

**ATTACHMENT G.3**  
**TECHNICAL AREA 16-399**  
**OUTDOOR TREATMENT UNIT**  
**CLOSURE PLAN**

DRAFT

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## 1.0 INTRODUCTION

This closure plan describes the activities necessary to close the outdoor hazardous waste treatment unit at the Technical Area 16-399 (TA-16-399) Burn Tray at the Los Alamos National Laboratory (Facility), hereinafter referred to as the permitted unit. The information provided in this closure plan addresses the closure requirements specified in Permit Part 9 and the Code of Federal Regulations (CFR), Title 40, Part 264, Subparts G and X for the open burning treatment unit operated at the Facility under the Resource Conservation and Recovery Act (RCRA) and the New Mexico Hazardous Waste Act.

Until closure is complete and has been certified in accordance with Permit Section 9.5, a copy of the approved closure plan or the hazardous waste facility permit containing the plan, any approved revisions, and closure activity documentation associated with the closure will be on file with hazardous waste compliance personnel at the Facility and at the U.S. Department of Energy (DOE) Los Alamos Site Office. Prior to closure of the permitted unit, this closure plan may be amended in accordance with Permit Section 9.4.8, as necessary and appropriate, to provide updated sampling and analysis plans and to incorporate updated decontamination technologies. Amended closure plans shall be submitted to the New Mexico Environment Department (Department) for approval prior to implementing closure activities.

## 2.0 DESCRIPTION OF UNIT TO BE CLOSED

A specific description of the permitted unit can be found in Attachment A (*Technical Area Unit Descriptions*). The waste that is treated at the permitted unit consists only of high explosives (HE) waste (bulk dry HE). Permit Part 6 (*Treatment by Open Burning*), Permit Attachment A (*Technical Area Unit Descriptions*), Permit Attachment B (*Part A Application*), and Permit Attachment C (*Waste Analysis Plan*) include information about waste management procedures and hazardous waste constituents treated at the permitted unit.

## 3.0 ESTIMATE OF MAXIMUM WASTE TREATED

The estimate of the total maximum inventory of hazardous wastes treated over the active life (1980 to present) of the permitted unit is approximately 155,500 pounds of solid. If the permitted unit treats an average of 5,000 pounds per year, 50,000 pounds of waste would be added to the current estimation through the life of this Permit.

## 4.0 GENERAL CLOSURE INFORMATION

### 4.1 Closure Performance Standard

As required by Permit Section 9.2, the permitted unit will be closed to meet the following performance standards:

- a. remove all hazardous waste residues and hazardous constituents;
- b. ensure contaminated media do not contain concentrations of hazardous constituents greater than the clean-up levels established in accordance with Permit Sections 11.4 and 11.5. For soils the cleanup levels shall be established based on residential use. The Permittees must also demonstrate that there is no potential to contaminate groundwater;

- c. control hazardous waste residues, hazardous constituents, and, as applicable, contaminated media such that they do not exceed a total excess cancer risk of  $10^{-5}$  for carcinogenic substances and, for non-carcinogenic substances, a target Hazard Index of 1.0 for human receptors, and meet Ecological Screening Levels established under Permit Section 11.5;
- d. minimize the need for further maintenance;
- e. control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, groundwater, surface waters, or to the atmosphere; and
- f. comply with the closure requirements of Permit Part 9 (*Closure*) and 40 CFR Part 264 Subparts G and X.

Closure of the permitted unit will be deemed complete when: 1) all surfaces and equipment have been decontaminated, or otherwise properly managed as waste; 2) closure has been certified by an independent, professional engineer licensed in the State of New Mexico; and 3) closure certification has been submitted to, and approved by, the Department.

#### 4.2 Closure Schedule

This closure plan schedule is intended to address the closure requirements for the permitted unit within the authorized timeframe of the current Hazardous Waste Facility Permit (*see* Permit Section 9.4.1). The following section provides the schedule of closure activities (*see also* Table G.3-1 in this closure plan).

Notification of closure will occur at least 45 days before the Permittees expect to begin closure (*see* 40 CFR § 264.112(d)(1)) and closure activities will begin according to the requirements of 40 CFR § 264.112(d)(2). However, pursuant to 40 CFR §264.112(e), removing hazardous wastes and decontaminating or dismantling equipment in accordance with an approved closure plan may be conducted at any time before or after notification of closure.

Within 20 days before the final treatment of hazardous waste, the Permittees will notify the Department in writing of their intent to conduct a records review (review) and structural assessment (assessment) as described in Section 5.2 of this closure plan.

Within ten days after the final treatment of hazardous waste, the Permittees will conduct the review and assessment and submit an amended closure plan, if necessary, to the Department for review and approval as a permit modification in accordance with Permit Section 9.4.8. Upon approval of the modified closure plan, if applicable, the Permittees will decontaminate unit structures and related equipment.

Soil sampling and decontamination verification wipe sampling will be conducted to demonstrate that soils, surfaces, and related equipment at the permitted unit meet the performance standards in Permit Section 9.2.

All closure activities, including submittal of a final closure certification report to the Department for review and approval, will be completed within 180 days after the final treatment of waste. In the event that closure of the permitted unit cannot proceed according to schedule, the Permittees will notify the Department in accordance with the extension request requirements in Permit Section 9.4.1.1.

## 5.0 CLOSURE PROCEDURES

Closure activities at the permitted unit will include: removal of hazardous wastes, proper management and disposal of hazardous waste residues and contaminated equipment associated with the permitted unit; verification that the closure performance standards in Permit Section 9.2 have been achieved; and submittal of a final closure certification report. The following sections describe closure activities applicable to the permitted unit.

### 5.1 Removal of Waste

After hazardous wastes are treated at the permitted unit, treatment residues and any non-combustible debris, as applicable, are removed, characterized, and disposed of in accordance with Permit Section 6.3.3.3. Therefore, removal of hazardous waste from the permitted unit prior to initiation of closure activities is not applicable to the closure procedures for this particular permitted unit.

### 5.2 Records Review and Structural Assessment

Before starting closure decontamination and sampling activities, the Operating and Inspection Records for the permitted unit will be reviewed and an assessment will be conducted to determine any previous finding(s) or action(s) that may influence closure activities or potential sampling locations.

#### 5.2.1 Records Review

The Facility Operating and Inspection Records shall be reviewed as outlined in Permit Section 9.4.6.1. The goals of the review will be to:

- a. confirm the specific hazardous waste constituents of concern; and
- b. confirm additional sampling locations (*e.g.*, locations of spills or chronic conditions identified in the Operating and Inspection Records).

#### 5.2.2 Structural Assessment

An assessment of the permitted unit's physical condition will be conducted in accordance with Permit Section 9.4.6.2. The assessment will include inspecting the concrete pad for any existing cracks or conditions that indicate a potential for release of constituents. If a crack, gap, or stained area is present, the Permittees will amend this closure plan in order to update the sampling and analysis plan (SAP) (*see* Section 6.0 of this closure plan) to add these sampling locations and the applicable sampling methods and procedures. This inspection will be documented with photographs and drawings, as necessary.

### 5.3 Decontamination and Removal of Structures Equipment

In accordance with Permit Section 9.4.3, all remaining hazardous waste residues and hazardous waste constituents will be removed from the permitted unit. The permitted unit's surfaces and equipment will be decontaminated, removed, or both and managed appropriately. All waste material will be controlled, handled, characterized, and disposed of in accordance with Permit Attachment C (*Waste Analysis Plan*), Permit Section 9.4.5, and Facility waste management procedures. Decontamination activities will ensure the removal of all hazardous waste residues and hazardous waste constituents from the permitted unit meet the closure performance standards outlined in Permit Section 9.2.

### **5.3.1 Removal of Structures and Related Equipment**

All surfaces and related equipment that are removed will not require decontamination, will be considered solid and potentially hazardous waste (as defined by this Permit) when removed, and will be disposed of in accordance with Permit Section 9.4.5 and Section 7.0 of this closure plan. The following related equipment will be removed after the structural assessment: the burn tray; the concrete pad; the metal cover; the cover tracks; and the electronic ignition assembly.

### **5.3.2 Decontamination of Structures and Related Equipment**

All structures and equipment that will be reused by the Facility will be decontaminated. At this time there is no equipment or surfaces located at the unit that are expected to be decontaminated; however, if equipment is identified during the assessment, it will be decontaminated in accordance with this section.

Equipment will be steam cleaned using water or pressure washed with a solution consisting of a surfactant detergent (*e.g.*, Alconox<sup>®</sup>) and water. Portable berms or other such devices (*e.g.*, absorbent socks, plastic sheeting, wading pools, existing secondary containment) will collect excess wash water and provide containment during the decontamination process.

### **5.3.3 Equipment Used During Decontamination Activities**

Reusable protective clothing, tools, and equipment used during decontamination activities will be cleaned with a wash water solution. Residue, disposable equipment, and small reusable equipment that cannot be decontaminated will be containerized and managed as waste as summarized in Table G.3-2 and in accordance with Permit Section 9.4.5 and Section 7.0 of this closure plan.

## **6.0 SAMPLING AND ANALYSIS PLAN**

This SAP addresses the specific closure sampling and analysis requirements in Permit Section 9.4.7 and describes the sampling, analysis, and quality assurance/quality control (QA/QC) methods that will be used to demonstrate that the Permittees have met the closure performance standards outlined in Permit Section 9.2.

### **6.1 Soil Sampling and Decontamination Verification Wipe Sampling Activities**

Soil sampling and decontamination verification wipe sampling activities will be conducted at the permitted unit in order to verify that soils, surfaces, and related equipment at the permitted unit meet the closure performance standards in Permit Section 9.2. All samples will be collected and analyzed in accordance with the procedures in Sections 6.2, 6.3, and 6.4 of this closure plan.

Sampling activities will consist of the collection of soil samples from the soils surrounding the pad as well as soils in the designated locations identified in Figure G.3-1, a soil sample at the stormwater discharge point at the permitted unit, one surface water sample, and at least one wipe sample from each piece of equipment related to the permitted unit.

Five soil samples and one surface water sample will be collected in accordance with Permit Section 9.4.7.1.ii.b (*see* Figures G.3-1 and G.3-2, respectively); four samples from soils surrounding the permitted unit and one sample at the stormwater discharge point. One surface water sample will be collected at the location identified in Figure G.3-2.

## **6.2 Sample Collection Procedures**

Samples will be collected in accordance with Permit Section 9.4.7.1 and the procedures identified in this SAP which incorporates guidance from the United States Environmental Protection Agency (USEPA) (EPA, 1986 and EPA, 2002), DOE (DOE, 1995), and other Department-approved procedures.

### **6.2.1 Liquid Sampling**

Liquid samples will be collected and analyzed to determine if hazardous constituents are present in surface waters as a result of run-off from the permitted unit. Liquid samples will be collected using glass or plastic tubes, a composite liquid sampler, a bacon bomb, a bailer, or by pouring liquid in sample containers.

### **6.2.2 Soil Sampling**

Soil samples will be collected and analyzed to determine if hazardous constituents are present in soils at or in the vicinity of the permitted unit. Soil samples will be collected using a spade, scoop, auger, or trowel or other equipment as specified in approved methods for the type of analytes (*i.e.*, EPA 1996 or 2002) and from the appropriate depths as directed in Permit Section 9.4.7.ii. Samples will be kept at their at-depth temperature or lower, protected from ultraviolet light, sealed tightly in the recommended container, and analyzed within the specific holding times listed in Table G.3-4.

### **6.2.3 Wipe Sampling**

Surface wipe samples will be collected and analyzed to determine if residual hazardous constituents remain in the surfaces or related equipment at the permitted unit. Samples will be collected in accordance with the National Institute of Occupational Safety and Health (NIOSH) *Manual of Analytical Methods* (NIOSH, 1994). The appropriate wipe sample method will consider the type of surface being sampled, the type of constituent being sampled for, the solution used, and the desired constituent concentration detection limit.

The NIOSH method includes wiping a 100 square centimeter area at each discrete location with a gauze wipe wetted with a liquid solution appropriate for the desired analysis (*e.g.*, deionized water for lead). For wipe sampling, guidance from the analytical laboratory must be obtained prior to wipe verification sampling to confirm that the solution chosen for each analysis is appropriate for the analysis to be conducted and that wipe sampling is a proper technique for the analysis.

### **6.2.4 Cleaning of Sampling Equipment**

Reusable sampling equipment will be cleaned and rinsed prior to use. Sampling equipment rinsate blanks will be collected and analyzed only if reusable sampling equipment is used. Reusable decontamination equipment, including protective clothing and tools, used during closure activities will be scraped as necessary to remove residue and cleaned with a wash water solution. Sampling equipment will be cleaned prior to each use with a wash solution, rinsed several times with tap water, and air-dried or wiped dry to prevent cross-contamination of samples. A disposable sampler is considered clean if still in a factory-sealed wrapper.

### **6.3 Sample Management Procedures**

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

#### **6.3.1 Sample Documentation**

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

##### **6.3.1.1 Chain-of-Custody**

Chain-of-custody forms will be maintained by sampling personnel until the samples are relinquished to the analytical laboratory. This will 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 will be responsible for the integrity of the samples collected until properly transferred to another person. The EPA considers a sample to be in a person's custody if it is:

- a. in a person's physical possession;
- b. in view of the person in possession; or
- c. secured by that person in a restricted access area to prevent tampering.

The sample collector will document all pertinent sample collection data. Individuals relinquishing or receiving custody of the samples will 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 will return the completed chain-of-custody form to the Facility and it will become part of the permanent sampling record documenting the sampling efforts.

##### **6.3.1.2 Sample Labels and Custody Seals**

A sample label will be affixed to each sample container. The sample label will 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. location from which the sample was collected.

A custody seal will 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.

### **6.3.1.3 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 will 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; and
- k. name(s) of personnel responsible for the observations.

### **6.3.2 Sample Handling, Preservation, and Storage**

Samples will be collected and containerized in appropriate pre-cleaned sample containers. Table G.3-4 presents the requirements in *SW-846* (EPA, 1986) for sample containers, preservation techniques, and holding times. Samples that require cooling to 4 degrees Celsius will be placed in a cooler with ice or ice gel or in a refrigerator immediately upon collection.

### **6.3.3 Packaging and Transportation of Samples**

All packaging and transportation activities will meet safety expectations, QA requirements, DOE Orders, and relevant local, state, and federal laws (including 10 CFR and 49 CFR). Appropriate Facility documents 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.

Off-site transportation of samples will occur via private, contract, or common motor carrier, air carrier, or freight. All off-site transportation will be processed through the Facility 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.

#### **6.4 Sample Analysis Requirements**

Samples will be analyzed for all the hazardous constituents listed in Appendix VIII of 40 CFR Part 261 and in Appendix IX of 40 CFR Part 264 that have been managed at the permitted unit over its operational history. Samples will be analyzed by an independent laboratory using the methods outlined in Table G.3-3. Analytes, test methods and instrumentation, target detection limits, and rationale for metals and organic analyses are presented in Table G.3-3. If any of the information from these tables has changed at the time of closure, the Permittees will amend this closure plan to update all methods in this SAP.

##### **6.4.1 Analytical Laboratory Requirements**

The analytical laboratory will perform the detailed qualitative and quantitative chemical analyses specified in Section 6.4.2 of this closure plan. The analytical laboratory will 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 Table G.3-3 is based on the following considerations:

- e. the physical form of the waste;
- f. constituents of interest;
- g. required detection limits (*e.g.*, regulatory thresholds); and
- h. information requirements (*e.g.*, waste classification).

##### **6.4.2 Quality Assurance/Quality Control**

All sampling and analysis will 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 will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. 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.

#### **6.4.2.1 Field Quality Control**

The field QC samples that will be collected are trip blanks, field blanks, field duplicates, and equipment rinsate blanks. Table G.3-5 presents a summary of QC sample types, applicable analyses, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples. QC samples will be identified on the applicable forms so that the results can be applied to the associated sample.

#### **6.4.2.2 Analytical Laboratory QC 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 are the tools employed to measure the degree to which these QA objectives are met.

#### **6.4.3 Data Reduction, Verification, Validation, and Reporting**

Analytical data generated by the activities described in this closure plan will be verified and validated. 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.

#### **6.4.4 Data Reporting Requirements**

Analytical results will include all pertinent information about the condition and appearance of the sample-as-received. Analytical reports will include:

- a. a summary of analytical results for each sample;
- b. results from QC samples such as blanks, spikes, and calibrations;
- c. reference to standard methods or a detailed description of analytical procedures; and
- d. raw data printouts for comparison with summaries.

The laboratory will describe the analysis in sufficient detail so that the data user can understand how the sample was analyzed.

### **7.0 WASTE MANAGEMENT**

All waste generated during closure will be controlled, handled, characterized, and disposed of in accordance Permit Section 9.4.5, Permit Attachment C (*Waste Analysis Plan*), and Facility waste management procedures. Closure activities may generate different types of waste materials; these wastes are listed with potential disposal options in Table G.3-2 of this closure plan. Subsequent disposition options for the decontaminated structures and equipment include reuse, recycling, or disposal. Reusable protective clothing, tools, and equipment used during decontamination will be cleaned with a wash water solution. Disposable equipment and small reusable equipment that cannot be decontaminated, as summarized in Table G.3-2, will be containerized and managed as waste.

## 8.0 CLOSURE CERTIFICATION REPORT

Upon completion of the closure activities at the permitted unit, a closure certification report will be prepared and submitted to the Department for review and approval in accordance with Permit Section 9.5.

## 9.0 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.
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- LANL, 1999. "Screening Level Ecological Risk Assessment Methods," LA-UR-99-1406, Los Alamos National Laboratory, Los Alamos, New Mexico.
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- NMED, 2006. "Technical Background Document for Development of Soil Screening Levels," Rev. 4.0, June 2006, New Mexico Environment Department, Santa Fe, New Mexico.

**Table G.3-1**  
**Closure Schedule for the Technical Area 16-399 Outdoor Treatment Unit**

<b>Activity</b>	<b>Maximum Time Required</b>
Notify the Department of intent to close.	-45 Days
Notify the Department of intent to conduct records review and structural assessment.	-20 Days
Final treatment of waste.	Day 0
Complete records review and structural assessment.	Day 10
Complete all closure activities and submit final closure certification report to the Department.	Day 180

**Table G.3-2**  
**Potential Waste Materials, Waste Types, and Disposal Options**

Potential Waste Materials	Waste Types	Disposal Options
Personal protective equipment (PPE)	Non-regulated solid waste	Subtitle D landfill
	Hazardous waste	The PPE will 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-regulated liquid waste	High Explosives Waste Treatment Facility (HEWTF) or sanitary sewer
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Firebrick	Non-regulated solid waste	Subtitle D landfill or reuse
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Metal covers/trays	Non-regulated solid waste	Recycled
	Hazardous waste	Treated if necessary to remove HE and recycled.
Soil and tuff	Non-regulated solid waste	Subtitle D landfill
	Hazardous waste	Waste will be treated to LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Discarded waste management equipment	Non-regulated solid waste	Recycled, salvaged, or sent to a Subtitle D landfill
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Discarded concrete	Non-regulated solid waste	Subtitle D landfill or reuse
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a

Potential Waste Materials	Waste Types	Disposal Options
		Subtitle C or D landfill, as appropriate.
Discarded liner	Non-regulated solid waste	Subtitle D landfill or reuse
	Hazardous waste	Waste will 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-regulated solid waste	Subtitle D landfill
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.

**Table G.3-3**  
**Summary of Analytical Methods**

Analyte	EPA SW-846 Analytical Method <sup>a</sup>	Test Methods/ Instrumentation	Target Detection Limit <sup>b</sup>	Rationale
<i>Metal Analysis</i>				
Antimony	6010, 7010	ICP-AES, GFAA	20 ug/L	Determine the metal concentration in the samples.
Arsenic	6010, 7010, 7061A	ICP-AES, GFAA, CVAA	10 ug/L	
Barium	6010, 7010	ICP-AES, GFAA	200 ug/L	
Beryllium	6010, 7010	ICP-AES, GFAA	0.2 ug/L	
Cadmium	6010, 7010	ICP-AES, GFAA	2 ug/L	
Chromium	6010, 7010	ICP-AES, GFAA	10 ug/L	
Cobalt	6010, 7010	ICP-AES, GFAA	5 ug/L	
Copper	6010, 7010	ICP-AES, GFAA	5 ug/L	
Lead	6010, 7010	ICP-AES, GFAA	5 ug/L	
Mercury	6010, 7470A, 7471B	ICP-AES, CVAA	0.2 ug/L	
Selenium	6010, 7010, 7741A	ICP-AES, GFAA, CVAA	5 ug/L	
Silver	6010, 7010	ICP-AES, GFAA	10 ug/L	
Thallium	6010, 7010	ICP-AES, GFAA	30 ug/L	
Vanadium	6010, 7010	ICP-AES, GFAA	5 ug/L	
Zinc	6010, 7010	ICP-AES, GFAA	1 ug/L	
<i>Organic Analysis</i>				
Target compound list VOCs plus ten tentatively identified	8260B	GC/MS	10 mg/L	Determine the VOCs concentration in the samples.

compounds (TIC)				
Target compound list SVOCs plus 20 TICs	8270D, 8275	GC/MS	10 mg/L	Determine the SVOCs concentration in the samples.
<i>Other Parameters</i>				
Cyanide	9010, 9012	Colorimetric	20 ug/L	Determine cyanide concentration

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

<sup>b</sup> Detection limits listed for metals are for clean water. Detection limits for organics are expressed as practical quantitation limits. Actual detection limits may be higher depending on sample composition and matrix type.

CVAA = Cold-vapor atomic absorption spectroscopy

FLAA = Flame atomic absorption spectroscopy

GC/MS = Gas chromatography/mass spectrometry

GFAA = Graphite furnace atomic absorption spectroscopy

ICP-AES = Inductively coupled plasma-atomic emission spectrometry

mg/L = milligrams per liter

ug/L = micrograms per liter.

**Table G.3-4**  
**Sample Containers<sup>a</sup>, Preservation Techniques, and Holding Times<sup>b</sup>**

Analyte Class and Sample Type	Container Type and Materials	Preservation	Holding Time
<i>Metals</i>			
TCLP/Total Metals: Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver	Aqueous Media: 500-mL Wide Mouth- Polyethylene or Glass with Teflon Liner	Aqueous Media: HNO <sub>3</sub> to pH <2 Cool to 4 °C	180 Days
	Solid Media: 125-mL Glass	Solid Media: Cool to 4 °C	
TCLP/Total Mercury	Aqueous Media: 500-mL Wide Mouth- Polyethylene or Glass with Teflon Liner	Aqueous Media: HNO <sub>3</sub> to pH <2 Cool to 4 °C	28 Days
	Solid Media: 125-mL Glass	Solid Media: Cool to 4 °C	
<i>Volatile Organic Compounds</i>			
Target Compound Volatile Organic Compounds	Aqueous Media: Two 40-mL Amber Glass Vials with Teflon-Lined Septa	Aqueous Media: HCl to pH<2 Cool to 4 °C	14 days
	Solid Media: 125-mL Glass or Two 40-mL Amber Glass Vials with Teflon- Lined Septa	Solid Media Cool to 4 °C  Add 5 mL Methanol or Other Water Miscible Organic Solvent to 40-mL Glass Vials	

<i>Semi-Volatile Organic Compounds</i>			
Target Compound Semi-volatile Organic Compounds	Aqueous Media: Four 1-L Amber Glass with Teflon-Lined Lid	Aqueous Media: Cool to 4 °C	Seven days from field collection to preparative extraction. 40 days from preparative extraction to determinative analysis.
	Solid Media: 250-mL Glass	Solid Media: Cool to 4 °C	

<sup>a</sup> Smaller sample containers may be required due to health and safety concerns associated with potential radiation exposure, transportation requirements, and waste management considerations.

<sup>b</sup> Information obtained from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, U.S. Environmental Protection Agency, 1986 and all approved updates.

°C = degrees Celsius

HCl = hydrochloric acid

mL = milliter

HNO<sub>3</sub> = nitric acid

L = Liter

TCLP = Toxicity Characteristic Leaching Procedure

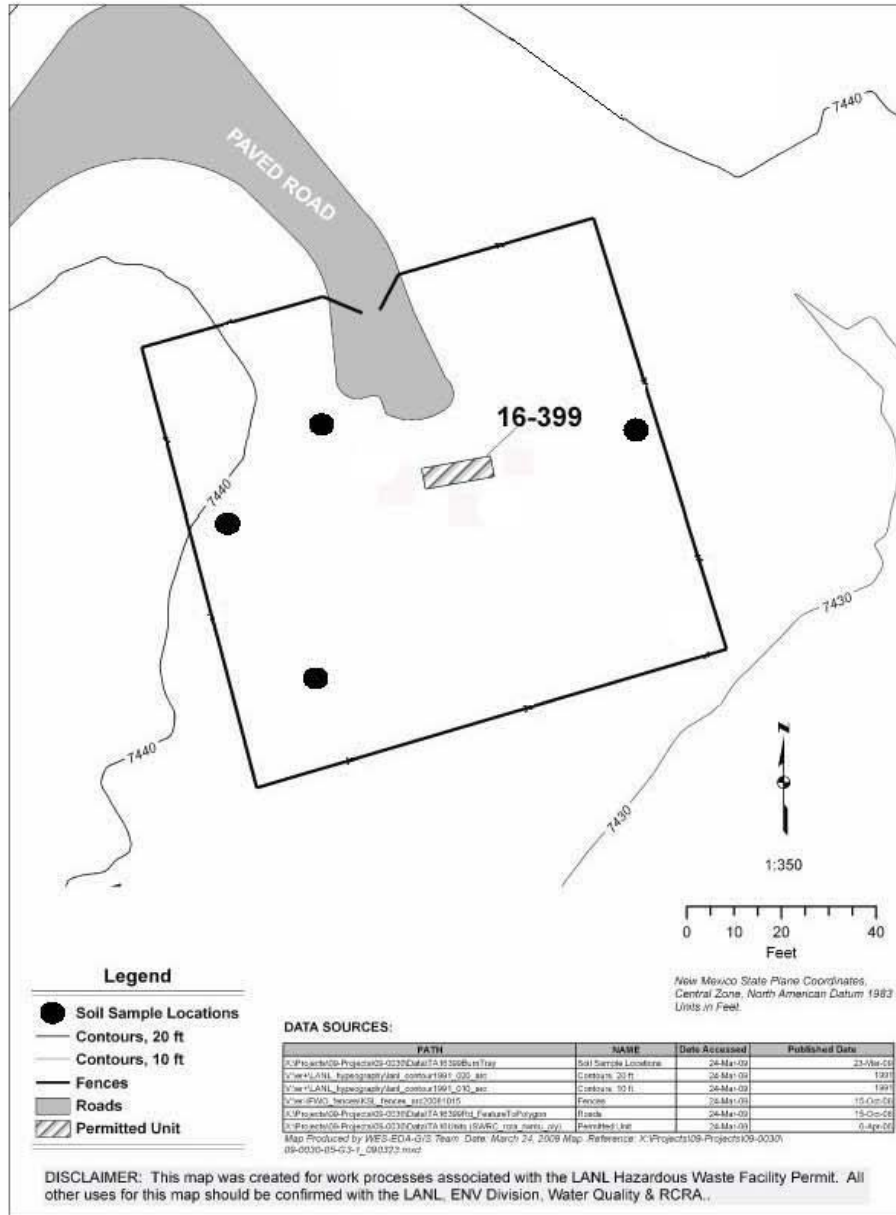
**Table G.3-5**

**Quality Control Sample Types, Applicable Analyses, Frequency, and Acceptance Criteria**

QC Sample Type	Applicable Analysis <sup>a</sup>	Frequency	Acceptance Criteria
Trip Blank	VOC	One set per shipping cooler containing samples to be analyzed for VOCs	Not Applicable
Field Blank	VOC/SVOC, metals	One sample daily per analysis	Not Applicable
Field Duplicate	Chemical	One for each sampling sequence	Relative percent difference less than or equal to 20 percent
Equipment Rinsate Blank <sup>b</sup>	VOC/SVOC, metals	One sample daily	Not Applicable

<sup>a</sup> For VOC and SVOC analysis, if blank shows detectable levels of any common laboratory contaminant (*e.g.*, methylene chloride, acetone, 2-butanone, toluene, and/or any phthalate ester), sample must exhibit that contaminant at a level 10 times the quantitation limit to be considered detectable. For all other contaminants, sample must exhibit the contaminant at a level 5 times the quantitation level to be considered detectable.

<sup>b</sup> Collected only if reusable sampling equipment used.



**Figure G.3-1:** Technical Area (TA) 16-399 Outdoor Treatment Unit Soil Sampling Locations

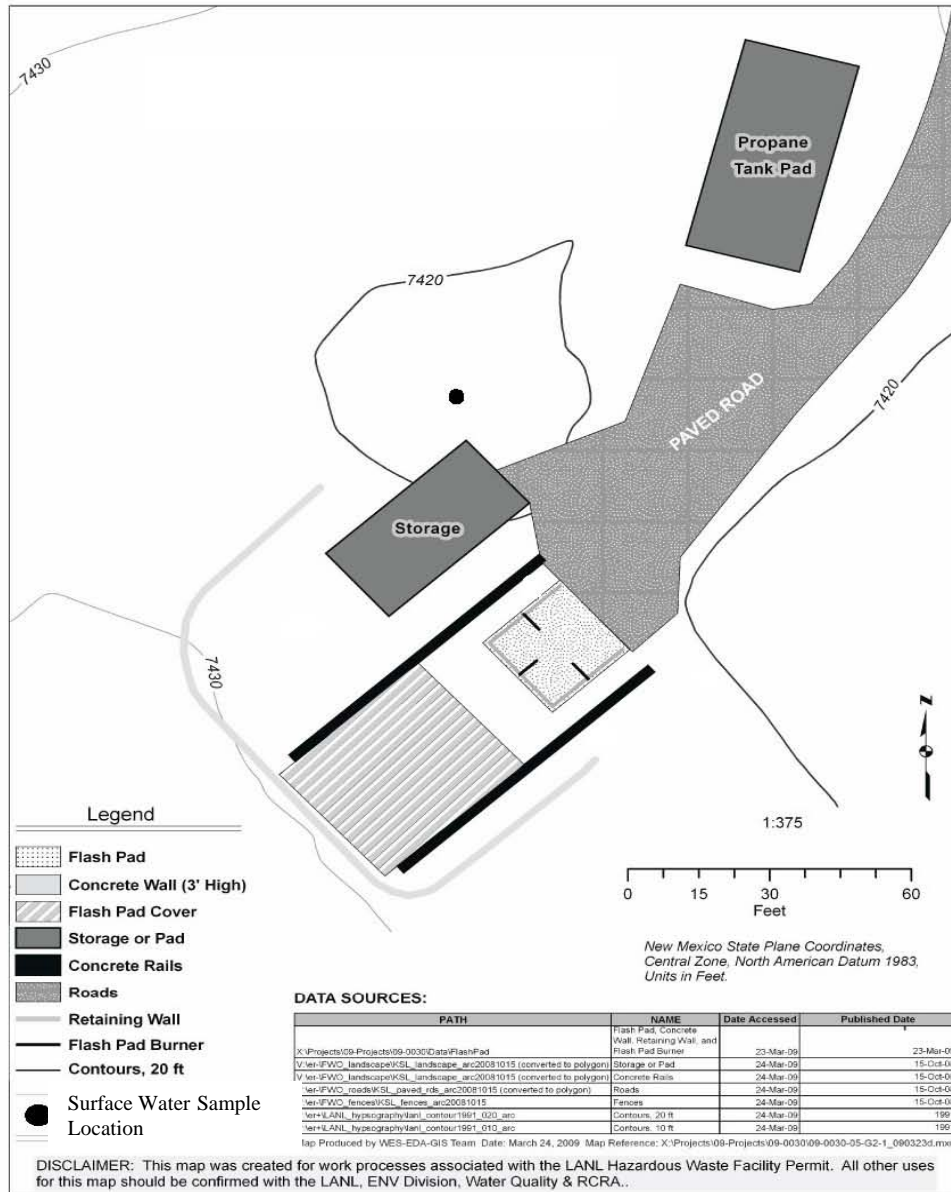


Figure G.3-2: Technical Area (TA) 16-399 Outdoor Treatment Unit Surface Water Sampling Location