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Date: DEC 2 1 2009
Refer To: EP2009-0629

James Bearzi, Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Submittal of the Accelerated Corrective Action Work Plan for Upper Los Alamos Canyon Aggregate Area, Former Technical Area 32

Dear Mr. Bearzi:

Enclosed please find two hard copies with electronic files of the Accelerated Corrective Action Work Plan for Upper Los Alamos Canyon Aggregate Area, Former Technical Area 32. This work is being proposed in anticipation of Los Alamos County's planned development of this site.

If you have any questions, please contact Becky Coel-Roback at (505) 665-5011 (becky_cr@lanl.gov) or Cheryl Rodriguez at (505) 665-5330 (crodriguez2@doeal.gov).

Sincerely,

for

Michael J. Graham, Associate Director
Environmental Programs
Los Alamos National Laboratory

Sincerely,

David R. Gregory, Project Director
Environmental Operations
Los Alamos Site Office

32329

MG/DG/DM/BCR:sm

Enclosures: Two hard copies with electronic files – Accelerated Corrective Action Work Plan for Upper Los Alamos Canyon Aggregate Area, Former Technical Area 32 (LA-UR-09-8056)

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LA-UR-09-8056
December 2009
EP2009-0629

Accelerated Corrective Action Work Plan for Upper Los Alamos Canyon Aggregate Area, Former Technical Area 32

Los Alamos
NATIONAL LABORATORY
EST. 1943

Prepared by the Environmental Programs Directorate

Los Alamos National Laboratory, operated by Los Alamos National Security, LLC, for the U.S. Department of Energy under Contract No. DE-AC52-06NA25396, has prepared this document pursuant to the Compliance Order on Consent, signed March 1, 2005. The Compliance Order on Consent contains requirements for the investigation and cleanup, including corrective action, of contamination at Los Alamos National Laboratory. The U.S. government has rights to use, reproduce, and distribute this document. The public may copy and use this document without charge, provided that this notice and any statement of authorship are reproduced on all copies.

LA-UR-09-8056
EP2009-0629

Accelerated Corrective Action Work Plan for Upper Los Alamos Canyon Aggregate Area, Former Technical Area 32

December 2009

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EXECUTIVE SUMMARY

This accelerated corrective action (ACA) work plan includes the proposed sampling and remediation activities for two solid waste management units (SWMUs) and two areas of concern (AOCs) in the Upper Los Alamos Canyon Aggregate Area at Los Alamos National Laboratory (the Laboratory). The sites are located south of NM 502 and within the Los Alamos townsite in former Technical Area 32 (TA-32). The objectives of this work plan are to (1) conduct limited soil removal to reduce potential risk at specific locations where residential screening levels have been exceeded and (2) collect samples to define the lateral and vertical extent of contamination, as recommended in the May 2009 investigation report. The work will be conducted under an ACA work plan because Los Alamos County plans to develop the area in the near future for commercial and/or residential use.

The Upper Los Alamos Canyon Aggregate Area was investigated in 2008–2009 according to the New Mexico Environment Department–approved investigation work plan and the results reported in the investigation report for the Upper Los Alamos Canyon Aggregate Area. The investigation report concluded that the extent of site contamination had not been defined for SWMUs 32-002(a) and 32-002(b) and for AOC 32-003. Additional sampling is proposed to define the extent of contamination at these sites, and limited soil removal is proposed to remove elevated concentrations of metals and polychlorinated biphenyls at SWMU 32-002(a) and AOC 32-003. Although nature and extent were defined at AOC 32-004, there are potential unacceptable risks to human health under the industrial and residential scenarios, based on the results of samples collected in 1996 that had substantially higher concentrations of polycyclic aromatic hydrocarbons than more recently collected samples. Additional samples are proposed to verify the 1996 sampling results.

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1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility located in north-central New Mexico, approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory site covers 40 mi^2 of the Pajarito Plateau, which consists of a series of fingerlike mesas separated by deep canyons containing perennial and intermittent streams running from west to east. Mesa tops range in elevation from approximately 6200 to 7800 ft above sea level.

The Laboratory's Environmental Programs (EP) Directorate, which includes the former Environmental Restoration Project, is participating in a national effort by the U.S. Department of Energy (DOE) to clean up sites and facilities previously involved in weapons research and development. The goal of EP is to ensure past operations do not threaten human or environmental health and safety in and around Los Alamos County, New Mexico. To achieve this goal, EP 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).

This accelerated corrective action (ACA) work plan addresses four sites in former Technical Area 32 (TA-32) within the Upper Los Alamos Canyon Aggregate Area (Figure 1.0-1). These sites, SWMUs 32-002(a) and 32-002(b) and AOCs 32-003 and 32-004, are potentially contaminated with hazardous chemicals. Corrective actions at the Laboratory are subject to the March 1, 2005, Compliance Order on Consent (the Consent Order). Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to the New Mexico Environment Department (NMED) in accordance with DOE policy. The work will be conducted under an ACA work plan because Los Alamos County plans to develop the area for commercial and residential use in the near future.

1.1 General Site Information

Former TA-32 is part of the Upper Los Alamos Canyon Aggregate Area and was evaluated according to the approved investigation work plan (LANL 2006, 091916; NMED 2006, 095460). Sampling at former TA-32 occurred in 2008–2009, and the data were reported in the investigation report (LANL 2009, 106597).

Former TA-32 was a small medical research facility consisting of three laboratories, an office building, a warehouse, a valve house, and a transformer station. The site of former TA-32 is located within the townsite of Los Alamos, approximately 400 ft east of Knecht Street and 400 ft south of Trinity Drive. Various Los Alamos County buildings and operations now occupy the area, and DOE owns the land south of the mesa top.

1.2 ACA Investigation Objectives

The objectives of the ACA are to (1) conduct limited soil removal to reduce potential risk at specific locations where residential screening levels were exceeded and (2) collect samples at the sites to define the lateral and/or vertical extent of contamination, as recommended in the investigation report (LANL 2009, 106597). The proposed ACA is consistent with the overall corrective action objectives of the Consent Order because it will finalize determination of the extent of contamination and eliminate the potential for unacceptable risk resulting from past Laboratory activities.

1.3 Conceptual Site Model

The sampling proposed in this work plan uses a conceptual site model to predict areas of potential contamination and allow for adequate characterization of these areas. A conceptual site model describes potential contaminant sources, transport mechanisms, and receptors.

1.3.1 Potential Contaminant Sources

Releases at the sites may have occurred as a result of past Laboratory operations. Previous sampling results indicated that inorganic chemicals above background and organic chemicals are present. Further sampling and/or remediation is necessary to determine the extent of contamination and to remove contaminated soil. Based on the nature and extent of contamination, as described in the investigation report (LANL 2009, 106597), the releases from the drainlines were of limited volume.

Other potential contaminant sources include the activities conducted at the site from 1954 to present. Los Alamos County uses the site to store equipment and materials for road work and maintenance, which may include the use of solvents, lubricants, and fuels. Asphalt and other materials are staged at the site, which is almost entirely paved. There is abundant staining on the ground.

1.3.2 Potential Contaminant Transport Mechanisms

Potential transport mechanisms that may lead to exposure of potential receptors include

- vaporization, gaseous diffusion, and advection of volatile organic compounds (VOCs),
- dissolution and/or particulate transport of surface contaminants during precipitation and runoff events,
- airborne transport of contaminated surface soil,
- continued dissolution and advective/dispersive transport of chemical contaminants contained in subsurface soil and bedrock, and
- disturbance and uptake of contaminants in shallow soil by plants and animals.

1.3.3 Current and Future Contaminant Potential Receptors

Potential receptors of possible contaminants include

- site and construction workers,
- potential residents, and
- plants and animals both on-site and in areas immediately surrounding the sites.

2.0 BACKGROUND OF FORMER TA-32

Former TA-32 was occupied by the medical research facility in 1944, and after the research group expanded, operations were moved in 1953 to TA-43. All the structures at former TA-32 were removed after 1954. The mesa-top portion of TA-32 is owned by Los Alamos County and is almost entirely covered by asphalt. The area is used to store equipment and materials for road work and maintenance. Maintenance activities may include using solvents, lubricants, and fuels; emptying of street sweeper contents until they are moved to a disposal facility; staging of asphalt, road salt, and other materials; and cleaning vehicles.

The five sites addressed in this ACA work plan are shown on Figure 2.0-1 and include four sites investigated in 2008 and 2009. The corrective actions at the fifth site (SWMU 32-001) have been completed, and the results are reported in the investigation report (LANL 2009, 106597).

2.1 Operational History and Historical Releases

The septic system (structure 32-07) [SWMU 32-002(a)] received waste from building 32-01 and discharged to Los Alamos Canyon. Research activities at the site involved plutonium-238, plutonium-239, americium-241, and carbon-14. Inorganic and organic chemicals also may have been used at the facility. The laboratory (building 32-01) operated from 1944 to 1953 and was decommissioned in 1954. The septic tank was removed, but no historical records are available on removal date or disposition of the tank. The drainline was removed in 1996.

The septic system (structure 32-08) [SWMU 32-002(b)] was installed when the SWMU 32-002(a) septic system could no longer meet the usage requirement of the laboratory (building 32-01). The influent line of SWMU 32-002(a) was diverted to the septic tank of SWMU 32-002(b), which also received effluent from building 32-02, the medical research annex. The outfall of SWMU 32-002(b) was at the edge of Los Alamos Canyon. The septic tank was removed in 1988, and the drainline was removed in 1996.

Research activities at building 32-01 involved radionuclides. Inorganic and organic chemicals may also have been used. Because no industrial waste line served former TA-32, it is possible chemical and radioactive wastes may have been disposed of in sinks and drains connected to the septic systems at SWMUs 32-002(a) and 32-002(b).

The location of the former transformer station (structure 32-10) (AOC 32-003) was discovered during the 1993 Phase I Resource Conservation and Recovery (RCRA) facility investigation (RFI) (LANL 1995, 048944). Three transformers sat on a wooden platform on poles, approximately 20 ft aboveground (LASL 1948, 091749). Phase I RFI analytical results from samples collected in the immediate area indicated polychlorinated biphenyl (PCB) contamination (LANL 1995, 048944, p. 34).

The drainline and outfall (AOC 32-004) served building 32-03, an office building, and discharged directly to Los Alamos Canyon without passing through a septic tank. Building 32-03 included a vault room where a radioactive source was stored. The drainline of AOC 32-004 led directly to an outfall at the edge of the mesa without passing through a septic tank.

2.2 Previous Investigations

A Phase I RFI was conducted at former TA-32 in 1993 (LANL 1995, 048944). Samples were collected at SWMUs 32-001, 32-002(a), and 32-002(b) and AOC 32-003 and analyzed at on-site laboratories or could not be validated because the documentation was insufficient. Data from the 1993 investigation are considered screening-level data. During the Phase I RFI, it was also discovered that the previously identified location of SWMU 32-002(a), where samples had been collected, was incorrect, and further investigation was recommended. AOC 32-004 was discovered during the 1993 investigation.

A Phase II RFI and voluntary corrective action (VCA)were conducted at former TA-32 in 1996 (LANL 1996, 059178). Drainlines of SWMU 32-002(a) and SWMU 32-002(b) were removed, and part of the drainline of AOC 32-004 was also removed. Remedial activities included excavation of contaminated soil at SWMUs 32-002(a) and 32-002(b) and AOC 32-003. Samples collected at all five sites were analyzed at off-site laboratories for various combinations of the following: metals, semivolatile organic compounds (SVOCs), VOCs, americium-241, gamma-emitting radionuclides, isotopic plutonium, isotopic uranium, and tritium.

2.3 Results of Previous Investigations

The results of previous investigations were presented in the historical investigation report for the Upper Los Alamos Canyon Aggregate Area (LANL 2006, 091915) and in the investigation report (LANL 2009, 106597). The nature of contamination at former TA-32 is defined by the analytical results of previous investigations.

At SWMU 32-002(a), the lateral and vertical extent of the inorganic, organic, and radionuclide chemicals of potential concern (COPCs) are defined, except for the vertical extent of barium, chromium, and nickel. Additional sampling is needed to define the vertical extent of barium, chromium, and nickel contamination. In addition, concentrations of lead (maximum 530 mg/kg) and arsenic (maximum 13 mg/kg) exceed the residential soil screening levels (SSLs) at one location, warranting limited soil removal.

At SWMU 32-002(b), the lateral and vertical extent of the inorganic, organic, and radionuclide COPCs are defined, except for the vertical extent of barium, chromium, and nickel. Additional sampling is needed to define the vertical extent of barium, chromium, and nickel contamination.

At AOC 32-003, the lateral and vertical extent of the inorganic and organic COPCs are defined, except for the vertical extent of chromium and nickel, the lateral extent of Aroclor-1260 to the east, and the lateral extent of polycyclic aromatic hydrocarbons (PAHs) to the east, south, and west. Additional sampling is needed to define the extent of contamination of these COPCs. Concentrations of Aroclor-1260 (maximum 26 mg/kg) also exceeded the residential SSL at one location, warranting limited soil removal.

At AOC 32-004, the lateral and vertical extent of COPCs are defined, and there are no potential unacceptable risks or doses to human health under the construction worker scenario. However, there are potential unacceptable risks to human health under the industrial and residential scenarios. Most of the excess risk is from benzo(a)pyrene detected above SSLs in samples collected in 1996 from multiple locations; these locations are under pavement or receive runoff from the adjacent pavement. Additional sampling is needed to determine whether the results from the 1996 sampling are representative of current site conditions, and if so, the soil will be remediated.

3.0 SCOPE OF ACTIVITIES

3.1 Proposed Remediation and Sampling at SWMU 32-002(a)

The vertical extent of barium is not defined at locations 00-603582 and 00-603585 because concentrations increase with depth. An additional sample will be collected from each location and analyzed for target analyte list (TAL) metals. At location 00-603582, the sample will be collected from 7–8 ft below ground surface (bgs), and at location 00-603585 the sample will be collected from 3–4 ft bgs (Figure 3.1-1 and Table 3.1-1). Originally, the deepest intervals were 6–7 ft bgs and 2–3 ft bgs, respectively.

The vertical extent of chromium and nickel are not defined at locations 00-603580, 00-603581, 00-603583, and 00-603585, because concentrations increase with depth. An additional sample will be collected from each location and analyzed for TAL metals. At location 00-603580, the sample will be collected from 6–7 ft bgs; at location 00-603581 the sample will be collected from 7–8 ft bgs; at location 00-603583 the sample will be collected from 10–11 ft bgs; and at location 00-603585 the sample will be collected from 4–5 ft bgs (Figure 3.1-1 and Table 3.1-1). Originally, the deepest intervals sampled were 4–5 ft bgs, 5–6 ft bgs, 8.5–9.5 ft bgs, and 2–3 ft bgs, respectively.

The concentrations of lead and arsenic exceeded the residential SSL in the surface sample (0–0.5 ft) at location 32-06373. Cleanup at location 32-06373 will be to residential levels and will meet residential risk goals. Material will be removed from an area up to, but not including, the closest adjacent sampling locations. The depth of the excavation will be approximately 2 ft bgs. One or two locations within the excavation (depending on the size of the excavation) will be sampled at depths of 2–3 ft bgs and 4–5 ft bgs and analyzed for TAL metals to confirm elevated lead and arsenic have been removed. In addition, a sample will be collected from the north and east sidewalls of the excavation from an approximate vertical depth of 4–5 ft bgs and analyzed for TAL metals (Figure 3.1-1 and Table 3.1-1).

Samples were collected from only one depth (0–0.5 ft) at four locations in 1996. Deeper samples will be collected and analyzed for TAL metals at the following locations: 32-06367 (5–6 ft), 32-06368 (5–6 ft), 32-06370 (5–6 ft), and 32-06372 (4–5 ft) (Figure 3.1-1 and Table 3.1-1). Only metals will be analyzed because the nature and extent of organic and radionuclide COPCs have been defined at the site (LANL 2009, 106597, p. F-137).

3.2 Proposed Sampling at SWMU 32-002(b)

The vertical extent has not been defined for barium at locations 00-603589 and 00-603595. The vertical extent has not been defined for chromium and nickel at locations 00-603590, 00-603591, 00-603592, and 00-603594. Deeper samples will be collected and analyzed for TAL metals at each of the following locations: 00-603589 (7–8 ft), 00-603595 (5–6 ft), 00-603590 (9–10 ft), 00-603591 (9–10 ft), 00-603592 (7–8 ft), and 00-603594 (8–9 ft) to define vertical extent (Figure 3.2-1 and Table 3.2-1). Originally, the deepest intervals sampled were 5.5–6.5 ft bgs, 3.2–4.2 ft bgs, 7.5–8.5 ft bgs, 7.5–8.5 ft bgs, 5.5–6.5 ft bgs, and 6.5–7.5 ft bgs, respectively.

3.3 Proposed Remediation and Sampling at AOC 32-003

Concentrations of Aroclor-1260 increase with depth at location 00-603608 from 0.051 mg/kg (1.5–2.0 ft) to 0.26 mg/kg (3.0–3.5 ft). Deeper samples will be collected at location 00-603608 from 4–4.5 ft bgs to define the vertical extent of Aroclor-1260 (Figure 3.3-1 and Table 3.3-1).

Contaminated soil at location 00-603601 will be removed because the concentration of Aroclor-1260 (26 mg/kg at 0–1 ft) is above the industrial and residential SSLs (8.26 mg/kg and 1.7 mg/kg, respectively). Cleanup at location 32-603601 will be to residential levels and will meet residential risk goals. Following soil removal, confirmatory samples will be collected from the north, south, and east walls of the excavation at a depth of 0.5–1.0 ft bgs. The west wall will not be sampled because it consists of fill from the previous excavation conducted in 1996. A confirmatory sample from the bottom of the excavation is not necessary because sample RE00-08-15206 (2.0–2.5 ft bgs) at location 00-603601 reported a concentration of 0.088 mg/kg. PCB test kits will be used to aid in determining the amount of material to be removed. If the PCB test kit shows a concentration greater than 1 mg/kg, additional soil will be removed approximately 1 ft at a time until screening results indicate the concentration is less than 1 mg/kg (Figure 3.3-1 and Table 3.3-1).

The lateral extent has not been defined for PAHs and Aroclor-1260. Additional samples will be collected to the east, west, and south of the former excavation to determine the lateral extent of PAHs and Aroclor-1260. Each sampling location will be approximately 20 ft from locations 00-603610, 00-603602, and 00-603603 and sampled at 0–1 ft and 2–2.5 ft depths (Figure 3.3-1 and Table 3.3-1).

The concentrations of chromium and nickel increase with depth at several locations. Deeper samples will be collected at the following locations and analyzed for TAL metals and hexavalent chromium: location 00-603601 (3–4 ft bgs); location 00-603605 (5.5–6.5 ft bgs); location 00-603606 (5–6 ft bgs); location 00-603609 (4–5 ft bgs); and location 00-603611 (5–6 ft bgs) (Figure 3.3-1 and Table 3.3-1). Originally, the deepest intervals sampled were 2–2.5 ft bgs, 4–5 ft bgs, 3.75–4.25 ft bgs, 3.25–3.75 ft bgs, and 3.75–4.25 ft bgs, respectively. The samples will be analyzed for hexavalent chromium to determine whether under the construction worker scenario it is appropriate to assume that the total chromium concentrations in existing samples can be attributed to hexavalent chromium.

3.4 Proposed Sampling at AOC 32-004

Samples collected in 1996 reported substantially higher concentrations of PAHs than more recent samples, and resulted in potential cancer risks above NMED's target risk level for the industrial and residential scenarios. Additional sampling is needed to determine whether historical data are representative of PAH concentrations at the site and to determine if soil removal is warranted to reduce the potential risk. Soil samples will be collected and analyzed for PAHs from the following locations: location 32-06340 (0–0.5 ft and 1–1.5 ft bgs), location 32-06338 (0–0.5 ft and 1–1.5 ft bgs), location 32-06326 (0–0.5 ft and 1–1.5 ft bgs), and location 32-06331 (1–1.5 ft bgs) (Figure 3.4-1 and Table 3.4-1). Further actions will be based on the results of this sampling.

3.5 Investigation-Derived Waste Management

Investigation-derived waste (IDW) generated as a result of field-investigation activities may include, but is not limited to, excavated soil, drill rig cuttings, personal protective equipment, and miscellaneous materials used during dry decontamination of sampling equipment (e.g., paper towels and nitrile gloves). The IDW generated during the ACA will be managed to protect human health and the environment; comply with applicable U.S. Environmental Protection Agency (EPA) and NMED regulations, DOE orders, and Laboratory implementation requirements; and adhere to Laboratory waste-minimization goals. The management of IDW is described in Appendix B of this work plan.

4.0 INVESTIGATION METHODS

The following sections describe the field methods to be used in implementing this work plan. Table 4.0-1 lists applicable standard operating procedures (SOPs). The most current versions of all SOPs will be used. The investigation methods for field activities are summarized in Table 4.0-2.

4.1 Excavation

Excavation will be completed using a standard backhoe. Excavations will be visually logged for evidence of nonnative materials, disturbed bedding horizons, and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Excavation will advance from the ground surface to remove material in lifts until the specified depth is reached.

Excavations will be backfilled with clean fill material obtained from an off-site source. All affected surfaces will be restored to the approximate original grade and condition and reseeded with a native seed mix as appropriate for unpaved areas. Any paved areas will be patched as appropriate after backfilling.

4.2 Geodetic Survey

A geodetic survey will be conducted with a Trimble 5700 (or equivalent) global positioning system to obtain coordinates of all sampling locations. The survey method is described in Table 4.0-2. The surveyed coordinates for all sampling locations will be uploaded into the EP geographic information system database and presented in the investigation report. Geodetic surveying will be performed in accordance with EP-ERSS-SOP-5028, Coordinating and Evaluating Geodetic Surveys (or a technically equivalent subcontractor procedure).

4.3 Collection of Soil and Rock Samples

Surface and shallow subsurface samples will be collected using a stainless-steel hand auger in accordance with SOP-06.10, Hand Auger and Thin-Wall Tube Sampler (or technically equivalent subcontractor procedure). Samples will be placed in a stainless-steel bowl and will be transferred using a stainless-steel spoon to sterile sample collection jars or bags for transport to the Sample Management Office (SMO).

Subsurface samples will be collected using a hollow-stem auger drill rig with a stainless-steel core barrel to retrieve material from the advancing hole, in accordance with SOP-06.26, Core Barrel Sampling for Subsurface Earth Materials (or technically equivalent subcontractor procedure). The drill rig may also be used to collect samples from depths and from areas where the hand-auger method meets refusal or is impractical. However, several of the proposed sampling locations will be inaccessible by drill rig and will require the use of hand-sampling methods. Regardless of sampling method, at least three attempts will be made to reach target sampling depths at a given location.

Quality assurance/quality control samples will include field duplicate samples collected in accordance with EP-ERSS-SOP-5059, Field Quality Control Samples. Field duplicate samples will be collected at a minimum rate of 1 per 10 regular samples. Rinsate blanks will also be collected at a minimum rate of 1 per 10 regular samples to confirm decontamination of sampling equipment. Field trip blank (FTB) samples will be collected with regular samples to be analyzed for VOCs at a minimum rate of one FTB per day and will be included when VOC samples are being collected.

4.4 Field Screening of Soil and Rock Samples

Although field-detectable VOC and radionuclide contamination is not expected based on historical TA-32 sampling results, field screening of samples will be used for health and safety purposes and for identifying unexpected conditions. If unexpected contamination is detected, the proposed sampling depths may be modified, or additional samples may be collected to characterize the site.

Samples collected by spade-and-scoop or hand-auger methods will be screened in the collection bowl or sample container soon after the samples are collected. Screening values will be recorded in the appropriate spaces on the corresponding sample collection logs at the time of sample collection. If field-screening results are used to change the planned sample interval or to collect additional samples, the modification will be recorded in the appropriate sample collection log. Field-screening instruments will be checked at least daily for proper operation and checked at least daily against calibration standards, as appropriate.

Although radionuclides are not expected to occur at concentrations that pose a risk to site workers based on the results of previous sampling, samples will be field screened for gross-alpha radiation using a Model 139 rate meter or equivalent and for beta/gamma radiation using an Eberline Smart Portable-1 or equivalent. Radiological field screening of all samples will be conducted by Laboratory radiological control

technicians (RCTs) using appropriately calibrated instruments. Calibration of radiological instruments will be performed and documented by the RCTs or the appropriate Laboratory organization.

Although VOCs are not expected to occur at concentrations that pose a risk to site workers based on the results of previous sampling, samples will be field screened for VOCs using a MiniRae 2000 (or equivalent) photoionization detector (PID) with an 11.7-electronvolt lamp. Calibration of the PIDs will be performed at least once each day during field activities. Daily calibration will be performed using a standard source of 100 parts per million isobutylene.

The PCB test kit will be used for the samples collected at AOC 32-003 to define the extent of the excavation.

4.5 Collection of Geotechnical Data

All characterization borings completed with a hollow-stem auger drill rig will be cored continuously to total depth and will be geologically logged in accordance with the following procedures:

- American Society for Testing and Materials (ASTM) D2487, “Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)”
- ASTM D2488, “Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)”
- Applicable Laboratory SOPs

Information to be logged includes the lithologically apparent moisture, structural features, and core recovery compared with the interval drilled. Graphical borehole logs will be recorded as drilling proceeds and will be included in the investigation report.

4.6 Boring Abandonment

All boreholes (0–20 ft) will be abandoned by placing bentonite chips, then hydrating the chips, in the hole up to 2–3 ft from the ground surface, followed by 2–3 ft of concrete or clean soil placed on top. Boring abandonment will be performed in accordance with EP-ERSS-SOP-5034, Monitor Well and RFI Borehole Abandonment (or a technically equivalent subcontractor procedure).

4.7 Equipment Decontamination

Project personnel will decontaminate all sampling equipment before each sample is collected to avoid cross-contamination. Residual material adhering to the equipment will be removed using dry decontamination methods, including wire-brushing and scraping, in accordance with EP-ERSS-SOP-5061, Field Decontamination of Equipment. If equipment cannot be free-released following dry decontamination, wet decontamination methods will be used. If wet decontamination is required, the equipment will be pressure-washed on a temporary wash pad covered with a high-density polyethylene liner. Cleaning solutions and wash water will be collected and contained for proper disposal. Decontamination solutions will be sampled and analyzed to determine final disposition of the wastewater and the effectiveness of the decontamination procedures. Equipment ready for demobilization will be surveyed by an RCT before it is released from the site.

5.0 MONITORING AND SAMPLING PROGRAM

Groundwater monitoring is currently performed in Los Alamos Canyon as part of the interim facility-wide groundwater monitoring plan (LANL 2008, 101897). No site-specific groundwater monitoring is proposed as part of the activities included in this work plan.

Stormwater monitoring at former TA-32 will be conducted under the National Pollutant Discharge Elimination System Individual Permit.

6.0 SCHEDULE

The date for submitting the work plan to NMED is December 21, 2009. Per the Consent Order, work will commence no less than 30 days after the work plan has been submitted to NMED. The proposed activities are estimated to take 60 days. The TA-32 remedy completion report must be submitted to NMED 90 days after the ACA is completed. Based on this schedule, the remedy completion report will be submitted to NMED by June 20, 2010.

7.0 REFERENCES AND MAP DATA SOURCES

7.1 References

The following list includes all documents cited in this work plan. Parenthetical information following each reference provides the author(s), publication date, and ER ID. This information is also included in text citations. ER IDs 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 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), June 30, 1995. "RFI Report for Potential Release Sites 32-001, 32-002(a), 32-002(b), 32-003, 32-004," Los Alamos National Laboratory document LA-UR-95-2231, Los Alamos, New Mexico. (LANL 1995, 048944)

LANL (Los Alamos National Laboratory), September 1996. "Phase II and Voluntary Corrective Action Report for Potential Release Sites at TA-32: 32-001, Former Incinerator; 32-002(a,b), Former Septic Systems; 32-003, Former Transformer; 32-004, Former Radioactive Source Vault, Drain Line, and Outfall," Los Alamos National Laboratory document LA-UR-96-3128, Los Alamos, New Mexico. (LANL 1996, 059178)

LANL (Los Alamos National Laboratory), April 2006. "Investigation Work Plan for Upper Los Alamos Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-06-2464, Los Alamos, New Mexico. (LANL 2006, 091916)

LANL (Los Alamos National Laboratory), April 2006. "Historical Investigation Report for Upper Los Alamos Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-06-2465, Los Alamos, New Mexico. (LANL 2006, 091915)

LANL (Los Alamos National Laboratory), May 2008. "2008 Interim Facility-Wide Groundwater Monitoring Plan," Los Alamos National Laboratory document LA-UR-08-3273, Los Alamos, New Mexico. (LANL 2008, 101897)

LANL (Los Alamos National Laboratory), May 2009. "Investigation Report for Upper Los Alamos Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-09-3325, Los Alamos, New Mexico. (LANL 2009, 106597)

LASL (Los Alamos Scientific Laboratory), April 9, 1948. "The TA-32-2 MRL-2 Electrical Plan and Details, Medical Research Annex," Engineering Drawing A5-C117, 4/14/48, Los Alamos, New Mexico. (LASL 1948, 091749)

NMED (New Mexico Environment Department), November 6, 2006. "Approval of the Investigation Work Plan, Upper Los Alamos Canyon Aggregate Area," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2006, 095460)

7.2 Map Data Sources

Boundaries - Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published 04 December 2008.

Building drainlines - Former Structures of the Los Alamos Site, Line Feature Representation; Los Alamos National Laboratory, Environment and Remediation Support Services Division, EP2007-0566; 1:2,500 Scale Data; 16 April 2008.

Hypsography - Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; 1991.

Point Feature Locations of the ER Project Database - Los Alamos National Laboratory, Waste and Environmental Services Division; April 2009.

Potential Release Sites - Los Alamos National Laboratory, Waste and Environmental Services Division, Environmental Data and Analysis Group, EP2009-0137; 1:2,500 Scale Data; 13 March 2009.

Structures - County of Los Alamos, Information Services; as published 29 October 2007. Former Structures of the Los Alamos Site; Los Alamos National Laboratory, Waste and Environmental Services Division, EP2008-0441; 1:2,500 Scale Data; 08 August 2008.

Utilities - Sewer Line System Maintained by the County of Los Alamos; County of Los Alamos, Information Services; as published 04 March 2009. Water Utility Distribution System Maintained by the County of Los Alamos; County of Los Alamos, Information Services; as published 04 March 2009.

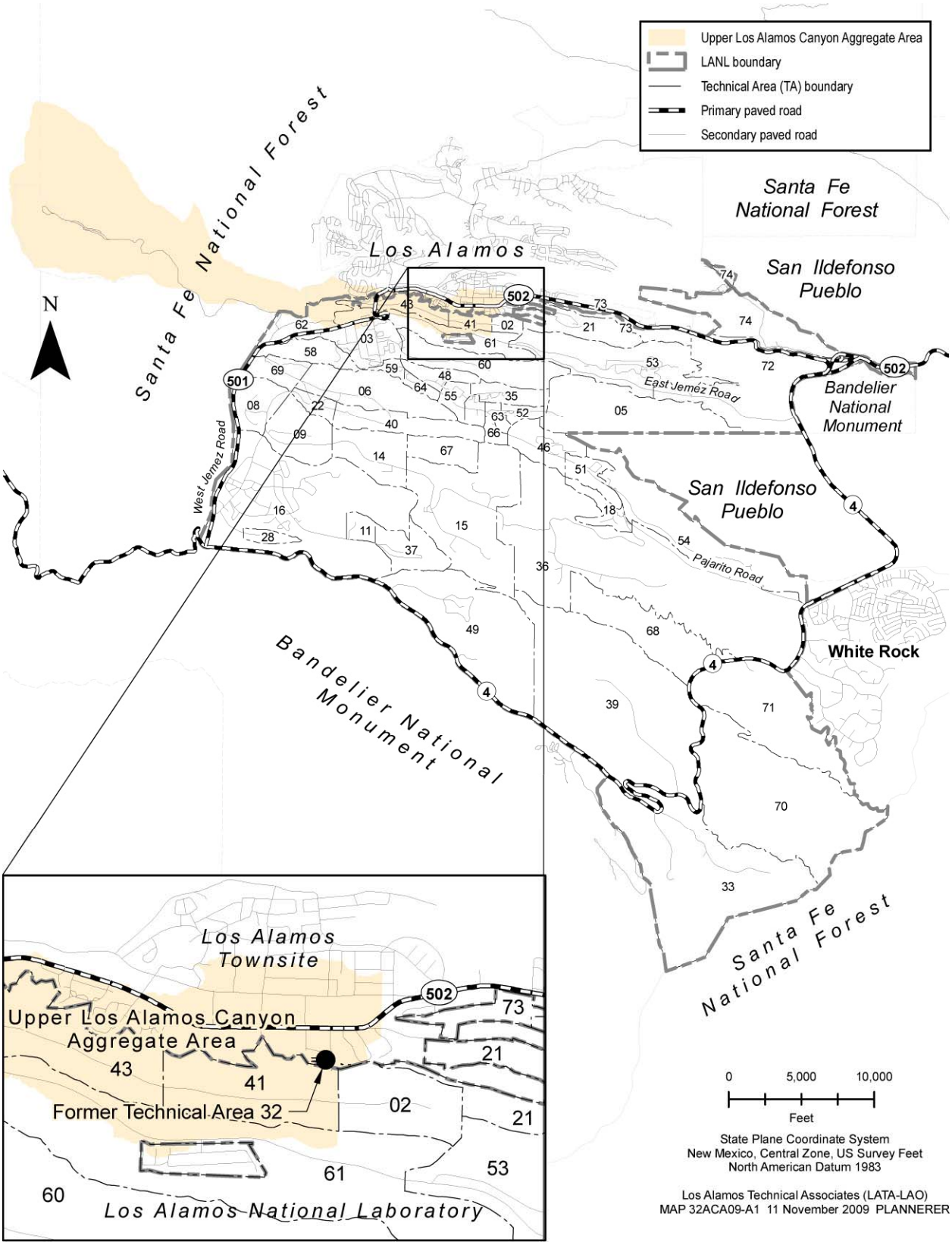

Figure 1.0-1 Location of former TA-32 within the Upper Los Alamos Canyon Aggregate Area

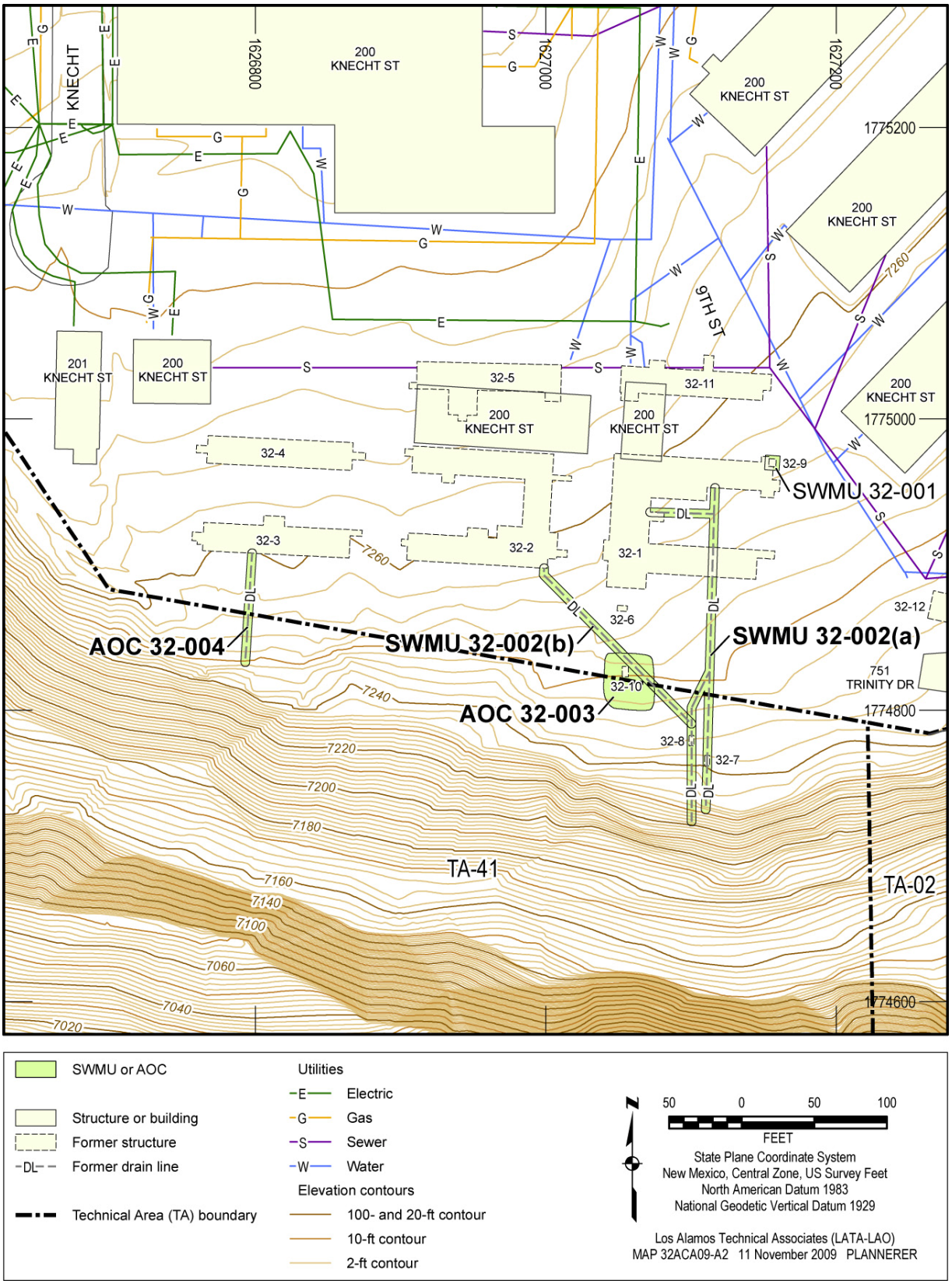

Figure 2.0-1 Site map of former TA-32

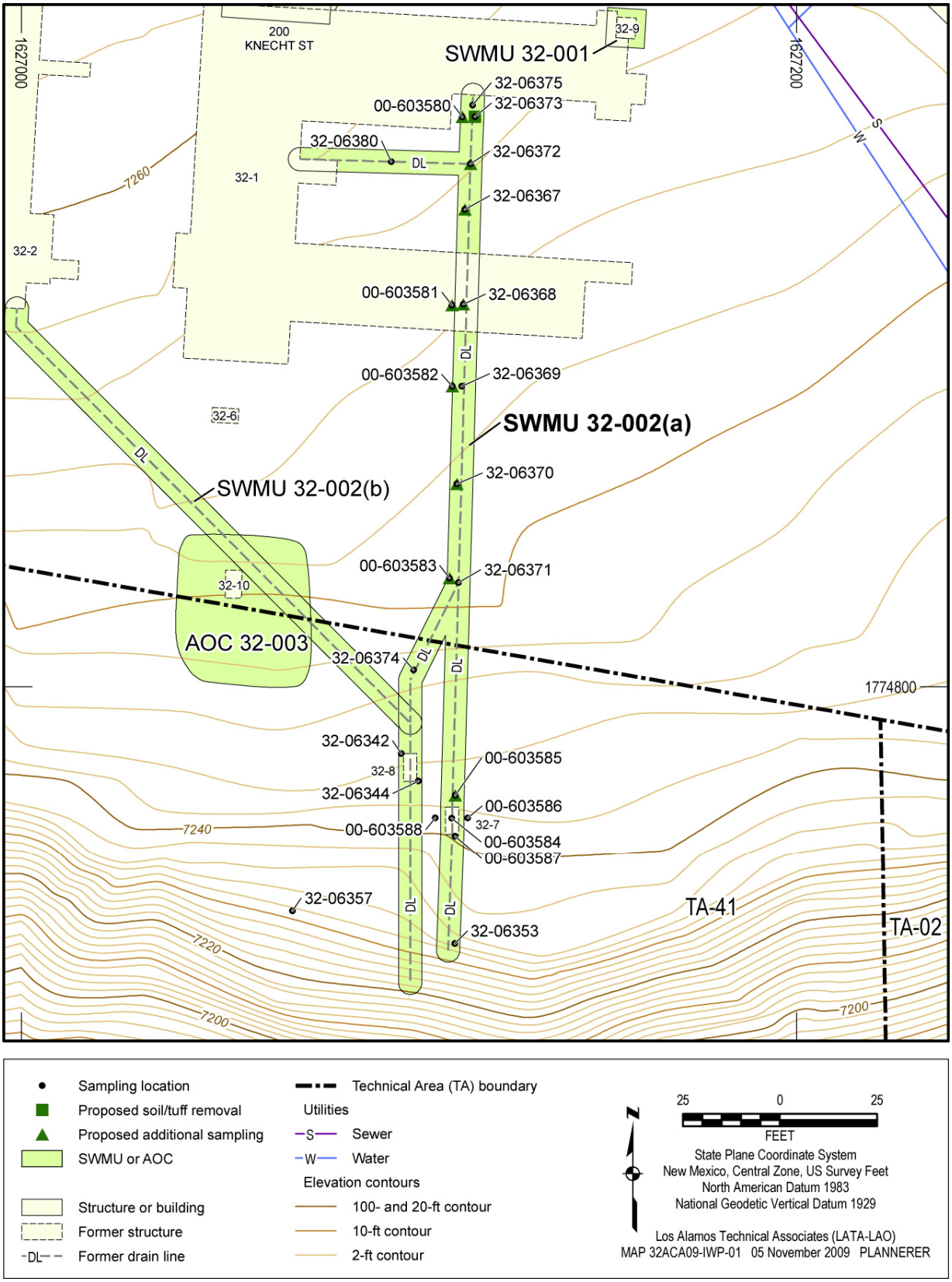

Figure 3.1-1 Proposed remediation and sampling locations at SWMU 32-002(a)

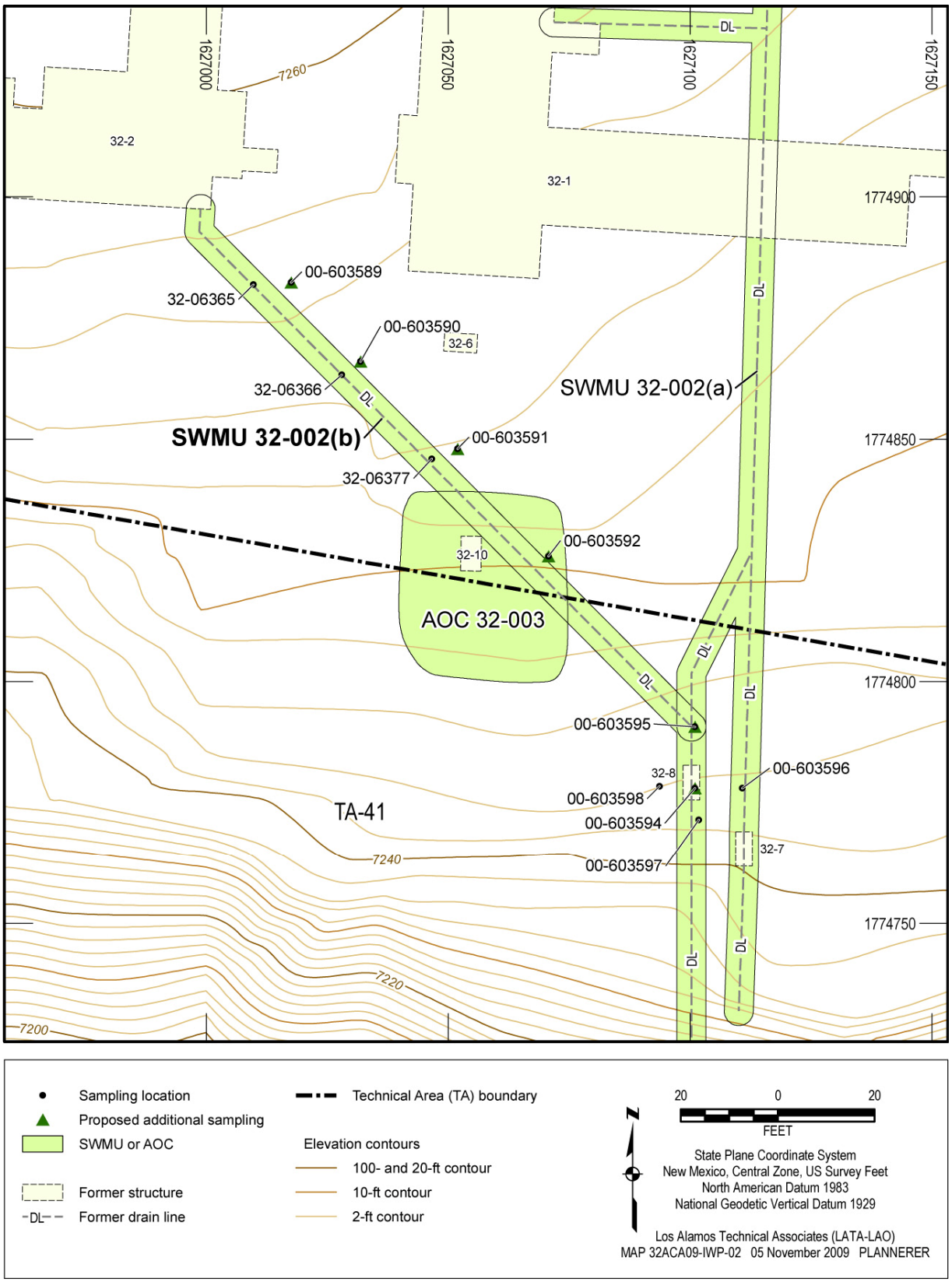

Figure 3.2-1 Proposed sampling locations at SWMU 32-002(b)

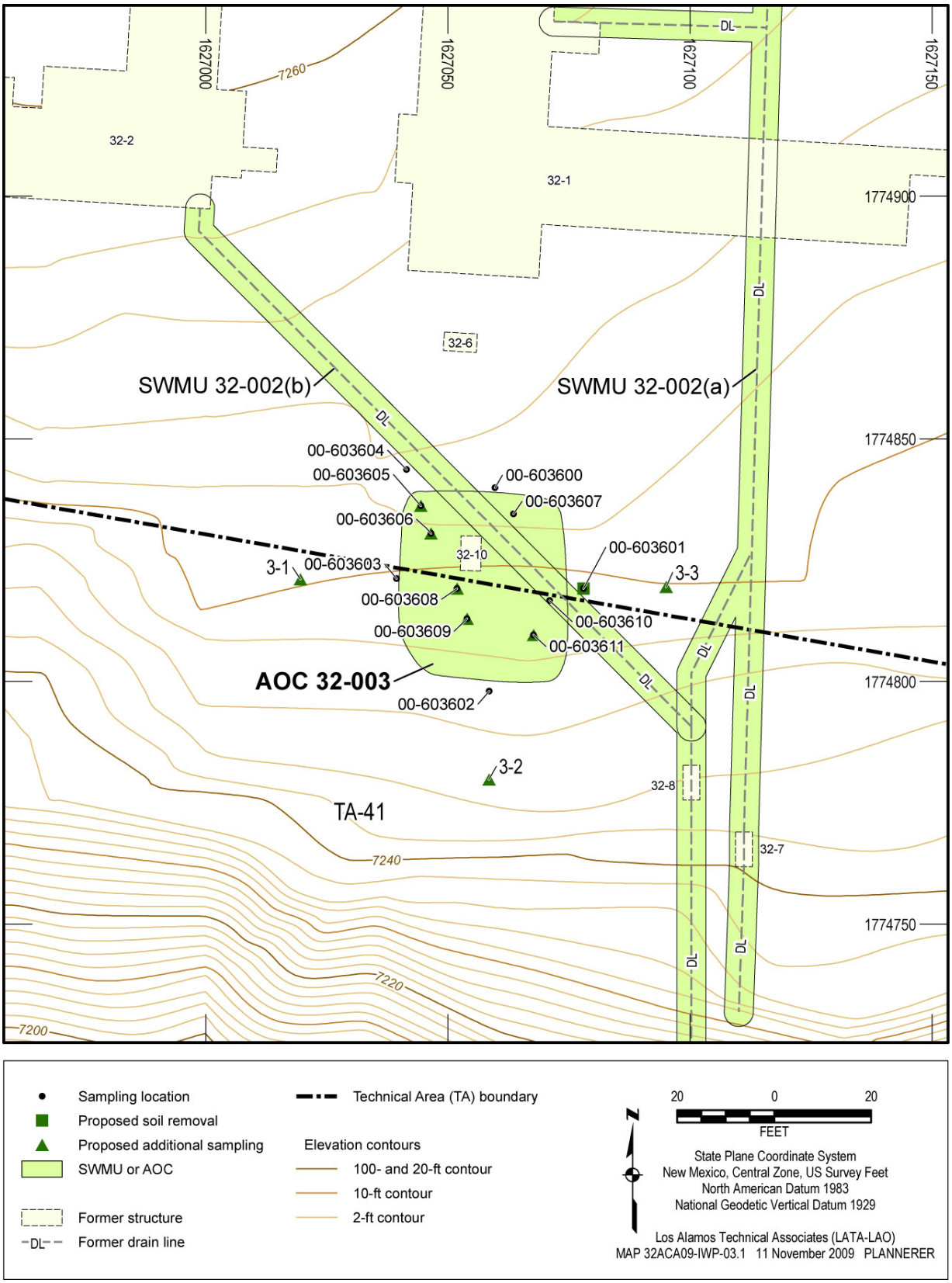

Figure 3.3-1 Proposed remediation and sampling locations at AOC 32-003

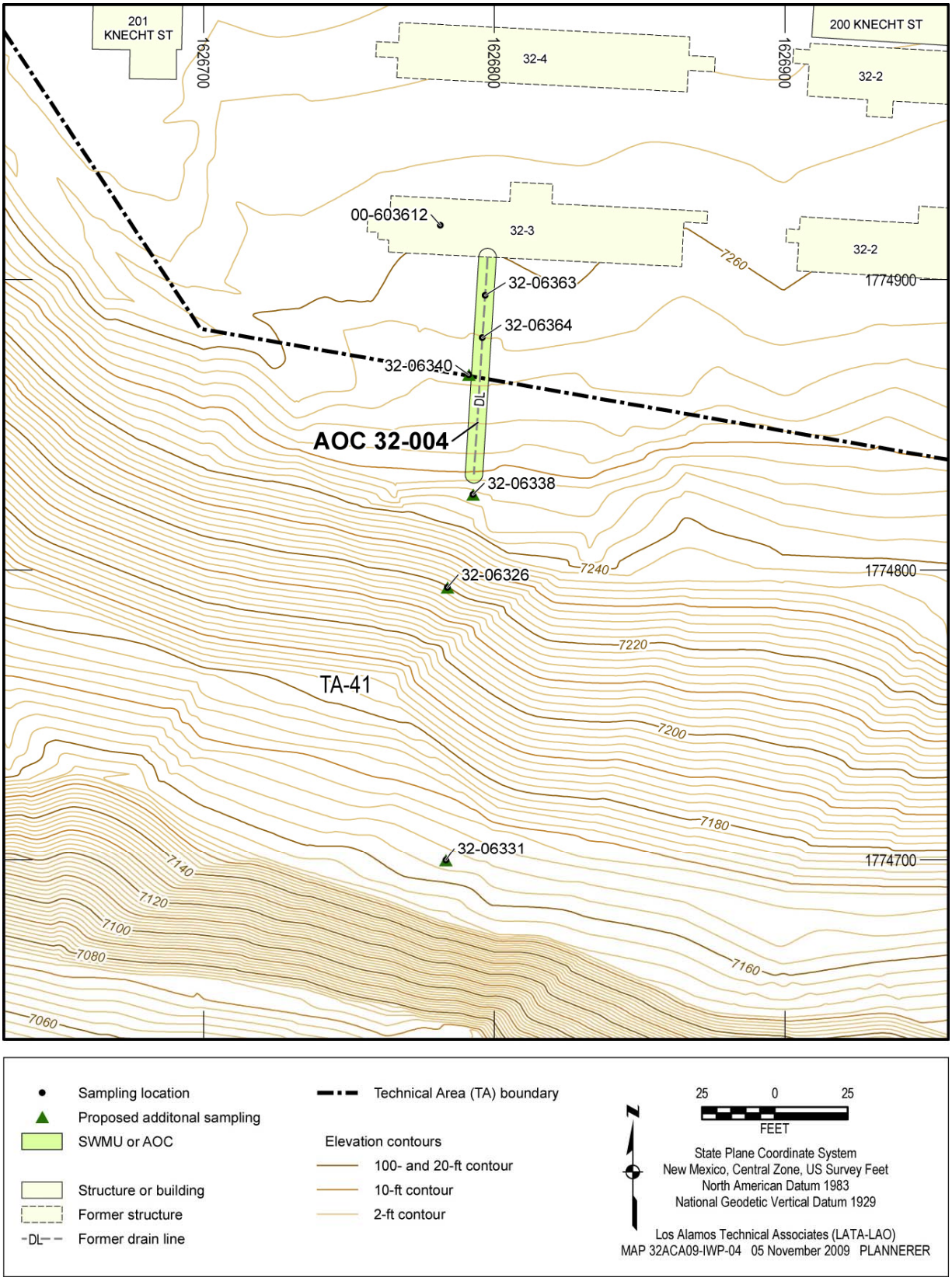

Figure 3.4-1 Proposed sampling locations at AOC 32-004

Table 1.1-1
Sites under ACA in Upper Los Alamos Canyon Aggregate Area

SWMU/AOC	Site Description	Associated Structure or Facility	Previous Investigation	COPCs to be Addressed
Former TA-32				
SWMU 32-002(a)	Septic tank received waste from a laboratory	Septic tank (structure 32-07) and laboratory building 32-01	1993 Phase I RFI 1996 Phase II RFI and VCA 2008–2009 Sampling	Metals
SWMU 32-002(b)	Septic tank	Septic tank (structure 32-08) and buildings 32-01 and 32-02	1993 Phase I RFI 1996 Phase II RFI and VCA 2008–2009 Sampling	Metals
AOC 32-003	Former transformer station	Transformer station (structure 32-10)	1993 Phase I RFI 1996 Phase II RFI and VCA 2008–2009 Sampling	Metals, PCBs, PAHs
AOC 32-004	Former drainline and outfall	Building 32-03	1993 Phase I RFI 1996 Phase II RFI and VCA 2008–2009 Sampling	PAHs

Table 3.1-1
Proposed Remediation and Sampling at SWMU 32-002(a)

Objective Addressed	Location	Sample Depth (ft)	TAL Metals
Determine vertical extent of barium	Previous location 00-603582	7–8	X*
Determine vertical extent of barium	Previous location 00-603585	3–4	X
Vertical extent of chromium and nickel are not defined at location 00-603580	Previous location 00-603580	6–7	X
Vertical extent of chromium and nickel are not defined at location 00-603581	Previous location 00-603581	7–8	X
Vertical extent of chromium and nickel are not defined at location 00-603583	Previous location 00-603583	10–11	X
Vertical extent of chromium and nickel are not defined at location 00-603585	Previous location 00-603583	4–5	X
Remove elevated arsenic and lead at location 32-06373	Bottom of excavation	2–3 4–5	X X
Remove elevated arsenic and lead at location 32-06373	Bottom of excavation if necessary	2–3 4–5	X X
Remove elevated arsenic and lead at location 32-06373	North sidewall of the excavation	~4–5	X
Remove elevated arsenic and lead at location 32-06373	East sidewall of the excavation	~4–5	X
Determine vertical extent of TAL metals	Previous location 32-06367	5–6	X
Determine vertical extent of TAL metals	Previous location 32-06368	5–6	X
Determine vertical extent of TAL metals	Previous location 32-06370	5–6	X
Determine vertical extent of TAL metals	Previous location 32-06372	4–5	X

*X = This sample analysis will be requested.

Table 3.2-1
Proposed Sampling at SWMU 32-002(b)

Objective Addressed	Location	Sample Depth (ft)	TAL Metals
Determine vertical extent of barium	Previous location 00-603589	7–8	X*
Determine vertical extent of barium	Previous location 00-603595	5–6	X
Determine vertical extent of chromium and nickel	Previous location 00-603590	9–10	X
Determine vertical extent of chromium and nickel	Previous location 00-603591	9–10	X
Determine vertical extent of chromium and nickel	Previous location 00-603592	7–8	X
Determine vertical extent of chromium and nickel	Previous location 00-603594	8–9	X

* X = This sample analysis will be requested.

Table 3.3-1
Proposed Remediation and Sampling at AOC 32-003

Objective Addressed	Location	Sample Depth (ft)	PAHs	PCBs	TAL Metals	Hexavalent Chromium
Determine lateral extent of PAHs and PCBs	20 ft west of the former excavation	0–1 2–2.5	X[a] X	X X	—[b] —	— —
Determine lateral extent of PAHs and PCBs	20 ft south of the former excavation	0–1 2–2.5	X X	X X	— —	— —
Determine lateral extent of PAHs and PCBs	20 ft east of the former excavation	0–1 2–2.5	X X	X X	— —	— —
Determine vertical extent of Aroclor-1260	Previous location 00-603608	4–4.5	—	X	—	—
Remove elevated Aroclor-1260	Confirmatory sample from the north wall of the excavation	0.5–1	—	X	—	—
Remove elevated Aroclor-1260	Confirmatory sample from the south wall of the excavation	0.5–1	—	X	—	—
Remove elevated Aroclor-1260	Confirmatory sample from the east wall of the excavation	0.5–1	—	X	—	—
Determine vertical extent of chromium and nickel	Previous location 00-603601	3–4	—	—	X	X
Determine vertical extent of chromium and nickel	Previous location 00-603605	5.5–6.5	—	—	X	X
Determine vertical extent of chromium and nickel	Previous location 00-603606	5–6	—	—	X	X
Determine vertical extent of chromium and nickel	Previous location 00-603609	4–5	—	—	X	X
Determine vertical extent of chromium and nickel	Previous location 00-603611	5–6	—	—	X	X
Remove elevated chromium	Bottom of excavation	4.5–5	—	—	X	—
Remove elevated chromium	North wall of excavation	4.0	—	—	X	—
Remove elevated chromium	East wall of excavation	4.0	—	—	X	—
Remove elevated chromium	South wall of excavation	4.0	—	—	X	—
Remove elevated chromium	West wall of excavation	4.0	—	—	X	—

[a] X = This sample analysis will be requested.
[b] — = This sample analysis will not be requested.

Table 3.4-1
Proposed Sampling at AOC 32-004

Objective Addressed	Location	Sample Depth (ft)	PAHs
Verify PAH concentrations	Previous location 32-06340	0–0.5 1–1.5	X* X
Verify PAH concentrations	Previous location 32-06338	0–0.5 1–1.5	X X
Verify PAH concentrations	Previous location 32-06326	0–0.5 1–1.5	X X
Verify PAH concentrations	Previous location 32-06331	0–0.5 1–1.5	X X

*X = This sample analysis will be requested.

Table 4.0-1
Quality Procedures and SOPs

EP-DIR-QAP-0001, Quality Assurance Plan for the Environmental Programs
EP-DIR-SOP-2011, Personnel Training and Qualification
EP-DIR-SOP-4001, Document Control
EP-DIR-SOP-4002, Document Development
EP-DIR-SOP-4003, Records Management
EP-DIR-SOP-4004, Records Transmittal and Retrieval Processes
EP-DIR-SOP-5006, Control of Measurement and Test Equipment
EP-ERSS-SOP-5238, Characterization and Management of Environmental Program Waste
EP-ERSS-SOP-5028, Coordinating and Evaluating Geodetic Surveys
EP-ERSS-SOP-5034, Monitor Well and RFI Borehole Abandonment
EP-ERSS-SOP-5055, General Instructions for Field Investigations
EP-ERSS-SOP-5056, Sample Containers and Preservation
EP-ERSS-SOP-5057, Handling, Packaging, and Transporting Field Samples
EP-ERSS-SOP-5058, Sample Control and Field Documentation
EP-ERSS-SOP-5059, Field Quality Control Samples
EP-ERSS-SOP-5061, Field Decontamination of Equipment
EP-ERSS-SOP-5181, Notebook Documentation for WES Technical Field Activities
SOP-01.12, Field Site Closeout Checklist
SOP-01.13, Initiating and Managing Data Set Requests
SOP-06.09, Spade and Scoop Method for Collection of Soil Samples
SOP-06.10, Hand Auger and Thin-Wall Tube Sampler
SOP-06.26, Core Barrel Sampling for Subsurface Earth Materials
SOP-06.33, Headspace Vapor Screening with a Photoionization Detector
SOP-12.01, Field Logging, Handling, and Documentation of Borehole Materials

Notes: These procedures are available at http://www.lanl.gov/environment/all/qa/adep.shtml. Technically equivalent subcontractor procedures may be used if required by subcontract.

Table 4.0-2
Summary of Investigation Methods

Method	Summary
Spade-and-Scoop Collection of Soil Samples	This method is typically used to collect shallow (i.e., approximately 0–1 ft) soil or sediment samples. The spade-and-scoop method involves digging a hole to the desired depth, as prescribed in the sampling and analysis plan, and collecting a discrete grab sample. The sample is typically placed in a clean stainless-steel bowl for transfer into various sample containers.
Hand-Auger Sampling	This method is typically used for sampling soil or sediment at depths of less than 10–15 ft but in some cases may be used to collect samples of weathered or nonwelded tuff. The method involves hand-turning a stainless-steel bucket auger (typically 3–4 in.-inside diameter [I.D.]), creating a vertical hole that can be advanced to the desired sampling depth. When the desired depth is reached, the auger is decontaminated before advancing the hole through the sample depth. The sample material is transferred from the auger bucket to a stainless-steel sampling bowl before filling the various required sample containers.
Split-Spoon Core-Barrel Sampling	In this method, a stainless-steel core barrel (typically 4 in. I.D. and 2.5 ft long) is advanced using a powered drilling rig. The core barrel extracts a continuous length of soil and/or rock that can be examined as a unit. The split-spoon core barrel is a cylindrical barrel split lengthwise so the two halves can be separated to expose the core sample. Once extracted, the section of core is typically screened for radioactivity and organic vapors, photographed, and described in a geologic log. A portion of the core may then be collected as a discrete sample from the desired depth.
Handling, Packaging, and Shipping of Samples	Field team members label samples before packing and ensure that the sample containers and the containers used for transport are free of external contamination. Field team members package all samples to minimize the possibility of breakage during transportation. After all environmental samples are collected, packaged, and preserved, a field team member transports them to the SMO, which arranges to ship the samples to analytical laboratories. The field team member must inform the SMO when levels of radioactivity are in the action-level or limited-quantity ranges.
Sample Control and Field Documentation	The collection, screening, and transport of samples are documented on standard forms generated by the SMO. These include sample collection logs (SCLs), chain-of-custody (COC) forms, and sample container labels. SCLs are completed at the time of sample collection and are signed by the sampler and a reviewer who verifies the logs for completeness and accuracy. Corresponding labels are applied to each sample container. COC forms are completed and assigned to verify that the samples are not left unattended.
Field Quality Control Samples	Field quality control samples are collected as directed in the Consent Order as follows: *Field duplicate*: At a frequency of 10%; collected at the same time as a regular sample and submitted for the same analyses. *Equipment rinsate blank*: At a frequency of 10%; collected by rinsing sampling equipment with deionized water, which is collected in a sample container and submitted for laboratory analysis. *Trip blanks*: Required for all field events that include the collection of samples for VOC analysis. For soil/tuff/sediment sampling, trip blank containers of certified clean sand are opened and kept with the other sample containers during the sampling process.

Table 4.0-2 (continued)

Method	Summary
Field Decontamination of Drilling and Sampling Equipment	Dry decontamination is the preferred method to minimize the generation of liquid waste. Dry decontamination may include the use of a wire brush or other tool to remove soil or other material adhering to the sampling equipment, followed by use of Fantastik and paper wipes. Dry decontamination may be followed by wet decontamination if necessary. Wet decontamination may include washing with a nonphosphate detergent and water, followed by a water rinse and a second rinse with deionized water. Alternatively, steam cleaning may be used.
Containers and Preservation of Samples	Specific requirements/processes for sample containers, preservation techniques, and holding times are based on EPA guidance for environmental sampling, preservation, and quality assurance. Specific requirements for each sample are printed on SCLs provided by the SMO (size and type of container [i.e., glass, amber glass, polyethylene, preservative]). Soil/tuff/sediment samples are preserved by placing them in insulated containers with ice to maintain a temperature of 4°C. Other requirements such as nitric acid or other preservatives may apply to different media or analytical requests.