0031	39-01316	0.00–0.50	Soil	11.1 (U)	0.42 (UJ)	—	198 (J)	0.643 (U)	—	0.13 (U)	—	—	4.8 (J)	—	—	4445	—
0239-95-0032	39-01316	0.50–0.83	Soil	10.3 (U)	—	—	—	0.599 (U)	—	0.11 (U)	—	—	1.7 (U)	—	—	247	—
0239-95-0033	39-01317	0.00–0.50	Soil	10.8 (U)	0.41 (UJ)	—	19.6 (J+)	0.626 (U)	—	0.32	—	—	1.7 (U)	—	—	598	—
0239-95-0034	39-01317	0.50–0.83	Soil	9.7 (U)	—	—	—	0.553 (U)	—	0.11 (U)	—	—	1.6 (U)	—	—	53	—
0239-95-0035	39-01318	0.00–0.50	Soil	9.9 (U)	—	—	—	0.576 (U)	—	—	—	—	1.6 (U)	—	—	12.1	—
0239-95-0036	39-01318	0.50–0.83	Soil	9.6 (U)	—	—	—	0.542 (U)	—	—	—	—	1.5 (U)	—	—	3.17	—
0239-95-0037	39-01319	0.00–0.50	Soil	10.1 (U)	—	—	—	0.578 (U)	—	0.12 (U)	—	—	1.6 (U)	—	—	3.41	—
0239-95-0038	39-01319	0.50–0.83	Soil	9.9 (U)	—	—	—	0.561 (U)	—	0.11 (U)	—	—	1.6 (U)	—	—	3.14	—
0239-95-0039	39-01320	0.00–0.50	Soil	2.9 (UJ)	—	—	—	0.53 (U)	—	0.11	—	—	—	—	—	196	—
0239-95-0041	39-01320	0.50–0.83	Soil	2.9 (UJ)	—	—	—	0.54 (U)	—	—	—	—	—	—	—	10.1	—
0239-95-0042	39-01321	0.00-0.50	Soil	3.2 (J-)	—	—	20.6 (J-)	0.51 (U)	—	0.15	—	—	—	—	—	7.34	—
0239-95-0043	39-01321	0.50–0.83	Soil	2.9 (UJ)	—	—	—	0.53 (U)	—	—	—	—	—	—	—	5.16	—
0239-95-0045	39-01322	0.00–0.50	Soil	2.9 (UJ)	—	—	—	0.53 (U)	—	0.13	—	—	—	—	—	162	—
0239-95-0044	39-01322	0.50–0.83	Soil	2.9 (UJ)	—	—	—	0.53 (U)	—	0.14	—	—	—	—	—	10.4	—
0239-95-0046	39-01323	0.00–0.50	Soil	6 (U)	0.76 (U)	—	—	0.61 (U)	—	—	—	—	1.3 (U)	—	—	5.5 (J+)	—
0239-95-0047	39-01323	0.50–0.83	Soil	6 (U)	0.75 (U)	—	—	0.61 (U)	—	—	—	—	1.3 (U)	—	—	50.4 (J+)	—
0239-95-0202	39-01382	0.00–0.50	Soil	10.5 (U)	—	—	—	0.6 (U)	—	0.11 (U)	—	—	1.7 (U)	—	—	481	—
0239-95-0203	39-01383	0.00–0.50	Soil	10.4 (U)	—	—	—	0.601 (U)	—	0.12 (U)	—	—	1.7 (U)	—	—	2434	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

[a] Background values from LANL (1998, 059730).

[b] — = If analyzed, sample result is not detected.

Table 2.1-8
Detected Organic Chemicals at SWMU 39-004(e)

Sample ID	Location ID	Depth (ft)	Media	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Di-n-butylphthalate
0239-95-0004	39-01260	0.00–0.50	Soil	—*	0.41	0.31 (J)
0239-95-0005	39-01261	0.00–0.50	Soil	—	0.83	1
0239-95-0006	39-01262	0.00–0.50	Soil	—	1.1	0.61
0239-95-0044	39-01322	0.50–0.83	Soil	0.18 (J)	—	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

* — = If analyzed, sample result is not detected.

Table 2.1-9
Radionuclides Detected above BV at SWMU 39-004(e)

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Europium-152	Thorium-228	Thorium-230	Thorium-232
Soil BV[a, b]				**1.65**	**na**[c]	**2.28**	**2.29**	**2.33**
0239-95-0005	39-01261	0.00–0.50	Soil	—[d]	0.242	—	—	—
0239-95-0069	39-01276	0.50–0.83	Soil	0.112	—	—	—	—
0239-95-0024	39-01312	0.50–0.83	Soil	—	0.239	—	—	—
0239-95-0025	39-01313	0.00–0.50	Soil	—	—	2.42	2.56	2.48
0239-95-0026	39-01313	0.50–0.83	Soil	—	—	2.36	2.36	2.51
0239-95-0027	39-01314	0.00–0.50	Soil	—	—	2.56	2.58	2.48
0239-95-0028	39-01314	0.50–0.83	Soil	—	—	2.77	2.53	2.67
0239-95-0033	39-01317	0.00–0.50	Soil	—	0.447	—	—	—
0239-95-0043	39-01321	0.50–0.83	Soil	0.304	—	—	—	—
0239-95-0044	39-01322	0.50–0.83	Soil	0.182	—	—	—	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in pCi/g.

[a] Background values from LANL (1998, 059730).

[b] The fallout values are only applicable for samples from 0 to 0.5 ft.

[c] na = Not available.

[d] — = If analyzed, sample result is not detected.

Table 2.2-1
Inorganic Chemicals above BVs at SWMU 39-001(b)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Mercury	Nickel	Silver	Thallium	Uranium	Vanadium	Zinc
Soil BV [a]				**0.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**0.1**	**15.4**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
0239-96-0431	39-01392	2.00-3.00	Soil	5.4 (U)	0.54 (U)	—[b]	—	—	—	1.1 (U)	—	—	—	—	—	—	2	—	—
0239-96-0432	39-01392	6.00-7.00	Soil	5.7 (U)	0.57 (U)	—	—	—	36	1.1 (U)	—	—	0.69	—	—	—	8.1	—	153
0239-96-0433	39-01392	11.00-12.00	Soil	5 (U)	0.5 (U)	—	—	—	—	1.07 (U)	—	—	—	—	—	—	2.46	—	—
0239-96-0440	39-01394	14.00–15.00	Soil	—	0.5 (U)	—	—	—	—	—	—	—	—	—	—	1.78 (J)	2.17	—	—
0239-96-0441	39-01395	3.00–4.00	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	3.1	—	—
0239-96-0446	39-01396	2.00–3.00	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	12.1	—	—
0239-96-0447	39-01396	6.00–7.00	Soil	—	—	—	—	—	20.9	32.9 (J)	—	—	—	—	1.36	—	7.09	—	88.8
0239-96-0448	39-01396	14.00–15.00	Soil	7.97 (J)	—	—	—	—	—	1.42 (J)	—	—	0.833	—	—	—	8.12	—	103
0239-96-0449	39-01397	3.00–4.00	Soil	—	0.49 (U)	—	—	—	—	—	—	—	0.334	—	—	0.98 (U)	17.8	—	—
0239-96-0450	39-01397	5.00–6.00	Soil	1 (U)	0.5 (U)	—	—	—	—	—	—	—	—	—	—	1 (U)	3.73	—	—
0239-96-0451	39-01397	15.00–16.00	Soil	—	0.495 (U)	—	—	—	—	—	—	—	—	17.5	—	2.48 (U)	—	—	—
0239-96-0453	39-01398	2.00–3.00	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	3.27	—	—
0239-96-0455	39-01398	11.00–12.00	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	3.27	—	—
0239-96-0456	39-01399	4.50–5.00	Soil	1 (U)	0.746	—	—	—	75.1	—	—	—	—	—	—	2.5 (U)	6.66	—	57.3
0239-96-0457	39-01399	7.00–8.00	Soil	0.971(U)	2	—	—	—	33.2	2.86	—	—	0.144	—	—	2.43 (U)	—	—	—
0239-96-0458	39-01399	14.00–15.00	Soil	1 (U)	0.5 (U)	—	—	—	—	—	—	—	—	—	—	2.5 (U)	3.03	—	—
0239-96-0460	39-01400	2.00–3.00	Soil	1 (U)	0.5 (U)	—	—	—	—	—	—	—	—	—	—	1 (U)	3.08	—	—
0239-96-0461	39-01400	5.00–6.00	Soil	—	0.495 (U)	8590	51.5	9.31	22.2	0.741	22400	89.4	1.04	23.3	1.89	0.99 (U)	3.92	148	—
0239-96-0463	39-01401	3.00–4.00	Soil	0.971(U)	—	—	—	—	—	—	—	—	0.129	—	—	0.971(U)	3.2	—	—
0239-96-0464	39-01401	6.00–7.00	Soil	—	—	—	—	—	—	—	—	—	—	—	—	4.85 (U)	—	—	—
0239-96-0465	39-01401	11.00–12.00	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	2.96	—	—

Table 2.2-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Iron	Lead	Mercury	Nickel	Silver	Thallium	Uranium	Vanadium	Zinc
Soil BV[a]				**0.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**21500**	**22.3**	**0.1**	**15.4**	**1**	**0.73**	**1.82**	**39.6**	**48.8**
0239-96-0467	39-01402	2.00–3.00	Soil	—	0.495 (U)	—	—	—	—	—	—	—	—	—	—	0.99 (U)	—	—	—
0239-96-0468	39-01402	5.00–6.00	Soil	—	—	—	—	—	153	—	—	23.5	—	—	—	2.48 (U)	5.9	—	—
0239-96-0469	39-01402	8.00–9.00	Soil	0.971(U)	—	—	—	—	—	—	—	—	—	—	—	2.43 (U)	2.76	—	—
0239-96-0470	39-01403	2.00–3.00	Soil	0.971(U)	—	—	—	—	—	—	—	—	—	—	—	0.971(U)	2.68	—	—
0239-96-0471	39-01403	5.00–6.00	Soil	—	—	—	—	—	36.7	—	—	26.7	0.202	—	—	0.98 (U)	6.23	—	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

[a] Background values from LANL (1998, 059730).

[b] — = If analyzed, sample result is not detected.

Table 2.2-2
Detected Organic Chemicals Detected at SWMU 39-001(b)

Sample ID	Location ID	Depth (ft)	Media	Acetone	Aldrin	Anthracene	Aroclor—1254	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Bis(2—ethylhexyl)phthalate	Butanone[2—]	Carbazole	Chrysene	DDT[4,4'—]	Dibenz(a,h)anthracene	Dibenzofuran	Dieldrin	Fluoranthene	Fluorene	HMX	Indeno(1,2,3—cd)pyrene	Methylene Chloride	Methylnaphthalene[2—]	Naphthalene	Phenanthrene	Pyrene	Tetrachloroethene	Trinitrotoluene[2,4,6—]
0239-96-0431	39-01392	2.00-3.00	Soil	—*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004 (J)	—	—	—	—	0.003 (J)	—
0239-96-0432	39-01392	6.00-7.00	Soil	0.18	—	—	0.033 (J-)	—	—	—	—	—	—	—	—	—	—	—	—	—	0.23 (J)	—	—	—	—	—	—	0.2 (J)	0.22 (J)	0.006 (J)	—
0239-96-0433	39-01392	11.00-12.00	Soil	0.17	—	0.16 (J)	—	0.35 (J)	0.32 (J)	0.42 (J)	—	0.16 (J)	—	—	0.25 (J)	0.39 (J)	—	—	—	—	0.94	—	—	0.16 (J)	0.007	—	—	0.85	0.89	0.014	—
0239-96-0434	39-01393	1.00-2.00	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.001 (J)	—
0239-96-0440	39-01394	14.00–15.00	Soil	0.0116 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0036 (J)	—	—	—	—	—	—
0239-96-0446	39-01396	2.00–3.00	Soil	0.01 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0239-96-0447	39-01396	6.00–7.00	Soil	0.0038 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0239-96-0448	39-01396	14.00–15.00	Soil	0.0047 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0239-96-0449	39-01397	3.00–4.00	Soil	—	—	—	—	0.222 (J)	0.205 (J)	0.254 (J)	—	—	—	—	—	0.241 (J)	—	—	—	—	0.577	—	—	—	—	—	—	0.515	0.538	—	—
0239-96-0456	39-01399	4.50–5.00	Soil	—	—	—	—	—	—	—	—	—	0.978	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0239-96-0461	39-01400	5.00–6.00	Soil	0.0165	—	67 (J)	—	111 (J)	116 (J)	153 (J)	71.7 (J)	60.4 (J)	—	0.0044 (J)	—	108 (J)	—	19.7 (J)	22.7 (J)	—	354 (J)	37.4 (J)	—	72.7 (J)	—	10.6 (J)	35.7 (J)	407 (J)	341 (J)	—	0.314
0239-96-0469	39-01402	8.00–9.00	Soil	—	0.0009	—	0.152	—	—	—	—	—	—	—	—	—	0.0030 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0239-96-0471	39-01403	5.00–6.00	Soil	—	—	—	0.043	—	—	—	—	—	—	—	—	—	0.0169	—	—	0.0256	—	—	4.14	—	—	—	—	—	—	—	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.
* — = If analyzed, sample result is not detected.

Table 2.2-3
Radionuclides Detected above BV at SWMU 39-001(b)

Sample ID	Location ID	Depth (ft)	Media	Plutonium-238	Uranium-234	Uranium-238
Soil BV[a,b]				0.023	2.59	2.29
0239-96-0429	39-01391	11.00–12.00	Soil	—[c]	2.63	—
0239-96-0431	39-01392	2.00-3.00	Soil	0.014	—	—
0239-96-0432	39-01392	6.00-7.00	Soil	0.002	—	—
0239-96-0433	39-01392	11.00-12.00	Soil	0.014	—	—
0239-96-0457	39-01399	7.00–8.00	Soil	—	—	2.76
0239-96-0460	39-01400	2.00–3.00	Soil	0.0655	—	—
0239-96-0461	39-01400	5.00–6.00	Soil	0.104	—	—
0239-96-0464	39-01401	6.00–7.00	Soil	0.0595	—	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in pCi/g.

[a] Fallout values are only applicable for samples from 0 to 0.5 ft.

[b] Background values from LANL (1998, 059730).

[c] —= If analyzed, sample result is not detected.

Table 2.2-4
Inorganic Chemicals above BV at SWMU 39-008

Sample ID	Location ID	Depth (ft)	Media	Antimony	Beryllium	Cadmium	Chromium	Cobalt	Cyanide (Total)	Lead	Mercury	Selenium	Silver	Thallium	Uranium
Soil BV[a]				**0.83**	**1.83**	**0.4**	**19.3**	**8.64**	**0.5**	**22.3**	**0.1**	**1.52**	**1**	**0.73**	**1.82**
0239-95-0204	39-01347	0.00–0.50	Soil	—[b]	—	—	—	—	—	32.5	—	—	—	—	21
0239-95-0205	39-01347	0.50–0.83	Soil	—	—	—	—	—	—	—	—	—	—	—	19.1
0239-95-0206	39-01348	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	—	23.9
0239-95-0207	39-01348	0.50–0.83	Soil	—	—	—	—	—	—	—	—	—	—	—	24.7
0239-95-0208	39-01349	0.00–0.50	Soil	3.2 (U)	3.7	0.84 (J)	111	18	—	138	—	9.3	100	14.2 (U)	23330
0239-95-0210	39-01349	0.50–0.83	Soil	—	—	—	—	—	—	—	—	—	2.2 (U)	—	12200
0239-95-0211	39-01350	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—	—	—	164
0239-95-0212	39-01350	0.50–0.83	Soil	—	—	—	—	—	—	26.7	—	—	14.5	2.3 (U)	59.9
0239-95-0213	39-01351	0.00–0.50	Soil	—	—	—	—	—	—	31.6	—	—	—	—	18.7
0239-95-0214	39-01351	0.50–0.83	Soil	—	—	—	—	—	—	425	—	—	—	—	15.6
0239-95-0215	39-01352	0.00–0.50	Soil	—	—	—	—	—	584 (U)	—	0.12 (U)	—	4.1 (J-)	1.4 (U)	1350
0239-95-0216	39-01352	0.50–0.83	Soil	—	—	—	—	—	0.588 (U)	1880	0.11 (U)	—	—	1.4 (U)	385
0239-95-0219	39-01355	0.00–0.50	Soil	—	—	—	—	—	0.542 (U)	—	0.11 (U)	—	—	1.3 (U)	6.1
0239-95-0221	39-01355	5.50–6.00	Soil	—	—	—	—	—	0.532 (U)	—	0.11 (U)	—	—	1.3 (U)	5.6
0239-95-0222	39-01356	0.00–0.50	Soil	—	—	—	—	—	0.536 (U)	—	—	—	—	1.3 (U)	6.1
0239-95-0223	39-01356	6.50–7.00	Soil	—	—	—	—	—	0.59	—	0.11 (U)	—	—	1.3 (U)	6.5
0239-95-0225	39-01357	0.00–0.50	Soil	—	—	—	—	—	0.535 (U)	—	0.11 (U)	—	—	1.3 (U)	6
0239-95-0227	39-01357	3.00–3.50	Soil	—	—	—	—	—	0.532 (U)	—	0.11 (U)	—	—	1.3 (U)	7.6
0239-95-0228	39-01358	0.00–0.50	Soil	—	—	—	—	—	0.532 (U)	—	0.11 (U)	—	—	1.3 (U)	11.1
0239-95-0230	39-01358	4.50–5.00	Soil	—	—	—	—	—	0.534 (U)	—	0.11 (U)	—	—	1.3 (U)	7.1
0239-95-0231	39-01359	0.00–0.17	Soil	—	—	—	—	—	0.536 (U)	—	0.11 (U)	—	—	1.2 (U)	30.5

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

[a] Background values from LANL (1998, 059730).

[b] — = If analyzed, sample result is not detected.

Table 2.2-5
Detected Organic Chemicals at SWMU 39-008

Sample ID	Location ID	Depth (ft)	Media	Bis(2-ethylhexyl)phthalate	Di-n-butylphthalate
0239-95-0205	39–01347	0.50-0.83	Soil	—*	2.6
0239-95-0206	39–01348	0.00-0.50	Soil	0.13 (J)	—
0239-95-0207	39–01348	0.50-0.83	Soil	0.072 (J)	—
0239-95-0213	39–01351	0.00-0.50	Soil	0.076 (J)	—
0239-95-0222	39–01356	0.00-0.50	Soil	—	0.53
0239-95-0225	39–01357	0.00-0.50	Soil	0.045 (J)	—
0239-95-0227	39–01357	3.00-3.50	Soil	0.058 (J)	—
0239-95-0228	39–01358	0.00-0.50	Soil	0.038 (J)	—
0239-95-0231	39–01359	0.00-0.17	Soil	0.054 (J)	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

* — = If analyzed, sample result is not detected.

Table 2.2-6
Radionuclides Detected above BVs at SWMU 39-008

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Plutonium-239/ Plutonium-240	Thorium-228	Thorium-230	Thorium-232	Uranium-235
Soil Background Value[a,b]				1.65	0.054	2.28	2.29	2.33	0.2
0239-95-0207	39-01348	0.50–0.83	Soil	0.185	0.00901	—[c]	—	—	—
0239-95-0208	39-01349	0.00–0.50	Soil	—	—	—	—	—	105
0239-95-0210	39-01349	0.50–0.83	Soil	—	0.0473	—	—	—	44.8
0239-95-0212	39-01350	0.50–0.83	Soil	0.089	—	—	—	—	—
0239-95-0213	39-01351	0.00–0.50	Soil	—	—	—	2.31	—	—
0239-95-0214	39-01351	0.50–0.83	Soil	0.106	—	2.31	2.42	—	—
0239-95-0215	39-01352	0.00–0.50	Soil	—	—	—	—	—	9.87
0239-95-0216	39-01352	0.50–0.83	Soil	—	—	—	—	—	2.46
0239-95-0221	39-01355	5.50–6.00	Soil	—	—	—	—	—	0.37
0239-95-0227	39-01357	3.00–3.50	Soil	—	—	2.51	2.56	2.58	0.38
0239-95-0230	39-01358	4.50–5.00	Soil	—	0.005	2.39	2.35	2.42	0.45
0239-95-0231	39-01359	0.00–0.17	Soil	—	—	—	—	—	0.35

Note: Data qualifiers are presented in Appendix A; all analytical results are in pCi/g.

[a] Fallout values are only applicable for samples from 0 to 0.5 ft.

[b] Background values from LANL (1998, 059730).

[c] — = If analyzed, sample result is not detected.

Table 2.2-7
Inorganic Chemicals above BV at SWMU 39-002(c)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Silver	Thallium	Uranium
Soil Background Value[a]				**0.83**	**0.4**	**1**	**0.73**	**1.82**
VCXX-95-0100	03-09030	0.00–0.50	Soil	—[b]	—	—	—	29
VCXX-95-0101	39-01452	0.00–0.50	Soil	9.1 (U)	1.1 (U)	2.3 (U)	1 (U)	—
VCXX-95-0173	39-01459	0.00–0.50	Soil	—	—	—	—	29.7
VCXX-95-0174	39-01460	0.00–0.50	Soil	9 (U)	1.1 (U)	2.3 (U)	1.1 (U)	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

[a] Background values from LANL (1998, 059730).

[b] — = If analyzed, sample result is not detected.

Table 2.2-8
Detected Organic Chemicals at SWMU 39-002(c)

Sample ID	Location ID	Depth (ft)	Media	Dimethyl Phthalate	Di-n-butylphthalate
VCXX-95-0176	39-01462	0.00–0.50	Soil	0.47	0.39 (J)

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

Table 2.2-9
Inorganic Chemicals above BVs at SWMU 39-004(c)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Silver	Thallium	Uranium	Zinc
Soil Background Value[a]				**0.83**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**22.3**	**0.1**	**15.4**	**1**	**0.73**	**1.82**	**48.8**
0239-95-0148	39-01249	0.00–0.50	Soil	—[b]	—	—	1.9	—	—	—	630 (J)	0.546 (U)	238 (J)	8.5	—	—	1.5 (U)	146	183
0239-95-0149	39-01250	0.00–0.50	Soil	—	—	2	—	—	104	14.5	290 (J)	0.582 (U)	419 (J)	0.11 (U)	17.7	55.1	1.4 (U)	34540	53
0239-95-0150	39-01251	0.00–0.50	Soil	—	302	—	0.61 (J)	—	—	—	2640 (J)	0.579 (U)	978 (J)	0.11 (U)	—	4.1	1.4 (U)	88	115
0239-95-0151	39-01252	0.00–0.50	Soil	—	—	—	—	—	—	—	1050 (J)	0.521 (U)	438 (J)	—	—	—	1.4 (J)	81	155
0239-95-0153	39-01284	0.00–0.50	Soil	—	—	—	0.55 (U)	—	—	—	—	0.55 (U)	—	0.11 (U)	—	2.2 (U)	1.1 (U)	—	—
0239-95-0154	39-01284	0.50–0.83	Soil	—	—	—	0.55 (U)	—	—	—	—	0.55 (U)	—	0.11 (U)	—	2.2 (U)	1.1 (U)	—	—
0239-95-0155	39-01285	0.00–0.50	Soil	—	—	—	0.55 (U)	—	—	—	—	0.55 (U)	—	0.11 (U)	—	2.2 (U)	1.1 (U)	—	—
0239-95-0156	39-01285	0.50–0.83	Soil	—	—	—	0.57 (U)	—	—	—	—	0.57 (U)	—	0.11 (U)	—	2.3 (U)	1.1 (U)	1.9	—
0239-95-0157	39-01286	0.00–0.50	Soil	—	—	—	0.52 (U)	—	—	—	—	0.52 (U)	—	—	—	2.1 (U)	1 (U)	—	—
0239-95-0158	39-01286	0.50–0.83	Soil	—	—	—	0.57 (U)	—	—	—	—	0.57 (U)	—	0.11 (U)	—	2.3 (U)	1.1 (U)	2.18	—
0239-95-0159	39-01287	0.00–0.50	Soil	—	—	—	0.55 (U)	—	—	—	—	0.55 (U)	—	0.11 (U)	—	2.2 (U)	1.1 (U)	—	—
0239-95-0160	39-01287	0.50–0.83	Soil	—	—	—	0.57 (U)	—	—	—	—	0.57 (U)	25	0.11 (U)	—	2.3 (U)	1.1 (U)	2.44	—
0239-95-0161	39-01288	0.00–0.50	Soil	—	—	—	0.53 (U)	—	—	—	16	0.53 (U)	—	0.11 (U)	—	2.1 (U)	1.1 (U)	5.82 (J)	—
0239-95-0163	39-01288	0.50–0.83	Soil	—	—	—	0.53 (U)	—	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	1.1 (U)	5.19	—
0239-95-0164	39-01289	0.00–0.50	Soil	—	—	—	0.53 (U)	—	—	—	15	0.53 (U)	26	0.11 (U)	—	2.1 (U)	1.1 (U)	12.7	—
0239-95-0165	39-01289	0.50–0.83	Soil	—	—	—	0.56 (U)	—	—	—	21	0.56 (U)	—	0.11 (U)	—	2.2 (U)	1.1 (U)	11.7 (J)	—
0239-95-0166	39-01290	0.00–0.50	Soil	—	—	—	0.52 (U)	—	—	—	23	0.52 (U)	—	—	—	2.1 (U)	1 (U)	23.4	—
0239-95-0167	39-01290	0.50–0.83	Soil	—	—	—	0.53 (U)	—	—	—	16	0.53 (U)	—	0.11 (U)	—	2.1 (U)	1.1 (U)	3.88	—
0239-95-0168	39-01291	0.00–0.50	Soil	—	—	—	0.54 (U)	—	—	—	—	0.54 (U)	—	0.11 (U)	—	2.2 (U)	1.1 (U)	4.63	—
0239-95-0169	39-01291	0.50–0.83	Soil	—	—	—	0.53 (U)	—	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	1.1 (U)	5.62	—
0239-95-0170	39-01292	0.00–0.50	Soil	—	—	—	0.52 (U)	—	—	—	—	0.52 (U)	—	—	—	2.1 (U)	1 (U)	5.62 (J)	—
0239-95-0171	39-01292	0.50–0.83	Soil	—	—	—	0.52 (U)	—	—	—	—	0.52 (U)	—	—	—	2.1 (U)	1 (U)	33.1	—
0239-95-0172	39-01293	0.00–0.50	Soil	—	—	—	0.52 (U)	—	—	—	55	0.52 (U)	—	—	—	2.1 (U)	1 (U)	33.1 (J)	60
0239-95-0173	39-01293	0.50–0.83	Soil	—	—	—	0.51 (U)	—	—	—	—	0.51 (U)	—	—	—	2 (U)	1 (U)	4.43	—

Table 2.2-9 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide (Total)	Lead	Mercury	Nickel	Silver	Thallium	Uranium	Zinc
Soil Background Value[a]				**0.83**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**0.5**	**22.3**	**0.1**	**15.4**	**1**	**0.73**	**1.82**	**48.8**
0239-95-0174	39-01324	0.00–0.50	Soil	5.3 (U)	—	—	0.67 (U)	—	—	—	—	—	—	—	—	1.2 (U)	—	9 (J+)	—
0239-95-0176	39-01324	0.50–0.83	Soil	5.4 (U)	—	—	0.68 (U)	—	—	—	—	—	—	—	—	1.2 (U)	—	12.7 (J+)	—
0239-95-0181	39-01327	0.00–0.50	Soil	5.1 (U)	—	—	0.64 (U)	—	—	—	—	—	—	—	—	1.1 (U)	—	5.1 (J+)	—
0239-95-0183	39-01328	0.00–0.50	Soil	11 (UJ)	—	—	0.53 (U)	—	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	—	3.83	—
0239-95-0184	39-01328	0.50–0.83	Soil	11 (UJ)	—	—	0.54 (U)	—	—	—	—	0.54 (U)	—	0.11 (U)	—	2.2 (U)	—	3.4	—
0239-95-0185	39-01329	0.00–0.50	Soil	11 (UJ)	—	—	0.53 (U)	—	—	—	15	0.53 (U)	—	0.11 (U)	—	2.1 (U)	—	9.2	—
0239-95-0186	39-01329	0.50–0.83	Soil	11 (UJ)	—	—	0.53 (U)	—	—	—	—	53 (U)	—	0.11 (U)	—	2.1 (U)	—	14.3	—
0239-95-0187	39-01330	0.00–0.50	Soil	11 (UJ)	—	—	0.53 (U)	—	—	—	—	0.53 (U)	—	0.53 (U)	—	2.1 (U)	—	5.56	—
0239-95-0188	39-01330	0.50–0.83	Soil	11 (UJ)	—	—	0.53 (U)	—	—	—	—	0.53 (U)	—	0.11 (U)	—	2.1 (U)	—	22.6	—
0239-95-0189	39-01331	0.00–0.50	Soil	10 (UJ)	—	—	0.52 (U)	—	—	—	—	0.52 (U)	—	—	—	2.1 (U)	—	5.09	—
0239-95-0190	39-01331	0.50–0.83	Soil	10 (UJ)	—	—	0.52 (U)	—	—	—	—	1.6	—	—	—	2.1 (U)	—	7.05	—
0239-95-0191	39-01332	0.00–0.33	Soil	5.1 (U)	—	—	0.64 (U)	—	—	—	48.3	—	68.7	—	—	1.1 (U)	—	15.2 (J+)	50.2
0239-95-0194	39-01333	0.00–0.50	Soil	9.2 (U)	—	—	0.74 (U)	—	—	—	—	0.53 (U)	—	—	—	—	—	5.4 (J+)	—
0239-95-0195	39-01333	0.50–0.83	Soil	9.2 (U)	—	—	0.72 (U)	6140	—	—	—	0.53 (U)	24.2	—	—	—	1.9 (U)	7.7	52.7
0239-95-0196	39-01334	0.00–0.50	Soil	9.3 (U)	—	—	0.73 (U)	—	—	—	16.7	0.54 (U)	—	—	—	—	—	10.6	—
0239-95-0197	39-01334	0.50–0.83	Soil	9.2 (U)	—	—	0.73 (U)	—	—	—	—	0.53 (U)	—	—	—	—	—	6.9	—
0239-95-0198	39-01335	0.00–0.50	Soil	8.9 (U)	—	—	0.7 (U)	—	—	—	—	0.51 (U)	—	—	—	—	—	4.9	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

[a] Background values from LANL (1998, 059730).

[b] — = If analyzed, sample result is not detected.

Table 2.2-10
Detected Organic Chemicals at SWMU 39-004(c)

Sample ID	Location ID	Depth (ft)	Media	Benzoic Acid	Bis(2-chloroethyl)ether	Bis(2-ethylhexyl)phthalate	Butylbenzylphthalate	Di-n-butylphthalate	Naphthalene
0239-95-0148	39-01249	0.00–0.50	Soil	—*	—	0.79	—	0.54	—
0239-95-0149	39-01250	0.00–0.50	Soil	—	—	0.17 (J)	0.22 (J)	—	—
0239-95-0150	39-01251	0.00–0.50	Soil	—	—	0.09 (J)	—	0.72	—
0239-95-0151	39-01252	0.00–0.50	Soil	—	—	0.21 (J)	—	0.35	—
0239-95-0183	39-01328	0.00–0.50	Soil	—	—	—	—	—	0.17
0239-95-0184	39-01328	0.50–0.83	Soil	—	0.17	—	—	—	—
0239-95-0190	39-01331	0.50–0.83	Soil	—	—	—	—	0.46	—
0239-95-0191	39-01332	0.00–0.33	Soil	—	—	—	—	0.036 (J)	—
0239-95-0196	39-01334	0.00–0.50	Soil	0.049 (J)	—	—	—	—	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

* — = If analyzed, sample result is not detected.

Table 2.2-11
Radionuclides Detected above BV the Firing Site SWMU 39-004(c)

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Sodium-22	Thorium-228	Thorium-230	Thorium-232
Soil Background Value[a, b]				**1.65**	**na**[c]	**2.28**	**2.29**	**2.33**
0239-95-0154	39-01284	0.50–0.83	Soil	0.0949	0.0632	—[d]	—	—
0239-95-0165	39-01289	0.50–0.83	Soil	0.311	—	—	—	—
0239-95-0169	39-01291	0.50–0.83	Soil	0.123	—	—	—	—
0239-95-0173	39-01293	0.50–0.83	Soil	0.0812	—	—	—	—
0239-95-0174	39-01324	0.00–0.50	Soil	—	—	2.41	2.46	2.37
0239-95-0176	39-01324	0.50–0.83	Soil	—	—	2.55	2.76	2.56
0239-95-0186	39-01329	0.50–0.83	Soil	0.351	—	—	—	—
0239-95-0188	39-01330	0.50–0.83	Soil	0.112	—	—	—	—
0239-95-0190	39-01331	0.50–0.83	Soil	0.157	—	—	—	—
0239-95-0195	39-01333	0.50–0.83	Soil	—	—	2.38	—	—
0239-95-0197	39-01334	0.50–0.83	Soil	0.67	—	—	—	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in pCi/g.

[a] Fallout values are only applicable for samples from 0 to 0.5 ft.

[b] Background values from LANL (1998, 059730).

[c] na = Not available.

[d] — = If analyzed, sample result is not detected.

Table 2.2-12
Inorganic Chemicals above BV at the Storage Area SWMU 39-007(a)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Copper	Mercury	Zinc
Soil/Fill Background Value[a, b]				**0.83**	**0.4**	**6120**	**14.7**	**0.1**	**48.8**
VCXX-95-0109	39-01455	0.00–0.50	Soil	2.12	1.51	—[c]	28.1	1.16	67.8
VCXX-95-0112	39-01458	0.00–0.50	Soil	—	—	—	—	—	288
VCXX-95-0119	39-01470	0.00–0.50	Soil	9.91	—	8980	—	—	—
RC39-01-0001	39-10018	0.00–0.50	Fill	—	—	—	—	—	57.6
RC39-01-0002	39-10019	0.00–0.50	Fill	—	—	—	—	—	51.6

Note: Data qualifiers are presented in Appendix A; all analytical results are in pCi/g.

[a] Fallout values are only applicable for samples from 0 to 0.5 ft.

[b] Background values from LANL 1(998, 059730).

[c] — = If analyzed, sample result is not detected.

Table 2.2-13
Detected Organic Chemicals at SWMU 39-007(a)

Sample ID	Location ID	Depth (ft)	Media	Aroclor-1254	Aroclor-1260
RC39-01-0001	39-10018	0.00–0.50	Fill	—*	0.032 (J)
RC39-01-0002	39-10019	0.00–0.50	Fill	3	—
RC39-01-0003	39-10020	0.00–0.50	Fill	—	0.086
RC39-01-0005	39-10022	0.00–0.50	Fill	—	0.036

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

*— = If analyzed, sample result is not detected.

Table 2.3-1
Inorganic Chemicals above BVs at SWMU 39-001(a)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Copper	Cyanide (Total)	Mercury	Silver	Uranium	Zinc
Soil/Fill Background Value[a]				**0.83**	**0.4**	**14.7**	**0.5**	**0.1**	**1**	**1.82**	**48.8**
0239-96-0402	39-01384	5.00–6.00	Soil	8.3 (U)	0.69 (U)	—[b]	0.52 (U)	—	—	2.08	—
0239-96-0403	39-01384	14.00–15.00	Soil	6.1 (U)	1.7	—	0.53 (U)	—	—	2.25	—
0239-96-0404	39-01385	2.00–3.00	Soil	6.8 (U)	0.78 (U)	—	0.59 (U)	—	—	4.21	—
0239-96-0405	39-01385	5.00–6.00	Soil	5.9 (U)	0.68 (U)	32.5	0.54 (U)	—	—	1.98	140
0239-96-0406	39-01385	11.00–12.00	Soil	6.1 (U)	0.71 (U)	—	0.55 (U)	—	—	—	—
0239-96-0407	39-01386	3.00–4.00	Soil	6.4 (U)	0.74 (U)	—	0.57 (U)	—	—	—	—
0239-96-0409	39-01386	5.00–6.00	Soil	6.2 (U)	0.71 (U)	—	0.54 (U)	—	—	1.91	—
0239-96-0411	39-01386	12.00–13.00	Soil	6 (U)	0.7 (U)	—	0.54 (U)	—	—	—	—
0239-96-0412	39-01387	4.00–5.00	Soil	6.7 (U)	0.77 (U)	—	0.59 (U)	—	—	2.24	—
0239-96-0413	39-01387	6.00–7.00	Soil	6.4 (U)	0.74 (U)	—	0.59 (U)	0.61	—	—	—
0239-96-0414	39-01387	12.00–13.00	Soil	6.2 (U)	0.71 (U)	—	0.56 (U)	1.3	—	3.76	—
0239-96-0418	39-01388	11.00–12.00	Soil	9.4 (U)	0.59 (U)	—	0.54 (U)	—	1.9 (U)	—	—
0239-96-0421	39-01389	11.00–12.00	Soil	8.7 (U)	0.54 (U)	—	0.52 (U)	—	1.7 (U)	—	—
0239-96-0426	39-01390	11.00–12.00	Soil	10 (U)	0.62 (U)	—	0.58 (U)	—	2 (U)	—	—

Note: Data qualifiers are presented in Appendix A.; all analytical results are in mg/kg.

[a] Background values from LANL (1998, 059730).

[b] — = If analyzed, sample result is not detected.

Table 2.3-2
Detected Organic Chemicals at SWMU 39-001(a)

Sample ID	Location ID	Depth (ft)	Media	Aroclor-1254	DDE[4,4'-]	DDT[4,4'-]	Di-n-butylphthalate	Methoxychlor [4,4'-]	Trimethylbenzene [1,2,4-]	Trimethylbenzene [1,3,5-]
0239-96-0403	39-01384	14.00–15.00	Fill	—*	—	0.0053 (J-)	0.039 (J)	0.023 (J-)	—	—
0239-96-0405	39-01385	5.00–6.00	Fill	0.041	—	—	—	—	—	—
0239-96-0406	39-01385	11.00–12.00	Fill	—	—	—	0.063(J)	—	—	—
0239-96-0413	39-01387	6.00–7.00	Fill	0.064	—	—	—	—	0.003 (J)	0.001 (J)
0239-96-0414	39-01387	12.00–13.00	Fill	0.79	0.312	—	—	—	—	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

* — = If analyzed, sample result is not detected.

Table 2.3-3
Radionuclides Detected above BV the Landfill SWMU 39-001(a)

Sample ID	Location ID	Depth (ft)	Media	Europium-152	Uranium-238
Soil/Fill Background Value[a, b]				**na**[c]	**2.29**
0239-96-0403	39-01384	14.00–15.00	Fill	0.395	—[d]
0239-96-0413	39-01387	6.00–7.00	Fill	—	7.22

Note: Data qualifiers are presented in Appendix A; all analytical results are in pCi/g.

[a] Background values from LANL (1998, 059730).

[b] The fallout values are only applicable for samples from 0 to 0.5 ft.

[c] na = Not available.

[d] — = If analyzed, sample result is not detected.

Table 2.3-4
Inorganic Chemicals above BV at SWMU 39-002(a)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Copper	Lead	Mercury	Nickel	Silver	Thallium	Uranium	Zinc
Soil Background Value[a]				**0.83**	**0.4**	**14.7**	**22.3**	**0.1**	**15.4**	**1**	**0.73**	**1.82**	**48.8**
0239-97-0013	39-01051	0.00–0.50	Soil	—[b]	0.62 (J)	214 (J+)	50 (J+)	1.3 (J+)	—	—	0.78 (U)	—	59.3 (J+)
0239-97-0014	39-01053	0.00–0.50	Soil	—	1 (J)	186 (J+)	96.9 (J+)	2.5 (J+)	39.8	—	0.87 (J)	—	110 (J+)
ECXX-95-0313	39-01464	0.00–0.50	Soil	8.7 (U)	1.1 (U)	52.7	34.7	0.14	—	2.2 (U)	1.1 (U)	3	62.6
0239-97-0001	39-01491	0.00–0.50	Soil	5.2 (U)	0.52 (U)	16.8	34.7	0.12	—	—	—	—	—
0239-97-0010	39-01491	1.00–1.50	Soil	6.1 (U)	0.61 (U)	—	—	—	—	—	—	—	—
0239-97-0002	39-01492	0.00–0.50	Soil	5.2 (U)	0.52 (U)	128	29.2	—	—	—	—	—	98
0239-97-0003	39-01493	0.00–0.50	Soil	4.9 (U)	0.76	78.7	41	—	—	—	—	—	77.4
0239-97-0004	39-01494	0.00–0.50	Soil	5.1 (U)	0.51 (U)	28.2	38.9	0.25	—	—	—	—	—
0239-97-0005	39-01495	0.00–0.50	Soil	5.2 (U)	0.52 (U)	—	24.2	0.13	—	—	—	—	—
0239-97-0006	39-01496	0.00–0.50	Soil	5.1 (U)	0.84	61.3	35	0.16	—	1.1	—	—	52.4
0239-97-0011	39-01496	1.00–1.50	Soil	5.8 (U)	0.58 (U)	—	—	1.1	—	—	—	—	—
0239-97-0007	39-01497	0.00–0.50	Soil	5.5 (U)	0.55 (U)	—	—	—	—	—	—	—	416
0239-97-0008	39-01498	0.00–0.50	Soil	5.3 (U)	0.53 (U)	28.6	34.8	0.18	—	—	—	—	49
0239-97-0012	39-01498	1.00–1.50	Soil	5.9 (U)	0.59 (U)	—	—	—	—	—	—	—	—
0239-97-0009	39-01499	0.00–0.50	Soil	5.2 (U)	1.7	508	141	1.9	—	—	—	—	191

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

[a] Background values from LANL (1998, 059730).

[b] — = If analyzed, sample result is not detected.

Table 2.3-5
Detected Organic Chemicals at SWMU 39-002(a)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Amino-2,6-dinitrotoluene[4-]	Anthracene	Aroclor-1254	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Di-n-butylphthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Methylnaphthalene[2-]	Naphthalene	Phenanthrene	Pyrene	Tetryl	Total Petroleum Hydrocarbons Diesel Range Organics	Trinitrotoluene[2,4,6-]
0239-97-0013	39-01051	0.00–0.50	Soil	—*	—	—	0.057	0.88	0.99	0.86	0.45	0.96	—	1.1	—	—	—	2.2	—	0.46	—	—	1.4	1.9	—	51	—
0239-97-0014	39-01053	0.00–0.50	Soil	0.5	0.171	1	0.18	2.3	2.7	2.4	0.95	2.3	—	2.4	0.38	—	1.3	6.5	0.57	0.95	—	—	3.7	3.8	0.345	110	1.02
0239-97-0001	39-01491	0.00–0.50	Soil	—	—	—	0.21	1.3	1.6	1.2	1.5	1.3	—	1.6	—	—	—	3.4	—	1.3	—	—	1.8	3	—	57	—
0239-97-0010	39-01491	1.00–1.50	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9.1	—
0239-97-0002	39-01492	0.00–0.50	Soil	—	—	—	0.16	0.73	0.84	0.6	0.72	0.73	—	0.93	—	—	—	2.1	—	0.64	—	—	1.3	1.9	—	18	—
0239-97-0003	39-01493	0.00–0.50	Soil	—	—	0.35	0.16	0.97	1	0.82	0.53	0.87	—	1.2	—	—	—	2.1	—	0.51	—	—	2.1	2.4	—	56	—
0239-97-0004	39-01494	0.00–0.50	Soil	—	—	—	0.26	1.3	1.5	1.2	0.84	1.4	—	1.5	—	—	—	3.4	—	0.8	—	—	2.1	2.9	—	34	—
0239-97-0005	39-01495	0.00–0.50	Soil	0.43	—	0.81	0.1	—	3.6	3.6	1.8	3	—	3.1	—	—	0.64	8.4	0.36	1.8	—	—	4.2	5	—	70	—
0239-97-0006	39-01496	0.00–0.50	Soil	0.34 (J)	—	—	0.24	—	1.5 (J)	1.5 (J)	0.67 (J)	1.5 (J)	—	1.6 (J)	—	—	—	3.7 (J)	—	—	—	—	2.9 (J)	3.7 (J)	—	41	—
0239-97-0011	39-01496	1.00–1.50	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9.8	—
0239-97-0007	39-01497	0.00–0.50	Soil	1.8 (J)	—	3.1 (J)	0.14	5.5 (J)	6.4 (J)	4.9 (J)	4 (J)	5.2 (J)	—	5.6 (J)	—	1.1 (J)	—	21 (J)	2 (J)	3.7 (J)	0.44 (J)	1.5 (J)	18 (J)	17 (J)	—	170	—
0239-97-0008	39-01498	0.00–0.50	Soil	—	—	0.82 (J)	0.1	2 (J)	2.1 (J)	1.9 (J)	1 (J)	2.1 (J)	—	2.2 (J)	—	—	2.8 (J)	4.8 (J)	0.41 (J)	0.91 (J)	—	—	4 (J)	4.7 (J)	—	110	—
0239-97-0009	39-01499	0.00–0.50	Soil	0.7 (J)	—	1.4 (J)	0.38	2.9 (J)	3.3 (J)	3.3 (J)	0.67 (J)	3.4 (J)	0.74 (J)	3.3 (J)	—	0.41 (J)	4.4 (J)	8.8 (J)	0.76 (J)	1.4 (J)	—	0.52 (J)	7.3 (J)	7.6 (J)	—	43	—

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

*— = If analyzed, sample result was not detected.

Table 2.3-6
Radionuclides Detected above BV at SWMU 39-002(a)

Sample ID	Location ID	Depth (ft)	Media	Uranium-238
Soil Background Value[a, b]				**2.29**
0239-97-0014	39-01053	0.00–0.50	Soil	3.88
0239-97-0009	39-01499	0.00–0.50	Soil	6.32

Note: Data qualifiers are presented in Appendix A; all analytical results are in pCi/g.

[a] Background values from LANL (1998, 059730).

[b] The fallout values are only applicable for samples from 0 to 0.5 ft.

Table 2.3-7
Inorganic Chemicals above BV at SWMU 39-006(a)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Mercury	Silver	Thallium
Soil Background Value*				**0.83**	**0.4**	**0.1**	**1**	**0.73**
ECXX-95-0317	39-01474	11.29–12.83	Soil	10 (U)	1.6	0.13 (U)	9.9	1 (U)
ECXX-95-0318	39-01474	12.83–15.33	Soil	11 (U)	2	0.14 (U)	4.2	1 (U)

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

* Background values from LANL 1998, 059730.

Table 2.3-8
Detected Organic Chemicals at the septic system SWMU 39-006(a)

Sample ID	Location ID	Depth (ft)	Media	Benzene	Phenol
0239-96-0485	39-01502	8.00–9.00	Fill	0.0088	0.49

Note: Data qualifiers are presented in Appendix A; all analytical results are in mg/kg.

Table 4.0-1
NAC Investigation Strategy Summary

Location ID	Sampling Area	Objectives	Sampling Depth (ft bgs)	Media	pH (SW-846 9045C)	Anions (Nitrates) (EPA Method 300.0)	Cyanide (SW-846 9012A)	TAL Metals (SW-846 6010B)	Perchlorate (EPA Method 314.0 and SW-846 8321A)	Mercury (EPA SW-846:7471A)	Explosives (EPA SW-846:8321A)	VOCs (SW-846 8260B)	SVOCs (SW-846 8270C)	PCBs (EPA SW-846:8082)	Gamma-emitting radionuclides (EPA 901.1)	Isotopic plutonium, isotopic uranium, americium-241 (HASL-300)	Field screening: PCBs (SOP-10.01)	Field Screening: Silver (SOP-10.08)	Field Screening: Gamma radiation (SOP-10-14)	Field Screening: Metals, XRF (SOP-10-08)	Field Screening: RDX and TNT (D-Tech RDX immunoassay test kits)
SWMU 39-001(a)	Within excavation limits	Determine nature and extent of contamination within excavation limits (confirmation)	0–0.5	Soil	x	x	x	x	x	x	x	x	x	x	x	x			x		
			0.5–1.0		x	x	x	x	x	x	x	x	x	x	x	x			x		
SWMU 39-001(b)	Within excavation limits	Determine nature and extent of contamination within excavation limits (confirmation)	0–0.5	Soil	x	x	x	x	x	x	x	x	x	x	x	x			x		
			0.5–1.0		x	x	x	x	x	x	x	x	x	x	x	x			x		
SWMU 39-002(a) Area 1	Within approximate SWMU limits	Determine nature and extent of contamination within the approximate SWMU limits	0–1.0	Soil	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
			1.0–2.0		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
			2.0–3.0		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
SWMU 39-005	Within approximate SWMU limits	Determine nature and extent of contamination within the approximate SWMU limits	0–1.0	Soil	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
			1.0–2.0		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
			2.0–4.0		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
			4.0–6.0		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
			6.0–8.0		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
			8.0–10.0		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
SWMU 39-006(a) inactive components	Within excavation limits	Field screening within excavation limits for silver, PCBs, gamma radiation	0–1.0	Soil													x	x	x		x
			1.0–2.0														x	x	x		x
			2.0–3.0														x	x	x		x
	Within excavation limits	Determine nature and extent of contamination within excavation limits (confirmation)	0–1.0	Soil	x	x	x	x	x	x	x	x	x	x	x	x			x		
			1.0-2.0		x	x	x	x	x	x	x	x	x	x	x	x			x		
			2.0–3.0		x	x	x	x	x	x	x	x	x	x	x	x			x		

Table 4.0-1 (continued)

Location ID	Sampling Area	Objectives	Sampling Depth (ft bgs)	Media	pH (SW-846 9045C)	Anions (Nitrates) (EPA Method 300.0)	Cyanide (SW-846 9012A)	TAL Metals (SW-846 6010B)	Perchlorate (EPA Method 314.0 and SW-846 8321A)	Mercury (EPA SW-846:7471A)	Explosives (EPA SW-846:8321A)	VOCs (SW-846 8260B)	SVOCs (SW-846 8270C)	PCBs (EPA SW-846:8082)	Gamma-emitting radionuclides (EPA 901.1)	Isotopic plutonium, isotopic uranium, americium-241 (HASL-300)	Field screening: PCBs (SOP-10.01)	Field Screening: Silver (SOP-10.08)	Field Screening: Gamma radiation (SOP-10-14)	Field Screening: Metals, XRF (SOP-10-08)	Field Screening: RDX and TNT (D-Tech RDX immunoassay test kits)
SWMU 39-007(a)	Within approximate SWMU limits	Determine nature and extent of contamination within the approximate SWMU limits	0–1.0	Soil	x	x	x	x	x	x	x	x	x	x	x	x			x		
			1.0–2.0		x	x	x	x	x	x	x	x	x	x	x	x			x		
			2.0–-3.0		x	x	x	x	x	x	x	x	x	x	x	x			x		
AOC 39-007(d)	Adjacent to asphalt pad	Determine nature and extent of contamination from storage of materials on the asphalt pad	0–1.0	Soil	x	x	x	x	x	x	x	x	x	x	x	x			x		
			1.0–2.0		x	x	x	x	x	x	x	x	x	x	x	x			x		
SWMU 39-010	Within approximate SWMU limits	Determine nature and extent of contamination within the approximate SWMU limits	0–1.0	Soil	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
			1.0–2.0		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
			2.0–3.0		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
	Within excavation limits	Determine nature and extent of contamination within excavation limits (confirmation)- if applicable	0–0.5	Soil	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
			0.5–1.0		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
Extended drainages	Along both banks and the centerline of the stream at each sampling point in transect	Field screening to determine nature and extent of contamination along ephemeral drainage and at each stream bank	0–0.5	Soil		x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
			0.5–1.0			x	x	x	x	x	x	x	x	x	x	x	x		x	x	x

Table 4.1-1
Analytical Methods for Confirmation Sampling

Analytical Method	Analytical Description	Analytical Suite
Inorganic Methods		
EPA SW-846: 9045C	Electrometric	pH
EPA Method 300	Ion chromatography (IC)	Anions (nitrates)
EPA SW-846: 9012A	Colorimetric	Cyanide
EPA SW-846: 6010B/6020	Inductively coupled plasma emission spectrometry—atomic emission spectroscopy (ICPES-AES0	Aluminum, antimony, arsenic, barium, beryllium, boron, calcium, cadmium, cobalt, chromium, copper, iron, lead, lithium, magnesium, manganese, nickel, potassium, selenium, silicon, sodium, silver, thallium, titanium, uranium, vanadium, and zinc (TAL metals)
EPA SW-846: 6850	Liquid chromatography/ mass spectrometry (LC/MS)	Perchlorate
EPA SW-846:7471A	Cold vapor atomic absorption (CVAA)	Mercury (TAL metal)
Organic Methods		
EPA SW-846:8321A	liquid chromatography/ mass spectrometry (LC/MS)	Explosives
EPA SW-846:8270C	Gas chromatograph/ mass spectrometry (G/CMS)	SVOCs
EPA SW-846:8260B	GC/MS	VOCs
EPA SW-846:8082	GC	PCBs
EPA SW-846:8015B	GC	TPH-DRO
Radionuclide Methods		
EPA 901.1	Gamma spectroscopy	Gamma-emitting radionuclides (e.g., cesium-137)
HASL-300	Chemical separation/alpha spectroscopy	Isotopic plutonium, isotopic uranium, americium-241

Table 4.1-2
Human Health Industrial Soil Screening Levels

Chemical	Industrial Soil Screening Level[a]
Inorganic Chemicals (mg/kg)	
Aluminum	100,000[b]
Antimony	454[c]
Arsenic	17.7[d]
Barium	100,000[b]
Beryllium	2250[c]
Boron	100,000[b]
Cadmium	564[c]
Calcium	100,000[b]
Chromium (total)	3400[c]
Chromium (hexavalent)	20,500[c]
Cobalt	45,400[c]
Copper	13,700[c]
Cyanide (total)	100,000 [b]
Iron	800 IEUBK[e]
Lead	48,400[c]
Magnesium	100,000[b]
Manganese	22,700[c]
Mercury	100,000[b]
Nickel	5680[c]
Nitrate-Nitrite as N	5680[c]
Potassium	74.9[c]
Selenium	200[c,g]
Silver	1140[c]
Sodium	100,000[b]
Thallium	100,000[b]
Thorium	454[c]
Titanium	17.7[d]
Uranium	100,000[b]
Vanadium	2250[c]
Zinc	100,000[b]
Organic Chemicals (mg/kg)	
Acenaphthene	33,500[c]
Acenaphthylene[h]	30,900[c]
Acetone	100,000[b]
Amino-2,6-dinitrotoluene[4-][i]	2000[c,j]
Amino-4,6-dinitrotoluene[2-][i]	2000[c,j]

Table 4.1-2 (continued)

Chemical	Industrial Soil Screening Level[a]
Amino-DNTs	2000[c,j]
Aniline	10,000[d,j]
Anthracene	100,000[b]
Benzene	25.8[d]
Benzo(a)anthracene	23.4[d]
Benzo(a)pyrene	2.34[d]
Benzo(b)fluoranthene	23.4[d]
Benzo(g,h,i)perylene[h]	30,900[c]
Benzo(k)fluoranthene	234[d]
Benzoic Acid	100,000[b,j]
Bis(2-ethylhexyl)phthalate	1370[d]
Bromodichloromethane	37.2[d]
Butanone[2-]	48,700 sat[k]
Butylbenzene[n-]	62.1 sat[k]
Butylbenzene[sec-]	60.6 sat[k]
Carbazole	2900[d,j]
Carbon Disulfide	460 sat[k]
Carbon Tetrachloride	8.64[d]
Chlorobenzene	245 sat[k]
Chlorotoluene[2-]	202 sat[k]
Chrysene	2310[d]
Dibenz(a,h)anthracene	2.34[d]
Dibenzofuran	1620[c]
Dichlorobenzene[1,3-]	37.4 sat[k]
Dichlorobenzene[1,4-]	103[d]
Dichlorodifluoromethane	211 sat[k]
Dichloroethane[1,2-]	15.2[d]
Dichloroethene[cis-1,2-]	300[c]
Dichloropropene[1,1-]	31.7[d]
Diethylphthalate	100,000[b]
Dimethylphenol[2,4-]	13,700[c]
Di-n-butylphthalate	68,400[c]
Dinitrobenzene[1,3-]	200[c,j]
Dinitrotoluene[2,4-]	1370[c]
Dinitrotoluene[2,6-]	2000[c,j]
Ethylbenzene	128 sat[k]
Fluoranthene	24,400[c]
Fluorene	26,500[c]
Hexachlorobutadiene	137[c]

Table 4.1-2 (continued)

Chemical	Industrial Soil Screening Level[a]
Hexanone[2-][l]	48,700 sat[k]
HMX	34,200[c]
Indeno(1,2,3-cd)pyrene	23.4[d]
Isopropybenzene	389 sat[k]
Isopropyltoluene[4-][m]	389 sat[k]
Methylene Chloride	490[d]
Methylnaphthalene[2-][n]	300[c]
Methylphenol[2-]	100,000[b,j]
Methylphenol[3-]	100,000[b,j]
Methylphenol[4-]	10,000[c,j]
Naphthalene	300[c]
Nitrobenzene	147[c]
Nitrosodimethylamine[n-]	0.376[d]
Nitrotoluene[2-]	32.3[d]
Nitrotoluene[4-]	437[d]
Phenanthrene	20,500[c]
Phenol	100,000[b]
Propylbenzene[1-]	62.1 sat[k]
Pyrene	30,900[c]
Pyridine	2000[c]
RDX	174[d]
Tetrachloroethane	14.6[d]
Tetryl	2700[j]
Toluene	252 sat[k]
Trichlorobenzene[1,2,3-][o]	269[c]
Trichlorobenzene[1,2,4-]	269[c]
Trichloroethane[1,1,1-]	563 sat[k]
Trichloroethene	1.56[d]
Trichlorofluoromethane	983 sat[k]
Trimethylbenzene[1,2,4-]	213[c]
Trinitrobenzene[1,3,5-]	69.2 sat[k]
Trinitrotoluene[2,4,6-]	342[c]
Xylene[total-]	82.0 sat[k]
Xylene[1,2-]	99.5 sat[k]
Xylene[1,3-]+Xylene[1,4-]	82.0 sat[k]
Radionuclides (pCi/g)[p]	
Cesium-137	23
Plutonium-238	240
Plutonium-239/240	210

Table 4.1-2 (continued)

Chemical	Industrial Soil Screening Level[a]
Protactinium-231	—
Protactinium-234	—
Protactinium-234M	—
Thorium-231	—
Thorium-234	—
Uranium-234	1500
Uranium-235	87
Uranium-238	430

[a] SSLs from NMED (2006, 092513), unless otherwise noted.
[b] SSL exceeds 10^5 mg/kg.
[c] Noncarcinogen.
[d] Carcinogen.
[e] IEUBK denotes integrated exposure uptake biokinetic.
[f] — = SSL/SAL is not available.
[g] SSL from 2006 Region 9 Preliminary Remediation Goals (www.epa.gov/region09/waste/sfund/prg).
[h] Pyrene used as a surrogate chemical based on structural similarity.
[i] 2,6-DNT used as a surrogate chemical based on structural similarity.
[j] SSL from Region 6 EPA (2005, 094321).
[k] SSL based on soil saturation limit.
[l] 2-Butanone used as a surrogate chemical based on structural similarity.
[m] Isopropybenzene used as a surrogate chemical based on structural similarity.
[n] Naphthalene used as a surrogate chemical based on structural similarity.
[o] 1,2,4-Trichlorobenzene used as a surrogate chemical based on structural similarity.
[p] SALs from LANL (2005, 088493).

Table 4.3-1
Analytical Methods for Preliminary Characterization

Analytical Method	Analytical Description	Analytical Suite
Inorganic Methods		
EPA Method 300	Ion chromatography	Anions (nitrates)
EPA SW-846: 9045C	Electrometric	pH
EPA SW-846: 9012A	Colorimetric	Cyanide
EPA SW-846: 6010B/6020	ICP-AESAtomic Emission Spectroscopy	Aluminum, antimony, arsenic, barium, beryllium, boron, calcium, cadmium, cobalt, chromium, copper, iron, lead, lithium, magnesium, manganese, nickel, potassium, selenium, silicon, sodium, silver, thallium, titanium, uranium, vanadium, and zinc (TAL metals)
EPA SW-846: 6850	LC/MS	Perchlorate
EPA SW-846:7471A	CVAA	Mercury (TAL metal)
Organic Methods		
EPA SW-846:8321A	LC/MS	Explosives
EPA SW-846:8270C	GC/MS	SVOCs
EPA SW-846:8260B	GC/MS	VOCs
EPA SW-846:8082	GC	PCBs
EPA SW-846:8081A	GC	Organochlorinated pesticides
EPA SW-846:8015B	GC	TPH-DRO
Radionuclide Methods		
EPA 901.1	Gamma spectroscopy	Gamma-emitting radionuclides (e.g., cesium-137)
HASL-300	Chemical separation/alpha spectroscopy	Isotopic plutonium, isotopic uranium, americium-241
EPA 906	Liquid scintillation	Tritium

Table 5.1-1
Summary of Field SOPs

Procedure	Title	Summary
SOP-01.01	General Instructions for Field Investigations	This SOP provides an overview of instructions regarding activities to be performed before, during, and after field investigations. It is assumed that field investigations involve standard sampling equipment, PPE, waste-management, and site-control equipment/materials. The procedure covers premobilization activities, mobilization to the site, documentation and sample collection activities, sample media evaluation, surveying, and completing lessons learned.
SOP-01.02	Sample Containers and Preservation	This SOP describes the specific requirements/process for sample containers, preservation techniques, and holding times as specified by field regulations and guidance documents. The use of specific types of sample containers and preservation techniques is mandatory for hazardous site investigations because the integrity of any sample is diminished over time. Physical factors (light, pressure, temperature, etc.), chemical factors (changes in pH, volatilization, etc.), and biological factors may alter the original quality of the sample. Because the various target parameters are uniquely altered at varying rates, distinct sample containers, preservation techniques, and holding times have been established to maintain sample integrity for a reasonable and acceptable period of time. The procedure covers documenting SOP deviations, using proper sample containers and preservatives, performing data entry, implementing containment procedures, preserving samples, implementing holding times, completing documentation, implementing postoperation activities, and performing lessons learned.
SOP-01.03	Handling, Packaging and Transporting Field Samples	This SOP directs field team members in the preparation of environmental and waste characterization samples for transportation to the Laboratory's SMO or to an approved radiation screening laboratory. In general, samples collected are expected to have a low concentration of potential contaminants, although higher concentrations will be present in some cases. These low-concentration samples that do not satisfy the DOT hazard-class definitions are classified as environmental samples and are not subject to DOT regulations. Historical data, knowledge of processes, and field-screening results will assist the team members in deciding whether a sample can be designated as "environmental" or if it needs to be treated as a DOT-regulated material. The procedure covers transportation of environmental and DOT-regulated samples.
SOP-01.04	Sample Control and Field Documentation	This SOP describes the process for documenting samples collected using sample control and field documentation, specifically, container labels, sample collection logs, chain-of-custody/request for analysis forms, and daily activity log forms or field notebooks. The procedure covers performing request notification, generating sample control and field documentation, completing sample collection logs, using field chain-of-custody forms, delivering samples to the SMO, delivering samples to another analytical laboratory, using custody seals, collecting the samples, completing sample control and field documentation, completing field investigation summaries, and performing field closeouts.

Table 5.0-1 (continued)

Procedure	Title	Summary
SOP-01.05	Field Quality Control Samples	This SOP describes the requirements for the collection of field QC samples to ensure the reliability and validity of field and laboratory data. Field QC samples shall be collected as described in this procedure and taken to the Laboratory's SMO with the regular field samples for subsequent chemical and physical testing. The procedure covers preoperation activities, collecting, and preparing each type of QC sample including equipment rinsate blank, field duplicate, and trip blank.
SOP-01.06	Management of Environmental Restoration Project Wastes	This SOP describes the process for managing waste generated during corrective action activities. This procedure outlines the preparation, approval, and retention of all required documents associated with waste generation. The procedure covers waste identification and characterization, waste minimization/recycling, waste generation/storage, segregation, waste treatment, authorized release limits, packaging/transportation, disposal options, and specific policies, including area of contamination policy, environmental media, and contained-in policy.
SOP-01.08	Field Decontamination of Drilling and Sampling Equipment	This SOP describes the process for the general field decontamination of drilling and sampling equipment. It is intended to help ensure the integrity of soil, sediment, rock, water, and other samples collected from potentially contaminated sites and to minimize the potential for cross-contamination between sampling locations. Implementation of this procedure will help protect site and community personnel, requiring that equipment not be removed from a controlled area without proper decontamination. The procedure covers setup of dry and wet decontamination areas, drilling/excavation equipment decontamination, and sampling equipment decontamination.
SOP-01.10	Waste Characterization	This SOP describes the development of a strategy for characterizing wastes generated during projects performed at the Laboratory. Specifically, the SOP identifies the steps involved in waste identification and characterization as delineated by Laboratory requirements and provides instructions for completing a WCSF. A WCSF is required for projects that include (but are not limited to) site investigations, corrective actions, drilling, closures, and decommissioning projects.
SOP-02.01	Surface Water Site Assessments	This SOP describes the process for determining whether a site has the potential to adversely affect surface-water quality. The procedure identifies responsible participants and provides a detailed checklist to evaluate the erosion potential at a site that does not meet the criterion for NFA. SWMUs with highest priority are those adjacent to drainages and canyon systems or those with an erosion matrix score greater than 40 based on an evaluation of erosion/sediment transport potential. Erosion matrix scores range from 1 to 100 and are qualitatively determined based on a systematic assessment of the site. The assessment involves an evaluation of the site setting, examination of the site for evidence of runoff and erosion, and documentation of structures and/or operations that are directing stormwater onto the site.
SOP-03.11	Coordinating and Evaluating Geodetic Surveys	This SOP describes the methodology for coordinating and evaluating geodetic surveys and establishing QA and QC for geodetic survey data. The procedure covers evaluating geodetic survey requirements, preparing to perform a geodetic survey, performing geodetic survey field activities, preparing geodetic survey data for QA review, performing QA review of geodetic survey data, and submitting geodetic survey data.

Table 5.0-1 (continued)

Procedure	Title	Summary
SOP-04.01	Hollow Stem Auger Drilling Methods	In this method, hollow-stem augers (sections of seamless pipe with auger flights welded to the pipe) act as a screw conveyor to bring cuttings of sediment, soil, and/or rock to the surface. Auger sections are typically 5 ft long and have outside diameters of 4.25–14 in. Drill rods, split-spoon core barrels, Shelby tubes, and other samplers can pass through the center of the hollow-stem auger sections for collection of discrete samples from desired depths. Hollow-stem augers are used as temporary casings when setting wells to prevent cave-ins of the borehole walls.
SOP-04.04	Contract Geophysical Logging	This SOP states the responsibilities and describes the general process for obtaining borehole logging data of acceptable quality regardless of logging system or logging contractor to meet site-characterization and/or subsurface-sampling requirements of the investigation. Borehole-logging techniques are used in situ to determine physical, chemical, geological, and hydrological conditions in an open borehole. The procedure covers precontract considerations, preoperation activities, borehole geophysical logging activities, and postoperation activities. The primary concerns during logging activities are monitoring the logging equipment as it emerges from the borehole or before it leaves the work site for contamination, verifying field calibration both immediately before and immediately after, a logging run or runs with a logging tool, and ensuring that the logging equipment is decontaminated between sampling events.
SOP-05-07	Operation of LANL-Owned Borehole Logging Trailer	This SOP describes the process for operation and maintenance of the borehole video/geophysics logging trailer. The procedure covers running the borehole video camera system, running the borehole caliper tool, running the borehole conductivity/resistivity (induction) tool, running the gamma tool, and running the borehole spontaneous potential/single point resistance tool.
SOP-06.09	Spade and Scoop Method for the Collection of Soil Samples	This SOP describes the process for spade-and-scoop collection of shallow (e.g., typically 0–12 in.-) soil samples. The spade-and-scoop method involves digging a hole to the desired depth, as prescribed in the sampling and analysis plan, and collecting a discrete grab or portion of a composite sample. The procedure covers presampling activities, sampling activities, and postsampling activities.
SOP-06.10	Hand Auger and Thin-Wall Tube Sampler	This SOP states the responsibilities and describes the process for collecting surface and subsurface (up to about 15 in.-) soil samples with a hand auger and thin-wall tube sampler. This procedure describes the selection and use of sampling methods and equipment at sites that may include contamination with hazardous or radioactive materials. The procedure covers presampling activities, sampling activities, collecting field duplicates, and postsampling activities.
SOP-06.24	Sample Collection from Split-Spoon Samplers and Shelby-Tube Samplers	This SOP states the responsibilities and describes the process for collecting soil and sediment samples using either split-spoon samplers or Shelby-tube samplers. A split-spoon sampler is used to collect subsurface soil or sediment samples by forcefully driving the sampler into the soil or sediment at the bottom of a borehole. The Shelby tube is a similar type of sampling apparatus. The split spoon is a multipiece sampler; the Shelby tube is a single-piece metal tube of thinner gauge. The procedure covers presampling activities, sampling activities, and postsampling activities.

Table 5.0-1 (continued)

Procedure	Title	Summary
SOP-10.01	Screening for Polychlorinated Biphenyls in Soil	This SOP describes the process for using test kits to screen for PCBs in soil while conducting field activities. To determine the effectiveness of a PCB field-screening kit, initially a split of 10% of the samples must be submitted for fixed-base laboratory analysis using EPA-approved methods. This analysis determines whether the specific PCB field-screening kit that was chosen is appropriate for the site-specific conditions. It also helps determine whether the matrix being analyzed or other contaminants that are present could cause interference and detection problems with the particular kit being used. Once an acceptable correlation has been made between the concentrations found at the site (as measured by approved methods) and those being measured by the kit, the percent of samples submitted for fixed-base laboratory analysis can be reduced or even eliminated. If possible, the process of reducing the number of splits that undergo fixed-base analysis should be described in such planning documents as a field implementation plan or voluntary corrective action plan, as reduction decisions are based on how a kit is being used. If a kit is being used to help guide a cleanup effort, for example, and if that kit has been demonstrated to have a good performance record, additional fixed-base laboratory splits may be eliminated with the justification that all cleanup verification samples are going to be submitted for fixed-base laboratory analysis. The decision must be documented according to either SOP- 01.04, Sample Control and Field Documentation, or QP-5.7, Notebook Documentation for Environmental Restoration Technical Activities.
SOP-10.08	Operation of the Spectrace 9000 Field-Portable X-Ray Fluorescence Instrument	This SOP describes the process for operating and using the Spectrace 9000 field-portable XRF analyzer to screen for hazardous or potentially hazardous inorganic materials. The data that are generated allow for rapid evaluation of the extent of contamination. Samples are analyzed for elements of atomic number 13 (aluminum) through 92 (uranium), with proper x-ray source selection and instrument calibration. Environmental applications include measuring elemental metals in soil and on filters and measuring lead in paint.
SOP-10.14	Performing and Documenting Gross Gamma Radiation Scoping Surveys	This SOP describes the process for performing and documenting gross gamma radiation scoping surveys in buildings and soil. Scoping surveys are conducted after an assessment of the site history is completed and consist of judgmental measurements based on historical site information and data. If the scoping survey locates contamination, a characterization survey is typically performed.
SOP-12.01	Field Logging, Handling, and Documentation of Borehole Materials	This SOP prescribes the specific borehole material management methods to be followed and documentation to be prepared during handling and field logging of selected borehole materials identified in the site guidance documents and WCSF. This procedure is limited to the activities necessary to take custody of core and cuttings from drill rig personnel; conduct field-screening tests; remove time-sensitive analytical samples and subsamples for preliminary characterization; complete photograph documentation when necessary; perform field structural and lithologic description; and mark, package, and temporarily store the borehole materials at a drill site borehole material storage trailer. This procedure describes the handling of the subset of borehole materials to be curated from the time they are withdrawn from the borehole to the time they are ready to be transported to the Field Support Facility for curating and archiving. For the purposes of this SOP, borehole material may also refer to other solid materials, such as drive samples or augured materials. The procedure covers borehole material staging, temporary packaging of time sensitive analytical samples, measurement and determination of material loss, marking core (depth notation and stripes), core photography, core logging, removal of analytical samples (core), and core box loading and storing.

Appendix A

Acronyms and Abbreviations, Glossary,
Metric Conversion Table, and Data Qualifier Definitions

A-1.0 ACRONYMS

µCi/L	microcurie(s) per liter
µg	microgram(s)
AK	acceptable knowledge
amsl	above mean sea level
AOC	area of concern
ASTM	American Society of Testing and Materials
bgs	below ground surface
BV	background value
CA	corrective action
Ci	curie[s]
cm/sec	centimeters per second
Consent Order	Compliance Order on Consent
COPC	chemical of potential concern
CSM	conceptual site model
CVAA	Cold vapor atomic absorption
DNT	Dinitrotoluene
DOE	Department of Energy [U.S.]
DOT	Department of Transportation [U.S.]
DU	depleted uranium
EC	expedited cleanup
EP	Environmental Programs
EPA	Environmental Protection Agency [U.S.]
ESAL	ecological screening action level
FV	fallout value
GC/MS	gas chromatography/mass spectrometry
HE	high explosives
HIR	historical investigation report

HMX	high-melting explosive
HSA	hollow-stem auger
HWFP	Hazardous Waste Facility Permit
IC	ion chromatography
ICPS-AES	inductively coupled plasma–atomic emission spectrometry
IDW	investigation-derived waste
IR	investigation report
LANL	Los Alamos National Laboratory
LC/MS	liquid chromatography/mass spectrometry
LIR	laboratory implementation requirements
MDA	material disposal area
mm/yr	millimeters per year
MSI	Mount Sopris Instrument
NES	nuclear environmental site
NFA	no further action
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
NPDES	National Pollutant Discharge Elimination System
OD	open detonation
OU	operable unit
PAH	polycyclic aromatic hydrocarbon [interchangeable with polynuclear aromatic hydrocarbon]
PCB	polychlorinated biphenyls
PCOC	potential contaminant of concern
PID	photoionization detector
ppb	part(s) per billion
PPE	personal protective equipment
ppm	part(s) per million
PRG	preliminary remediation goal

QA/QC	quality assurance/quality control
Qbo	Otowi Member and Guaje Pumice Bed
Qbt	Quarternary Tshirege Member of the Bandelier Tuff
Qct	Cerro Toledo Interval
QP	quality procedure
RCRA	Resource Conservation and Recovery Ac
RCT	radiological control technician
RDX	research department explosive
RFI	Resource Conservation and Recovery Act facility investigation
SAA	satellite accumulation area
SAL	screening action level
SMO	Sample Management Office
SOP	standard operating procedure
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	solid waste management unit
SWSC	Sanitary Wastewater System Consolidation
TA	technical area
TAL	target analyte list [EPA]
TCA	1,1-tricholoroethane
TCLP	toxicity characteristic leaching procedure
TD	total depth
TDS	total dissolved solids
TNT	2,4,6-trinitrotoluene
Tpf	Puye Formation fanglomerates
TPH-DRO	total petroleum hydrocarbons–diesel range organics
VCA	voluntary corrective action
VOC	volatile organic compound

WAC	waste acceptance criteria
WCSF	waste characterization strategy form
wSAL	water screening action level
WWTP	wastewater treatment plant
XRF	x-ray fluorescence

A-2.0 GLOSSARY

aggregate—At the Los Alamos National Laboratory, an area within a *watershed* containing solid waste management units (SWMUs) and/or areas of concern (AOCs), and the media affected or potentially affected by releases from those SWMUs and/or AOCs. Aggregates are designated to promote efficient and effective corrective action activities.

aquifer—An underground geological formation (or group of formations) containing water that is the source of groundwater for wells and springs.

area of concern—(1) A release that may warrant investigation or remediation and is not a solid waste management unit (SWMU). (2) An area at Los Alamos National Laboratory that may have had a release of a hazardous waste or a hazardous constituent but is not a SWMU.

analysis—A critical evaluation, usually made by breaking a subject (either material or intellectual) down into its constituent parts, then describing the parts and their relationship to the whole. Analyses may include physical analysis, chemical analysis, toxicological analysis, and knowledge-of-process determinations.

analyte—The element, nuclide, or ion a chemical analysis seeks to identify and/or quantify; the chemical constituent of interest.

analytical method—A procedure or technique for systematically performing an activity.

background level—(1) The concentration of a substance in an environmental medium (air, water, or soil) that occurs naturally or is not the result of human activities. (2) In exposure assessment, the concentration of a substance in a defined control area over a fixed period of time before, during, or after a data-gathering operation.

background value (BV)—A statistically derived concentration (i.e., the upper tolerance limit [UTL]) of a chemical used to represent the background data set. If a UTL cannot be derived, either the detection limit or maximum reported value in the background data set is used.

canyon—A stream-cut chasm or gorge, the sides of which are composed of cliffs or a series of cliffs rising from the chasm's bed. Canyons are characteristic of arid or semiarid regions where downcutting by streams greatly exceeds weathering.

catchment—(1) A structure, such as a basin or reservoir, used for collecting or draining water. (2) The amount of water collected in such a structure. (3) A catching or collecting of water, especially rainwater.

chemical—Any naturally occurring or human-made substance characterized by a definite molecular composition.

chemical of potential concern (COPC)—A detected chemical compound or element that has the potential to adversely affect human receptors as a result of its concentration, distribution, and toxicity.

cleanup—A series of actions taken to deal with the release, or threat of a release, of a hazardous substance that could affect humans and/or the environment. The term cleanup is sometimes used interchangeably with the terms remedial action, removal action, or corrective action.

Compliance Order on Consent (Consent Order)—For the Environmental Remediation and Surveillance Program, an enforcement document signed by the New Mexico Environment Department, the U.S. Department of Energy, and the Regents of the University of California on March 1, 2005, which prescribes the requirements for corrective action at Los Alamos National Laboratory. The purposes of the Consent Order are (1) to define the nature and extent of releases of contaminants at, or from, the facility; (2) to identify and evaluate, where needed, alternatives for corrective measures to clean up contaminants in the environment and prevent or mitigate the migration of contaminants at, or from, the facility; and (3) to implement such corrective measures. The Consent Order supersedes the corrective action requirements previously specified in Module VIII of the Laboratory's Hazardous Waste Facility Permit.

Consent Order—See Compliance Order on Consent.

consolidated unit—A group of solid waste management units (SWMUs), or SWMUs and areas of concern, which generally are geographically proximate and have been combined for the purposes of investigation, reporting, or remediation.

contaminant—(1) Chemicals and radionuclides present in environmental media or on debris above background levels. (2) According to the March 1, 2005, Compliance Order on Consent (Consent Order), any hazardous waste listed or identified as characteristic in 40 Code of Federal Regulations (CFR) 261 (incorporated by 20.4.1.200 New Mexico Administrative Code [NMAC]); any hazardous constituent listed in 40 CFR 261 Appendix VIII (incorporated by 20.4.1.200 NMAC) or 40 CFR 264 Appendix IX (incorporated by 20.4.1.500 NMAC); any groundwater contaminant listed in the Water Quality Control Commission (WQCC) Regulations at 20.6.3.3103 NMAC; any toxic pollutant listed in the WQCC Regulations at 20.6.2.7 NMAC; explosive compounds; nitrate; and perchlorate. (Note: Under the Consent Order, the term "contaminant" does <u>not</u> include radionuclides or the radioactive portion of mixed waste.)

corrective action—(1) In the Resource Conservation and Recovery Act, an action taken to rectify conditions potentially adverse to human health or the environment. (2) In the quality assurance field, the process of rectifying and preventing nonconformances.

data validation—A systematic process that applies a defined set of performance-based criteria to a body of data and that may result in the qualification of the data. The data-validation process is performed independently of the analytical laboratory that generates the data set and occurs before conclusions are drawn from the data. The process may include a standardized data review (routine data validation) and/or a problem-specific data review (focused data validation).

decommissioning—The permanent removal of facilities and their components from service after the discontinued use of structures or buildings that are deemed no longer useful. Decommissioning must take place in accordance with regulatory requirements and applicable environmental policies.

decontamination—The removal of unwanted material from the surface of, or from within, another material.

detect (detection)—An analytical result, as reported by an analytical laboratory, that denotes a chemical or radionuclide to be present in a sample at a given concentration.

detection limit—The minimum concentration that can be determined by a single measurement of an instrument. A detection limit implies a specified statistical confidence that the analytical concentration is greater than zero.

discharge—The accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of hazardous waste into, or on, any land or water.

disposal—The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into, or on, any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.

effluent—Wastewater (treated or untreated) that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Environmental Restoration (ER) Project—A Los Alamos National Laboratory project established in 1989 as part of a U.S. Department of Energy nationwide program, and precursor of today's Environmental Remediation and Surveillance (ERS) Program. This program is designed (1) to investigate hazardous and/or radioactive materials that may be present in the environment as a result of past Laboratory operations, (2) to determine if the materials currently pose an unacceptable risk to human health or the environment, and (3) to remediate (clean up, stabilize, or restore) those sites where unacceptable risk is still present.

facility—All contiguous land (and structures, other appurtenances, and improvements on the land) used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units. For the purpose of implementing a corrective action, a facility is all the contiguous property that is under the control of the owner or operator seeking a permit under Subtitle C of the Resource Conservation and Recovery Act.

groundwater—Interstitial water that occurs in saturated earth material and is capable of entering a well in sufficient amounts to be used as a water supply.

Hazardous and Solid Waste Amendments (HSWA)—Public Law No. 98-616, 98 Stat. 3221, enacted in 1984, which amended the Resource Conservation and Recovery Act of 1976 (42 United States Code § 6901 et seq).

hazardous constituent (hazardous waste constituent)—According to the March 1, 2005, Compliance Order of Consent (Consent Order), any constituent identified in Appendix VIII of Part 261, Title 40 Code of Federal Regulations (CFR) (incorporated by 20.4.1.200 New Mexico Administrative Code [NMAC]) or any constituent identified in 40 CFR 264, Appendix IX (incorporated by 20.4.1.500 NMAC).

Hazardous Waste Facility Permit—The authorization issued to Los Alamos National Laboratory (the Laboratory) by the New Mexico Environment Department that allows the Laboratory to operate as a hazardous waste treatment, storage, and disposal facility.

HSWA module—See Module VIII.

infiltration—(1) The penetration of water through the ground surface into subsurface soil. (2) The technique of applying large volumes of wastewater to land to penetrate the surface and percolate through the underlying soil.

intermittent stream—A stream that flows only in certain reaches as a result of the channel bed's losing and gaining characteristics.

laboratory control sample (LCS)—A known matrix that has been spiked with compound(s) representative of target analytes. LCSs are used to document laboratory performance, and the acceptance criteria for LCSs are method-specific.

LANL (Los Alamos National Laboratory) data validation qualifiers—The Los Alamos National Laboratory data qualifiers which are defined by, and used, in the Environmental Remediation and Surveillance (ERS) Program validation process. The qualifiers describe the general usability (or quality) of data. For a complete list of data qualifiers applicable to any particular analytical suite, consult the appropriate ERS standard operating procedure.

material disposal area (MDA)—A subset of the solid waste management units at Los Alamos National Laboratory (the Laboratory) that include disposal units such as trenches, pits, and shafts. Historically, various disposal areas (but not all) were designated by the Laboratory as MDAs.

matrix spike—An aliquot of a sample to which a known concentration of target analyte has been added. Matrix spike samples are used to measure the ability to recover prescribed analytes from a native sample matrix. The spiking typically occurs before sample preparation and analysis.

medium (environmental)—Any material capable of absorbing or transporting constituents. Examples of media include tuffs, soils and sediments derived from these tuffs, surface water, soil water, groundwater, air, structural surfaces, and debris.

method detection limit (MDL)—The minimum concentration of a substance that can be measured and reported with a known statistical confidence that the analyte concentration is greater than zero. After subjecting samples to the usual preparation, the MDL is determined by analyzing those samples of a given matrix type that contain the analyte. The MDL is used to establish detection status.

migration—The movement of inorganic and organic chemical species through unsaturated or saturated materials.

migration pathway—A route (e.g., a stream or subsurface flow path) for the potential movement of contaminants to environmental receptors (plants, humans, or other animals).

model—A schematic description of a physical, biological, or social system, theory, or phenomenon that accounts for its known or inferred properties and may be used for the further study of its characteristics.

Module VIII—Module VIII of the Los Alamos National Laboratory (the Laboratory) Hazardous Waste Facility Permit. This permit allows the Laboratory to operate as a hazardous-waste treatment, storage, and disposal facility. From 1990 to 2005, Module VIII included requirements from the Hazardous and Solid Waste Amendments. These requirements have been superceded by the March 1, 2005, Compliance Order on Consent (Consent Order).

National Pollutant Discharge Elimination System—The national program for issuing, modifying, revoking and reissuing, terminating, monitoring, and enforcing permits to discharge wastewater or storm water, and for imposing and enforcing pretreatment requirements under the Clean Water Act.

no further action—Under the Resource Conservation and Recovery Act, a corrective-action determination whereby, based on evidence or risk, no further investigation or remediation is warranted.

operable units (OUs)—At Los Alamos National Laboratory, 24 areas originally established for administering the Environmental Remediation and Surveillance Program. Set up as groups of potential release sites, the OUs were aggregated according to geographic proximity for the purposes of planning and conducting Resource Conservation and Recovery Act (RCRA) facility assessments and RCRA facility investigations. As the project matured, it became apparent that there were too many areas to allow efficient communication and to ensure consistency in approach. In 1994, the 24 OUs were reduced to 6 administrative field units.

outfall—A place where effluent is discharged into receiving waters.

permit—An authorization, license, or equivalent control document issued by the U.S. Environmental Protection Agency or an approved state agency to implement the requirements of an environmental regulation.

polychlorinated biphenyls (PCBs)—Any chemical substance limited to the biphenyl molecule that has been chlorinated to varying degrees, or any combination that contains such substances. PCBs are colorless, odorless compounds that are chemically, electrically, and thermally stable and have proven to be toxic to both humans and other animals.

quality assurance/quality control—A system of procedures, checks, audits, and corrective actions set up to ensure that all U.S. Environmental Protection Agency research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.

radiation—A stream of particles or electromagnetic waves emitted by atoms and molecules of a radioactive substance as a result of nuclear decay. The particles or waves emitted can consist of neutrons, positrons, alpha particles, beta particles, or gamma radiation.

radioactive material—For purposes of complying with U.S. Department of Transportation regulations, any material having a specific activity (activity per unit mass of the material) greater than 2 nanocuries per gram (nCi/g) and in which the radioactivity is evenly distributed.

radionuclide—Radioactive particle (human-made or natural) with a distinct atomic weight number.

RCRA facility investigation (RFI)—A Resource Conservation and Recovery Act (RCRA) investigation that determines if a release has occurred and characterizes the nature and extent of contamination at a hazardous waste facility. The RFI is generally equivalent to the remedial investigation portion of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process.

regional aquifer—Geologic material(s) or unit(s) of regional extent whose saturated portion yields significant quantities of water to wells, contains the regional zone of saturation, and is characterized by the regional water table or potentiometric surface.

release—Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of hazardous waste or hazardous constituents into the environment.

Resource Conservation and Recovery Act—The Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (Public Law [PL] 94-580, as amended by PL 95-609 and PL 96-482, United States Code 6901 et seq.).

runoff—The portion of the precipitation on a drainage area that is discharged from the area.

run-on—Surface water that flows onto an area as a result of runoff occurring higher up on a slope.

sample—A portion of a material (e.g., rock, soil, water, or air), which, alone or in combination with other portions, is expected to be representative of the material or area from which it is taken. Samples are typically either sent to a laboratory for analysis or inspection or are analyzed in the field. When referring to samples of environmental media, the term field sample may be used.

sediment—(1) A mass of fragmented inorganic solid that comes from the weathering of rock and is carried or dropped by air, water, gravity, or ice. (2) A mass that is accumulated by any other natural agent and that forms in layers on the earth's surface (e.g., sand, gravel, silt, mud, fill, or loess). (3) A solid material that is not in solution and is either distributed through the liquid or has settled out of the liquid.

site characterization—Defining the pathways and methods of migration of hazardous waste or constituents, including the media affected; the extent, direction and speed of the contaminants; complicating factors influencing movement; or concentration profiles.

soil—(1) A material that overlies bedrock and has been subject to soil-forming processes. (2) A sample media group that includes naturally occurring and artificial fill materials.

solid waste management unit (SWMU)—(1) Any discernible site at which solid wastes have been placed at any time, whether or not the site use was intended to be the management of solid or hazardous waste. SWMUs include any site at a facility at which solid wastes have been routinely and systematically released. This definition includes regulated sites (i.e., landfills, surface impoundments, waste piles, and land treatment sites), but does not include passive leakage or one-time spills from production areas and sites in which wastes have not been managed (e.g., product storage areas). (2) According to the March 1, 2005, Compliance Order on Consent (Consent Order), any discernible site at which solid waste has been placed at any time, and from which the New Mexico Environment Department determines there may be a risk of a release of hazardous waste or hazardous waste constituents (hazardous constituents), whether or not the site use was intended to be the management of solid or hazardous waste. Such sites include any area in Los Alamos National Laboratory at which solid wastes have been routinely and systematically released; they do not include one-time spills.

split-spoon sampler—A hollow, tubular sampling device below a drill stem that is driven by a weight to retrieve soil samples. The core barrel can be opened to remove samples. This is a sampling method commonly used with auger drilling. The split-spoon sampler can be driven into the ground or can be advanced inside hollow-stem augers.

standard operating procedure—A document that details the officially approved method(s) for an operation, analysis, or action, with thoroughly prescribed techniques and steps.

surface sample—A sample taken at a collection depth that is (or was) representative of the medium's surface during the period of investigative interest. A typical depth interval for a surface sample is 0 to 6 in. for mesa-top locations, but may be up to several feet in sediment-deposition areas within canyons.

target analyte—A chemical or parameter, the concentration, mass, or magnitude of which is designed to be quantified by a particular test method.

technical area (TA)—At Los Alamos National Laboratory, an administrative unit of operational organization (e.g., TA-21).

topography—The physical or natural features of an object or entity and their structural relationships.

transport (transportation)—(1) The movement of a hazardous waste by air, rail, highway, or water. (2) The movement of a contaminant from a source through a medium to a receptor.

tuff—Consolidated volcanic ash, composed largely of fragments produced by volcanic eruptions.

U.S. Department of Energy—The federal agency that sponsors energy research and regulates nuclear materials for weapons production.

U.S. Environmental Protection Agency (EPA)—The federal agency responsible for enforcing environmental laws. Although state regulatory agencies may be authorized to administer some of this responsibility, EPA retains oversight authority to ensure the protection of human health and the environment.

vadose zone—The zone between the land surface and the water table within which the moisture content is less than saturation (except in the capillary fringe) and pressure is less than atmospheric. Soil pore space also typically contains air or other gases. The capillary fringe is included in the vadose zone.

A-3.0 METRIC CONVERSION TABLE

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

A-4.0 DATA QUALIFIER DEFINITIONS

Data Qualifier	Definition
U	The analyte was analyzed for but not detected.
J	The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.
J+	The analyte was positively identified, and the result is likely to be biased high.
J-	The analyte was positively identified, and the result is likely to be biased low.
UJ	The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific detection or quantitation limit.
R	The data are rejected as a result of major problems with quality assurance/quality control parameters.

Appendix B

Investigation-Derived Waste Management

B-1.0 INTRODUCTION

This appendix describes the management of investigation-derived waste (IDW) and cleanup wastes generated during the investigation and remediation of sites comprising the North Ancho Canyon Aggregate Area at Los Alamos National Laboratory (LANL or the Laboratory). This waste is generated during field-investigation activities and it may include, but is not limited to, drill cuttings; contaminated soil; contaminated personal protective equipment (PPE), sampling supplies, and plastic; fluids from the decontamination of PPE and sampling equipment; and all other waste that has potentially come into contact with contaminants. In addition, IDW includes remediation waste generated during removal actions planned in conjunction with site characterization. This remediation waste includes, but is not limited to, septic tank structures and drainlines, underground storage tanks, debris, contaminated soil, and sludge. Estimated quantities of all anticipated waste types are listed in Table B-1.0-1.

B-2.0 INVESTIGATION-DERIVED WASTE

All IDW generated during field investigation activities will be managed in accordance with applicable standard operating procedures (SOPs). These SOPs incorporate the requirements of all applicable U.S. Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED) regulations, U.S. Department of Energy (DOE) orders, and laboratory implementation requirements (LIRs). The two SOPs applicable to the characterization and management of IDW are SOP-01.06, Management of Environmental Restoration Project Waste, and SOP-01.10, Waste Characterization. These SOPs are available at http://www.lanl.gov/environment/all/qa.shtml.

Preliminary sampling and characterization will be performed at sites proposed for cleanup to determine or confirm the extent of buried waste or locations of inactive units and to provide sufficient information to complete the Waste Characterization Strategy Form (WCSF) for dispositioning. The characterization strategy to complete the WCSF is described in Section 8 of SOP-01-10, as follows:

- Review existing data/documentation to determine if they meet requirements for acceptable knowledge (AK), as specified in LIG 404-00-02.0.
- Identify preliminary waste classifications. Classifications may include but are not limited to the following:
    - ❖ Radioactive
    - ❖ Solid
    - ❖ Hazardous
    - ❖ Mixed (hazardous and radioactive)
    - ❖ Toxic Substances Control Act
    - ❖ New Mexico Special Waste
    - ❖ Industrial
    - ❖ Or combinations of the above
- Identify additional waste classification considerations. SOP-01.06, Management of Environmental Remediation Project Waste, specifically addresses IDW remediation waste
- Prepare the WCSF

Investigation activities will be conducted in a manner that minimizes the generation of waste. Waste minimization will be accomplished by implementing the requirements of the Environmental Programs Directorate's portion of the "Los Alamos National Laboratory Hazardous Waste Minimization Report" (LANL 2005, 091291).

The waste streams that will be generated and managed during the field investigation and removal actions at the North Ancho Canyon Aggregate Area sites are described below.

B-2.1 Drill Cuttings

The drill cuttings waste stream will consist of cuttings from boreholes that will be drilled in and around North Ancho Canyon Aggregate Area sites. Drill cuttings will be collected and placed in containers at the point of generation (e.g., at the drill rig) and temporarily stored at the site. The drill cuttings waste stream will be characterized using analytical results from core samples and augmented by direct sampling of the containerized cuttings, if necessary. Chemicals of potential concern (COPCs) include radionuclides, inorganic chemicals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and high explosives (HE). The maximum detected concentrations of radionuclides will be compared with the background or fallout values. If the maximum concentrations exceed these values, the drill cuttings will be designated as low-level radioactive waste. Maximum concentrations of toxicity characteristic leaching procedure (TCLP) constituents (e.g., total metals analytical results) will be compared with 20 times the TCLP regulatory level. If the concentrations are less than 20 times the regulatory level, the drill cuttings will be designated nonhazardous waste by characteristic. If the concentrations exceed 20 times the regulatory level, the drill cuttings will be sampled and analyzed using the TCLP to determine whether it is hazardous waste by characteristic. If potential EPA-listed hazardous waste constituents are detected, the Laboratory will conduct a review of historical records and data to determine whether the source of each constituent was a listed hazardous waste at its point of generation. If the source is determined to be a listed hazardous waste, the cuttings will be managed as hazardous or mixed waste (depending on the levels of radioactivity). Based on the results of previous investigations, the Laboratory expects the majority of these drill cuttings to be designated as nonhazardous, nonradioactive waste that will be either used for cover material at Technical Area (TA) 54 or disposed of at an off-site disposal facility permitted for the disposal of solid waste. Potentially, some drill cuttings may be designated as low-level radioactive or mixed waste at several of the sites because of the presence of depleted uranium, metals, and/or HE. Low-level waste will be disposed of on-site at TA-54 or off-site at a licensed facility. Mixed waste will be sent to an off-site facility permitted for treating and/or disposing of mixed waste.

B-2.2 Tank Structures, Drainlines, and Debris

Waste from the demolition and removal of septic tanks will consist of concrete reinforced with steel rebar and vitrified clay pipe or steel pipe. Waste will be placed into 20-yd^3 roll-off containers, secured, and temporarily stored at the site. COPCs include radionuclides, inorganic chemicals, VOCs, SVOCs, PCBs, and HE. The concentrations of radionuclides detected on swipe samples will be compared with DOE radiological release criteria. If the concentrations exceed release criteria, the waste will be designated as low-level radioactive waste. Determination of whether the waste is hazardous will be based on AK using characterization data from the tank contents or from media where the tank contents were released. Based on the results of previous investigations, the Laboratory expects these wastes to be designated as nonhazardous, nonradioactive waste that will be disposed of at an off-site disposal facility permitted for the disposal of solid waste.

B-2.3 Soil

Soil will be placed into containers appropriate to the waste volume generated (drums and/or rolloff containers), secured, and temporarily stored at the site. Potential COPCs include radionuclides, inorganic chemicals, VOCs, SVOCs, PCBs, and HE. The maximum detected concentrations of radionuclides will be compared with the background or fallout values. If the maximum concentrations exceed these values, the soil will be designated as low-level radioactive waste. Maximum concentrations of TCLP constituents will be compared with 20 times the TCLP regulatory level. If the concentrations are less than 20 times the regulatory level, the soil will be designated nonhazardous by characteristic. If the concentrations exceed 20 times the regulatory level, the waste will be sampled and analyzed using the TCLP to determine whether it is hazardous by characteristic. If potential EPA-listed hazardous waste constituents are detected, the Laboratory will conduct a review of historical records and data to determine whether the source of each constituent was a listed hazardous waste at its point of generation. If the source is determined to be a listed hazardous waste, the soil will be managed as hazardous or mixed waste (depending on the levels of radioactivity). Based on the results of previous investigations, the Laboratory expects these wastes to be designated as nonhazardous, nonradioactive waste that will be either used for cover material at TA-54 or disposed of at an off-site disposal facility permitted for the disposal of solid waste. Potentially, some soil may be designated as low-level radioactive or mixed waste at several of the sites because of the presence of depleted uranium, metals, and/or HE. Low-level waste will be disposed of on-site at TA-54 or off-site at a licensed facility. Mixed waste will be sent to an off-site facility permitted for the treatment and/or disposal of mixed waste.

B-2.4 Spent PPE

The spent PPE waste stream will consist of PPE that has come into contact with contaminated environmental media (e.g., core and/or drill cuttings) and cannot be decontaminated. The bulk of this waste stream will consist of protective clothing, such as coveralls, gloves, shoe covers, and (if required) respirator cartridges. Spent PPE will be collected in containers at personnel decontamination stations, secured, and temporarily stored at the site. Characterization of this waste stream will be performed through AK of the waste materials, the methods of generation, and the levels of contamination observed in the associated environmental media. The Laboratory expects spent PPE to be designated as nonhazardous, nonradioactive waste that will be disposed of at an off-site disposal facility permitted for the disposal of solid waste.

B-2.5 Disposable Sampling Supplies

The disposable sampling supplies waste stream will consist of all equipment and materials that are necessary for collecting samples and that have come into direct contact with contaminated environmental media and cannot be decontaminated. This waste stream also includes residues associated with field test kits and wastes associated with dry decontamination activities. The latter will consist primarily of paper and plastic items collected in bags at the sampling location and transferred to accumulation drums. Characterization of this waste stream will be performed through AK of the waste materials, the methods of generation, and the levels of contamination observed in the associated environmental media. The Laboratory expects disposable sampling supplies to be designated as nonhazardous, nonradioactive waste, with the exception of residues from some field test kits, which will be deemed hazardous. Nonhazardous wastes will be disposed of at an off-site disposal facility permitted for the disposal of solid waste; hazardous wastes will be sent to an off-site facility permitted for the treatment and/or disposal of hazardous waste.

B-2.6 Decontamination Fluids

The decontamination fluids waste stream will consist of liquid wastes from decontamination activities (e.g., decontamination solutions and rinse waters). Following waste-minimization practices, the Laboratory employs dry decontamination methods to the extent possible. If dry decontamination cannot be performed, liquid decontamination wastes will be collected in containers at the point of generation and transferred to accumulation drums. Decontamination fluids will be accumulated in drums, temporarily stored at the site, and characterized using analytical results from direct sampling of the containerized waste. The Laboratory expects that the majority of decontamination fluids will be designated as nonhazardous, nonradioactive liquid waste. A potential exists for some decontamination rinsate to be designated as low-level radioactive or mixed waste at several of the sites because of presence of radionuclides, metals, and/or HE. Nonhazardous and radioactive liquid wastes may be treated and disposed of at several on-site treatment facilities, provided the waste meets the facility's waste acceptance criteria (WAC). Mixed waste and waste that do not meet the WAC of Laboratory treatment facilities will be sent to permitted off-site treatment facilities.

B-2.7 Spent Immunoassay Test Kits (D-Tech)

Sampling containers and materials from used test kits include glass ampules, soil, and miscellaneous plastic/Teflon. Due to the solvents present, it is assumed to be hazardous based on its ignitability. This waste will be stored in a 55-gal. drum at a waste accumulation area until a final waste determination is made. Nonhazardous wastes will be disposed of at an off-site disposal facility permitted for the disposal of industrial waste; hazardous wastes will be sent to an off-site facility permitted for the treatment and/or disposal of hazardous waste.

B-3.0 WASTE MANAGEMENT

All wastes will be managed in accordance with applicable federal, state, DOE, and Laboratory requirements. The IDW waste streams, expected waste types, estimated waste volumes, and other data are listed in Table B-3.0-1.

All waste drums and containers (rolloff bins) will remain on-site until analytical results have been received and waste characterization has been completed.

Before field-investigation activities begin, a WCSF will be prepared and approved as required by the current version of SOP-01.10. The WCSF will provide detailed information about IDW characterization, management, containerization, and potential volume generation for each subaggregate.

The IDW will be characterized through existing data and/or documentation, direct sampling of the IDW, or sampling of the media being investigated (e.g., surface soil, subsurface soil). If sampling is necessary, the procedures will be described in a sampling and analysis plan that will be developed in conjunction with the WCSF.

Some wastes will be characterized on the basis of AK rather than direct waste analysis. The AK characterization will consist of the results of analyzing the environmental media associated with each waste stream. For example, spent PPE and disposable sampling supplies that have potentially come into contact with contaminated media will be characterized based on the analytical results for samples of that media. Similarly, borehole drill cuttings will be characterized by the analytical results for the core samples from that borehole. If decontamination fluids are to be sent off-site for disposal, they will be sampled to demonstrate compliance with the WAC of the receiving facility.

B-4.0 WASTE CONTAINERS AND TRANSPORTATION

The selection of waste containers will be based on the appropriate U.S. Department of Transportation (DOT) requirements and the type and amount of IDW anticipated to be generated. Immediately following containerization, each waste container will be individually labeled to identify the waste classification, the item identification number, its radioactivity (if applicable), and the date of generation. Waste containers will be managed in clearly marked and appropriately constructed waste accumulation areas. Waste accumulation area postings, regulated storage duration, and inspection requirements will be based on IDW type and classification. Container and storage requirements will be detailed in the WCSF, based on requirements outlined in the most recent versions of LIR 404-00-03, Hazardous and Mixed Waste Requirements; LIR 404-00-04, Managing Solid Waste; LIR 404-00-05, Managing Radioactive Waste; and LIR 405-10-01, Packaging and Transportation. Before the waste is generated, the WCSF will be approved by the process detailed in SOP-01.10, Waste Characterization.

Transportation of IDW will comply with appropriate DOT requirements. Transportation and disposal requirements will be detailed in the WCSF and approved before the generation of waste.

B-5.0 REFERENCES

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in text citations. ER ID numbers are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the 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 Directorate. 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.

LANL (Los Alamos National Laboratory), November 2005. "Los Alamos National Laboratory Hazardous Waste Minimization Report," Los Alamos National Laboratory document LA-UR-05-8650, Los Alamos, New Mexico. (LANL 2005, 091291)

Table B-3.0-1
Investigation and Corrective Action Wastes for North Ancho Canyon Aggregate Area Investigation

Waste Stream	Expected Waste Type	Estimated Volume	Characterization Method	On-Site Management	Expected Disposition
Drill Cuttings	Solid waste, nonhazardous, nonradioactive	0.3 yd^3	Analytical results from waste samples and core samples	Accumulation in 55-gal. drums, covered rolloff containers, or cubic-yard soft-sided containers	Permitted off-site disposal facility
Soil and Debris	Solid waste, nonhazardous, nonradioactive	0.1 yd^3	Analytical results from waste samples	Accumulation in covered rolloff containers	Permitted off-site disposal facility
Spent PPE and Disposable Sampling Supplies	Solid waste, nonhazardous, nonradioactive	0.8 yd^3	AK	Accumulation in 55-gal. drums	Permitted off-site disposal facility
Decontamination Fluid	Liquid waste, nonhazardous or low-level radioactive	73.3 gal.	Analytical results from waste samples	Accumulation in 55-gal. drums	On-site treatment facility for which waste meets waste acceptance criteria

Note: Sample depths, numbers, and/or locations are yet to be determined.