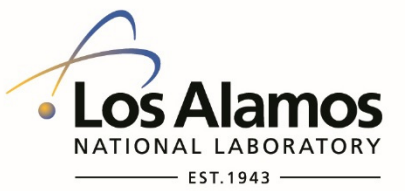
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Historical Investigation Report for South Ancho Canyon Aggregate Area



Prepared by the Environmental Programs Directorate

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EP2015-0103

Historical Investigation Report for South Ancho Canyon Aggregate Area

July 2015

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EXECUTIVE SUMMARY

The South Ancho Canyon Aggregate Area, located in Technical Area 33 at Los Alamos National Laboratory, includes a total of 11 solid waste management units and 1 area of concern. Of these 12 sites, 1 site has been approved for no further investigation. For the remaining 11 sites requiring investigation, this historical investigation report provides site descriptions, summarizes previous investigations, and presents analytical results. The background information and previous investigations discussed within this report form the basis for the proposed sampling design necessary to complete site investigations, as discussed in the South Ancho Canyon Aggregate Area investigation work plan.

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Appendixes

Appendix A Acronyms and Abbreviations, Metric Conversion Table, and Data Qualifier Definitions

Appendix B Analytical Suites and Results (on CD included with this document)

Plates

Plate 1 South Ancho Canyon Aggregate Area

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, 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 site covers 36 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 mean sea level. The location of South Ancho Canyon Aggregate Area with respect to the Laboratory technical areas (TAs) is shown in Figure 1.0-1.

The Laboratory is participating in a national effort by DOE to reduce risk to human health and the environment at its facilities. The goal of the Laboratory's effort 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 Laboratory is currently investigating sites potentially contaminated by past Laboratory operations. The sites under investigation are designated as solid waste management units (SWMUs) and an area of concern (AOC).

This historical investigation report (HIR) describes operational histories, previous investigations, and analytical data for SWMUs and the AOC in Technical Area 33 (TA-33). These sites are potentially contaminated with hazardous chemicals and radionuclides. The New Mexico Environment Department (NMED), pursuant to the New Mexico Hazardous Waste Act, regulates cleanup of hazardous wastes and hazardous constituents. DOE regulates cleanup of radioactive contamination, pursuant to DOE Order 458.1, Administrative Change 3, 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 a Compliance Order on Consent (the Consent Order). This HIR provides supporting information for the work plan activities that will be executed and completed in accordance with the Consent Order.

1.1 Historical Investigation Report Overview

The South Ancho Canyon Aggregate Area includes 11 SWMUs and 1 AOC located in TA-33. One site has been approved for no further action (NFA). The remaining 11 sites require additional characterization and are addressed in this report. Table 1.1-1 provides a summary of the 12 sites within the aggregate area and their status. For the NFA site, only a brief description and the reference to the approval document is provided in this HIR and only in Table 1.1-1.

The purpose of this HIR is to provide supporting information for the activities necessary to complete the investigations as presented in the South Ancho Canyon Aggregate Area investigation work plan (LANL 2015, 600531).

Section 2 of this HIR provides site descriptions and operational histories, summarizes previous investigations, and presents analytical data for sites under investigation. For each site, the location, historical operations, and current status are described first, followed by descriptions of historical investigations with dates and activities conducted. The results of analytical data obtained from previous investigation are summarized. Plate 1 shows the locations of the sites under investigation within the South Ancho Canyon Aggregate Area.

Appendix A includes a list of acronyms and abbreviations, a metric conversion table, and a table for data qualifier definitions. Appendix B presents screening-level data from previous investigations (included on CD).

1.2 Data Overview

Data evaluated in this report include historical data collected from 1994 to 1996 as part of Resource Conservation and Recovery Act facility investigations (RFIs) and other corrective actions. In the Environmental Programs Directorate's database, all data records include a vintage code field denoting how and where samples were submitted for analyses. All historical data evaluated in this report are validated or revalidated by current quality-control metrics.

Analytical samples described in this report have undergone analyses at both on-site and off-site laboratories. In general, because analytical practices and documentation of analyses vary in quality and completeness, analytical data presented are designated as either screening-level or decision-level quality. Because the data from these sites are approximately 20 yr old, they are considered screening-level data. Screening-level data are appropriate for applications that require only determination of gross contamination areas and/or for site characterization. Screening-level data are also often used to specify areas where additional data should be collected.

Inorganic chemical and radionuclide data from previous investigations were compared with background values (BVs) and fallout values (FVs) (LANL 1998, 059730, p. 6-2). Fallout radionuclides in soil greater than a depth of 1 ft or in rock and organic chemicals are evaluated based on detection status.

2.0 SITES UNDER INVESTIGATION

TA-33 is located in the southeastern portion of the Laboratory and is bounded by Bandelier National Monument to the west, Santa Fe National Forest to the south, TA-70 to the north east, and TA-39 to the north. The mesa drains to Ancho Canyon (to the north) and White Rock Canyon (to the east and south).

TA-33 was created in 1947 as a test site for weapons experiments using conventional high explosives (HE), and uranium, beryllium, and polonium radiation sources. It was used as a substitute test site for weapons components experiments being conducted at Trinity Site in southern New Mexico. The tests were conducted primarily to verify the design of nuclear weapons' components called initiators. The experiments were performed in underground chambers, on surface firing pads, and at firing sites equipped with large guns that fired projectiles into catcher boxes and berms. These activities ceased in 1972. A high-pressure tritium facility operated at TA-33 Main Site from 1955 to late 1990. Five areas comprise TA-33:

- a laboratory and office complex near the entrance at NM 4 (Main Site),
- a western firing site (Area 6),
- a southern firing site (South Site),
- an eastern firing site (East Site), and

the current site of the National Radio Astronomy Observatory (NRAO) antenna, formerly a storage area and disposal site.

Current activities are centered primarily at Main Site with Laboratory groups occupying portions of the office buildings. Other small buildings and surface areas are also used. The NRAO Very Long Baseline Array radiotelescope antenna was sited at TA-33 in 1985 and is still operational (LANL 1992, 007671). Three material disposal areas (MDAs) are located at TA-33: MDA D at East Site, MDA E at South Site, and MDA K at Main Site. All the sites addressed in this HIR are located at East Site at TA-33.

2.1 SWMU 33-003(a), Soil Contamination

2.1.1 Description and History

MDA D consists of SWMUs 33-003(a) and 33-003(b). Both SWMUs are former underground chambers that were used to conduct experiments involving radioactive materials and HE. MDA D is located at the east end of TA-33 (East Site) on a mesa bordered by Ancho and White Rock Canyons.

SWMU 33-003(a) consists of a former underground chamber, designated chamber 1 (structure 33-4), and its associated underground elevator shaft (Figure 2.1-1). The chamber and shaft were constructed to perform experiments on initiators. Construction was completed in January 1948. The octagonal chamber was 18 ft in diameter and 11 ft high, with the top of the chamber located approximately 30 ft below ground surface (bgs). The adjacent elevator shaft was 4 ft × 6 ft × 46 ft deep and shored with timbers (LASL 1952, 025008). Chamber 1 was used to conduct a single experiment in April 1948. The experiment did not vent to the surface, and no radioactivity was detected on the ground surface or in the atmosphere immediately after the test or 24 h later (LANL 1992, 007671, pp. 3-67–3-69). Components used in the experiments included HE, which was consumed in the tests; gram-quantities of beryllium; polonium-210 (half-life 138 d); kg-quantities of steel, copper, and aluminum; and gram-quantities of lead (LANL 1992, 007671, pp. 3-67–3-89). In addition, the chamber contained capacitors which were estimated to contain a total of 5 lb of polychlorinated biphenyls (PCBs) (Morgan 1994, 246105). This experiment is believed to have been the cause of the chamber's collapse. A berm was built over the site some years later. A concrete pad is currently installed at the surface over the chamber.

2.1.2 Previous Investigations

During the 1989 investigation of MDA D, three boreholes were drilled at SWMU 33-003(a): one to the floor of the elevator shaft, one to the concrete roof of the chamber, and one next to the chamber to a depth below the chamber floor. Two samples were collected from each borehole and analyzed for radionuclides, inorganic chemicals, and HE. Data from the 1989 investigation are screening level; only uranium was detected above the BV in one sample collected at a depth of 44 ft bgs next to the chamber. No other inorganic chemicals were detected above BVs, no radionuclides were detected or detected above BVs, and no HE was detected. During the 1994 Phase I RFI, no sampling was performed at SWMU 33-003(a). Based on the 1989 data, the 1995 RFI report recommended NFA for SWMU 33-003(a) because no release to the environment had occurred (LANL 1995, 071300, pp. 21–24). The NFA recommendation was never approved by the U.S. Environmental Protection Agency (EPA) or NMED.

2.1.3 Analytical Results

There are no analytical results for SWMU 33-003(a).

2.2 SWMU 33-003(b), Soil Contamination

2.2.1 Description and History

MDA D consists of SWMUs 33-003(a) and 33-003(b). Both SWMUs are former underground chambers that were used to conduct experiments involving radioactive materials and HE. MDA D is located at the east end of TA-33 (East Site) on a mesa bordered by Ancho and White Rock Canyons.

SWMU 33-003(b) consists of a former underground chamber, designated chamber 2 (structure 33-6), and its associated underground elevator shaft within MDA D (Figure 2.2-1). Chamber 2 was constructed to perform initiator experiments; construction was completed in October 1948. The octagonal chamber was 18 ft in diameter and 11 ft high, with the top of the chamber located approximately 30 ft bgs. The adjacent elevator shaft was 4 ft × 6 ft × 46 ft deep and shored with timbers (LASL 1952, 025008). Chamber 2 was used to conduct two experiments, one in December 1948 and one in April 1952 (Blackwell 1952, 007857). Components used in the experiments included HE, which was consumed in the tests; gram-quantities of beryllium; polonium-210 (half-life 138 d); kg-quantities of steel, copper, and aluminum; and gram-quantities of lead. In addition, the chamber contained capacitors estimated to contain less than 5 lb of PCBs (Morgan 1994, 246105).

The second experiment destroyed the chamber, caused debris to be ejected from the shaft onto the ground surface, and formed a 10-ft-deep crater. The crater subsequently was filled with the ejected debris and covered with uncontaminated soil (LANL 1995, 071300). The depression was refilled in 1963 (LASL 1963, 006745). The 1997 RFI report noted a broken 8-ft × 12-ft concrete pad and a 6-ft × 10-ft depression near the shaft location (LANL 1997, 071478). This depression was up to 2 ft deep.

2.2.2 Previous Investigations

Surface sampling was conducted in 1977 as part of the Laboratory's Environmental Surveillance Program. Sixteen surface samples were collected around the site and analyzed for radionuclides. No elevated levels were detected. During the 1989 investigation of MDA D, three boreholes were drilled at SWMU 33-003(b): one to the floor of the elevator shaft, one to the concrete roof of the chamber, and one next to the chamber to a depth below the chamber floor. Three subsurface samples were collected from each borehole. Seven of the samples were analyzed for total uranium, six for target analyte list (TAL) metals, three for volatile organic compounds (VOCs), and seven for HE. Data from the 1989 investigation are screening level; lead, mercury, and zinc were detected above the BVs from the sample collected at the bottom of the elevator shaft. No other inorganic chemicals were detected above BVs, no radionuclides were detected or detected above BVs/FVs, and no HE or VOCs were detected (LANL 1995, 071300, pp. 21–24).

A radiation survey was conducted from December 3 to 17, 1993, on a fixed grid with readings taken on contact with the ground surface every 20 ft. No elevated readings were detected (LANL 1995, 048840, pp. 7–8).

During the 1994 Phase I RFI conducted at SWMU 33-003(b), nine surface samples were collected from eight locations on a 100-ft × 100-ft grid around the shaft location (Figure 2.2-1). The samples were analyzed for TAL metals, gamma-emitting radionuclides, and HE. In addition, three samples were analyzed for semi-volatile organic compounds (SVOCs) and cyanide. The RFI report concluded that surface sampling was not sufficient to characterize debris that might have been used to backfill the crater around the shaft (i.e., the samples may have been representative of clean cover soil) and recommended additional subsurface sampling at SWMU 33-003(b). In addition, samples collected during the Phase I RFI were not analyzed for PCBs (LANL 1995, 071300, pp. 74–76; LANL 1995, 048840).

During the 1996 Phase II RFI conducted at SWMU 33-003(b), surface samples were collected at each of the nine Phase I RFI sample locations and field-screened for PCBs. PCBs were detected in two samples within a concentration range of 0.5 mg/kg to 1 mg/kg, which was below the 1 mg/kg screening level that triggered the need for laboratory analysis. Boreholes were drilled at two locations within 3 ft to 4 ft of the shaft to a depth of 15 ft bgs. Samples were collected from three depths in each borehole and analyzed for TAL metals. In addition, four samples were analyzed for PCBs (LANL 1997, 071478, pp. 54–63). Samples collected and analyses requested are presented in Table 2.2-1.

The 1997 RFI report recommended NFA for SWMU 33-003(b) because the site had been characterized, and available data indicated that contaminants at SWMU 33-003(b) were not present or were present in concentrations that posed no unacceptable risk under projected land use. The report indicated that evaluation of this site for ecological risk concerns would be deferred until an ecological risk assessment methodology had been developed (LANL 1997, 071478, p. 63). The NFA recommendation was never approved by EPA or NMED.

2.2.3 Analytical Results

Inorganic chemicals detected above BVs during the 1994 Phase I RFI and the 1996 Phase II RFI include calcium, cyanide, lead, potassium, thallium, and zinc. Calcium and cyanide were each detected above the soil BV (6120 mg/kg and 0.5 mg/kg) in three samples with a maximum concentration of 58,100 mg/kg and 2.3 mg/kg, respectively. Lead was detected above the soil BV (22.3 mg/kg) in two samples with a maximum concentration of 44.4 mg/kg. Potassium was only detected above the soil BV (3460 mg/kg) at one location at a concentration of 4720 mg/kg. Thallium was detected above the soil BV (0.73 mg/kg) in four samples with a maximum concentration of 1.8 mg/kg. Zinc was detected above the soil BV (48.8 mg/kg) in five samples with a maximum concentration of 71.3 mg/kg. Antimony, cadmium, and silver were not detected above BVs, but six or fewer samples had detection limits above BVs. No organic chemicals or HE were detected at SWMU 33-003(b). Cobalt-60 was detected in four soil samples with a maximum activity of 1.07 pCi/g.

Analytical data from the 1994 Phase I RFI and the 1996 Phase II RFI sampling are presented in Tables 2.2-2 and 2.2-3. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 2.2-2 and 2.2-3, respectively.

2.3 SWMU 33-004(c), Septic System

2.3.1 Description and History

SWMU 33-004(c) consists of an inactive septic tank (structure 33-96) and associated drainline and drain field located at TA-33 East Site (Figure 2.3-1). This septic tank received wastewater from building 33-87, which was constructed in June 1955 to serve as the control bunker for the firing site at East Site. The septic tank has a capacity of 768 gal. and is located approximately 100 ft northeast of building 33-87. Wastewater was conveyed to the tank through a 4-in.-diameter vitrified clay pipe and effluent from the tank flowed through a similar pipe to a small drain field approximately 30 ft east of the septic tank (LASL 1955, 025040). No outfall is or has been associated with this septic tank. Building 33-87 was used as a control bunker for experiments conducted by Group W-3 until 1972. It has since been used for storage and for occasional short-term experiments (LANL 1995, 051903, p. 43). There is no documented use of hazardous or radioactive materials within building 33-87 (Gonzales 1990, 000145). Septic tank 33-96 was operated under NMED Permit Number LA 34; however, no discharges to the septic system have occurred since the late 1980s (LANL 1990, 007513, p. 33-4).

2.3.2 Previous Investigations

During the 1994 Phase I RFI conducted at SWMU 33-004(c), the septic tank was opened and inspected. No sludge was present in the tank. Two liquid samples were collected from the tank. In addition, one surface sample and two subsurface samples were collected from each of three boreholes advanced to depths of 4 ft to 6 ft bgs. One borehole was located 5 ft from the septic tank and the other two were located in the drain field. Before the boreholes were drilled, a trench was excavated in the drain field to locate the drainage tiles and any drain lines; no drain lines were discovered (LANL 1995, 051903, pp. 43–44).

Twelve samples were submitted to on-site and off-site contract analytical laboratories for analysis of cyanide, gamma-emitting radionuclides, TAL metals, and SVOCs. One of the 12 samples was also analyzed for isotopic uranium and 8 of the 12 samples were also analyzed for VOCs. Samples collected and analyses requested are presented in Table 2.3-1.

2.3.3 Analytical Results

Inorganic chemicals detected above BVs during the 1994 Phase I RFI include arsenic, cadmium, cyanide, and zinc. Arsenic was detected above the soil BV (8.17 mg/kg) in one sample at a concentration of 12 mg/kg. Cadmium was detected above the soil BV (0.4 mg/kg) in two samples with a maximum concentration of 1.5 mg/kg, and seven samples had detection limits above BV. Cyanide was detected above the soil BV (0.5 mg/kg) in five samples with a maximum concentration of 7.7 mg/kg. Silver was not detected above the BV, but nine samples had detection limits above the soil BV (1 mg/kg). Zinc was detected above the soil BV (48.8 mg/kg) in three samples with a maximum concentration of 66 mg/kg. No organic chemicals were detected at SWMU 33-004(c). Uranium-235/236 was detected in one soil sample at an activity of 0.2546 pCi/g.

Analytical data from the 1994 Phase I RFI sampling are presented in Tables 2.3-2 and 2.3-3. Sampling locations and results for inorganic chemicals detected above BVs and radionuclides detected or detected above BVs/FVs are shown in Figures 2.3-2 and 2.3-3, respectively.

2.4 SWMU 33-004(k), Drainline and Outfall

2.4.1 Description and History

SWMU 33-004(k) is described in the 1990 SWMU report as two parallel drainlines for building 33-87 that merged and discharged to a single outfall located near gun mount 33-116 (Figure 2.4-1). The outfall reportedly received discharge from a toilet, sink, floor drains, and an electrical water cooler within the building. The engineering drawing for building 33-87 depicts a cast-iron drainpipe exiting the south wall of the building, and extending approximately 125-ft southeast of the building (LASL 1955, 600499). Building 33-87 was constructed in 1955 to support firing site experiments that were conducted until the early 1970s. Attempts to locate the drainline and outfall in 1994 and 1995 using geophysics and test trenches were unsuccessful. An inspection of the building in 1996 revealed that no floor drains existed in the building. The sink and toilet in the building discharged to septic tank 33-96 [SWMU 33-004(c)], located north of the building. Therefore, it is likely that the drainline and outfall never existed.

2.4.2 Previous Investigations

A radiation survey was conducted from December 3 to 17, 1993, on a fixed grid and readings were taken on contact with the ground surface every 20 ft. A 50-ft grid was established over the SWMU 33-004(k) outfall area. No elevated readings were detected (LANL 1995, 048840, pp. 7–8).

During the 1994 Phase I RFI conducted at SWMU 33-004(k), electromagnetic (EM) surveys were performed east of the bunker where the drainline was shown on the engineering drawing. The EM surveys did not indicate the presence of a drainline at the surveyed locations. In 1995, a ground-penetrating radar survey was conducted, and two anomalies at the southeast corner of the building were noted. Eleven trenches were dug to the top of bedrock both parallel and perpendicular to the anomalies; however, no drainline was encountered (LANL 1997, 071478, Figure 5.4.2.1). An inspection of the building in 1996 revealed no floor drains existed in the building. Based on the results of the Phase I RFI activities for SWMU 33-004(k), the RFI report recommended NFA because the SWMU could not be located or may have never existed (LANL 1997, 071478, pp. 81–82). The NFA recommendation was never approved by EPA or NMED.

2.4.3 Analytical Results

There are no analytical results for SWMU 33-004(k).

2.5 SWMU 33-006(b), Firing Site

2.5.1 Description and History

SWMU 33-006(b) is a former gun-firing site that consists of two inactive concrete firing pads and associated berms (Figure 2.5-1). The firing pads were used to conduct tests of gun-type initiators and consisted of 20-ft × 30-ft concrete pads (former structures 33-97 and 33-98, respectively) (LANL 1992, 007671, pp. 3-70–3-71; LASL 1955, 600499). The firing pads are located in the centers of two adjacent crescent-shaped south-facing berms constructed of soil and crushed tuff (LANL 1995, 051903, p. 77). The double berm is located on the northern edge of East Site near the rim of Ancho Canyon.

Guns formerly mounted on the pads were used to fire uranium projectiles containing beryllium and polonium-210 into the berms. Cobalt-60 was used as a tracer in some of the projectiles. Projectiles were not detonated but were fired intact into the berms for recovery and investigation (LANL 1992, 007671, pp. 3-70–3-71). Some neutron detectors used at East Site may have contained liquid organic scintillation fluids. Operations at East Site began in June 1955 (LANL 1992, 007671, pp. 3-70–3-71). The operating dates of SWMU 33-006(b) were not reported, but firing tests at East Site were conducted until 1972. A general cleanup of the site was conducted in 1984 (Buhl 1988, 035754).

2.5.2 Previous Investigations

A radiation survey was conducted from December 3 to 17, 1993, on a fixed grid and readings were taken on contact with the ground surface every 20 ft. No elevated readings were detected (LANL 1995, 048840, pp. 7–8).

During the 1994 Phase I RFI conducted at SWMU 33-006(b), a geophysical survey was conducted over the berms in an attempt to locate buried metallic objects. Numerous anomalies were detected. Subsequent trenching indicated that the anomalies were associated with large pieces of buried tuff. The only metallic object identified was a piece of an artillery gun breech. A surface soil sample was collected at each of two locations near each firing pad (four samples total). Soil samples were also collected from a 5-ft-deep trench cut into each berm at a location directly in front of each gun mount. Three samples were collected from the east trench and six samples were collected from the west trench. Three of the samples from the west trench were collected from the areas around metal projectiles found in the berm (LANL 1995, 048840, p. 24; LANL 1995, 051903, pp. 77–84).

At total of 13 samples were collected from 6 locations at depths ranging from 0–8 ft bgs. The samples were submitted to on-site and off-site contract analytical laboratories for analysis of gamma-emitting radionuclides, TAL metals, SVOCs, and HE. Four of the 13 samples were also analyzed for uranium, and another 4 of the 13 samples were also analyzed for isotopic uranium. Samples collected and analyses requested are presented in Table 2.5-1.

2.5.3 Analytical Results

Inorganic chemicals detected above BVs during the 1994 Phase I RFI include arsenic, cadmium, copper, lead, silver, uranium, and zinc. Arsenic, lead, and zinc were detected above their soil BVs (8.2 mg/kg, 22.3 mg/kg and 48.8 mg/kg, respectively) in only one sample at concentrations of 12 mg/kg, 326 mg/kg, and 67.3 mg/kg, respectively. Cadmium was detected above the soil BV (0.4 mg/kg) in three samples at one location, with a maximum concentration of 0.8 mg/kg, and three samples had detection limits above the BV. Copper was detected above the soil BV (14.7 mg/kg) in two samples with a maximum concentration of 32.9 mg/kg. Silver was detected above the soil BV (1 mg/kg) in three samples at one location with a maximum concentration of 2 mg/kg and had detection limits above the BV in six samples. Uranium was detected above the soil BV (1.82 mg/kg) in eight samples with a maximum concentration of 6.9 mg/kg.

Organic chemicals detected include bis(2-ethylhexyl)phthalate, fluoranthene, and phenanthrene. These organic chemicals were each detected in one sample with concentrations ranging from 0.36 mg/kg to 0.44 mg/kg.

Cobalt-60 was detected in three fill samples with a maximum activity of 0.034 pCi/g. Uranium-234 and uranium-238 were each detected above their BVs (2.59 mg/kg and 2.29 mg/kg, respectively) in one sample each with activities of 3.29 pCi/g and 4.62 pCi/g, respectively.

Analytical data from the 1994 Phase I RFI sampling are presented in Tables 2.5-2 through 2.5-4. Sampling locations and results for inorganic chemicals detected above BVs, organic chemicals detected, and radionuclides detected or detected above BVs/FVs are shown in Figures 2.5-2, 2.5-3, and 2.5-4, respectively.

2.6 SWMU 33-007(a), Firing Site

2.6.1 Description and History

SWMU 33-007(a) is a gun firing site that consists of three gun mounts (structures 33-116 and 33-135 and former structure 33-117), two former catcher boxes (structures 33-118 and 33-136), and a recoil box (LANL 1990, 007513) (Figure 2.6-1). Concrete gun mounts 33-116 and 33-135 were located at the west end of the site, and the catcher boxes were located at the east end. A sandbag barricade was located east of the catcher boxes. The recoil box was located immediately west of gun mount 33-116. Firing site activities began in the mid-1950s and included firing projectiles from large cannons into the catcher boxes filled with vermiculite and sand (LANL 1995, 051903, pp. 84–85). Other activities included experiments using scintillation fluids and x-rays. Cobalt-60 was used in some of the firing site activities (LANL 1992, 007671, pp. 3-70–3-71). Firing site activities ceased in 1972 (LANL 1995, 051903, pp. 84–85). In 1984, the catcher boxes and their contents were removed and disposed of in a landfill [SWMU 33-008(b)] located at East Site (Buhl 1988, 035754).

2.6.2 Previous Investigations

A radiation survey was conducted at the site from December 3 to 17, 1993, on a fixed grid, and readings were taken on contact with the ground surface every 20 ft. No elevated readings were detected (LANL 1995, 048840, pp. 7–8).

During the 1994 Phase I RFI, geophysical surveys were performed to determine the presence of subsurface metal objects. Trenches were excavated over two anomalies, but no projectiles or debris were found (LANL 1995, 051903, p. 85).

As part of the Phase I RFI, sampling was conducted at SWMU 33-007(a) in 1994 (LANL 1995, 051903). Surface sampling at SWMU 33-007(a) consisted of randomized grid sampling designed to determine the distribution of potential surface contamination resulting from firing activities. In addition, biased samples were collected from a trench in the berm at the west end of the firing area and from north and south of the culvert draining the central part of the area. Thirty-one samples were collected from 28 locations at depths ranging from 0–8 ft bgs. The samples were submitted for on-site analyses and off-site contract analytical laboratories for analysis of HE and metals. Four of the 31 samples were also analyzed for herbicides, 12 of the 31 samples were also analyzed for SVOCs, and 28 of the 31 samples were also analyzed for uranium and gamma-emitting radionuclides. Samples collected and analyses requested are presented in Table 2.6-1.

2.6.3 Analytical Results

Inorganic chemicals detected above BVs during the 1994 Phase I RFI include arsenic, calcium, chromium, copper, lead, mercury, and uranium. Antimony was not detected above the soil BV (0.83 mg/kg), but 20 samples had detection limits above the BV. Arsenic was detected above the soil BV (8.17 mg/kg) in 1 sample at a concentration of 13 mg/kg. Cadmium was not detected above the soil BV (0.4 mg/kg), but 9 samples had detection limits above the BV. Calcium was detected above the soil BV (6120 mg/kg) in 13 samples with a maximum concentration of 19,100 mg/kg. Chromium was detected above the soil BV (19.3 mg/kg) in 4 samples with a maximum concentration of 32.4 mg/kg. Copper was detected above the soil BV (14.7 mg/kg) in 2 samples with a maximum concentration of 22 mg/kg. Lead was detected above the soil BV (22.3 mg/kg) in 4 samples with a maximum concentration of 48.8 mg/kg. Mercury was detected above the soil BV (0.1 mg/kg) in 5 samples with a maximum concentration of 0.12 mg/kg. Silver was not detected above the soil BV (1 mg/kg), but 3 samples had detection limits above the BV. Uranium was detected above the soil BV (1.82 mg/kg) in 6 samples with a maximum concentration of 40.67 mg/kg.

A total of 21 organic chemicals were detected at 7 locations at SWMU 33-007(a).

Cesium-137 was detected above the soil BV (1.65 mg/kg) in 1 fill sample with at an activity of 16.8 pCi/g. Cobalt-60 was detected in 12 samples with a maximum activity of 27.7 pCi/g.

Analytical data from the 1994 Phase I RFI sampling are presented in Tables 2.6-2 through 2.6-4. Sampling locations and results for inorganic chemicals detected above BVs, organic chemicals detected, and radionuclides detected or detected above BVs/FVs are shown in Figures 2.6-2, 2.6-3, and 2.6-4, respectively.

2.7 SWMU 33-008(b), Landfill

2.7.1 Description and History

SWMU 33-008(b) consists of a landfill that was created at East Site in 1984 during a major cleanup of the former TA-33 firing sites (Buhl 1988, 035754) (Figure 2.7-1). The landfill is located between the two large gun mounts and the former recovery catcher boxes associated with SWMU 33-007(a) (Figure 2.6-1).

This landfill was used to dispose of uncontaminated debris, including large items such as telephone poles, timbers, and railroad ties (LANL 1997, 071478, p. 86). Additional materials buried in the landfill may have included timbers, sawdust, and vermiculite contaminated with small amounts of lead, beryllium, and HE (LANL 1992, 007671, pp. 3-70–3-71). All debris from the cleanup was screened for radioactivity. Radioactively contaminated materials were disposed of at MDA G at TA-54. Uncontaminated salvageable materials were also removed from the site rather than deposited in the landfill (Buhl 1988, 035754). Upon completion of site cleanup activities, the surface of the landfill was graded to prevent ponding of storm water and the four corners of the fill area were marked with metal posts (LANL 1997, 071478, p. 82).

2.7.2 Previous Investigations

During the 1996 Phase I RFI conducted at SWMU 33-008(b), boreholes were advanced into the landfill at six locations to depths ranging from 4.5–7.5 ft bgs or approximately 3 ft into tuff (LANL 1997, 071478, pp. 85–97). Twenty-one samples were collected from six locations at depths ranging from 0–16 ft. The samples were submitted to an off-site contract analytical laboratory for analysis of metals and SVOCs. Depth to tuff varied between 1.5 ft and 4.5 ft bgs. None of the debris was collected as samples because of its large and solid nature. Instead, soil surrounding the debris was collected (LANL 1997, 071478, pp. 88–86). Samples collected and analyses requested are presented in Table 2.7-1.

2.7.3 Analytical Results

Inorganic chemicals detected above BVs during the 1996 RFI include aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, nickel, potassium, selenium, thallium, uranium, vanadium, and zinc. Aluminum was detected above the tuff BV (3560 mg/kg) in 2 samples with a maximum concentration of 4730 mg/kg. Beryllium, cobalt, selenium, thallium, and zinc were detected above BVs in only 1 sample each. Arsenic was detected above the tuff BV (0.56 mg/kg) in 1 sample, and 5 samples had detection limits above the BV. Barium was detected above the soil and tuff BVs (295 mg/kg and 25.7 mg/kg, respectively) in 8 samples with a maximum concentration of 333 mg/kg in fill and 172 mg/kg in tuff. Cadmium was detected above the soil BV (0.4 mg/kg) in 1 sample (1.2 mg/kg), and 12 samples had detection limits above BVs. Calcium was detected above the soil and tuff BVs (6120 mg/kg and 1900 mg/kg, respectively) in 1 fill, 10 soil, and 5 tuff samples with a maximum concentration of 111,000 mg/kg. Chromium was detected above the soil and tuff BVs (19.3 mg/kg and 2.6 mg/kg, respectively) in 8 fill and 3 tuff samples with a maximum concentration of 144 mg/kg. Copper was detected above the soil and tuff BVs (14.7 mg/kg and 3.96 mg/kg, respectively) in 2 fill and 3 tuff samples with a maximum concentration of 41 mg/kg. Iron, lead, potassium and vanadium were each detected above the BV in 2 samples. Magnesium was detected above the soil and tuff BVs (4,610 mg/kg and 739 mg/kg, respectively) in 3 fill and 4 tuff samples with a maximum concentration of 11,200 mg/kg. Nickel was detected above the soil and tuff BVs (15.4 mg/kg and 2 mg/kg, respectively) in 1 fill and 5 tuff samples with a maximum concentration of 25.5 mg/kg. Uranium was detected above the soil and tuff BVs (1.82 mg/kg and 0.72 mg/kg, respectively) in 15 soil/fill and 6 tuff samples with a maximum concentration of 6 mg/kg.

A total of 24 organic chemicals were detected at 6 locations at SWMU 33-008(b).

Analytical data from the 1996 RFI sampling are presented in Tables 2.7-2 and 2.7-3. Sampling locations and results for inorganic chemicals detected above BVs and organic chemicals detected are shown in Figures 2.7-2 and 2.7-3, respectively.

2.8 SWMU 33-010(a), Surface Disposal Site

2.8.1 Description and History

SWMU 33-010(a) is a surface disposal site located southeast of structure 33-151 on the slope at the eastern edge of East Site (Figure 2.8-1). Much of the debris disposed of at this site was associated with the initial clearing of East Site and included dead tree trunks, rocks, and scraped earth. Other debris, such as metal scrap, timber, and plastic foam, is associated with firing site operations conducted from 1955 to 1972. Debris was scattered at the rim of the canyon and extends to approximately 15 ft below the rim.

2.8.2 Previous Investigations

During the 1994 Phase I RFI at SWMU 33-010(a), surface soil samples were collected at four locations from 0.0–0.5 ft bgs. The samples were submitted to an off-site contract analytical laboratory for analysis of gamma-emitting radionuclides, TAL metals, and uranium (LANL 1995, 051903). Samples collected and analyses requested are presented in Table 2.8-1.

A voluntary corrective action (VCA) was implemented in 1995. All debris was field-screened to detect alpha, beta, and gamma radiation. Eight cubic yards of nonhazardous, nonradioactive debris and 0.2 yd^3 of radioactive debris were removed from the surface of the site. No confirmation samples were collected (LANL 1996, 054755, pp. 2, 15). No hazardous waste was found during the VCA activities.

2.8.3 Analytical Results

Inorganic chemicals detected above BVs during the 1994 Phase I RFI include cadmium, calcium, chromium, copper, lead, manganese, mercury, uranium, and zinc. Antimony and selenium were not detected above the sediment BVs (0.83 mg/kg and 0.3 mg/kg, respectively), but four samples had detection limits above the BVs. Cadmium, chromium, copper, manganese, and zinc were detected above sediment BVs in one sample each. Calcium was detected above the sediment BV (4420 mg/kg) in four samples with a maximum concentration of 11,200 mg/kg. Lead and mercury were detected above sediment BVs (19.7 mg/kg and 0.1 mg/kg, respectively) in two samples at a maximum concentrations of 989 mg/kg and 0.42 mg/kg, respectively. Uranium was detected above the sediment BV (2.22 mg/kg) in four samples with a maximum concentration of 8.34 mg/kg.

Analytical data from the 1994 Phase I RFI sampling are presented in Table 2.8-2. Sampling locations and results for inorganic chemicals detected above BVs are shown in Figure 2.8-2.

2.9 SWMU 33-010(b), Surface Disposal Site

2.9.1 Description and History

SWMU 33-010(b) is a former canyon-side disposal site that was located on a narrow ledge in the middle of a 60-ft cliff at the southern edge of East Site at TA-33 (Figure 2.9-1). This disposal area consisted of a large pile of metal turnings, strapping strips, timbers, and asbestos boards (Buhl 1988, 035754, pp. 1–2). The debris was likely disposed of between 1947 and 1972 (Buhl 1988, 035754, pp. 1–2). The ledge is approximately 10 ft to 15 ft wide. At the base of the cliffs, a succession of steep slopes and cliffs extend into White Rock Canyon.

2.9.2 Previous Investigations

During the 1994 Phase I RFI conducted at SWMU 33-010(b), three samples were collected beneath the metal turnings pile on the face of the slope below the debris area ((Buhl 1988, 035754, pp. 2–3). The three samples collected were submitted to an off-site contract analytical laboratory for analysis of gamma-emitting radionuclides, TAL metals, and uranium.

During the 1996 VCA conducted at SWMU 33-010(b), the metal turnings pile and associated debris were removed along with contaminated soil beneath and around the pile. In addition, other debris located along the canyon rim was removed. Waste generated during the VCA included 0.5 yd^3 of asbestos tiles, 12 yd^3 of nonhazardous/nonradioactive debris, less than 1 yd^3 of hazardous and mixed waste debris, and 6 yd^3 of mixed waste soil (LANL 1996, 063065, p. 11). Removal was based on screening with a sodium iodide scintillation detector system for uranium and an x-ray fluorescence detector for cadmium, lead, and chromium.

Two composite confirmation samples were collected from the former metal turnings pile location, and 2 composite confirmation samples were collected from the slope below the former metal turnings pile. Each sample was composited from subsamples collected at 10 locations. All 4 samples were analyzed for TAL metals and 1 of the 4 samples was also analyzed for uranium. The 1996 VCA report recommended NFA for SWMU 33-010(b) because the site had been characterized and available data indicated contaminants at SWMU 33-010(b) were not detected or were present in concentrations that posed no unacceptable risk under the projected future land use (LANL 1996, 063065 p. 5). The NFA recommendation was never approved by EPA or NMED. Samples collected and analyses requested from the 1994 Phase I RFI and 1996 VCA are presented in Table 2.9-1.

2.9.3 Analytical Results

Inorganic chemicals detected above BVs during the 1994 Phase I RFI include cadmium, calcium, chromium, copper, iron, lead, nickel, uranium, and zinc. Antimony and thallium were not detected above the soil BVs (0.83 mg/kg and 0.73 mg/kg, respectively) but three samples each had detection limits above the BVs. Cadmium was detected above the soil BV (0.4 mg/kg) in five samples and two samples had detection limits above the BV. Calcium was detected above the soil BV (6120 mg/kg) in seven samples with a maximum concentration of 31,300 mg/kg. Chromium was detected above the soil BV (19.3 mg/kg) in three samples with a maximum concentration of 57.8 mg/kg. Copper and lead were detected above the soil BVs (14.7 mg/kg and 22.3 mg/kg, respectively) in four samples with a maximum concentration of 760 mg/kg and 205 mg/kg, respectively. Iron was detected above the soil BV (21,500 mg/kg) in two samples with a maximum concentration of 31,500 mg/kg. Nickel and zinc were detected above the soil BV (15.4 mg/kg and 48.8 mg/kg) in five samples with a maximum concentration of 429 mg/kg and 402 mg/kg, respectively. Uranium was detected above the soil BV (1.82 mg/kg) in seven samples with a maximum concentration of 761.62 mg/kg.

Analytical data from the 1994 Phase I RFI and 1996 VCA sampling are presented in Table 2.9-2. Sampling locations and results for inorganic chemicals detected above BVs are shown in Figure 2.9-2.

2.10 SWMU 33-010(d), Surface Disposal Site

2.10.1 Description and History

SWMU 33-010(d) is a former canyon-side disposal area situated in the northeastern portion of East Site at TA-33 (Figure 2.10-1). This site is located on a steep slope directly north of the former gun-firing site berms [SWMU 33-006(b)]. Debris scattered along the canyon rim and in a small drainage leading to

Ancho Canyon consisted of concrete blocks, empty glass specimen vials, pieces of foam, cable, and metal cans. The date this debris was deposited at the site is not known, but operations at East Site occurred between 1948 and 1972 (LANL 1995, 243475, p. 10). During the 1995 VCA implemented at the site, 2 yd^3 of nonhazardous/nonradioactive debris and 0.1 yd^3 of radioactive debris were removed from the site (LANL 1996, 054755, p. 15).

2.10.2 Previous Investigations

During the 1994 Phase I RFI at SWMU 33-010(d), surface-soil samples were collected from four locations on the canyon edge and two locations in the drainage (LANL 1995, 048840, Exhibit 1, p. 7). All samples were submitted for laboratory analysis of TAL metals, uranium, and gamma-emitting radionuclides. Samples collected and analyses requested are presented in Table 2.10-1.

A VCA was performed in 1995 to remove debris from the ground surface and the drainage. All debris was field screened for radioactivity and inorganic chemicals. Natural materials and debris smaller than 3 in. in diameter were not removed unless field-screening results indicated that radioactivity was above background levels. A total of 2 yd^3 of nonhazardous/nonradioactive debris and 0.1 ft^3 of radioactive debris were removed (LANL 1996, 054755, p. 15).

2.10.3 Analytical Results

Inorganic chemicals detected above BVs during the 1994 Phase I RFI include lead and zinc. Lead was detected above the soil BV (22.3 mg/kg) in two samples with a maximum concentration of 59 mg/kg. Zinc was detected above the soil BV (48.8 mg/kg) in one sample at a concentration of 77 mg/kg.

Analytical data from the 1994 Phase I RFI sampling are presented in Table 2.10-2. Sampling locations and results for inorganic chemicals detected above BVs are shown in Figure 2.10-2.

2.11 AOC C-33-002, Former Transformer

2.11.1 Description and History

AOC C-33-002 is the location of a former electrical transformer (former structure 33-95) that was located next to building 33-87, a former firing site bunker (Figure 2.11-1). The transformer was located within a concrete-walled vault covered by a soil berm (LASL 1955, 025040). The berm was constructed to provide protection from nearby gun-firing sites [SWMUs 33-006(b) and 33-007(a)].

Because this transformer was placed into service in the 1950s, the oil in the transformer may have contained PCBs. Oil stains were visible on the concrete floor of the vault. However, active leaks from the transformer were not observed during inspections conducted in September 1985 and March 1992 (LANL 1992, 007671, p. 3-71). In 1992, under the Toxic Substances Control Act, the transformer was replaced with a non-PCB transformer (Morales 1992, 065600). Sampling performed during transformer replacement was limited to the areas where the transformer had been placed temporarily during removal (Morales 1992, 009745).

2.11.2 Previous Investigations

The 1992 RFI work plan states that the transformer pad would be cleaned and sampled during transformer replacement and proposed no additional sampling (LANL 1992, 007671, p. 3-71). During 1993 Phase I RFI activities, it was determined that the sampling conducted during transformer replacement did not meet RFI objectives. The 1995 RFI report, therefore, recommended additional

sampling to determine whether historical releases of PCBs had occurred. Sampling was conducted at AOC C-33-002 in 1996 (ICF Kaiser Engineers 1997, 600529, p. 20). Four surface samples were collected from four locations in the drainage downgradient of the transformer vault and analyzed for PCBs. Samples collected and analyses requested are presented in Table 2.11-1.

2.11.3 Analytical Results

Aroclor-1260 was detected at all four locations with a maximum concentration of 2.5 mg/kg. Analytical data from 1996 sampling are presented in Table 2.11-2. Sampling locations and results for organic chemicals detected are shown in Figure 2.11-2.

3.0 REFERENCES AND MAP DATA SOURCES

3.1 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 or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH 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.

Blackwell, C.D., April 23, 1952. "Excavation and Shot in Chamber #2 at 'Hot Point,' TA-33," Los Alamos Scientific Laboratory memorandum to D.D. Meyer (H-1) from C.D. Blackwell (H-1), Los Alamos, New Mexico. (Blackwell 1952, 007857)

Buhl, T., 1988. "Clean-Up of Two Firing Site Areas at TA-33," internal draft report, Los Alamos National Laboratory, Los Alamos, New Mexico. (Buhl 1988, 035754)

EPA (U.S. Environmental Protection Agency), July 15, 1993. "RFI Work Plan for OU 1122, Approval," U.S. Environmental Protection Agency letter to J.C. Vozella (DOE) from A.M. Davis (EPA), Los Alamos, New Mexico. (EPA 1993, 027049)

Gonzales, R.L., May 31, 1990. "Salvage Yard Modifications - Road and Storage Area," Los Alamos National Laboratory memorandum (HSE-DO/ER:90:156) to D. Heineman (HSE-3) from R.L. Gonzales, Los Alamos, New Mexico. (Gonzales 1990, 000145)

ICF Kaiser Engineers, June 30, 1997. "Field Summary Report for 1996 Phase I and II Survey and Sampling Activities at TA-33, OU 1122, Volume 1," draft report prepared for Los Alamos National Laboratory, Los Alamos, New Mexico. (ICF Kaiser Engineers 1997, 600529)

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Vol. III of IV (TA-26 through TA-50), Los Alamos National Laboratory document LA-UR-90-3400, Los Alamos, New Mexico. (LANL 1990, 007513)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1122," Los Alamos National Laboratory document LA-UR-92-925, Los Alamos, New Mexico. (LANL 1992, 007671)

LANL (Los Alamos National Laboratory), December 1995. "RFI Report for Potential Release Sites 33-004(b), 33-004(c), 33-004(j), 33-004(m), 33-006(a), 33-006(b), 33-007(a), 33-007(b), 33-010(a), 33-010(b), 33-010(c), 33-010(d), 33-010(g), 33-010(h), 33-011(b), 33-011(c), 33-014," Los Alamos National Laboratory document LA-UR-95-4439, Los Alamos, New Mexico. (LANL 1995, 051903)

LANL (Los Alamos National Laboratory), April 3, 1995. "Field Investigation Activities at TA-33, East Site, South Site, NRAO Site, Main Site, and Area 6 Site," Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1995, 048840)

LANL (Los Alamos National Laboratory), September 29, 1995. "RFI Report for Field Unit 3, Operable Unit 1122, Technical Area 33, RFI Report for PRSs 33-003(a), 33-004(a), 33-007(c), 33-009, 33-011(d), 33-013, 33-016, 33-017, Revised Sampling Plans for PRSs 33-003(b), 33-004(k), 33-008(a), 33-008(b), C-33-001, C-33-002," Los Alamos National Laboratory document LA-UR-95-3625, Los Alamos, New Mexico. (LANL 1995, 071300)

LANL (Los Alamos National Laboratory), November 1995. "Voluntary Corrective Action Plan for Solid Waste Management Units at TA-33: 33-010(a), Canyon-Side Disposal Area; 33-010(b), Canyon-Side Disposal Area; 33-010(d), Surface Disposal Area; 33-010(g), Canyon-Side Disposal Area; 33-011(b), General Storage Area," Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1995, 243475)

LANL (Los Alamos National Laboratory), September 1996. "Voluntary Corrective Action Completion Report for Solid Waste Management Unit at TA-33, 33-010(b), Canyon-Side Disposal Area," Los Alamos National Laboratory document LA-UR-96-3089, Los Alamos, New Mexico. (LANL 1996, 063065)

LANL (Los Alamos National Laboratory), September 1997. "NFA Report for Potential Release Sites 33-002(b–c), 33-003(b), 33-004(k), 33-006(a), 33-008(a–b), 33-011(d), 33-013, 33-017 (located in former Operable Unit 1122)," Los Alamos National Laboratory document LA-UR-97-2944, Los Alamos, New Mexico. (LANL 1997, 071478)

LANL (Los Alamos National Laboratory), September 22, 1998. "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 059730)

LANL (Los Alamos National Laboratory), December 2014. "Derivation and Use of Radionuclide Screening Action Levels, Revision 3," Los Alamos National Laboratory document LA-UR-14-29225, Los Alamos, New Mexico. (LANL 2014, 600064)

LANL (Los Alamos National Laboratory), July 2015. "Investigation Work Plan for South Ancho Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-15-25429, Los Alamos, New Mexico. (LANL 2015, 600531)

LASL (Los Alamos Scientific Laboratory), April 3, 1952. "Installation of Undergound Chamber at (HP-4) TA-33 - Plans, Elevations, Sections, Revision 2," Drawing No. A5-C95, Los Alamos, New Mexico. (LASL 1952, 025008)

LASL (Los Alamos Scientific Laboratory), August 25, 1955. “Mechanical Details, Additional Facilities T A-33, Project 'F', Los Alamos, New Mexico, Revision 1,” Engineering Drawing ENG-C-3359, sheet number 58 of 66, Los Alamos, New Mexico. (LASL 1955, 025040)

LASL (Los Alamos Scientific Laboratory), August 25, 1955. “Plot Plan – Area 'B', Additional Facilities TA-33, Project 'F', Los Alamos, New Mexico, Revision 1,” Engineering Drawing ENG-C-3304, sheet number 3 of 66, Los Alamos, New Mexico. (LASL 1955, 600499)

LASL (Los Alamos Scientific Laboratory), May 1963. “List of Work Requested at TA-33,” Job Order No. 165991, Los Alamos Scientific Laboratory, Los Alamos, New Mexico. (LASL 1963, 006745)

Morales, R., March 23, 1992. “Status of PCB Transformers at TA-33,” Los Alamos National Laboratory memorandum (EM-8:92-766) to K. Dowler (CLS-1) from R. Morales (EM-8), Los Alamos, New Mexico. (Morales 1992, 009745)

Morales, R., October 26, 1992. “Transfer of Transformers to ENG-8,” Los Alamos National Laboratory memorandum (EM-8:92-3255) to H. Nunes (ENG-1) from R. Morales (EM-8), Los Alamos, New Mexico. (Morales 1992, 065600)

Morgan, G.L., May 2, 1994. “Investigation of Material Used in Underground Chambers at TA-33,” LosAlamos National Laboratory memorandum (P-15-94-U-141) to D. Hoard (CST-1) from G.L. Morgan (P-15), Los Alamos, New Mexico. (Morgan 1994, 246105)

NMED (New Mexico Environment Department), December 2014. “Risk Assessment Guidance for Site Investigations and Remediation,” Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico. (NMED 2014, 600115)

3.2 Map Data Sources

Sampling location: er_location_ids_pnt; ER Project Locations; Los Alamos National Laboratory, ESH&Q Waste and Environmental Services Division, 2010-2E; 1:2,500 Scale Data; 04 October 2010.

SWMU or AOC: er_res_all_reg; Potential Release Sites; Los Alamos National Laboratory, ESH&Q Waste & Environmental Services Division, Environmental Data and Analysis Group, EP2010-1C; 1:2,500 Scale Data; 02 December 2010.

Structure or building: ksl_structures_ply; Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 29 November 2010.

Fence: ksl_fences_arc: Security and Industrial Fences and Gates; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 29 November 2010.

Paved road: ksl_paved_rds_arc; Paved Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 29 November 2010.

Unpaved road: ksl_dir_rds_arc; Dirt Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 29 November 2010.

Contours (Site Maps, East Site Inset): generated from 2014 LIDAR DATA

Communication line: ksl_comm_arc; Communication Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 08 August 2002; as published 29 November 2010.

Surface Water Sampling Station: er_location_ids_pnt; ER Project Locations; Los Alamos National Laboratory, ESH&Q Waste and Environmental Services Division, 2010-2E; 1:2,500 Scale Data; 04 October 2010.

Former structure [33-006(b)]: digitized from engineering drawing C-34651, sheet 1; May, 2015.

Former structure [33-007(a)]: digitized from engineering drawing C-34651, sheet 1; May, 2015.

Storm drain [33-003(c)]: based on field observations by McCrory, email 14 May, 2015.

Drainline [33-004(c), 33-004(k)]: digitized from engineering drawing C-3304, sheet 3; May, 2015.

South Ancho Canyon Aggregate Area (Plate, Inset): er_agg_areas_ply; Aggregate Areas; Los Alamos National Laboratory, ENV Environmental Remediation & Surveillance Program, ER2005-0496; 1:2,500 Scale Data; 22 September 2005.

Technical area boundary (Plate, Inset): plan_tecareas_arc; Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published 13 August 2010.

LANL boundary (Inset): plan_tecareas_ply; Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published 13 August 2010.

River (Plate, Inset): wqh_drainage_arc: WQH Drainage_arc; Los Alamos National Laboratory, ENV Water Quality and Hydrology Group; 1:24,000 Scale Data; 03 June 2003.

Spring: er_springs_pt (Plate): Locations of Springs; Los Alamos National Laboratory, Waste and Environmental Services Division in cooperation with the New Mexico Environment Department, Department of Energy Oversight Bureau, EP2008-0138; 1:2,500 Scale Data; 17 March 2008.

Surface Water Monitoring Station (Plate): er_location_ids_pnt; ER Project Locations; Los Alamos National Laboratory, ESH&Q Waste and Environmental Services Division, 2010-2E; 1:2,500 Scale Data; 04 October 2010.

Primary paved road (Inset): ksl_centerline_arc; Road Centerlines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 15 December 2005; Unknown publication date.

Secondary paved road (Inset): ksl_centerline_arc; Road Centerlines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 15 December 2005; Unknown publication date.

Contours (Plate 1): lanl_contour1991_; Hypsography, 2, 10, 20, 100 Foot Contour Interval; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; 1991.

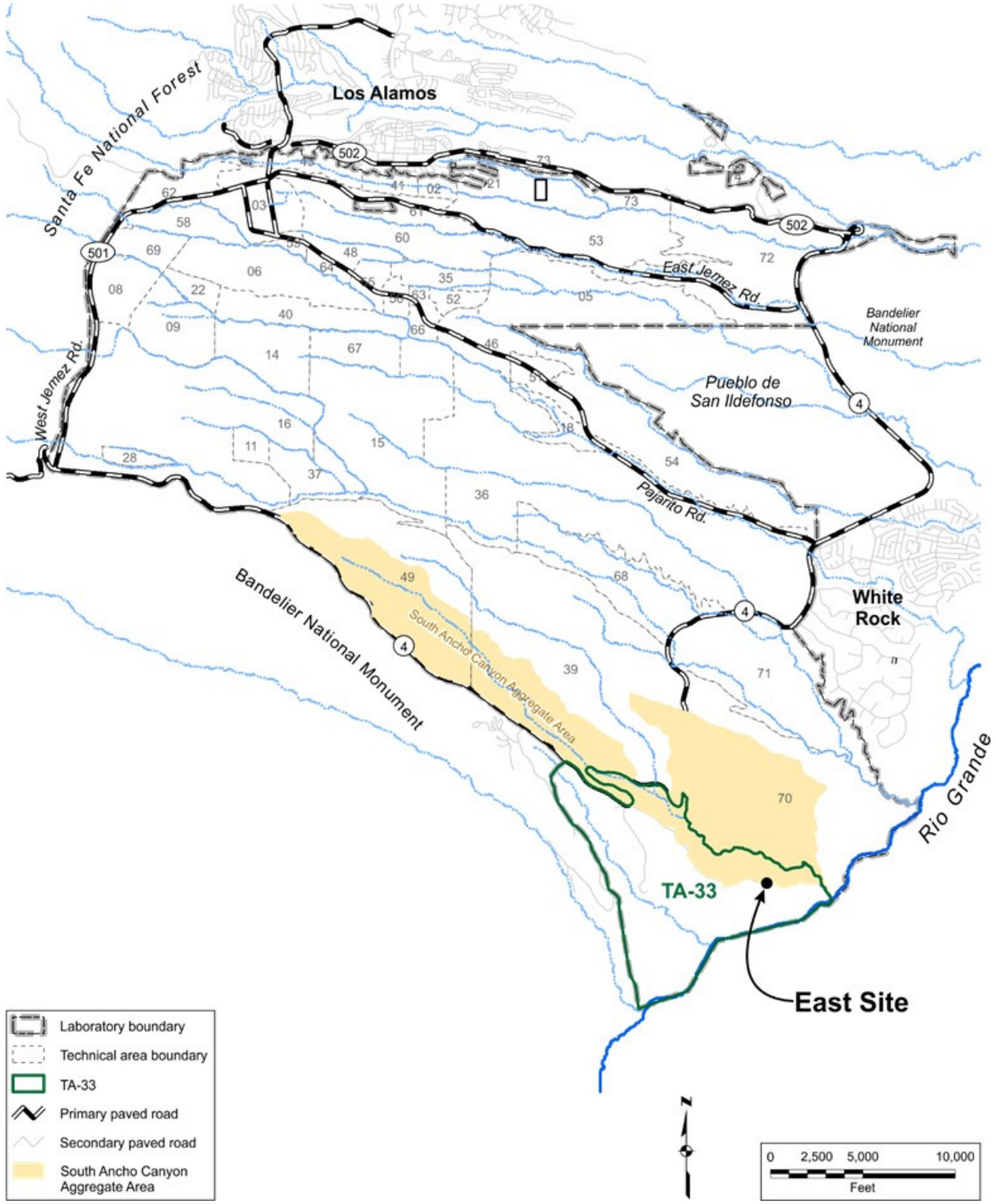


Figure 1.0-1 South Ancho Canyon Aggregate Area with respect to Laboratory TAs and surrounding land holdings

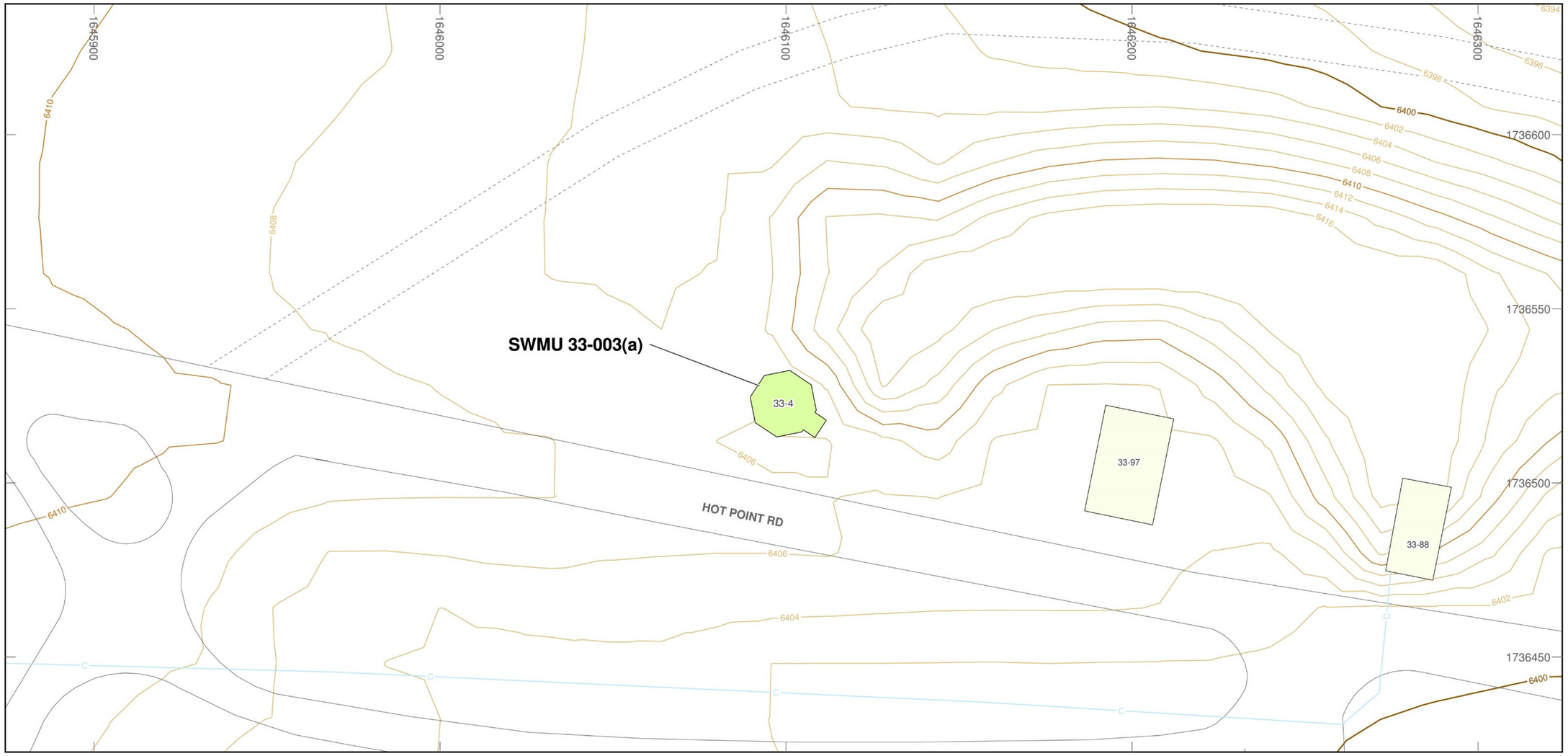


Figure 2.1-1 Site features for SWMU 33-003(a)

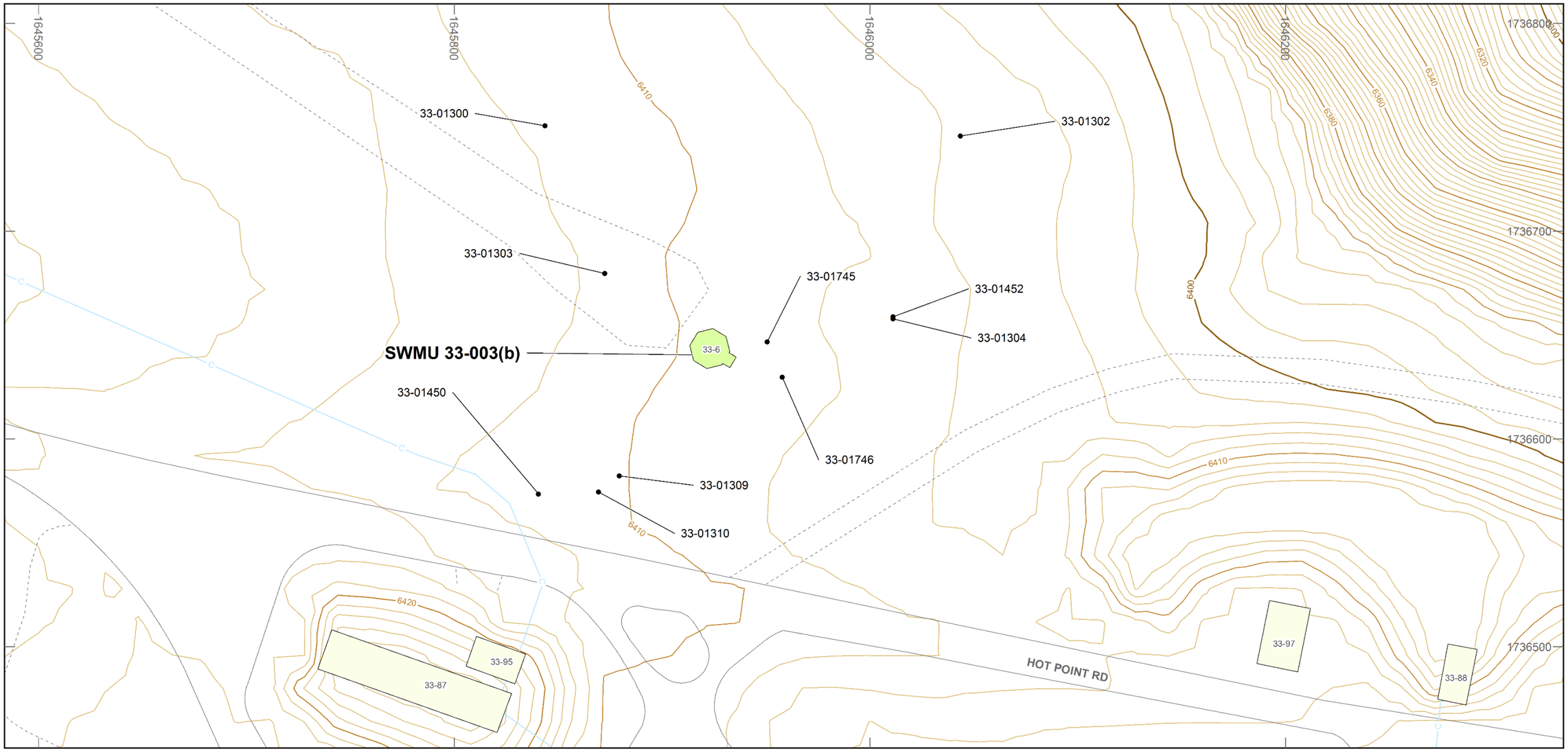


Figure 2.2-1 Site features and historical sampling locations for SWMU 33-003(b)

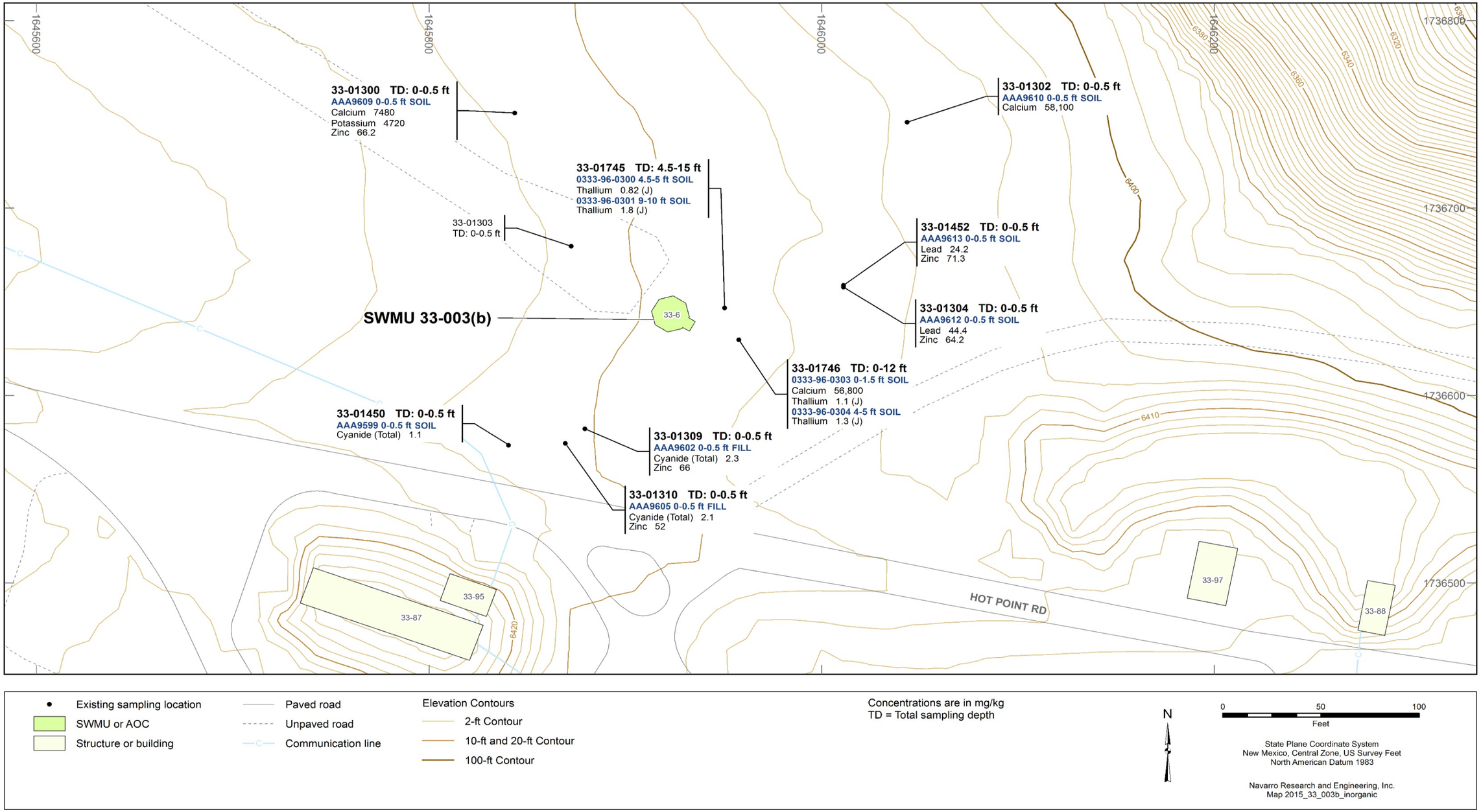


Figure 2.2-2 Inorganic chemicals detected above BVs at SWMU 33-003(b)

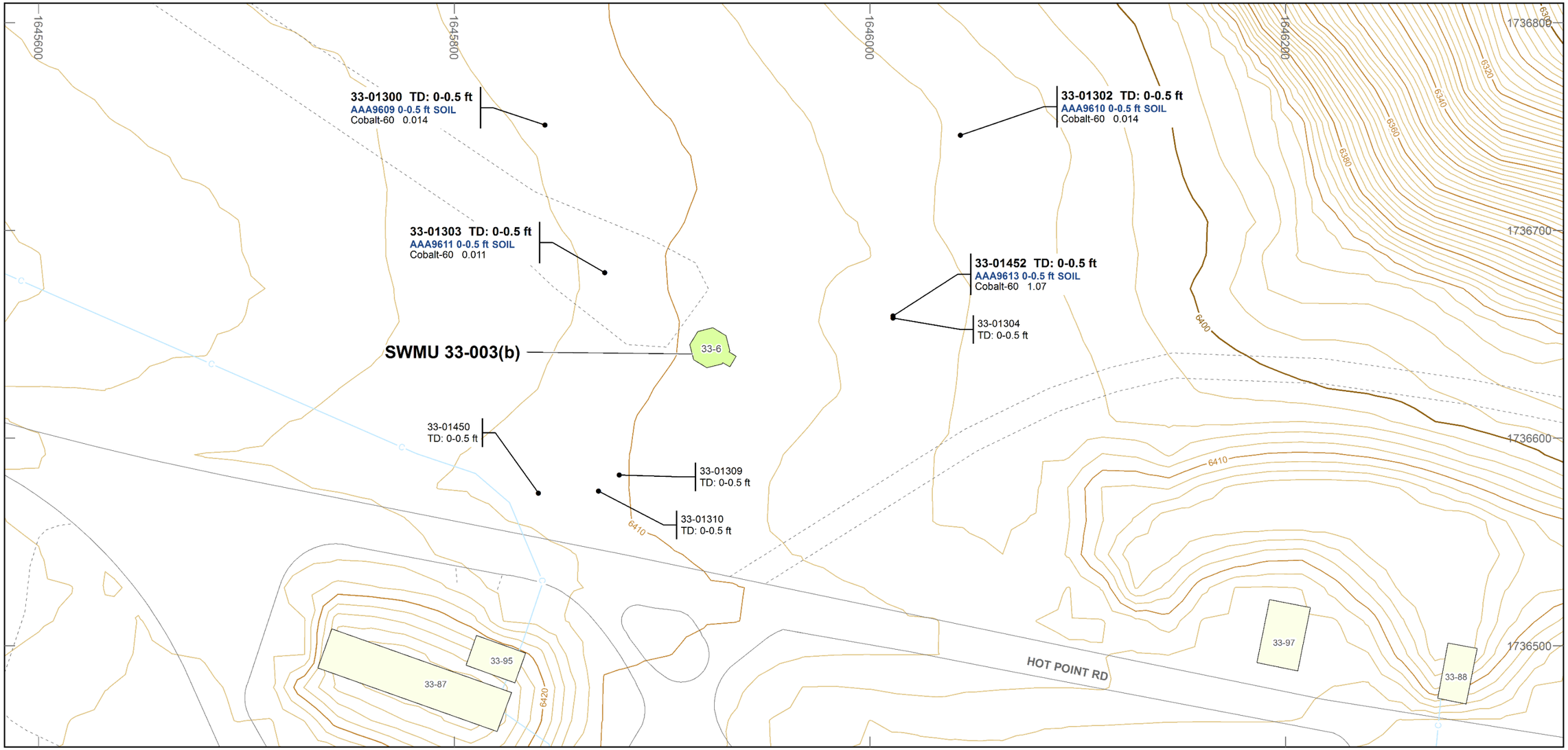


Figure 2.2-3 Radionuclides detected or detected above BVs/FVs at SWMU 33-003(b)

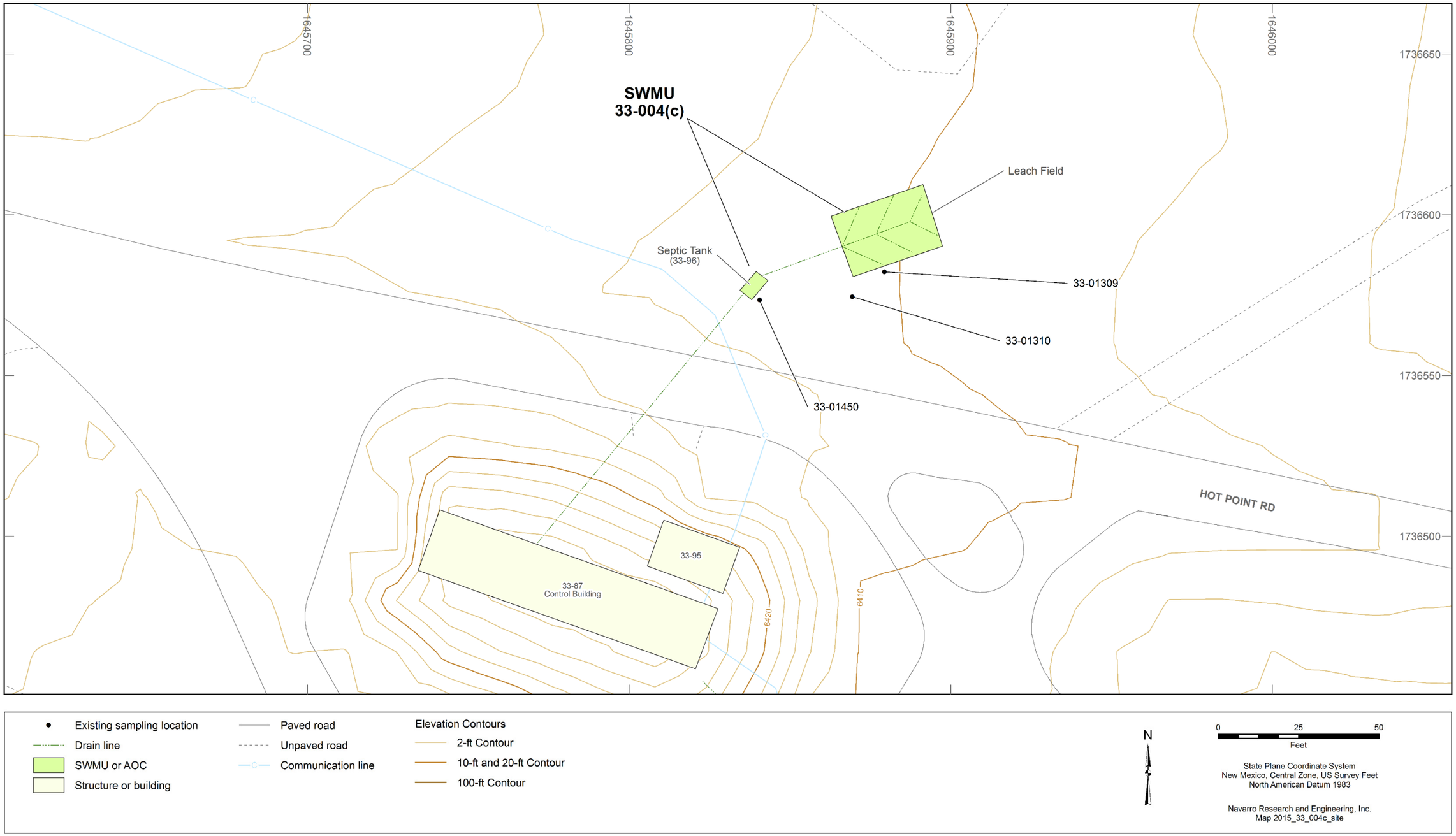


Figure 2.3-1 Site features and historical sampling locations for SWMU 33-004(c)

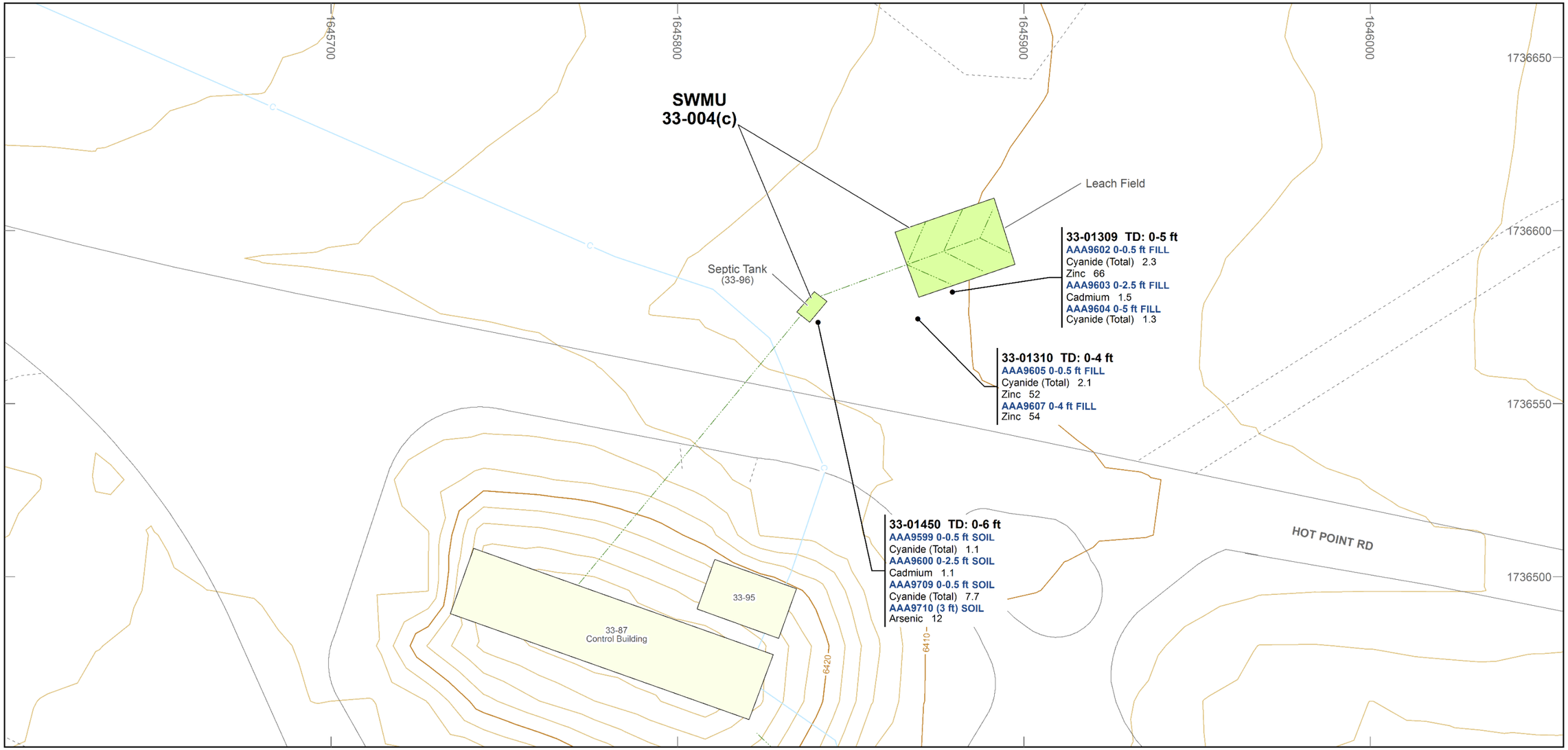


Figure 2.3-2 Inorganic chemicals detected above BVs at SWMU 33-004(c)

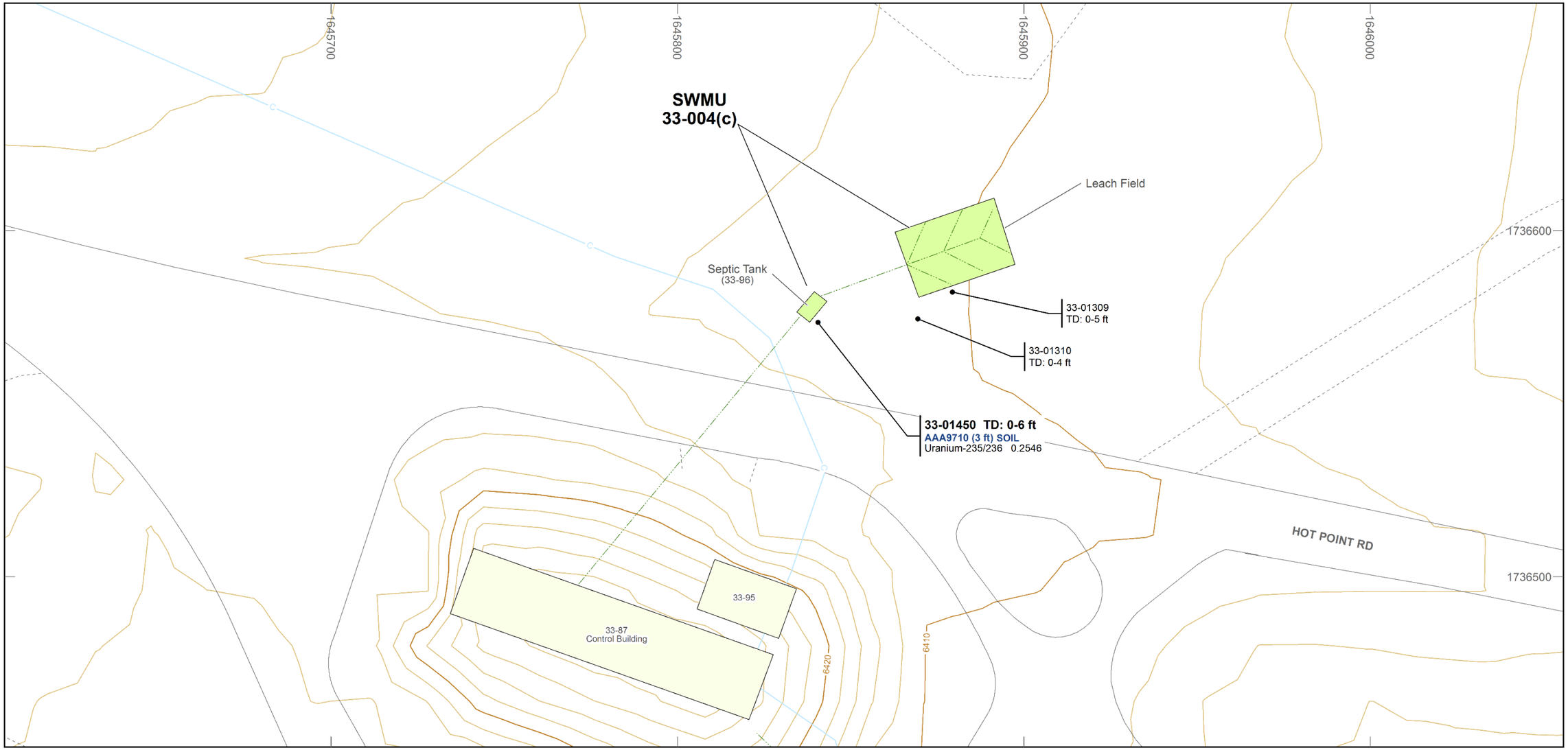


Figure 2.3-3 Radionuclides detected or detected above BVs/FVs at SWMU 33-004(c)

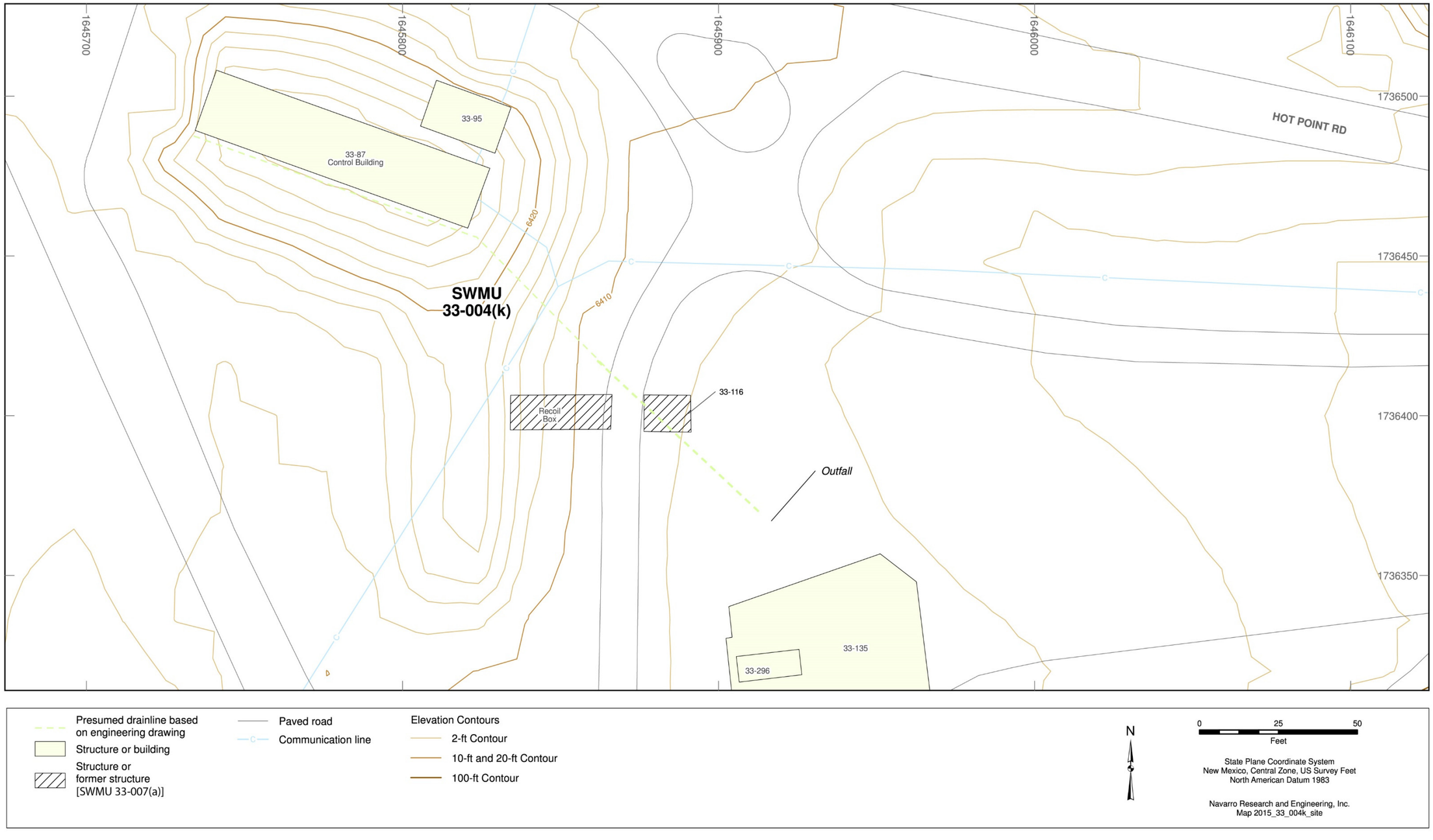


Figure 2.4-1 Site features for SWMU 33-004(k)

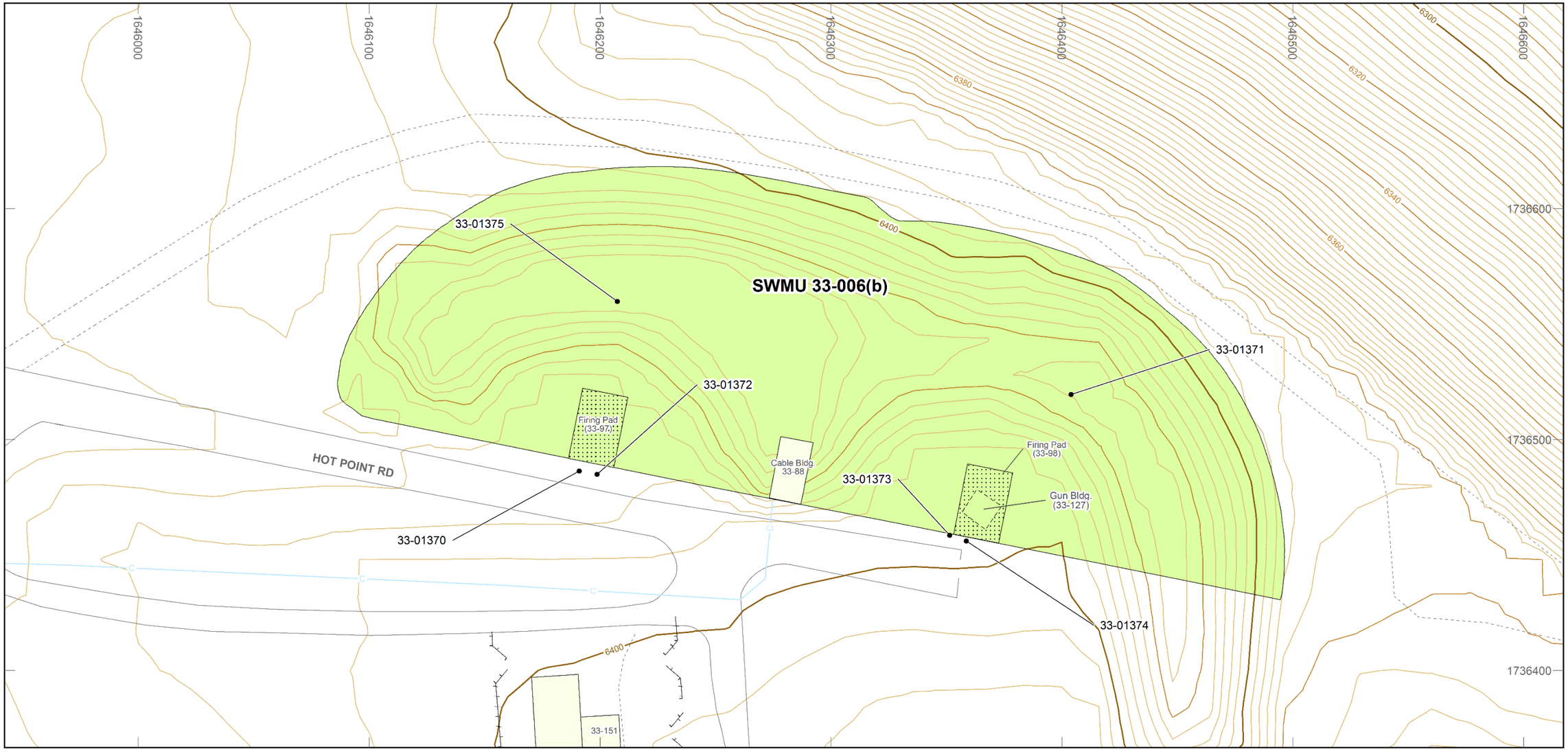


Figure 2.5-1 Site features and historical sampling locations for SWMU 33-006(b)

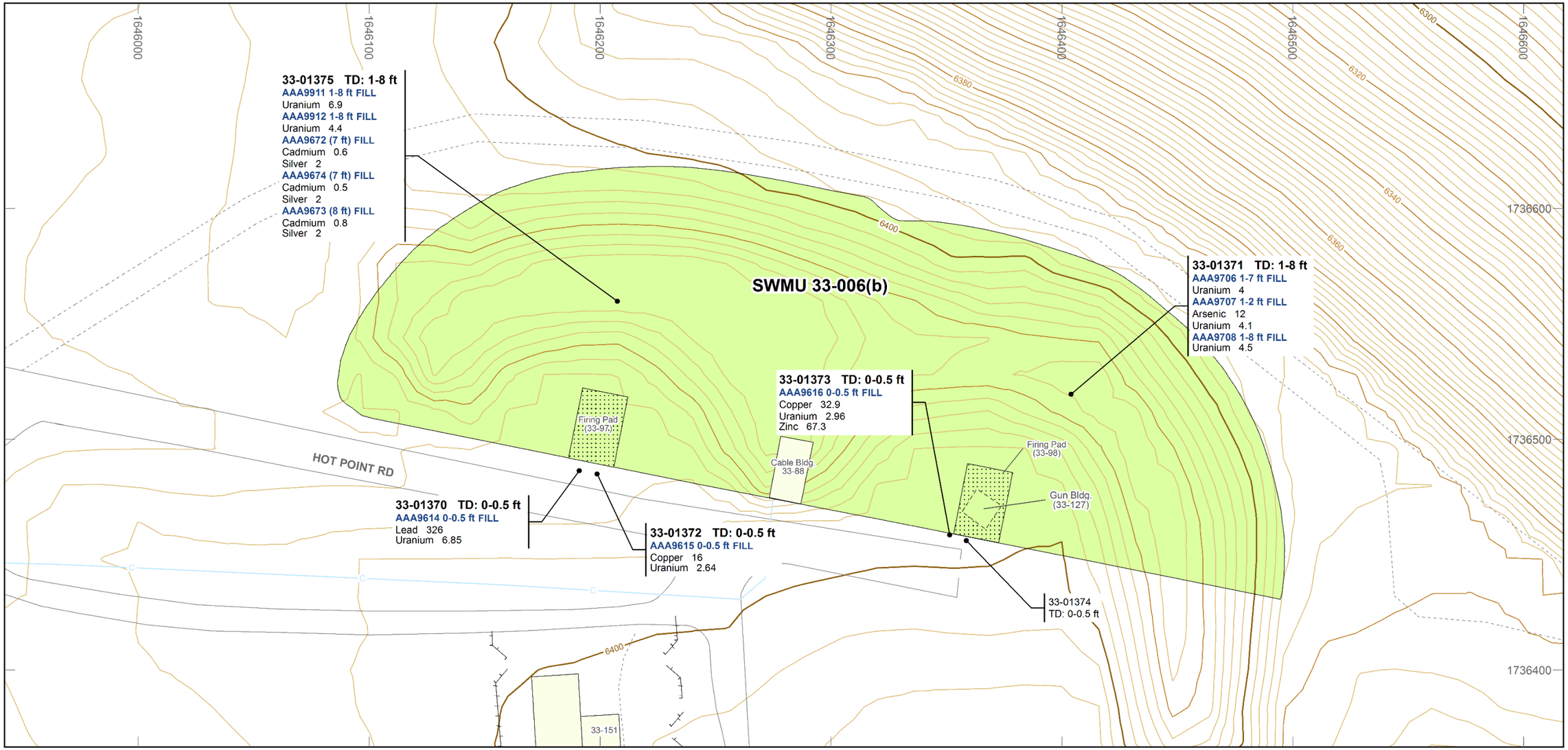


Figure 2.5-2 Inorganic chemicals detected above BVs at SWMU 33-006(b)

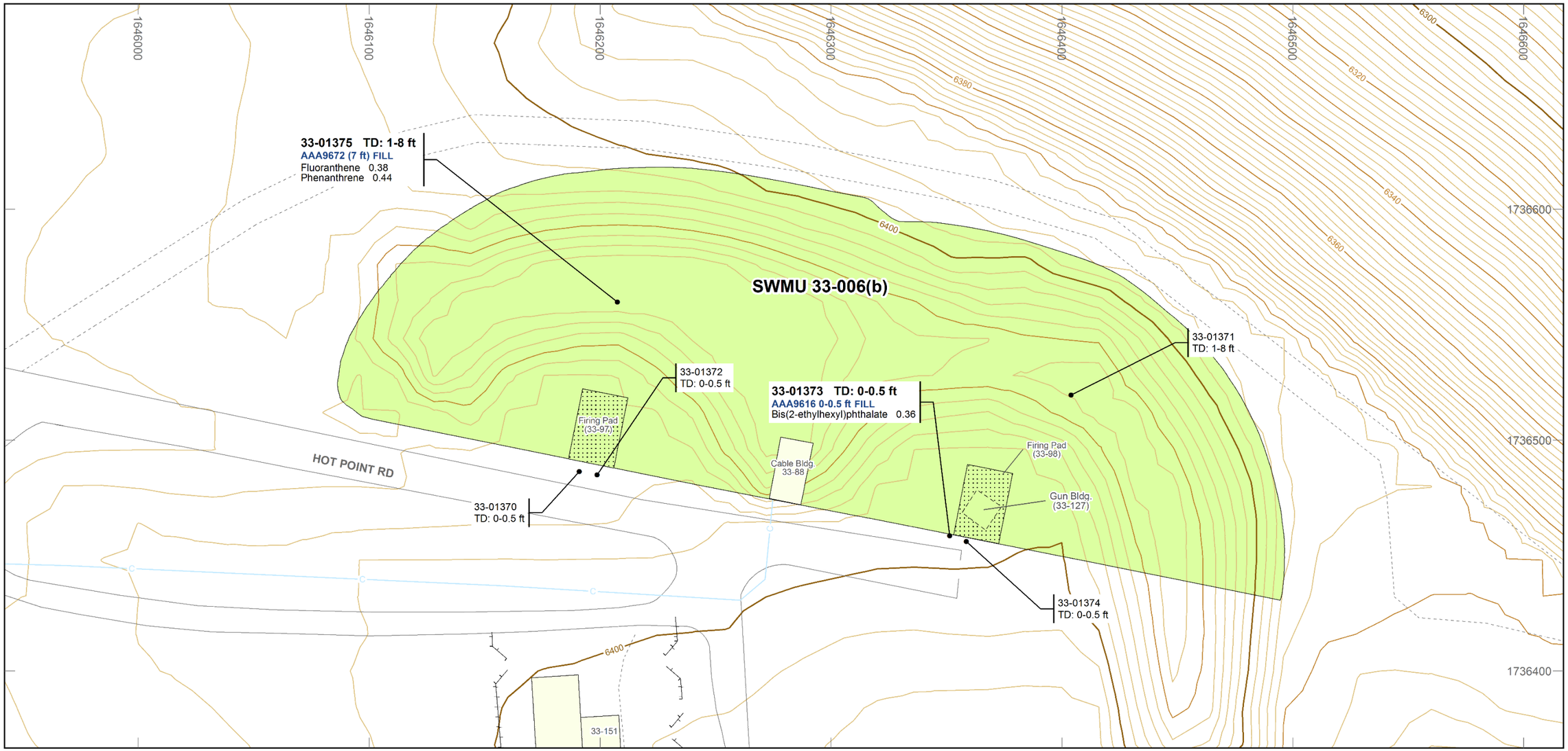


Figure 2.5-3 Organic chemicals detected at SWMU 33-006(b)

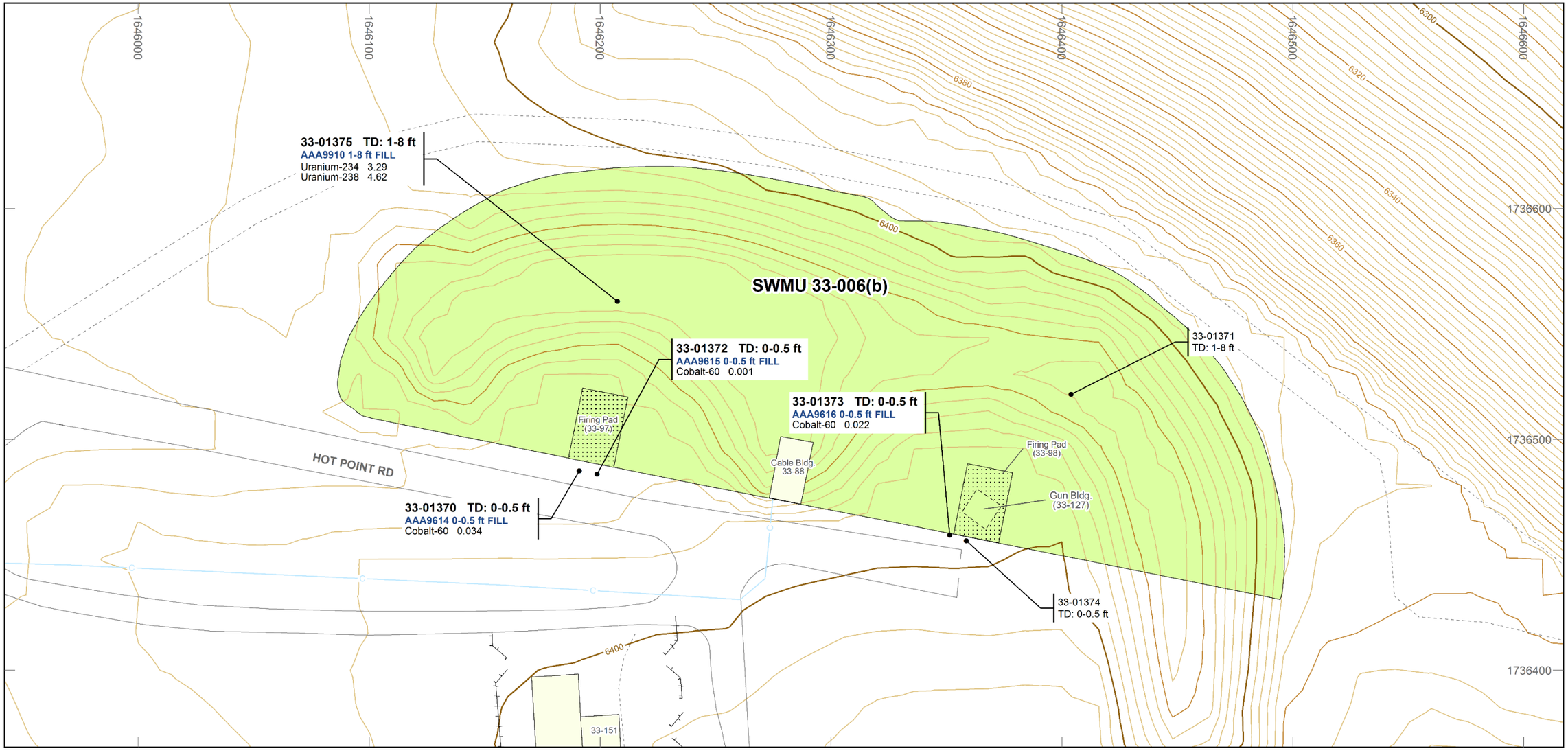


Figure 2.5-4 Radionuclides detected or detected above BVs/FVs at SWMU 33-006(b)

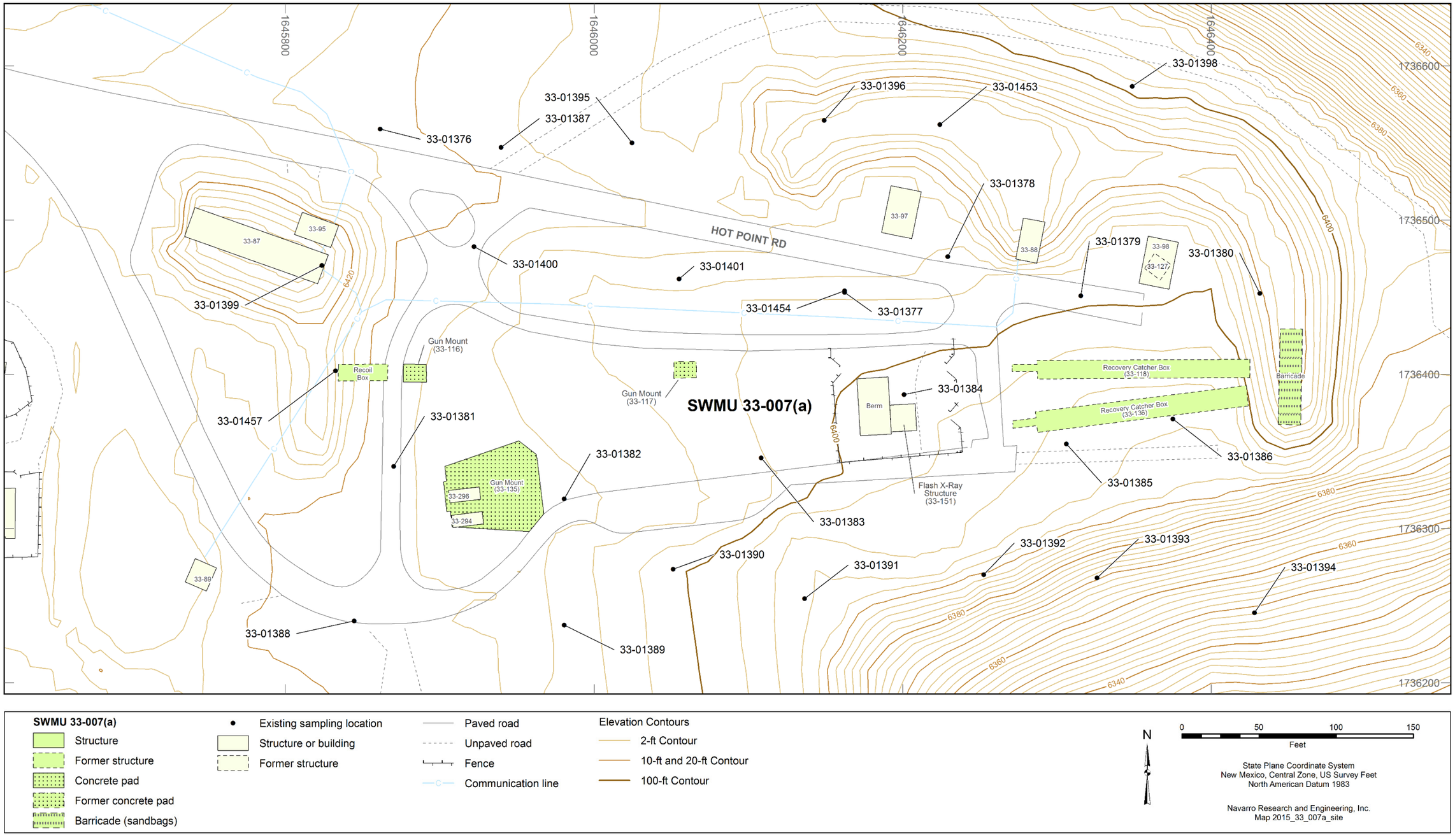


Figure 2.6-1 Site features and historical sampling locations for SWMU 33-007(a)

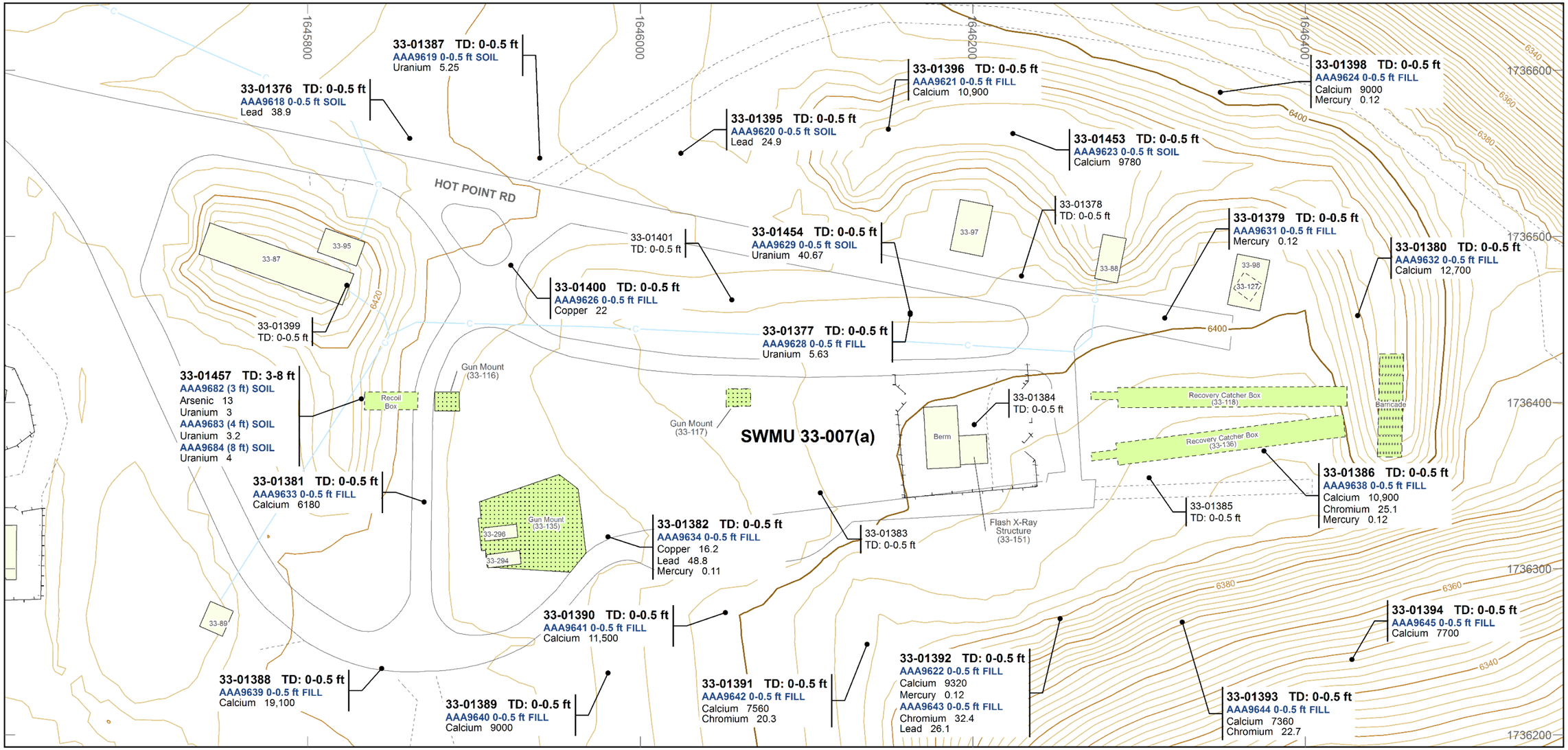


Figure 2.6-2 Inorganic chemicals detected above BVs at SWMU 33-007(a)

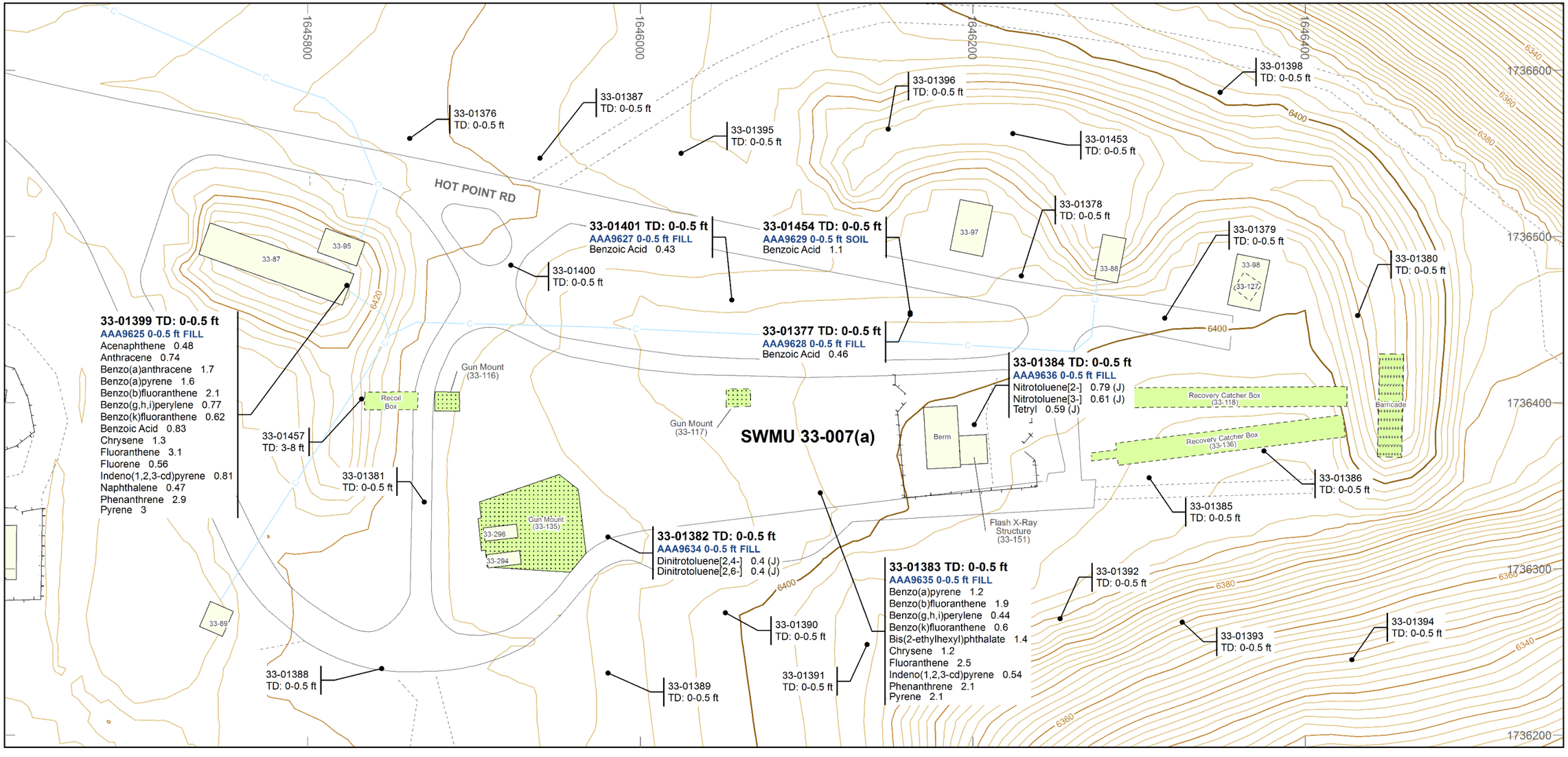


Figure 2.6-3 Organic chemicals detected at SWMU 33-007(a)

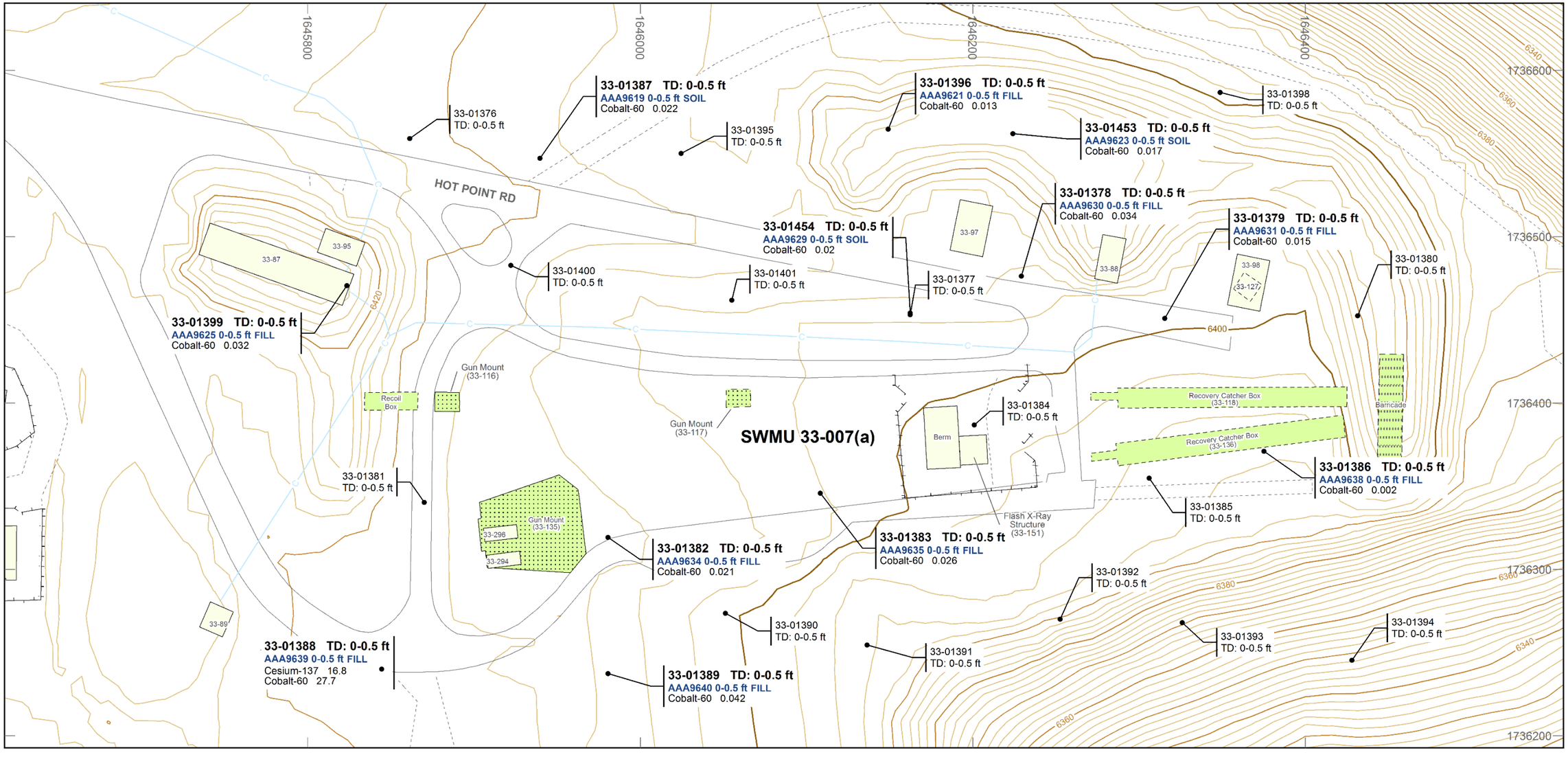


Figure 2.6-4 Radionuclides detected or detected above BVs/FVs at SWMU 33-007(a)

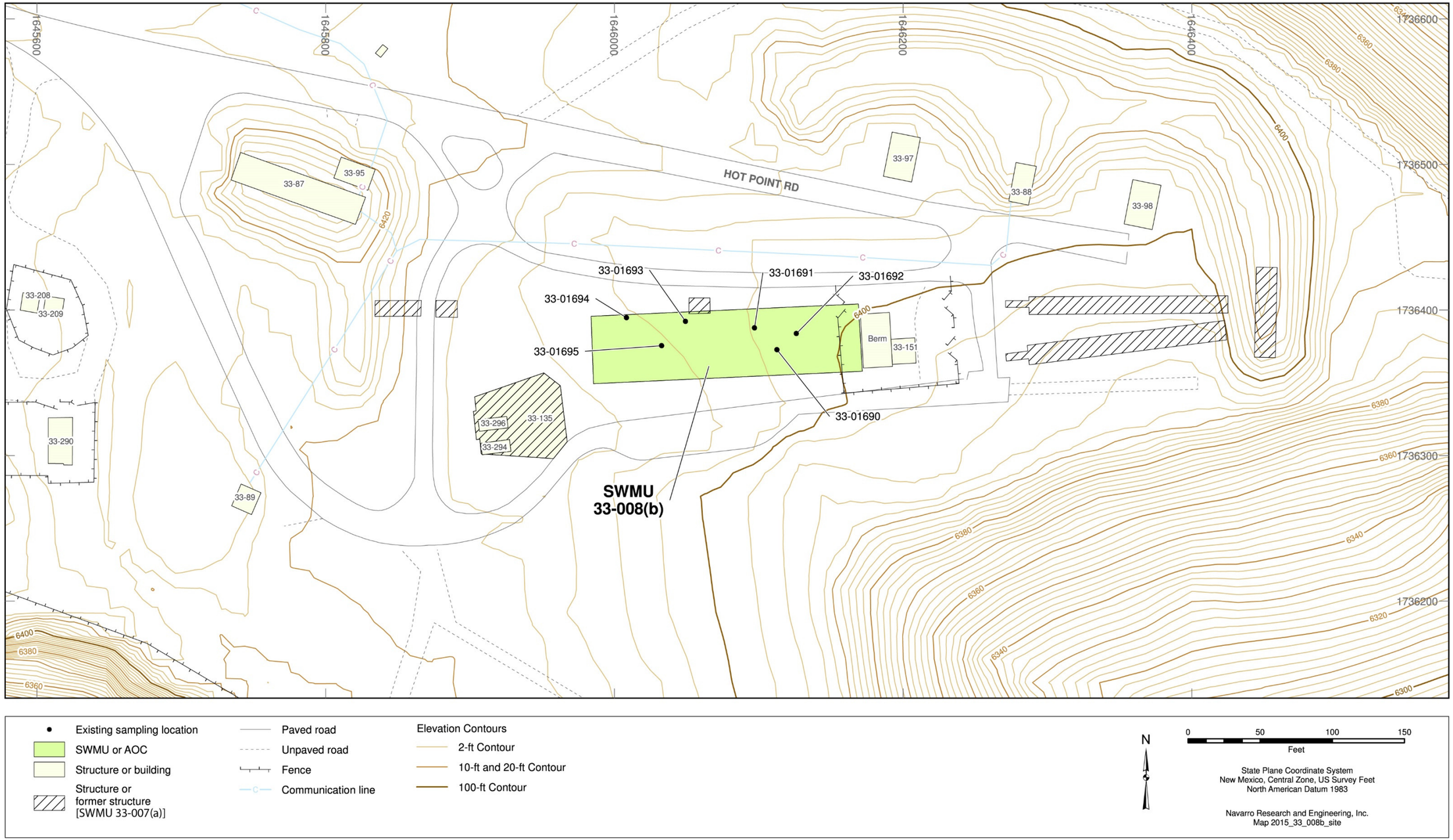


Figure 2.7-1 Site features and historical sampling locations for SWMU 33-008(b)

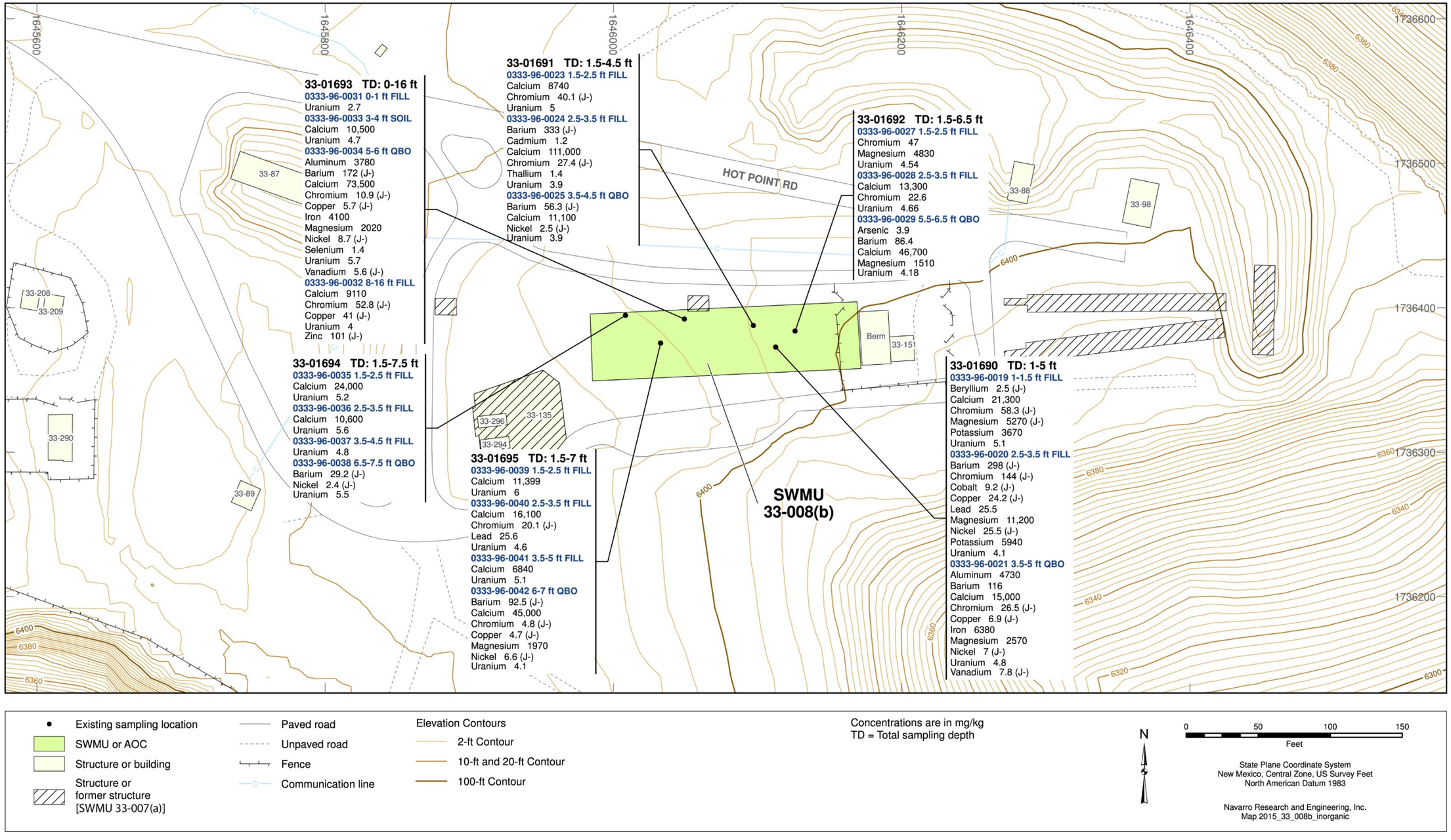


Figure 2.7-2 Inorganic chemicals detected above BVs at SWMU 33-008(b)

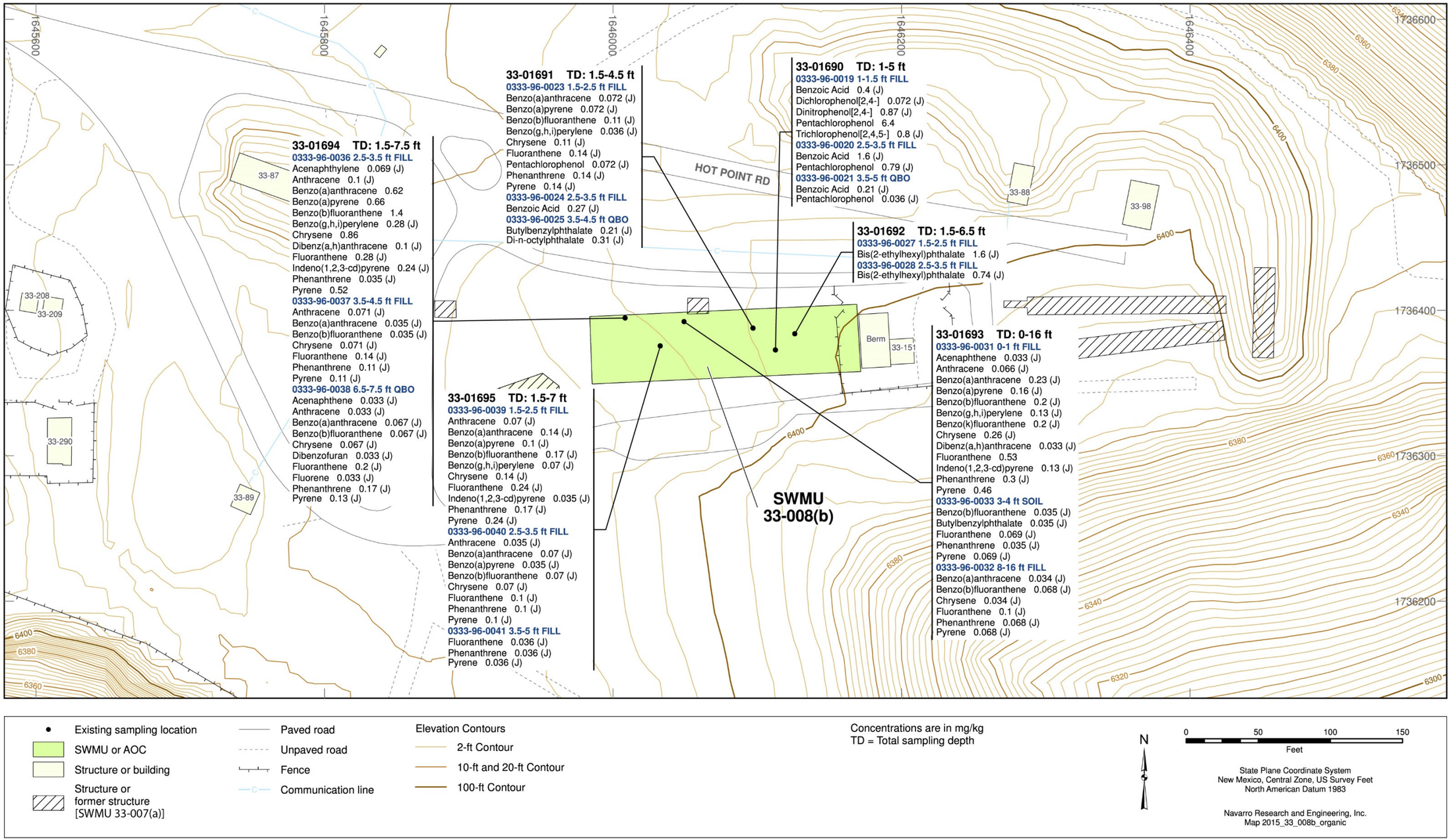


Figure 2.7-3 Organic chemicals detected at SWMU 33-008(b)

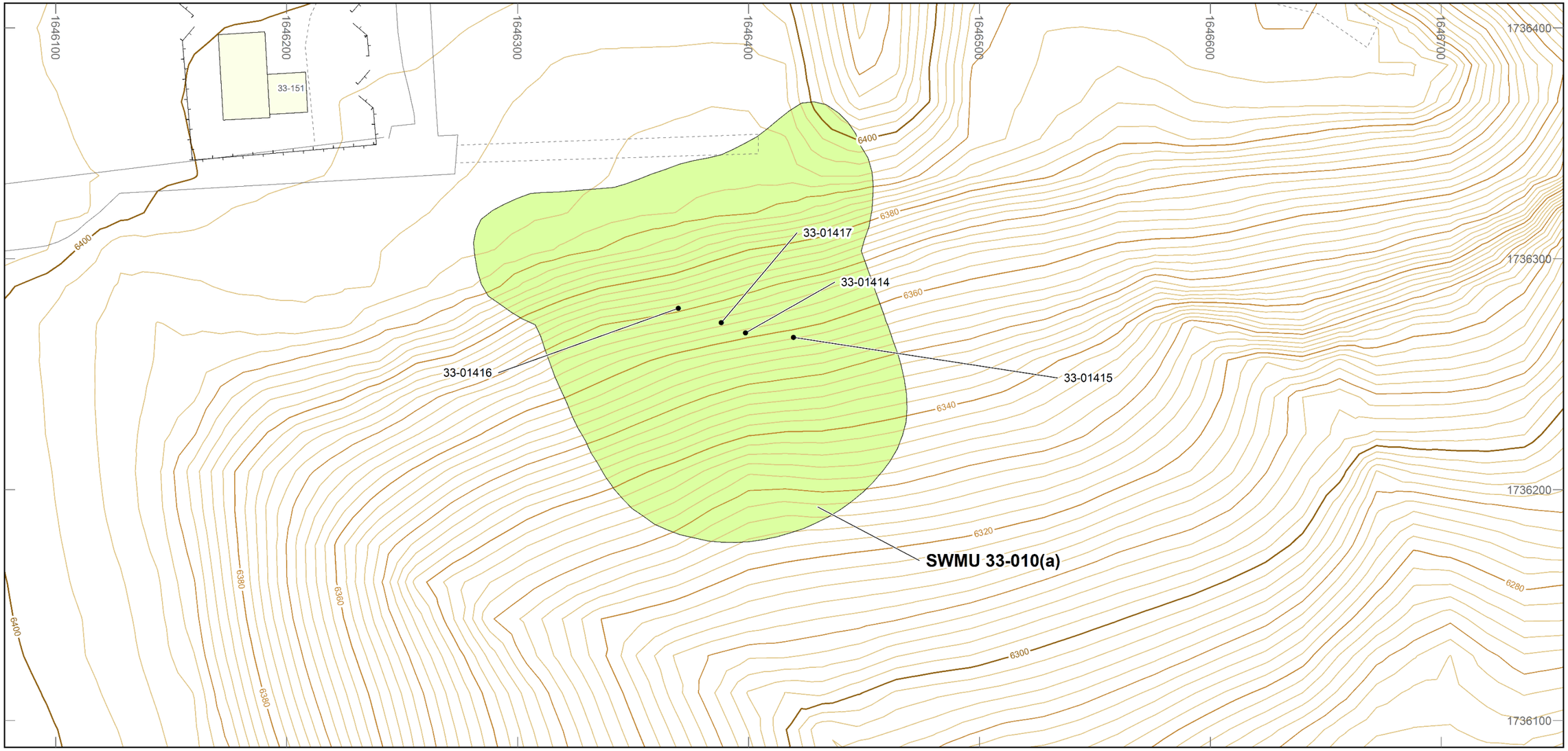


Figure 2.8-1 Site features and historical sampling locations for SWMU 33-010(a)

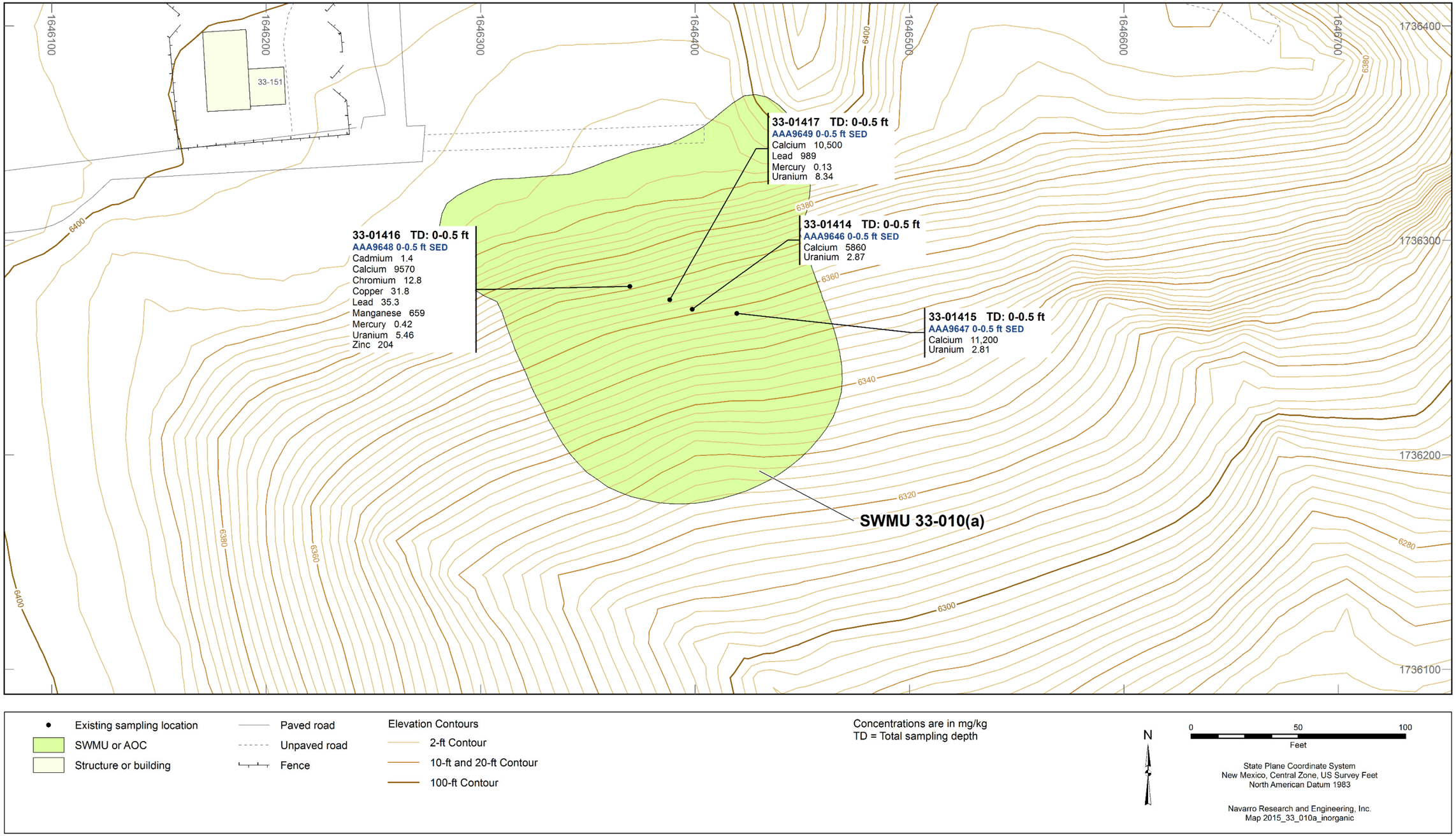


Figure 2.8-2 Inorganic chemicals detected above BVs at SWMU 33-010(a)

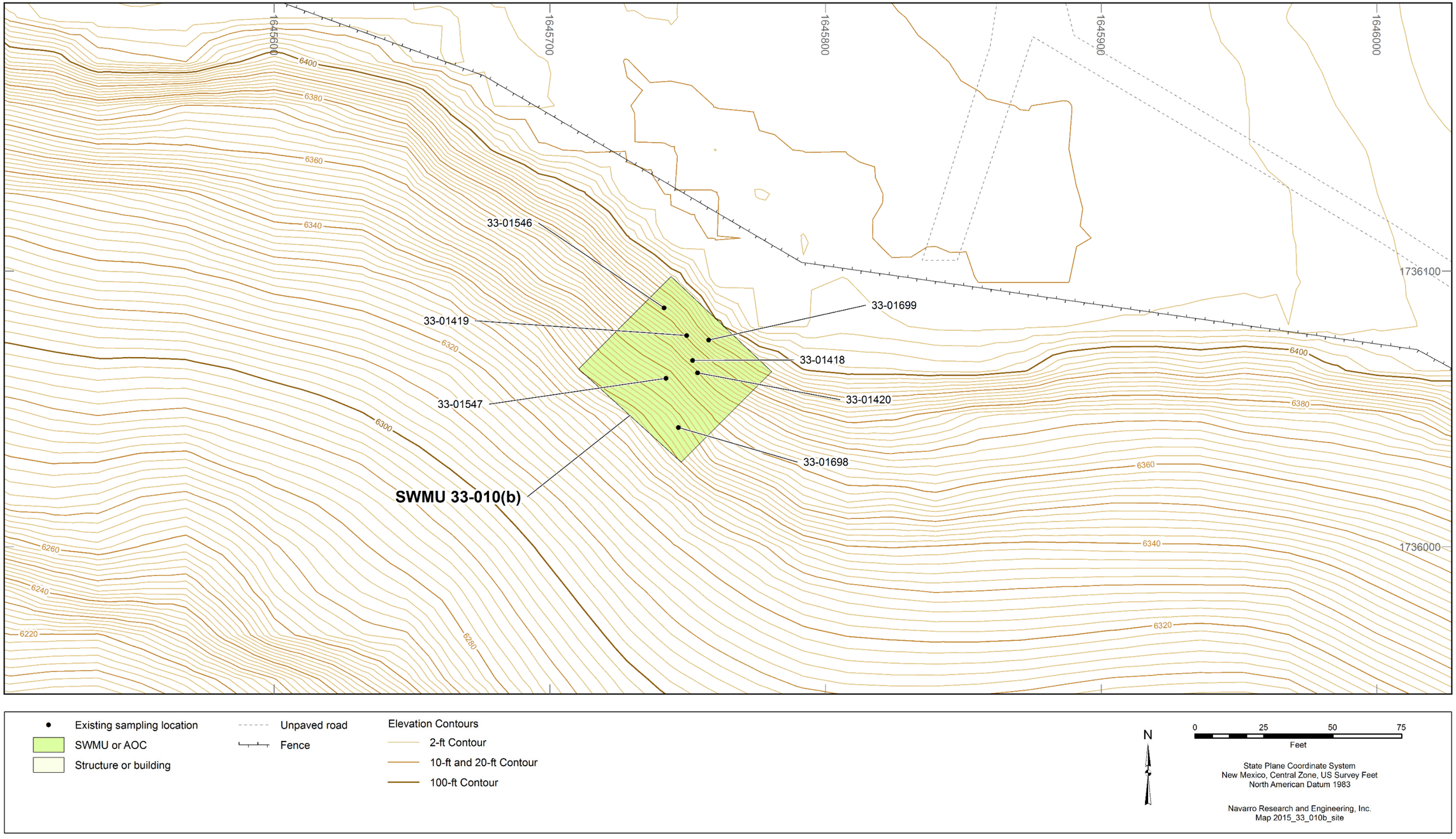


Figure 2.9-1 Site features and historical sampling locations for SWMU 33-010(b)

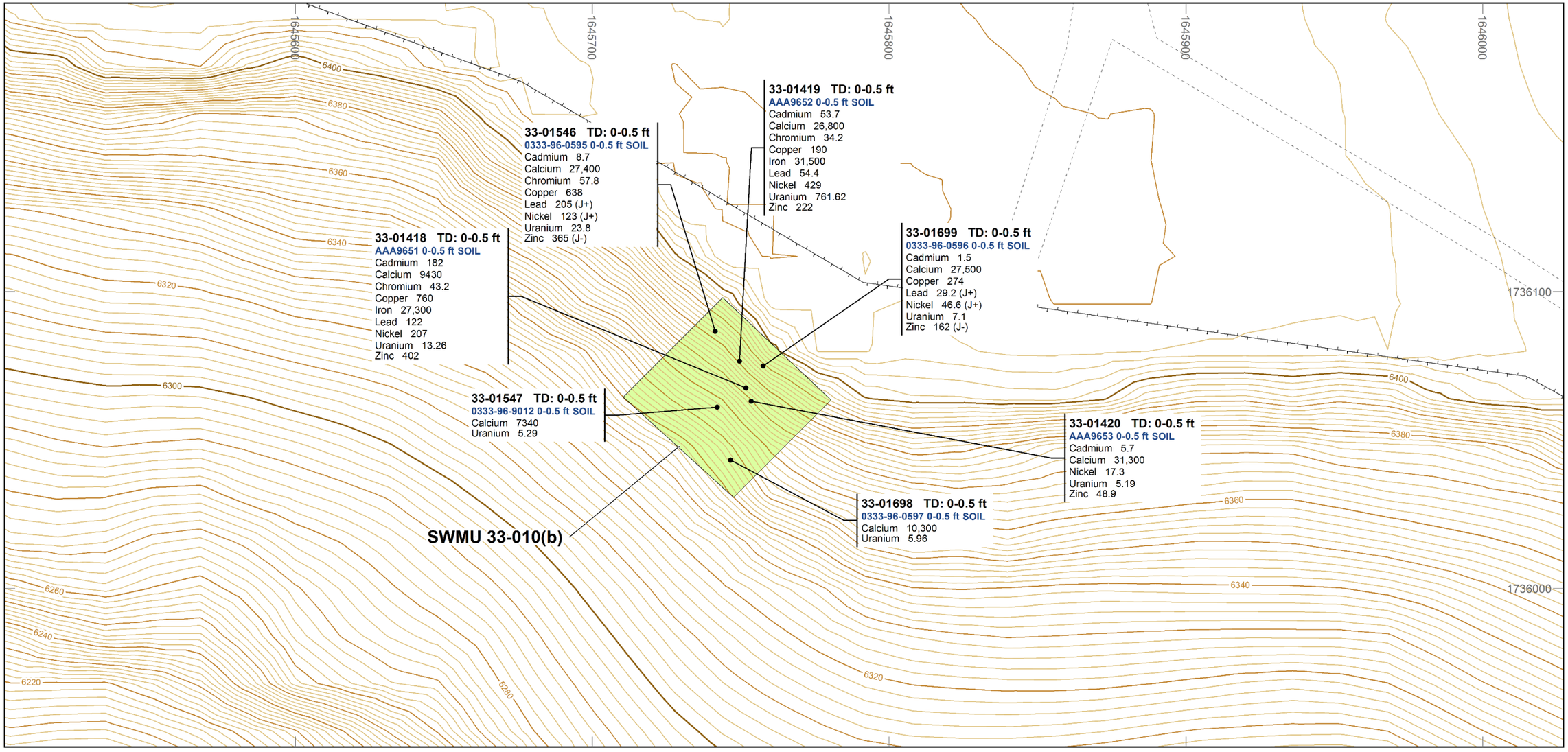


Figure 2.9-2 Inorganic chemicals detected above BVs at SWMU 33-010(b)

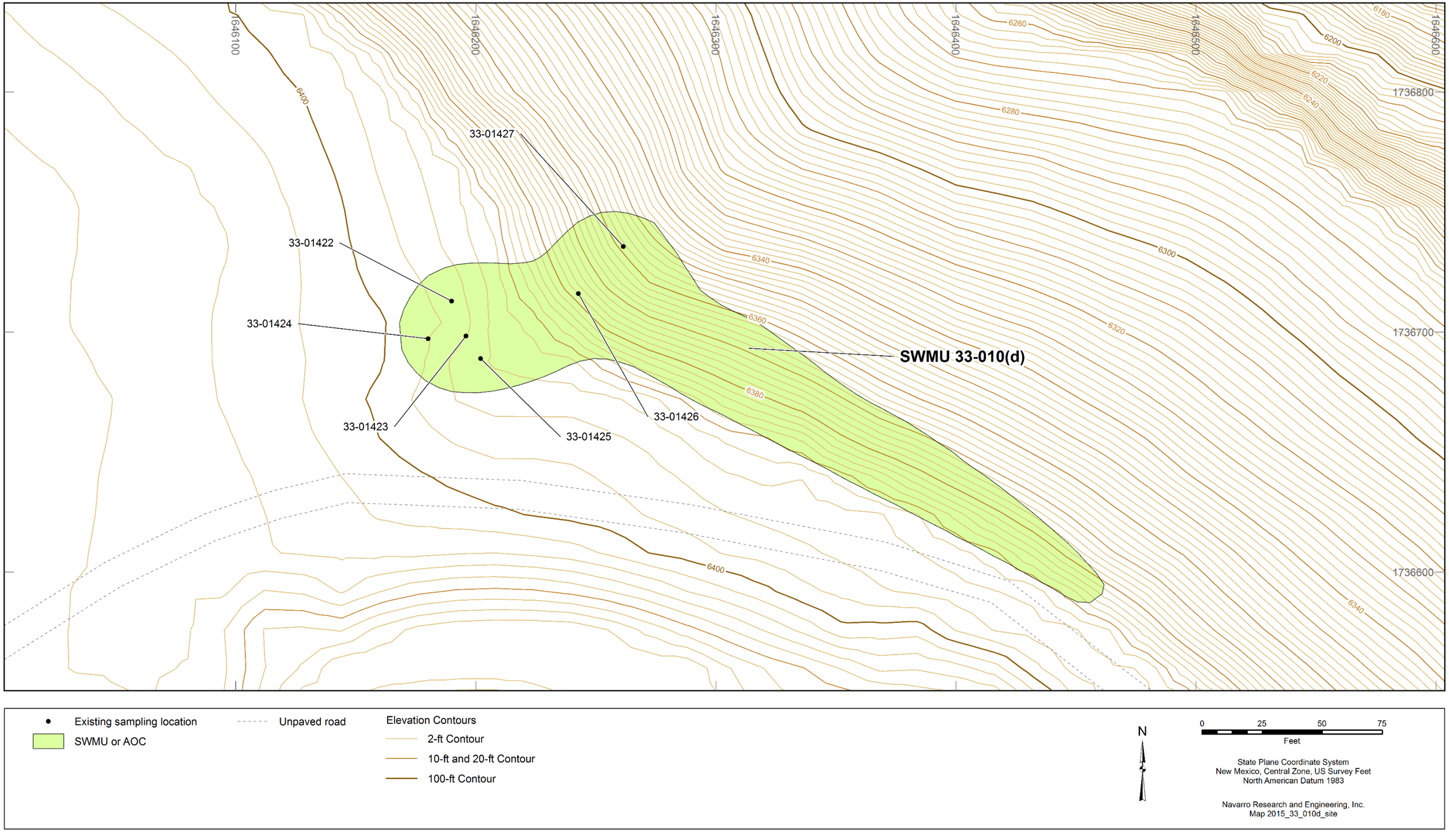


Figure 2.10-1 Site features and historical sampling locations for SWMU 33-010(d)

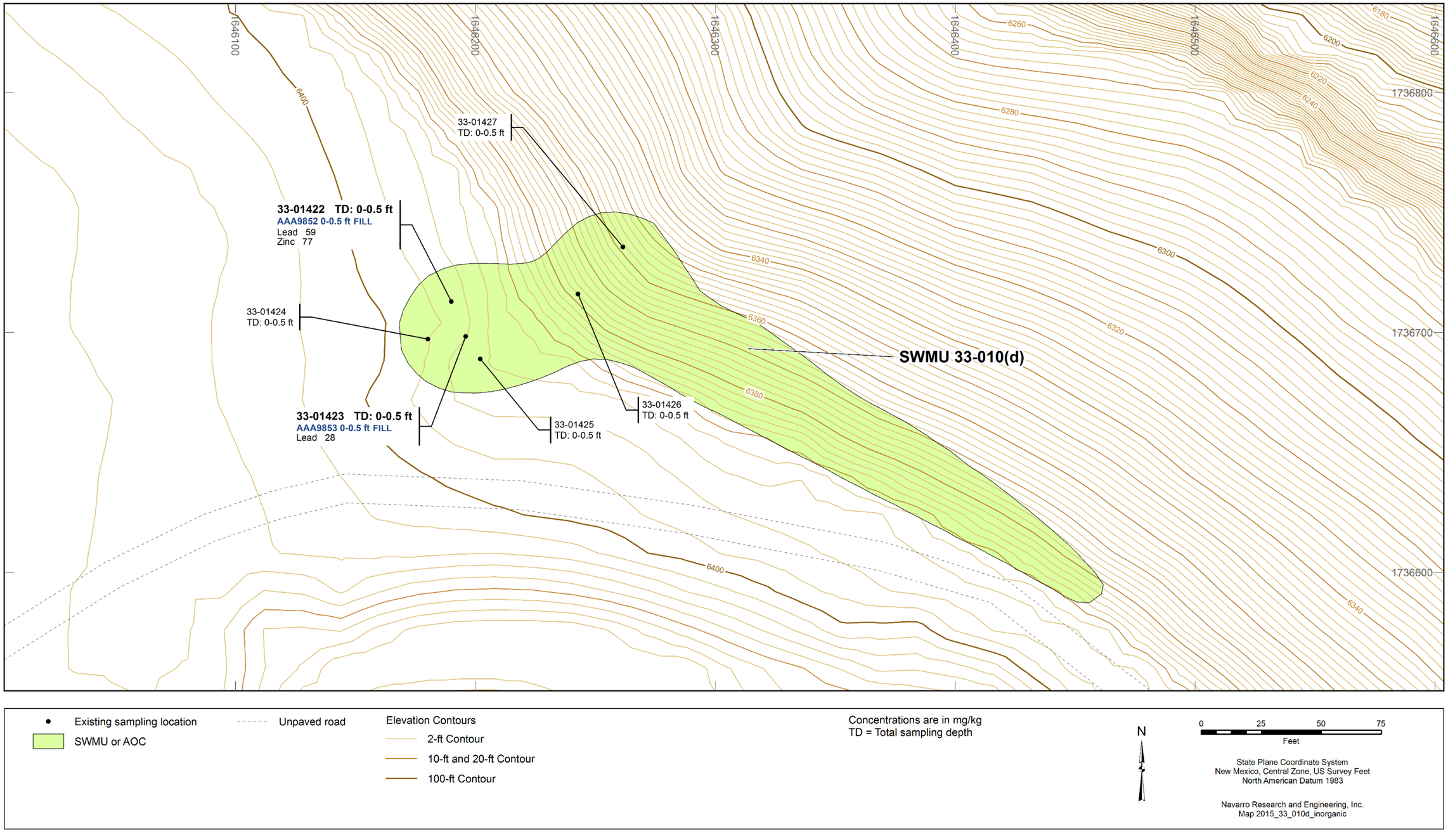


Figure 2.10-2 Inorganic chemicals detected above BVs at SWMU 33-010(d)

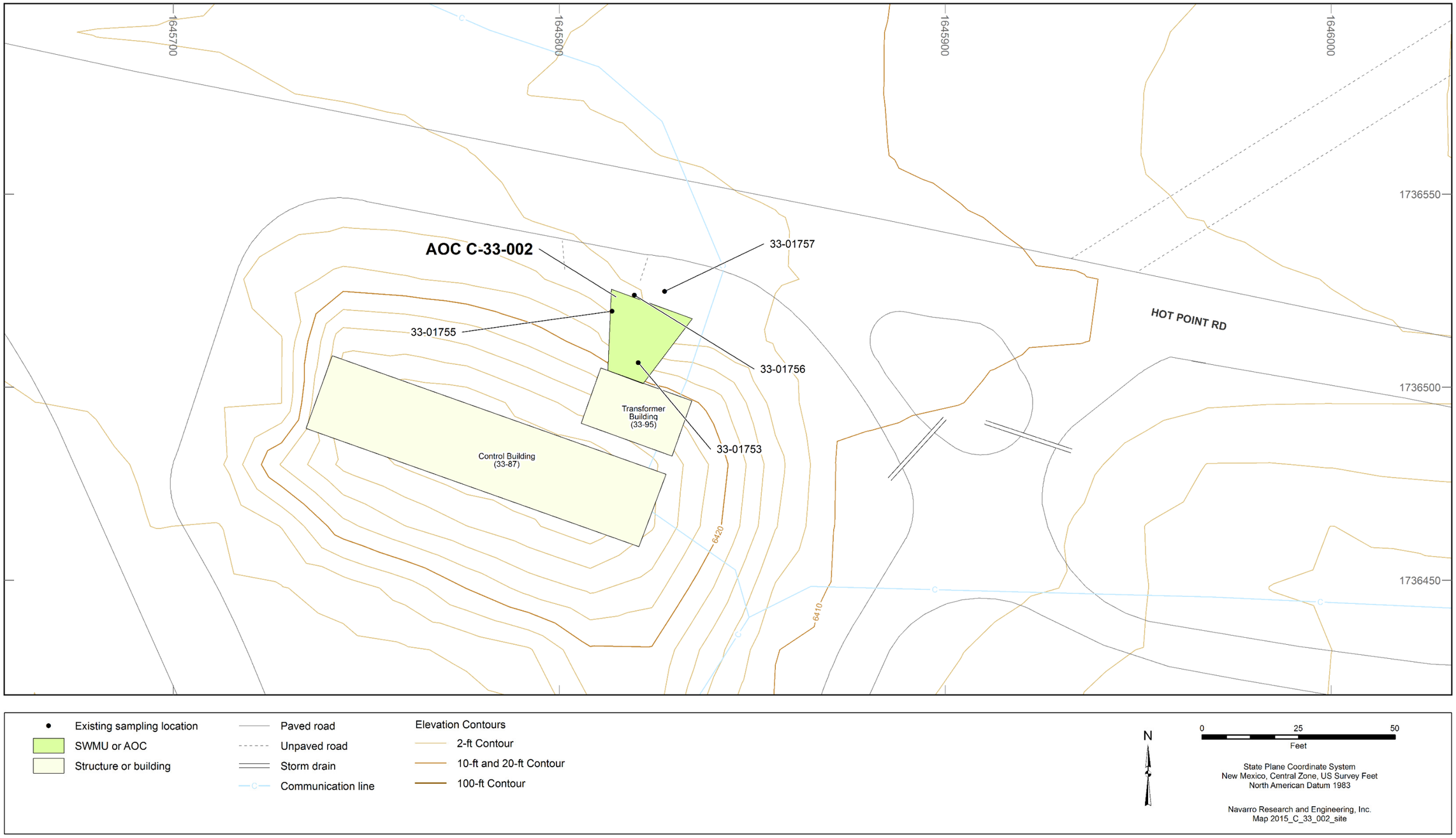


Figure 2.11-1 Site features and historical sampling locations for AOC C-33-002

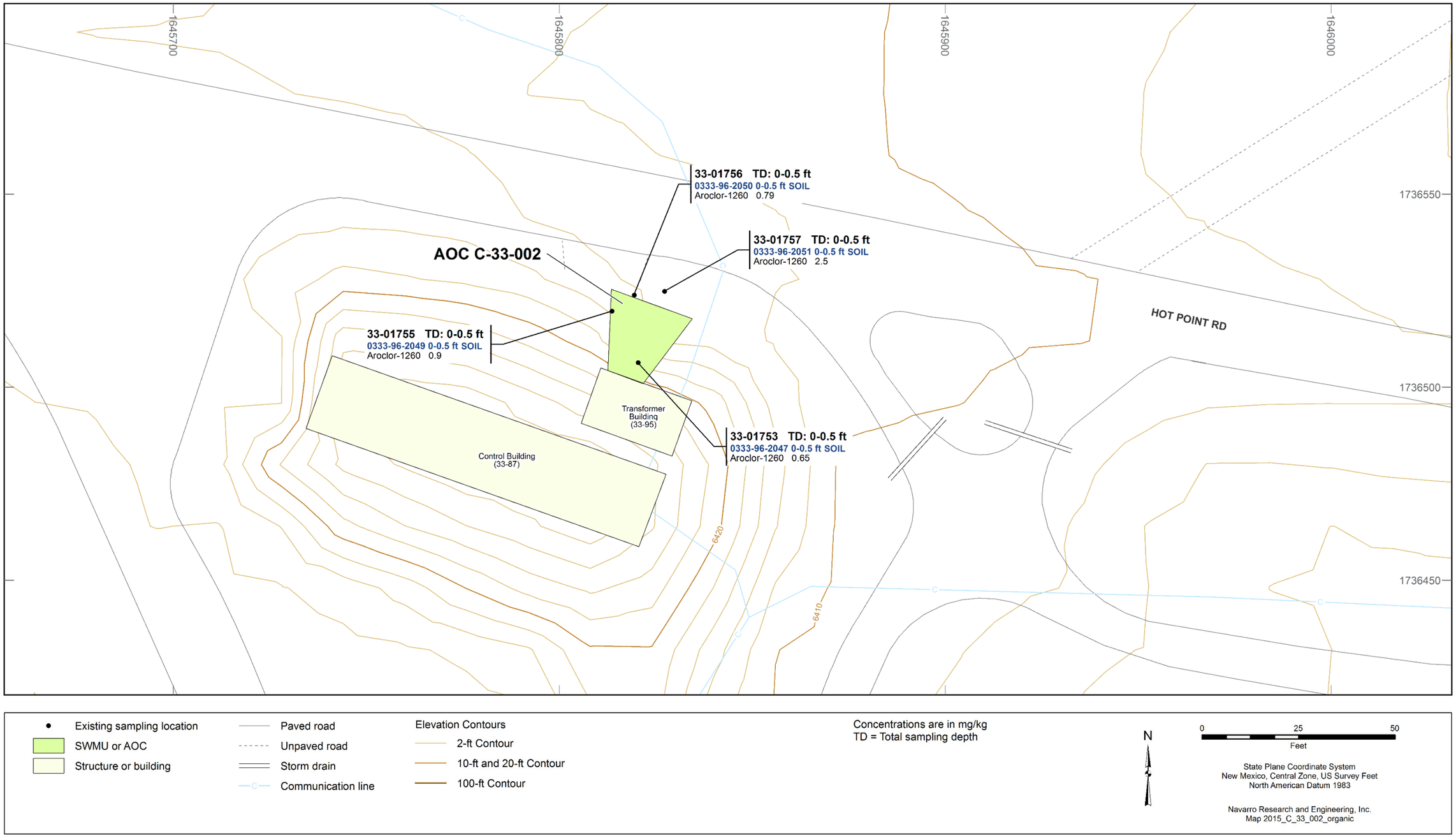


Figure 2.11-2 Organic chemicals detected at AOC C-33-002

Table 1.1-1
Status of SWMUs and AOC in South Ancho Canyon Aggregate Area

Site ID	Brief Description	Site Status	Reference
TA-33			
SWMU 33-003(a)	Soil Contamination	Under investigation	Work plan section 4.1
SWMU 33-003(b)	Soil Contamination	Under investigation	Work plan section 4.2
SWMU 33-004(c)	Septic System	Under investigation	Work plan section 4.3
SWMU 33-004(k)	Drainline and Outfall	Under investigation	Work plan section 4.4
SWMU 33-006(b)	Firing Site	Under investigation	Work plan section 4.5
SWMU 33-007(a)	Firing Site	Under investigation	Work plan section 4.6
SWMU 33-008(b)	Landfill	Under investigation	Work plan section 4.7
SWMU 33-010(a)	Surface Disposal Site	Under investigation	Work plan section 4.8
SWMU 33-010(b)	Surface Disposal Site	Under investigation	Work plan section 4.9
SWMU 33-010(d)	Surface Disposal Site	Under investigation	Work plan section 4.10
AOC C-33-002	Former Transformer	Under investigation	Work plan section 4.11
SWMU 33-004(l)	Outfall	NFA Approved, 07/15/1993	EPA 1993, 027049

Table 2.2-1
Samples Collected and Analyses Requested at SWMU 33-003(b)

Sample ID	Location ID	Depth (ft)	Media	Cyanide, Total	Gamma Spectroscopy	Metals	Pesticides/ PCBs	SVOCs	HE
AAA9608	33-01300	0–0.5	Soil	—*	19470	19256	—	—	17610
AAA9609	33-01300	0–0.5	Soil	—	19470	19256	—	—	17610
AAA9610	33-01302	0–0.5	Soil	—	19470	19256	—	—	17610
AAA9611	33-01303	0–0.5	Soil	—	19470	19256	—	—	17610
AAA9612	33-01304	0–0.5	Soil	—	19470	19256	—	—	17610
AAA9602	33-01309	0–0.5	Fill	18837	18756	18837	—	18085	—
AAA9605	33-01310	0–0.5	Fill	18837	18756	18837	—	18085	—
AAA9599	33-01450	0–0.5	Soil	18837	18756	18837	—	18085	—
AAA9613	33-01452	0–0.5	Soil	—	19470	19256	—	—	17610
0333-96-0300	33-01745	4.5–5	Soil	—	—	2144	2143	—	—
0333-96-0301	33-01745	9–10	Soil	—	—	2144	—	—	—
0333-96-0302	33-01745	14–15	Soil	—	—	2144	—	—	—
0333-96-0303	33-01746	0–1.5	Soil	—	—	2144	2143	—	—
0333-96-0304	33-01746	4–5	Soil	—	—	2144	2143	—	—
0333-96-0305	33-01746	10–12	Soil	—	—	2144	2143	—	—

* — = Analysis not requested.

Table 2.2-2
Inorganic Chemicals above BVs at SWMU 33-003(b)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Cyanide (Total)	Lead	Potassium	Silver	Thallium	Zinc
Soil BV[a]				**0.83**	**0.4**	**6120**	**0.5**	**22.3**	**3460**	**1**	**0.73**	**48.8**
Construction Worker SSL[b]				**142**	**72.1**	**8850000**	**12.1**	**800**	**19900000**	**1770**	**3.54**	**106000**
Industrial SSL[b]				**519**	**1110**	**32400000**	**63.3**	**800**	**73000000**	**6490**	**13**	**389000**
Residential SSL[b]				**31.3**	**70.5**	**13000000**	**11.2**	**400**	**15600000**	**391**	**0.782**	**23500**
AAA9608	33-01300	0–0.5	Soil	5 (U)	0.41 (U)	—[c]	NA[d]	—	—	—	—	—
AAA9609	33-01300	0–0.5	Soil	5.4 (U)	0.94 (U)	7480	NA	—	4720	—	—	66.2
AAA9610	33-01302	0–0.5	Soil	5.2 (U)	0.63 (U)	58100	NA	—	—	—	—	—
AAA9611	33-01303	0–0.5	Soil	4.9 (U)	0.46 (U)	—	NA	—	—	—	—	—
AAA9612	33-01304	0–0.5	Soil	5.1 (U)	0.48 (U)	—	NA	44.4	—	—	—	64.2
AAA9602	33-01309	0–0.5	Fill	—	1 (U)	NA	2.3	—	NA	5 (U)	NA	66
AAA9605	33-01310	0–0.5	Fill	—	1 (U)	NA	2.1	—	NA	5 (U)	NA	52
AAA9599	33-01450	0–0.5	Soil	—	1 (U)	NA	1.1	—	NA	5 (U)	NA	—
AAA9613	33-01452	0–0.5	Soil	5.3 (U)	0.55 (U)	—	NA	24.2	—	—	—	71.3
0333-96-0300	33-01745	4.5–5	Soil	—	—	—	NA	—	—	—	0.82 (J)	—
0333-96-0301	33-01745	9–10	Soil	—	—	—	NA	—	—	—	1.8 (J)	—
0333-96-0303	33-01746	0–1.5	Soil	—	—	56800	NA	—	—	—	1.1 (J)	—
0333-96-0304	33-01746	4–5	Soil	—	—	—	NA	—	—	—	1.3 (J)	—

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] Soil screeninglevels (SSLs) from NMED (2014, 600115).

[c] — = Not detected or not detected above BV.

[d] NA = Not analyzed.

Table 2.2-3
Radionuclides Detected or Detected above BVs/FVs at SWMU 33-003(b)

Sample ID	Location ID	Depth (ft)	Media	Cobalt-60
Soil BV				**na**[a]
Construction Worker SAL[b]				**6.8**
Industrial SAL[b]				**8.5**
Residential SAL[b]				**2.5**
AAA9608	33-01300	0–0.5	Soil	—[c]
AAA9609	33-01300	0–0.5	Soil	0.014
AAA9610	33-01302	0–0.5	Soil	0.014
AAA9611	33-01303	0–0.5	Soil	0.011
AAA9612	33-01304	0–0.5	Soil	—
AAA9613	33-01452	0–0.5	Soil	1.07

Note: All activities are in pCi/g. Data qualifiers are defined in Appendix A.

[a] na = Not available.

[b] Screening action levels (SALs) from LANL (2014, 600064).

[c] — = Not detected.

Table 2.3-1
Samples Collected and Analyses Requested at SWMU 33-004(c)

Sample ID	Location ID	Depth (ft)	Media	Cyanide, Total	Gamma Spectroscopy	Isotopic Uranium	TAL Metals	VOCs	SVOCs
AAA9602	33-01309	0–0.5	Fill	18837	18756	—*	18837	—	18085
AAA9603	33-01309	0–2.5	Fill	18837	18756	—	18837	18085	18085
AAA9604	33-01309	0–5	Fill	18837	18756	—	18837	18085	18085
AAA9605	33-01310	0–0.5	Fill	18837	18756	—	18837	—	18085
AAA9606	33-01310	0–2.5	Fill	18837	18756	—	18837	18085	18085
AAA9607	33-01310	0–4	Fill	18837	18756	—	18837	18085	18085
AAA9709	33-01450	0–0.5	Soil	18616	19026	—	18616	—	18115
AAA9599	33-01450	0–0.5	Soil	18837	18756	—	18837	—	18085
AAA9600	33-01450	0–2.5	Soil	18837	18756	—	18837	18085	18085
AAA9601	33-01450	0–4.5	Soil	18837	18756	—	18837	18085	18085
AAA9710	33-01450	3–3	Soil	18616	19026	19026	18616	18115	18115
AAA9711	33-01450	6–6	Soil	18616	19026	—	18616	18115	18115

* — = Analysis not requested.

Table 2.3-2
Inorganic Chemicals above BVs at SWMU 33-004(c)

Sample ID	Location ID	Depth (ft)	Media	Arsenic	Cadmium	Cyanide (Total)	Silver	Zinc
Soil BV[a]				**8.17**	**0.4**	**0.5**	**1**	**48.8**
Construction Worker SSL[b]				**57.4**	**72.1**	**12**	**1770**	**106000**
Industrial SSL[b]				**21.5**	**1110**	**63**	**6490**	**389000**
Residential SSL[b]				**4.25**	**70.5**	**11**	**391**	**23500**
AAA9602	33-01309	0–0.5	Fill	—[c]	1 (U)	2.3	5 (U)	66
AAA9603	33-01309	0–2.5	Fill	—	1.5	—	5 (U)	—
AAA9604	33-01309	0–5	Fill	—	1 (U)	1.3	5 (U)	—
AAA9605	33-01310	0–0.5	Fill	—	1 (U)	2.1	5 (U)	52
AAA9606	33-01310	0–2.5	Fill	—	1 (U)	—	5 (U)	—
AAA9607	33-01310	0–4	Fill	—	1 (U)	—	5 (U)	54
AAA9599	33-01450	0–0.5	Soil	—	1 (U)	1.1	5 (U)	—
AAA9709	33-01450	0–0.5	Soil	—	–	7.7	—	—
AAA9600	33-01450	0–2.5	Soil	—	1.1	—	5 (U)	—
AAA9601	33-01450	0–4.5	Soil	—	1 (U)	—	5 (U)	—
AAA9710	33-01450	3–3	Soil	12	—	—	—	—

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] SSLs from NMED (2014, 600115).

[c] — = Not detected or not detected above BV.

Table 2.3-3
Radionuclides Detected or Detected above BVs/FVs at SWMU 33-004(c)

Sample ID	Location ID	Depth (ft)	Media	Uranium-235/236
Soil BV[a]				**0.2**
Construction Worker SAL[b]				**100**
Industrial SAL[b]				**150**
Residential SSL[b]				**39**
AAA9710	33-01450	3–3	Soil	0.2546

Note: All activities are in pCi/g. Data qualifiers are defined in Appendix A.

[a] BV is from LANL (1998, 059730).

[b] SALs from LANL (2014, 600064).

Table 2.5-1
Samples Collected and Analyses Requested at SWMU 33-006(b)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Uranium	Isotopic Uranium	TAL Metals	SVOCs	HE
AAA9614	33-01370	0–0.5	Fill	19354	19354	—*	19257	17669	17668
AAA9707	33-01371	1–2	Fill	18758	—	—	18590 18758	18104	18103
AAA9706	33-01371	1–7	Fill	18758	—	—	18590 18758	18104	18103
AAA9708	33-01371	1–8	Fill	18758	—	—	18590 18758	18104	18103
AAA9615	33-01372	0–0.5	Fill	19354	19354	—	19257 —	17669	17668
AAA9616	33-01373	0–0.5	Fill	19354	19354	—	19257 —	17669	17668
AAA9617	33-01374	0–0.5	Fill	19354	19354	—	19257 —	17669	17668
AAA9910	33-01375	1–8	Fill	18758	—	18758	18590 18590	18104	18103
AAA9911	33-01375	1–8	Fill	18758	—	—	18590 18758	18104	18103
AAA9912	33-01375	1–8	Fill	18758	—	—	18590 18758	18104	18103
AAA9672	33-01375	7–7	Fill	19076	—	19076	19095 19095	18109	18112
AAA9674	33-01375	7–7	Fill	19076	—	19076	19095 19095	18109	18112
AAA9673	33-01375	8–8	Fill	19076	—	19076	19095 19095	18109	18112

* — = Analysis not requested.

Table 2.5-2
Inorganic Chemicals above BVs at SWMU 33-006(b)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Arsenic	Cadmium	Copper	Lead	Silver	Uranium	Zinc
Soil BV[a]				**0.83**	**8.17**	**0.4**	**14.7**	**22.3**	**1**	**1.82**	**48.8**
Construction Worker SSL[b]				**142**	**57.4**	**72.1**	**14200**	**800**	**1770**	**277**	**106000**
Industrial SSL[b]				**519**	**21.5**	**1110**	**51900**	**800**	**6490**	**3880**	**389000**
Residential SSL[b]				**31.3**	**4.25**	**70.5**	**3130**	**400**	**391**	**234**	**23500**
AAA9614	33-01370	0–0.5	Fill	4.4 (U)	—[c]	0.48 (U)	—	326	—	6.85	—
AAA9707	33-01371	1–2	Fill	—	12	—	NA[d]	—	13 (U)	4.1	—
AAA9706	33-01371	1–7	Fill	—	—	—	NA	—	13 (U)	4	—
AAA9708	33-01371	1–8	Fill	—	—	—	NA	—	13 (U)	4.5	—
AAA9615	33-01372	0–0.5	Fill	4.4 (U)	—	—	16	—	—	2.64	—
AAA9616	33-01373	0–0.5	Fill	4.4 (U)	—	0.98 (U)	32.9	—	—	2.96	67.3
AAA9617	33-01374	0–0.5	Fill	4.4 (U)	—	0.43 (U)	–	—	—	—	—
AAA9910	33-01375	1–8	Fill	—	—	—	NA	—	13 (U)	NA	—
AAA9911	33-01375	1–8	Fill	—	—	—	NA	—	13 (U)	6.9	—
AAA9912	33-01375	1–8	Fill	—	—	—	NA	—	13 (U)	4.4	—
AAA9672	33-01375	7–7	Fill	—	—	0.6	NA	—	2	NA	—
AAA9674	33-01375	7–7	Fill	—	—	0.5	NA	—	2	NA	—
AAA9673	33-01375	8–8	Fill	—	—	0.8	NA	—	2	NA	—

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs from LANL (1998, 059730).

[b] SSLs from NMED (2014, 600115).

[c] — = Not detected or not detected above BV.

[d] NA = Not analyzed.

Table 2.5-3
Organic Chemicals Detected at SWMU 33-006(b)

Sample ID	Location ID	Depth (ft)	Media	Bis(2-ethylhexyl)phthalate	Fluoranthene	Phenanthrene
Construction Worker SSL[a]				**5380**	**10000**	**7530**
Industrial SSL[a]				**1830**	**33700**	**25300**
Residential SSL[a]				**380**	**2320**	**1740**
AAA9616	33-01373	0–0.5	Fill	0.36	—[b]	—
AAA9672	33-01375	7–7	Fill	—	0.38	0.44

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2014, 600115).

[b] — = Not detected.

Table 2.5-4
Radionuclides Detected or Detected above BVs/FVs at SWMU 33-006(b)

Sample ID	Location ID	Depth (ft)	Media	Cobalt-60	Uranium-234	Uranium-238
Soil BV[a]				**na**[b]	**2.59**	**2.29**
Construction Worker SAL[c]				**6.8**	**770**	**410**
Industrial SAL[c]				**8.5**	**3000**	**750**
Residential SAL[c]				**2.5**	**270**	**150**
AAA9614	33-01370	0–0.5	Fill	0.034	NA[d]	NA
AAA9615	33-01372	0–0.5	Fill	0.001	NA	NA
AAA9616	33-01373	0–0.5	Fill	0.022	NA	NA
AAA9617	33-01374	0–0.5	Fill	—[e]	NA	NA
AAA9910	33-01375	1–8	Fill	—	3.29	4.62

Note: All activities are in pCi/g. Data qualifiers are defined in Appendix A.

[a] BVs are from LANL (1998, 059730).

[b] na = Not available.

[c] SALs from LANL (2014, 600064).

[d] NA = Not analyzed.

[e] — = Not detected.

Table 2.6-1
Samples Collected and Analyses Requested at SWMU 33-007(a)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Herbicides	HE	TAL Metals	SVOCs	Uranium
AAA9618	33-01376	0–0.5	Soil	19473	—*	17608	19980	—	19473
AAA9628	33-01377	0–0.5	Fill	19352	—	17665	17843	17663	19352
AAA9630	33-01378	0–0.5	Fill	19354	—	17668	19257	17669	19354
AAA9631	33-01379	0–0.5	Fill	19358	17674	17676	19253	—	19358
AAA9632	33-01380	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9633	33-01381	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9634	33-01382	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9635	33-01383	0–0.5	Fill	19358	17674	17676	19253	17674	19358
AAA9636	33-01384	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9637	33-01385	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9638	33-01386	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9619	33-01387	0–0.5	Soil	19473	—	17608	19980	—	19473
AAA9639	33-01388	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9640	33-01389	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9641	33-01390	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9642	33-01391	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9643	33-01392	0–0.5	Fill	19358	—	17676	19253	17674	19358
AAA9622	33-01392	0–0.5	Fill	19358	—	17676	19253	—	19358

Table 2.6-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Herbicides	HE	TAL Metals	SVOCs	Uranium
AAA9644	33-01393	0–0.5	Fill	19358	—	17676	19253	17674	19358
AAA9645	33-01394	0–0.5	Fill	19358	—	17676	19253	17674	19358
AAA9620	33-01395	0–0.5	Soil	19473	—	17608	19980	—	19473
AAA9621	33-01396	0–0.5	Fill	19473	17609	17608	19980	—	19473
AAA9624	33-01398	0–0.5	Fill	19358	—	17676	19253	—	19358
AAA9625	33-01399	0–0.5	Fill	19352	—	17665	17843	17663	19352
AAA9626	33-01400	0–0.5	Fill	19358	17674	17676	19253	—	19358
AAA9627	33-01401	0–0.5	Fill	19352	—	17665	17843	17663	19352
AAA9623	33-01453	0–0.5	Soil	19358	—	17676	19253	—	19358
AAA9629	33-01454	0–0.5	Soil	19352	—	17665	17843	17663	19352
AAA9682	33-01457	3–3	Soil	—	—	18103	18590 18758	18104	—
AAA9683	33-01457	4–4	Soil	—	—	18103	18590 18758	18104	—
AAA9684	33-01457	8–8	Soil	—	—	18103	18590 18758	18104	—

* — = Analysis not requested.

Table 2.6-2
Inorganic Chemicals above BVs at SWMU 33-007(a)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Arsenic	Cadmium	Calcium	Chromium	Copper	Lead	Mercury	Silver	Uranium
Soil BV[a]				**0.83**	**8.17**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**0.1**	**1**	**1.82**
Construction Worker SSL[b]				**142**	**57.4**	**72.1**	**8850000**	**134**[c]	**14200**	**800**	**77.1**	**1770**	**277**
Industrial SSL[b]				**519**	**21.5**	**1110**	**32400000**	**505**[c]	**51900**	**800**	**389**	**6490**	**3880**
Residential SSL[b]				**31.3**	**4.25**	**70.5**	**13000000**	**96.6**[c]	**3130**	**400**	**23.5**	**391**	**234**
AAA9618	33-01376	0–0.5	Soil	—[d]	—	—	—	—	—	38.9	—	—	—
AAA9628	33-01377	0–0.5	Fill	—	—	—	NA[e]	—	NA	—	NA	—	5.63
AAA9630	33-01378	0–0.5	Fill	4.2 (U)	—	0.54 (U)	—	—	—	—	—	—	—
AAA9631	33-01379	0–0.5	Fill	4.5 (U)	—	—	—	—	—	—	0.12	—	—
AAA9632	33-01380	0–0.5	Fill	5 (U)	—	0.55 (U)	12700	—	—	—	—	—	—
AAA9633	33-01381	0–0.5	Fill	4.4 (U)	—	—	6180	—	—	—	—	—	—
AAA9634	33-01382	0–0.5	Fill	4.4 (U)	—	—	—	—	16.2	48.8	0.11	—	—
AAA9635	33-01383	0–0.5	Fill	5.4 (U)	—	0.45 (U)	—	—	–	–	–	—	—
AAA9636	33-01384	0–0.5	Fill	4.3 (U)	—	—	—	—	–	–	–	—	—
AAA9637	33-01385	0–0.5	Fill	4.5 (U)	—	—	—	—	–	–	–	—	—
AAA9638	33-01386	0–0.5	Fill	4.4 (U)	—	—	10900	25.1	–	–	0.12	—	—
AAA9619	33-01387	0–0.5	Soil	–	—	—	—	—	—	—	—	—	5.25
AAA9639	33-01388	0–0.5	Fill	4.3 (U)	—	—	19100	—	—	—	—	—	—
AAA9640	33-01389	0–0.5	Fill	4.7 (U)	—	0.81 (U)	9000	—	—	—	—	—	—
AAA9641	33-01390	0–0.5	Fill	4.5 (U)	—	0.58 (U)	11500	—	—	—	—	—	—
AAA9642	33-01391	0–0.5	Fill	4.5 (U)	—	—	7560	20.3	—	—	—	—	—
AAA9622	33-01392	0–0.5	Fill	4.7 (U)	—	0.56 (U)	9320	—	—	—	0.12	—	—
AAA9643	33-01392	0–0.5	Fill	4.4 (U)	—	—	—	32.4	—	26.1	–	—	—
AAA9644	33-01393	0–0.5	Fill	4.6 (U)	—	0.69 (U)	7360	22.7	—	—	—	—	—
AAA9645	33-01394	0–0.5	Fill	4.5 (U)	—	0.43 (U)	7700	—	—	—	—	—	—

Table 2.6-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Arsenic	Cadmium	Calcium	Chromium	Copper	Lead	Mercury	Silver	Uranium
Soil BV[a]				**0.83**	**8.17**	**0.4**	**6120**	**19.3**	**14.7**	**22.3**	**0.1**	**1**	**1.82**
Construction Worker SSL[b]				**142**	**57.4**	**72.1**	**8850000**	**134[c]**	**14200**	**800**	**77.1**	**1770**	**277**
Industrial SSL[b]				**519**	**21.5**	**1110**	**32400000**	**505[c]**	**51900**	**800**	**389**	**6490**	**3880**
Residential SSL[b]				**31.3**	**4.25**	**70.5**	**13000000**	**96.6[c]**	**3130**	**400**	**23.5**	**391**	**234**
AAA9620	33-01395	0–0.5	Soil	—	—	—	—	—	—	24.9	—	—	—
AAA9621	33-01396	0–0.5	Fill	—	—	—	10900	—	—	—	—	—	—
AAA9624	33-01398	0–0.5	Fill	4.7 (U)	—	0.43 (U)	9000	—	—	—	0.12	—	—
AAA9626	33-01400	0–0.5	Fill	4.4 (U)	—	—	—	—	22	—	—	—	—
AAA9623	33-01453	0–0.5	Soil	4.5 (U)	—	—	9780	—	—	—	—	—	—
AAA9629	33-01454	0–0.5	Soil	—	—	—	NA	—	NA	—	NA	—	40.67
AAA9682	33-01457	3–3	Soil	—	13	—	NA	—	NA	—	NA	13 (U)	3
AAA9683	33-01457	4–4	Soil	—	—	—	NA	—	NA	—	NA	13 (U)	3.2
AAA9684	33-01457	8–8	Soil	—	—	—	NA	—	NA	—	NA	13 (U)	4

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs are from LANL (1998, 059730).

[b] SSLs from NMED (2014, 600115).

[c] SSL for total chromium.

[d] — = Not detected or not detected above BV.

[e] NA = Not analyzed.

Table 2.6-3
Organic Chemicals Detected at SWMU 33-007(a)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Chrysene	Dinitrotoluene[2,4-]	Dinitrotoluene[2,6-]	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Nitrotoluene[2-]	Nitrotoluene[3-]	Phenanthrene	Pyrene	Tetryl
Construction Worker SSL[a]				**18600**	**75300**	**240**	**24**	**240**	**7530[b]**	**2310**	**1090000[c]**	**5380**	**23100**	**536**	**80.9**	**10000**	**10000**	**240**	**159**	**26.9**	**na[e]**	**7530**	**7530**	**706**
Industrial SSL[a]				**50500**	**253000**	**32.3**	**3.23**	**32.3**	**25300[b]**	**323**	**3300000[d]**	**1830**	**3230**	**82.3**	**17.2**	**33700**	**33700**	**32.3**	**241**	**165**	**na**	**25300**	**25300**	**2590**
Residential SSL[a]				**3480**	**17400**	**1.53**	**0.153**	**1.53**	**1740[b]**	**15.3**	**250000[d]**	**380**	**153**	**17.1**	**3.56**	**2320**	**2320**	**1.53**	**49.7**	**31.6**	**na**	**1740**	**1740**	**156**
AAA9628	33-01377	0–0.5	Fill	—[f]	—	—	—	—	—	—	0.46	—	—	—	—	—	—	—	—	—	—	—	—	—
AAA9634	33-01382	0–0.5	Fill	NA[g]	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.4 (J)	0.4 (J)	NA	NA	NA	NA	—	—	NA	NA	—
AAA9635	33-01383	0–0.5	Fill	NA	NA	NA	1.2	1.9	0.44	0.6	NA	1.4	1.2	—	—	2.5	NA	0.54	NA	—	—	2.1	2.1	—
AAA9636	33-01384	0–0.5	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	—	—	NA	NA	NA	NA	0.79 (J)	0.61 (J)	NA	NA	0.59 (J)
AAA9625	33-01399	0–0.5	Fill	0.48	0.74	1.7	1.6	2.1	0.77	0.62	0.83	—	1.3	—	—	3.1	0.56	0.81	0.47	—	—	2.9	3	—
AAA9627	33-01401	0–0.5	Fill	—	—	—	—	—	—	—	0.43	—	—	—	—	—	—	—	—	—	—	—	—	—
AAA9629	33-01454	0–0.5	Soil	—	—	—	—	—	—	—	1.1	—	—	—	—	—	—	—	—	—	—	—	—	—

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2014, 600115) unless otherwise noted.

[b] Pyrene used as a surrogate based on structural similarity.

[c] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2014, 600115).

[d] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[e] na = Not available.

[f] — = Not detected.

[g] NA = Not analyzed.

Table 2.6-4
Radionuclides Detected or Detected above BVs/FVs at SWMU 33-007(a)

Sample ID	Location ID	Depth (ft)	Media	Cesium-137	Cobalt-60
Soil BV[a]				**1.65**	**na**[b]
Construction Worker SAL[c]				**31**	**6.8**
Industrial SAL[c]				**39**	**8.5**
Residential SAL[c]				**11**	**2.5**
AAA9618	33-01376	0–0.5	Soil	—[d]	—
AAA9628	33-01377	0–0.5	Fill	—	—
AAA9630	33-01378	0–0.5	Fill	—	0.034
AAA9631	33-01379	0–0.5	Fill	—	0.015
AAA9632	33-01380	0–0.5	Fill	—	—
AAA9633	33-01381	0–0.5	Fill	—	—
AAA9634	33-01382	0–0.5	Fill	—	0.021
AAA9635	33-01383	0–0.5	Fill	—	0.026
AAA9636	33-01384	0–0.5	Fill	—	—
AAA9637	33-01385	0–0.5	Fill	—	—
AAA9638	33-01386	0–0.5	Fill	—	0.002
AAA9619	33-01387	0–0.5	Soil	—	0.022
AAA9639	33-01388	0–0.5	Fill	16.8	27.7
AAA9640	33-01389	0–0.5	Fill	—	0.042
AAA9641	33-01390	0–0.5	Fill	—	—
AAA9642	33-01391	0–0.5	Fill	—	—
AAA9622	33-01392	0–0.5	Fill	—	—
AAA9643	33-01392	0–0.5	Fill	—	—
AAA9620	33-01395	0–0.5	Soil	—	—
AAA9621	33-01396	0–0.5	Fill	—	0.013
AAA9624	33-01398	0–0.5	Fill	—	—
AAA9625	33-01399	0–0.5	Fill	—	0.032
AAA9626	33-01400	0–0.5	Fill	—	—
AAA9627	33-01401	0–0.5	Fill	—	—
AAA9623	33-01453	0–0.5	Soil	—	0.017
AAA9629	33-01454	0–0.5	Soil	—	0.02

Note: All activities are in pCi/g. Data qualifiers are defined in Appendix A.

[a] BVs are from LANL (1998, 059730).

[b] na = Not available.

[c] SALs from LANL (2014, 600064).

[d] — = Not detected.

Table 2.7-1
Samples Collected and Analyses Requested at SWMU 33-008(b)

Sample ID	Location ID	Depth (ft)	Media	TAL Metals	SVOCs
0333-96-0019	33-01690	1–1.5	Fill	2117, 2118	2116
0333-96-0020	33-01690	2.5–3.5	Fill	2117, 2118	2116
0333-96-0021	33-01690	3.5–5	Qbo	2117, 2118	2116
0333-96-0023	33-01691	1.5–2.5	Fill	2117, 2118	2116
0333-96-0024	33-01691	2.5–3.5	Fill	2117, 2118	2116
0333-96-0025	33-01691	3.5–4.5	Qbo	2117, 2118	2116
0333-96-0027	33-01692	1.5–2.5	Fill	2136, 2135	2134
0333-96-0028	33-01692	2.5–3.5	Fill	2136, 2135	2134
0333-96-0029	33-01692	5.5–6.5	Qbo	2136, 2135	2134
0333-96-0031	33-01693	0–1	Fill	2117, 2118	2116
0333-96-0033	33-01693	3–4	Soil	2117, 2118	2116
0333-96-0034	33-01693	5–6	Qbo	2117, 2118	2116
0333-96-0032	33-01693	8–16	Fill	2117, 2118	2116
0333-96-0035	33-01694	1.5–2.5	Fill	2117, 2118	2116
0333-96-0036	33-01694	2.5–3.5	Fill	2117, 2118	2116
0333-96-0037	33-01694	3.5–4.5	Fill	2117, 2118	2116
0333-96-0038	33-01694	6.5–7.5	Qbo	2117, 2118	2116
0333-96-0039	33-01695	1.5–2.5	Fill	2117, 2118	2116
0333-96-0040	33-01695	2.5–3.5	Fill	2117, 2118	2116
0333-96-0041	33-01695	3.5–5	Fill	2117, 2118	2116
0333-96-0042	33-01695	6–7	Qbo	2117, 2118	2116

Table 2.7-2
Inorganic Chemicals above BVs at SWMU 33-008(b)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Nickel	Potassium	Selenium	Thallium	Uranium	Vanadium	Zinc
Soil BV[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**	**14.7**	**21500**	**22.3**	**4610**	**15.4**	**3460**	**1.52**	**0.73**	**1.82**	**39.6**	**48.8**
Qbt1g, Qct, Qbo BV[a]				**3560**	**0.5**	**0.56**	**25.7**	**1.44**	**0.4**	**1900**	**2.6**	**8.89**	**3.96**	**3700**	**13.5**	**739**	**2**	**2390**	**0.3**	**1.22**	**0.72**	**4.59**	**40**
Construction Worker SSL[b]				**41400**	**142**	**57.4**	**4390**	**148**	**72.1**	**8850000**	**134[c]**	**36.6[d]**	**14200**	**248000**	**800**	**1550000**	**753**	**19900000**	**1750**	**3.54**	**277**	**614**	**106000**
Industrial SSL[b]				**1290000**	**519**	**21.5**	**255000**	**2580**	**1110**	**32400000**	**505[c]**	**350[e]**	**51900**	**908000**	**800**	**5680000**	**25700**	**73000000**	**6490**	**13**	**3880**	**6530**	**389000**
Residential SSL[b]				**78000**	**31.3**	**4.25**	**15600**	**156**	**70.5**	**13000000**	**96.6[c]**	**23[e]**	**3130**	**54800**	**400**	**339000**	**1560**	**15600000**	**391**	**0.782**	**234**	**394**	**23500**
0333-96-0019	33-01690	1–1.5	Fill	—[f]	—	—	—	2.5 (J-)	0.54 (U)	21300	58.3 (J-)	—	—	—	—	5270 (J-)	—	3670	—	—	5.1	—	—
0333-96-0020	33-01690	2.5–3.5	Fill	—	—	—	298 (J-)	—	—	—	144 (J-)	9.2 (J-)	24.2 (J-)	—	25.5	11200	25.5 (J-)	5940	—	—	4.1	—	—
0333-96-0021	33-01690	3.5–5	Qbo	4730	—	2.3 (U)	116	—	0.45 (U)	15000	26.5 (J-)	—	6.9 (J-)	6380	—	2570	7 (J-)	—	—	—	4.8	7.8 (J-)	—
0333-96-0023	33-01691	1.5–2.5	Fill	—	—	—	—	—	0.52 (U)	8740	40.1 (J-)	—	—	—	—	—	—	—	—	—	5	—	—
0333-96-0024	33-01691	2.5–3.5	Fill	—	—	—	333 (J-)	—	1.2	111000	27.4 (J-)	—	—	—	—	—	—	—	—	1.4	3.9	—	—
0333-96-0025	33-01691	3.5–4.5	Qbo	—	—	1.6 (U)	56.3 (J-)	—	—	11100	—	—	—	—	—	—	2.5 (J-)	—	—	—	3.9	—	—
0333-96-0027	33-01692	1.5–2.5	Fill	—	—	—	—	—	—	—	47	—	—	—	—	4830	—	—	—	—	4.54	—	—
0333-96-0028	33-01692	2.5–3.5	Fill	—	—	—	—	—	—	13300	22.6	—	—	—	—	—	—	—	—	—	4.66	—	—
0333-96-0029	33-01692	5.5–6.5	Qbo	—	0.59 (UJ)	3.9	86.4	—	—	46700	—	—	—	—	—	1510	—	—	0.48 (U)	—	4.18	—	—
0333-96-0031	33-01693	0–1	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.7	—	—
0333-96-0033	33-01693	3–4	Soil	—	—	—	—	—	0.91 (U)	10500	—	—	—	—	—	—	—	—	—	—	4.7	—	—
0333-96-0034	33-01693	5–6	Qbo	3780	—	2.7 (U)	172 (J-)	–	0.53 (U)	73500	10.9 (J-)	—	5.7 (J-)	4100	–	2020	8.7 (J-)	—	1.4	—	5.7	5.6 (J-)	—
0333-96-0032	33-01693	8–16	Fill	—	—	—	—	—	0.63 (U)	9110	52.8 (J-)	—	41 (J-)	—	—	—	—	—	—	—	4	—	101 (J-)
0333-96-0035	33-01694	1.5–2.5	Fill	—	—	—	—	—	0.54 (U)	24000	—	—	—	—	—	—	—	—	—	—	5.2	—	—
0333-96-0036	33-01694	2.5–3.5	Fill	—	—	—	—	—	0.55 (U)	10600	—	—	—	—	—	—	—	—	—	—	5.6	—	—
0333-96-0037	33-01694	3.5–4.5	Fill	—	—	—	—	—	0.48 (U)	—	—	—	—	—	—	—	—	—	—	—	4.8	—	—
0333-96-0038	33-01694	6.5–7.5	Qbo	—	—	0.9 (U)	29.2 (J-)	—	—	—	—	—	—	—	—	—	2.4 (J-)	—	—	—	5.5	—	—
0333-96-0039	33-01695	1.5–2.5	Fill	—	—	—	—	—	0.5 (U)	11400	—	—	—	—	—	—	—	—	—	—	6	—	—
0333-96-0040	33-01695	2.5–3.5	Fill	—	—	—	—	—	0.92 (U)	16100	20.1 (J-)	—	—	—	25.6	—	—	—	—	—	4.6	—	—
0333-96-0041	33-01695	3.5–5	Fill	—	—	—	—	—	0.46 (U)	6840	—	—	—	—	—	—	—	—	—	—	5.1	—	—
0333-96-0042	33-01695	6–7	Qbo	—	—	2.3 (U)	92.5 (J-)	—	—	45000	4.8 (J-)	—	4.7 (J-)	—	—	1970	6.6 (J-)	—	—	—	4.1	—	—

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs are from LANL (1998, 059730).

[b] SSLs from NMED (2014, 600115) unless otherwise noted.

[c] SSL for total chromium.

[d] **Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm)** and equation and parameters from NMED (2014, 600115).

[e] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[f] — = Not detected or not detected above BV.

Table 2.7-3
Organic Chemicals Detected at SWMU 33-008(b)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic Acid	Bis(2-ethylhexyl)phthalate	Butylbenzylphthalate	Chrysene	Di-n-octylphthalate	Dibenz(a,h)anthracene	Dibenzofuran	Dichlorophenol[2,4-]	Dinitrophenol[2,4-]	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Pentachlorophenol	Phenanthrene	Pyrene	Trichlorophenol[2,4,5-]
Construction Worker SSL[a]				**18600**	**7530[b]**	**75300**	**240**	**24**	**240**	**7530[b]**	**2310**	**1090000[c]**	**5380**	**54500[c]**	**23100**	**3540[c]**	**24**	**354[b]**	**807**	**na[d]**	**10000**	**10000**	**240**	**346**	**7530**	**7530**	**26900**
Industrial SSL[a]				**50500**	**25300[b]**	**253000**	**32.3**	**3.23**	**32.3**	**25300[b]**	**323**	**3300000[e]**	**1830**	**12000[e]**	**3230**	**8200[e]**	**3.23**	**1000[e]**	**2750**	**na**	**33700**	**33700**	**32.3**	**44.5**	**25300**	**25300**	**91600**
Residential SSL[a]				**3480**	**1740[b]**	**17400**	**1.53**	**0.153**	**1.53**	**1740[b]**	**15.3**	**250000[e]**	**380**	**2800[e]**	**153**	**620[e]**	**0.153**	**72[e]**	**185**	**na**	**2320**	**2320**	**1.53**	**9.85**	**1740**	**1740**	**6160**
0333-96-0019	33-01690	1–1.5	Fill	—[f]	—	—	—	—	—	—	—	0.4 (J)	—	—	—	—	—	—	0.072 (J)	0.87 (J)	—	—	—	6.4	—	—	0.8 (J)
0333-96-0020	33-01690	2.5–3.5	Fill	—	—	—	—	—	—	—	—	1.6 (J)	—	—	—	—	—	—	—	—	—	—	—	0.79 (J)	—	—	—
0333-96-0021	33-01690	3.5–5	Qbo	—	—	—	—	—	—	—	—	0.21 (J)	—	—	—	—	—	—	—	—	—	—	—	0.036 (J)	—	—	—
0333-96-0023	33-01691	1.5–2.5	Fill	—	—	—	0.072 (J)	0.072 (J)	0.11 (J)	0.036 (J)	—	—	—	—	0.11 (J)	—	—	—	—	—	0.14 (J)	—	—	0.072 (J)	0.14 (J)	0.14 (J)	—
0333-96-0024	33-01691	2.5–3.5	Fill	—	—	—	—	—	—	—	—	0.27 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0333-96-0025	33-01691	3.5–4.5	Qbo	—	—	—	—	—	—	—	—	—	—	0.21 (J)	—	0.31 (J)	—	—	—	—	—	—	—	—	—	—	—
0333-96-0027	33-01692	1.5–2.5	Fill	—	—	—	—	—	—	—	—	—	1.6 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0333-96-0028	33-01692	2.5–3.5	Fill	—	—	—	—	—	—	—	—	—	0.74 (J)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0333-96-0031	33-01693	0–1	Fill	0.033 (J)	—	0.066 (J)	0.23 (J)	0.16 (J)	0.2 (J)	0.13 (J)	0.2 (J)	—	—	—	0.26 (J)	—	0.033 (J)	—	—	—	0.53	—	0.13 (J)	–	0.3 (J)	0.46	—
0333-96-0033	33-01693	3–4	Soil	—	—	—	—	—	0.035 (J)	—	–	–	–	0.035 (J)	—	—	—	—	—	—	0.069 (J)	—	—	—	0.035 (J)	0.069 (J)	—
0333-96-0032	33-01693	8–16	Fill	—	—	—	0.034 (J)	—	0.068 (J)	—	—	—	—	—	0.034 (J)	—	—	—	—	—	0.1 (J)	—	—	—	0.068 (J)	0.068 (J)	—
0333-96-0036	33-01694	2.5–3.5	Fill	—	0.069 (J)	0.1 (J)	0.62	0.66	1.4	0.28 (J)	—	—	—	—	0.86	—	0.1 (J)	—	—	—	0.28 (J)	—	0.24 (J)	—	0.035 (J)	0.52	—
0333-96-0037	33-01694	3.5–4.5	Fill	—	—	0.071 (J)	0.035 (J)	—	0.035 (J)	—	—	—	—	—	0.071 (J)	—	—	—	—	—	0.14 (J)	—	—	—	0.11 (J)	0.11 (J)	—
0333-96-0038	33-01694	6.5–7.5	Qbo	0.033 (J)	—	0.033 (J)	0.067 (J)	—	0.067 (J)	—	—	—	—	—	0.067 (J)	—	—	0.033 (J)	—	—	0.2 (J)	0.033 (J)	—	—	0.17 (J)	0.13 (J)	—
0333-96-0039	33-01695	1.5–2.5	Fill	—	—	0.07 (J)	0.14 (J)	0.1 (J)	0.17 (J)	0.07 (J)	—	—	—	—	0.14 (J)	—	—	—	—	—	0.24 (J)	—	0.035 (J)	—	0.17 (J)	0.24 (J)	—
0333-96-0040	33-01695	2.5–3.5	Fill	—	—	0.035 (J)	0.07 (J)	0.035 (J)	0.07 (J)	—	—	—	—	—	0.07 (J)	—	—	—	—	—	0.1 (J)	—	—	—	0.1 (J)	0.1 (J)	—
0333-96-0041	33-01695	3.5–5	Fill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.036 (J)	—	—	—	0.036 (J)	0.036 (J)	—

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] SSLs from NMED (2014, 600115) unless otherwise noted.

[b] Pyrene used as a surrogate due to structural similarity.

[c] Construction worker SSL calculated using toxicity value from EPA (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2014, 600115).

[d] na = Not available.

[e] SSLs from EPA regional tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[f] — = Not detected.

Table 2.8-1
Samples Collected and Analyses Requested at SWMU 33-010(a)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	TAL Metals	Uranium
AAA9646	33-01414	0–0.5	Sed	19957	19258	19957
AAA9647	33-01415	0–0.5	Sed	19957	19258	19957
AAA9648	33-01416	0–0.5	Sed	19957	19258	19957
AAA9649	33-01417	0–0.5	Sed	19957	19258	19957

Table 2.8-2
Inorganic Chemicals above BVs at SWMU 33-010(a)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Manganese	Mercury	Selenium	Uranium	Zinc
Sediment BV[a]				**0.83**	**0.4**	**4420**	**10.5**	**11.2**	**19.7**	**543**	**0.1**	**0.3**	**2.22**	**60.2**
Construction Worker SSL[b]				**142**	**72.1**	**8850000**	**134**[c]	**14200**	**800**	**464**	**77.1**	**1750**	**277**	**106000**
Industrial SSL[b]				**519**	**1110**	**32400000**	**505**[c]	**51900**	**800**	**160000**	**389**	**6490**	**3880**	**389000**
Residential SSL[b]				**31.3**	**70.5**	**13000000**	**96.6**[c]	**3130**	**400**	**10500**	**23.5**	**391**	**234**	**23500**
AAA9646	33-01414	0–0.5	Sed	4.3 (U)	—[d]	5860	—	—	—	—	—	0.57 (U)	2.87	—
AAA9647	33-01415	0–0.5	Sed	4.5 (U)	—	11200	—	—	—	—	—	0.54 (U)	2.81	—
AAA9648	33-01416	0–0.5	Sed	4.4 (U)	1.4	9570	12.8	31.8	35.3	659	0.42	0.53 (U)	5.46	204
AAA9649	33-01417	0–0.5	Sed	4.3 (U)	—	10500	—	—	989	—	0.13	0.52 (U)	8.34	—

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs are from LANL (1998, 059730).

[b] SSLs from NMED (2014, 600115).

[c] SSL for total chromium.

[d] — = Not detected or not detected above BV.

Table 2.9-1
Samples Collected and Analyses Requested at SWMU 33-010(b)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	Uranium	TAL Metals
AAA9651	33-01418	0–0.5	Soil	19957	19957	19258
AAA9652	33-01419	0–0.5	Soil	19957	19957	19258
AAA9653	33-01420	0–0.5	Soil	19957	19957	19258
0333-96-0595	33-01546	0–0.5	Soil	—*	2476	2475
0333-96-9012	33-01547	0–0.5	Soil	—	—	2476, 2475
0333-96-0597	33-01698	0–0.5	Soil	—	—	2476, 2475
0333-96-0596	33-01699	0–0.5	Soil	—	—	2476, 2475

* — = Analysis not requested.

Table 2.9-2
Inorganic Chemicals above BVs at SWMU 33-010(b)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Chromium	Copper	Iron	Lead	Nickel	Thallium	Uranium	Zinc
Soil BV[a]				**0.83**	**0.4**	**6120**	**19.3**	**14.7**	**21500**	**22.3**	**15.4**	**0.73**	**1.82**	**48.8**
Construction Worker SSL[b]				**142**	**72.1**	**8850000**	**134**[c]	**14200**	**248000**	**800**	**753**	**3.54**	**277**	**106000**
Industrial SSL[b]				**519**	**1110**	**32400000**	**505**[c]	**51900**	**908000**	**800**	**25700**	**13**	**3880**	**389000**
Residential SSL[b]				**31.3**	**70.5**	**13000000**	**96.6**[c]	**3130**	**54800**	**400**	**1560**	**0.782**	**234**	**23500**
AAA9651	33-01418	0–0.5	Soil	4.3 (U)	182	9430	43.2	760	27300	122	207	—[d]	13.26	402
AAA9652	33-01419	0–0.5	Soil	4.6 (U)	53.7	26800	34.2	190	31500	54.4	429	—	761.62	222
AAA9653	33-01420	0–0.5	Soil	4.5 (U)	5.7	31300	—	—	—	—	17.3	—	5.19	48.9
0333-96-0595	33-01546	0–0.5	Soil	—	8.7	27400	57.8	638	—	205 (J+)	123 (J+)	0.76 (U)	23.8	365 (J-)
0333-96-9012	33-01547	0–0.5	Soil	—	0.89 (U)	7340	—	—	—	—	—	—	5.29	—
0333-96-0597	33-01698	0–0.5	Soil	—	0.97 (U)	10300	—	—	—	—	—	0.79 (U)	5.96	—
0333-96-0596	33-01699	0–0.5	Soil	—	1.5	27500	—	274	—	29.2 (J+)	46.6 (J+)	1.5 (U)	7.1	162 (J-)

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs are from LANL (1998, 059730).

[b] SSLs from NMED (2014, 600115).

[c] SSL for total chromium.

[d] — = Not detected or not detected above BV.

Table 2.10-1
Samples Collected and Analyses Requested at SWMU 33-010(d)

Sample ID	Location ID	Depth (ft)	Media	Gamma Spectroscopy	TAL Metals	Uranium
AAA9852	33-01422	0–0.5	Fill	19352	17843	19352
AAA9853	33-01423	0–0.5	Fill	19352	17843	19352
AAA9854	33-01424	0–0.5	Fill	19352	17843	19352
AAA9855	33-01425	0–0.5	Fill	19352	17843	19352
AAA9856	33-01426	0–0.5	Fill	19352	17843	19352
AAA9857	33-01427	0–0.5	Fill	19352	17843	19352

Table 2.10-2
Inorganic Chemicals above BVs at SWMU 33-010(d)

Sample ID	Location ID	Depth (ft)	Media	Lead	Zinc
Soil BV[a]				**22.3**	**48.8**
Construction Worker SSL[b]				**800**	**106000**
Industrial SSL[b]				**800**	**389000**
Residential SSL[b]				**400**	**23500**
AAA9852	33-01422	0–0.5	Fill	59	77
AAA9853	33-01423	0–0.5	Fill	28	—[c]

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

[a] BVs are from LANL (1998, 059730).

[b] SSLs from NMED (2014, 600115).

[c] na = Not available.

Table 2.11-1
Samples Collected and Analyses Requested at AOC C-33-002

Sample ID	Location ID	Depth (ft)	Media	Pesticides/PCBs
0333-96-2047	33-01753	0–0.5	Soil	2393
0333-96-2049	33-01755	0–0.5	Soil	2393
0333-96-2050	33-01756	0–0.5	Soil	2393
0333-96-2051	33-01757	0–0.5	Soil	2393

Table 2.11-2
Organic Chemicals Detected at AOC C-33-002

Sample ID	Location ID	Depth (ft)	Media	Aroclor-1260
Construction Worker SSL*				**85.3**
Industrial SSL*				**11.5**
Residential SSL*				**2.43**
0333-96-2047	33-01753	0–0.5	Soil	0.65
0333-96-2049	33-01755	0–0.5	Soil	0.9
0333-96-2050	33-01756	0–0.5	Soil	0.79
0333-96-2051	33-01757	0–0.5	Soil	2.5

Notes: Units are mg/kg. Data qualifiers are defined in Appendix A.

* SSLs from NMED (2014, 600115).

Appendix A

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

A-1.0 ACRONYMS AND ABBREVIATIONS

AOC	area of concern
bgs	below ground surface
BV	background value
Consent Order	Compliance Order on Consent
DOE	Department of Energy (U.S.)
EM	electromagnetic
EPA	Environmental Protection Agency (U.S.)
ES&H	Environment, Safety, and Health
FV	fallout value
HE	high explosives
HIR	historical investigation report
LANL	Los Alamos National Laboratory (the Laboratory)
LASL	Los Alamos Scientific Laboratory
MDA	material disposal area
NFA	no further action
NMED	New Mexico Environment Department
NRAO	National Radio Astronomy Observatory
PCB	polychlorinated biphenyl
RFI	Resource Conservation and Recovery Act facility investigation
SAL	screening action level
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
TAL	target analyte list
TD	total depth
VCA	voluntary corrective action
VOC	volatile organic compound

A-2.0 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-3.0 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 (QA/QC) parameters.

Appendix B

Analytical Suites and Results
(on CD included with this document)