Amended Closure Plan
Open Burning Treatment Unit
Technical Area 16-399 Burn Tray

~~January 2019~~June 2022

Los Alamos NATIONAL LABORATORY

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DEFINITIONS

Terms used in this interim status Closure Plan (Closure Plan) shall have the same meanings as those in the HWA, RCRA, and their implementing regulations unless this Closure Plan specifically provides otherwise. Where a term is not defined in the HWA, RCRA, implementing regulations, or this Closure Plan, the meaning of the term shall be determined by a standard dictionary reference, EPA guidelines or publications, or the generally accepted scientific or industrial meaning of the term.

Active Portion means that portion of a facility where treatment, storage, or disposal operations are being or have been conducted after the effective date of 40 CFR Part 261 and which is not a closed portion as defined in 40 CFR § 260.10.

Day means a calendar day unless otherwise specified. Business day means Monday through Friday, other than a federal or State legal holiday.

Department or NMED refers to the New Mexico Environment Department and any successor and predecessor agencies.

Discharge means the accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of hazardous waste into or on any land or water.

Facility means the Los Alamos National Laboratory site comprised of approximately 40 square miles, located on the Pajarito Plateau in Los Alamos County in north central New Mexico, approximately 60 miles north-northeast of Albuquerque and 25 miles northwest of Santa Fe, and owned by the United States Department of Energy.

Final Closure means the closure of all hazardous waste management units at the Facility in accordance with all applicable closure requirements so that hazardous waste management activities under 40 CFR Parts 264 and 265 are no longer conducted at the Facility.

Hazardous Constituent or **Hazardous Waste Constituent** means: 1) any constituent identified in 40 CFR Part 261 Appendix VII that caused EPA to list a hazardous waste in 40 CFR Part 261 Subpart D; or 2) any constituent identified in 40 CFR Part 261, Appendix VIII. For purposes of closure, post-closure, or corrective action, "hazardous constituent" and "hazardous waste constituent" also means any constituent identified in 40 CFR Part 264 Appendix IX, perchlorate, and nitrates.

Hazardous Waste means a solid waste that is: 1) not excluded from regulation under 40 CFR § 261.4(b); and 2) is either listed in 40 CFR Part 261, Subpart D, exhibits any of the characteristics identified in 40 CFR Part 261, Subpart C, or is a mixture of solid waste and one or more hazardous wastes listed in 40 CFR Part 261, Subpart D.

For purposes of corrective action, **"hazardous waste"** shall have the meaning set forth in the HWA, Section 74-4-3(K).

Hazardous waste may be a "**mixed waste**," which means it is waste that contains hazardous waste subject to the HWA and RCRA, and source, special nuclear, or byproduct material subject to the Atomic Energy Act, 42 USC § 2011, *et seq.* (AEA).

Hazardous Waste Management Unit means a contiguous area of land on or in which hazardous waste is placed, or the largest area in which there is significant likelihood of mixing hazardous waste constituents in the same area. A container alone does not constitute a unit; the unit includes containers and the land or pad upon which they are placed. At the Facility, hazardous waste management units include both permitted units and interim status units.

Interim Status Unit means any hazardous waste management unit that was in operation before the effective date of the statutory or regulatory amendments that caused the unit to become subject to permitting requirements, that meets the requirements for interim status under § 3005(e) of RCRA, 42 U.S.C. § 6925(e), for which interim status has not been terminated pursuant to section 3005(e)(2) of RCRA, 42 U.S.C. § 6925(e)(2), and that has not been issued a permit by EPA or the Department.

Permit means the Los Alamos National Laboratory Hazardous Waste Facility Permit originally dated November 2010 including all attachments thereto and all modifications to the Permit.

Permittees means collectively the United States Department of Energy (DOE) and the Triad National Security L.L.C. (Triad). [Note: Los Alamos National Security L.L.C. (LANS) was replaced by Triad as a Permittee on November 1, 2018]

Release means any accidental or intentional spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, or dumping of any hazardous waste or hazardous constituents inside a permitted unit or from a permitted unit to the environment, including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous waste or hazardous constituents.

1.0 INTRODUCTION

This amended Closure Plan describes the activities necessary to complete closure ~~one~~ of the interim status hazardous waste open burning treatment unit~~s~~ at Technical Area (TA) 16 at the Los Alamos National Laboratory (LANL or the Facility), hereinafter referred to as the "TA-16-399 Burn Tray" or "the Unit". The Unit is listed in the LANL Hazardous Waste Facility Permit Attachment K (Listing of SWMUS and AOCS), Table K-1 (SWMUs and AOCs Requiring Corrective Action). The information provided in this amended Closure Plan addresses the closure requirements specified in the Code of Federal Regulations (CFR), Title 40, Part 265, Subparts G and P for the thermal treatment unit operated at the Facility under the Resource Conservation and Recovery Act (RCRA), the New Mexico Hazardous Waste Act, and is consistent with the standards outlined in the Permit. Closure of the open burning treatment unit must be completed in accordance with Section 4.1 of this amended Closure Plan.

The Unit will be closed by removal of the burn tray, the cement pad and electrical box and collection and analysis of surface and subsurface soil and tuff samples. Until closure is complete and has been certified in accordance with Permit Part 9.5 and 40 CFR §265.115, a copy of the approved Closure Plan, any approved revisions to the plan, and closure activity documentation associated with the closure must be on file with hazardous waste compliance personnel at the Facility and at the U.S. Department of Energy (DOE) Los Alamos Field Office. Prior to or during closure of the Unit, this Closure Plan may be amended whenever: (1) newly identified hazardous constituents are determined to have been managed at the unit, ~~and~~ (2) new sampling locations are required as a result of the record review and structural assessment, or (3) an unexpected event occurs during closure. Any amended Closure Plans must be submitted to the New Mexico Environment Department (the Department or NMED) for approval prior to implementing closure activities.

In January 2022, the Triad National Security, LLC (Triad), on behalf of the National Nuclear Security Administration Los Alamos Field Office (NA-LA, collectively Permittees) became aware that an amendment of the Closure Plan was necessary due to the unexpected discovery of elevated concentrations of barium and explosives compounds under the former burn tray after proactive source/soil removal actions. These concentrations indicated excess human health and ecological risk due to metals and explosives. The amendment includes requirements necessary to meet the closure performance standard in accordance with 40 CFR 265.11 and the approved Closure Plan (NMED, 2019).

2.0 DESCRIPTION OF UNIT TO BE CLOSED

TA-16 is located in the southwestern quadrant of the Facility at the west end of the Pajarito Plateau near the foothills of the Jemez Mountains (see Figure 1). Elevation ranges from approximately 7,700 feet at the west end of the TA to approximately 6,800 feet at the lower east end. Topography is varied, ranging from steep canyon walls to sloping mesa tops. The TA-16 Burn Ground consists of the TA-16-388 Flash Pad and the TA-16-399 Burn Tray, but only the TA-16-399 Burn Tray is addressed in this Closure Plan. The open burn (OB) units were managed by the high explosives (HE) engineering personnel (Operators) who were responsible for the safe treatment, storage, and handling of HE waste and HE contaminated wastes generated by the HE production facilities at LANL.

2.1 Description of the Unit ~~and the Wastes Treated at the Unit~~

The TA-16-399 Burn Tray (see Figure 2) ~~is~~was comprised of a 4-foot wide, by 16-foot long steel tray supported by 1.5-foot high legs and is lined with firebricks (see Figure 3). The maximum treatment capacity of the TA-16-399 Burn Tray ~~is~~was 1,000 pounds of waste per burn.

The Unit consist~~s~~ed~~s~~ of: a burn tray, firebrick, burn tray cover, wheels, tracks, a concrete pad, and an electrical box. The area ~~and~~ is surrounded by a chain-link fence.

The burn tray, burn tray cover, concrete pad, electric box, and firebrick ~~will be~~ were removed from the Unit in 2019. The fencing shall remain after the closure of the Unit. The remaining equipment was~~must be~~ assessed for damages~~,~~ and/or decontaminated ~~prior to closure of the Unit~~at the time of removal.

2.2 Description of Waste Treated at the Unit

The Permittees state that the TA-16-399 burn tray was used to treat a single waste stream by open burning to destroy the characteristic of reactivity (D003). Bulk explosives waste stream consists of: Octahydro-1,3,5,7- tetranitro-1,3,5,7- tetrazocine (HMX); cyclo-1,3,5-trimethylene-2,4,6-trinitramine (RDX): 2,2-bis[(nitroxy)methyl]-1,3-propanediol dinitrate (PETN); 2,4,6- trinitrotoluene (TNT); and triamino trinitrobenzene (TATB). Additionally, mixtures of explosives were treated including: ammonium nitrate-fuel oil (ANFO), Composition B, Cyclotol, IMX-101, PBX 9404, PBX 9407, PBX 9501, PBX 9502, X0233, X0533, XTX 8003, XTX 8004, LX-02, LX-07, LX-10 and LX-14.

The Permittees were unable to provide records of waste treated at the Burn Tray from 1951 to 1980. Therefore, in addition to constituents identified in Table 2, analysis of target analyte metals, nitrates, perchlorate, volatile organic chemicals (VOCs) , semi volatile organic chemicals (SVOCs), diesel range organics (DRO), gasoline range organics (GRO), kerosene, dioxins/furans, and HE degradation products must be added to the analytical suite.

2.3 Treatment Method

The high explosives trained personnel packed waste explosives in cardboard and wooden boxes and transported the boxes to the Unit for treatment. The burn tray Operators rolled back the cover from the tray, and placed padding on the tray, while the high explosives trained personnel removed the explosives from the boxes and set them on the padding. The burn tray Operators then dampened the padding with kerosene. The Permittees report that approximately one-half gallon of kerosene was used during each treatment event. The burn tray Operators then connected electric matches (*e.g.*, squibs) to the firing cables and saturated the train of excelsior with kerosene, the burn tray Operators ran the train from the squibs to the padding for ignition. The burn tray Operators ignited all open burning treatment events remotely from a control building. The burn tray Operators allowed the waste to burn of its own accord, and observed the burn from the control building. After the burn was complete, the burn tray Operators waited for the tray to cool before putting the burn tray cover back in place. The burn tray Operators waited 24 hours after the treatment to remove any residue or ash from the burn tray. The Permittees report that treatment methods at this Unit were consistent during the operational period of 1980 to July 18, 2012; however, the treatment method used between the initial use of the Unit in 1951 and 1980 are not known.

3.0 ESTIMATE OF MAXIMUM WASTE TREATED

According to the Permittees' record (1980-2012), the maximum treatment capacity of the TA-16-399 Burn Tray was 1,000 pounds of waste per burn and treatment events range in volume from 30 pounds to 350 pounds. The Permittees report that approximately 255,685 pounds of HE waste has been treated at the

TA-16-399 Burn Tray since 1980. The Permittees report that TA-16-399 Burn Tray was operated as a treatment Unit from 1951 to 1980 (Vigil-Holterman, Luciana, 2010) but did not provide a record of waste treated during that time period.

4.0 GENERAL CLOSURE INFORMATION

4.1 Closure Performance Standards

Closure plans are required to be submitted in accordance with 40 CFR § 265.112. At a minimum, closure plans must describe how a unit will be closed to meet the interim status performance standards set forth in the closure plan and in accordance with 40 CFR § 265.111. Closure plans shall include a sampling and analysis plan (SAP). The SAP shall include:

(a) verification of the decontamination of the surfaces, structures and all related equipment;

(b) ~~-~~determination whether a release of hazardous constituents to any environmental media has occurred;

(c) a list of hazardous constituents, as defined in 40 CFR 261.10 and 261.30 to be sampled and analyzed. The Permittees may propose to NMED a list of hazardous constituents of concern limited to only those related to the hazardous wastes managed at the unit if the Permittees can provide a complete Facility operating record with respect to hazardous waste management operations at the unit undergoing closure;

(d) a site plan for verification soil samples shall include:

i. a figure depicting boundaries of the unit and verification soil sampling locations. The locations shall include, but not be limited to, where applicable: discharge points (*e.g.*, storm water run-off locations) (See Figure 5);

- Sumps and catch basins;
- Secondary containment areas;
- Conveyance systems (e.g., pipe drains, drainage swales);
- Location of spills or the releases of hazardous waste or hazardous constituents during operation of the Unit;
- Loading and unloading areas;
- Other potential release locations; and
- Sampling grid location points.

ii. rationale for the selected number and locations of samples.

(e) Type of Samples. The type of sample to be collected (*e.g.*, soil) and the rationale for the selection of sampling types must be provided.

(f) Sampling Methods. A description of the approved EPA SW-846 sampling methods and procedures that will be used to collect each type of sample must be included.

(g) Analytical Methods. A description of the approved EPA SW-846 laboratory analytical methods that will be used to measure concentrations of hazardous constituents must be included.

(h) Quality Assurance and Quality Control Procedures. The SAP must include a description of the quality assurance and quality control (QA/QC) procedures that include, but are not limited to:

i. Duplicates, trip blanks, equipment blanks;
ii. A description of methods for decontamination of re-usable sampling equipment; and

iii. A description of all sample preservation, handling, labeling, and chain of custody procedures.

Closure of a Unit shall be deemed complete when: 1) all surfaces and equipment have been decontaminated, or otherwise removed and properly managed as waste; 2) closure has been completed in accordance with this Closure Plan and certified by an independent, professional engineer licensed in the State of New Mexico; and 3) a closure report including closure certification as required by 40 CFR 265.115, has been submitted to, and approved by, the Department. If residential clean-up levels are not achieved during closure, the Permittees shall submit a post closure care plan for approval by the Department. The proposed post closure care plan will be made available for public comment and opportunity for public hearing in accordance with applicable sections of 40 CFR §§ 265.118 and 270.

4.2 Closure Schedule

The following section provides the schedule of closure activities (also see Table 1 in this Closure Plan).

Closure activities must begin no later than 45 days after approval of this plan. However, in accordance with Permit Sections 9.4.1, 9.4.2 and 40 CFR § 265.112(e), removing hazardous wastes, decontaminating or dismantling equipment, in accordance with an approved Closure Plan, may be conducted at any time before notification of closure. The records review has been completed, and the structural assessment was conducted on July 19, 2012. The review and structural assessment are described in Sections 5.1.1 and 5.1.2 of the Closure Plan. An amendment to the plan allowing for soil removal at the site and the collection of verification samples to the extent necessary to meet closure performance standards was submitted to the plan in June 2022. Upon approval of the original Closure Plan, ~~if applicable,~~ the Unit surfaces and related equipment ~~must be~~was decontaminated or dispositioned as discussed in Section 5.2. Upon approval of the amended Closure Plan, soil removal, as discussed in Section 5.3, and associated confirmation sampling will be completed. All closure activities must be completed within 180 days after ~~beginning closure~~approval of the amended Closure Plan. The final submittal of the revised closure certification report must be submitted to NMED 60 days after ~~completing closure in accordance with Permit Section 9.5~~receipt of soil sample analytical data. In the event, closure of the Unit cannot proceed according to schedule, the NMED must be notified in accordance with the extension request requirements in 40 CFR § 265.113(b) and comply with the applicable closure requirements in 40 CFR § 265.113(b)(1) and (2).

4.3 Amendment of the Closure Plan

The Permittees may amend this Closure Plan in accordance with the requirements in 40 CFR § 265.112(c). If the results of the review or assessment require any changes to this Closure Plan (e.g., the sampling and analysis plan), the Permittees shall submit an amended Closure Plan to NMED, for review and approval, in accordance with this Section (4.3). Associated public comment periods and opportunities for public hearing will be in adherence with 40 CFR § 265.112(c).

5.0 CLOSURE PROCEDURES

Closure activities at the Unit shall include: a physical review of the Unit and a review of the Unit's records; proper management and disposal of hazardous waste residues, if applicable, ~~and~~ removal and cleaning of all contaminated surfaces and equipment associated with the Unit; removal of soil; and sampling to verify the closure performance standards in Section 4.1 of this Closure Plan and Permit Sections 11.4 and 11.5 have been achieved; and submittal of a final closure certification report. The following sections describe these closure activities applicable to the Unit.

5.1 Records Review and Structural Assessment

Before starting closure decontamination and sampling activities, the operating and inspection records for the Unit must be reviewed and a structural assessment must be conducted to determine any previous finding(s) or action(s) that may influence closure activities or potential sampling locations. Specific results of the records review and structural assessment must be included within the closure certification report.

5.1.1 *Records Review*

The Facility Operating Record (including, but not limited to, inspection and contingency plan implementation records) has been reviewed in accordance with Permit Section 9.4.6.1. The goals of the review were to:

(a) confirm the specific hazardous waste constituents of concern listed in Table 2;

(b) update the above-mentioned list as necessary;

(c) update the estimated quantity of waste treated in Section 3.0 in the Closure Plan; and

(d) confirm additional sampling locations (*e.g.*, locations of spills or chronic conditions identified in the Operating and Inspection Records).

The Permittees have determined that there have been no spills or releases, defects, deterioration, damage, or hazards (*e.g.*, damage to the concrete pad or other Unit materials) affecting waste containment or treatment during the operational period of 1980 - 2012 of the Unit during which waste classified as hazardous waste was treated. Sections 3.0 and 6.1 and Table 2 of the Closure Plan have been updated to reflect changes made in support of the records review and structural assessment. The Permittees report that records are not available to review prior to 1980; therefore, release of contaminants may have occurred between 1951 and 1980.

5.1.2 *Structural Assessment*

The structural assessment is an assessment of the Unit's physical condition. The assessment for the Unit was conducted on July 19, 2012, in accordance to Permit Section 9.4.6.2. The assessment included inspecting the Unit's concrete pad (for any existing cracks or conditions that indicate a potential for release of hazardous constituents) and assessing the Unit for evidence of any releases. The assessment did not reveal any evidence of a release (*e.g.*, stains) or damage (*e.g.*, cracks, gaps, chips) to the pad. The assessment was photographed, documented, and will be submitted to the NMED as part of the closure report.

5.2 Decontamination and Removal of Structures and Equipment

In accordance with 40 CFR § 265.112(b)(4), the Unit related equipment and materials, must be decontaminated, or removed and managed according to Section 7.0 of this Closure Plan and Permit Section 9.4.4. All surfaces and related equipment that are removed and not intended for recycle shall be considered solid and potentially hazardous waste when removed, and must be disposed of in accordance with Section 7.0 of the Closure Plan and Permit Section 9.4.3. Decontamination activities must ensure the removal of all hazardous waste residues and hazardous waste constituents from the Unit to meet the closure performance standards in Section 4.1 of this plan and Permit Section 9.4.4.

5.2.1 *Removal of Structures and Related Equipment*

The burn tray, metal cover, tracks and rims (without the rubber tires) must be flashed at the TA-16-388 Flash Pad, if a high explosives spot test is conducted and the results are positive or residual high explosives are expected on the equipment. Prior to shipment off-site, a HE spot test must be completed for verification purposes in accordance with Permit Section 9.4.3. The electronic ignition assembly must be removed from the Unit at closure and recycled or disposed. In addition, the electrical box and the concrete pad must be removed from the Unit at the time of closure. The bricks must be removed and must be disposed of or reused.

5.2.2 *Decontamination of Structures and Related Equipment*

If decontamination of structures and related equipment is conducted prior to removal, portable berms or other devices (*e.g.*, absorbent socks, plastic sheeting, and wading pools) must be used to collect excess wash water and provide containment during the decontamination process.

With the exception of the fence, no other equipment at the Unit will be left in place. The burn tray will be flashed at Unit 16-388 prior to shipment offsite for disposal or recycling.

5.2.3 *Equipment Used During Decontamination Activities*

Reusable protective clothing, tools, and equipment used during decontamination activities must be cleaned with a wash water solution that consists of a non-phosphate surfactant detergent (*e.g.*, Alconox®) and water mixed in accordance with the manufacturers' recommendations and in accordance with Permit Section 11.10.2.11. Residue and disposable equipment must be containerized, characterized, and managed as waste in accordance with Section 7.0 of this Closure Plan and with Permit Section 9.4.5. All activities must be documented in the Closure Certification Report submitted to NMED no later than 60 days following completion of closure activities.

5.3 Removal of Soil

Soil removal activities will be conducted primarily within the fenced area surrounding the location of the former burn tray. Soil removal will be conducted as needed to meet closure performance standards. All field activities will be conducted in the presence of and under the guidance of an Explosives Safety Officer. Excavation will be conducted using heavy equipment and shovels, as necessary. Soil removal will be conducted based on historic soil sampling results. Guidance for the extent of the soil excavation will also be provided based on the presence of vegetation growth and utilizing field-test methods such as high explosives spot tests and/or X-ray fluorescence, if available.

Table 5 includes the soil sample locations/descriptions where the Permittees collected soil contaminant concentration data; Figure 5 depicts the sample locations on a map, and Figures 6-9 present the analytical results. Utilizing these data, the Permittees will plan estimations for excavation activities. The Permittees estimate the volume of soil to be removed to be approximately 15,000 ft^3; however, based on field activities the estimated volume will change. Prior to soil removal activities, the Permittees may use hand tools or augers and field-testing such as high explosives spot tests and/or X-ray fluorescence to better inform excavation planning and determination of extent. All field measurements and excavation planning will be documented and described in the Closure Certification Report.

Uncontaminated overburden base course will be excavated and staged on plastic sheeting for use as backfill (after a confirmation soil sample determination as being suitable for backfill). The impacted soil will be placed either in drums, in lined and covered roll-off containers, or in dump trucks for offsite

disposal at an approved disposal facility. The Permittees do not anticipate that waste will be staged on plastic sheeting. If left open overnight, the excavation will be appropriately secured with hazard marking tape, cones, or barricades.

As the soil is removed from the area, each removal will be tested by an Explosives Safety Officer with high explosives spot testing and the appropriate number of grab samples will be collected and composited for off-site analytical laboratory analysis and managed according to Section 7.0 of this Closure Plan and Permit Section 9.4.4.

After soil removal, the Permittees will backfill with the excavated area with clean fill and contour as appropriate and revegetate, to ensure that storm water control best management practices established at the site are still effective. All field activities must be documented in the Closure Certification Report submitted to NMED no later than 60 days following receipt of verification sample analytical results.

6.0 SAMPLING AND ANALYSIS PLAN

This Sampling and Analysis Plan (SAP) is designed to verify decontamination of surfaces, equipment, and materials; and determine whether a release of hazardous constituents to any environmental media has occurred. The SAP shall include:

(a) Hazardous constituents of concern based on the available records (Table 2), and the additional constituents of concern included in Section 2.2 for which analysis is required. This includes all potential hazardous constituents managed at this site and:

  i. any constituent identified in 40 CFR Part 261, Appendix VIII; or
  ii. any constituent identified in 40 CFR Part 264 Appendix IX, dioxins, furans, perchlorates, DRO, GRO, and nitrates.

(b) The constituents of concern identified in Section 6.0.a. shall be utilized to select the analytical methods capable of detecting these constituents (Table 4).

(c) A site plan (Figure 4) depicting the boundaries of the Unit and verification and soil sampling locations. The locations include a minimum of eleven grab sample locations that represent locations immediately around the Unit, underneath the concrete pad, and locations where run-off likely occurred from the Unit and the closest surface water monitoring location (Figure 5).

(d) Subsurface samples must be collected from tuff at soil/tuff interface from four sampling locations to determine whether there was any contamination transport to the subsurface.

(e) The type of samples to be collected (e.g., soil, tuff) and the rationale for the selection of the sample type.

(f) Sampling methods including a description of the approved EPA sampling methods and procedures that must be used to collect each type of sample as specified in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) (EPA, 1986).

(g) A description of the approved EPA SW-846 laboratory analytical methods that must be used to measure hazardous constituent concentrations (see Table 4).

(h) A description of quality assurance and quality control (QA/QC) procedures that include, but are not limited to:

  i. field duplicates, trip blanks, equipment blanks;
  ii. a description of methods for decontamination of re-usable sampling equipment; and

iii. a description of all sample preservation, handling, labeling, and chain-of-custody procedures.

6.1 Sampling Activities

Sampling activities must be conducted in order to demonstrate that Unit-related equipment and soils in and around the Unit meet the closure performance standards in Section 4.1. All samples shall be collected and analyzed in accordance with the procedures in Sections 6.1, 6.2, 6.3, 6.4, 6.5, and 6.6 of this Closure Plan.

6.1.1 *Sample Collection Procedures*

Samples must be collected in accordance with the procedures identified in this SAP which incorporates guidance from the EPA (EPA, 1986 and EPA, 2002), DOE (DOE, 1995), and other Department-approved procedures and shall comply with Sections 9.4.7.1 and 11.10 of the Permit. Before samples are collected, the sampling plan must be approved by the area Explosives Safety Officer. The Explosives Safety Officer must evaluate the area to determine the potential for detonable explosives or explosives contamination and whether or not any extracted samples may be released from the area without initial internal explosives analysis. All samples must be tested by the high explosives spot test immediately upon collection and have a high explosives handler present when performing the sampling. If samples test positive on the high explosives spot test, they must be handled, packaged, stored, and transported from the site as material determined to present an explosive hazard.

6.1.2 *Soil Sampling*

Soil samples must be collected from six locations outside the fence line of the TA-16-399 Burn Tray. Soil samples must be collected from five additional locations within the fence line (See Figure 4). A minimum of 11 surface samples must be collected from the top two inches of soil and four samples must be collected from a 0 to 12 inches depth from below the soil/tuff interface. Care must be taken in sample collection to prevent mixing of top sandy soil with tuff samples. The soil sample locations are in areas of potential deposition from air to soil and areas of disposition related to storm water runoff. Soil samples must be collected using a Teflon scoop for surface samples and a stainless-steel auger for samples collected at 6-12 inch depths. The sample collection process must be completed in accordance with American Society for Testing and Materials (ASTM), Active Standard D4823-95 (2008) Standard Guide for Core Sampling and ASTM D5633-04 (2008) for scoop sampling. Global positioning system (GPS) data utilizing Trimble GeoExplorer Unit must be collected for each sample location.

Soil sample analysis must include the following: 11 surface samples from a 0-2 inch depth (See Figure 4, Locations 1-11) and four subsurface samples from a depth of 0-12 inches below soil/tuff interface (See Figure 4, Locations 3, 6, 8, and 11) at TA-16-399 to be analyzed for:

(a) Target analyte list (TAL) metal analysis for 24 analytes using *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)* Methods 6010B, 6020 (inductively coupled plasma – mass spectrometry), and 7471A;

(b) Dioxins/Furans analysis using EPA Method 8290A;

(c) High explosives analysis for 20 target compounds using EPA Method 8330B or 8321A with a modification to add explosive compounds generated specifically at LANL listed in Tables 2 and 4 of the Closure Plan;

(d) Analysis for SVOCs using EPA Method 8270C;

(e) Analysis for VOCs using EPA Method 8260B;

(f) Perchlorate anion (ClO_4^-) by EPA Method 6850 or 6860;

(g) DRO and GRO by EPA Method 8015B; and

(h) Nitrates by EPA Method 9056A.

After soil excavations are complete, confirmation sampling will be conducted at the site. At least five surface samples and two subsurface samples will be collected and analyzed for all previously identified constituents, with the exception of VOCs, as they have not been detected in any analytical data collected from the site. The proposed surface samples will be located at four excavation boundaries within the excavated area and at the center of the excavation at the newly exposed surface. Samples collected from the exposed surface will be located approximately equidistant from each other as the excavated area allows. The subsurface samples will be collected outside the excavated boundary at depths representative of the excavation depth. Specific locations for the confirmation samples are best determined after soil removal to ensure that appropriate number of samples and appropriate distance between samples are determined. A figure including these locations and distances will be contained within the Closure Certification Report.

Field quality control samples: One field duplicate soil sample must be collected for each analytical suite. A single trip blank for VOC analysis must be submitted per day per shipping cooler when VOC analysis is required.

The samples must be shipped to an independent contract analytical laboratory for analysis using the methods described above. Results and data from the sample collection activity must be submitted with the TA-16-399 closure report.

6.1.3 *Cleaning of Sampling Equipment*

A disposable sampler is considered clean only when directly removed from a factory-sealed wrapper. Reusable decontamination equipment, including protective clothing and tools, and sampling equipment used during closure activities must be scraped, as necessary, to remove residue and cleaned prior to each use in accordance with Permit Section 11.10.2.11. Sampling equipment rinsate blanks must be collected and analyzed only if reusable sampling equipment is used.

6.2 Sample Management Procedures

The following sections provide a description of sample documentation, handling, preservation, storage, packaging, and transportation requirements that must be followed during the sampling activities associated with the closure.

6.3 Sample Documentation

Sampling personnel must complete and maintain records to document sampling and analysis activities. Sample documentation must include sample identification numbers, chain-of-custody forms, analysis requested, sample logbooks detailing sample collection activities, and shipping forms (if necessary).

6.3.1 *Chain-of-Custody*

Chain-of-custody forms must be maintained by sampling personnel and Sample Management Office personnel until the samples are relinquished to the analytical laboratory. Chain of custody protocols must ensure the integrity of the samples and provide for an accurate and defensible written record of the

sampling possession and handling from the time of collection until laboratory analysis. One chain-of-custody form may be used to document all of the samples collected from a single sampling event. The sample collector shall be responsible for the integrity of the samples collected until properly transferred to another person. Chain-of custody forms must be maintained in accordance with Permit Section 11.10.

The sample collector shall document all pertinent sample collection data. Individuals relinquishing or receiving custody of the samples shall sign, date, and note the time on the analysis request and chain-of-custody form. A chain-of-custody form must accompany all samples from collection through laboratory analysis. The analytical laboratory shall return the completed chain-of-custody form to the Facility and it must become part of the permanent sampling record documenting the sampling efforts.

6.3.2 *Sample Labels and Custody Seals*

A sample label must be affixed to each sample container. The sample label must include the following information:

(a) a unique sample identification number;

(b) name of the sample collector;

(c) date and time of collection;

(d) type of preservatives used, if any; and

(e) the location where the sample was collected, GPS coordinates must be recorded.

A custody seal must be placed on each sample container to detect unauthorized tampering with the samples. These labels must be initialed, dated, and affixed by the sample collector in such a *manner that it is necessary to break the seal to open the container.*

6.3.3 *Sample Logbook*

All pertinent information on the sampling effort must be recorded in a bound logbook. Information must be recorded in ink and any cross-outs must be made with a single line with the change initialed and dated by the author. The sample logbook must include the following information:

(a) the sample location;

(b) suspected composition;

(c) sample identification number;

(d) volume/mass of sample taken;

(e) purpose of sampling;

(f) description of sample point and sampling methodology;

(g) date and time of collection;

(h) name of the sample collector;

(i) sample destination and how it will be transported;

(j) observations;

(k) name(s) of personnel responsible for the observations; and

(l) any deviations from the sampling plan must be noted in the sample logbook and reported in the TA-16-399 closure certification report.

6.4 Sample Handling, Preservation, and Storage

Samples must be collected and containerized in appropriate pre-cleaned sample containers. Samples that require cooling to 4 degrees Celsius must be placed in a cooler with ice or ice gel or in a refrigerator immediately upon collection.

6.5 Packaging and Transportation of Samples

All packaging and transportation activities must meet safety expectations, QA requirements, DOE Orders, and relevant local, state, and federal laws (including 10 CFR and 49 CFR). The Permittee shall provide the appropriate Facility documents to establish the requirements for packaging design, testing, acquisition, acceptance, use, maintenance, and decommissioning and for on-site, intra-site, and off-site shipment preparation and transportation of general commodities, hazardous materials, substances, waste, and defense program materials.

The samples must be maintained at appropriate temperatures after collection and throughout the shipping process. All samples must be chilled to four degrees Celsius before shipment occurs. Samples must be then wrapped, placed in the DOT approved shipping container with ample blue ice to hold the required temperature. Temperature blanks must be placed in the cooler and sealed with custody tape. Off-site transportation of samples must occur via contract, or common motor carrier, air carrier, or freight. All off-site transportation must be processed through the Permittees' packaging and transportation organization unless the shipper is specifically authorized through formal documentation by that organization to independently tender shipments to common motor or air carriers. All shipments must be sent overnight delivery. Once received, the analytical laboratory must verify that the custody tape is still intact and measure the temperature of the cooler. All sample information and observations must be recorded and presented in the analytical data package. For all discrepancies, the sender must be notified for resolution.

6.6 Sample Analysis Requirements

Samples must be analyzed for all the hazardous constituents listed in Table 2 and Table 4. Samples must be analyzed by an independent laboratory using the methods outlined in SW-846. Analytes, test methods and instrumentation, estimated quantitation limits, and rationale for metals and organic analyses shall be included in the closure Report. If any of the information from this plan has changed at the time of closure, the Permittee shall request that NMED amend this Closure Plan to update all methods in this sampling and analysis plan (SAP).

6.6.1 *Analytical Laboratory Requirements*

The analytical laboratory must perform the detailed qualitative and quantitative chemical analyses specified in Section 6.6.2 of this plan. The analytical laboratory must also comply with the mandates outlined in Permit Section 11.10.3. The analytical laboratory must have:

(a) a documented comprehensive QA/QC program;

(b) technical analytical expertise;

(c) a document control/records management plan; and

(d) the capability to perform data reduction, validation, and reporting.

The selection of the analytical testing methods identified in Section 6.0 of this plan, must be based on the following considerations:

(a) the physical form of the waste;

(b) constituents of interest;

(c) required detection limits (*e.g.*, regulatory thresholds); and

(d) information requirements (*e.g.*, waste classification).

6.6.2 *Quality Assurance/Quality Control*

All sampling and analysis must be conducted in accordance with quality assurance (QA)/quality control (QC) procedures defined by the latest revision of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (*SW-846*) (EPA, 1986) or other Department-approved procedures. Field sampling procedures and laboratory analyses must be evaluated through the use of QA/QC samples to assess the overall quality of the data produced as specified in the applicable portions of Permit Sections 11.10.2.4.vii, 11.10.2.8.iv and 11.10.3.1. QC samples evaluate precision, accuracy, and the potential for sample contamination associated with the sampling and analysis process which is described in the following sections. Information on calculations necessary to evaluate the QC results is also described below. Analysis must be conducted in accordance with procedures described in SW-846 (EPA 1986, as updated) and Permit Section 11.10.3.

6.6.2.1 Field Quality Control

The field QC samples that must be collected include trip blanks, and field duplicates as required by the applicable requirements of Permit Section 9.4.7.1, 11.10.2.4.vii, and 11.10.2.9.iv. Field QC samples must be given a unique sample identification number and submitted to the analytical laboratory as blind samples. Field QC samples must be identified on the applicable forms so that the results can be applied to the associated sample.

6.6.2.2 Analytical Laboratory Quality Control Samples

QA/QC considerations are an integral part of analytical laboratory operations. Laboratory QA ensures that analytical methods generate data that are technically sound, statistically valid, and that can be documented. QC procedures described in EPA SW-846 are the tools employed to measure the degree to which these QA objectives are met, and include method blank, matrix spike, and laboratory duplicate samples. The results for analytical laboratory QC samples must be reported along with the regular sample analyses.

6.7 Data Reduction, Verification, Validation, and Reporting

Data reduction is the conversion of raw data to reportable units, transfer of data between recording media, and computation of summary statistics, standard errors, confidence intervals, and statistical tests and must be in accordance with provisions of Permit Section 11.10.3.5. Analytical data generated by the activities described in this Closure Plan must be verified and validated by the analytical laboratory and provided to the Permittee and NMED in an electronic data deliverable format for upload to the LANL's public environmental management system as referenced in 1.10.1 of the Permit.

6.8 Data Reporting Requirements

Analytical results must include all pertinent information about the condition and appearance of the sample-as-received. The level II laboratory analytical data packages shall be included with the closure report for this Unit. The analytical reports must be prepared in accordance with the provisions of Permit Section 11.10.3.1.iv.

7.0 WASTE MANAGEMENT

By removing any hazardous waste or hazardous waste constituents during closure, the Permittees may become a generator of hazardous waste. The Permittee shall control, handle, characterize, and dispose of all wastes generated during closure activities in accordance with this Section (7.0), Permit Section 9.4.5, Permit Attachment C, and Facility waste management procedures, and shall be in compliance with applicable state, federal, and local requirements (*see* 40 CFR § 265.114). These wastes shall include, but are not limited to:

(a) demolition debris;

(b) concrete;

(c) containerized waste;

(d) personnel protective equipment;

(e) soil;

(f) decontamination wash water; and

(g) decontamination waste.

The different types of wastes generated at closure, including the Unit's decontaminated structures and related equipment, and their disposition options (*e.g.*, reuse, recycling, or disposal) are listed in Table 3 of this Closure Plan. Disposable equipment and other small equipment that cannot be decontaminated shall be containerized and managed as waste.

8.0 CLOSURE CERTIFICATION REPORT

Upon completion of the closure activities at the Unit, the Permittee shall submit, by registered mail, or equivalent method of delivery, a closure certification report for Department review and approval. The Report shall document that the Unit has been closed in compliance with the specifications in this Closure Plan and Permit Section 9.5. The Report shall summarize all activities conducted during closure.

Documentation supporting the certification of an independent professional engineer licensed in New Mexico must be furnished to the Department before the closure of the Unit will be approved.

9.0 DEPARTMENT CLOSURE ASSESSMENT

Upon submittal of the closure certification report described in Section 8.0 of this Closure Plan, the Permittees shall arrange an on-site closure review with representatives of the Department to assess the completion of the closure activities at the Unit.

10.0 POSTINGS TO ELECTRONIC INFORMATION REPOSITORY

The Permittees have an Electronic Information Repository, currently called the Electronic Public Reading Room. The Permittees shall add new documents to the electronic IR within ten days after the documents are submitted to, or received from, the Department in accordance with provisions of Permit Section 1.10 (*See* 40 CFR § 124.33(f)). The documents to be made available to public for this Closure Plan include:

(a) Closure Plan Submitted to NMED with all attachments and appendices;

(b) Notices of Disapproval;

(c) NMED approved Closure Plan with all attachments and appendices;

(d) Responses to Notices of Disapproval;

(e) Amendments to the Closure Plan~~, if any~~;

~~(e)~~(f) Closure Certification Report: and

~~(f)~~(g) Post Closure Plan, if required.

11.0 REFERENCES

DOE, 1995. "DOE Methods for Evaluating Environmental and Waste Management Samples," DOE/EM-0089T, Rev. 2. Prepared for the U.S. Department of Energy by Pacific Northwest Laboratory, Richland, Washington.

EPA, 1986 and all approved updates. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA-*SW-846*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.

EPA, 2000. US Environmental Protection Agency, Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity, Authorization to Discharge under the NPDES, NPDES Permits No. NMR05A734 and NMR05A735, issued to the University of California and the DOE, respectively. Effective December 23, 2000.

EPA, 2002. *RCRA Waste Sampling Draft Technical Guidance Planning, Implementation, and Assessment*, EPA530-D-02-002, August 2002, Office of Solid Waste, U.S. Environmental Protection Agency, Washington, DC.

EPA, 2005. EPA, 2005. U.S. Environmental Protection Agency Region 6, *In the Matter of United States Department of Energy and the Los Alamos National Laboratory, NPDES Nos. NMR05A735, NMR05A734, and NM0028355, Federal Facility Compliance Agreement*. Effective February 2005.

EPA, 2005. U.S. Environmental Protection Agency Region 6, Administrative Order Docket No. CWA-06-205-1734, NPDES Permit No. NMR05A734. Effective March 2005.

EPA, 2007. U.S. Environmental Protection Agency Region 6, *Authorization to Discharge Under the National Pollutant Discharge Elimination System*, NPDES Permit No.. NM0028355, issued to the DOE and Los Alamos National Security, LLC. Effective August 1, 2007.

EPA, 2008. U.S. Environmental Protection Agency, *Multi-Sector General Permit for Storm Water Discharge Associated with Industrial Activities*, Notice of Intent to Discharge, Permit Tracking Number NMR05GB21, Los Alamos National Security, LLC. Effective January 8, 2009.

EPA, 2009. U.S. Environmental Protection Agency Region 6, *Individual Permit for Storm Water Discharge from SWMUs and AOCs*, NPDES Permit No. NM003075, issued to the DOE and Los Alamos National Security, LLC. Effective April 1, 2009.

EPA, 2010. U.S. Environmental Protection Agency Region 6, *Individual Permit for Storm Water Discharge from SWMUs and AOCs, Final Permit Modification Decision*, NPDES Permit No. NM003075, issued to the DOE and Los Alamos National Security, LLC. Effective November 1, 2010.

LANL, 2006. *Closure Plan for Technical Areas 16, 50, 54 and 55, Revision 0.0*. LA-UR-06-6913. September 26, 2006.

LANL, 2009. *Closure Evaluation of the Ecological Risk Screening Assessment for Dioxin/Furans for the Open Burn Treatment Units (TA-16-388 and TA-16-399 June 2009.* DCN: NMED-2009-13. June 30, 2009.

LANL, 2012. *Interim Status Closure Plan Open Burning Treatment Unit Technical Area 16-399 Burn Tray, Revision 2.0.* LA-UR-12-26782. December 11, 2012.

LANL, 2015. *Ecorisk Database (Release 3.1),* ESH ID600921Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2016. *2017 Interim Facility-Wide Groundwater Monitoring Plan for the 2017 Monitoring Year, October 2016-September 2017*, Los Alamos National Laboratory documentEP2016-0045, Los Alamos, New Mexico).

NMED, 2010. *Los Alamos National Laboratory Hazardous Waste Permit*. November 2010, New Mexico Environment Department, Santa Fe, New Mexico.

NMED, 2017. *New Mexico Environment Department Risk Assessment Guidance for Site Investigations and Remediation.* March 2017, New Mexico Environment Department, Santa Fe, New Mexico.

NMED, 2019. *Final Action and Response to Comments Closure Plan for Technical Area 16-399 Open Burn Unit, Los Alamos National Laboratory, EPA ID #NM0890010515.* Letter. January 2019.

Vigil-Holterman, Luciana. State of New Mexico before the Secretary of Environment. *Application of the United States Department of Energy and Los Alamos National Security, LLC for Hazardous Waste Facility Permit for Los Alamos National Laboratory*, Testimony, April 5, 2012 (HWB-09-37(P) and HWB-10-04(P)). Exhibit JJ, page 9 and OB Testimony page 1282, line 8. Kathy Townsend Court Reporters

Table 1. Closure Schedule for the Technical Area 16-399 Open Burning Treatment Unit

Activity	Maximum Time Required
Begin closure activities	45 days after approval of the Closure Plan
Conduct records review	Completed November 2012
Conduct structural assessment	Completed on July 19, 2012
Documentation of structural assessment	Submit to Department no later than 45 days after approval of Closure Plan
Complete all closure activities	No later than 180 days of initiating closure activities
Submit ~~final~~ closure certification report to the Department	No later than 60 days after completion of closure activities
Begin soil removal	Within 45 days of approval of the amended Closure Plan
Complete all additional closure activities	Within 180 days of approval of the amended Closure Plan
Submit final closure certification report to the Department	No later than 60 days after receipt of confirmation sample analytical data

Note: The schedule above indicates calendar days in which the listed activities shall be completed from the day closure activities are initiated. Some activities may be conducted simultaneously.

Table 2. Hazardous Waste Constituents of Concern at the TA-16-399 Open Burning Treatment Unit[a]

Category	EPA Hazardous Waste Numbers	Specific Constituents
High explosives and associated compounds	D003	HMX, RDX, TNT, PETN, TATB, Tetryl, and mixtures of explosives including; ANFO, Composition B, Cyclotol, IMX-101, PBX 9404, PBX 9407, PBX 9501, PBX 9502, X0233, X0533, XTX 8003, XTX 8004, LX-02, LX-07, LX-10, and LX-14
Toxic Metals	D004, D005, D006, D007, D008, D009, D010, D011	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver
Semi-volatile Organic Compounds	D030, D036, F004	2,4-Dinitrotoluene, Nitrobenzene
Other constituents of concern		Dioxins/Furans, Perchlorate, and kerosene

[a] Based on the Unit operating record 1980-2012.
PETN = pentaerythrioltetranitrate (2,2-bis[(nitroxy)methyl]-1,3-propanediol dinitrate)
HMX = cyclotetramethylenetetranitramine (octahydro, 1,3,5,7-tetranitro, 1,3,5,7-tetrazocine)
RDX = cyclonite (cyclo-1,3,5-trimethylene-2,4,6-trinitramine)
TNT = 2,4,6-trinitrotoluene
TATB = 1,3,5-triamino-2,4,6-trinitrobenzene

Table 3. Potential Waste Materials, Waste Types, and Disposal Options

Potential Waste Materials	Waste Types	Disposal Options
Personal protective equipment (PPE)	Non-hazardous solid waste	Subtitle D landfill
	Hazardous waste	The PPE must be treated to meet Land Disposal Restriction (LDR) treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Decontamination water	Non-hazardous liquid waste	High Explosives Waste Treatment Facility (HEWTF) or sanitary sewer
	Hazardous waste	Waste must be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Metal covers/trays	Non-hazardous metals	Subtitle D landfill
	Hazardous waste	Treated to remove HE and recycled or disposed of in subtitle C or D landfill.
Firebrick associated with the Unit	Non-Hazardous/Hazardous	Firebrick must be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate
Soil and tuff	Non-hazardous solid waste	Subtitle D landfill
	Hazardous waste	Waste must be treated to LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Discarded waste management equipment	Non-hazardous solid waste	Recycled, salvaged, or sent to a Subtitle D landfill
	Hazardous waste	Waste must be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Discarded sampling and decontamination equipment	Non-hazardous solid waste	Subtitle D landfill
	Hazardous waste	Waste must be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.

Table 4. Summary of Analytical Methods

Analyte	EPA *SW-846* Analytical Method[a]	Analytical Technique	Estimated Quantitation Limits[b] (mg/kg)	Rationale
Metal Analysis				
Aluminum	6010B	ICP-AES	20	Determine the environmentally available metal concentration in the soil samples following strong acid digestion.
Antimony	6010B	ICP-AES	0.03	
Arsenic	6020	ICP-MS	1.5	
Barium	6010B	ICP-AES	0.5	
Beryllium	6020	ICP-MS	0.1	
Cadmium	6010B	ICP-AES	0.03	
Calcium	6010B	ICP-AES	30	
Chromium	6010B	ICP-AES	0.5	
Cobalt	6010B	ICP-AES	0.5	
Copper	6010B	ICP-AES	1	
Iron	6010B	ICP-AES	30	
Lead	6010B	ICP-AES	1	
Magnesium	6010B	ICP-AES	50	
Manganese	6010B	ICP-AES	1.0	
Mercury	7471A	CVAA	0.01	
Nickel	6020	ICP-MS	0.4	
Potassium	6010B	ICP-AES	30	
Selenium	6020	ICP-AES	1.5	
Silver	6020	ICP-MS	0.01	
Sodium	6010B	ICP-AES	20	
Thallium	6020	ICP-MS	0.2	
Vanadium	6010B	ICP-AES	0.5	
Zinc	6010B	ICP-AES	1	
Organic Analysis				
VOCs	8260B	GC/MS	0.001 to 0.005	Determine the solvent-extractable VOCs concentration in the soil samples.
SVOCs	8270C	GC/MS	0.033 to 0.33	Determine the solvent-extractable SVOCs concentration in the soil samples.

Analyte	EPA *SW-846* Analytical Method[a]	Analytical Technique	Estimated Quantitation Limits[b] (mg/kg)	Rationale
Other Analysis				
Dioxins/Furans	8290A	HRGC/MS	0.00001 to 0.0003	Determine the solvent extractable dioxin/furan concentration in the soil samples.
Perchlorate [ClO_4^-]	6850 or 6860	HPLC/ESI/MS	0.002 mg/kg	Determine the water-soluble [ClO_4^-] concentration in the soil samples.
High Explosives and associated degradation products	8330B or 8321A [c]	HPLC/TS/MS	0.5 to 2.0	Determine the solvent-extractable high explosives concentrations in the samples.
Nitrates	9056A	IC		Determine the water-soluble NO_3 concentration in the soil samples.
Diesel range organics (DRO), gas range organics (GRO), and Kerosene	8015C			Determine the DRO and GRO concentration in the soil samples.

[a] U.S. Environmental Protection Agency (EPA), 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846.

[b] Estimated quantitation limits listed for all methods are based LANL contract-required quantitation limits for subcontractor analytical laboratory services.

[c] Instrumentation published in Method SW-846-8321A can be used to identify the required analytes that would not be detected using Method SW-846-8330, thus a LANL-specific modification is used for Method SW-846-8321A to analyze for explosives compounds.

CVAA = Cold-vapor atomic absorption spectroscopy
ESI/MS = Electrospray ionization/mass spectrometry
GC/MS = Gas chromatography/mass spectrometry
IC=Ion Chromotography
HPLC = High performance liquid chromatography
HRGC/MS = High resolution gas chromatography/mass spectrometry
ICP-AES = Inductively coupled plasma-atomic emission spectrometry
SVOC = Semivolatile organic compound(s)
TS/MS = Thermospray/mass spectrometry
VOC = Volatile organic compound(s)
mg/kg = milligrams per kilogram

Table 5. Sample Locations included on Figures 6-9

Year	Sample ID	Location Comment	Analysis Conducted	Depth in Inches	Reason for Sample Collection
2009	09RCRA695	West of Closure Plan Location #10	Dioxin/Furans	0-2	Site characterization
2009	09RCRA696	West of Closure Plan Location #10	Metals	0-2	Site characterization
2009	09RCRA697	Approximate same as Closure Plan Location #10	Dioxin/Furans	0-2	Site characterization
2009	09RCRA698	Approximate same as Closure Plan Location #10	Metals	0-2	Site characterization
2009	09RCRA699	North of Closure Plan Location #1	Dioxin/Furans	0-2	Site characterization
2009	09RCRA700	North of Closure Plan Location #1	Metals	0-2	Site characterization
2009	09RCRA701	West of 09RCRA706 across road	Dioxin/Furans	0-2	Site characterization
2009	09RCRA702	West of 09RCRA706 across road	Metals	0-2	Site characterization
2009	09RCRA703	South of 09RCRA706	Dioxin/Furans	0-2	Site characterization
2009	09RCRA704	South of 09RCRA706	Metals	0-2	Site characterization
2009	09RCRA705	West of Closure Plan Location #1 other side of the road	Dioxin/Furans	0-2	Site characterization
2009	09RCRA706	West of Closure Plan Location #1 other side of the road	Metals	0-2	Site characterization
2009	09RCRA707	Just south of Closure Plan Location #1	Dioxin/Furans	0-2	Site characterization
2009	09RCRA708	Just south of Closure Plan Location #1	Metals	0-2	Site characterization
2009	09RCRA709	Approximate same as Closure Plan Location #8	Dioxin/Furans	0-2	Site characterization
2009	09RCRA710	Approximate same as Closure Plan Location #8	Metals	0-2	Site characterization

Year	Sample ID	Location Comment	Analysis Conducted	Depth in Inches	Reason for Sample Collection
2009	09RCRA711	South and east of Closure Plan Location #6	Dioxin/Furans	0-2	Site characterization
2009	09RCRA712	South and east of Closure Plan Location #6	Metals	0-2	Site characterization
2009	09RCRA731	North of Closure Plan Location #9	Dioxin/Furans	0-2	Site characterization
2009	09RCRA732	North of Closure Plan Location #9	Metals	0-2	Site characterization
2012	RE16-12-17672	Approximate same as Closure Plan Location #1	High Explosives, SVOC, VOC, Metals, Perchlorate, Dioxins/Furans	0-2	Anticipated closure plan approval
2012	RE16-12-17673	Approximate same as Closure Plan Location #2	High Explosives, SVOC, VOC, Metals, Perchlorate, Dioxins/Furans	0-2	Anticipated closure plan approval
2012	RE16-12-17674	Approximate same as Closure Plan Location #3 (at depth)	High Explosives, SVOC, VOC, Metals, Perchlorate, Dioxins/Furans	10	Anticipated closure plan approval
2012	RE16-12-17675	Approximate same as Closure Plan Location #4	High Explosives, SVOC, VOC, Metals, Perchlorate, Dioxins/Furans	0-2	Anticipated closure plan approval
2012	RE16-12-17676	Approximate same as Closure Plan Location #4 (duplicate)	High Explosives, SVOC, VOC, Metals, Perchlorate, Dioxins/Furans	0-2	Anticipated closure plan approval
2012	RE16-12-17677	Approximate same as Closure Plan Location #5	High Explosives, SVOC, VOC, Metals, Perchlorate, Dioxins/Furans	0-2	Anticipated closure plan approval
2012	RE16-12-17678	Approximate same as Closure Plan Location #6 (at depth only)	High Explosives, SVOC, VOC, Metals, Perchlorate, Dioxins/Furans	10	Anticipated closure plan approval
2012	RE16-12-17679	Approximate south of Closure Plan Location #8	High Explosives, SVOC, VOC, Metals, Perchlorate, Dioxins/Furans	0-2	Anticipated closure plan approval
2012	RE16-12-17680	Approximate same as Closure Plan Location #3	High Explosives, SVOC, VOC, Metals, Perchlorate, Dioxins/Furans	0-2	Anticipated closure plan approval
2012	RE16-12-17681	Approximate same as Closure Plan Location #9	High Explosives, SVOC, VOC, Metals, Perchlorate, Dioxins/Furans	0-2	Anticipated closure plan approval
2013	WST16-13-29794	East of Closure Plan Location #9	High Explosives, SVOC, Metals, Perchlorate, Dioxins/Furans	0-2	Hotspot location identification

Year	Sample ID	Location Comment	Analysis Conducted	Depth in Inches	Reason for Sample Collection
2013	WST16-13-29795	(north of RE16-12-17681)	High Explosives, SVOC, Metals, Perchlorate, Dioxins/Furans	0-2	Hotspot location identification
2013	WST16-13-29796	(east of RE16-12-17681)	High Explosives, SVOC, Metals, Perchlorate, Dioxins/Furans	0-2	Hotspot location identification
2013	WST16-13-29797	(south of RE16-12-17681)	High Explosives, SVOC, Metals, Perchlorate, Dioxins/Furans	0-2	Hotspot location identification
2013	WST16-13-29798	(west of RE16-12-17681)	High Explosives, SVOC, Metals, Perchlorate, Dioxins/Furans	0-2	Hotspot location identification
2019	WST16-19-181353	Closure Plan Location #2	High Explosives, VOC, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics, Nitrate	0-2	Closure plan sample location
2019	WST16-19-181354	Closure Plan Location #3	High Explosives, VOC, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics, Nitrate	0-2	Closure plan sample location
2019	WST16-19-181355	Closure Plan Location #5	High Explosives, VOC, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics, Nitrate	0-2	Closure plan sample location
2019	WST16-19-181359	Closure Plan Location #3 subsurface sample	High Explosives, VOC, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics, Nitrate	2-12	Closure plan sample location
2019	WST16-19-181361	Closure Plan Location #1	High Explosives, VOC, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics, Nitrate	0-2	Closure plan sample location
2019	WST16-19-181362	Closure Plan Location #6	High Explosives, VOC, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics, Nitrate	0-2	Closure plan sample location

Year	Sample ID	Location Comment	Analysis Conducted	Depth in Inches	Reason for Sample Collection
2019	WST16-19-181363	Closure Plan Location #6 subsurface sample	High Explosives, VOC, SVOC, Metals (No Mercury), Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics	2-12	Closure plan sample location
2019	WST16-19-181364	Closure Plan Location #8	High Explosives, VOC, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics	0-2	Closure plan sample location
2019	WST16-19-181365	Closure Plan Location #8 subsurface sample	High Explosives, VOC, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics	2-12	Closure plan sample location
2019	WST16-19-181366	Closure Plan Location #7	High Explosives, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics, Nitrate	0-2	Closure plan sample location
2019	WST16-19-181367	Closure Plan Location #9	High Explosives, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics, Nitrate	0-2	Closure plan sample location
2019	WST16-19-181368	Closure Plan Location #10	High Explosives, SVOC, Metals, Perchlorate, Dioxins/Furans, Gas Range Organics, Diesel Range Organics	0-2	Closure plan sample location
2019	WST16-19-184748	Closure Plan Location #10	VOC	0-2	Resample closure plan sample location
2019	WST16-19-184749	Closure Plan Location #6 subsurface sample	Mercury	0-2	Resample closure plan sample location
2019	WST16-19-184750	Closure Plan Location #7	VOC	0-2	Resample closure plan sample location
2019	WST16-19-184751	Closure Plan Location #9	VOC	0-2	Resample closure plan sample location
2019	WST16-19-184752	Closure Plan Location #4	Mercury	0-2	Resample closure plan sample location

Year	Sample ID	Location Comment	Analysis Conducted	Depth in Inches	Reason for Sample Collection
2019	WST16-19-184753	Closure Plan Location #4 duplicate sample	Mercury	0-2	Resample closure plan sample location
2019	WST16-19-184757	Closure Plan Location #8	Nitrate	0-2	Resample closure plan sample location
2019	WST16-19-184758	Closure Plan Location #8 subsurface sample	Nitrate	2-12	Resample closure plan sample location
2020	WST16-20-191427	South of #11 at new surface	High Explosives	~12	Confirmation sample after soil excavation
2020	WST16-20-191428	Original Closure Plan Location #11	High Explosives	~12	Confirmation sample after soil excavation
2020	WST16-20-191429	North of #11 at new surface	High Explosives	~12	Confirmation sample after soil excavation
2020	WST16-20-191430	East of #11 at new surface	High Explosives	~12	Confirmation sample after soil excavation
2020	WST16-20-191431	West of #11 at new surface	High Explosives	~12	Confirmation sample after soil excavation
2020	WST16-20-191432	North of #11 at depth	High Explosives	20-24	Confirmation sample after soil excavation
2020	WST16-20-191433	East of #11 at depth	High Explosives	20-24	Confirmation sample after soil excavation
2020	WST16-20-191434	West of #11 at depth	High Explosives	20-24	Confirmation sample after soil excavation
2020	WST16-20-191435	South of #11 at depth	High Explosives	20-24	Confirmation sample after soil excavation
2020	WST16-20-191735	Duplicate South of #11 at depth	High Explosives	20-24	Confirmation sample after soil excavation
2021	WST16-22-237994	Middle of excavation- D-F excavation	High Explosives, Metals, Dioxin/Furan	~10	Confirmation sample after soil excavation
2021	WST16-22-237995	Southern portion of excavation- D-F excavation	High Explosives, Metals, Dioxin/Furan	~10	Confirmation sample after soil excavation

Year	Sample ID	Location Comment	Analysis Conducted	Depth in Inches	Reason for Sample Collection
2021	WST16-22-238006	Western portion of excavation- D-F excavation	High Explosives, Metals, Dioxin/Furan	~10	Confirmation sample after soil excavation
2021	WST16-22-238007	Northern portion of excavation (by pole)- D-F excavation	High Explosives, Metals, Dioxin/Furan	~10	Confirmation sample after soil excavation
2021	WST16-22-238008	Northeastern portion of excavation- D-F excavation	High Explosives, Metals, Dioxin/Furan	~10	Confirmation sample after soil excavation
2021	WST16-22-238009	Southeastern portion of excavation- D-F excavation	High Explosives, Metals, Dioxin/Furan	~10	Confirmation sample after soil excavation
2021	WST16-22-238454	Barium excavation 1	High Explosives, Metals, Dioxin/Furan	~15	Confirmation sample after soil excavation
2021	WST16-22-238455	Barium excavation 2	High Explosives, Metals, Dioxin/Furan	~15	Confirmation sample after soil excavation
2021	WST16-22-238456	Barium excavation 3	High Explosives, Metals, Dioxin/Furan	~15	Confirmation sample after soil excavation
2021	WST16-22-238457	Barium excavation 4	High Explosives, Metals, Dioxin/Furan	~15	Confirmation sample after soil excavation
	WST16-22-238458	Barium excavation 5	High Explosives, Metals, Dioxin/Furan	~15	Confirmation sample after soil excavation
2021	WST16-22-238460	Barium excavation 6	High Explosives, Metals, Dioxin/Furan	~15	Confirmation sample after soil excavation
2021	WST16-22-238461	Barium excavation 7	High Explosives, Metals, Dioxin/Furan	~15	Confirmation sample after soil excavation
2021	WST16-22-238462	Barium excavation 8	High Explosives, Metals, Dioxin/Furan	~15	Confirmation sample after soil excavation
2021	WST16-22-238463	Barium excavation 9	High Explosives, Metals, Dioxin/Furan	~15	Confirmation sample after soil excavation
2021	WST16-22-238459	Barium excavation 5 dup	High Explosives, Metals, Dioxin/Furan	~15	Confirmation sample after soil excavation

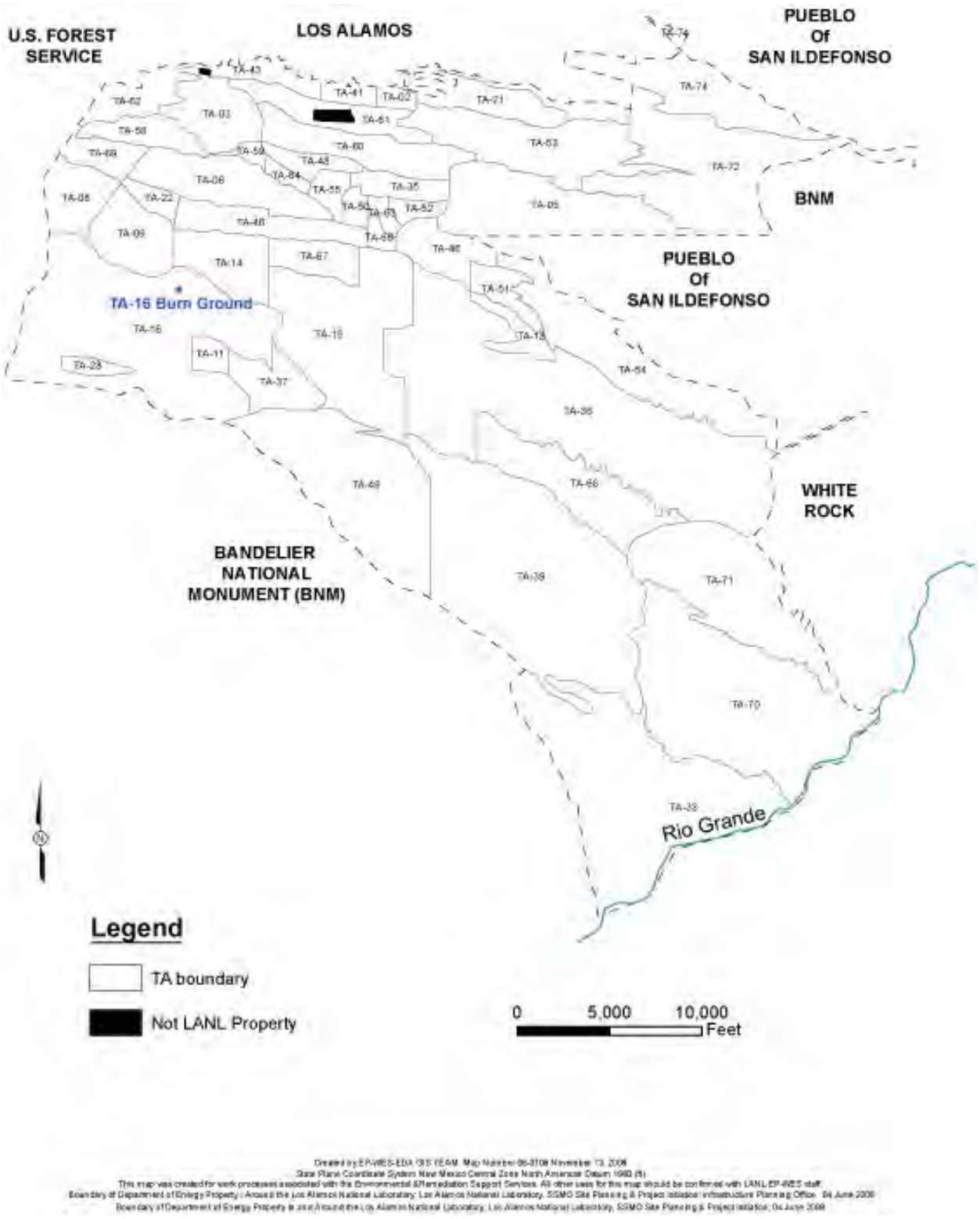

Figure 1. Technical Area 16 (TA-16) Location Map

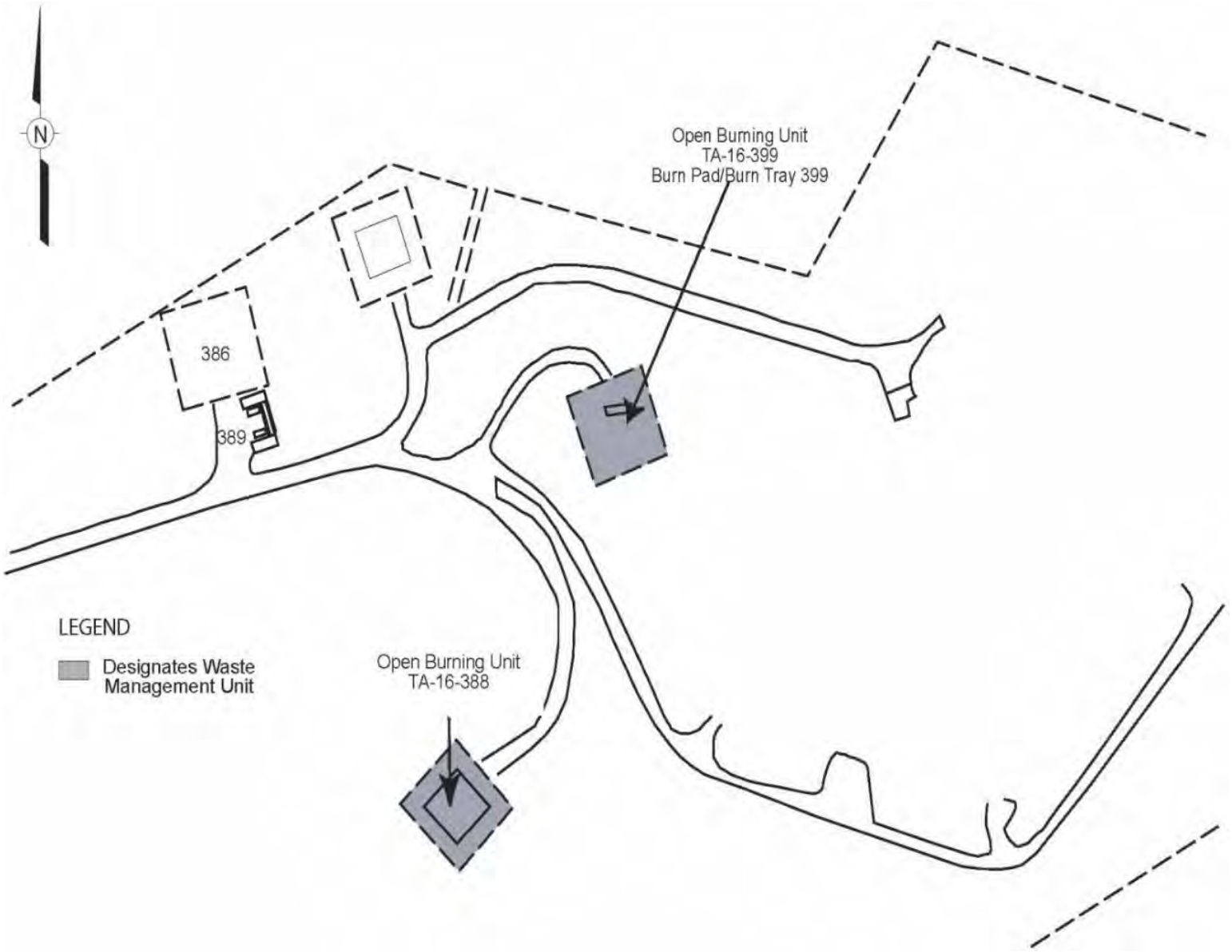

Figure 2. Technical Area 16-399 Open Burning Treatment Unit Layout

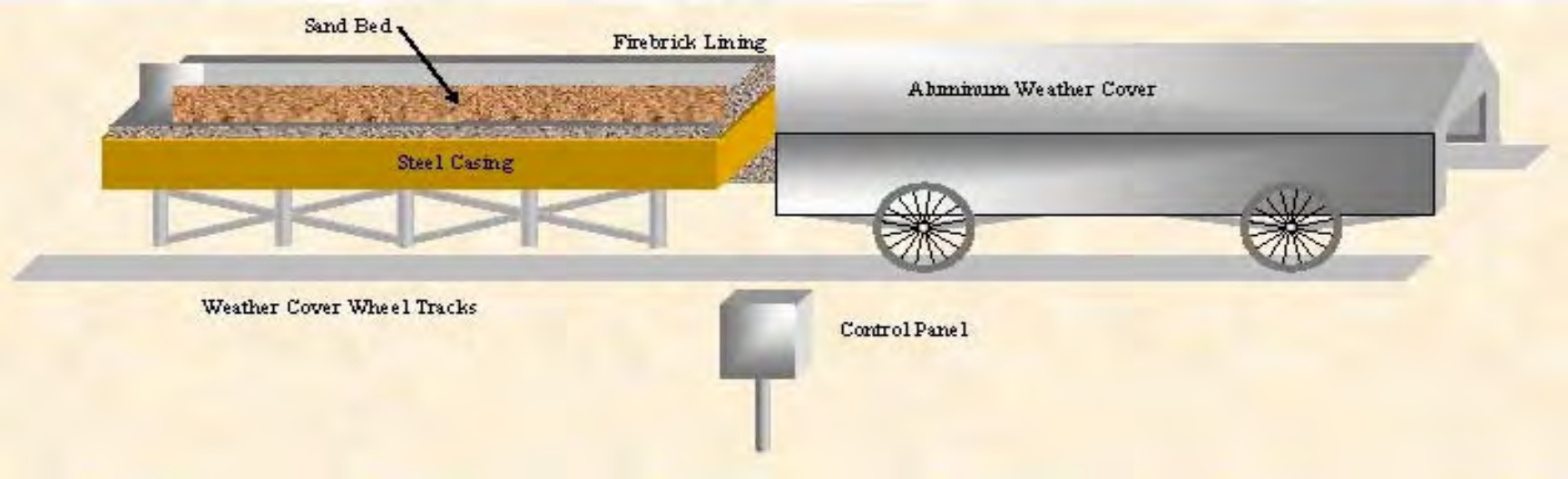

Figure 3. Technical Area 16-399 Open Burning Treatment Unit Configuration

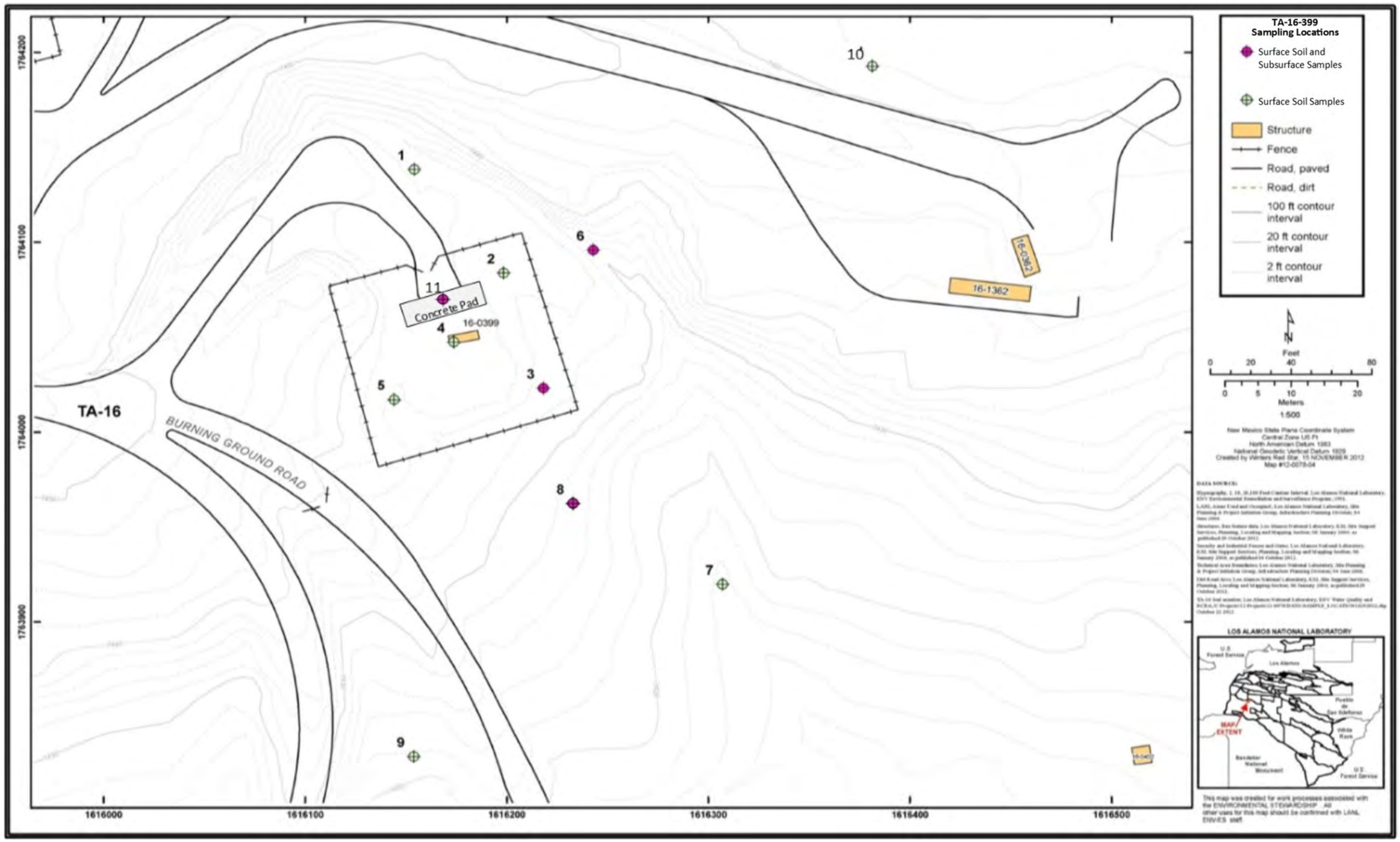

Figure 4. Technical Area 16-399 Soil Sample Locations for Closure of Unit

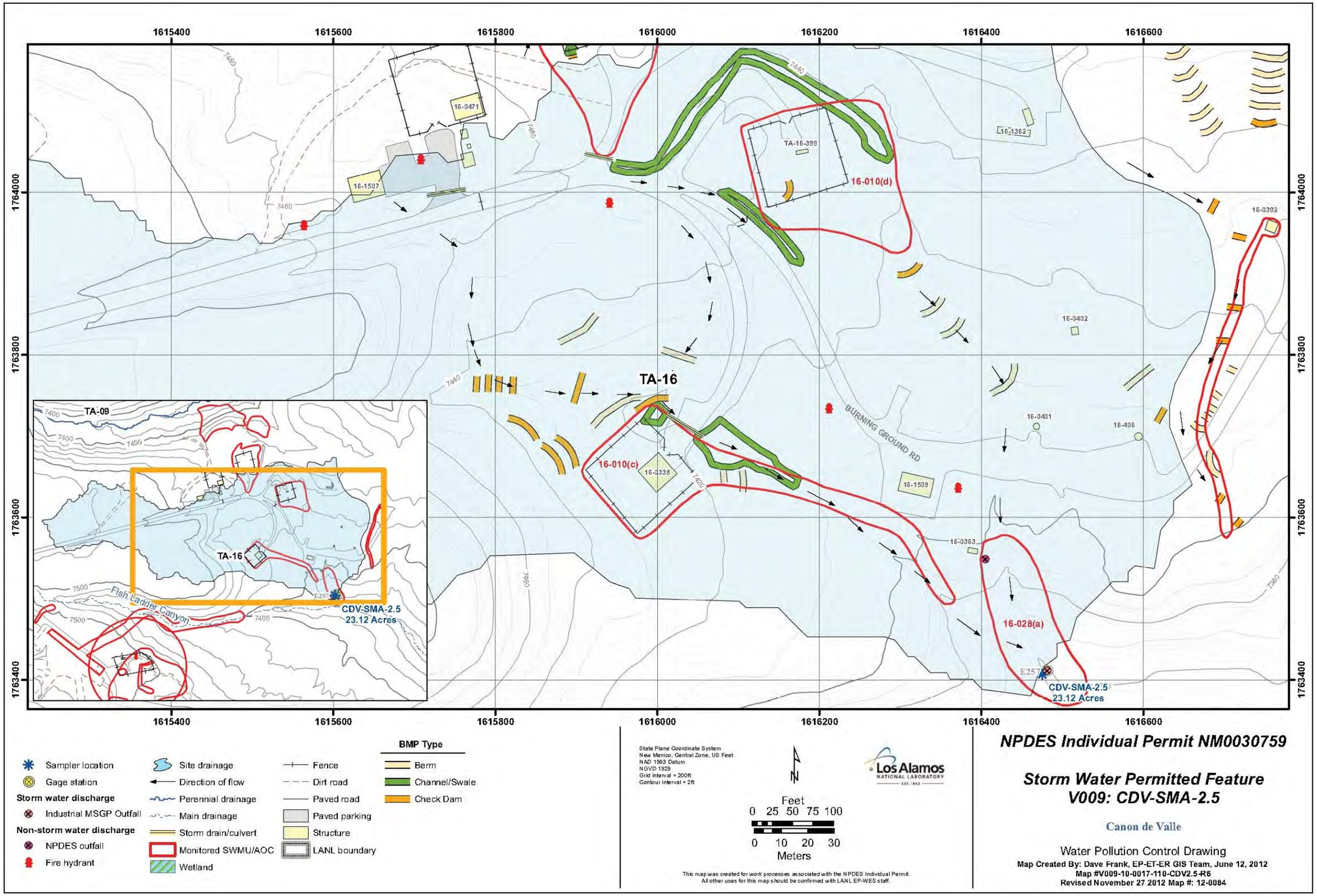

Figure 5. Storm Water Monitoring Station at TA-16 Burn Ground

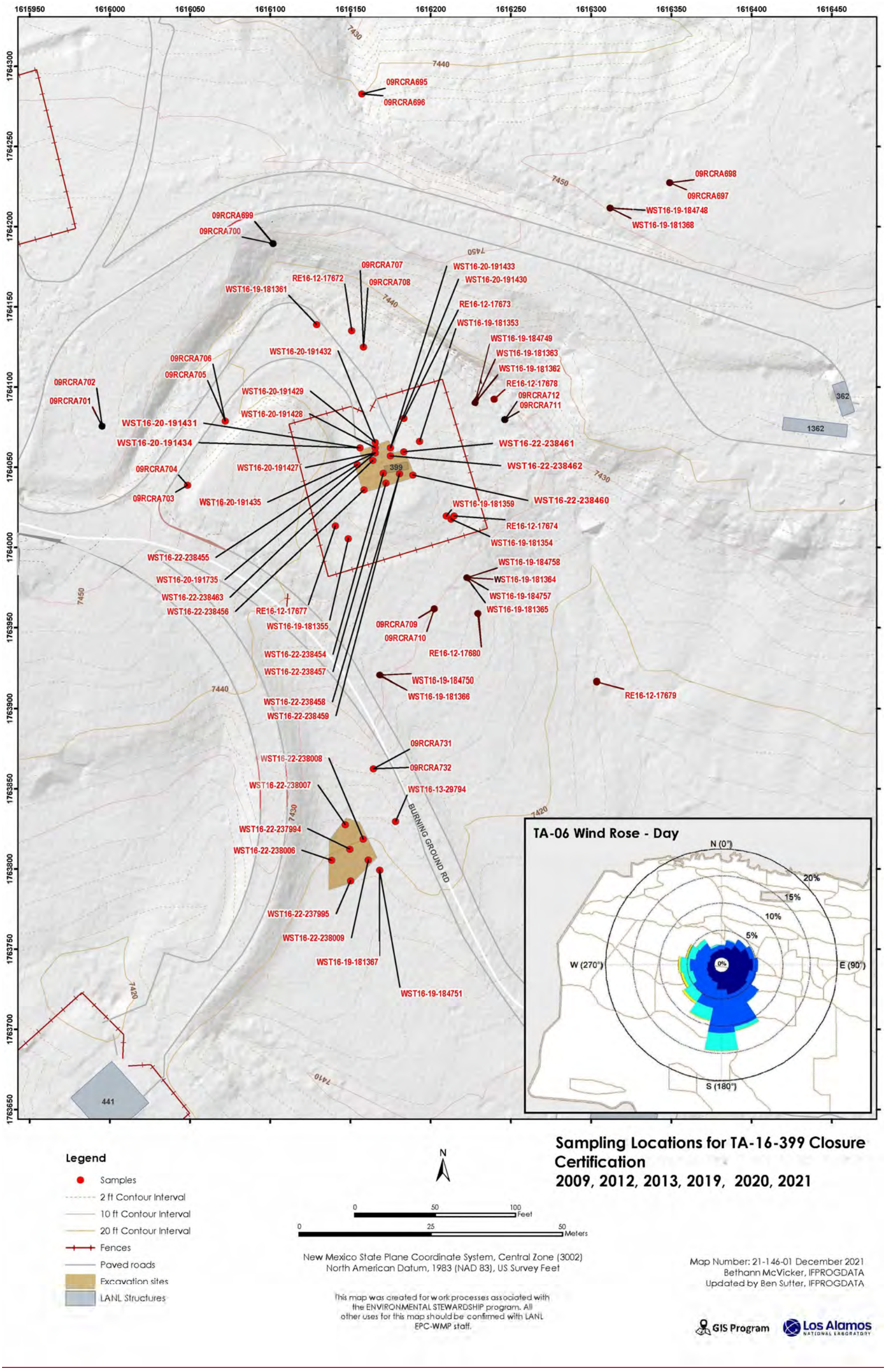

Figure 6. Sample locations, both past and present, at TA-16-399 area

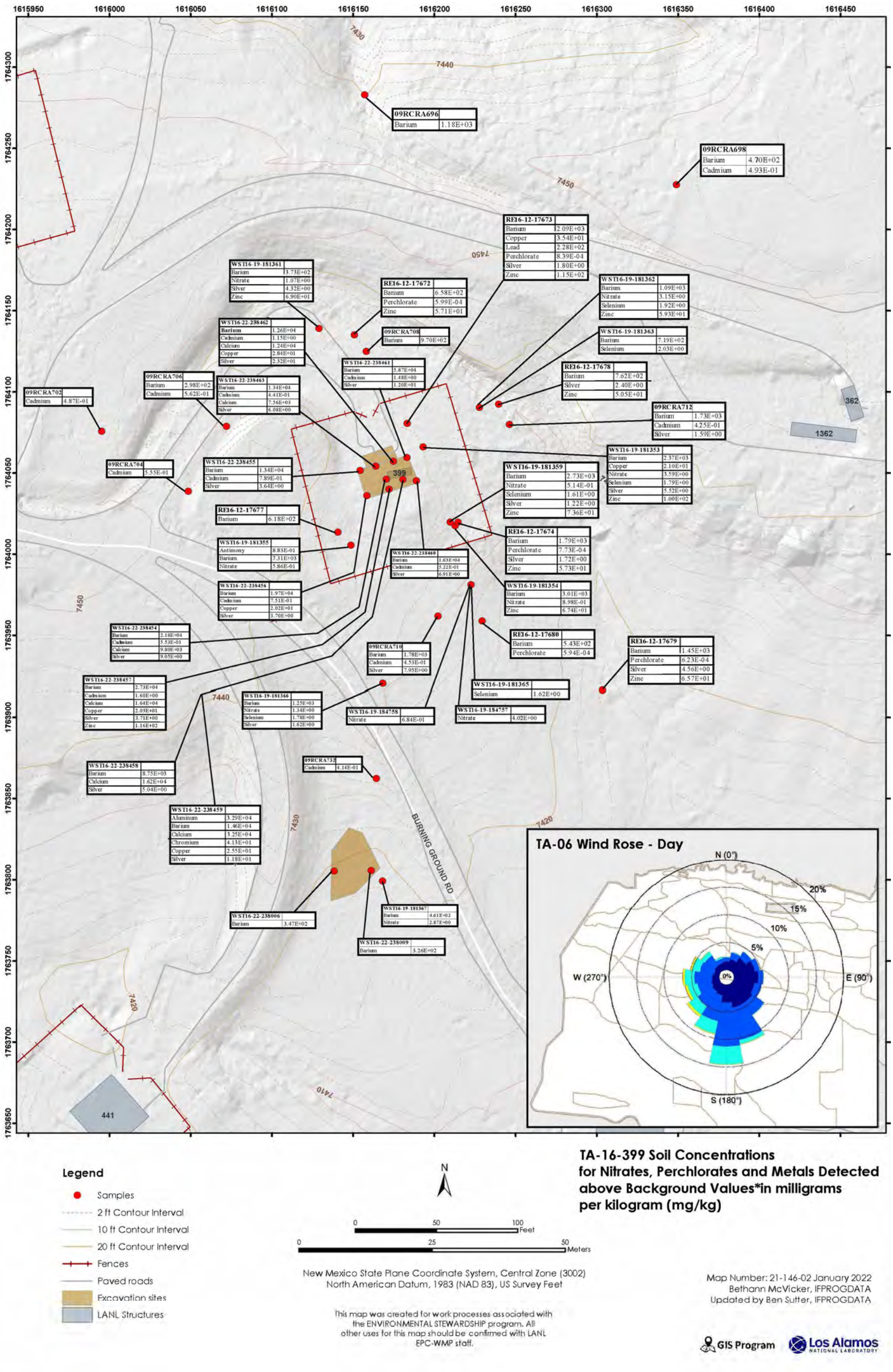

Figure 7. Analytical Results for Inorganic Analytes at TA-16-399 area

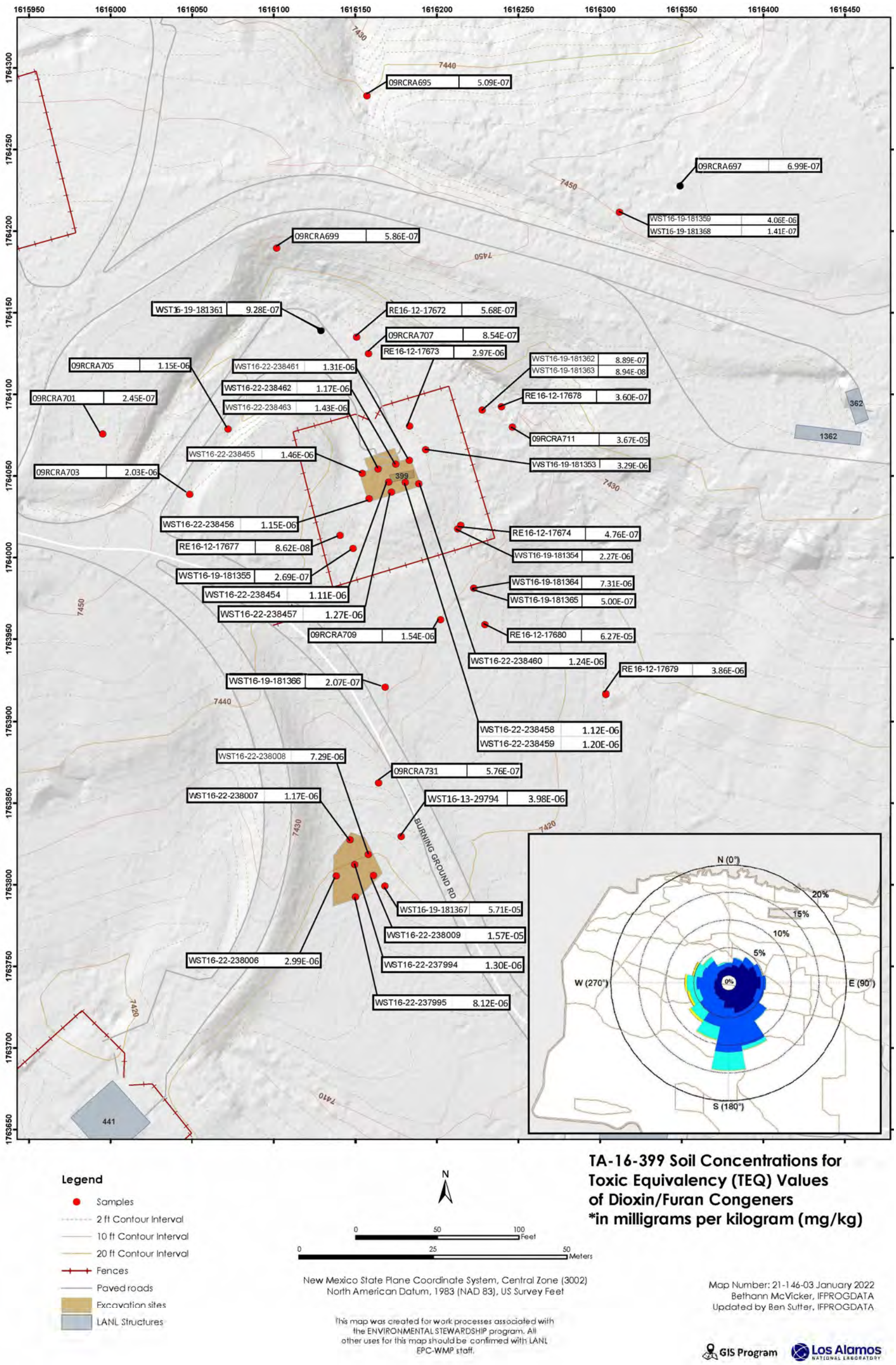

Figure 8. Analytical Results for Dioxin/Furans at TA-16-399 area

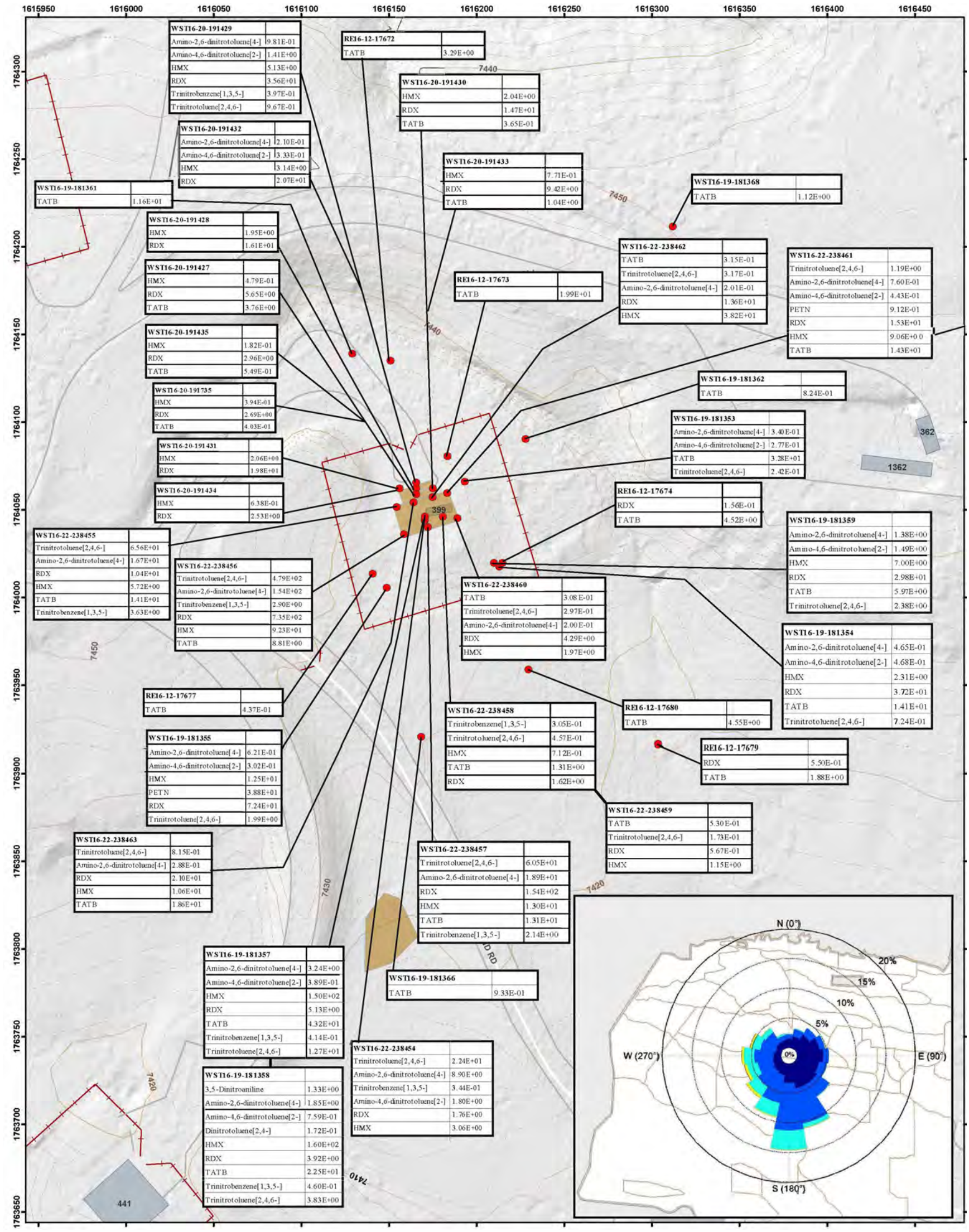

Figure 9. Analytical Results for Explosives Compounds at TA-16-399