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DEPARTMENT OF ENERGY
National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, New Mexico 87544

JAN 10 2013

CERTIFIED MAIL- RETURN RECEIPT REQUESTED

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

Dear Mr. Kieling:

Subject: Request for Class 2 Permit Modification to the Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit for Technical Area 54, Building 38, West, EPA ID No. NM0890010515

The purpose of this letter is to request approval by the New Mexico Environment Department-Hazardous Waste Bureau (NMED-HWB) of a Class 2 Permit Modification to the Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit (Permit) issued to the U.S. Department of Energy (DOE) and Los Alamos National Security, LLC (LANS) in November 2010. DOE and LANS, collectively known as the Permittees, request to increase the storage capacity and storage footprint of the hazardous waste management units located at Technical Area 54, Building 38, West (TA-54-38 West or RANT facility). This permit modification request also includes corrections to clarify the inclusion of the loading dock within the TA-54-38 West Outdoor Pad rather than the TA-54-38 West Indoor Unit.

The enclosed permit modification request includes descriptions of the necessary changes to the Permit and explains why the changes are necessary to facilitate the transport of transuranic waste from LANL for off-site disposal at the Waste Isolation Pilot Plan (WIPP) in Carlsbad, New Mexico. TA-54-38 West serves as the packaging facility for transuranic waste that is stored at other permitted units at LANL and for preparation from transport to the WIPP. The 2011 *Framework Agreement: Realignment of Environmental Priorities,* established between the New Mexico Environment Department (NMED) and DOE set forth goals to safely process, repackage, and remove 3,706 cubic meters of the transuranic waste from permitted container storage units at TA-54 Area G by June 30, 2014. An important component to meeting the goals of that agreement is the need for increased shipping capability from the permitted units at TA-54-38 West. The increased storage capacity at both of the units and the increased footprint at the TA-54-38 West Indoor Unit are necessary for waste shipping goals to be met.

This permit modification request has been drafted in accordance with Title 40 of the Code of Federal Regulations (40 CFR) § 270.42(b)). The class 2 modifications to the Permit presented for approval fall under 40 CFR § 270.42, Appendix I, Items F.1.b. This item references a modification to the container storage unit that results in an increase in less than 25 percent of the storage capacity included within the Permit. The requested changes to the Permit increase the operating capacity at the TA-54-38 West Outdoor Pad and the TA-54-38 West Indoor Unit as well as increase the physical footprint of the TA-54-38 West Indoor Unit in order to

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accommodate shipments of larger containers. There are no changes to specific storage-related permit conditions or waste management practices associated with this request and there will be no changes made to the building.

The additional changes to Permit Attachment G.16 included with this permit modification request do not change any permit conditions or waste management practices. The Permittees are proposing to relocate language associated with the TA-54-38 West loading dock from the TA-54-38 West Indoor Unit closure plan to the TA-54-38 West Outdoor Pad closure plan. Changes associated with the loading dock are considered an administrative change under 40 CFR § 270.42, Appendix I, Item A.1 as they are merely clarifying the language associated with closure of the loading dock. The modifications to the closure plans have been included with this permit modification request in order to consolidate all the changes for the two permitted units at TA-54-38 West into a single request.

This permit modification request consists of three enclosures. Enclosure 1 (LA-UR-12-27049) includes the basis for the modification request, a description of the changes to be made to the Permit, pages from the Permit that illustrate the changes requested (including editing marks), and a signed certification page. Enclosure 2 (LA-UR-12-27049) includes a draft fact sheet that outlines the changes requested by the permit modification and information on where the permit modification request can be obtained and how the public can comment. Enclosure 3 (LA-UR-12-27035) is a report that discusses the applicability of the seismic standard in 40 CFR § 264.18(a) in accordance with 40 CFR §270.14(b)(11)(ii). This report is included because the NMED-HWB has requested this type of information for Permit changes similar to the footprint increase at TA-54-38 West Indoor Unit.

Provided herein are three hard copies of the permit modification request package as well as an electronic version. The fact sheet (Enclosure 2) will be sent to the NMED-HWB maintained LANL facility mailing list within seven days of transmittal of this request. The fact sheet contains the location and date of a scheduled public meeting; and a notice will be published in several local newspapers containing the same information. If you have comments or questions regarding this permit modification request, please contact Gene Turner of my staff at (505) 667-5794 or Mark Haagenstad, LANS, at (505) 665-2014.

Juan L. Griego
Acting Manager

Enclosure

cc w/enclosure:
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S. Miller, LTP-SSS, LANS, MS-J595
M. Saladen, ENV-RCRA, LANS, MS-K490
M. Haagenstad, ENV-RCRA, LANS, MS-K404
Records Center, LASO
Official Contract File, LASO

EPO-32GT-422- 488416

ENCLOSURE 1

Class 2 Permit Modification Request for

Technical Area 54, Building 38 (TA-54-38) West

Los Alamos National Laboratory Hazardous Waste Facility Permit

January 2013

LA-UR-12-27049

Date: JAN 10 2013

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Permit Modification Request Description Summary

This document is a request for a Class 2 permit modification to the Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit (Permit). It includes text modifications proposed by the Department of Energy (DOE) and Los Alamos National Security, LLC (LANS), collectively the Permittees. These modifications would not require any changes to the waste management practices at the permitted units; they do not add Environmental Protection Agency (EPA) waste numbers to those already permitted for storage at each of the units; and they propose no changes to the structure. The Permittees are proposing the following modifications to two units at Technical Area 54, Building 38 (TA-54-38) West.

- Increase the storage capacity of the TA-54-38 West Indoor Unit from 3,740 gallons to 4,950 gallons.
- Increase the storage capacity of the TA-54-38 West Outdoor Pad from 7,920 gallons to 42,570 gallons.
- Increase the footprint of the TA-54-38, West Indoor Unit to encompass the entire High Bay and Low Bay within Building 38.
- Rectify an inconsistency in the TA-54-38 West Outdoor Pad and the TA-54-38 West Indoor Unit closure plans to clarify that the loading dock is not part of the indoor unit.

The proposed modifications to the text of the Permit are shown using red underlined text for additions and red lines through the texts for deletions. Only the sections where changes are necessary have been provided within this submittal. Additionally, new figures are provided that illustrate the proposed changes to the two units.

Modification Description

The permitted units at TA-54-38 West are essential parts of the current LANL process for shipping transuranic (TRU) waste off-site for disposal. The final packaging and preparation activities for shipment to the Waste Isolation Pilot Plant (WIPP) take place at the TA-54-38 West Indoor Unit and the TA-54-38 West Outdoor Pad. In 2011, the *Framework Agreement: Realignment of Environmental Priorities* was established between the State of New Mexico Environment Department (NMED) and the DOE. The agreement makes a commitment to safely process, repackage, and remove 3,706 cubic meters of the TRU waste from permitted container storage units at TA-54 Area G by June 30, 2014.

To meet the goals set out within the agreement, increased shipping capability is required from TA-54-38 West (also known as RANT facility). The Permittees have taken specific measures such as safety basis modifications, procurement of additional equipment, and investment in remediation capability to provide and make more efficient the important capability of waste packing and preparation for transport that is housed at TA-54-38 West. However, the overall plan requires the need for an increase in the number and size of containers allowed to be stored at the RANT facility. As more waste undergoes WIPP waste characterization procedures, larger containers than originally anticipated are being processed through the two units. The number of shipments of larger containers will increase to meet framework agreement deadlines established between the NMED and the DOE. This permit modification will greatly reduce operational constraints by increasing container storage capacity within both of the units and removing the current space limitations of the unit boundaries within the TA-54-38 West Indoor Unit.

An increase in the storage capacity of both units will allow for the processing of multiple shipments of standard waste boxes as well as standard drum configurations to WIPP. The current capacity of the TA-54-38 West Indoor Unit is 3,740 gallons and the capacity of the TA-54-38 West Outdoor Pad is 7,920 gallons. The requested capacity increases to 4,950 gallons for the TA-54-38 West Indoor Unit and 42,570

gallons for the TA-54-38 West Outdoor Pad will allow for the storage of both standard waste boxes as well as standard sized drums and facilitate the greater throughput needed at the units.

Expansion of the footprint for the TA-54-38 West Indoor Unit is necessary to accommodate larger waste containers inside the building. No equipment changes or adjustments to the procedures need to be made for this change. Additionally, waste storage will not occur in entryways, in front of doors, or in any other location that would be considered a high-traffic area. The boundary of the TA-54-38 West Indoor Unit is increased to encompass the entire High Bay and Low Bay areas.

In addition to the class 2 modifications explained above, the Permittees are proposing correction to the closure plans for these units. Permit Attachment J, *Hazardous Waste Management Units*, includes the loading dock at TA-54-38 West as part of the TA-54-38 West Outdoor Pad. However, the closure plan for the TA-54-38 West Indoor Unit erroneously includes descriptions and sample locations for the loading dock that is part of the TA-54-38 West Outdoor Pad. Therefore, Permit Attachment G.16, *Technical Area 54 West, Building 38 Indoor Container Storage Unit Closure Plan* and Permit Attachment G.17, *Technical Area 54 West, Outdoor Container Storage Unit Closure Plan* are being corrected for consistency with Attachment J.

Basis

The capacity increase for the TA-54-38 West units and the expansion of the footprint at the TA-54-38 West Indoor Unit are classified as modifications to a container storage unit "[r]esulting in up to 25% increase in the facility's container storage capacity". The changes are therefore, a Class 2 modification pursuant to 40 CFR § 270.42, Appendix I, Item F.1.b. There is a clear distinction between references to an individual "unit" within a permit and references to "facility" throughout Appendix I of 40 CFR § 270.42. The term "facility" is defined in 40 CFR § 260.10 as:

> *All contiguous land, and structures, other appurtenance, and improvements on the land, used for treating, storing, or disposing of hazardous waste, or for managing hazardous secondary material prior to reclamation. A facility may consist of several treatment, storage, or disposal operational units (e.g., one or more landfills, surface impoundments, or combinations of them).*

It is clear that Appendix I, Item F.1.b refers to the total container storage capacity for all of the container storage units within the LANL Hazardous Waste Facility Permit. The Permittees are requesting an increase in container storage capacity at both of the individual units at TA-54-38 West. The total requested increase in container storage capacity is 35,860 gallons: 1,120 gallons at the indoor unit and 34,650 gallons at the outdoor unit. The total facility container storage capacity within the LANL Hazardous Waste Facility Permit is 5,023,730 gallons. Therefore, the resulting increase is less than 1% of the facility's container storage capacity.

The associated language change for closure of the loading dock at TA-54-38 West is classified as an administrative change pursuant to 40 CFR § 270.42, Appendix I, Item A.1, because no changes in requirements are proposed, only rearrangement for clarification purposes. Although this change would be classified as a Class 1 permit modification, it has been included with this Class 2 permit modification request because it affects the same units addressed in this permit modification request.

Discussion of Changes

Several changes are being made to Permit Attachment G.16, *Technical Area 54, West, Building 38 Indoor Container Storage Unit Closure Plan*; Permit Attachment G.17 *Technical Area 54 West, Outdoor Container Storage Unit Closure Plan;* Permit Attachment J, *Hazardous Waste Management Units*; and Permit Attachment N, *Figures*. These text and figure changes are necessary to reflect the changes associated with storage capacity increase of the TA-54-38 West Indoor Unit and TA-54-38 West Outdoor Pad, the increase of the footprint of the TA-54-38 West Indoor Unit, and the correction of language associated with the loading dock. Table 1 summarizes these changes.

Changes to Permit Attachment J, *Hazardous Waste Management Units,* are necessary to reflect the

increase in the operating capacities for both the TA-54-38 West Indoor Unit and the TA-54-38 West Outdoor Pad. Storage of waste within both permitted units will continue in the same manner as required by the Permit.

Permit Attachments G.16, *Technical Area 54 West, Building 38 Indoor Container Storage Unit Closure Plan* has been revised to incorporate the change to the footprint of the TA-54-38 West Indoor Unit. Additionally, deletions are being made to remove references to the loading dock. Currently the boundaries of the units allow for storage within a limited number of square footage, and for simplicity of storage operations the Permittees are requesting that the unit boundary encompass the entire High Bay and Low Bay within the building. The closure plan has been revised in Sections 2.0 and 6.1 and Figure G.16-1. Section 2.0 has been revised to remove the limitations on the footprint within the High Bay and Low Bay and to remove the language associated with the loading dock. Section 6.1 and Figure G.16-1 have been revised to update sample locations that have been added to meet the requirements set out in Permit Section 9.4.7.1.i and to remove the sample locations that were located on the loading dock.

Permit Attachment G.17, *Technical Area 54 West, Outdoor Container Storage Unit Closure Plan*, has been revised in Sections 6.1 and on Figure G.17-1 to add references to the loading dock. Section 2.0 of the closure plan already includes an accurate description of the loading dock; therefore, no changes were made to that section of the closure plan. Section 6.1 has been revised to include the sample locations for the loading dock that were previously included in Permit Attachment G.16. The sample areas have also been added to Figure G.17-1.

Figures 9 and 37 within Permit Attachment N, *Figures* have been updated to include the entire High Bay and Low Bay as part of the TA-54-38 West Indoor Unit.

Table 1. Summary of Changes Requested to the Permit

Location of Change	Change Description	Justification
Attachment G.16, Section 2.0, 2nd paragraph	Mention of the loading dock has been removed from the description of the unit.	Change has been made to correct the location of the loading dock requirements within the closure plans.
Attachment G.16, Section 2.0, 2nd, 3rd and 4th paragraphs	Footprint limitations have been removed from the description of the unit.	Change has been made to describe the entire High Bay and Low Bay as the permitted unit boundary.
Attachment G.16, Section 6.1, Bulleted Items	Sample locations within the building have been increased.	Change has been made to account for the larger footprint of the entire High Bay and Low Bay as the permitted unit boundary.
Attachment G.16, Section 6.1, Bulleted Items	Sample locations for the loading dock have been removed.	Change has been made to correct the location of the loading dock requirements within the closure plans.
Attachment G.16, Figure G.16-1	Figure has been replaced.	Change has been made to illustrate the larger footprint of the entire High Bay and Low Bay as the permitted unit boundary, incorporate sample areas for the larger footprint, and remove the loading dock sample locations.
Attachment G.17, Section 6.1, Last paragraph	Sample locations for the loading dock have been added.	Change has been made to correct the location of the loading dock sampling requirements within the closure plans.
Attachment G.17, Figure G.17-1	Figure has been replaced.	Change has been made to correct the location of the loading dock sample areas within the closure plans. The figure was also changed to remove a structure (357) that does not exist at the unit and is not included within either Figures 9 or 37 in Attachment N.
Attachment J, TA-54, West Indoor	Operating capacity has been increased.	Change has been made to increase the operating capacity of the unit to allow the flexibility of managing shipments of larger containers.
Attachment J, TA-54, West Indoor	Total square footage of the unit has been corrected.	Change has been made to illustrate the larger footprint of the entire High Bay and Low Bay as the permitted unit boundary.
Attachment J, TA-54 West Outdoor Pad	Operating capacity has been increased.	Change has been made to increase the operating capacity of the unit to allow the flexibility of managing shipments of larger containers.
Attachment N, Figure 9	Figure has been replaced.	Change has been made to illustrate the larger footprint of the entire High Bay and Low Bay as the permitted unit boundary.
Attachment N, Figure 37	Figure has been replaced.	Change has been made to illustrate the larger footprint of the entire High Bay and Low Bay as the permitted unit boundary.

Revised Permit Text

Changes to Attachment G.16, Technical Area 54 West, Building 38 Indoor Container Storage Unit Closure Plan

2.0 DESCRIPTION OF UNIT TO BE CLOSED

A specific description of the permitted unit can be found in Permit Attachment A (*Technical Area Unit Descriptions*). Additional features and equipment located at the permitted unit and not discussed elsewhere within the Permit are described below.

The permitted unit is comprised of the ~~outdoor loading dock and areas within the~~ entire High Bay (Room 101) and the entire Low Bay (Room 102). Access between the two bays is provided through a 2.4 meter (m) wide by 3.8 m high roll-up door.

The High Bay, which stores fiberglass-reinforced plywood boxes, standard waste boxes (SWB), B25 boxes, and drums of various sizes, is 40 feet (ft) wide and 80 ft long. It is equipped with a 5-ton capacity bridge crane, a truck-axle weighing scale, loading platforms, and TRUPACT–II and HalfPACT lid stands. The floor is a 6-inch, reinforced, epoxy-coated, concrete slab which gently slopes toward a central 50-ft trench and a sump. The sump is locked out and a pipe plug has been installed. The floor has a grated drain (approximately five (5) inches (in.) wide by 57 ft long) that runs down the center of the bay which collects melting snow and water from the trucks that enter the bay. The permitted container storage area within the High Bay~~, which is located along the south side of the room's center wall, is approximately 11 ft wide and 34 ft long and~~ is used as a transuranic (TRU) waste payload-container assembly area and TRUPACT-II/HalfPACT shipper-container loading area. Its primary function is the preparation of waste packages for transport to the Waste Isolation Pilot Plant (WIPP). The TRU waste packaged in the High Bay is predominantly radioactive, but can include mixed waste.

The Low Bay, where waste drums of various sizes are stored, is 40 ft long by 34 ft wide; it was once used for staging hazardous solid and liquid waste while nondestructive radioassay waste characterization activities were performed. The floor is a 6-inch reinforced concrete slab coated with industrial grade enamel paint. ~~The permitted container storage area within the Low Bay is approximately 11 ft^2.~~

The permitted unit began hazardous waste operations in 1995 when testing of radioassay equipment occurred. Shipments of waste packages from the facility to the WIPP began in 1999. The building was constructed in 1989 and 1990. Specific hazardous waste constituents stored at the permitted unit are included in Tables G.16-1 and G.16-2.

Permit Part 3 (*Storage in Containers*), Permit Attachment A (*Technical Area Unit Descriptions*), Permit Attachment B (*Part A Application*), and Permit Attachment C (*Waste Analysis Plan)* include information about waste management procedures and hazardous waste constituents stored at the permitted unit.

6.1 Decontamination Verification Sampling Activities

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

One wipe sample will be collected from each piece of decontaminated equipment at the permitted unit. In compliance with Permit Section 9.4.7.1.i, this closure plan will ensure the collection of:

a. ~~four~~ nine wipe samples from the High Bay (*see* Figure G.16-1):

    1. ~~two~~four from the floor;

    2. one from ~~the~~each wall; and

    3. one from the sump;

b. ~~one~~six wipe sample~~s~~ from the Low Bay (*see* Figure G.16-1):

    1. two from the floor; and

    2. one from each wall.

c. ~~one from the floor; and~~

d. ~~two wipe samples from the Loading Dock areas identified as 'sample area 1' and 'sample area 2' (*see* Figure G.16-1)~~

If liquid is found in the sump in the High Bay at the time of the assessment, liquid samples will be collected in accordance with Section 6.2.1 of this closure plan.

Solid chip samples may be collected and analyzed to determine if residual hazardous constituents remain in the concrete floor at the permitted unit.

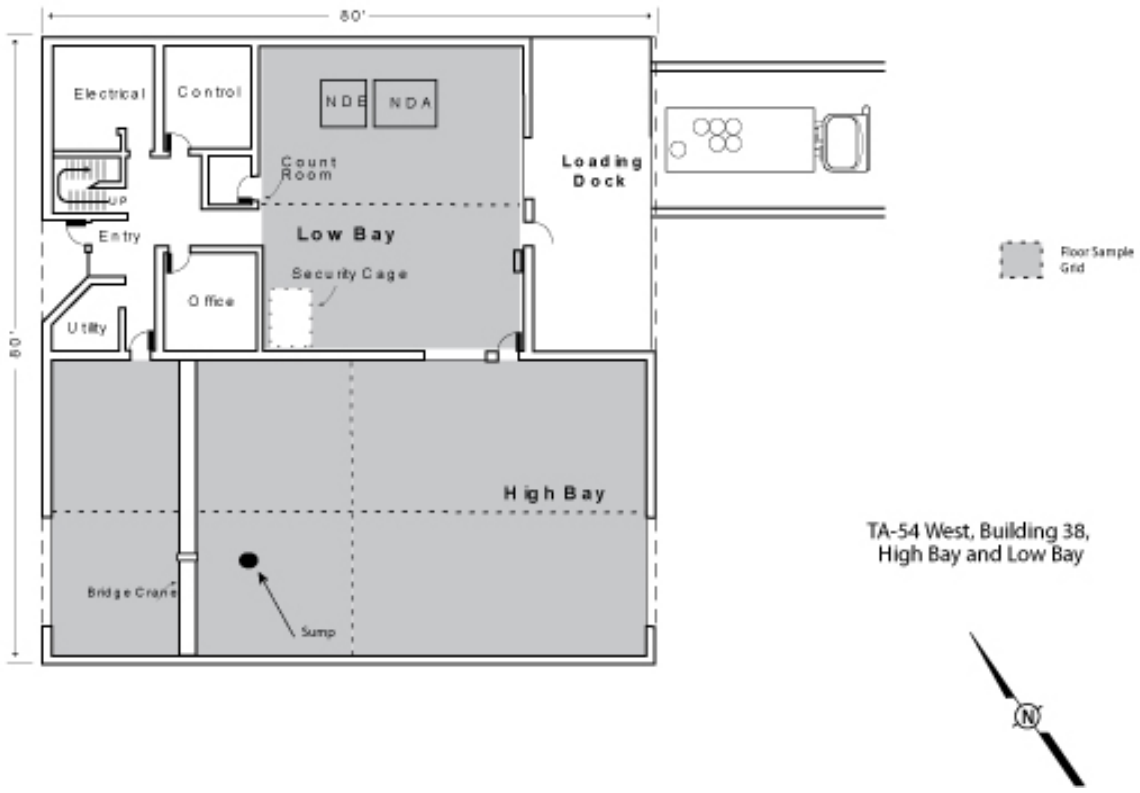

Figure G.16-1: Technical Area 54, Building 38 (High, Low Bay, and Loading Dock Sampling Locations)

6.1 Soil Sampling and Decontamination Verification Wipe Sampling Activities

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

One wipe sample will be collected from each piece of decontaminated equipment related to the permitted unit (*e.g.*, the awning). In compliance with Permit Section 9.4.7.1.i, this closure plan will ensure the collection of wipe samples from the floor and walls of the loading dock for a total of four verification samples.

In compliance with Permit Section 9.4.7.1.ii, this closure plan will ensure the collection of soil samples from the permitted unit at the following locations:

a. one sample from a known past loading zone area ('sample location 1') identified in the permitted unit's records (*see* Permit Section 9.4.7.1.ii(1));

b. one sample every 900 square feet of the permitted unit for a total of 46 samples (*see* Permit Section 9.4.7.1.ii(2));

c. two samples from the swale in the eastern portion of the permitted unit (*see* Permit Section 9.4.7.1.ii(3)); and

d. one sample every 30 feet along the drain line on the northern boundary of the permitted unit for a total of four samples (*see* Permit Section 9.4.7.1.ii(8)).

An additional two wipe samples are required from the Loading Dock areas identified as 'Sample Area 1' and 'Sample Area 2.' Figure G.17-1 illustrates the sampling locations discussed in this section.

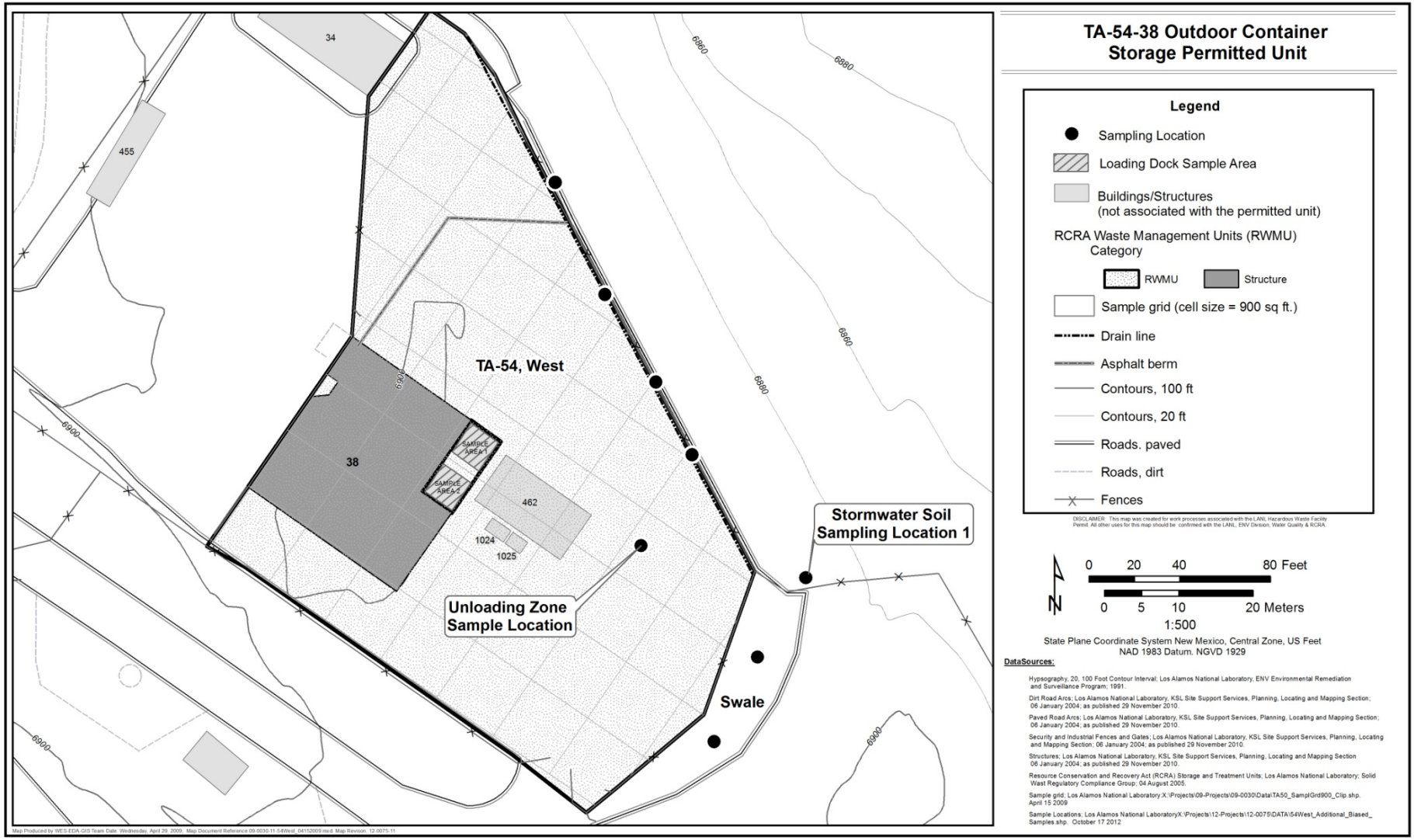

Figure G.17-1: Technical Area 54 West Outdoor Container Storage Unit Grid Sampling and Additional Sampling Locations

Changes to Attachment J: Hazardous Waste Management Units

TABLE J-1

Active Portion of the Facility

Includes units permitted to store and treat hazardous waste, interim status units, and the Material Disposal Areas.

Process codes and associated process descriptions:

- S01-storage in containers
- S02-storage in tanks
- S99-other storage
- D80-landfill
- T04 – treatment in tanks
- X01*-open burning
- X01**-open detonation

Unit Identifier	Process Codes	Operating Capacity	General Information	Type of Unit
TA-54-38 West Indoor	S01	4,950 ~~3,740~~ gal	Includes High Bay and Low Bay Total square footage – 4,060	Indoor
TA-54-38 West Outdoor Pad	S01	42,570 ~~7,920~~ gal	Includes loading dock and Pad surrounding Total square footage – 37,900	Outdoor (not associated with a regulated unit)

Revised Figures for Attachment N: Figures

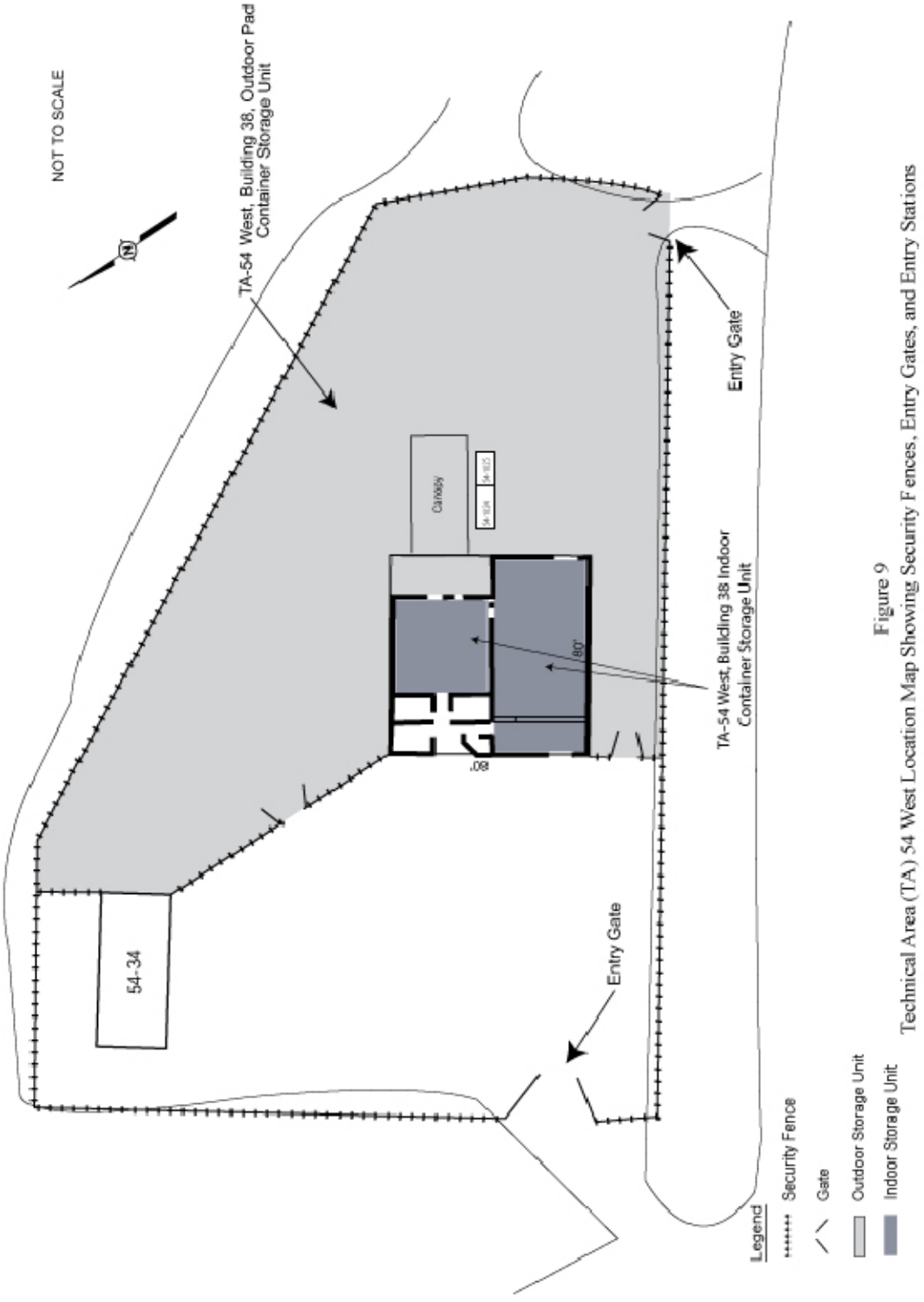

Figure 9
Technical Area (TA) 54 West Location Map Showing Security Fences, Entry Gates, and Entry Stations

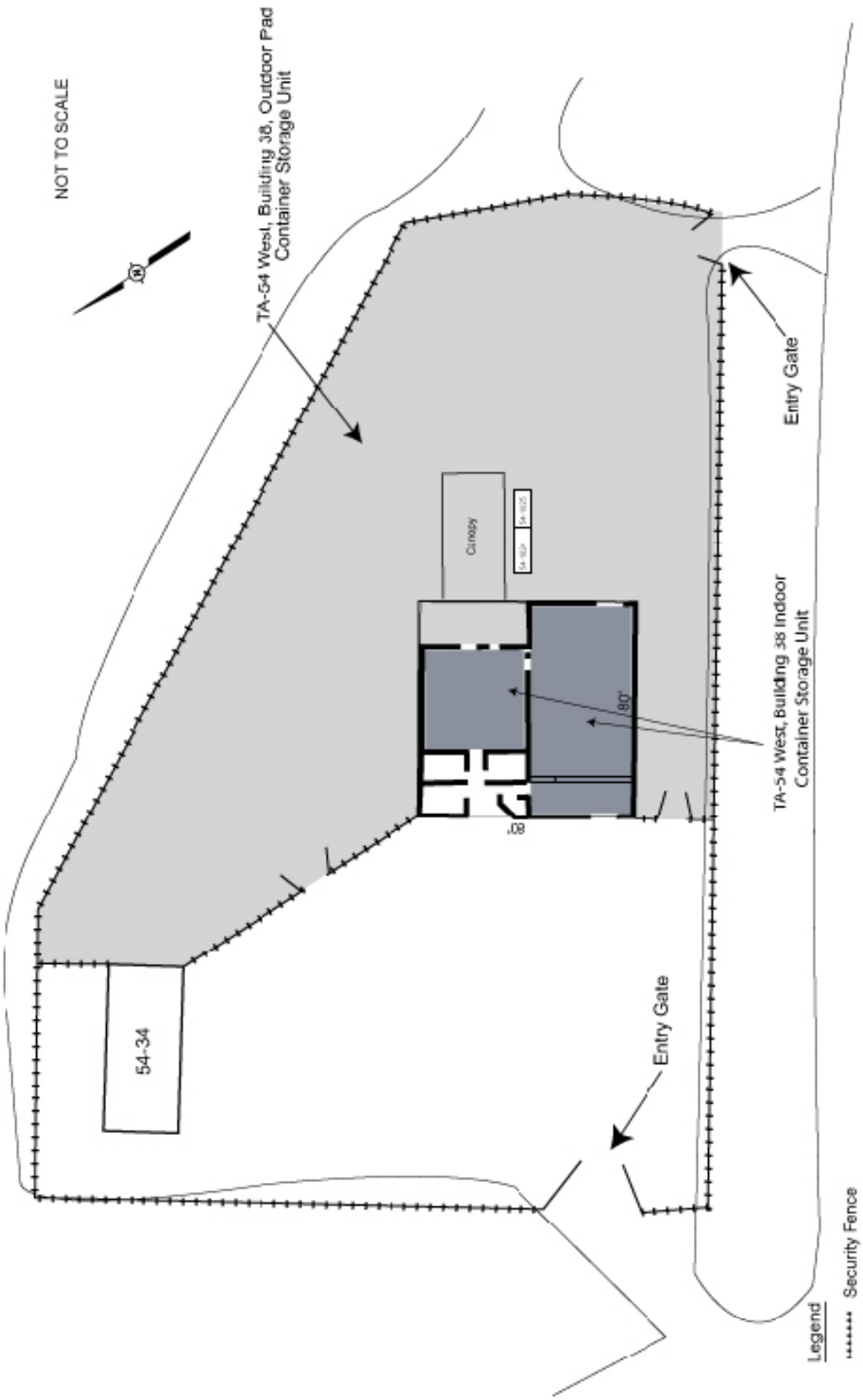

Figure 37
Technical Area (TA) 54 West, Building 38 Indoor (High Bay and Low Bay) and Outdoor Pad

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.

1/7/13
Date Signed

Alison M. Dorries
Division Leader
Environmental Protection Division
Los Alamos National Laboratory
Operator

1-7-13
Date Signed

Juan L. Griego
Manager (Acting)
Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy
Owner/Operator

ENCLOSURE 2

Fact Sheet and Public Notice of Class 2 Permit Modification Request and Public Meeting Technical Area 54, Building 38 West

January 2013

LA-UR-12-27049

Date: JAN 10 2013

Fact Sheet and Public Notice of Class 2 Permit Modification Request and Public Meeting for Technical Area 54, Building 38 (TA-54-38) West
January 2013

Los Alamos National Laboratory Hazardous Waste Facility Permit, EPA ID No. NM0890010515

Activity: The U.S. Department of Energy (DOE) and the Los Alamos National Security, LLC (LANS), have submitted a Class 2 permit modification request to modify the Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit. The modification supports container storage capacity increases at the permitted units located at TA-54-38, West Indoor Unit and Outdoor Pad, increases the footprint of the TA-54-38 Indoor Unit, and clarifies language inconsistencies within the Permit.

Facility: Los Alamos National Laboratory (LANL) is owned by DOE, and is operated jointly by DOE and LANS. Under authority of the New Mexico Hazardous Waste Act (Section 74-4-1 et seq., NMSA 1978, as amended, 1992) and the New Mexico Hazardous Waste Management Regulations (20.4.1 NMAC), the New Mexico Environment Department (NMED) can approve or deny hazardous waste permits and closure plans, permit modifications, and amendments.

Availability: The proposed permit modification is available for public review weekdays between 8 am and 5 pm:
NMED - Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

Copies are also available at the LANL Hardcopy Public Reading Room in Pojoaque weekdays from 9 am to 4 pm:
Northern New Mexico Citizens' Advisory Board Office
94 Cities of Gold Road
Santa Fe, NM 87506
http://www.lanl.gov/community-environment/environmental-stewardship/public-reading-room.php

Electronic copies of the permit modification request can also be found in the LANL Electronic Public Reading Room (EPRR) at: http://eprr.lanl.gov.

The LANL Hazardous Waste Facility Permit can be found on the NMED LANL Permit web page at: http://www.nmenv.state.nm.us/HWB/Permit.htm

Meeting: A public meeting about the permit modification will be held on February 13, 2013 at Fuller Lodge, 2132 Central Ave, Los Alamos, NM from 5:30pm – 7:30pm.

Comments: Any person who would like to comment or would like to request a public hearing on the proposed Class 2 permit modification may do so by contacting: Dave Cobrain at the NMED-Hazardous Waste Bureau address listed above, via telephone (505) 476-6000, or via e-mail: dave.cobrain@state.nm.us. The Permittee's compliance history during the life of the permit being modified is available from the NMED contact person. Submittal of the permit modification request occurred on January 10, 2013. The 60-day public comment period for this permit modification will run from January 14, 2013 – March 14, 2013. Any person who wishes to comment on this action or request a public hearing should submit written or e-mail comments with the commenter's name and address to the address above. Requests for a hearing shall state the nature of the issues proposed to be raised in the hearing and must include the requestor's name and address. Only written comments and/or requests received on or before March 14, 2013, will be considered.

Facility Contact: If you have questions, please contact us at phone/email: 505-667-0216 / envoutreach@lanl.gov or
Lorrie Bonds Lopez
Environmental Communication & Public Involvement
Los Alamos National Laboratory
P.O. Box 1663, MS M996
Los Alamos, NM 87545

LA-UR-12-27049

Water Quality & RCRA Group
P.O. Box 1663, Mail Stop K404
Los Alamos, NM 87545

ENCLOSURE 3

Evaluation of potential seismic hazards from Holocene-age surface-rupturing faults at the Radioassay and Nondestructive Testing Facility (RANT), Building 38, Technical Area 54, Los Alamos National Laboratory

LA-UR-12-27035

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memorandum

Earth and Environmental Sciences Division

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This memorandum summarizes geologic investigations at and around the Radioassay and Nondestructive Testing Facility, herein referred to as RANT or the RANT facility, Building 38, at Technical Area 54 (TA-54) of the Los Alamos National Laboratory (LANL) in Los Alamos County, New Mexico.

When selecting a site for a hazardous waste treatment, storage, and/or disposal facility, the owner/operator (in this case, LANS, LLC and NNSA) must adhere to certain location standards, as identified in the Code of Federal Regulations, Title 40 (40 CFR), Part 264.18. The guidelines used to demonstrate compliance with the seismic location standard are presented in 40 CFR, Part 270.14(b)(11).

In this document, we address compliance with the seismic location standard through published geologic data, beginning with a regional view of the Pajarito Plateau and ending with specific focus on the area to be permitted. We present a Pajarito Plateau-scale map of faults and aerial photographic lineaments located within a five-mile radius of the area to provide an overview of the structural setting and state of knowledge of the area. We discuss recent published mapping of the Pajarito fault system to determine the presence or absence of Holocene-aged surface-rupturing faults. We also include the following: field reconnaissance and analysis of aerial photography covering a 3,000-ft radius of the area; a discussion of microseismic monitoring at LANL; and a summarization of relevant published geologic studies completed in and around TA-54. These items are included to help evaluate Holocene seismic hazards, and provide important control on the known extent of faults in the area.

Definitions

The following technical terms are used frequently throughout this document. Definitions are taken from The Dictionary of Geological Terms (Bates and Jackson, eds., 1984).

Displacement: a general term for the relative movement of the two sides of a fault, measured in any chosen direction; also, the specific amount of such movement. [Within this report, “displacement” and “offset” are interchangeable terms.]

Holocene: an epoch of the Quaternary period, from the end of the Pleistocene, approximately 8 thousand years ago [*sic*; recent studies have updated the beginning of the Holocene to 11,700 years ago; *cf*. Gradstein et al. (2008); Ogg et al. (2008)] to the present time.

Lineament: a linear topographic feature of regional extent that is believed to reflect crustal structure. Examples are fault lines, aligned volcanoes, and straight stream courses.

Note that the definition of “lineament” used in this report primarily in the context of faulting does not imply that such an identified feature is actually a surficial manifestation of crustal structure with recent tectonic activity until the local geology is carefully considered.

General Geologic Setting

LANL and the Los Alamos townsite sit atop the Pajarito Plateau, which is bounded on its western edge by the Pajarito fault system, a 50-km-long system locally comprised of the down-to-the-east Pajarito fault (the master fault) and subsidiary down-to-the-west Rendija Canyon, Guaje Mountain, and Sawyer Canyon faults (Figure 1). This fault system forms the local active western margin of the Rio Grande rift near Los Alamos.

The RANT facility at TA-54 is situated on Mesita del Buey in the eastern part of LANL between Pajarito Canyon to the south and Cañada del Buey to the north (Figure 2). As mapped by Goff et al. (2002) on the Frijoles 7.5-minute quadrangle, the RANT facility is immediately underlain by highly-disturbed mesa top deposits of manmade origin, usually consisting of a mixture of older alluvium, tuffaceous rubble, native soil, and imported fill. Below this fill deposit, the local bedrock is the Quaternary Bandelier Tuff, formed in two eruptive pulses from nearby Valles caldera, the eastern edge of which is located approximately 8 miles (13.2 km) west of TA-54. The older member (Otowi Member) of the Bandelier Tuff has been dated at 1.61 Ma (Izett and Obradovich 1994). The younger member (Tshirege Member) of the Bandelier Tuff has been dated at 1.256 Ma (age from Phillips et al. 2007) and is widely exposed as the mesa-forming unit around Los Alamos. Several discrete subunits comprise the Tshirege Member. Commonly accepted stratigraphic nomenclature for the subunits of the Tshirege Member is described in detail by Broxton and Reneau (1995), Gardner et al. (2001), and Lewis et al. (2009). The Tshirege Member subunit exposed at the ground surface at TA-54 is Qbt2, and in select locations along Mesita del Buey, the underlying Qbt1 is also exposed in cliff faces. Unit Qbt3 pinches out immediately west of the RANT facility. Understanding the subtle differences between Tshirege Member cooling units and the nature of the contacts between cooling units is critical to identifying fault-generated displacements around the Pajarito Plateau.

Regional Structural and Seismic Studies

Lineament mapping

Before the campaign of detailed geologic mapping began at LANL in the mid 1990s, geologic studies performed prior to this time dominantly used lineament mapping from aerial photographs to infer the surface traces of the Rendija Canyon and Guaje Mountain faults as southward structural continuations through the Los Alamos townsite and through TA-55 and TA-63, respectively (including Rogers et al. 1996; Dransfield and Gardner 1985; Vaniman and Wohletz 1990; Wong et al. 1995; Olig et al. 1996; and Wohletz 2004). The traces of these faults are important, as they have been interpreted as the easternmost structural extent of the Pajarito fault system in the Los Alamos area (Lewis et al., 2009). For reference, the TA-55 and TA-63 technical areas are located approximately 2 miles (3.1 km) northwest of the RANT facility.

Studies by Gardner et al. (1998, 1999, 2008), Lewis et al. (2002, 2009), and Lavine et al. (2003, 2005) utilized the most widely-accepted and detailed published stratigraphy of the Bandelier Tuff (that of Broxton and Reneau 1995; published in peer-reviewed literature by Lewis et al. 2009) to map small displacements across Tshirege Member cooling unit contacts throughout much of western and central LANL for the purpose of identifying potential seismic surface rupture hazards in LANL technical areas. These relatively-recent studies acquired information on fault locations and amount of displacement using high-precision geodetic mapping of Tshirege Member subunit contacts along canyon exposures. These detailed mapping studies have shown that lineaments in this area are not expressed as young surface-rupturing components of the Rendija Canyon and Guaje Mountain faults through the TA-55 and TA-63 areas. In fact, the surface trace of the Rendija Canyon fault bends southwesterly at Los Alamos Canyon and splays into TA-3 instead of continuing southerly through TA-55 (Gardner et al., 1999). The surface expression of the Guaje Mountain fault is not identifiable in contact displacement to the south of Pueblo Canyon (Lavine et al., 2003).

While lineament mapping has been completed at a regional scale across much of the Pajarito Plateau, we emphasize that for determining the presence of Holocene faults at a given location, conventional field geologic mapping or paleoseismic trenching must be consulted or performed to confirm that (1) a lineament is truly a fault, and (2) that it displaces young units. Olig et al. (1998) supports this:

> "The lineaments [from Wong et al. (1995), Plate 1] were identified on aerial photographs or observed during an aerial reconnaissance and field-checked at a reconnaissance level. However, this generalized map … should be considered preliminary in nature until a more comprehensive and detailed surficial mapping of LANL is completed."

Geologic quadrangle mapping

The New Mexico Bureau of Geology and Mineral Resources, in conjunction with the US Geological Survey's National Cooperative Geologic Mapping Program (STATEMAP), published a geologic and structural map of the Frijoles 7.5-minute quadrangle (LANL and Bandelier National Monument area) at 1:24,000 scale (Goff et al. 2002). This investigation did not find surficial geologic faults that disrupt the Bandelier Tuff or younger units in the vicinity (e.g., within 3,000 ft) of the proposed facilities at TA-54. As noted above, the RANT facility is immediately underlain by highly-disturbed mesa top deposits of manmade origin, on the order of three to six feet (1-2 m) thick.

Other geologic mapping

The Pajarito fault system was mapped at 1:1,200 scale by personnel with a detailed knowledge of structural geology and Tshirege Member subunits, and that work published by Lewis et al. (2009) represents a culmination of considerable detailed geologic investigations by the LANL Seismic Hazards Geology Team performed on the Pajarito Plateau since the mid 1990s. Plate 1 shows the RANT facility at TA-54, a 3,000-foot buffer, a five-mile buffer around the facility (as mandated by 40 CFR 270.14(b)(11)(A)(2)), published mapped surface faults from Goff et al. (2002) and Lewis et al. (2009), and mapped lineaments from Vaniman and Wohletz (1990) and Wong et al. (1995). The surficial faults mapped by Lewis et al. (2009) and seen on Plate 1 represent the most recent and detailed state of published knowledge of the Pajarito fault system near LANL.

No surficial faults with lateral continuity associated with the Pajarito fault system fall within the 3,000 ft buffer surrounding the RANT facility, as shown on Figure 4 and Plate 1. The closest mapped fault associated with the main trace of the master Pajarito fault is approximately 5.5 miles (8.8 km) to the west of the RANT facility. The closest mapped fault with lateral surface continuity in proximity to RANT is a trace of the antithetic Rendija Canyon fault mapped through TA-41 and TA-2, approximately 2.7 miles (4.3 km) northwest of the RANT facility. The closest mapped point-offset (an individual location where offset on a geologic contact was identified but lateral or vertical continuity of displacement along a fault plane was not visible) is a site in TA-66 approximately 1.9 miles (3 km) west-northwest of the RANT facility. Points of offset were found to be notable features in geologic field investigations (e.g., Gardner et al. 1999, 2001; Lavine et al., 2003), but these features were also found to have little to no lateral continuity, could not be traced down or up through the stratigraphic section, were not visible as surficial offset, could not be followed across mesa-tops through conventional geologic mapping, and were not found to displace geologic units younger than the tuff (younger than 1.256 Ma).

Microseismic monitoring

The Los Alamos Seismic Network (LASN) continuously monitors local earthquake activity in the Los Alamos area in support of LANL's Seismic Hazards program. Seismic monitoring of LANL facilities is a requirement of DOE Order 420.1B (Facility Safety). LASN currently consists of several permanent seismic instrument field stations that telemeter real-time sensitive ground motion data to a central recording facility. These stations include broadband microseismic, broadband seismo-acoustic, broadband strong motion, short-period microseismic, and short-period

seismo-acoustic monitoring stations. Four short-period microseismic monitoring stations are located on LANL property, and five seismic stations (including a strong-motion vertical array) are located within five miles of TA-54. Other stations are in remote locations in the Jemez Mountains, St Peters Dome, and the Caja del Rio Plateau across the Rio Grande, with additional stations currently under construction or in various stages of installation. The network has been detecting and archiving seismic events from 1973 to present, and the most recent earthquake catalogue is described by Roberts et al. (2012)(a) and (b). During the operational duration of LASN through 2011, over 750 clearly locatable earthquakes were recorded in northern New Mexico. Over 200 of these were located within a 50-km radius of Los Alamos, and roughly 90 of those were within 20 km. Figure 3 shows the current LASN station locations and the seismic events recorded in the area from 1973 to 2011. Because the LASN station spatial coverage is limited, and stations on LANL property are plagued by cultural noise (e.g., construction activities, explosive shots), there can be issues with earthquake identification and location errors. Misidentification of recorded events as local earthquakes is very rare. When it does occur, the most common cause is that LANL test explosions and distant earthquakes occasionally generate signals that can mimic the characteristics of local earthquakes. The events are then reviewed and revised as necessary. A revised version of the LASN earthquake catalogue has been presented by Roberts et al. 2012(a) and (b).

No earthquakes detected by LASN have been epicentered within 3,000 feet of TA-54 during the network's 39 years of operation.

Published geologic studies of relevance to seismic hazards issues at TA-54

Several geologic investigations have taken place at LANL with specific focus on TA-54. Data from some of these area-specific studies provide constraint on the location, size, distribution, and implications of known faults with relation to the RANT facility. This document summarizes some key geological studies below, in chronological order by publication date.

- **Purtymun and Kennedy 1971**, Geology and Hydrology of Mesita del Buey [report number LA-4660]

  This report describes the geology, structure, and hydrology of the TA-54 area for basic background and geologic site characterization. Purtymun and Kennedy (1971) identified three dominant joint sets at field sites around TA-54: 310° to 330° (N50W to N30W); 280° to 300° (N80W to N60W); and 40° to 60° (N40E to N60E). The authors described these joints as tensional, formed by the contraction of the tuff as it cooled, based upon the joints' near-vertical attitudes and curvilinear trends. Purtymun and Kennedy (1971) used borehole data to identify a sequence of basalts underlying the Bandelier Tuff that thin towards the west across Mesita del Buey. They describe the older, Cerros del Rio-aged basalts as a paleo-topographic high over which the Bandelier Tuff was deposited.

- **Rogers 1977**, History and Environmental Setting of LASL Near-Surface Land Disposal Facilities for Radioactive Wastes (Areas A, B, C, D, E, F, G, and T): A Source Document [report number LA-6848-MS, 2 vols.]

  This report consolidated a vast amount of historic and geologic information on the beginnings and growth of material disposal areas around LANL. Here, we discuss in general geologic characterizations of pits located at TA-54 that were available at the time of Rogers' (1977) report publication. MDAs H and J, nearest to the RANT facility, were not yet developed at the time of this publication.

  Some faults were identified in pits at TA-54; however, the displacements on these faults are quite small (less than 6 in), they did not have lateral continuity (could not be correlated to larger fractures or geologic structures), and the age of displacement could only be determined as younger than 1.2 Ma (the age of the

Bandelier Tuff). The characterized pits that were investigated provided geologic data suggesting a wide range of fracture orientations, near-vertical fracture dips, narrow apertures, and some minor faulting with offsets of less than a foot since the deposition of the Bandelier Tuff. These small-displacement faults with no documented lateral continuity do not pose a seismic hazard to the RANT facility, and can be attributed to cooling and compaction of the tuff shortly after emplacement.

- **Dransfield and Gardner 1985**, Subsurface Geology of the Pajarito Plateau, Española Basin, New Mexico [report number LA-10455-MS]

  This report provides a description of geologic structure in units predating the Bandelier Tuff, based upon drill cores and geophysical surveys across the Pajarito Plateau. They note the presence of numerous down-to-the-west faults averaging 100 ft of displacement within basalts below TA-54. Cumulatively, 600 ft of displacement was identified along the sequence of pre-Bandelier Tuff faults. One of the easterly subsurface faults, near to the TA-54 area, correlates to a gravity inflection. This gravity anomaly may indicate the western margin of the thick basalt sequence underlying the Bandelier Tuff, as identified in the cross-section from Purtymun and Kennedy (1971). None of these pre-Bandelier Tuff faults propagate upwards into the Bandelier Tuff or younger units.

- **Reneau et al. 1998**, Structure of the Tshirege Member of the Bandelier Tuff at Mesita del Buey, Technical Area 54, Los Alamos National Laboratory [report number LA-13538-MS]

  This study was performed to determine the presence or absence of faults at TA-54 through use of high-precision geodetic surveying of the Qbt1v – Qbt2 contact along the flanks of Mesita del Buey. Reneau et al. (1998) identified widely-distributed, small-scale faults at Mesita del Buey along a 2.2 mile traverse of the north wall of Pajarito Canyon and a 0.4 mile traverse of the north wall of a tributary to Cañada del Buey. A total of 37 faults with offsets ranging from 5 to 65 cm (2 to 25 in) were recorded in a zone between the eastern edge of MDA J in the west and MDA G in the east, with the highest density of observed faults in the vicinity of MDA L where pyroclastic surge beds were well exposed and continuous. The western boundary of MDA L is approximately 4500 ft (1400 m) southeast of the RANT facility. Typical fault offset across the study area was 20 to 30 cm (8 to 12 in) and all observed fault planes were steeply dipping. Since the exposure of the Qbt1 – Qbt2 contact was incomplete along the canyon wall traverses, Reneau et al. (1998) postulate that several additional faults of similar magnitude to those identified may exist in obscured areas. 65% of observed offset on identified faults was down-to-the-west, while the remaining 35% of observed offset was down-to-the-east. Opposing fault displacements partially compensate for each other, reducing cumulative offset along the surveyed transects. These identified faults were not concentrated in discrete areas or zones.

  The general absence of large (> 2ft) displacements along the Qbt1v – Qbt2 contact suggests that these small-displacement structures are not associated with major fault zones. Reneau et al. (1998) suggest that these small-displacement faults may record secondary deformation across the Pajarito Plateau associated with large earthquakes on the main Pajarito fault, several miles to the west, or even perhaps earthquakes on other regional faults. The small single offsets, reduced cumulative offset due to opposing fault displacements, lack of lateral continuity of these small faults across the mesa, no displacements of units younger than the Bandelier Tuff along similar fractures, and lack of mapped laterally-continuous faults in other geologic studies correlative to these identified faults support the statement that these small faults do not pose a seismic hazard to the RANT facility.

- **Various borehole studies**

To constrain groundwater flow patterns and directions and for monitoring purposes, a number of wells exist around TA-54. During drilling, these wells were logged and core recovered. This section describes geologic information from wells within 3,000 ft of the RANT facility.

Well logs from water supply hole PM-2 (Purtymun, 1995) help constrain the subsurface geology beneath TA-54 and the nearby RANT facility. Well PM-2 is located approximately 2650 ft (807 m) south-southeast of the RANT facility. The logs for well PM-2 from Purtymun (1995) and used by Goff et al. (2002) demonstrate that the Tshirege Member of the Bandelier Tuff is over 200 ft thick at this location, and the Otowi Member (including the Guaje Pumice) is approximately 200 ft thick. The Cerro Toledo interval, a volcaniclastic unit variably present above the Otowi Member and below the Tshirege Member, is less than 10 ft thick at this location. Nearly 2,000 ft of Cerros del Rio basaltic units of variable thickness interbedded with Santa Fe Group sediments underlie the Bandelier Tuff units in this area. No faults were identified through this borehole characterization effort.

Stratigraphic descriptions from borehole PM-4 (G. WoldeGabriel, personal communication, 11/15/2012) show similar subsurface geology to that identified in borehole PM-2. This borehole is located approximately 2000 ft (610 m) north of the RANT facility. No faults were identified in this borehole.

One of the nearby regional characterization wells is R-20, located approximately 3700 ft (1.3 km) southeast of the RANT facility, east of TA-18 on the south side of Pajarito Road, in the bottom of Pajarito Canyon. This well was drilled as part of the Groundwater Protection Program. The well summary data sheet indicates the drilling efforts encountered a significant thickness (68 ft) of alluvium, nearly 100 ft of Tshirege Member, approximately 15 ft of Cerro Toledo Interval, nearly 200 ft of Otowi Member, 18 ft of Guaje Pumice, and large thicknesses of Cerros del Rio basalts underlain by Puye Formation deposits to a depth of 1242 ft. No faults were identified in the completion report for this well.

Another nearby regional characterization well is R-37, located approximately 2000 ft (610 m) east of the RANT facility, along the north side of Mesita del Buey and adjacent to the southern side of Cañada del Buey, about 0.25 mi east of MDA J. This well was drilled as part of the Groundwater Protection Program. The well summary data sheet indicates the drilling efforts encountered nearly 230 ft of Tshirege Member, approximately 3 ft of sediments attributed to the Cerro Toledo Interval, nearly 260 ft of Otowi Member, 11 ft of Guaje Pumice, and large thicknesses of Cerros del Rio basalts (433 ft) underlain by Puye Formation deposits to a total depth of 1100 ft. No faults were identified in the completion report for this well.

Also nearby is regional characterization well R-40, located approximately 2100 ft (640 m) south-southeast of the RANT facility, east of TA-18 on the north side of Pajarito Road, near the bottom of Pajarito Canyon. This well was drilled for the LANL Water Stewardship Program to monitor potential releases from MDA H. The well summary data sheet indicates the drilling efforts encountered 40 ft of alluvium, 114 ft of Tshirege Member, approximately 18 ft of sediments attributed to the Cerro Toledo Interval, nearly 260 ft of Otowi Member, 18 ft of Guaje Pumice, and large thicknesses of Cerros del Rio basalts (nearly 350 ft) underlain by Puye Formation deposits to a total depth of 910 ft. No faults were identified in the completion report for this well.

Local Lineament Mapping and Field Reconnaissance at TA-54 and Surrounding Canyons

We present a local lineament map (Plate 2) of the 3,000-ft buffer area surrounding the RANT facility at TA-54. Present on both Plates 1 and 2 are lineaments from Wong et al. (1995; yellow lines) and Vaniman and Wohletz (1990; orange lines) that trend roughly north-south, as well as lineaments mapped in this study using color orthophotography (red dotted lines). The lineaments mapped by Wong et al. (1995) and Vaniman and Wohletz

(1990) were identified using aerial photographs.

Plate 2 shows two northeast-striking lineament traces, one mapped by Wong et al. (1995) and the other mapped by this study, transecting the 3,000 ft buffer around the RANT facility. These lineaments project through the northwestern quadrant of the buffer area. The lineaments identified on Plate 2 do not correlate to any Holocene faults or measured point-locations of offset on Bandelier Tuff subunit contacts.

Figure 4 is a map showing faults in the vicinity of the proposed RCRA-permitted RANT facility area, with 200-ft (orange) and 3,000-ft (blue) buffers for RCRA seismic considerations. This map shows there are no faults within the 200-ft or 3,000-ft buffers around the RANT facility.

Discussion

Site-specific geologic investigations in the TA-54 area, described above, show that the lineaments mapped through TA-54 on Plates 1 and 2 do not correlate with any Holocene faults. Neither geologic investigations in the TA-54 area, nor geologic mapping in the Los Alamos and White Rock areas show Holocene faults in areas where lineaments have been identified on Plates 1 and 2. Detailed geodetic surveying of the Qbt1 – Qbt2 contact by Reneau et al (1998) did find small-displacement faulting along the mesa edge between the eastern edge of MDA J and MDA L, but did not locate faults within 200 ft of the RANT facility. Lineaments found in the TA-54 area do not appear to correlate with displacement of the Bandelier Tuff or younger units.

Goff et al. (2002) notes that the RANT facility area is largely underlain by highly-disturbed fill units of manmade origin. The creation of these fill deposits likely has modified or removed any undisturbed post-Bandelier Tuff deposits. Without undisturbed native deposits younger than the Bandelier Tuff, conducting future geologic field investigations with the purpose of identifying Holocene movement across faults (e.g., paleoseismic trenching, borehole investigations) would be challenging, if not unachievable, in the immediate area around the RANT facility.

Conclusions

No faults have been documented within 200 ft of the RANT facility in western TA-54. Two lineaments, mapped by Wong et al. (1995) and this study, project within the 3,000 ft buffer around the RANT facility. These mapped lineaments do not correlate to identifiable displacements on Tshirege Member subunit contacts. Additionally, these lineaments do not correspond to faults that exhibit movement in Holocene time, and they do not have clear connections to small local faults or major regional faults. Therefore, these features do not pose a seismic hazard to the RANT facility. Based on the data presented in this memo using information from published geologic studies at and around TA-54, aerial reconnaissance of the area within a five-mile radius from the RANT facility, an analysis of aerial photographs, and field reconnaissance of lineaments and contact elevations, we demonstrate that no faults with Holocene displacement are present within 200 ft of the RANT facility. Aerial reconnaissance, detailed geologic mapping of portions of LANL, and paleoseismic trenching investigations show that the focus of possible Holocene faulting is concentrated along the main Pajarito fault, over five miles west of the RANT facility.

Figure Captions

Figure 1. Map of the RANT facility with respect to the Pajarito fault system in the vicinity of Los Alamos National Laboratory (green outline). Location of TA-54 is highlighted as a red bordered area; RANT facility location labeled and shown as pink polygon within TA-54. Inset map shows approximate location of Rio Grande rift. Proposed RCRA-permitted RANT facility area is shown in greater detail in Figure 2. **PF** = Pajarito fault; **RCF** = Rendija Canyon

fault; **GMF** = Guaje Mountain fault; **SCF** = Sawyer Canyon fault. Fault mapping (bold black lines) from Goff et al. (2002) and Lewis et al. (2009).

Figure 2. Map view of the location of the RANT facility within TA-54. The TA-54 technical area shown in inset map. The region proposed for RCRA permitting is shown as a pink shaded area with a red ball-bar border. The 200 ft buffer is a bold orange line surrounding the RANT facility. The Pajarito Canyon watershed lies to the south of the technical area; Cañada del Buey and its tributaries lie north of the RANT facility. MDAs H and J are shaded green with a black border.

Figure 3. Map of earthquakes recorded by the Los Alamos Seismic Network (LASN) from 1973 to 2011. Individual earthquake epicenters shown as purple circles; relative circle size indicates earthquake magnitude. Recent, news-worthy October 2011 Cuyamungue earthquake labeled and show in red. TA-54 and approximate location of RANT facility location shown. Active LASN stations shown as blue triangles. See report text for further discussion.

Figure 4. Mapped faults and point-locations of offset, with respect to the 200 ft (orange) and 3,000 ft (blue) buffers surrounding the RANT facility (red polygon at center of map). No faults are mapped within the 200 ft or 3,000 ft buffers. See text for further discussion.

Plate 1. Mapped faults, mapped lineaments, and color orthophotographic map of the Pajarito Plateau. Buffers of 3,000 feet (blue circle) and five miles (pink circle) around the RANT facility at TA-54 are shown. Structural mapping (bold black lines) from Goff et al. (2002) and Lewis et al. (2009). Mapped lineaments from Vaniman and Wohletz (1990; orange lines), Wong et al. (1995; yellow lines), and this study (red dotted lines). TA-54 is east of the main trace of the Pajarito fault system. See text for further discussion.

Plate 2. Mapped faults, mapped lineaments, and orthophotography in the area surrounding the RANT facility. Lineaments from Vaniman and Wohletz (1990; orange lines), Wong et al. (1995; yellow lines), and this study (red dotted lines). Two separate lineaments project into the 3,000 ft buffer (blue circle) around the RANT facility. These lineaments do not project within the 200 ft buffer (red line) surrounding the facility. See text for further discussion.

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Distribution

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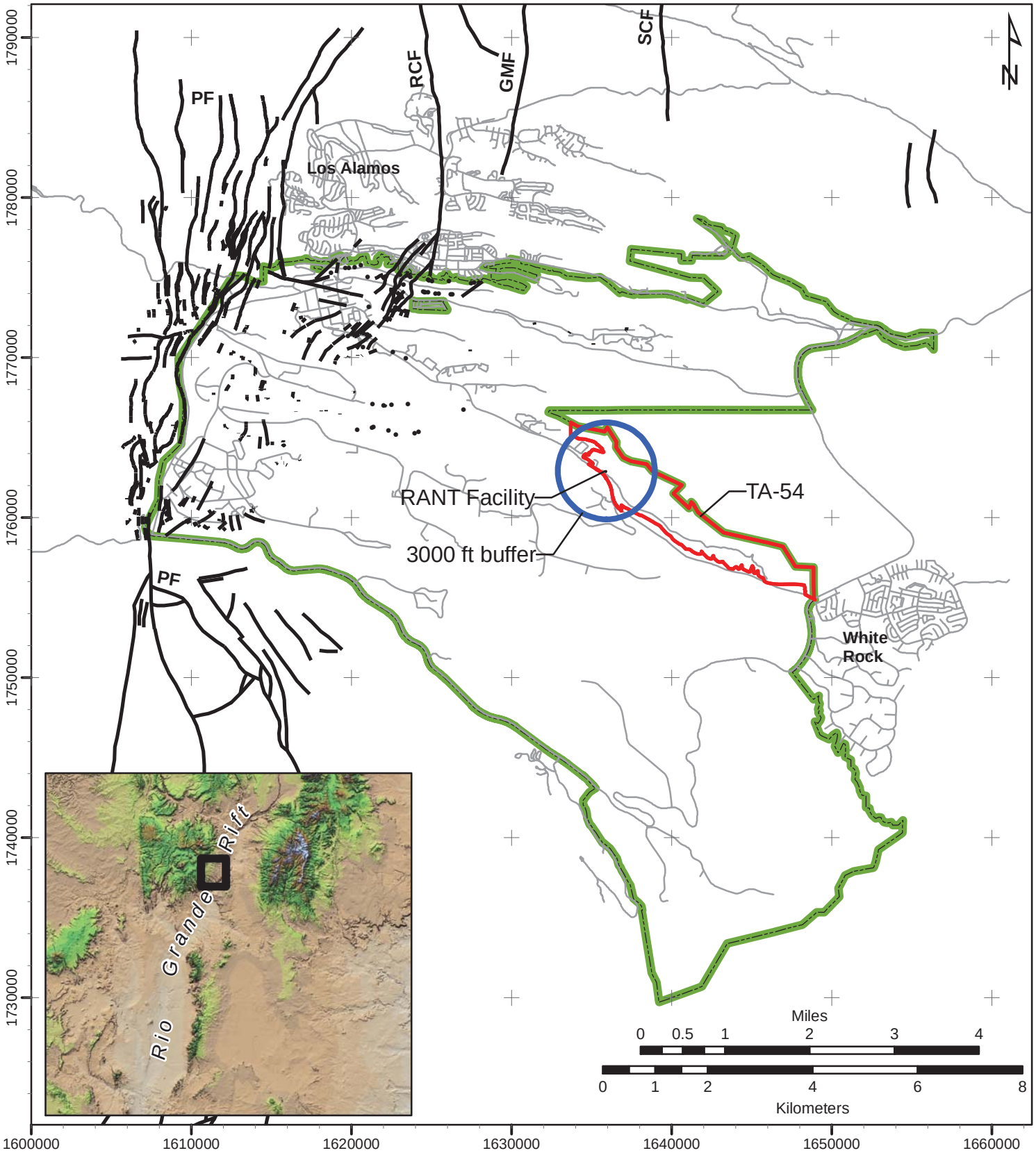
Attachments (4 figures; 2 plates)



- Identified offset
- Fault
- Road
- RANT facility
- 3000' buffer
- Technical Area 54
- LANL

Figure 1: Map of the RANT facility with respect to the Pajarito Fault System in the vicinity of Los Alamos National Laboratory

State Plane Coordinate System
New Mexico Central Zone
1983 North American Datum
Grid Provides Units in Feet

LA-UR-12-27035
GISLab Map No. m202391
GISLab Req. No. 14388
Document No. EES14-12-018
Cartography by Liz Miller
December 17, 2012

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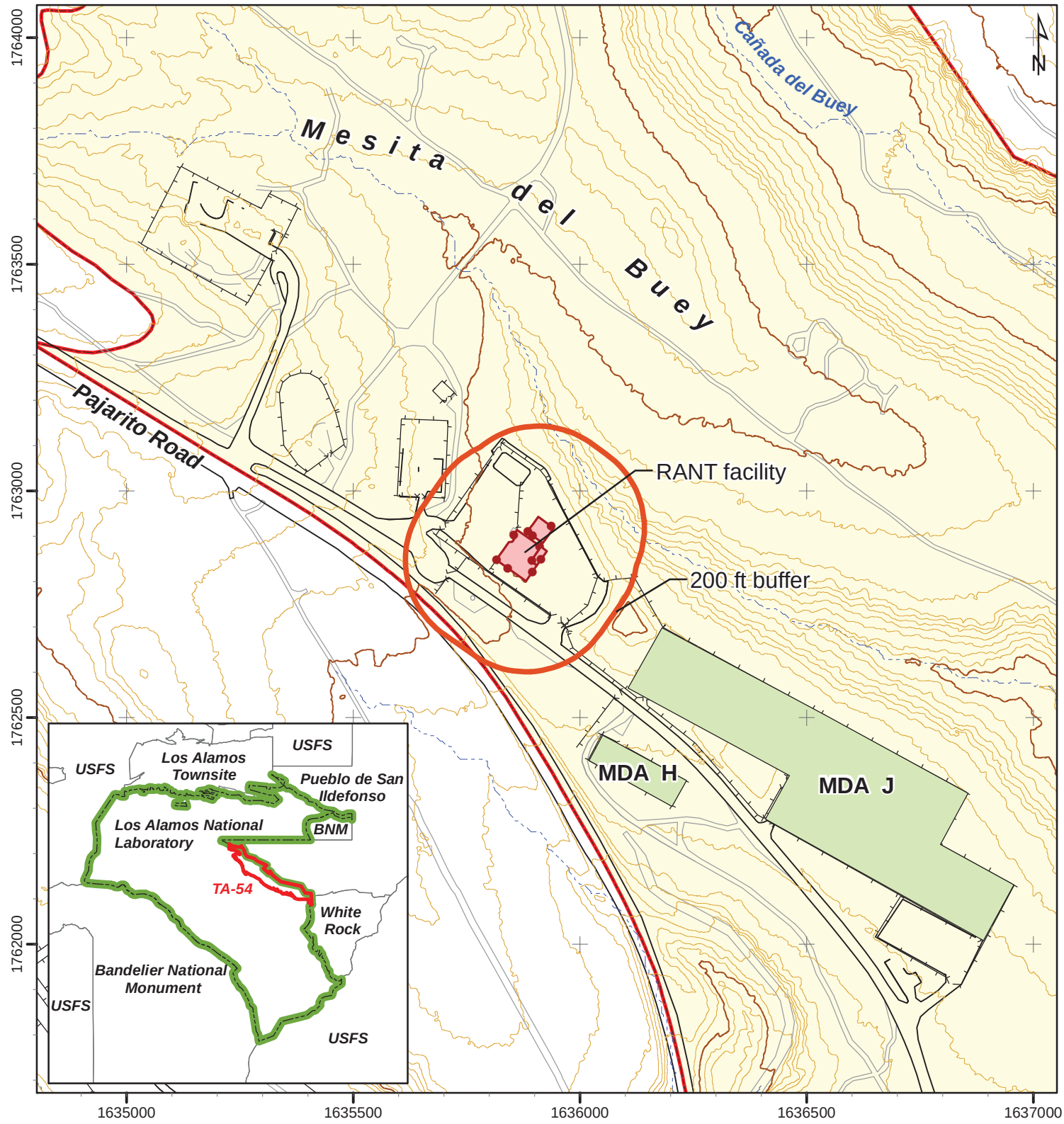

- Drainage
- Paved road
- Dirt road
- Fence
- Material disposal area
- 200' buffer
- RANT facility
- Technical Area 54 boundary

Figure 2. Details of RCRA-Permitted Area of RANT facility, TA-54

State Plane Coordinate System
New Mexico Central Zone
1983 North American Datum
Grid Provides Units in Feet
Contour interval = 10 feet

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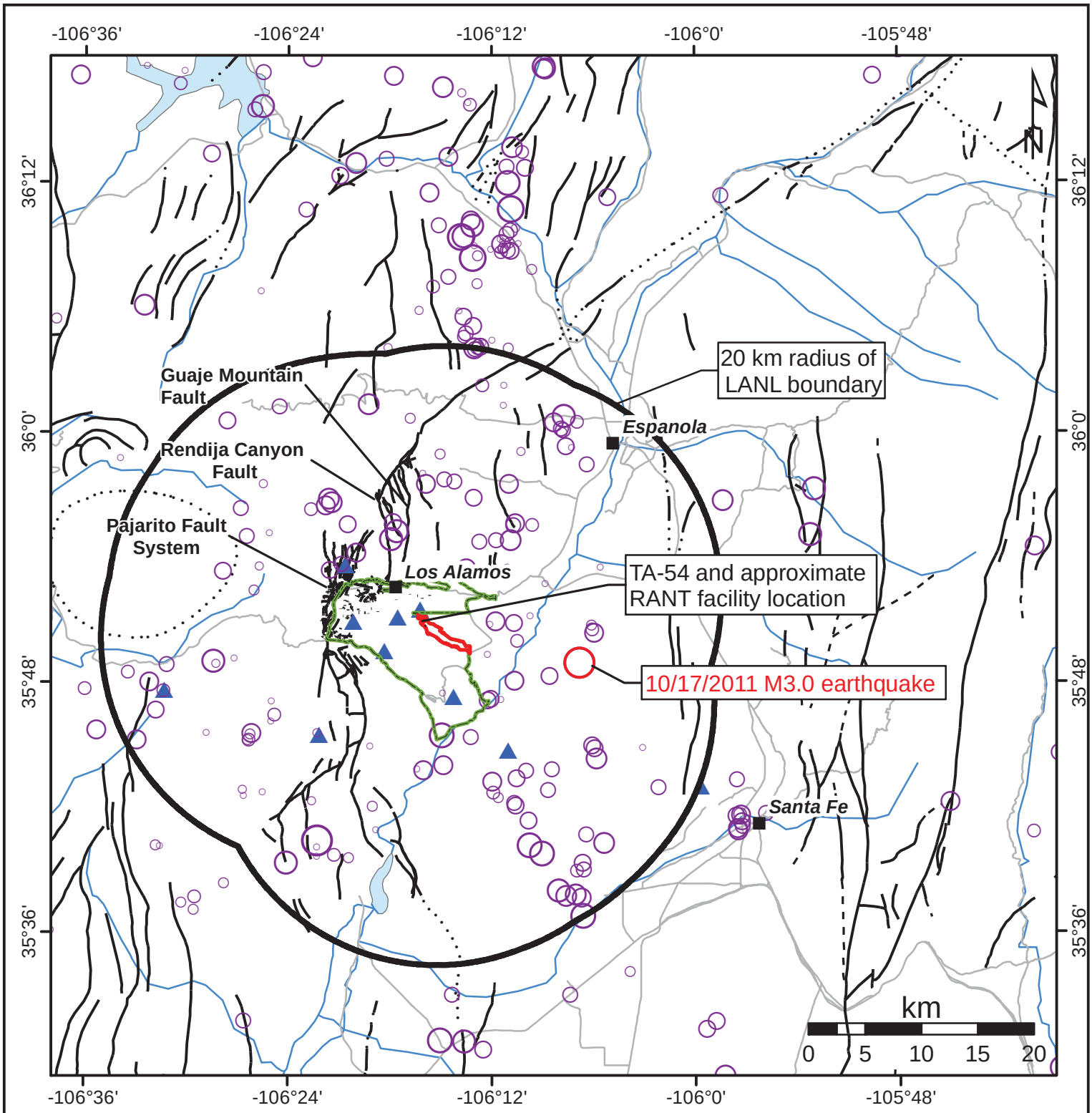
Feet
0 125 250 500 750 1,000

0 0.05 0.1 0.2 0.3 0.4
Kilometers

GISLab Los Alamos National Laboratory



Earthquake magnitude

- 0
- 1
- 2
- 3
- Los Alamos Seismic Network station
- Technical Area 54
- LANL

Figure 3. Greater Los Alamos Area Seismic Events

218 Total Local Earthquakes (1973 - 2011)
87 Earthquakes within 20-km Radius of LANL
Purple Circles: Earthquake Locations and Magnitudes

State Plane Coordinate System
New Mexico Central Zone
1983 North American Datum
Grid Provides Units in Feet

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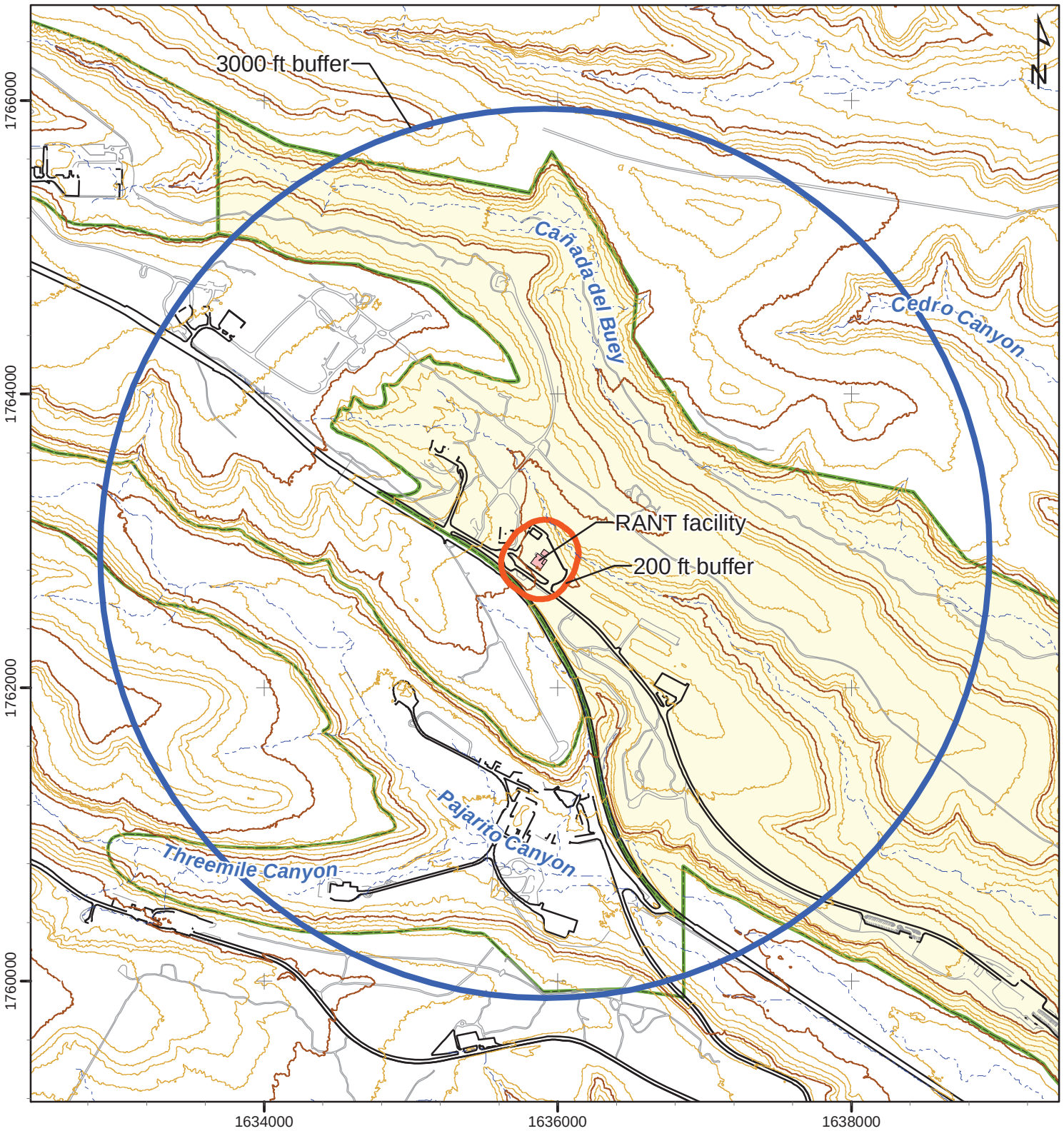

Figure 4. Mapped faults with respect to 200' and 3000' RCRA buffers surrounding the RANT facility, TA-54

- Identified offset
- Fault
- Drainage
- 20 ft contour
- 100 ft contour
- Paved road
- Parking
- Dirt road
- 200' buffer
- 3000' buffer
- RANT facility
- Technical area boundary
- Technical Area 54

Miles
0 0.05 0.1 0.2 0.3 0.4
0 0.1 0.2 0.4 0.6 0.8
Kilometers

State Plane Coordinate System
New Mexico Central Zone
1983 North American Datum
Grid Provides Units in Feet
Contour interval = 20 feet

LA-UR-12-27035
GISLab Map No. m202394
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1570000 1580000 1590000 1600000 1610000 1620000 1630000 1640000 1650000 1660000 1670000 1680000 1690000 1700000

1800000 1790000 1780000 1770000 1760000 1750000 1740000 1730000

5 mile buffer

3000 ft buffer

RANT facility

TA-54

N

- Fault
- Linear features
- Lineaments, Vaniman & Wohletz, 1990
- Lineaments, Wong, et al, 1995
- RANT facility
- 3000' buffer
- 5 mile buffer
- Technical Area 54
- LANL

Plate 1: Faults, lineaments, and color orthophotographic map of the Pajarito Plateau

Miles
0 0.5 1 2 3 4

0 1 2 4 6 8
Kilometers

State Plane Coordinate System
New Mexico Central Zone
1983 North American Datum
Grid Provides Units in Feet

LA-UR-12-27035
GISLab Map No. m202395
GISLab Req. No. 14388
Document No. EES14-12-018
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1628000 1629000 1630000 1631000 1632000 1633000 1634000 1635000 1636000 1637000 1638000 1639000 1640000 1641000 1642000 1643000 1644000

1767000 1766000 1765000 1764000 1763000 1762000 1761000 1760000 1759000

3000 ft buffer

RANT facility

200 ft buffer

TA-54

N

- Identified Offsets
- Faults
- Linear features
- Lineaments, Vaniman & Wohletz, 1990
- Lineaments, Wong, et al, 1995
- RANT facility
- 200' buffer
- 3000' buffer
- TA-54
- LANL

Plate 2: Faults and lineaments with respect to the RANT facility, TA-54

Feet
0 350 700 1,400 2,100 2,800

0 100 200 400 600 800
Meters

State Plane Coordinate System
New Mexico Central Zone
1983 North American Datum
Grid Provides Units in Feet

LA-UR-12-27035
GISLab Map No. m202396
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ATTACHMENT J

HAZARDOUS WASTE MANAGEMENT UNITS

TABLE J-1

Active Portion of the Facility

Includes units permitted to store and treat hazardous waste, interim status units, and the Material Disposal Areas.

Process codes and associated process descriptions:

- S01-storage in containers
- S02-storage in tanks
- S99-other storage
- D80-landfill
- T04 – treatment in tanks
- X01*-open burning
- X01**-open detonation

Unit Identifier	Process Codes	Operating Capacity	General Information	Type of Unit
TA-3-29	S01	18,500 gal	Includes Room 9010 and portions of Room 9020 and 9030 Located in Wing 9 of the basement of Building 29 Total square footage – 3,040	Indoor
TA-14-23	X01*	50 lbs HE/burn	Near Structure TA-14-23 Interim Status Unit	NA
TA-14-23	X01**	20 lbs HE/ detonation	Near Structure TA-14-23 Interim Status Unit	NA
TA-16-388	X01*		Flash Pad Total square footage - 484 Interim Status Unit not authorized to treat hazardous waste and undergoing closure	Outdoor (associated with a open burn unit)

Unit Identifier	Process Codes	Operating Capacity	General Information	Type of Unit
TA-16-399	X01*		Burn Tray Total square footage - 64 Interim Status Unit not authorized to treat hazardous waste and undergoing closure	Outdoor (associated with an open burn unit)
TA-36-8	X01**	2000 lbs/ detonation	Near Structure TA-36-8 Interim Status Unit	NA
TA-39-6	X01**	1000 lbs/ detonation	Near Structure TA-39-6 Interim Status Unit	NA
TA-39-57	X01**	1000 lbs/ detonation	Near Structure TA-39-57 Interim Status Unit	NA
TA-50-69 Indoor	S01	1,500 gal	Includes Rooms 102 and 103. Total square footage – 2,680	Indoor
TA-50-69 Outdoor Pad	S01	30,000 gal	Total square footage – 2,160	Outdoor (not associated with a regulated unit)
TA-54 “G”	D80	NA	Material Disposal Area Unit not permitted to receive hazardous waste	Regulated unit
TA-54 Area G Container Storage Unit (below ground)	S99	4,950 gal	Includes shafts 145 and 146 Wastes removed and unit undergoing closure, closure certification incomplete	NA
TA-54 Area G Pad 1	S01	502,920 gal	Includes building TA-54-412 (DVRS) Approximately 76,000 square feet	Outdoor (associated with a regulated unit)

Unit Identifier	Process Codes	Operating Capacity	General Information	Type of Unit
TA-54 Area G Pad 3	S01	213,840 gal	Includes Storage Dome 48 Approximately 17,000 square feet	Outdoor (associated with a regulated unit)
TA-54 Area G Pad 5	S01	623,480 gal	Includes Storage Domes 49 and 224; Storage Sheds 144, 145, 146, 177, 1027, 1028, 1030, and 1041 Pad 5 is a consolidation of former Pads 5, 7, and 8. Total square footage – 59,900	Outdoor (associated with a regulated unit)
TA-54 Area G Pad 6	S01	597,300 gal	Includes Storage Domes 153 and 283; Transportainer 491; and Storage Sheds 486, 522, 523, and 492. Approximately 62,700 square feet	Outdoor (associated with an regulated unit)
TA-54 Area G Pad 9	S01	1,446,720 gal	Includes Storage Domes 229, 230, 231, and 232; and Storage Sheds 574 and 484. Total square footage – 158,000	Outdoor (associated with a regulated unit)
TA-54 Area G Pad 10	S01	159,770 gal	Includes Transuranic (TRU) Waste Characterization Facilities: TA-54-0547 (SuperHENC), TA-54-0497 (RTR2), TA-54-0498 (LANL HENC), TA-54-0506 (MCS HENC), TA-54-0545 and 546 (Storage trailers), TA-54-0365 (Office Building Formerly MTGS), TA-54-0483 (Source Storage Trailer), and TA-54-1059 (Storage Trailer) Pad 10 is a consolidation of former Pads 2 and 4. Approximately 89,600 square	Outdoor (associated with a regulated unit)

Unit Identifier	Process Codes	Operating Capacity	General Information	Type of Unit
			feet	
TA-54 Area G Pad 11	S01	682,440 gal	Includes Storage Dome 375 and RTR1 Total square footage – 65,500	Outdoor (associated with a regulated unit)
TA-54 Area G Storage Shed 8	S01	11,880 gal	Also referred to as TA-54-8 Total square footage - 640	Indoor
TA-54 Area G TA-54-33	S01	108,240 gal	Also referred to as Drum Prep Facility Total square footage – 8,570	Indoor
TA-54 "H"	D80	NA	Material Disposal Area H Unit not permitted to receive hazardous waste	Regulated unit
TA-54 "L"	D80	NA	Material Disposal Area L Unit not permitted to receive hazardous waste	Regulated unit
TA-54 Area L Container Storage Unit (below ground)	S99	600 gal	Includes shafts 36 and 37 Wastes removed and unit undergoing closure, closure certification incomplete	NA
TA-54 Area L Outdoor Pad	S01	407,880 gal	Includes all area within fence-line except limited administrative areas. Includes Storage Sheds 31, 68, 69, and 70; Storage Pads 32, 35, 36, and 58; and Building 39; and Storage Dome 215 (former Area 1). Total square footage – 110,500	Outdoor (associated with a regulated unit)
TA-54-38 West Indoor	S01	4,9503~~,740~~ gal	Includes High Bay and Low Bay	Indoor

Unit Identifier	Process Codes	Operating Capacity	General Information	Type of Unit
			Total square footage – 4,5060	
TA-54-38 West Outdoor Pad	S01	42,5707,920 gal	Includes loading dock and Pad surrounding Total square footage – 37,900	Outdoor (not associated with a regulated unit)
TA-55-4, B40	S01	21,500 gal	Located in basement Referred to as Area 1 Total square footage – 3,380	Indoor
TA-55-4, K13	S01	2,500 gal	Located in basement Referred to as Area 4 Total square footage - 208	Indoor
TA-55-4, B05	S01	3,600 gal	Located in basement Referred to as Area 5 Non-liquid wastes only Total square footage - 260	Indoor
TA-55-4, B45	S01	11,000 gal	Located in basement Non-liquid wastes only Total square footage - 788	Indoor
TA-55-4, Vault	S01	4,000 gal	Located in basement Referred to as Area 6 Total square footage – 4,020	Indoor
TA-55-4-401 Mixed Waste Storage Tank Unit	S02	Storage - 137 gal	TA-55-4 Room 401 Unit divided into two components (Evaporator Glovebox Storage Tank System and Cementation Storage Tank System) Total square footage – 4,500	Indoor

Unit Identifier	Process Codes	Operating Capacity	General Information	Type of Unit
TA-55-4-401 Mixed Waste Stabilization Unit	T04	Treatment - 150 gal / day	TA-55-4 Room 401 Total square footage – 4,500	Indoor
TA-55-185	S01	30,000 gal	Located west of TA-55-4 Non-liquid wastes only Total square footage - 2,400	Indoor
TA-55-4 Outdoor Pad	S01	135,000 gal	Located outside and west of TA-55-4 Total square footage – 11,100	Outdoor (not associated with a regulated unit)

TABLE J-2

Permitted Units Undergoing Post-Closure Care

There are no units in post-closure care.

Unit Identifier	Process Codes	Regulatory Status	Operating Capacity	General Information
(none)				

TABLE J-3

Closed Portion of the Facility not in Post-Closure Care

Closed units in this table are not considered units addressed under the Permit. Therefore, this table is for informational purposes only.

Process codes and associated process descriptions:

- D80-disposal trench
- D83-surface impoundment disposal
- S01-storage in containers
- S02-storage in tanks
- S04-surface impoundment
- S99-storage in shafts
- T01-treatment in tanks
- T03-incinerator
- T04-other treatment
- X01*-open burning
- X01**-open detonation

Unit Identifier	Process Codes	General Information
TA-3-102	S01	(High Explosives Storage Unit)
TA 9-39	S01	
TA 09-43	T04	Hydrothermal Processing Unit (HPU) unit never managed hazardous waste
TA-15-184,	T04, X01**	OD site (Phermix)) Site was never used to treat hazardous waste
TA-16-88	S01	unit never stored hazardous waste
TA-16-387	X01** T04	Flash Pad 387 Underwent RCRA closure in conjunction with Material Disposal Area (MDA) P in 2002.
TA-16-394	X01* and X01** T04	
TA-16-401	X01* and X01**	(Pressure Vessel - sand filter tank)

Unit Identifier	Process Codes	General Information
TA-16-406	X01* and X01**	(Pressure Vessel - sand filter tank)
TA-16 Surface Impoundment	S04 - D83	
TA-16 Incinerator	T03	(TA-16-1409)
TA-16, Material Disposal Area P	D80	
TA-21-61	S01	
TA-22-24	S01	(High Explosive Storage Unit)
TA-33-90	S01	Application was withdrawn and that the unit never stored hazardous waste.
TA-33-92	S01	Application was withdrawn and that the unit never stored hazardous waste.
TA-35-85, Surface Impoundment	S04 - D83	
TA-35-125, Surface Impoundment	S04 - D83	Closure by removal.
TA 35-128	T03	Packed Bed Reactor/Silent Discharge Plasma Research
TA-39, MDA-Y	D80	
TA-40, Scrap Detonation Unit	X01** T04	
TA-40-DF2 (magazine)	S01	Converted to a <90 day storage unit
TA-50-1, Batch Waste Treatment Unit (BWTU)	T01	
TA-50-1, Container Storage Unit(s) associated with BWTU	S01	
TA-50-1, Room 34B	S01	unit never managed hazardous waste
TA-50-1, Room 34C	S01	unit never managed hazardous waste
TA-50-1, Room 35	S01	unit never managed hazardous waste
TA-50-1, Room 36	S01	unit never managed hazardous waste

Unit Identifier	Process Codes	General Information
TA-50-1, Room 38	S01	unit never managed hazardous waste
TA-50-1, Room 38A	S01	unit never managed hazardous waste
TA-50-1, Room 59	S01	Radioactive Liquid Waste Treatment Facility (RLWTF)
TA-50-1, Room 60A	T04	Cementation Treatment Unit Proposed treatment process was revised to generator treatment in a < 90 day storage area.
TA-50-37	T03	Controlled Air Incinerator (CAI)
TA-50-37 RAMROD	T04	Radioactive Materials Research, Operations and Demonstration Facility (RAMROD). LANL withdraws permit request. Convert unit(s) to <90 day storage.
TA-50-37, Storage Tanks	S02	Located in Room 115
TA 50-37-112	S01, T03	Location of Controlled Air Incinerator (CAI), part of RAMROD Facility
TA-50-37-114	S01	Part of RAMROD
TA-50-37, Room 115	S01 - S02	Location of storage tanks and waste feed tanks Part of RAMROD
TA-50-37, Room 117	S01	Room used for container storage. Part of RAMROD
TA-50-37, Room 118	S01	Room used for container storage. Part of RAMROD
TA-50-114	S01	Storage shed
TA-50-137	S01	Storage Bldg Unit was never built
TA-50-138	S01	Storage Bldg Unit was never built
TA-50-139	S01	Storage pad Unit was never built

Unit Identifier	Process Codes	General Information
TA-50-140	S01	Storage pad Unit was never built
TA 53-166	S04	South Surface Impoundment Change from closure as a TSD to cleanup under HSWA
TA 53-166	S04	NE Surface Impoundment Change from closure as a TSD to cleanup under HSWA
TA 53-166	S04	NW Surface Impoundment Change from closure as a TSD to cleanup under HSWA
TA-54-L, Waste Oil Storage Tank (WOST)	S02	
TA-54-L, Truck Mounted Container Treatment System	T01	Unit was proposed in a 1993 permit modification and was withdrawn in a 1998 Part A.
TA-54-L, Bldg. 35, Storage/ Treatment Tanks (4)	S02 and (T01)	Pad below the tanks remains operational for waste storage.
TA-55-4, Oxygen Sparging Treatment Furnace	T04	
TA-55-4, B38	S01	Unit also referred to as TA-55-4, basement, Area 2
TA-55-4, basement. Area 7 North end of basement CSA	S01	Unit was never used for hazardous waste storage and was withdrawn in the 1998 Part A.
TA-55-4-401 Mixed waste Monitoring CSA (Area 8 also called FLO-1)	S01	Unit was never used for hazardous waste storage and was withdrawn in the 1998 Part A.
TA-55-4-401 Sphere Material Removal CSA (Area 9)	S01	Unit was never used for hazardous waste storage and was withdrawn in the 1998 Part A.

Unit Identifier	Process Codes	General Information
TA-55-4-401 CSA for Evaporator Salt Precipitate (Area 10)	S01	This unit was included as part of the evaporator glovebox storage tank system in the June 1996 TA-55 Part B
TA-55-4-433 Mixed Waste Monitoring CSA	S01	(Area 11 – referenced as Area 10 in June 1996) Unit was never used for hazardous waste storage and was withdrawn in the 1998 Part A.
TA-55-4-432 CSA Glovebox Process Waste	S01	(Area 12 - referenced as Area 11 in June 1996) Unit was never used for hazardous waste storage and was withdrawn in the 1998 Part A.
TA-55-41 CSA Vault	S01	Unit was never used for hazardous waste storage and was withdrawn in the 1998 Part A.
TA-63 Chemical Waste Treatment Skid	T01	This unit was never constructed and was withdrawn in the 1998 Part A application.
TA-63 Liquid Waste Storage Tanks (6)	S02	These tanks were never constructed and were withdrawn in the 1998 Part A application.

ATTACHMENT G.16
TECHNICAL AREA 54 WEST, BUILDING 38
INDOOR CONTAINER STORAGE UNIT
CLOSURE PLAN

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1.0 INTRODUCTION

This closure plan describes the activities necessary to close the indoor hazardous waste container storage unit that is comprised of the High Bay and Low Bay rooms located at Technical Area 54 West, Building 38 (TA-54-38) at the Los Alamos National Laboratory (Facility), hereinafter referred to as the permitted unit. The information provided in this closure plan addresses the closure requirements specified in Permit Part 9, the Code of Federal Regulations (CFR), Title 40, Part 264, Subparts G and I for hazardous waste management units operated at the Facility under the Resource Conservation and Recovery Act (RCRA) and the New Mexico Hazardous Waste Act.

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

2.0 DESCRIPTION OF UNIT TO BE CLOSED

A specific description of the permitted unit can be found in Permit Attachment A (*Technical Area Unit Descriptions*). Additional features and equipment located at the permitted unit and not discussed elsewhere within the Permit are described below.

The permitted unit is comprised of the ~~outdoor loading dock and areas within the~~ entire High Bay (Room 101) and the entire Low Bay (Room 102). Access between the two bays is provided through a 2.4 meter (m) wide by 3.8 m high roll-up door.

The High Bay, which stores fiberglass-reinforced plywood boxes, standard waste boxes (SWB), B25 boxes, and drums of various sizes, is 40 feet (ft) wide and 80 ft long. It is equipped with a 5-ton capacity bridge crane, a truck-axle weighing scale, loading platforms, and TRUPACT–II and HalfPACT lid stands. The floor is a 6-inch, reinforced, epoxy-coated, concrete slab which gently slopes toward a central 50-ft trench and a sump. The sump is locked out and a pipe plug has been installed. The floor has a grated drain (approximately five (5) inches (in.) wide by 57 ft long) that runs down the center of the bay which collects melting snow and water from the trucks that enter the bay. The permitted container storage area within the High Bay~~, which is located along the south side of the room's center wall, is approximately 11 ft wide and 34 ft long and~~ is used as a transuranic (TRU) waste payload-container assembly area and TRUPACT-II/HalfPACT shipper-container loading area. Its primary function is the preparation of waste packages for transport to the Waste Isolation Pilot Plant (WIPP). The TRU waste packaged in the High Bay is predominantly radioactive, but can include mixed waste.

The Low Bay, where waste drums of various sizes are stored, is 40 ft long by 34 ft wide; it was once used for staging hazardous solid and liquid waste while nondestructive radioassay waste characterization activities were performed. The floor is a 6-inch reinforced concrete slab coated with industrial grade enamel paint. ~~The permitted container storage area within the Low Bay is approximately 11 ft^2.~~

The permitted unit began hazardous waste operations in 1995 when testing of radioassay equipment occurred. Shipments of waste packages from the facility to the WIPP began in 1999. The building was constructed in 1989 and 1990. Specific hazardous waste constituents stored at the permitted unit are included in Tables G.16-1 and G.16-2.

Permit Part 3 (*Storage in Containers*), Permit Attachment A (*Technical Area Unit Descriptions*), Permit Attachment B (*Part A Application*), and Permit Attachment C (*Waste Analysis Plan)* include information about waste management procedures and hazardous waste constituents stored at the permitted unit.

3.0 ESTIMATE OF MAXIMUM WASTE STORED

Approximately 612,755 gallons of waste has been stored at the permitted unit since 1995. Throughout the life of this permit, it is estimated that an additional 440,000 gallons of waste will be stored at the permitted unit.

4.0 GENERAL CLOSURE INFORMATION

4.1 Closure Performance Standard

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

a. remove all hazardous waste residues and hazardous constituents; and

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

If the Permittees are unable to achieve either of the clean closure standards above, they must:

c. control hazardous waste residues, hazardous constituents, and, as applicable, contaminated media such that they do not exceed a total excess cancer risk of 10^{-5} for carcinogenic substances and, for non-carcinogenic substances, a target Hazard Index of 1.0 for human receptors, and meet Ecological Screening Levels established under Permit Section 11.5;

d. minimize the need for further maintenance;

e. control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, groundwater, surface waters, or to the atmosphere; and

f. comply with the closure requirements of Permit Part 9 (*Closure*) and 40 CFR Part 264 Subparts G and I for container storage units.

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

4.2 Closure Schedule

This closure plan schedule is intended to address the closure requirements for the permitted unit within the authorized timeframe of the current Hazardous Waste Facility Permit (*see* Permit Section 9.4). The following section explains the schedule of closure activities (*see also* Table G.16-3 of this closure plan).

Notification of closure will occur at least 45 days before the Permittees expect to begin closure (*see* 40 CFR § 264.112(d)(1)) and closure activities will begin according to the requirements of 40 CFR § 264.112(d)(2). However, pursuant to 40 CFR § 264.112(e), removing hazardous wastes and decontaminating or dismantling equipment in accordance with an approved closure plan may be conducted at any time before or after notification of closure. Notification of the structural assessment (assessment), as described in Section 5.2 of this closure plan, shall occur in accordance with Permit Section 9.4.6.2.

Within 90 days after the final receipt of hazardous waste, the permitted unit will be emptied of all stored waste. Within ten days of completing hazardous waste removal or within 100 days of the final receipt of hazardous waste the Permittees will conduct the records review (review) and assessment and submit an amended closure plan, if necessary, to the Department for review and approval as a permit modification in accordance with Permit Section 9.4.8. Upon approval of the modified closure plan, if applicable, the Permittees will decontaminate unit surfaces and related equipment.

Decontamination verification sampling activities, and soil sampling if applicable, will be conducted to demonstrate that surfaces, related equipment, and media, if applicable, at the permitted unit meet the closure performance standards in Permit Section 9.2.

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

5.0 CLOSURE PROCEDURES

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

5.1 Removal of Waste

In accordance with Permit Section 9.4.2, all stored hazardous wastes will be removed from the permitted unit scheduled for closure. Depending upon their size, containers will be removed with forklifts, container dollies, air pallets, or manually. Containers will be placed on flatbed trucks, trailers, or other appropriate vehicles for transport. Appropriate shipping documentation will accompany the wastes during transport. Containers holding hazardous wastes will be moved to a permitted on-site storage unit or a permitted off-site treatment, storage, or disposal facility.

5.2 Records Review and Structural Assessment

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

5.2.1 Records Review

The Facility Operating and Inspection Records shall be reviewed in accordance with Permit Section 9.4.6.1. Goals of the review will be to:

a. confirm the specific hazardous waste constituents of concern; and

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

5.2.2 Structural Assessment

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

5.3 Decontamination and Removal of Structures and Related Equipment

In accordance with Permit Section 9.4.3, the unit's surfaces and related equipment will be decontaminated, or removed, or both and managed appropriately. Decontamination activities will ensure the removal of all hazardous waste residues and hazardous waste constituents from the permitted unit to meet the closure performance standards.

All surfaces and related equipment that are removed and not intended for recycle will not require decontamination, will be considered solid and potentially hazardous waste when removed, and will be disposed of in accordance with Section 7.0.

5.3.1 Removal of Structures and Related Equipment

At this time, there is no equipment identified for removal from the unit; however, if equipment is identified during the assessment it will be decontaminated, removed, and disposed of in accordance with the appropriate sections of this closure plan.

5.3.2 Decontamination of Structures and Related Equipment

Decontamination of the permitted unit's surfaces and equipment will include all features located within the unit (*e.g.*, drain grates, ladders). The following equipment located at the permitted unit is expected to be left in place and therefore decontaminated: the man lift; the lid stands; the drum wrapper; the portion of the bridge crane that comes into contact with waste containers; and the floor scales.

The permitted unit's floors and walls (up to 11 ft) will be decontaminated. Decontamination of the permitted unit will be conducted by first removing loose material (*e.g.*, dust, dirt) through sweeping followed by pressure washing or steam cleaning with a solution consisting of a surfactant detergent (*e.g.*, Alconox®) and water mixed in accordance with the manufacturer's recommendations.

Ceilings of the permitted unit, walls above 11 ft, and the areas outside of the permitted unit will be presumed to be free of contamination unless there is some physical indication of contamination (*e.g.*, staining), the records review reveals that large amounts of liquid volatile or semi-volatile organic hazardous waste was stored in the permitted unit, or a spill or release occurred within the permitted unit that could have affected the ceiling or the walls above 11 ft.

Portable berms or other such devices (*e.g.*, absorbent socks, plastic sheeting, wading pools, existing secondary containment) will collect excess wash water and provide containment during the decontamination process.

The floor drain in the High Bay will be plugged before decontamination activities begin to ensure that none of the wash water solution enters the drain located on the floor.

5.4 Equipment Used During Decontamination Activities

Reusable protective clothing, tools, and equipment used during closure decontamination activities will be cleaned with a wash water solution. Residue, disposable equipment, and small reusable equipment that cannot be decontaminated will be containerized and managed as waste as summarized in Table G.16-4 and in accordance with Permit Section 9.4.5 and Section 7.0 of this closure plan.

6.0 SAMPLING AND ANALYSIS PLAN

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

6.1 Decontamination Verification Sampling Activities

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

One wipe sample will be collected from each piece of decontaminated equipment at the permitted unit. In compliance with Permit Section 9.4.7.1.i, this closure plan will ensure the collection of:

a. ~~four~~ eight wipe samples from the High Bay (*see* Figure G.16-1):

    1. ~~two~~ four from the floor;
    2. one from each~~the~~ wall; and
    3. one from the sump;

b. five~~one~~ wipe samples from the Low Bay (*see* Figure G.16-1):

1. two from the floor; and

~~b.~~ one from each wall.

~~c.~~2. ~~one from the floor; and~~

~~d. two wipe samples from the Loading Dock areas identified as 'sample area 1' and 'sample area 2' (*see* Figure G.16-1)~~

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If liquid is found in the sump in the High Bay at the time of the assessment, liquid samples will be collected in accordance with Section 6.2.1 of this closure plan.

Solid chip samples may be collected and analyzed to determine if residual hazardous constituents remain in the concrete floor at the permitted unit.

6.2 Sample Collection Procedures

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

6.2.1 Liquid Sampling

Liquid samples will be collected and analyzed to determine if residual hazardous constituents remain in the drain at the permitted unit. Liquid samples will be collected using glass or plastic tubes, a composite liquid sampler, a bacon bomb, a bailer, or by pouring liquid in sample containers.

6.2.2 Wipe Sampling

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

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

6.2.3 Solid Chip Sampling

Solid chip samples may be collected and analyzed to determine if residual hazardous constituents remain in the concrete floor at the permitted unit. Any non-porous inclusions from the sampling location will be removed by brushing or wiping. Using a chisel, drill, hole saw, or similar tool, a minimum 100 grams of the sample will be collected to a depth of 2 cm, or to an alternate depth specified in the assessment and transferred to an appropriate sampling container. The holding time and the preservation techniques to be used for each analysis will be determined from Table G.16-5.

6.2.4 Cleaning of Sampling Equipment

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

6.3 Sample Management Procedures

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

6.3.1 Sample Documentation

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

6.3.1.1 Chain-of-Custody

Chain-of-custody forms will be maintained by sampling personnel until the samples are relinquished to the analytical laboratory. This will ensure the integrity of the samples and provide for an accurate and defensible written record of the sampling possession and handling from the time of collection until laboratory analysis. One chain-of-custody form may be used to document all of the samples collected from a single sampling event. The sample collector will be responsible for the integrity of the samples collected until properly transferred to another person. The EPA considers a sample to be in a person's custody if it is:

a. in a person's physical possession;

b. in view of the person in possession; or

c. secured by that person in a restricted access area to prevent tampering.

The sample collector will document all pertinent sample collection data. Individuals relinquishing or receiving custody of the samples will sign, date, and note the time on the analysis request/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 original chain-of-custody form to the Facility and it will become part of the permanent sampling record documenting the sampling efforts.

6.3.1.2 Sample Labels and Custody Seals

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

a. a unique sample identification number;

b. name of the sample collector;

c. date and time of collection;

d. type of preservatives used, if any; and

e. location from which the sample was collected.

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

6.3.1.3 Sample Logbook

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

a. the sample location;

b. suspected composition;

c. sample identification number;

d. volume/mass of sample taken;

e. purpose of sampling;

f. description of sample point and sampling methodology;

g. date and time of collection;

h. name of the sample collector;

i. sample destination and how it will be transported;

j. observations; and

k. name(s) of personnel responsible for the observations.

6.3.2 Sample Handling, Preservation, and Storage

Samples will be collected and containerized in appropriate pre-cleaned sample containers. Table G.16-5 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 Orders, and relevant local, state, and federal laws (including 10 CFR and 49 CFR). Appropriate Facility

documents establish the requirements for packaging design, testing, acquisition, acceptance, use, maintenance, and decommissioning and for on-site, intra-site, and off-site shipment preparation and transportation of general commodities, hazardous materials, substances, wastes, and defense program materials.

Off-site transportation of samples will occur via private, contract, or common motor carrier, air carrier, or freight. All off-site transportation will be processed through the Facility packaging and transportation organization unless the shipper is specifically authorized through formal documentation by the packaging and transportation 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 Appendix VIII of 40 CFR Part 261 and in Appendix IX of 40 CFR Part 264 that have been stored at the permitted unit over its operational history (*see* Tables G.16-1 and G.16-2). Tables G.16-1 and G.16-2 will be modified, as necessary, to incorporate changes as a result of the permitted unit's records review. Samples will be analyzed by an independent laboratory using the methods outlined in Table G.16-6. Analytes, test methods and instrumentation, target detection limits, and rationale for metals and organic analyses are presented in Table G.16-6. If any of the information from these tables has changed at the time of closure, the Permittees will amend this closure plan to update all methods in this SAP.

6.4.1 Analytical Laboratory Requirements

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

a. a documented comprehensive QA/QC program;

b. technical analytical expertise;

c. a document control/records management plan; and

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

The selection of the analytical testing methods identified in Table G.16-6 is based on the following considerations:

e. the capability to perform data reduction, validation, and reporting;

f. the physical form of the waste;

g. constituents of concern;

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

i. 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 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (*SW-846*) (EPA, 1986) or other Department-approved procedures. Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. QC samples evaluate precision, accuracy, and potential sample contamination associated with the sampling and analysis process, and is described in the following sections, along with information on calculations necessary to evaluate the QC results.

6.4.2.1 Field Quality Control

The field QC samples that will be collected are trip blanks, field blanks, field duplicates, and equipment rinsate blanks. Table G.16-7 presents a summary of QC sample types, applicable analyses, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples. QC samples will be identified on the applicable forms so that the results can be applied to the associated sample.

6.4.2.2 Analytical Laboratory QC Samples

QA/QC considerations are an integral part of analytical laboratory operations. Laboratory QA ensures that analytical methods generate data that are technically sound and statistically valid and that can be documented. QC procedures are the tools employed to measure the degree to which these QA objectives are met.

6.4.3 Data Reduction, Verification, Validation, and Reporting

Analytical data generated by the activities described in this closure plan will be verified and validated. Data reduction is the conversion of raw data to reportable units, transfer of data between recording media, and computation of summary statistics, standard errors, confidence intervals, and statistical tests.

6.4.4 Data Reporting Requirements

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

a. a summary of analytical results for each sample;

b. results from QC samples such as blanks, spikes, and calibrations;

c. reference to standard methods or a detailed description of analytical procedures; and

d. raw data printouts for comparison with summaries.

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

7.0 WASTE MANAGEMENT

All waste generated during closure will be controlled, handled, characterized, and disposed of in accordance with Permit Section 9.4.5, Permit Attachment C (*Waste Analysis Plan*), and Facility waste management procedures. Closure activities may generate different types of waste materials: these wastes are listed with potential disposal options in Table G.16-4 of this closure plan. Subsequent disposition options for the decontaminated structures and equipment include reuse, recycling, or disposal. Reusable protective clothing, tools, and equipment used during decontamination will be cleaned with a wash water solution. Disposable equipment and other small equipment that cannot be decontaminated, as summarized in Table G.16-4, will be containerized and managed as waste.

8.0 CLOSURE CERTIFICATION REPORT

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

REFERENCES

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

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

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

NIOSH, 1994. The National Institute for Occupational Health and Safety (NIOSH) *Manual of Analytical Methods*, 4th ed. Issue 1. 1994.

Table G.16-1

Hazardous Waste Constituents of Concern at the Technical Area 54, Building 38 High Bay [a]

Category	EPA Hazardous Waste Numbers	Specific Constituents
Toxic Metals	D003, D004, D005, D006, D007, D008, D009, D010. D011	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver
Organic Compounds	D018, D019, D021D022, D028, D035, D038, D039, D040, D043	Benzene, Carbon Tetrachloride, Chlorobenzene, Chloroform, 1,2 – Dichloroethane, Methyl ethyl ketone, Pyridine, Tetrachloroethylene, Vinyl Chloride
	F001, F002, F003, F004, F005, U080	Tetrachlrorethylene, Trichloroethylene, Methylene Chloride, 1,1,1-trichloroethane, Chlorinated Fluorocarbons, Trichloroethylene, 1,1,2- Trichloro-1,1,2-Trifluoroethane, Ortho-dichlorobenzene, Trichlorofluoromethane, 1,1,2-Trichloroethane, Xylene, Acetone, Ethyl acetate, Ethyl benzene, Ethyl ether, Methyl Isobutyl Ketone, n-Butyl alcohol, Cyclohexanone, Methanol, Cresols, Cresylic acid, Nitrobenzene, Toluene, Carbon disulfide, Isobutanol, Benzene, 2-Ethoxyethanol, 2-Nitropropane, Dichloromethane

[a] Based on the permitted unit's Operating Record

Table G.16-2

Hazardous Waste Constituents of Concern at the Technical Area 54, Building 38 Low Bay[a]

Category	EPA Hazardous Waste Numbers	Specific Constituents
Toxic Metals	D003, D004, D005, D006, D007, D008, D009, D010. D011	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver
Organic Compounds	D018, D019, D021D022, D028, D035, D038, D039, D040, D043	Benzene, Carbon Tetrachloride, Chlorobenzene, Chloroform, 1,2 – Dichloroethane, Methyl ethyl ketone, Pyridine, Tetrachloroethylene, Vinyl Chloride
	F001, F002, F003, F004, F005, U080	Tetrachlrorethylene, Trichloroethylene, Methylene Chloride, 1,1,1-trichloroethane, Chlorinated Fluorocarbons, Trichloroethylene, 1,1,2- Trichloro-1,1,2-Trifluoroethane, Ortho-dichlorobenzene, Trichlorofluoromethane, 1,1,2-Trichloroethane, Xylene, Acetone, Ethyl acetate, Ethyl benzene, Ethyl ether, Methyl Isobutyl Ketone, n-Butyl alcohol, Cyclohexanone, Methanol, Cresols, Cresylic acid, Nitrobenzene, Toluene, Carbon disulfide, Isobutanol, Benzene, 2-Ethoxyethanol, 2-Nitropropane, Dichloromethane

[a] Based on the permitted unit's Operating Record.

Table G.16-3

Closure Schedule for the TA-54 West, Building 38, Indoor Container Storage Unit

Activity	Maximum Time Required
Notify the Department of intent to close.	-45 Days
Final receipt of waste.	Day 0
Complete waste removal.	Day 90
Complete records review and structural assessment.	10 days after waste removal or 100 days after final receipt of waste
Complete all closure activities and submit final closure certification report to the Department.	Day 180

Table G.16-4

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.
	Low-level radioactive solid waste	Either an authorized on-site radioactive waste disposal area that is not undergoing closure under RCRA or its state analog, or an authorized off-site radioactive waste disposal facility.
	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 Plant (WIPP), as appropriate.
Decontamination wash water	Non-regulated liquid waste	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 or recycled
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
	Low-level radioactive solid waste	Either an authorized on-site radioactive waste disposal area that is not undergoing closure under RCRA or its state analog, or an authorized off-site radioactive waste

Figure G.16-4 (cont.)

Potential Waste Materials, Waste Types, and Disposal Options

Potential Waste Materials	Waste Types	Disposal Options
		disposal facility.
	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	Low-level radioactive solid waste	Either an authorized on-site radioactive waste disposal area that is not undergoing closure under RCRA or its state analog, or an authorized off-site radioactive waste disposal facility.
	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.
	Non-regulated solid waste	Subtitle D landfill, recycled, or reused
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Discarded waste management equipment	Low-level radioactive solid waste	Either an authorized on-site radioactive waste disposal area that is not undergoing closure under RCRA or its state analog, or an authorized off-site radioactive waste disposal facility.
	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.
	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.
Sampling equipment	Low-level radioactive solid waste	Either an authorized on-site radioactive waste disposal area that is not undergoing closure under RCRA or its state analog, or an authorized off-site radioactive waste disposal facility.

Figure G.16-4 (cont.)

Potential Waste Materials, Waste Types, and Disposal Options

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 or WIPP, as appropriate.
	Non-regulated solid waste	Subtitle D landfill
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.

Table G.16-5

Sample Containers[a], Preservation Techniques, and Holding Times[b]

Analyte Class and Sample Type	Container Type and Materials	Preservation	Holding Time
Metals			
TCLP/Total Metals: Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver	Aqueous Media: 500-mL Wide Mouth-Polyethylene or Glass with Teflon Liner	Aqueous Media: HNO_3 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_3 to pH <2 Cool to 4 °C	28 Days
	Solid Media: 125-mL Glass	Solid Media: Cool to 4 °C	
Volatile Organic Compounds			
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	

Semi-Volatile Organic Compounds			
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 extraction. 40 days from extraction to determinative analysis.
	Solid Media: 250-mL Glass	Solid Media: Cool to 4 °C	

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

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

°C = degrees Celsius
HCl = hydrochloric acid
mL = milliter
HNO_3 = nitric acid
L = Liter
TCLP = Toxicity Characteristic Leaching Procedure

Table G.16-6

Summary of Analytical Methods

Analyte	EPA *SW-846* Analytical Method [a]	Test Methods/ Instrumentation	Target Detection Limit [b]	Rationale
Metal Analysis				
Arsenic	7060A [c], 7061A	FLAA, GFAA	10 ug/L	Determine the metal concentration in the samples.
Barium	7080A [d], 7081 [c]	FLAA,GFAA	200 ug/L	
Cadmium	7130 [d], 7131A [c]	FLAA, GFAA	2 ug/L	
Chromium	7190 [d], 7191 [c]	FLAA, GFAA	10 ug/L	
Lead	7420 [d], 7421 [c]	FLAA, GFAA	5 ug/L	
Mercury	7470A, 7471A [e]	CVAA	0.2 ug/L	
Selenium	7740[c], 7741A	FLAA, GFAA	5 ug/L	
Silver	7760A[d], 7761 [c]	FLAA, GFAA	10 ug/L	
Organic Analysis				
Target compound list VOCs plus ten tentatively identified compounds (TIC)	8260B	GC/MS	10 mg/L	Determine the VOCs concentration in the samples.
Target compound list SVOCs plus 20 TICs	8270D [c]	GC/MS	10 mg/L	Determine the SVOCs concentration in the samples.

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

[b] 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.

[c] Method being integrated into Method 7010, per the May 1998 *SW-846* Draft Update IVA.

[d] Method being integrated into Method 7000B, per the May 1998 *SW-846* Draft Update IVA.

[e] Method being revised to 7471B per the May 1998 *SW-846* Draft Update IVA.

CVAA = Cold-vapor atomic absorption spectroscopy; GFAA = Graphite furnace atomic absorption spectroscopy
FLAA = Flame atomic absorption spectroscopy; GC/MS = Gas chromatography/mass spectrometry;
mg/L = milligrams per liter; ug/L = micrograms per liter

Table G.16-7

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

QC Sample Type	Applicable Analysis [a]	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[b]	VOC/SVOC, metals	One sample daily	Not Applicable

[a] 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.

[b] Collected only if reusable sampling equipment used.

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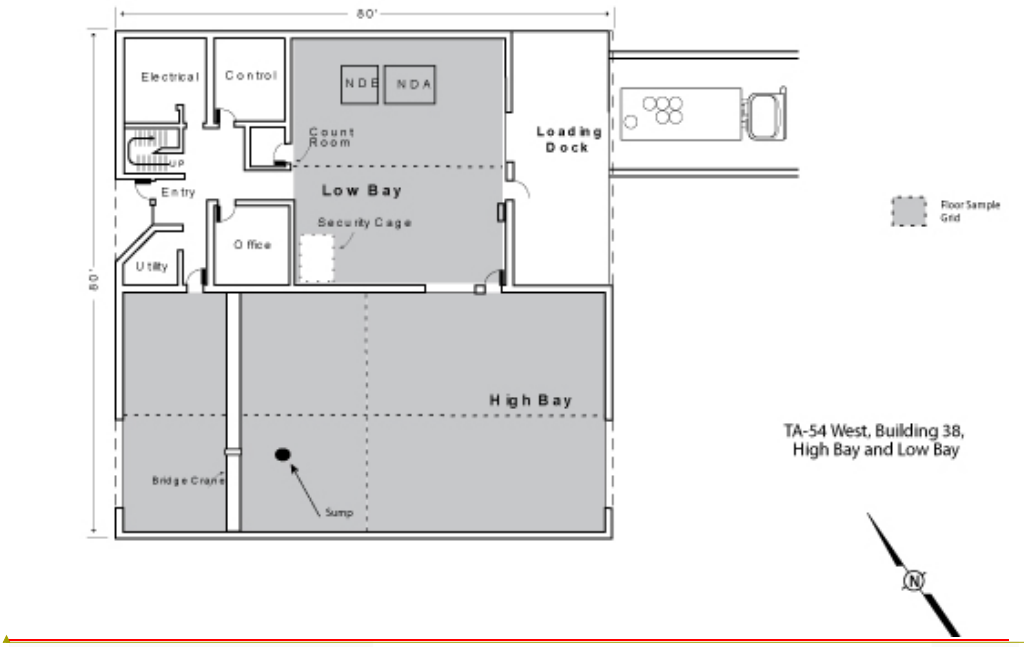

Figure G.16-1: Technical Area 54, Building 38 (High, Low Bay, and Loading Dock Sampling Locations)

ATTACHMENT G.17
TECHNICAL AREA 54, WEST
OUTDOOR CONTAINER STORAGE UNIT
CLOSURE PLAN

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G.17-1	Technical Area 54 West Outdoor Container Storage Unit Grid Sampling and Additional Sampling Locations

1.0 INTRODUCTION

This closure plan describes the activities necessary to close the outdoor hazardous waste container storage unit at Technical Area 54 West, Building 38 (TA-54-38) at the Los Alamos National Laboratory (Facility), hereinafter referred to as the permitted unit. The information provided in this closure plan addresses the closure requirements specified in Permit Part 9 and the Code of Federal Regulations (CFR), Title 40, Part 264, Subparts G and I for hazardous waste management units at the Facility under the Resource Conservation and Recovery Act (RCRA) and the New Mexico Hazardous Waste Act.

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

2.0 DESCRIPTION OF UNIT TO BE CLOSED

A specific description of the permitted unit can be found in Permit Attachment A (*Technical Area Unit Descriptions*). Additional features and equipment located at the permitted unit and not discussed elsewhere within the Permit are described below.

The permitted unit is located on the north and east sides of TA-54-38 and consists of an asphalt pad (which slopes toward the north and east and has a thickness of approximately four inches) and a loading dock which measures 16 ft wide by 38 ft, 10 inches long. The loading dock is constructed of six inch cast-in-place concrete, is approximately 4 inches above grade, and is covered by a metal roof awning. Small storage sheds (1024 and 1025) for supplies and equipment and not for the storage of hazardous waste, are also located on the permitted unit. The entire permitted unit measures approximately 37,900 square feet.

The slope of the asphalt pad allows for storm water to run off the pad into a one inch wide trench drain that runs along the north edge of the pad. The eastern edge of the pad consists of an asphalt swale that collects storm water and conveys it to a single discharge point at the northeast corner of the site. An asphalt berm running from the extreme northern corner of Building 38 to the drain flanks the northern side of the permitted unit and an asphalt curb flanks the southern side.

The waste typically stored at the permitted unit consists of hazardous and mixed waste in both solid and liquid form. The permitted unit was constructed in 1993, became operational in 1998, and has been subject to waste management regulations under RCRA since its construction. In 2007, the boundaries of the permitted unit were expanded to include the current configuration. The stored wastes include corrosive liquids, sludge, debris, and chemical wastes with metals and volatile and semi-volatile organic constituents.

Permit Part 3 (*Storage in Containers*), Permit Attachment A (*Technical Area Unit Descriptions*), Permit Attachment B (*Part A Application*), and Permit Attachment C (*Waste Analysis Plan)* include information about waste management procedures and hazardous waste constituents stored at the permitted unit.

The Loading Dock, located just east of the low bay, is approximately 16 ft wide and 39 ft long and is constructed of cast-in-place concrete. A truck ramp, which is not part of the Loading Dock CSA, runs perpendicular to the loading dock platform. At the bottom of the truck ramp is a 38-inch-square grate covering a drainage culvert. The Loading Dock container storage area is divided into two areas on the platform; the first is an area at the north end of the loading dock which measures 16 ft by ten (10) ft. and the second area is at the south end of the loading dock which measures 16 ft by 12 ft. Waste drums of various sizes are stored in the Loading Dock.

3.0 ESTIMATE OF MAXIMUM WASTE STORED

To date, approximately 612,755 gallons of waste has been stored in the permitted unit. Throughout the life of this Permit it is estimated that an additional 1,870,000 gallons of waste will be stored in the permitted unit.

4.0 GENERAL CLOSURE INFORMATION

4.1 Closure Performance Standard

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

a. remove all hazardous waste residues and hazardous constituents; and

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

If the Permittees are unable to achieve either of the clean closure standards above, they must:

c. control hazardous waste residues, hazardous constituents, and, as applicable, contaminated media such that they do not exceed a total excess cancer risk of 10^{-5} for carcinogenic substances and, for non-carcinogenic substances, a target Hazard Index of 1.0 for human receptors, and meet Ecological Screening Levels established under Permit Section 11.5;

d. minimize the need for further maintenance;

e. control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, groundwater, surface waters, or to the atmosphere; and

f. comply with the closure requirements of Permit Part 9 (*Closure*) and 40 CFR Part 264, Subparts G and I.

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

4.2 Closure Schedule

This closure plan schedule is intended to address the closure requirements for the permitted unit within the authorized timeframe of the current Hazardous Waste Facility Permit (*see* Permit Section 9.4). The following section provides the schedule of closure activities (*see also* Table G.17-2 in this closure plan).

Notification of closure will occur at least 45 days before the Permittees expect to begin closure (*see* 40 CFR § 264.112(d)(1)) and closure activities will be according to requirements of 40 CFR § 264.112(d)(2). However, pursuant to 40 CFR § 264.112(e), removing hazardous wastes and decontaminating or dismantling equipment in accordance with an approved closure plan may be conducted at any time before or after notification of closure. Notification of the structural assessment (assessment), as described in Section 5.2 of this closure plan, shall occur at the same time as notification of closure (s*e*e Permit Section 9.4.6.2).

Within 90 days after the final receipt of waste, the permitted unit will be emptied of all stored waste. Within ten days of completing hazardous waste removal or within 100 days of the final receipt of hazardous waste, whichever comes first, the Permittees will complete the records review (review) and assessment and submit an amended closure plan, if necessary, to the Department for review and approval as a permit modification in accordance with Permit Section 9.4.8. Upon approval of the modified closure plan, if applicable, the Permittees will decontaminate unit surfaces and related equipment.

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

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

5.0 CLOSURE PROCEDURES

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

5.1 Removal of Waste

In accordance with Permit Section 9.4.2, all stored hazardous wastes will be removed from the permitted unit scheduled for closure. Depending upon their size, containers will be removed with forklifts, container dollies, air pallets, or manually. Containers will be placed on flat bed trucks, trailers, or other appropriate vehicles for transport. Appropriate shipping documentation will accompany the wastes during transport. Containers holding hazardous wastes will be moved to a permitted on-site storage unit or a permitted off-site treatment, storage, or disposal facility.

5.2 Records Review and Structural Assessment

After waste removal and before starting closure decontamination and sampling activities, the Facility Operating and Inspection Records for the permitted unit will be reviewed and a structural assessment will

be conducted to determine any previous finding(s) or action(s) that may influence closure activities or potential sampling locations.

5.2.1 Records Review

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

a. confirm the specific hazardous waste constituents of concern; and

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

5.2.2 Structural Assessment

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

5.3 Decontamination and Removal of Structures and Equipment

In accordance with the procedures in Permit Section 9.4.3, all remaining hazardous waste residues and hazardous constituents will be removed from the permitted unit. The permitted unit's structures and related equipment will be decontaminated, removed, or both and managed appropriately. All waste material will be controlled, handled, characterized, and disposed of in accordance with Permit Attachment C (*Waste Analysis Plan*), Permit Section 9.4.5, and Facility waste management procedures (*see* Table G.17-3). Decontamination activities will ensure the removal of all hazardous waste residues and hazardous waste constituents from the permitted unit to meet the closure performance standards as outlined in Permit Section 9.2.

5.3.1 Removal of Structures and Related Equipment

All surfaces, structures, and related equipment that are removed will not require decontamination, will be considered solid and potentially hazardous waste (as defined by this Permit) when removed, and will be disposed of in accordance with Permit Section 9.4.5 and Section 7.0 of this closure plan.

At this time, there is no equipment identified for removal from the unit; however, if equipment is identified during the assessment, it will be removed and disposed of in accordance with Permit Section 9.4.3.2. The asphalt pad, the materials associated with the asphalt pad (*e.g.*, the berm around the pad), and a minimum of six inches of the base course and soil underlying the asphalt pad shall be removed after the assessment. If after the removal of the pad (and underlying soil and base course material) the remaining surface shows evidence that the removal to that point has not gathered all appropriate soils and materials associated with the pad, additional soil and materials will be remove. The Permittees shall take precautions to not remove or disturb the soil or tuff that overlies the regulated unit (covered under the March 1, 2005 Compliance Order on Consent (*see* Permit Section 9.3)) beneath the permitted unit. The option of removing small areas of asphalt at sampling locations where contamination is suspected (*i.e.*,

locations of spills or stains) to allow sampling without disturbing the surrounding area prior to the general removal of the pad will be assessed at the time of the assessment.

5.3.2 Decontamination of Structures and Related Equipment

All structures and related equipment that will be reused by the Facility will be decontaminated in accordance with Permit Section 9.4.3.1. The following structures and equipment located at the permitted unit is expected to be left in place and will therefore be decontaminated: the loading dock and the metal awning.

Water-resistant structures and equipment (*i.e.*, the loading dock, the awning) at the permitted unit and not sensitive to water intrusion will be decontaminated by steam cleaning, or pressure washing, with a solution consisting of a surfactant detergent (*e.g.*, Alconox®) and water and mixed in accordance with the manufacturer's recommendation. All other equipment at the permitted unit that is sensitive to water intrusion (*e.g.*, electronic devices or tools) will be decontaminated by washing using a wipe-down method with a solution consisting of a surfactant detergent (*e.g.*, Alconox®) and water and mixed in accordance with the manufacturer's recommendation.

The quantity of the wash solution will be minimized by dispensing from buckets, spray bottles, or other types of containers. Cloths, or other absorbent cleaning devices, will not be reused to wipe down the equipment after being wetted in the wash solution or after spraying solution onto the equipment. Portable berms or other such devices (*e.g.*, absorbent socks, plastic sheeting, wading pools, existing secondary containment) will collect excess water and provide containment during the decontamination process.

5.4 Equipment Used During Decontamination Activities

Reusable protective clothing, tools, and equipment used during decontamination activities will be cleaned with a wash water solution. Residue, disposable equipment, and small reusable equipment that cannot be decontaminated will be containerized and managed as waste as summarized in Table G.17-3 and in accordance with Facility waste management procedures, depending on the regulated constituents present.

6.0 SAMPLING AND ANALYSIS PLAN

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

6.1 Soil Sampling and Decontamination Verification Wipe Sampling Activities

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

One wipe sample will be collected from each piece of decontaminated equipment related to the permitted unit (*e.g.*, the awning). In compliance with Permit Section 9.4.7.1.i, this closure plan will ensure the collection of wipe samples from the floor and walls of the loading dock for a total of four verification samples.

In compliance with Permit Section 9.4.7.1.ii, this closure plan will ensure the collection of soil samples from the permitted unit at the following locations:

a. one sample from a known past loading zone area ('sample location 1') identified in the permitted unit's records (*see* Permit Section 9.4.7.1.ii(1));

b. one sample every 900 square feet of the permitted unit for a total of 46 samples (*see* Permit Section 9.4.7.1.ii(2));

c. two samples from the swale in the eastern portion of the permitted unit (*see* Permit Section 9.4.7.1.ii(3)); and

d. one sample every 30 feet along the drain line on the northern boundary of the permitted unit for a total of four samples (*see* Permit Section 9.4.7.1.ii(8)).

An additional two wipe samples are required from the Loading Dock areas identified as 'Sample Area 1' and 'Sample Area 2.' Figure G.17-1 illustrates the sampling locations discussed in this section.

6.2 Sample Collection Procedures

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

6.2.1 Wipe Sampling

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

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

6.2.2 Soil Sampling

Soil samples will be collected and analyzed to determine if hazardous constituents are present in soils at the permitted unit. Soil samples will be collected using a spade, scoop, auger, trowel, or other equipment as specified in approved methods for the type of analytes (*i.e.*, EPA 1996 or 2002) and from the appropriate depths as directed in Permit Section 9.4.7.1.ii. Samples will be kept at their at-depth temperature or lower, protected from ultraviolet light, sealed tightly in the recommended container, and analyzed within the specific holding times listed in Table G.10-5.

6.2.3 Cleaning of Sampling Equipment

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

6.3 Sample Management Procedures

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

6.3.1 Sample Documentation

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

6.3.1.1 Chain-of-Custody

Chain-of-custody forms will be maintained by sampling personnel until the samples are relinquished to the analytical laboratory. This will ensure the integrity of the samples and provide for an accurate and defensible written record of the sampling possession and handling from the time of collection until laboratory analysis. One chain-of-custody form may be used to document all of the samples collected from a single sampling event. The sample collector will be responsible for the integrity of the samples collected until properly transferred to another person. The EPA considers a sample to be in a person's custody if it is:

a. in a person's physical possession;

b. in view of the person in possession; or

c. secured by that person in a restricted access area to prevent tampering.

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

6.3.1.2 Sample Labels and Custody Seals

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

a. a unique sample identification number;

b. name of the sample collector;

c. date and time of collection;

d. type of preservatives used, if any; and

e. location from which the sample was collected.

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

6.3.1.3 Sample Logbook

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

a. the sample location;

b. suspected composition;

c. sample identification number;

d. volume/mass of sample taken;

e. purpose of sampling;

f. description of sample point and sampling methodology;

g. date and time of collection;

h. name of the sample collector;

i. sample destination and how it will be transported;

j. observations; and

k. name(s) of personnel responsible for the observations.

6.3.2 Sample Handling, Preservation, and Storage

Samples will be collected and containerized in appropriate pre-cleaned sample containers. Table G.17-5 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 Orders, and relevant local, state, and federal laws (including 10 CFR and 49 CFR). Appropriate Facility

documents establish the requirements for packaging design, testing, acquisition, acceptance, use, maintenance, and decommissioning and for on-site, intra-site, and off-site shipment preparation and transportation of general commodities, hazardous materials, substances, waste, and defense program materials.

Off-site transportation of samples will occur via private, contract, or common motor carrier, air carrier, or freight. All off-site transportation will be processed through the Facility packaging and transportation organization, unless the shipper is specifically authorized through formal documentation by that organization to independently tender shipments to common motor or air carriers.

6.4 Sample Analysis Requirements

Samples will be analyzed for all hazardous constituents listed in Appendix VIII of 40 CFR Part 261 and in Appendix IX of 40 CFR Part 264 that have been managed at the permitted unit over its operational history (*see* Table G.17-1). Table G.17-1 will be modified, as necessary, to incorporate changes as a result of the permitted unit's records review. Samples will be analyzed by an independent laboratory using the methods outlined in Table G.17-4. Analytes, test methods and instrumentation, target detection limits, and rationale for metals and organic analyses are presented in Table G.17-4. If any of the information from these tables has changed at the time of closure, the Permittees will amend this closure plan to update all methods in this SAP.

6.4.1 Analytical Laboratory Requirements

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

a. a documented comprehensive QA/QC program;

b. technical analytical expertise;

c. a document control and records management plan; and

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

The selection of the analytical testing methods identified in Table G.17-4 is based on the following considerations:

e. constituents of concern;

f. the physical form of the waste;

g. constituents of concern;

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

i. 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 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (*SW-846*) (EPA,

1986) or other Department-approved procedures. Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. QC samples evaluate precision, accuracy, and potential sample contaminations associated with the sampling and analysis process, and are described in the following sections, along with information on calculations necessary to evaluate the QC results.

6.4.2.1 Field Quality Control

The field QC samples that will be collected are trip blanks, field blanks, field duplicates, and equipment rinsate blanks. Table G.17-6 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 QC Samples

QA/QC considerations are an integral part of analytical laboratory operations. Laboratory QA ensures that analytical methods generate data that are technically sound, statistically valid, and that can be documented. QC procedures are the tools employed to measure the degree to which these QA objectives are met.

6.4.3 Data Reduction, Verification, Validation, and Reporting

Analytical data generated by the activities described in this closure plan will be verified and validated. Data reduction is the conversion of raw data to reportable units; transfer of data between recording media, and computation of summary statistics, standard errors, confidence intervals, and statistical tests.

6.4.4 Data Reporting Requirements

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

a. a summary of analytical results for each sample;

b. results from QC samples such as blanks, spikes, and calibrations;

c. reference to standard methods or a detailed description of analytical procedures; and

d. raw data printouts for comparison with summaries.

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

7.0 WASTE MANAGEMENT

All waste generated during closure will be controlled, handled, characterized, and disposed of in accordance Permit Section 9.4.5, Permit Attachment C (*Waste Analysis* Plan), and Facility waste management procedures. Closure activities may generate different types of waste materials: these wastes are listed with potential disposal options in Table G.17-3 of this closure plan. Subsequent disposition options for the decontaminated structures and equipment include reuse, recycling, or disposal. Reusable protective clothing, tools, and equipment used during decontamination will be cleaned with a wash water

solution. Disposable equipment and small reusable equipment that cannot be decontaminated, as summarized in Table G.17-3, will be containerized and managed as waste.

8.0 CLOSURE CERTIFICATION REPORT

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

9.0 REFERENCES

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

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

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

NIOSH, 1994. The National Institute for Occupational Health and Safety (NIOSH) *Manual of Analytical Methods*, 4th ed. Issue 1. 1994.

Table G.17-1

Hazardous Waste Constituents of Concern at the Technical Area 54, Area G, West Outdoor Container Storage Unit[a]

Category	EPA Hazardous Waste Numbers	Specific Constituents
Toxic Metals	D003, D004, D005, D006, D007, D008, D009, D010. D011	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver
Organic Compounds	D018, D019, D021, D022, D026, D027, D028, D029, D030, D035, D036, D037, D038, D039, D040, D043	Benzene, Carbon tetrachloride, Chlorobenzene, Chloroform, Cresol, 1,4-Dichlorobenzene, 1,2-Dichloroethylene, 2,4-Dinitrotoluene, Methyl ethyl ketone, Nitrobenzene, Pentachlorophenol, Pyridine, Tetrachloroethylene, Trichloroethylene, Vinyl Chloride
	F001, F002, F003, F004, F005	Acetone, Methyl ethyl ketone, , Methylene Chloride, Toluene, MIBK, DBCP, Tetrachlrorethylene, 1,1,1-trichloroethane, Chlorinated Fluorocarbons, 1,1,2- trichloro-1,1,2-trifluoroethane, ortho-dichlorobenzene, Trichlorofluoromethane, 1,1,2-trichloroethane, Xylene, Ethyl acetate, Ethyl benzene, Ethyl ether, n-butyl alcohol, Cyclohexanone, Methanol, Cresols, Cresylic acid, Nitroobenzene, Carbon disulfide, Isobutanol, Pyridine, 2-ethoxyethanol, 2-nitropropane

[a] Based on the unit Operating Record
MIBK = methyl isobutyl ketone or 4-methyl-2-pentanone
DBCP = 1,2-dibromo-3-chloropropane

Table G.17-2

Closure Schedule for Technical Area 54, Area G, West Outdoor Container Storage Unit

Activity	Maximum Time Required
Notify the Department of intent to close and conduct structural assessment.	-45 Days
Final receipt of waste.	Day 0
Complete waste removal.	Day 90
Complete records review and structural assessment.	10 days after completed waste removal or 100 days after final receipt of waste
Complete all closure activities and submit final closure certification report to the Department.	Day 180

Table G.17-3

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.
	Low-level radioactive solid waste	Either an authorized on-site radioactive waste disposal area that is not undergoing closure under RCRA or its state analog, or an authorized off-site radioactive waste disposal facility.
	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 Plant (WIPP), as appropriate.
Decontamination wash water	Non-regulated liquid waste	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 or recycled
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
	Low-level radioactive solid waste	Either an authorized on-site radioactive waste disposal area that is not undergoing closure under RCRA or its state analog, or an authorized off-site radioactive waste disposal facility.

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, 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.
	Low-level radioactive solid waste	Either an authorized on-site radioactive waste disposal area that is not undergoing closure under RCRA or its state analog, or an authorized off-site radioactive waste disposal facility.
	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.
Sampling 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.
	Low-level radioactive solid waste	Either an authorized on-site radioactive waste disposal area that is not undergoing closure under RCRA or its state analog, or an authorized off-site radioactive waste disposal facility.
	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.
Asphalt	Non-regulated solid waste	Subtitle D landfill or potentially, as included in corrective action activities at Area G.
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
	Low-level radioactive solid	Either an authorized on-site radioactive waste

Potential Waste Materials	Waste Types	Disposal Options
	waste	disposal area that is not undergoing closure under RCRA or its state analog, or an authorized off-site radioactive waste disposal facility.
	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 G.17-4

Summary of Analytical Methods

Analyte	EPA SW-846 Analytical Method [a]	Test Methods/ Instrumentation	Target Detection Limit [b]	Rationale
Metal Analysis				
Barium	6010, 7010	ICP-AES,GFAA	200 ug/L	Determine the metals 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, 7470A, 7471B	ICP-AES, CVAA	0.2 ug/L	
Organic Analysis				
Target compound list VOCs plus ten tentatively identified compounds (TIC)	8260B	GC/MS	10 mg/L	Determine the VOCs concentration in the samples.

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

[b] 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
mg/L = milligrams per liter
ug/L = micrograms per liter.

Table G.17-5

Sample Containers[a], Preservation Techniques, and Holding Times[b]

Analyte Class and Sample Type	Container Type and Materials	Preservation	Holding Time
Metals			
TCLP/Total Metals: Barium, Cadmium, Chromium, Lead	Aqueous Media: 500-mL Wide Mouth-Polyethylene or Glass with Teflon Liner	Aqueous Media: HNO_3 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_3 to pH <2 Cool to 4 °C	28 Days
	Solid Media: 125-mL Glass	Solid Media: Cool to 4 °C	
Volatile Organic Compounds			
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	

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

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

°C = degrees Celsius
HNO_3 = nitric acid
HCl = hydrochloric acid
mL = milliter
TCLP = Toxicity Characteristic Leaching Procedure

Table G.17-6

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

QC Sample Type	Applicable Analysis [a]	Frequency	Acceptance Criteria
Trip Blank	VOC	One set per shipping cooler containing samples to be analyzed for VOCs	Not Applicable
Field Blank	VOC, 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[b]	VOC, metals	One sample daily	Not Applicable

[a] For VOC 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.

[b] Collected only if reusable sampling equipment used.

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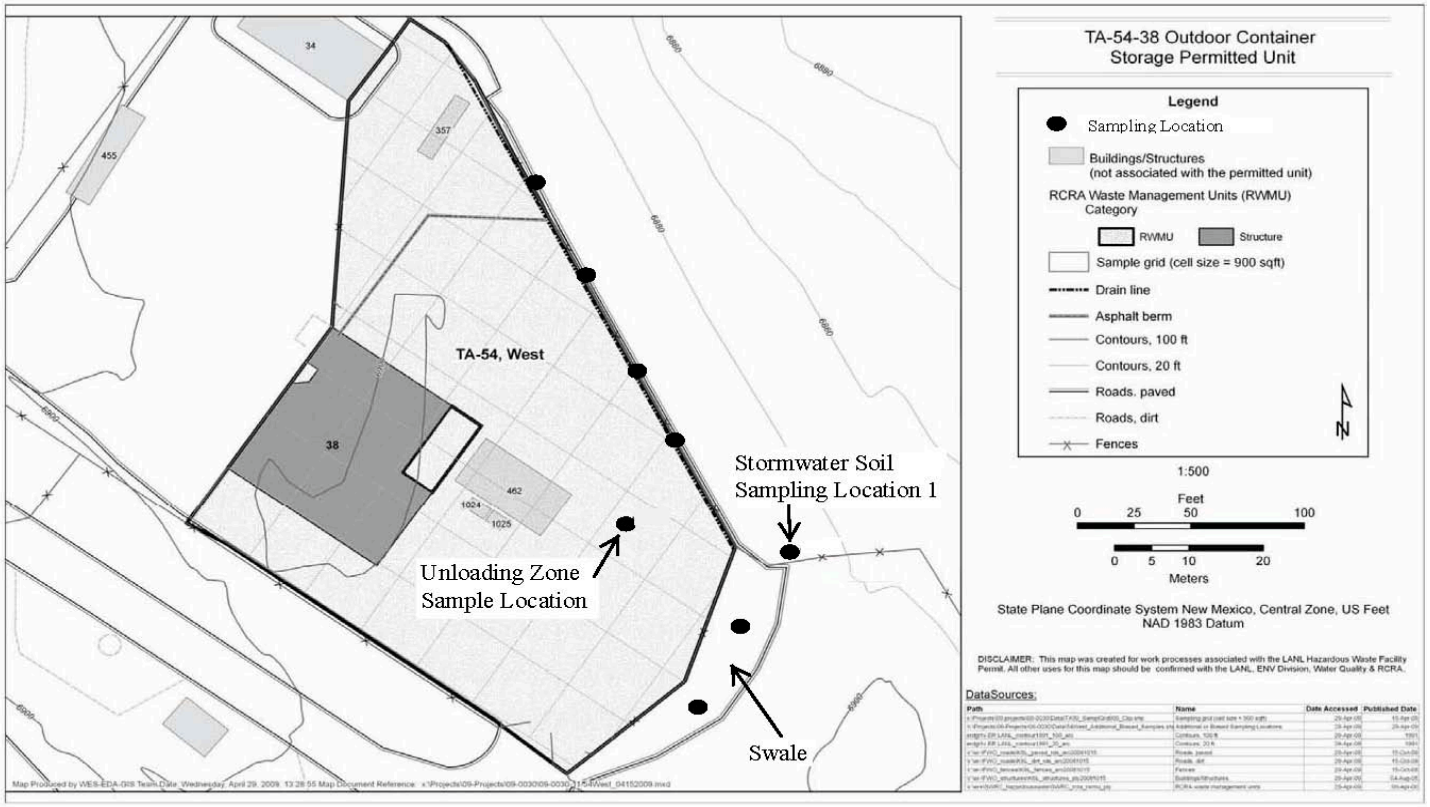

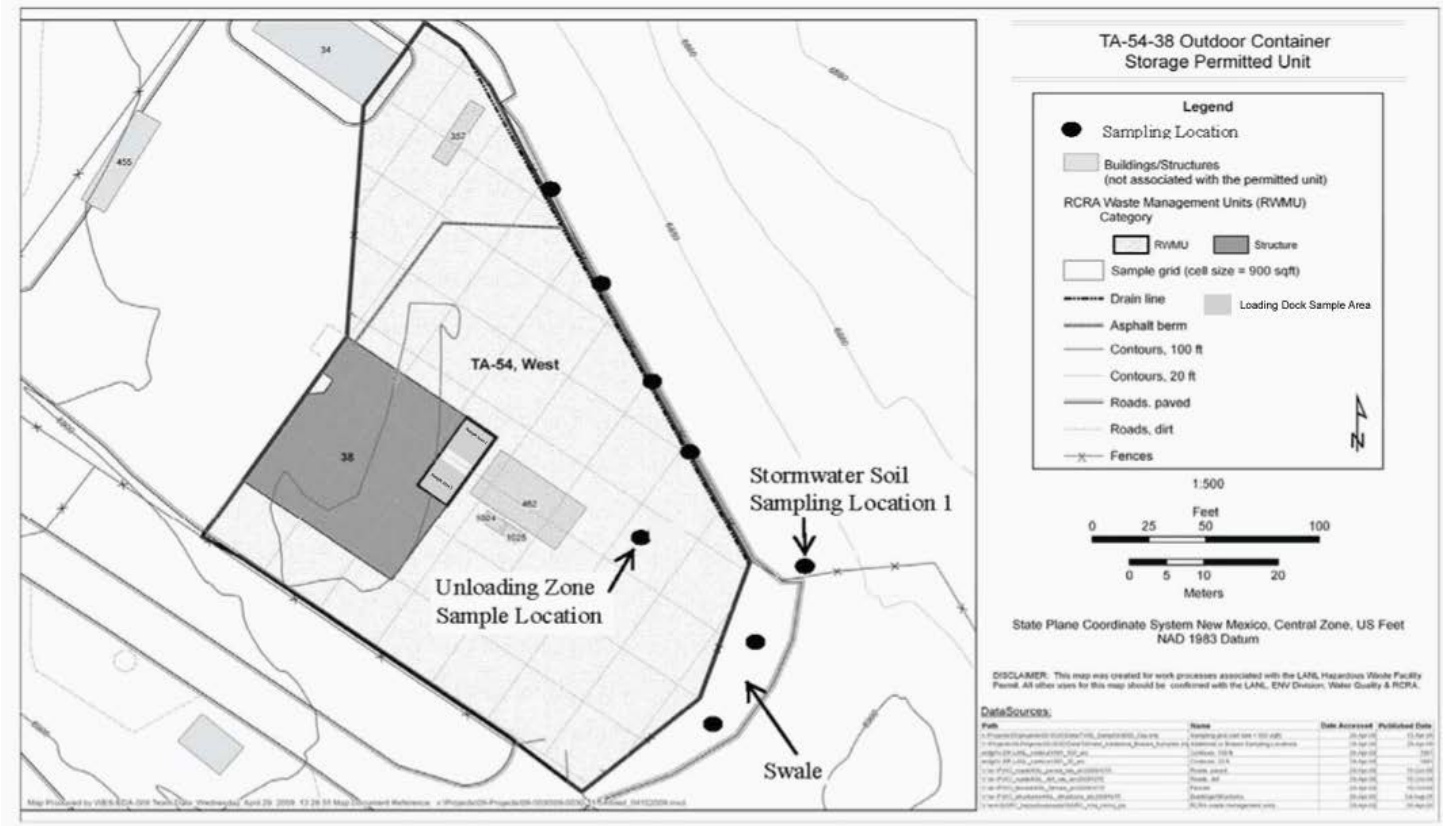

Figure G.17-1: Technical Area 54 West Outdoor Container Storage Unit Grid Sampling and Additional Sampling Locations