



14



Environmental Protection Division
Water Quality & RCRA Group (ENV-RCRA)
P.O. Box 1663, M704
Los Alamos, New Mexico 87545
(505) 667-0666/FAX (505) 667-5224

National Nuclear Security Administration
Los Alamos Site Office, A316
3747 West Jemez Road
Los Alamos, New Mexico 87545
(505) 667-5794/FAX (505) 667-5948

Date: February 24, 2012
Refer To: ENV-RCRA-12-0044
LAUR: 12-10332

Mr. John E. Kieling
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505

Dear Mr. Kieling:

SUBJECT: SUBMITTAL OF THE REVISED CLOSURE PLANS FOR TECHNICAL AREA 14-23 OPEN BURNING AND OPEN DETONATION UNITS AND TECHNICAL AREA 39-57 OPEN DETONATION UNIT

The purpose of this letter is to transmit the attached revised closure plans for the Technical Area (TA) 39-57 open detonation (OD) unit (Enclosure 1) and the TA-14-23 (Enclosure 2) open burning/open detonation (OB/OD) units. The revised closure plans include modifications based on the comments derived during the structural assessment conducted on September 12, 2011 and a phone conversation on September 19, 2011 with Steve Pullen of the New Mexico Environment Department – Hazardous Waste Bureau (NMED-HWB). Below is a general outline of the comments and how they are addressed in each of the revised closure plans.

General Changes

Comment 1:

During the September 19, 2011 site assessment it was determined that there were no structures included with the TA-39-57 OD unit or the TA-14-23 OB/OD unit; therefore, as suggested by the NMED-HWB personnel all language related to the sampling and/or removal of structures was removed from the text of each closure plan. An example of these changes can be found in Sections 5.2 of each of the closure plans.

Comment 2:

In Section 1.0 (Introduction), second paragraph was removed entirely and was replaced with the following language: "Closure of the OD Unit will be completed in accordance with Section 4.1 of this



closure plan.” Removal of the language was based on the determination that the language was repetitive to language in Section 4.1 and not necessary within both sections.

**Comment 3:**

The NMED-HWB personnel determined no structures were associated with the TA-14-23 and TA-39-57 hazardous waste management units, therefore, the language that discussed the proposal of wipe and chip samples from the concrete floor of any structures was removed from the text of each closure plan. These changes are illustrated by the removal of Section 5.2.1 from each closure plan. Decommissioning and demolition activities will be conducted for each of the structures in accordance with LANL Facility policies and procedures.

**Comment 4:**

Within section 2.2 (Description of the Wastes Treated at the Units), on page 3, as a typographical correction, “(i.e., ignitability, toxicity for barium)” was changed to state “(e.g., ignitability, toxicity for barium).

**Comment 5:**

Within Section 4.1 (Closure Performance Standard), pages 4 & 5 were modified to incorporate language from the regulations at 40 CFR § 265.11 and provide a step by step process to clarify how the Facility will adhere to the closure performance standards.

**Comment 6:**

Within Section 4.2 (Closure Schedule), reference to conducting a records review and structural assessment was modified to state that a records review and structural assessment has been conducted for the unit and that results are included under a separate report and will be discussed within the closure certification report.

**Comment 7:**

At the request of the NMED-HWB personnel a structural assessment and records review were completed and revised closure plans are submitted under this cover for review and approval. Sections (5.1, 5.1.1 and 5.1.2) were modified to state that a structural assessment and records review have been completed and the results will be included in a separate report. Section 5.2.1 (Removal of Structures and Related Equipment) included information related or similar to Section 5.2 (Decontamination and Removal of Structures and Related Equipment), Section 5.2.1 was combined with Section 5.2.

**Comment 8:**

Based on the structural assessment conducted on September 12, 2011, with NMED-HWB personnel, it was determined that there was no structure or equipment related to the TA-14-23 OB/OD unit; therefore, Section 5.2.1 (Removal of Structures and Related Equipment) was combined with Section 5.2

to discuss only the burn cage equipment and Section 5.2.2 (Decontamination of Related Equipment) was removed from the closure plan.

**Comment 9:**

The closure performance standards are included in Permit Section 4.1 (Closure Performance Standards) of each of the closure plans. The Section was modified to give a clear, step-by-step logic for how closure of the unit will be deemed complete by the Facility. This Section was modified to state that closure will be in accordance with Permit Parts 4.1, 9.4, 7.1 and 11.10.5 and reference to the regulations was removed from the text.

**TA-14-23 OB/OD Modifications**

**Comment 1:**

Section 2.1 (Description of Treatment Units), page 2, the statement “Non-treatment-related, experimental test detonations were also performed at TA-14, Q-Site East” was modified to include language that specifies that experimental operations will continue to occur at the site after closure of the units has been completed.

**Comment 2:**

Section 2.2 (Description of the Wastes Treated at the Units), page 3, contains the statement “From 2001 to the present, detonable HE contaminated materials from TA-22 and TA-40 have been treated by open detonation at Minie site.” This information was not related to treatment of waste at the units and therefore was removed from the text of the closure plan.

**Comment 3:**

Section 2.3 (Description of Treatments Conducted at the Units), page 4, the following statement was modified to remove “starter fluid” and to specify the type of fluid used. “A visual examination was conducted after unloading to ensure that no explosive material remained in the transport vehicle. OB of explosives-contaminated waste consisted of placing the waste in the burn cage, coating the waste with volatile hydrocarbons (i.e., acetone, fuel oil, or hexane) and igniting the waste”.

**Comment 4:**

During the structural assessment, NMED-HWB personnel suggested that three additional grab samples be collected down gradient of the units; therefore, Sections 6.0 (Sampling and Analysis Plan), 6.1 (Sampling Activities) and 6.2.2 (Soil Sampling) were modified to include the addition of the three grab soil samples.

**Comment 5:**

Figure 3 (Sampling Locations for Closure of the TA-14-23 Open Burn and Open Detonation Units) was updated to include the additional grab soil samples.

The modifications to the revised closure plans are intended to clarify discrepancies, language clarification, and proposed soil sampling locations based on findings during the structural assessment.

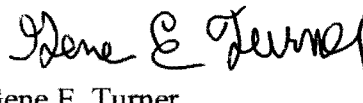
Please contact Tammy Diaz at (505) 665-8968 of the Water Quality and RCRA Group (ENV-RCRA) if you have any questions.

Sincerley,



Anthony R. Grieggs  
Group Leader  
Water Quality & RCRA Group  
Los Alamos National Laboratory

Sincerely,



Gene E. Turner  
Environmental Permitting Manager  
Environmental Projects Office  
Department of Energy  
Los Alamos Site Office

ARG:GET:TD/lm

Enclosure: a/s

Cy: George Rael, LASO-EO, w/enc., A906  
Gene Turner, LASO, EO, w/enc., A316  
Carl A. Beard, PADOPS, w/o enc., A102  
Michael T. Brandt, ADESH, w/o enc., K491  
Alison M. Dorries, ENV-DO, w/o enc., K491  
David Funk, WX-DO, w/enc., P942  
Scotty W. Jones, ENV-DO, w/o enc., K491, (E-File)  
Amanda Smith, WX-6, w/enc., P918  
Stephanie Archuleta, ESHQ-DR, w/enc., C925  
Connie Gerth, ENV-ES, w/enc., C919  
John Tymkowych, ENV-ES, w/enc., C925  
Mark Haagenstad, ENV-RCRA, w/o enc., K404, (E-File)  
Tammy Diaz, ENV-RCRA, w/o enc., K404, (E-File)  
ENV -RCRA File, M704  
IRM-RMMSO, File A150

**Enclosure 1**

**Closure Plan**

**Technical Area 39 Open Detonation Unit (TA-39-57),**

**Revision 1.0**

**LA-UR-12-10332**

---

---

February 2012

LA-UR-12-10332

## **Closure Plan**

# **Technical Area 39 Open Detonation Unit (TA-39-57), Revision 1.0**

Prepared by:

*Los Alamos National Laboratory*

*ENV-RCRA Group*

*Los Alamos, New Mexico 87545*

---

---

## Table of Contents

List of Tables .....	v
List of Figures .....	vi
List of Abbreviations and Acronyms .....	viii
1.0 INTRODUCTION.....	1
2.0 DESCRIPTION OF UNIT TO BE CLOSED.....	1
2.1 Description of the Treatment Unit.....	1
2.2 Description of the Wastes Treated at the Unit.....	2
2.3 Description of Treatments Conducted at the Unit.....	3
3.0 ESTIMATE OF MAXIMUM WASTE TREATED .....	3
4.0 GENERAL CLOSURE INFORMATION.....	3
4.1 Closure Performance Standard .....	3
4.2 Closure Schedule.....	5
5.0 CLOSURE PROCEDURES .....	5
5.1 Records Review and Structural Assessment.....	5
5.1.1 Records Review.....	5
5.1.2 Structural Assessment .....	6
5.2 Decontamination and Removal of Structures and Related Equipment.....	6
5.2.1 Equipment Used During Decontamination Activities .....	6
6.0 SAMPLING AND ANALYSIS PLAN .....	6
6.1 Sampling Activities .....	7
6.2 Sample Collection Procedures.....	8
6.2.1 Surface Water and Groundwater Sampling.....	8
6.2.2 Soil Sampling .....	8
6.2.3 Cleaning of Sampling Equipment .....	9
6.3 Sample Management Procedures.....	9
6.3.1 Sample Documentation .....	9
6.3.1.1 Chain-of-Custody.....	9
6.3.1.2 Sample Labels and Custody Seals.....	10
6.3.1.3 Sample Logbook .....	10
6.3.2 Sample Handling, Preservation, and Storage .....	10
6.3.3 Packaging and Transportation of Samples .....	10
6.4 Sample Analysis Requirements.....	11
6.4.1 Analytical Laboratory Requirements .....	11
6.4.2 Quality Assurance/Quality Control.....	11
6.4.2.1 Field Quality Control .....	11
6.4.2.2 Analytical Laboratory Quality Control Samples.....	12

6.4.3 Data Reduction, Verification, Validation, and Reporting ..... 12  
6.4.4 Data Reporting Requirements ..... 12  
7.0 WASTE MANAGEMENT ..... 12  
8.0 CLOSURE CERTIFICATION REPORT ..... 13  
9.0 REFERENCES ..... 14



### **List of Tables**

Table 1.	Schedule for Closure of the TA-39-57 OD Unit
Table 2.	Hazardous Waste Constituents of Concern at the TA-39-57 OD Unit
Table 3.	Potential Waste Materials, Waste Types, and Disposal Options
Table 4.	Summary of Analytical Methods
Table 5.	Sample Containers, Preservation Techniques, and Holding Times
Table 6.	Quality Control Sample Types, Applicable Analyses, Frequency, and Acceptance Criteria

### **List of Figures**

Figure 1.	Location of Technical Area 39 at Los Alamos National Laboratory
Figure 2.	Location and Layout of the TA-39-57 Open Detonation Units
Figure 3.	Sampling Locations for Closure of the TA-39-57 Open Detonation Units

## List of Acronyms and Abbreviations

CFR	Title 40, U.S. Code of Federal Regulations
CWA	Clean Water Act
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
HE	High Explosives
FFCA/AO	Federal Facility Compliance Agreement - Administrative Order
IP	Individual Permit
IFGMP	Interim Facility Wide Ground Water Monitoring Plan
LANL	Los Alamos National Laboratory
MSGP	Multi-Sector General Permit
NPDES	National Pollutant Discharge Elimination System
NMED	New Mexico Environment Department
OD	open detonation
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SW-846	<i>Test Methods for Evaluating Solid Waste, Physical/Chemical Methods</i> , EPA-SW-846, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.
TA	Technical Area
TALs	Target Action Levels

## CLOSURE PLAN

### TECHNICAL AREA 39 OPEN DETONATION UNIT

#### 1.0 INTRODUCTION

This closure plan describes the activities necessary to close the interim status hazardous waste open detonation (OD) thermal treatment unit at Technical Area 39 (TA-39) at the Los Alamos National Laboratory (the Facility), hereinafter referred to as the TA-39-57 OD Unit. The information provided in this closure plan addresses the closure requirements specified in the Code of Federal Regulations (CFR), Title 40, Part 265, Subparts G and P for hazardous waste thermal treatment units at LANL under the Resource Conservation and Recovery Act (RCRA) and the New Mexico Hazardous Waste Act. Closure of the OD Unit will be completed in accordance with Section 4.1 of this closure plan.

The TA-39-57 OD Unit is collocated within and near solid waste management units not yet scheduled for corrective action; therefore, if closure performance standards listed in Section 4.1 cannot be attained, the TA-39-57 OD Unit will undergo cleanup in conjunction with the overall corrective action processes to be implemented at TA-39. Buildings associated with the TA-39-57 OD Unit will also be removed as part of decommissioning and demolition activities of TA-39. Final closure of TA-39 will be in accordance with the requirements set forth in 40 CFR 265 Subpart G and P.

#### 2.0 DESCRIPTION OF UNIT TO BE CLOSED

This section provides an overview of past operations and waste management practices at the TA-39-57 OD Unit. It includes the location of the unit, a description of the unit, and past operational and waste management practices associated with it.

##### 2.1 Description of the Treatment Unit

TA-39 is located in the southern portion of LANL and includes much of the mesa between Water Canyon on the north and Ancho Canyon on the south (LANL, 1993). Mesa-top elevations at TA-39 range from approximately 6,500 to 7,000 feet above mean sea level. The area was established in 1953 for testing of explosive materials and has been used continuously for that purpose. TA-39 contains a number of structures located in the north fork of Ancho Canyon (LANL, 1993). The remainder of TA-39 is unoccupied and serves as a buffer zone for open detonation operations.

The TA-39-57 OD Unit is associated with the Control Building (Building TA-39-57); however, the building is not part of the hazardous waste management unit. The location and layout of this unit is shown on Figure 2.

The TA-39-57 OD Unit is a relatively flat sand-covered area, measuring approximately 40 by 40-feet, and is located in the canyon bottom. Steep canyon walls rise to heights of 100 feet or greater in the immediate vicinity of the unit, roughly forming a semicircle around the unit. The canyon walls serve to attenuate the force of the blasts. The associated Building TA-39-57 is a reinforced concrete structure extending partially beneath the detonation area. In early 2007, a

metal weather enclosure measuring approximately 70 by 20-feet was erected at TA-39-57 for experimental activities. Clean base course was placed on the firing point and the structure was erected on top of the base course. The enclosure has a wood floor throughout.

TA-39-57 OD unit is located approximately 50 feet northeast from the closest arroyo, which serves as a tributary to Ancho Canyon. An earthen berm north of the firing pad diverts surface water run-on away from the firing pad and to the northeast into a tributary of Ancho Canyon. There is a rock check dam at the lower end of the site within the channel. The vegetated median southeast of the firing point serves as a retention area for storm water run-off from the firing site. A grassy area south of the site is a potential run-off attenuation area.

## **2.2 Description of the Wastes Treated at the Unit**

The TA-39-57 OD Unit was used to treat hazardous explosive waste by OD. Hazardous waste treated at the TA-39-57 OD Unit included waste generated during research and development activities and processing and recovery operations at various TAs throughout LANL. Non-treatment related experimental test detonations were also performed at the TA-39-57 OD Unit.

The waste streams treated at the TA-39-57 OD Unit by open detonation would have included excess explosives, assemblies containing explosives, and explosives contaminated prep room debris. Excess explosives include bulk pieces, initiating devices (detonators/squibs), powders, developmental energetic materials, excess propellants, and explosive assemblies. High Explosives (HE) contaminated materials generated at the TA-39-57 OD Unit that were treated by open detonation included cellulose (kim wipes, paper towels, swabs, sheets of paper, etc.); plastics (weigh boats, gloves, plastic bags, anti-static bags, vials w/ stoppers, etc.); glass vials with stoppers; and metals (wire, thin plates, small targets).

Firing site debris generated by experimental activities, or rarely, waste treatment, would not routinely contain detonable quantities of explosives, although it may have contained trace quantities of non-hazardous residual HE. Firing site debris was surveyed by an RCT and dispositioned as either low level waste with DU contamination or as non-hazardous waste for offsite disposal. Firing site debris was treated if the firing leader observed unreacted HE during his post-shot survey. If explosive debris were not rendered safe immediately, through immediate detonation, the debris was stored in the satellite accumulation area within Building TA-39-57 and was treated as soon as possible.

The wastes treated were both homogeneous (e.g., solid explosives, scrap explosives) and heterogeneous (e.g., explosives-contaminated paper, rags, wood). These wastes were assigned the following U.S. Environmental Protection Agency (EPA) Hazardous Waste Numbers: D001 for ignitability; D003 for reactivity; D005 (for the barium in the explosives); D006; D007; D008; D009; D011; D018; D022; D028; D029; D030; D035 D036; D038; D040; F001; F002; F003; F004; and F005 (for spent solvents on the explosives-contaminated rags and wipes). Historically, there were no significant changes in waste compositions. The wastes were treated to remove the characteristic of reactivity, although other characteristic (e.g., ignitability, toxicity for barium) and listed (solvents on the explosives-contaminated rags and wipes) hazardous waste codes may have been applied to the wastes being treated.

## **2.3 Description of Treatments Conducted at the Unit**

Waste containers for explosives-contaminated waste and explosive material generally consisted of paper-lined cardboard boxes, wooden boxes, or small boxes. Most wastes contaminated with explosives and pieces of consolidated explosives were not packaged together. Explosives-contaminated wastes were placed within containers, sealed, and labeled appropriately. These waste containers were then stored in an accumulation area.

Wastes to be treated at the TA-39-57 OD Unit were collected from various accumulation areas at TA-39. When loading waste, the cargo compartment of the transport vehicle was visually assessed to ensure that it was clean and contained no loose items such as tools or pieces of metal. For transport, the wastes were placed in an enclosed compartment or secured with tie-downs. Wastes were transported by appropriately trained personnel in a designated vehicle to the TA-39-57 OD Unit on the day of planned treatment. Only the amount of waste that could be treated in one treatment event was transported to the unit. A maximum of 1,000 pounds of waste explosives may have been detonated per treatment event at the TA-39-57 OD Unit.

The waste was unloaded from the vehicle and placed at the OD location by qualified technicians/specialists. Depending on preparation activities, the time during which waste may have remained at the unit typically ranged from several minutes to a few hours. A visual examination was conducted after unloading to ensure that no explosive material remained in the transport vehicle. OD of waste was accomplished by using a predetermined amount of explosive to initiate the detonation. The detonation may have created temperatures up to 3,000 degrees Fahrenheit (1,649 degrees Celsius). Initiation for all waste treatment operations was performed remotely by qualified personnel from inside the Building TA-39-57. Thermal treatment operations were conducted in accordance with the approved versions of LANL operating procedures in place at that time.

Procedures for OD required a thorough survey of the area after detonation, collection of identifiable pieces of material not consumed by the detonation, and subsequent detonation of these materials. The Firing Site Leader determined when it was safe to re-enter the detonation site.

Pieces of damaged explosives resulting from a misfire, sensitivity experiment, incomplete detonation, or exposure to severe testing were packaged separately from excess explosives. The waste explosives were managed and stored appropriately according to operating procedures.

## **3.0 ESTIMATE OF MAXIMUM WASTE TREATED**

Since 1973, approximately 1,827 pounds of waste have been treated at the OD unit. Based on the estimate an average of 48 pounds of waste has been treated annually at the OD unit.

## **4.0 GENERAL CLOSURE INFORMATION**

### **4.1 Closure Performance Standard**

The TA-39-57 OD Unit will be closed to meet the following performance standards (40 CFR § 265.111):

- minimize the need for further maintenance;
- 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 run-off, or hazardous waste decomposition products to the ground or surface waters, or to the atmosphere; and

- comply with the closure requirements of 40 CFR Part 265 Subparts G and P.

This will be accomplished through one of two methods:

- Ensure contaminated media do not contain concentrations of hazardous constituents that are greater than the clean-up levels established in the New Mexico Environment Department's (NMED's) *Technical Background Document for Development of Soil Screening Levels* (as updated) (NMED, 2009), and in LANL's *Screening Level Ecological Risk Assessment Methods* (LANL, 2010a) (as updated and approved by the NMED). For soils, the cleanup levels shall be established based on residential use. The owner/operator must also demonstrate that there is not potential to contaminate groundwater; or
- conduct a human health and ecological risk evaluation utilizing the screening levels described above.

If LANL is unable to achieve any one of the risk-based clean closure standards above, LANL will:

- coordinate cleanup closure activities for the TA-39-57 OD Unit with the corrective action cleanup processes at TA-39 in its entirety.
- Control the migration of hazardous waste residues, hazardous constituents, and, as applicable, contaminated media such that they do not pose an unacceptable risk to human health and the environment the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off or hazardous waste decomposition products to the ground, groundwater, surface waters, or to the atmosphere; and
- comply with Closure Requirements in 40 CFR 265.113(b)(1)(ii)(C) and (2).

LANL shall demonstrate that the unit does not pose an unacceptable risk by complying with the post closure requirements in 40 CFR 265.117 as well as conduct the following to protect human health and the environment:

- Maintain the integrity and effectiveness of the unit by making repairs necessary to correct the effects of erosion, animal intrusion, or other events that compromise the unit;
- maintain surface water controls to prevent run-on and run-off from eroding or otherwise cause damage;
- conduct corrective action as necessary to protect human health and the environment;
- maintain fencing, security signs and locks;
- maintain training, operating, inspection, and monitoring, and other required records; and
- submit an annual report to the NMED providing the results of the required inspections, sampling results, and a summary of any needed repairs and whether repairs were effective.

Closure of the TA-39-57 OD Unit will be deemed complete when 1) closure has been completed in accordance with the closure plan and certified by an independent, professional engineer

licensed in the State of New Mexico; and 2) closure certification has been submitted to, and approved by, NMED.

## **4.2 Closure Schedule**

This closure plan schedule is intended to address the closure requirements for the TA-39-57 OD Unit. The following section provides the schedule of closure activities (see also Table 1 in this closure plan).

Closure activities will begin according to the requirements in 40 CFR § 265.112(d)(2). However, pursuant to 40 CFR § 265.112(e), removing hazardous wastes in accordance with an approved closure plan may be conducted at any time before or after notification of closure. Upon approval of the modified closure plan, soil sampling activities will be conducted to demonstrate that the soils at the permitted unit meet the closure performance standards in Section 4.1. Submittal of the final closure report and certification will be submitted to NMED 240 days after initiating closure. In the event that closure of the permitted unit cannot proceed according to schedule, the Facility will notify the NMED in accordance with the extension request requirements in 40 CFR § 265.113.

## **5.0 CLOSURE PROCEDURES**

Closure activities at the unit includes a physical review of the unit and a review of the unit's records; proper management and disposal of hazardous waste residues, if applicable; sampling to verify the closure performance standards in Section 4.1 of this closure plan have been achieved; and submittal of a final closure certification report. The following sections describe more specifically these closure activities applicable to the TA-39-57 OD Unit.

### **5.1 Records Review and Structural Assessment**

Prior to commencing closure decontamination and sampling activities, the TA-39-57 OD Unit Operating and Inspection Records were reviewed in November 2011 and a structural assessment was conducted on September 12, 2011 to determine if there were any previous finding(s) or action(s) that may influence closure activities or potential sampling locations.

#### **5.1.1 Records Review**

The TA-39-57 OD Unit Operating Record (including, but not limited to, inspection and contingency plan implementation records) has been reviewed with the intent of determining the following:

1. Confirmation of the specific hazardous waste constituents of concern listed in Table 2 of this closure plan;
2. updating the estimated quantity of waste treated at the unit discussed in Section 3.0 ; and
3. identification of additional sampling locations (*e.g.*, locations of spills or chronic conditions) identified in the TA-39-57 OD Unit Operating and Inspection Records.

A determination has been made based on the fact that there is no record of any spills or releases, defects, deterioration, damage, or hazards affecting waste containment or treatment occurred or developed during the operational life of the TA-39-57 OD Unit. Results from the records review are summarized briefly in this section and further details will be included in the closure certification report described in Section 8.0.

During the records review process, documentation was discovered that included years prior to the effective date of RCRA (from 1973-1980). These records as well as those from 1980 to the last documented treatment activity in 1995 were included in the review. These records indicate that the quantity of waste treatment was significantly lower than the originally estimated quantity. The original estimated quantity was based on the unit capacity, while the recorded quantity was approximately 1,827 pounds.

### **5.1.2 Structural Assessment**

The structural assessment is an evaluation of the unit's physical condition and was conducted prior to commencing closure activities. The structural assessment include an inspection of the unit for any conditions that indicate a potential for release of hazardous constituents and reveals any evidence of a release (*e.g.*, stains). Results from the assessment are summarized briefly within this section and will be discussed further in the closure certification report described in Section 8.0.

During the structural assessment process (September 12, 2011), a visual inspection of the unit was conducted and a determination was made that there was no evidence of a release of hazardous wastes or hazardous wastes constituents related to the treatment operations at the OD unit. Additionally, it was determined that the structures within the area are not included in the boundary of the unit.

## **5.2 Decontamination and Removal of Structures and Related Equipment**

There are no structures or related equipment at this unit that are expected to be removed or decontaminated. If equipment is encountered unexpectedly, in accordance with 40 CFR § 265.112(b)(4), the equipment will be decontaminated, or removed, or both and managed according to Section 7.0 of this closure plan. All equipment removed will be considered solid and potentially hazardous waste when removed, and will be disposed of in accordance with Section 7.0. Decontamination activities will 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.

### **5.2.1 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 or will not be decontaminated will be containerized and managed as waste in accordance with Section 7.0.

## **6.0 SAMPLING AND ANALYSIS PLAN**

This SAP identifies the specific sampling and analysis requirements for this unit and describes the sampling, analysis, and quality assurance/quality control (QA/QC) methods that will be used to demonstrate that LANL has met the closure performance standards in Section 4.1 of this closure plan. LANL will comply with all the requirements in this closure plan section (6.0). 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. It includes:



1. The hazardous waste constituents of concern listed in Table 2 that will be included in the analysis for soil samples. This list includes all hazardous constituents defined as:
  - a. any constituent identified in 40 CFR Part 261 Appendix VII that caused the United States EPA to list a hazardous waste in 40 CFR Part 261 Subpart D;
  - b. any constituent identified in 40 CFR Part 261, Appendix VIII; or
  - c. any constituent identified in 40 CFR Part 264 Appendix IX, perchlorate, and nitrates.
2. The list of hazardous constituents of concern will be utilized to select the EPA approved analytical methods capable of detecting those constituents.
3. A site plan for soil samples. The site plan includes:
  - a. Figure 3 depicting the boundaries of the unit and soil sampling locations. The locations include:
  - b. locations of known spills or other releases of hazardous waste or hazardous constituents during operation of the units;
  - c. other potential release locations; and
  - d. a rationale for the number and locations of samples.
4. The type of samples to be collected (*e.g.*, soil) and the rationale for the selection of the sample type.
5. Sampling methods including a description of the EPA-approved sampling methods and procedures that will be used to collect each type of sample as specified in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846) (EPA, 1986).
6. A description of the approved EPA laboratory analytical methods that will be used to measure hazardous constituent concentrations (see Table 4).
7. This SAP includes a description of the QA/QC procedures that include, but are not limited to:
  - a. duplicates, trip blanks, equipment blanks;
  - b. a description of methods for decontamination of re-usable sampling equipment; and
  - c. a description of all sample preservation, handling, labeling, and chain-of-custody procedures.

### 6.1 Sampling Activities

Sampling activities will be conducted to demonstrate that unit-related equipment, surfaces, and soils in and around the unit meet the closure performance standards in Section 4.1. 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. Soil sample locations are shown in Figure 3. These locations include, but are not limited to, soils surrounding the unit; soils in the vicinity of the unit; and soils at the storm water discharge point.

- Discrete soil samples as identified in Figure 3.

## **6.2 Sample Collection Procedures**

Samples will be collected in accordance with the procedures identified in this SAP which incorporates guidance from the EPA (EPA, 2002), DOE (DOE, 1995), and other NMED-approved procedures.

### **6.2.1 Surface Water and Groundwater Sampling**

Surface water sampling is not included as part of the TA-39-57 closure activities because surface water compliance is demonstrated as part of compliance with the Clean Water Act (CWA) and the National Pollutant Discharge Elimination System (NPDES) permit program. The TA-39-57 OD unit was subject to the 2008 CWA Multi-Sector General Permit (MSGP) for storm water until the modified LANL Storm Water Individual Permit (IP) became effective on November 1, 2010. Section 1.6.1 of the 2008 MSGP notes that there may be situations in which EPA may require a discharger to apply for and/or obtain authorization to discharge under either an IP or an alternative NPDES general permit. EPA required the DOE to apply for an individual NPDES permit for LANL by December 31, 2004, pursuant to the Federal Facility Compliance Agreement - Administrative Order Docket No. CWA-06-205-1701 (FFCA/AO) entered into between the EPA and the Department of Energy (DOE) in February 2005 (EPA, 2005). Further, Section 1.6.1 of the 2008 MSGP explains that for existing dischargers authorized to discharge under the MSGP, EPA's "notice will set a deadline to file the permit application, and will include a statement that on the effective date of the individual NPDES permit, or the alternative general permit as it applies to you, coverage under this general permit will terminate."

LANL's Individual Permit contains non-numeric technology-based effluent limitations, coupled with a comprehensive, coordinated monitoring program and corrective action where necessary, to minimize pollutants in LANL's storm water discharges. LANL is also required to implement site-specific control measures (including BMPs) to address the non-numeric technology-based effluent limits contained in the IP, followed by confirmation monitoring against New Mexico water-quality criteria-equivalent target action levels (TALs) to determine the effectiveness of the site-specific measures. If TALs are exceeded, corrective actions detailed in the IP are initiated and additional confirmation monitoring is conducted following completion of corrective actions. Monitoring for the IP will start in 2011.

Groundwater in the vicinity of TA-39-57 is monitored as part of the LANL Interim Facility-Wide Groundwater Monitoring Plan (IFGMP). Under the 2010 IFGMP (LANL, 2010b), surface water is monitored down gradient of TA-39-57 at the mouth of Ancho Canyon, near the confluence with the Rio Grande. Regional groundwater is monitored in four separate depth intervals at well R-31. Additional groundwater monitoring takes place down gradient of TA-39-57 at Ancho Spring in Ancho Canyon and at Springs 6, 6A, 8A, 9, and 9B in White Rock Canyon.

### **6.2.2 Soil Sampling**

Sampling activities shall consist of collection of discrete surface and subsurface samples within the treatment area, beneath the treatment unit, from nearby drainages and from the soils located beneath the floor and base course (e.g. gravel) of the metal weather enclosure. Soil samples will be collected from depths of 0-6 and 6-12 inches below ground surface (bgs). One discrete soil sample will be collected from the drainage located east of the TA-39-57 OD Unit, at one and five foot depths bgs., sample locations are shown in Figure 3. Soil samples will be analyzed to

determine if hazardous constituents are present in soils at, or in the vicinity of, the unit and to determine if there is an immediate threat to the environment. Soil sample analysis will be completed using the methods listed in Table 4 (Summary of Analytical Methods).

Soil samples will be collected using a spade, scoop, auger, trowel or other tool as specified in approved methods for the type of analyte to be sampled (EPA, 1986 or EPA, 2002). 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 5.

### **6.2.3 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 will be scraped, as necessary, to remove residue, cleaned prior to each use with a wash solution, rinsed several times with tap water, and air-dried to prevent cross-contamination of samples. Sampling equipment rinsate blanks will be collected and analyzed only if reusable sampling equipment is used.

## **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:

1. in a person's physical possession;
2. in view of the person in possession; or
3. 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 LANL 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 unique sample identification number;
- name of the sample collector;
- date and time of collection;
- type of preservatives used, if any; and
- 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 will 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 will be recorded in a bound logbook. Information will be recorded in indelible ink and any cross outs will be made with a single line and the change initialed and dated by the author. The sample logbook will include the following information:

- the sample location;
- suspected composition;
- sample identification number;
- volume/mass of sample taken;
- purpose of sampling;
- description of sample point and sampling methodology;
- date and time of collection;
- name of the sample collector;
- sample destination and how it will be transported;
- observations; and
- 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 5 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 requirements, and relevant local, state, and federal laws (including 10 CFR and 49 CFR). Appropriate LANL 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 LANL 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 hazardous constituents listed in Table 2. These constituents have been determined to be applicable constituents listed in Appendix VIII of 40 CFR Part 261 and in Appendix IX of 40 CFR Part 264 that were managed or treated at the units over their operational history. This determination has been made through the records review and structural assessment discussed in Section 5.1. Samples will be analyzed by an independent laboratory using the methods outlined in Table 4. Analytes, test methods and instrumentation, target detection limits, and rationale for metals and organic analyses are presented in Table 4. If any of the information from these tables has changed at the time of closure, LANL 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. This analytical laboratory will have:

- a documented comprehensive QA/QC program;
- technical analytical expertise;
- a document control/records management plan; and
- the capability to perform data reduction, validation, and reporting.

The selection of the analytical testing methods identified in Table 4 is based on the following considerations:

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

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

All sampling and analysis will be conducted in accordance with QA/QC procedures defined by the latest revision of SW-846 (EPA, 1986) or other NMED-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 may be collected include trip blanks, field blanks, field duplicates, and equipment rinsate blanks. Table 6 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 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 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 summary of analytical results for each sample;
- results from QC samples such as blanks, spikes, and calibrations;
- reference to standard methods or a detailed description of analytical procedures; and
- 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**

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

1. demolition debris;
2. concrete;
3. containerized waste;
4. decontamination wash water;
5. decontamination waste; and
6. soil.

The different types of wastes generated at closure, including the unit's decontaminated structures and related equipment, and their disposition options are listed in Table 3 of this closure plan.

## 8.0 CLOSURE CERTIFICATION REPORT

Upon completion of the closure activities at the units, LANL will submit, by registered mail, a closure certification report for NMED review and approval. The closure certification report will document that the units have been closed in compliance with the specifications in this closure plan. The Report will summarize all activities conducted during closure including, but not limited to:

- the results of the records review and structural assessment;
- the results of all investigations;
- remediation waste management;
- decontamination;
- decontamination verification and soil sampling activities; and
- results of all chemical analyses and other characterization activities.

LANL will submit the closure certification report to the NMED no later than 60 days after completion of closure of the unit. NMED may require interim reports that document the progress of closure. The certification will be signed by LANL and by an independent professional engineer registered in the State of New Mexico (*see* 40 CFR § 265.115).

The report will document the unit's closure and contain, at a minimum, the following information:

1. a copy of the certification pursuant to 40 CFR § 265.115;
2. any variance, and the reason for the variance, from the activities approved in this closure plan;
3. documentation of the records review and structural assessment conducted;
4. a summary of all sampling results, showing:
  - a. sample identification,
  - b. sampling location,
  - c. data reported,
  - d. detection limit for each analyte,
  - e. a measure of analytical precision (*e.g.*, uncertainty, range, variance),
  - f. identification of analytical procedure,
  - g. identification of analytical laboratory,
5. a QA/QC statement on analytical data validation and decontamination verification;
6. the location of the file of supporting documentation, including:
  - a. field logbooks,
  - b. laboratory sample analysis reports,
  - c. QA/QC documentation, and
  - d. chain-of-custody forms,
7. storage or disposal location of hazardous waste resulting from closure activities;
8. a copy of the Human Health and Ecological Risk Assessment Reports, if a site-specific risk assessment was conducted pursuant to Section 4.1 for the unit; and

9. a certification statement of the accuracy of the closure certification report.

Documentation supporting the independent registered professional engineer's certification must be furnished to NMED before LANL is released from the closure financial assurance requirements in 40 CFR § 265.143. If LANL leaves waste in place, they will submit to NMED a survey plat as required by 40 CFR § 265.116 in conjunction with the closure certification report.

## 9.0 REFERENCES

- DOE, 1995. *DOE Methods for Evaluating Environmental and Waste Management Samples*, DOE/EM-0089T, Rev. 2, Pacific Northwest Laboratory, Richland, Washington.
- EPA, 2005. Federal Facility Compliance Agreement - Administrative Order Docket No. CWA-06-205-1701 (FFCA/AO) *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. (February 2005)*, U.S. Environmental Protection Agency, Office of Solid Waste, U.S. Government Printing Office, Washington, DC.
- EPA, 2002. *RCRA Waste Sampling Draft Technical Guidance Planning, Implementation, and Assessment*, EPA530-D-02-002, U.S. Environmental Protection Agency, Office of Solid Waste, U.S. Government Printing Office, Washington, DC.
- 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, DC.
- LANL, 2010a. *Ecorisk Database (Release 2.5)*, on CD, LA-UR-10-6898, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2010, 110846)
- LANL, 2010b. *2010b Interim Facility-Wide Groundwater Monitoring Plan*, Los Alamos National Laboratory document LA-UR-10-1777, Los Alamos, New Mexico.).
- LANL, 1993. *RFI Work Plan for Operable Unit 1132*, LA-UR-93-768, Los Alamos National Laboratory, Los Alamos, New Mexico.
- NMED, 2009. *Technical Background Document for Development of Soil Screening Levels (Revision 5.0)*, New Mexico Environment Department Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program.



**Table 1**  
**Schedule for Closure of the TA-39-57 OD Unit**

<b>Closure Activity</b>	<b>Schedule</b>
Notify the Department of the initiation of closure.	Day 0
Remove all wastes including hazardous, mixed, and solid waste	No later than Day 90
Conduct records review	Already conducted
Conduct structural assessment	Already conducted
Submit a request to modify the Closure Plan and the records review and structural assessment report	Already conducted
Submit final Closure Report and Certification to the Department.	No later than Day 240

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

**Table 2**  
**Hazardous Waste Constituents of Concern at the TA-39-57 OD Unit<sup>a</sup>**

Category	EPA Hazardous Waste Numbers	Specific Constituents
high explosives and associated compounds	D001, D003	HMX, RDX, TNT, PETN, Tertyl and Other Nitrobenzenes and Nitrotoluenes
Toxic Metals	D005, D006, D007, D008, D009, D011	Barium, Cadmium, Chromium, Lead, Mercury, , Silver
Semi-volatile Organic Compounds	D030, D036, F004, D038	2,4-Dinitrotoluene, Nitrobenzene, Pyridine
Volatile Organic Compounds	F001, F002, F003, F004, F005, D018, D022, D028, D029, D035; D040	Acetone, Ethanol, Benzene, MEK, Methylene Chloride, Toluene, MIBK, Xylene, Ethyl Acetate, Methanol, 1,2 dichloroethane (D028), 1,1 dichloroethylene Trichloroethylene, chloroform
Other constituents of concern		Perchlorates

<sup>a</sup> Based on the unit operating record.

PETN = pentaerythrioltetranitrate (2,2-bis[(nitroxy)methyl]-1,3-propanediol dinitrate

HMX = cyclotetramethylenetetranitramine

RDX = cyclonite

MEK= methyl ethyl ketone

TNT = trinitrotoluene

MIBK = 4-methyl-2-pentanone

**Table 3**  
**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.
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill or the Waste Isolation Pilot Plan (WIPP), as appropriate.
Decontamination wash 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.
	Radioactive liquid waste	Radioactive Liquid Waste Treatment Facility (RLWTF)
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill or WIPP, as appropriate.
Metal	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.
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill or WIPP, as appropriate.
Discarded waste management 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.
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill or WIPP, as appropriate.
Soil and tuff	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,

Potential Waste Materials	Waste Types	Disposal Options
		as appropriate.
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill or WIPP, as appropriate.
Discarded concrete	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.
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill or WIPP, 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.
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill or WIPP, as appropriate.

**Table 4**  
**Summary of Analytical Methods**

Analyte	EPA SW-846 Analytical Method <sup>a</sup>	Test Methods/ Instrumentation	Target Detection Limit <sup>b</sup>	Rationale
<b>Metal Analysis</b>				
Barium	6010, 7010	ICP-AES,GFAA	200 ug/L	Determine the metal concentration in the samples.
Cadmium	6010, 7010	ICP-AES,GFAA	2 ug/L	
Chromium	6010, 7010	ICP-AES,GFAA	10 ug/L	
Lead	6010, 7010	ICP-AES,GFAA	5 ug/L	
Mercury	6010, 7010, 7471B	ICP-AES,GFAA, CVAA	0.2 ug/L	
Silver	6010, 7010	ICP-AES,GFAA	10 ug/L	
<b>Organic Analysis</b>				
Target compound list VOCs plus 10 TICs	8260B	GC/MS	10 mg/L	Determine the VOCs concentration in the samples.
Target compound list SVOCs plus 20 TICs	8270D, 8275	GC/MS	10 mg/L	Determine the SVOCs concentration in the samples.
<b>Other Analysis</b>				
Perchlorates	6850	HPLC-ESI/MS or MS/MS	1 µg/L	Determine concentration of perchlorate in the samples.

<sup>a</sup> 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
- GC/MS = gas chromatography/mass spectrometry
- GFAA = Graphite furnace atomic absorption spectroscopy
- ICP-AES = Inductively coupled plasma-atomic emission spectrometry
- HPLC = high performance liquid chromatograph
- ESI/MS = electrospray ionization/mass spectrometry
- MS/MS = tandem mass spectrometry
- SVOC = semi-volatile organic compound
- TIC = tentatively identified compound
- VOC = volatile organic compound
- mg/L = milligrams per liter
- ug/L = micrograms per liter.

**Table 5**  
**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: Barium, Cadmium, Chromium, Lead, 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)*, EPA, 1986, and all approved updates.

°C = degrees Celsius

L=Liter

mL = milliter

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

HCL=hydrochloric acid

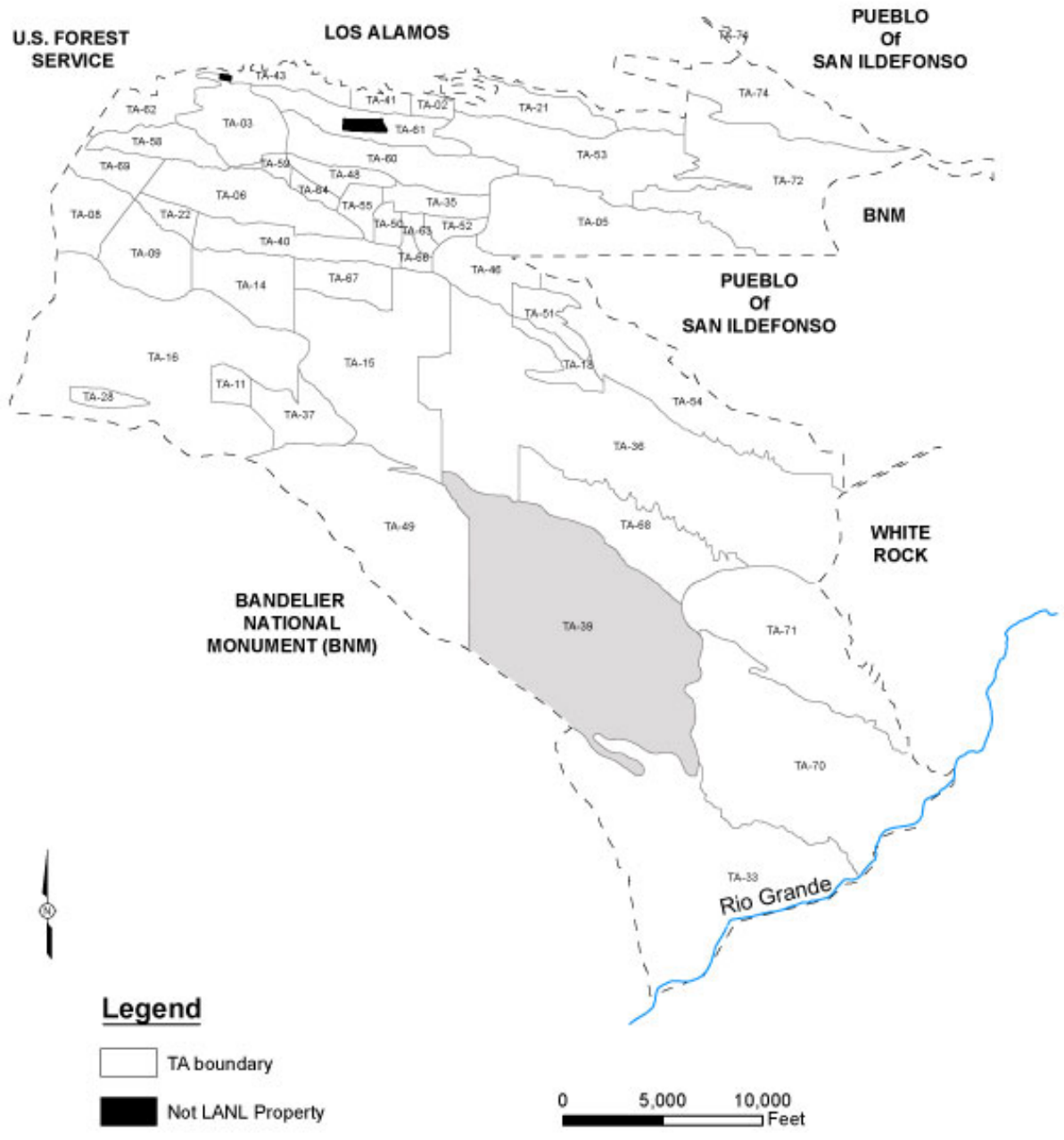
TCLP = Toxicity Characteristic Leaching Procedure

**Table 6**  
**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 1**  
 Location of Technical Area 39 at Los Alamos National Laboratory

Created by EPWES-EDA GIS TEAM, Map Number 26-2108 November 13, 2008  
 State Plane Coordinate System, New Mexico Central Zone, North American Datum 1983 (N)  
 This map was created for work processes associated with the Environmental & Remediation Support Services. All other uses for this map should be confirmed with LANL EPWES staff.  
 Boundary of Department of Energy Property Around the Los Alamos National Laboratory, Los Alamos National Laboratory, SSGMO Site Planning & Project Initiation, Infrastructure Planning Office, 04 June 2008  
 Boundary of Department of Energy Property Inside the Los Alamos National Laboratory, Los Alamos National Laboratory, SSGMO Site Planning & Project Initiation, 04 June 2008



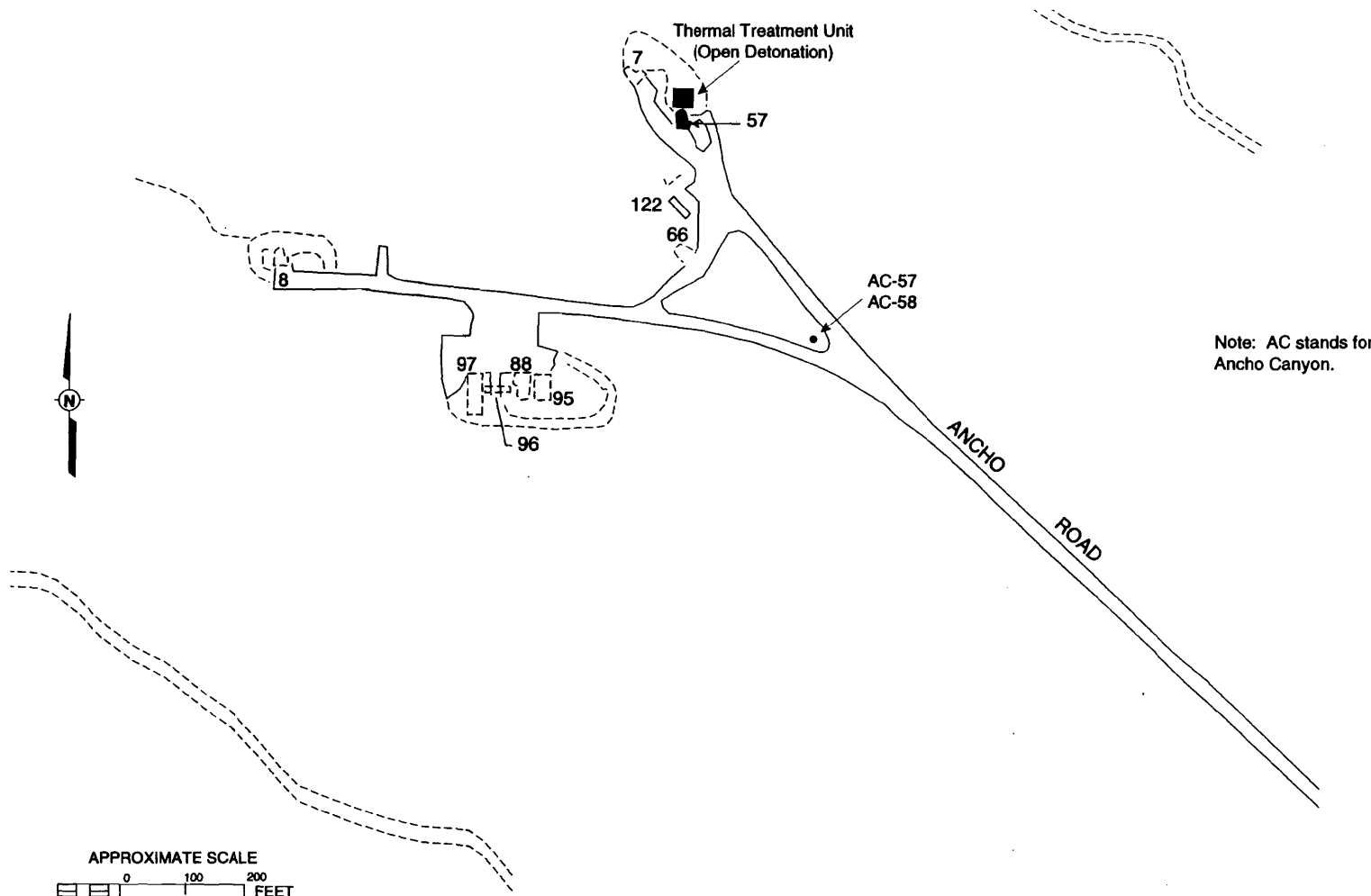


Figure 2. Location and Layout of the TA-39-57 Open Detonation Unit

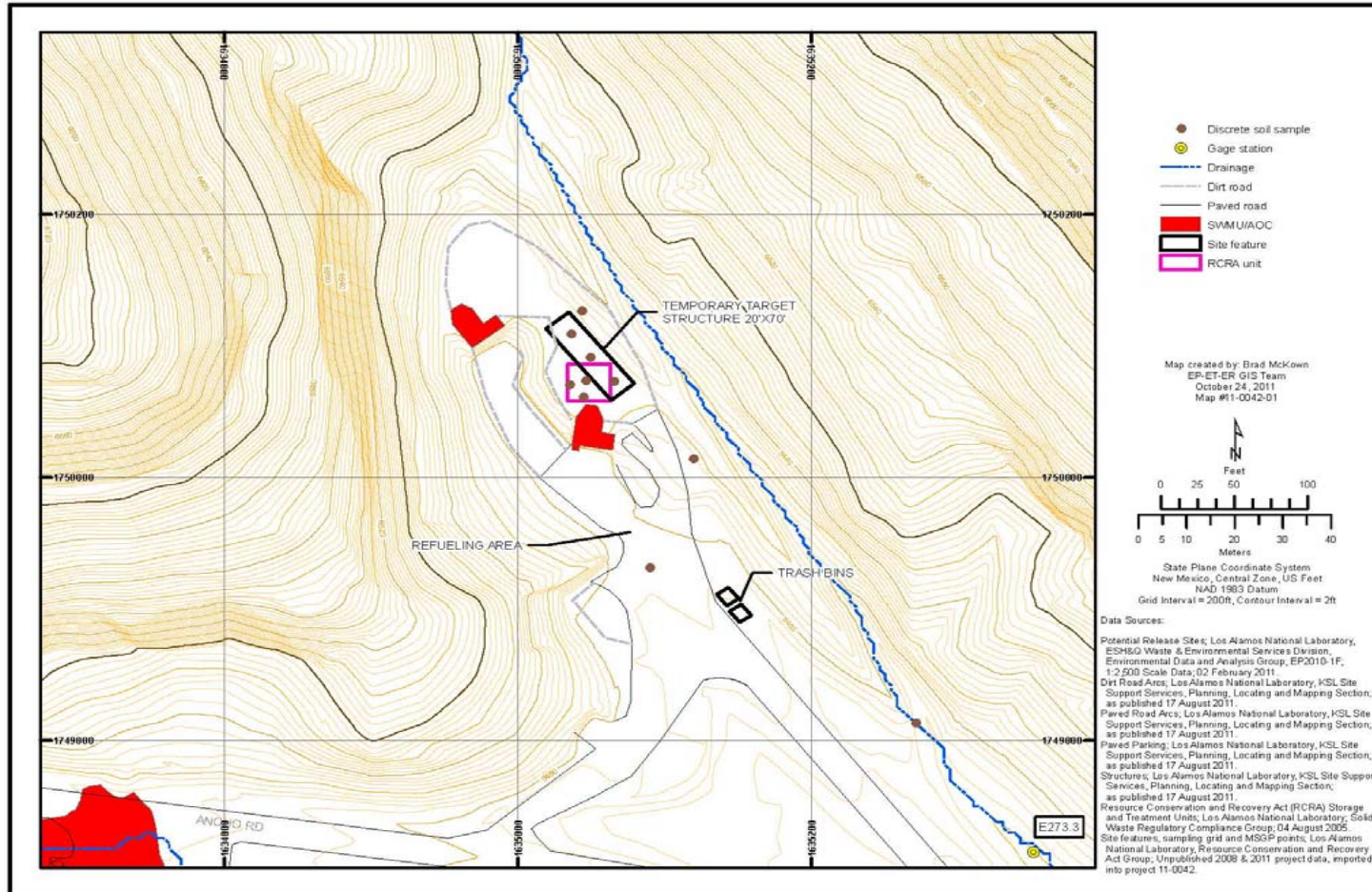


Figure 3. Sampling Locations for Closure of the TA-39-57 Open Detonation Units

**CERTIFICATION**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



**Alison M. Dorries**

Division Leader  
Environment Protection Division  
Los Alamos National Laboratory

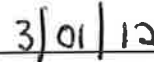


**Date Signed**



**Gene E. Turner**

Environmental Permitting Manager  
Environmental Projects Office  
Los Alamos Site Office  
National Nuclear Security Administration



**Date Signed**

## **Enclosure 2**

### **Closure Plan**

**Technical Area 14 Open Burning and Open Detonation Units  
(TA-14-23), Revision 1.0**

**LA-UR-12-10333**

---

---

February  
2012

LA-UR-12-10333

## **Closure Plan**

# **Technical Area 14 Open Burning and Open Detonation Units (TA-14-23), Revision 1.0**

Prepared by:

*Los Alamos National Laboratory*

*ENV-RCRA Group*

*Los Alamos, New Mexico 87545*

---

---

## Table of Contents

List of Tables .....	iv
List of Figures .....	iv
List of Abbreviations and Acronyms .....	v
1.0 INTRODUCTION .....	1
2.0 DESCRIPTION OF UNITS TO BE CLOSED.....	1
2.1 Description of the Treatment Units .....	1
2.2 Description of the Wastes Treated at the Units .....	2
2.3 Description of Treatments Conducted at the Units.....	3
3.0 ESTIMATE OF MAXIMUM WASTE TREATED .....	4
4.0 GENERAL CLOSURE INFORMATION.....	4
4.1 Closure Performance Standard .....	4
4.2 Closure Schedule .....	5
5.0 CLOSURE PROCEDURES .....	6
5.1 Records Review and Structural Assessment.....	6
5.1.1 Records Review.....	6
5.1.2 Structural Assessment .....	7
5.2 Decontamination and Removal of Structures and Related Equipment.....	7
5.2.1 Equipment Used During Decontamination Activities .....	7
6.0 SAMPLING AND ANALYSIS PLAN .....	7
6.1 Sampling Activities .....	8
6.2 Sample Collection Procedures.....	9
6.2.1 Surface Water and Groundwater Sampling .....	9
6.2.2 Soil Sampling .....	10
6.2.3 Cleaning of Sampling Equipment .....	10
6.3 Sample Management Procedures.....	10
6.3.1 Sample Documentation .....	10
6.3.1.1 Chain-of-Custody.....	10
6.3.1.2 Sample Labels and Custody Seals.....	11
6.3.1.3 Sample Logbook .....	11
6.3.2 Sample Handling, Preservation, and Storage .....	12
6.3.3 Packaging and Transportation of Samples .....	12
6.4 Sample Analysis Requirements.....	12
6.4.1 Analytical Laboratory Requirements .....	12
6.4.2 Quality Assurance/Quality Control .....	13
6.4.2.1 Field Quality Control .....	13
6.4.2.2 Analytical Laboratory Quality Control Samples.....	13
6.4.3 Data Reduction, Verification, Validation, and Reporting .....	13
6.4.4 Data Reporting Requirements .....	13

7.0 WASTE MANAGEMENT ..... 13  
8.0 CLOSURE CERTIFICATION REPORT ..... 14  
9.0 REFERENCES ..... 15

### **List of Tables**

Table 1.	Schedule for Closure of the TA-14-23 OB/OD Units
Table 2.	Hazardous Waste Constituents of Concern at the TA-14-23 OB/OD Units
Table 3.	Potential Waste Materials, Waste Types, and Disposal Options
Table 4.	Summary of Analytical Methods
Table 5.	Sample Containers, Preservation Techniques, and Holding Times
Table 6.	Quality Control Sample Types, Applicable Analyses, Frequency, and Acceptance Criteria

### **List of Figures**

Figure 1.	Location of Technical Area 14 at Los Alamos National Laboratory
Figure 2.	Location and Layout of the TA-14-23 Open Burn and Open Detonation Units
Figure 3.	Sampling Locations for Closure of the TA-14-23 Open Burn and Open Detonation Units



## List of Acronyms and Abbreviations

40 CFR	Title 40, U.S. Code of Federal Regulations
BMPs	Best Management Practices
CWA	Clean Water Act
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FFCA/AO	Federal Facility Compliance Agreement
HE	High Explosives
IFGMP	Interim Facility-Wide Groundwater Monitoring Plan
IP	Individual Permit
LANL	Los Alamos National Laboratory
MSGP	Multi-Sector General Permit
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
OB	open burn
OD	open detonation
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SW-846	<i>Test Methods for Evaluating Solid Waste, Physical/Chemical Methods</i> , EPA-SW-846, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.
TA	Technical Area
TALs	Target Action Levels

## CLOSURE PLAN

### TECHNICAL AREA 14 OPEN BURNING AND OPEN DETONATION UNITS

#### 1.0 INTRODUCTION

This closure plan describes the activities necessary to close the interim status hazardous waste open burning (OB) and open detonation (OD) thermal treatment units at Technical Area 14 (TA-14) at the Los Alamos National Laboratory (the Facility), hereinafter referred to as the TA-14-23 OB/OD Units. The information provided in this closure plan addresses the closure requirements specified in the Code of Federal Regulations (CFR), Title 40, Part 265, Subparts G and P for hazardous waste thermal treatment units at LANL under the Resource Conservation and Recovery Act (RCRA) and the New Mexico Hazardous Waste Act. Closure of the OB/OD units will be completed in accordance with Section 4.1 of this closure plan.

TA-14 was established in 1944 to study small-explosive charges, and since that time has been actively used for the development and testing of explosives (LANL, 1994). The TA-14-23 OB/OD Units are collocated within or near other solid waste management units (SWMUs) not yet scheduled for closure; therefore, if closure performance standards listed in Section 4.1 cannot be attained the TA-14-23 OB/OD Units will undergo RCRA clean closure activities in conjunction with the corrective action processes at TA-14. Final closure of the TA-14-23 OB/OD Units will be in accordance with the requirements set forth in 40 CFR Part 265, Subparts G and P.

#### 2.0 DESCRIPTION OF UNITS TO BE CLOSED

This section provides an overview of past operations and waste management practices at the TA-14-23 OB/OD Units. It includes the location of the units, a description of the units, and past operational and waste management practices associated with the units.

##### 2.1 Description of the Treatment Units

The TA-14-23 OB/OD Units are located in the western portion of LANL on the southern edge of Three-Mile Mesa (see Figure 1). Mesa-top elevations at TA-14 range from approximately 7,350 to 7,450 feet above mean sea level. TA-14 was established in 1944 as a small-explosive charges testing area, and since that time has been actively used for the development and testing of explosives (LANL, 1994). Structures located at the site but not included as part of the OB/OD Units are explosives magazines, a Control Building (Building TA-14-23) and equipment boxes.

The TA-14-23 OB/OD Units are located approximately 180 feet south of Building TA-14-23; this area is referred to as Q-Site East. The location and layout of these units are shown on Figure 2. OB operations were conducted in a burn cage located adjacent to Firing Mound 3. The OD treatment area is located on Firing Mound 3 and was used to treat (i.e., open detonate) hazardous explosive waste. Non-treatment-related, experimental test detonations were also performed at TA-14, Q-Site East and will continue to occur at the site.

The burn cage, which measures approximately 3 feet high and 2 feet in diameter, is constructed of 1/4-inch-thick steel and sits in a steel tray with three-inch raised edges. The steel tray measures 4 feet long and 2.5 feet wide, and rests on a 2 foot by 2 foot concrete pad (thickness unknown). The burn cage, which is not lined, has a wire mesh and steel door measuring 2 feet 10 inches high and 1 foot 7 inches wide. The door is attached to the front of the unit and closes with a latch. A steel mesh screen is located inside the unit 1 foot above the containment tray. Explosives-contaminated wastes to be burned are placed on this screen. A wire mesh screen also covers the top of the OB unit. A photograph of the OB unit is provided under the TA-14 tab of the most recent *Los Alamos National Laboratory General Part A Permit Application* (LANL, 2009). OB operations are monitored from Building TA-14-23.

The OD area, referred to as Firing Mound 3, is a gently sloping, sand-covered area measuring approximately 40 feet by 75 feet. There are no trenches or pits associated with the OD unit. The topography and areal extent of the OD unit are shown on the topographic map of TA-14 within the most recent *Los Alamos National Laboratory General Part A Permit Application* (LANL, 2009). Following waste placement at Firing Mound 3, detonation operations were conducted from Building TA-14-23.

The TA-14-23 OB/OD Units are located approximately 100-200 feet from the closest arroyo. Run on is diverted around the site to the west by a road and swale. A rock lined earthen berm located down slope of the burn cage creates a run-off attenuation area. The overflow from this detention structure and slope southeast of the burn cage is covered with riprap. There is a rock check dam in the drainage channel located southeast of Mound 3 and west of the dirt access road. There are also several groups of rock check dams within a channel east of Mound 5. These structures reduce run-off velocity and allow sediment to settle out of the surface water run-off. During precipitation events, water tends to flow eastward from the site into a tributary of Cañon de Valle. Additionally, best management practices (BMPs) installed to reduce run-off from the site were improved and upgraded in 2010. These BMPs included improved contouring of the road and drainage area east of the firing area and upgraded rock check dams.

## 2.2 Description of the Wastes Treated at the Units

The waste streams treated at the TA-14-23 OB/OD Units by OD included small quantities of excess explosives. The established RCRA interim status limit for TA-14 is 20 pounds of waste per detonation, so only small quantities of high explosives (HE) could have been treated at the unit. Excess explosives included small bulk pieces, initiating devices (detonators/squibs), small quantities of powders, developmental energetic materials, and, potentially, excess propellants from gas guns.

The waste streams treated at the TA-14-23 OB/OD Units by OB included HE contaminated materials generated at TA-14 and TA-09. It is possible that some materials from TA-22 and TA-40 were also treated at the TA-14-23 OB/OD Units. The burn cage was used for the treatment of HE contaminated combustibles. HE contaminated materials in the waste stream included cellulose (kimwipes, paper towels, swabs, sheets of paper, etc.); plastics (weigh boats, gloves, plastic bags, anti-static bags, vials w/ stoppers, etc.); ceramics (crucibles); glassware (flasks, beakers, test tubes, small columns, vials w/ stoppers); and metals (wire, thin plates, small targets). The largest fraction of waste treated by OB was cellulose contaminated with HE.

Firing site debris consisted of wood scraps, cardboard, burlap, Plexiglas®/Lexan®, plastic, glass, styrofoam, electrical cables, and metallic foils used for pin switches or metals such as target plates. These wastes would not routinely contain detonable quantities of explosives, although they may have contained trace quantities of non-hazardous residual HE. Occasionally firing site debris containing reactive explosives may have been generated. If explosive debris was not rendered safe immediately through detonation, the debris was stored in the satellite accumulation area within Building TA-14-23 and was treated as soon as possible.

The wastes treated were both homogeneous (e.g., solid explosives, scrap explosives) and heterogeneous (e.g., explosives-contaminated paper, rags, wood). These wastes were assigned the following U.S. Environmental Protection Agency (EPA) Hazardous Waste Numbers: D001 for ignitability; D003 for reactivity; D005 (for the barium in the explosives); D006, D007, D008, D009, D011, D018, D022, D028, D029, D030, D035, D036, D038, D040, F001, F002, F003, F004, and F005. Historically, there have been no significant changes in waste compositions. The wastes were treated primarily to remove the characteristic of reactivity although, other characteristic (e.g., ignitability, toxicity for barium) and listed wastes (solvents on the explosives-contaminated rags and wipes) hazardous waste codes may have been applied to the wastes.

### **2.3 Description of Treatments Conducted at the Units**

Waste containers for explosives-contaminated waste and explosive material generally consisted of paper-lined cardboard boxes, wooden boxes, or small metal boxes. Most wastes contaminated with explosives and actual pieces of explosives were not packaged together. Explosives-contaminated wastes were placed within a paper-lined cardboard box with a lid. When a cardboard box was filled, it was closed, sealed with tape, and marked "HE Hazardous Waste." These waste containers were then stored in an accumulation area at the point of generation.

Wastes to be treated at the TA-14-23 OB/OD Units were collected from various accumulation areas at TA09 and TA14 and possibly TA22 and TA40. When loading waste, the cargo compartment of the transport vehicle was checked to ensure that it was clean and contained no loose items such as tools or pieces of metal. For transport, the wastes were placed in an enclosed compartment or secured with tie-downs. Wastes were transported by appropriately trained personnel in designated vehicles to the TA-14-23 OB/OD Units on the day of scheduled treatment. Only the amount of waste that could be treated in one day was transported to the units. A maximum of 50 pounds of explosives-contaminated materials may have been burned per treatment event at the OB unit. A maximum of 20 pounds of waste explosives may have been detonated per treatment event at the OD unit.

The waste was unloaded from the vehicle and placed at the OB or OD location by qualified technicians/specialists. Depending on preparation activities, the time during which waste remained at the units typically ranged from several minutes to a few hours. A visual examination was conducted after unloading to ensure that no explosive material remained in the transport vehicle. OB of explosives-contaminated waste consisted of placing the waste in the burn cage, coating the waste with volatile hydrocarbons (e.g., acetone, fuel oil, or hexane) and igniting the waste. OD of waste was accomplished by using a predetermined amount of explosive as fuel to initiate the detonation of the waste explosive. The detonation may have created temperatures up to 3,000 degrees Fahrenheit (1,649 degrees Celsius). Initiation for all waste treatment operations was performed remotely by qualified personnel from inside Building TA-14-23. Thermal treatment

operations were conducted in accordance with the most recent, approved versions of LANL operating procedures in effect at that time.

Procedures did not require wetting of the OB Unit before and after each operation. Measures taken to minimize releases of hazardous waste from the OB Unit to environmental media included using sufficient fuel to aid in ignition and enhance waste destruction, covering the top of the burn cage with wire mesh to minimize the release of burning material, not conducting operations during adverse weather conditions (e.g., high winds), and using secondary containment beneath the OB unit to contain residue, ash and possibly incompletely treated material.

Ash resulting from OB operations was removed from the secondary containment tray within approximately 24 hours after each burn; it was not allowed to accumulate at the OB Unit. The ash was placed in a 55-gallon drum and stored in a satellite accumulation area near Building TA-14-23. The OB Unit was covered with a tarp after the ash was removed and remained in place when the unit was not in use. Procedures for OD required a thorough survey of the area after detonation, collection of identifiable pieces of material not consumed by the detonation, and subsequent detonation of these materials. The Firing Site Leader determined when it was safe to re-enter the detonation site after treatment events.

Pieces of damaged explosives resulting from misfires, sensitivity experiments, incomplete detonations, or exposure to severe testing were packaged separately from excess explosives or were rendered safe immediately. The waste explosives were managed and stored appropriately.

### **3.0 ESTIMATE OF MAXIMUM WASTE TREATED**

Since RCRA Subtitle C regulations became effective in November 1980, an average of 125 pounds of waste has been treated annually at the OB Unit, and an average of 60 pounds of waste has been treated annually at the OD Unit. Based on these estimates, approximately 3,750 pounds of waste has been treated at the OB Unit through 2010. Approximately 1,800 pounds of waste has been treated at the OD Unit through 2010.

## **4.0 GENERAL CLOSURE INFORMATION**

### **4.1 Closure Performance Standard**

TA-14-23 OB/OD Units will be closed to meet the following performance standards (40 CFR § 265.111):

- minimize the need for further maintenance;
- 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 run-off, or hazardous waste decomposition products to the ground or surface waters, or to the atmosphere; and
- comply with the closure requirements of 40 CFR Part 265 Subparts G and P.

This will be accomplished through one of two methods:

- Ensure that contaminated media do not contain concentrations of hazardous constituents that are greater than the clean-up levels established in the New Mexico Environment Department's (NMED's) *Technical Background Document for Development of Soil Screening Levels* (as updated) (NMED, 2009), and in LANL's *Screening Level*

*Ecological Risk Assessment Methods* (LANL, 2010a) (as updated and approved by the NMED). For soils, the cleanup levels shall be established based on residential use. The owner/operator must also demonstrate that there is not potential to contaminate groundwater; or

- conduct a human health and ecological risk evaluation utilizing the screening levels described above.

If LANL is unable to achieve any one of the risk-based clean closure standards above, LANL will:

- coordinate cleanup closure activities for the TA-14-23 OB/OD Unit with the corrective action cleanup processes at TA-14;
- control the migration of hazardous waste residues, hazardous constituents, and, as applicable, contaminated media such that they do not pose an unacceptable risk to human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off or hazardous waste decomposition products to the ground, groundwater, surface waters, or to the atmosphere; and
- comply with closure requirements in 40 CFR 265.113(b)(1)(ii)(C) and (2); and

LANL shall demonstrate that the unit does not pose an unacceptable risk by complying with the post closure requirements in 40 CFR 265.117 as well as conduct the following to protect human health and the environment:

- Maintain the integrity and effectiveness of the unit by making repairs necessary to correct the effects of erosion, animal intrusion, or other events that compromise the unit;
- maintain surface water controls to prevent run-on and run-off from eroding or otherwise cause damage;
- conduct corrective action as necessary to protect human health and the environment;
- maintain fencing, security signs and locks;
- maintain training, operating, inspection, and monitoring, and other required records; and
- submit an annual report to the NMED providing the results of the required inspections, sampling results, and a summary of any needed repairs and whether repairs were effective.

Closure of the TA-14-23 OB/OD Units will be deemed complete when: 1) the burn cage has been properly managed as waste; 2) closure has been completed in accordance with the closure plan and 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 NMED.

#### **4.2 Closure Schedule**

This closure plan schedule is intended to address the closure requirements for the TA-14-23 OB/OD Units. The following section provides the schedule of closure activities (see also Table 1 in this closure plan).

Closure activities will begin according to the requirements in 40 CFR § 265.112(d)(2). However, pursuant to 40 CFR § 265.112(e), removing hazardous wastes in accordance with an approved

closure plan may be conducted at any time before or after notification of closure. Upon approval of the modified closure plan, soil sampling and decontamination verification sampling activities will be conducted to demonstrate that the soils at the permitted unit meet the closure performance standards in Permit Section 9.2. Submittal of the final closure report and certification will be submitted to the NMED 240 days after initiating closure. In the event that closure of the permitted unit cannot proceed according to schedule, the Facility will notify the NMED in accordance with the extension request requirements in 40 CFR § 265.113.

## **5.0 CLOSURE PROCEDURES**

Closure activities at the units include: a physical review of the units and a review of the units' records; proper management and disposal of hazardous waste residues, if applicable; sampling to verify the closure performance standards in Section 4.1 of this closure plan have been achieved; and submittal of a final closure certification report. The following sections describe more specifically these closure activities applicable to the TA-14-23 OB/OD Units.

### **5.1 Records Review and Structural Assessment**

Prior to commencing closure decontamination and sampling activities, the TA-14-23 OB/OD Units' Operating and Inspection Records were reviewed in November 2011 and a structural assessment was conducted on September 12, 2011 to determine if there were any previous finding(s) or action(s) that may influence closure activities or potential sampling locations. Results from the records review and structural assessment are generally mentioned within the following sections and will be discussed in further detail in the closure certification report.

#### **5.1.1 Records Review**

The TA-14-23 OB/OD Units' Operating Record (including, but not limited to, inspection and contingency plan implementation records) has been reviewed with the purpose of determining the following:

1. Confirmation of the specific hazardous waste constituents of concern listed in Table 2;
2. updating the estimated quantity of waste treated in Section 3.0; and
3. identification of additional sampling locations (*e.g.*, locations of spills or chronic conditions) identified in the TA-14-23 OB/OD Units' Operating and Inspection Records.

Based on a thorough review of available records, a determination has been made that there have been no records of any spills or releases, defects, deterioration, damage, or hazards affecting waste containment or treatment during the operational life of the TA-14-23 OB/OD Units.

During the records review process, documentation was discovered that included years from 1988 to the last documented treatment activity in 2003. While quantities were included in the documentation, treatment by either OB or OD was not specified. These records indicate that the quantity of waste treatment was significantly lower than the originally estimated quantity. The original estimated quantity was based on the capacity of the OB/OD units, while the recorded quantity, based on the records found, was approximately 2,536 pounds.

### **5.1.2 Structural Assessment**

The structural assessment was conducted prior to commencing closure activities and was an evaluation of the units' physical condition. The assessment included an inspection of the units for any conditions that indicated a potential for release of hazardous constituents (e.g., deterioration) and any evidence of a release (e.g., stains). Results from the assessment are summarized briefly within this section and will be discussed further in the closure certification report.

During the structural assessment process (September 12, 2011), a visual inspection of the OB/OD units was conducted and a determination was made that there was no release of hazardous wastes or hazardous waste constituents related to the treatment operations at the OB/OD units. Additionally, it was determined that the structures within the area are not included within the boundary of the unit.

### **5.2 Decontamination and Removal of Structures and Related Equipment**

In accordance with 40 CFR § 265.112(b)(4), the units' related equipment will be decontaminated, or removed, or both and managed according to Section 7.0 of this closure plan. All related equipment removed from the site will be considered solid and potentially hazardous waste when removed, and will be disposed of in accordance with Section 7.0. Decontamination activities will ensure the removal of all hazardous waste residues and hazardous waste constituents from the units to meet the closure performance standards in Section 4.1. The burn cage, tray and concrete pad will be removed from the OB unit at closure. Building TA-14-23 will not be removed as part of closure of the TA-14-23 OB/OD Units. The potential removal of this building will be assessed as part of the closure of TA-14 at the time of corrective action activities.

#### **5.2.1 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 or will not be decontaminated will be containerized and managed as waste in accordance with Section 7.0.

## **6.0 SAMPLING AND ANALYSIS PLAN**

This sampling and analysis plan (SAP) identifies the specific sampling and analysis requirements for the TA-14-23 OB/OD Units and describes the sampling, analysis, and quality assurance/quality control (QA/QC) methods that will be used to demonstrate that LANL has met the closure performance standards in Section 4.1 of this closure plan. LANL will comply with all the requirements in Section 6.0 as well as the requirements in Part 11.10.5 and Part 9.4.7.1 of the Permit.

This 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 includes:



1. The hazardous waste constituents of concern listed in Table 2 will be included in the analysis for soil samples. This list includes all hazardous constituents defined as:
  - a. any constituent identified in 40 CFR Part 261 Appendix VII that caused the EPA to list a hazardous waste in 40 CFR Part 261 Subpart D;
  - b. any constituent identified in 40 CFR Part 261, Appendix VIII; or
  - c. any constituent identified in 40 CFR Part 264 Appendix IX, perchlorate, and nitrates.
2. The list of hazardous constituents of concern will be utilized to select the analytical methods capable of detecting those constituents.
3. A site plan for soil samples. The site plan includes:
  - a. Figure 3 depicting the boundaries of the units and soil sampling locations. The locations include:
  - b. Systematic composite soil sampling with no less than approximately 30 subsamples collected from each decision unit at each location identified in Figure 3;
  - c. Three grab soil samples collected at each location identified in Figure 3;
  - d. locations of known spills or other releases of hazardous waste or hazardous constituents during operation of the units;
  - e. other potential release locations; and
  - f. a rationale for the number and locations of samples.
4. The type of samples to be collected (*e.g.*, soil) and the rationale for the selection of the sample type.
5. Sampling methods including a description of the EPA-approved sampling methods and procedures that will be used to collect each type of sample as specified in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846) (EPA, 1986).
6. A description of the approved EPA SW-846 laboratory analytical methods that will be used to measure hazardous constituent concentrations (see Table 4).
7. This SAP includes a description of the QA/QC procedures that include, but are not limited to:
  - a. duplicates, trip blanks, equipment blanks;
  - b. a description of methods for decontamination of re-usable sampling equipment; and
  - c. a description of all sample preservation, handling, labeling, and chain-of-custody procedures.

## 6.1 Sampling Activities

Sampling activities will be conducted to demonstrate that the soils in and around the units meet the closure performance standards in Section 4.1. 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. Soil sample locations are shown in Figure 3. These locations include, but are not limited to, soils surrounding the units; soils in the vicinity of the units; and soils at the storm water discharge point.

- Systematic composite samples will be collected from soils within and near the unit to include topographic lows or drainages.
  - Additional discrete soil samples will also be collected from locations where contamination is detected by composite sampling.

- Discrete soil samples will be collected for volatile organic compounds (VOCs) analysis.
- One grab sample will be collected from soils near the burn pan
- Two additional grab samples will be collected from soils located southeast of the OD Unit.

## 6.2 Sample Collection Procedures

Samples will be collected in accordance with the procedures identified in this SAP which incorporates guidance from the EPA (EPA, 2002), DOE (DOE, 1995), and other NMED-approved procedures.

### 6.2.1 Surface Water and Groundwater Sampling

Surface water sampling is not included as part of the TA-14-23 closure activities because surface water compliance is demonstrated as part of compliance with the Clean Water Act (CWA) and the National Pollutant Discharge Elimination System (NPDES) permit program. The TA-14-23 OB/OD unit was subject to the 2008 CWA Multi-Sector General Permit (MSGP) for storm water until the modified LANL Storm water Individual Permit (IP) became effective on November 1, 2010. Section 1.6.1 of the 2008 MSGP notes, that there may be situations in which EPA may require a discharger to apply for and/or obtain authorization to discharge under either an IP or alternative NPDES general permit. EPA required the Department of Energy (DOE) to apply for an individual NPDES permit for LANL by December 31, 2004, pursuant to the Federal Facility Compliance Agreement - Administrative Order Docket No. CWA-06-205-1701 (FFCA/AO) entered into between the EPA and the Department of Energy (DOE) in February 2005 (EPA, 2005). Further, Section 1.6.1 of the 2008 MSGP explains that for existing dischargers authorized to discharge under the MSGP, EPA's "notice will set a deadline to file the permit application, and will include a statement that on the effective date of the individual NPDES permit, or the alternative general permit as it applies to you, coverage under this general permit will terminate."

LANL's IP contains non-numeric technology-based effluent limitations, coupled with a comprehensive, coordinated monitoring program and corrective action where necessary, to minimize pollutants in LANL's storm water discharges. LANL is also required to implement site-specific control measures (including BMPs) to address the non-numeric technology-based effluent limits contained in the IP, followed by confirmation monitoring against New Mexico water-quality criteria-equivalent target action levels (TALs) to determine the effectiveness of the site-specific measures. If TALs are exceeded, corrective actions detailed in the IP are initiated and additional confirmation monitoring is conducted following completion of corrective actions. Monitoring for the IP will start in 2011 after installation and certification of baseline and certification of baseline control measures.

Groundwater in the vicinity of TA-14-23 is monitored as part of the LANL Interim Facility-Wide Groundwater Monitoring Plan (IFGMP). Under the 2010 IFGMP (LANL 2010b), surface water is monitored down gradient of TA-14-23 below the confluence of Canon de Valle and Water Canyon at the Water at Beta station. Perched intermediate groundwater is monitored at wells R-47i and CdV-37-1(i). Regional groundwater is monitored down gradient of TA-14-23 at wells CdV-R-15-3 (monitored at three separate depth intervals), R-19 (monitored at five separate

depth intervals), R-17 (monitored at two separate depth intervals), and R-27 (monitored at one depth interval).

### **6.2.2 Soil Sampling**

Systematic composite soil samples will be collected to demonstrate that soils within and in the vicinity of the TA-14-23 OB/OD treatment units meet the closure performance standards. Six decision units will be established in the area and will consist of areas no greater than 3,600 ft<sup>2</sup> (see Figure 3). Approximately 30 sub-samples will be collected using a stratified random sampling design. Samples will be collected from 0-6 inch depths (soil/tuff interface), from the proposed decision units shown in Figure 3. This process will result in one sample from each decision unit, resulting in a total of six composite samples (EPA, 2002). Systematic composite sampling is not applicable to VOCs; therefore two discrete soil samples (0-6 inch depths) will be collected from each decision unit, from random locations, for VOC analysis. Soil samples will be analyzed to determine if hazardous constituents are present in soils at, or in the vicinity of, the units and to determine if there is an immediate threat to the environment. Three additional grab samples will be collected, one near the burn cage and two from locations southeast of the OB/OD treatment units. Grab soil samples will be collected from 0-6 inch depths (soil/tuff interface), from the proposed locations shown in Figure 3.

Soil samples will be collected using a spade, scoop, auger, trowel or other tool as specified in approved methods for the type of analytes to be sampled (EPA, 1986 or EPA, 2002). 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 5.

### **6.2.3 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 will be scraped, as necessary, to remove residue, cleaned prior to each use with a wash solution, rinsed several times with tap water, and air-dried to prevent cross-contamination of samples. Sampling equipment rinsate blanks will be collected and analyzed only if reusable sampling equipment is used.

## **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:

1. in a person's physical possession;
2. in view of the person in possession; or
3. 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 LANL 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 unique sample identification number;
- name of the sample collector;
- date and time of collection;
- type of preservatives used, if any; and
- 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 will 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 will be recorded in a bound logbook. Information will be recorded in ink and any cross outs will be made with a single line and the change initialed and dated by the author. The sample logbook will include the following information:

- the sample location;
- suspected composition;
- sample identification number;
- volume/mass of sample taken;
- purpose of sampling;
- description of sample point and sampling methodology;
- date and time of collection;
- name of the sample collector;
- sample destination and how it will be transported;
- observations; and

- 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 5 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 maintained at required temperatures 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 requirements, and relevant local, state, and federal laws (including 10 CFR and 49 CFR). Appropriate LANL 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 LANL 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 hazardous constituents listed in Table 2. These constituents have been determined to be applicable constituents listed in Appendix VIII of 40 CFR Part 261 and in Appendix IX of 40 CFR Part 264 that were managed or treated at the units over their operational history. This determination has been made through the records review and structural assessment discussed in Section 5.1. Samples will be analyzed by an independent laboratory using the methods outlined in Table 4. Analytes, test methods and instrumentation, target detection limits, and rationale for metals and organic analyses are presented in Table 4.

### **6.4.1 Analytical Laboratory Requirements**

The analytical laboratory will perform the detailed qualitative and quantitative chemical analyses specified in Section 6.4.2. This analytical laboratory will have:

- a documented comprehensive QA/QC program;
- technical analytical expertise;
- a document control/records management plan; and
- the capability to perform data reduction, validation, and reporting.

The selection of the analytical testing methods identified in Table 4 is based on the following considerations:

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

- information requirements (e.g., waste classification).

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

All sampling and analysis will be conducted in accordance with QA/QC procedures defined by the latest revision of SW-846 (EPA, 1986) or other NMED-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 may be collected include trip blanks, field blanks, field duplicates, and equipment rinsate blanks. Table 6 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 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 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 summary of analytical results for each sample;
- results from QC samples such as blanks, spikes, and calibrations;
- reference to standard methods or a detailed description of analytical procedures; and
- 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**

By removing any hazardous waste or hazardous waste constituents during closure, LANL may become a generator of hazardous waste. LANL will control, handle, characterize, and dispose of all wastes generated during closure activities in accordance with this Section (7.0), LANL waste

management procedures, and in compliance with applicable state, federal, and local requirements (*see* 40 CFR § 265.114). These wastes include, but are not limited to:

1. demolition debris;
2. concrete;
3. containerized waste;
4. decontamination wash water;
5. decontamination waste; and
6. soil.

The different types of wastes generated at closure, including the units' decontaminated structures and related equipment, and their disposition options are listed in Table 3 of this closure plan.

## 8.0 CLOSURE CERTIFICATION REPORT

Upon completion of the closure activities at the units, LANL will submit, by registered mail, a closure certification report for NMED review and approval. The closure certification report will document that the units have been closed in compliance with the specifications in this closure plan. The report will summarize all activities conducted during closure including, but not limited to:

- the results of the records review and structural assessment;
- the results of all investigations;
- remediation waste management;
- decontamination;
- decontamination verification and soil sampling activities; and
- results of all chemical analyses and other characterization activities.

LANL will submit the closure certification report to the NMED no later than 60 days after completion of closure of the units. NMED may require interim reports that document the progress of closure. The certification will be signed by LANL and by an independent professional engineer registered in the State of New Mexico (*see* 40 CFR § 265.115).

The report will document the units' closure and contain, at a minimum, the following information:

1. a copy of the certification pursuant to 40 CFR § 265.115;
2. any variance, and the reason for the variance, from the activities approved in this closure plan;
3. documentation of the records review and structural assessment conducted;
4. a summary of all sampling results, showing:
  - a. sample identification,
  - b. sampling location,
  - c. data reported,
  - d. detection limit for each analyte,
  - e. a measure of analytical precision (*e.g.*, uncertainty, range, variance),

- f. identification of analytical procedure,
- g. identification of analytical laboratory,
5. a QA/QC statement on analytical data validation and decontamination verification;
6. the location of the file of supporting documentation, including:
  - a. field logbooks,
  - b. laboratory sample analysis reports,
  - c. QA/QC documentation, and
  - d. chain-of-custody forms;
7. storage or disposal location of hazardous waste resulting from closure activities;
8. a copy of the Human Health and Ecological Risk Assessment Reports, if a site-specific risk assessment was conducted pursuant to Section 4.1, for the units; and
9. a certification statement of the accuracy of the closure certification report.

Documentation supporting the independent registered professional engineer's certification must be furnished to NMED before LANL is released from the closure financial assurance requirements in 40 CFR § 265.143. If LANL leaves waste in place, they will submit to NMED a survey plat as required by 40 CFR § 265.116 in conjunction with the closure certification report.

## 9.0 REFERENCES

- DOE, 1995. *DOE Methods for Evaluating Environmental and Waste Management Samples*, DOE/EM-0089T, Rev. 2, Pacific Northwest Laboratory, Richland, Washington.
- EPA, 2005. Federal Facility Compliance Agreement - Administrative Order Docket No. CWA-06-205-1701 (FFCA/AO) *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. (February 2005)*, U.S. Environmental Protection Agency, Office of Solid Waste, U.S. Government Printing Office, Washington, DC.
- EPA, 2002. *RCRA Waste Sampling Draft Technical Guidance Planning, Implementation, and Assessment*, EPA530-D-02-002, U.S. Environmental Protection Agency, Office of Solid Waste, U.S. Government Printing Office, Washington, DC.
- 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, DC.
- LANL, 2010a. *Ecorisk Database (Release 2.5)*, on CD, LA-UR-10-6898, Los Alamos National Laboratory, Los Alamos, New Mexico.
- LANL, 2010b. *2010 Interim Facility-Wide Groundwater Monitoring Plan*, Los Alamos National Laboratory document LA-UR-10-1777, Los Alamos, New Mexico.).
- LANL, 1994. *RFI Work Plan for Operable Unit 1085*, LA-UR-94-1033, Los Alamos National Laboratory, Los Alamos, New Mexico.



NMED, 2009. *Technical Background Document for Development of Soil Screening Levels* (Revision 5.0), New Mexico Environment Department Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program.

**Table 1**  
**Schedule for Closure of the TA-14-23 OB/OD Units**

Closure Activity	Schedule
Approval of the closure plan by the Department	Day 0
Remove all wastes including hazardous, mixed, and solid waste	No later than Day 90
Conduct records review	Already conducted
Conduct structural assessment	Already conducted
Submit a request to modify the Closure Plan and the records review and structural assessment report	Already conducted
Submit final closure certification report to the Department.	No later than Day 240

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

**Table 2**  
**Hazardous Waste Constituents of Concern at the TA-14-23 OB/OD Units<sup>a</sup>**

Category	EPA Hazardous Waste Numbers	Specific Constituents
high explosives and associated compounds	D001, D003	HMX, RDX, TNT, PETN, Tertyl and Other Nitrobenzenes and Nitrotoluenes
Toxic Metals	D005, D006, D007, D008, D009, D011	Barium, Cadmium, Chromium, Lead, Mercury, Silver
Semi-volatile Organic Compounds	D030, D036, F004, D038	2,4-Dinitrotoluene, Nitrobenzene, Pyridine
Volatile Organic Compounds	F001, F002, F003, F004, F005, D018, D022, D028, D029, D035; D040	Acetone, Ethanol, Benzene, MEK, Methylene Chloride, Toluene, MIBK, Xylene, Ethyl Acetate, Methanol, 1,2 dichloroethane , 1,1 dichloroethylene Trichloroethylene, chloroform
Other constituents of concern		Dioxans/Furans, Perchlorates

<sup>a</sup> Based on the units' operating record.

PETN = pentaerythrioltetranitrate (2,2-bis[(nitroxy)methyl]-1,3-propanediol dinitrate

HMX = cyclotetramethylenetetranitramine

RDX = cyclonite

MEK= methyl ethyl ketone

TNT = trinitrotoluene

MIBK = methyl isobutyl ketone

**Table 3**  
**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.
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Decontamination wash 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.
	Radioactive liquid waste	Radioactive Liquid Waste Treatment Facility (RLWTF)
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Metal	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.
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Discarded waste management 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.
	Mixed waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Soil and tuff	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.

Potential Waste Materials	Waste Types	Disposal Options
	Mixed 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
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
	Mixed 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.
	Mixed waste	Waste will 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 <sup>a</sup>	Test Methods/ Instrumentation	Target Detection Limit <sup>b</sup>	Rationale
<i>Metal Analysis</i>				
Barium	6010, 7010	ICP-AES,GFAA	200 ug/L	Determine the metal concentration in the samples.
Cadmium	6010, 7010	ICP-AES,GFAA	2 ug/L	
Chromium	6010, 7010	ICP-AES,GFAA	10 ug/L	
Lead	6010, 7010	ICP-AES,GFAA	5 ug/L	
Mercury	6010, 7010, 7471B	ICP-AES,GFAA, CVAA	0.2 ug/L	
Silver	6010, 7010	ICP-AES,GFAA	10 ug/L	
<i>Organic Analysis</i>				
Target compound list VOCs plus 10 TICs	8260B	GC/MS	10 mg/L	Determine the VOCs concentration in the samples.
Target compound list SVOCs plus 20 TICs	8270D, 8275	GC/MS	10 mg/L	Determine the SVOCs concentration in the samples.
<i>Other Analysis</i>				
Dioxans/Furans	8290	GC/MS	1.0 to 200 µg/L	Determine the dioxin/furan concentration in the samples
Perchlorates	6850	HPLC-ESI/MS or MS/MS	1 µg/L	Determine concentration of perchlorate in the samples.

<sup>a</sup> 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

GC/MS = gas chromatography/mass spectrometry

GFAA = Graphite furnace atomic absorption spectroscopy

ICP-AES = Inductively coupled plasma-atomic emission spectrometry

HPLC = high performance liquid chromatograph

ESI/MS = electrospray ionization/mass spectrometry

MS/MS = tandem mass spectrometry

SVOC = semi-volatile organic compound

TIC = tentatively identified compound

VOC = volatile organic compound

mg/L = milligrams per liter

ug/L = micrograms per liter.

**Table 5**  
**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: Barium, Cadmium, Chromium, Lead, 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)*, EPA, 1986, and all approved updates.

°C = degrees Celsius

L=Liter

mL = milliter

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

HCL-Hydrochloric Acid

TCLP = Toxicity Characteristic Leaching Procedure

**Table 6**

**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.

SVOC = semi-volatile organic compound  
 VOC = volatile organic compound

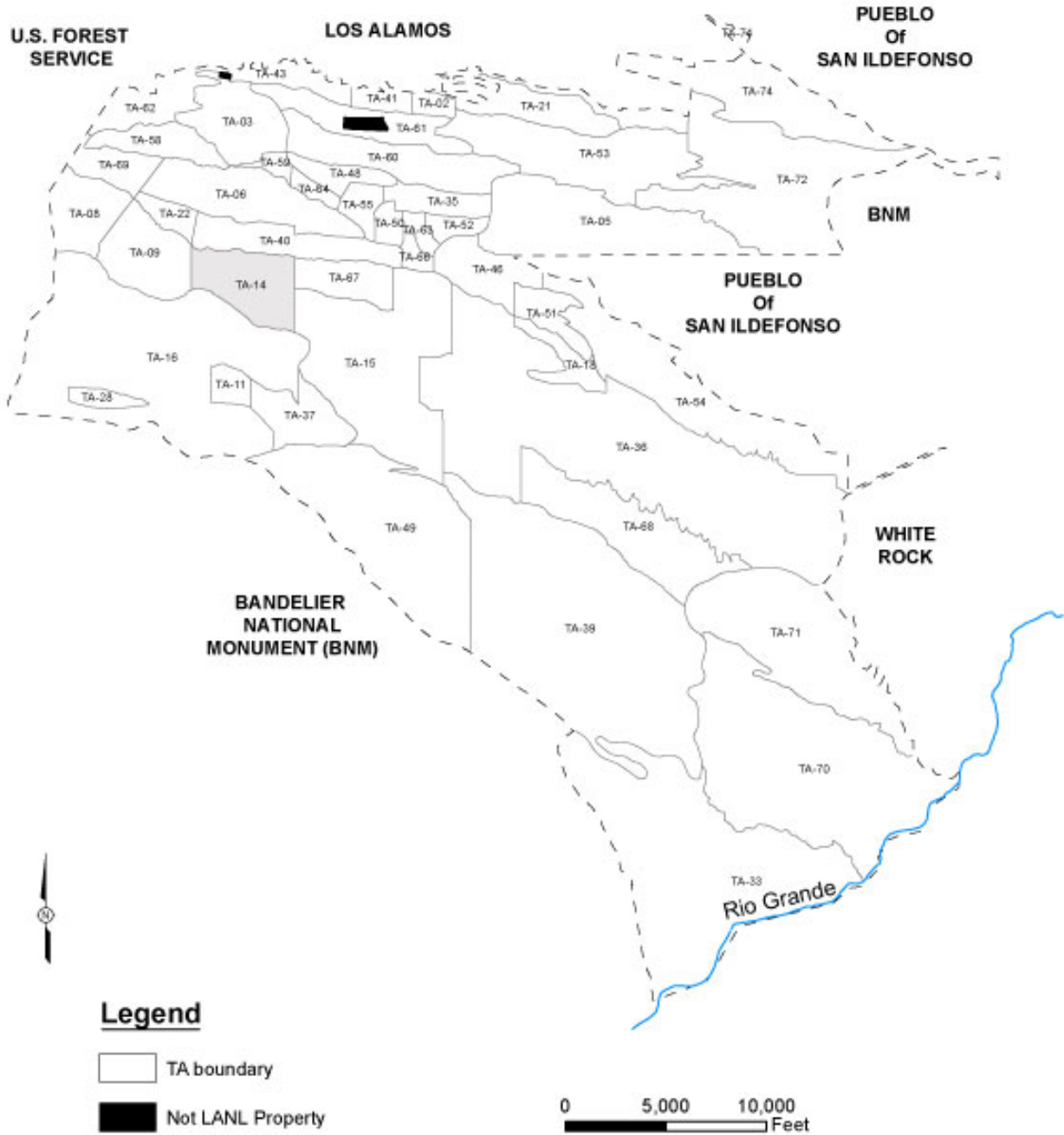


Figure 1

Location of Technical Area 14 at Los Alamos National Laboratory

Created by EPWES-EDA GIS TEAM, Map Number 96-0108 November 13, 2008  
 State Plane Coordinate System New Mexico Central Zone North American Datum 1983 (ft)  
 This map was created for work processes associated with the Environmental Remediation Support Services. All other uses for this map should be confirmed with LANL EPWES staff.  
 Boundary of Department of Energy Property is Around the Los Alamos National Laboratory, Los Alamos National Laboratory, SSMO Site Planning & Project Initiator, Infrastructure Planning Office, 04 June 2008  
 Boundary of Department of Energy Property is also Around the Los Alamos National Laboratory, Los Alamos National Laboratory, SSMO Site Planning & Project Initiator, 04 June 2009



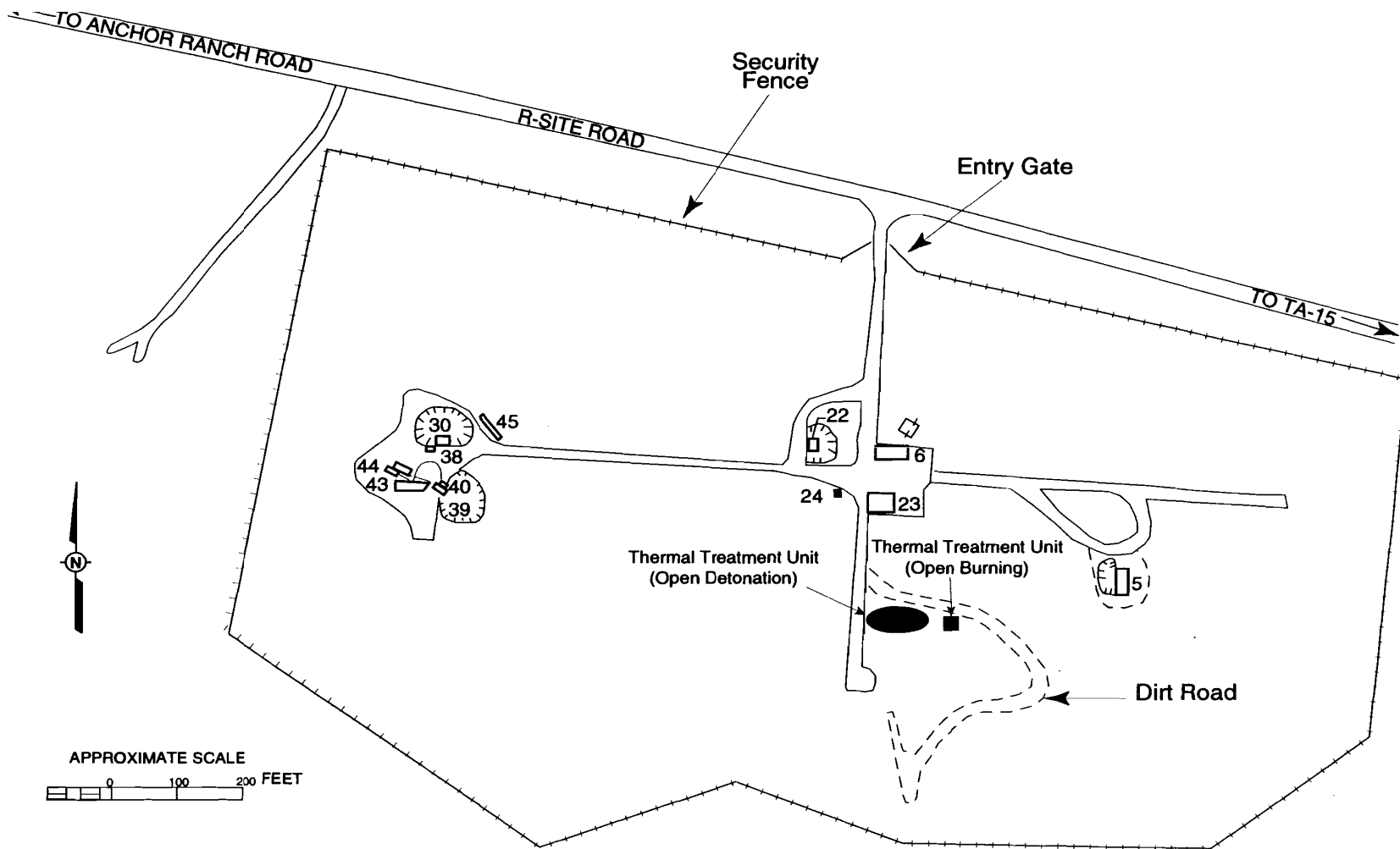


Figure 2. Location and Layout of the TA-14-23 Open Burn and Open Detonation Units

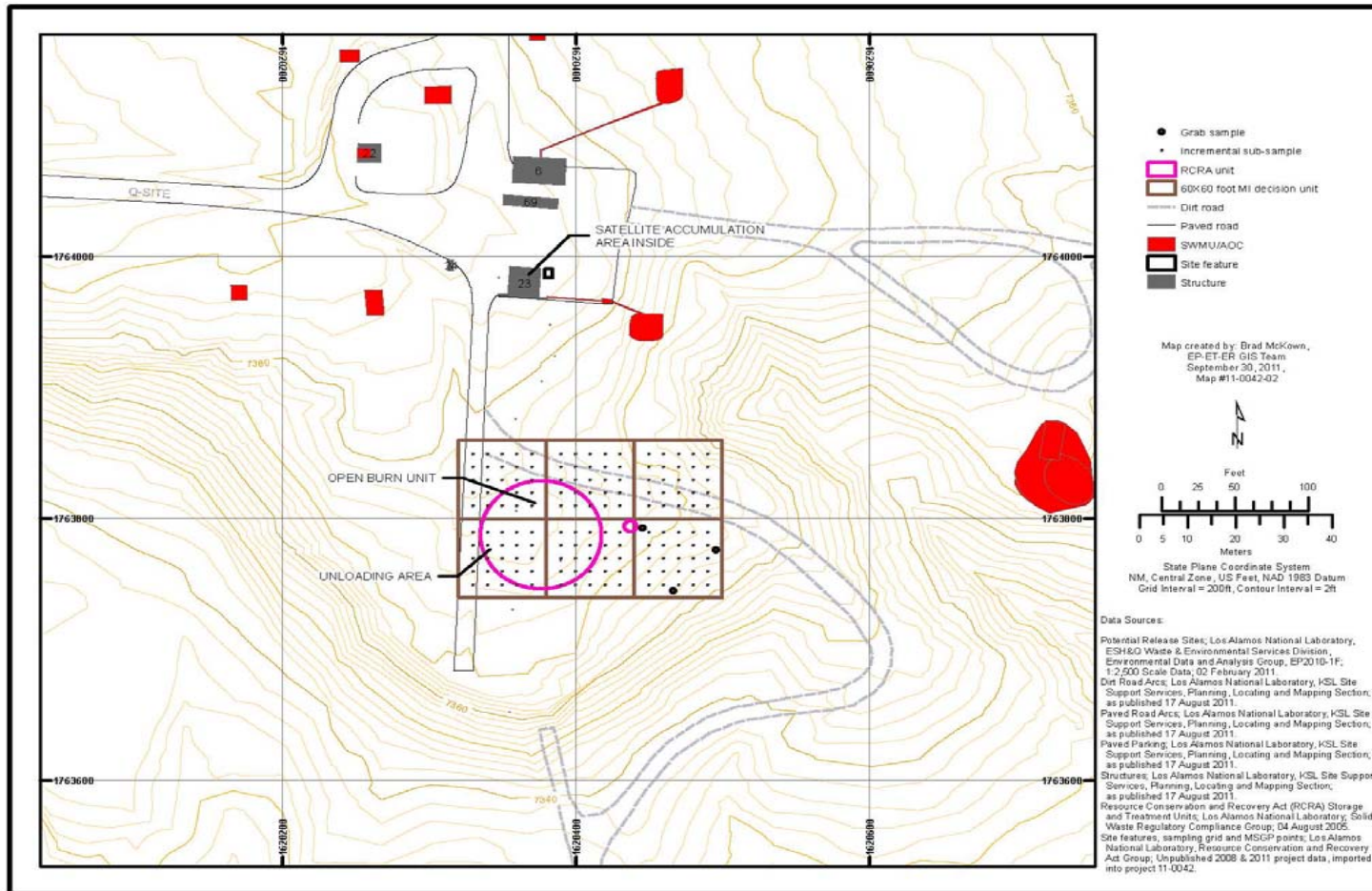


Figure 3. Sampling Locations for Closure of the TA-14-23 Open Burn and Open Detonation Units

**CERTIFICATION**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



2/20/12

**Alison M. Dorries**

**Date Signed**

Division Leader  
Environment Protection Division  
Los Alamos National Laboratory



3/01/12

**Gene E. Turner**

**Date Signed**

Environmental Permitting Manager  
Environmental Projects Office  
Los Alamos Site Office  
National Nuclear Security Administration