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

JAN 1 0 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

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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M. Haagenstad, ENV-RCRA, LANS, MS-K404
Records Center, LASO
Official Contract File, LASO

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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

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.

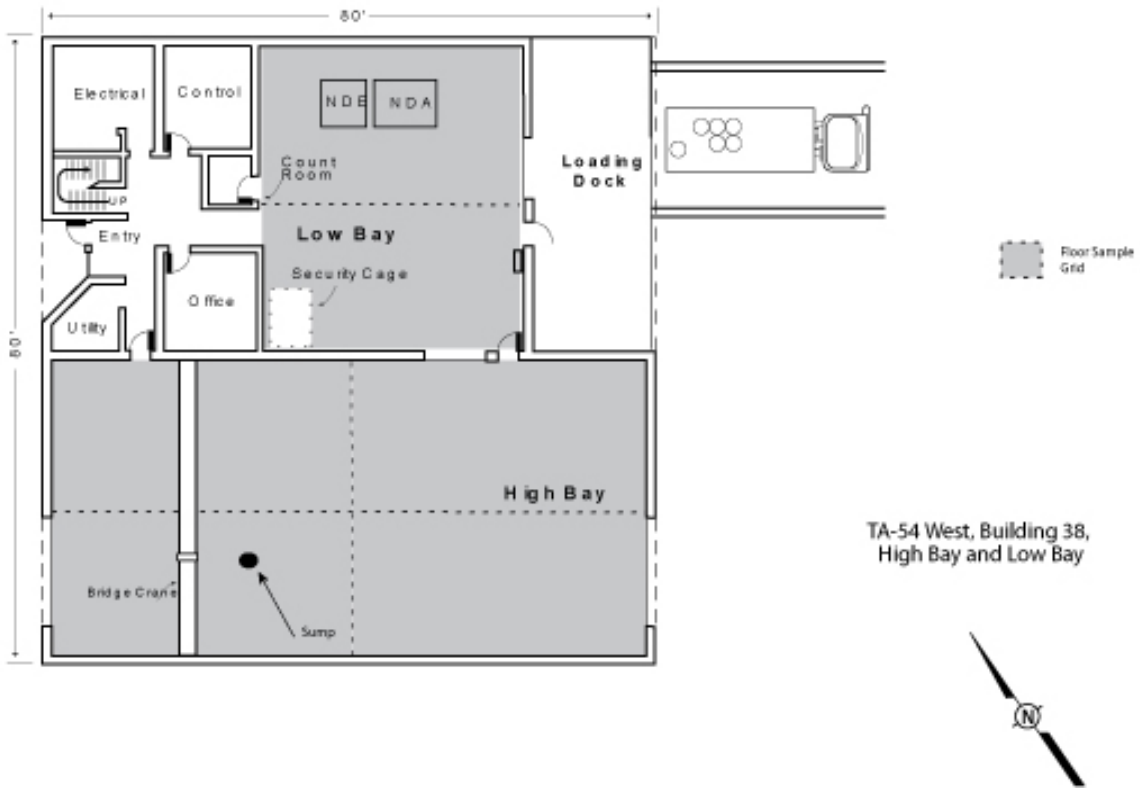


Figure G.16-1: Technical Area 54, Building 38 (High, Low Bay, and Loading Dock Sampling Locations)

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.

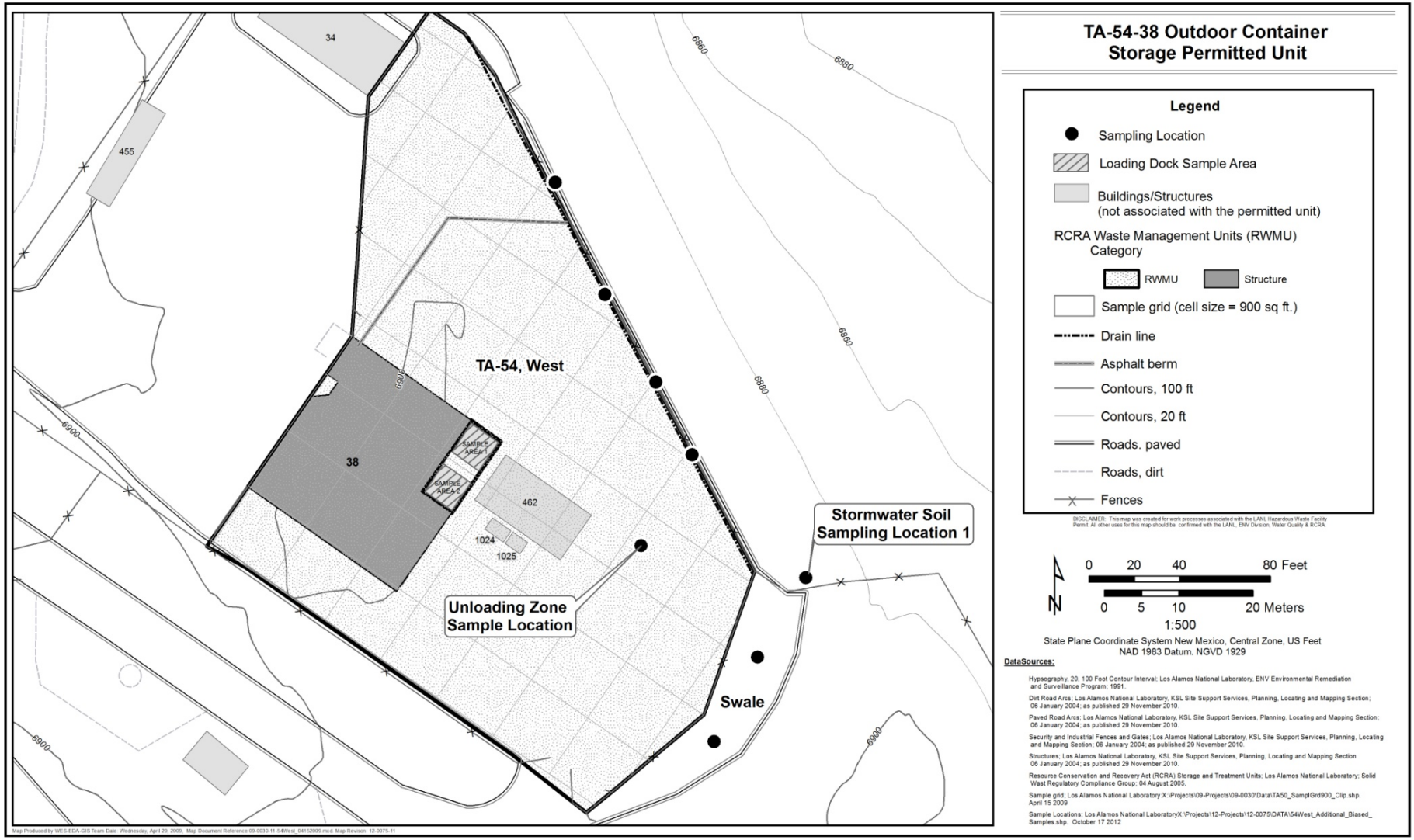


Figure G.17-1: Technical Area 54 West Outdoor Container Storage Unit Grid Sampling and Additional Sampling Locations

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

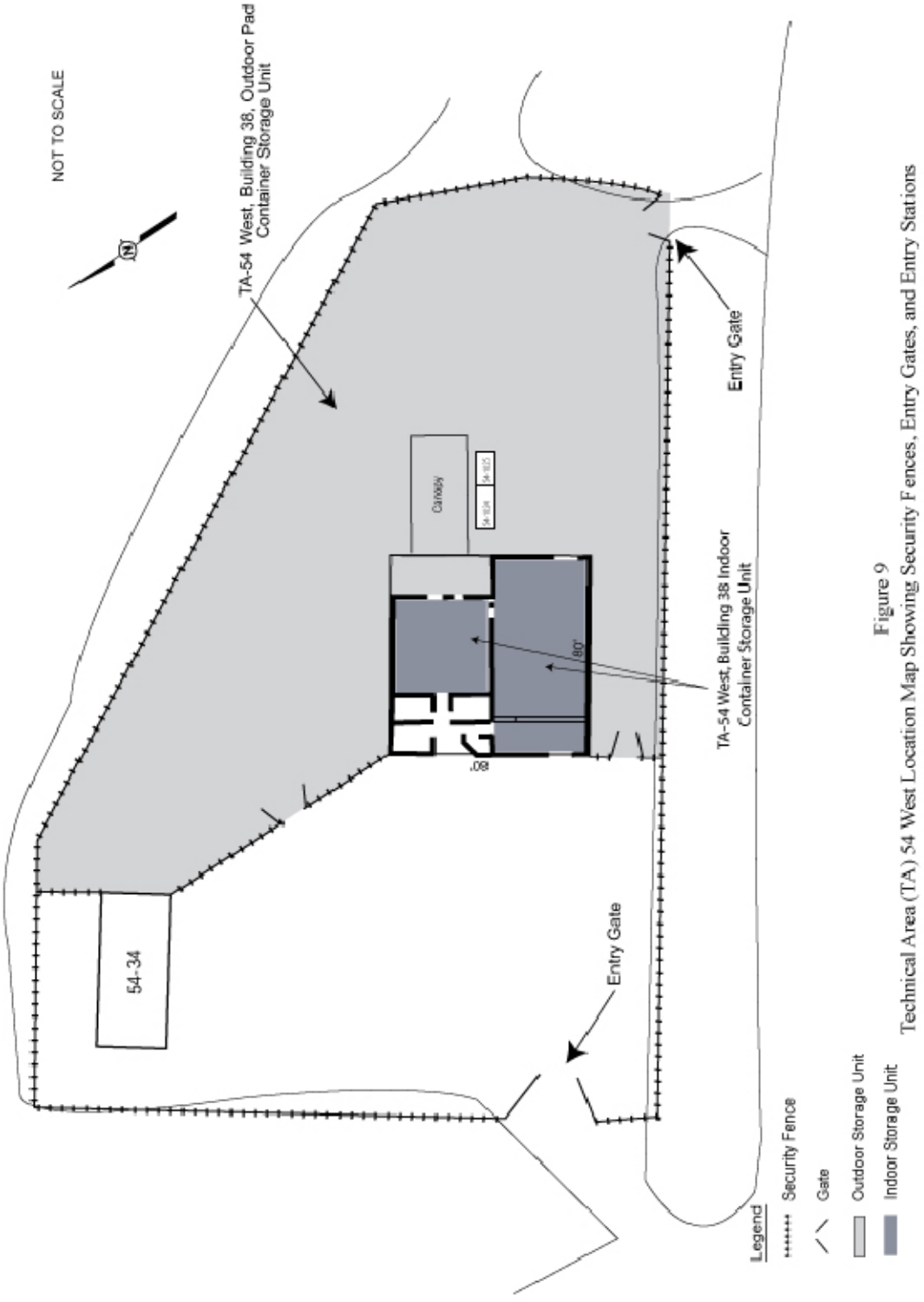


Figure 9
Technical Area (TA) 54 West Location Map Showing Security Fences, Entry Gates, and Entry Stations

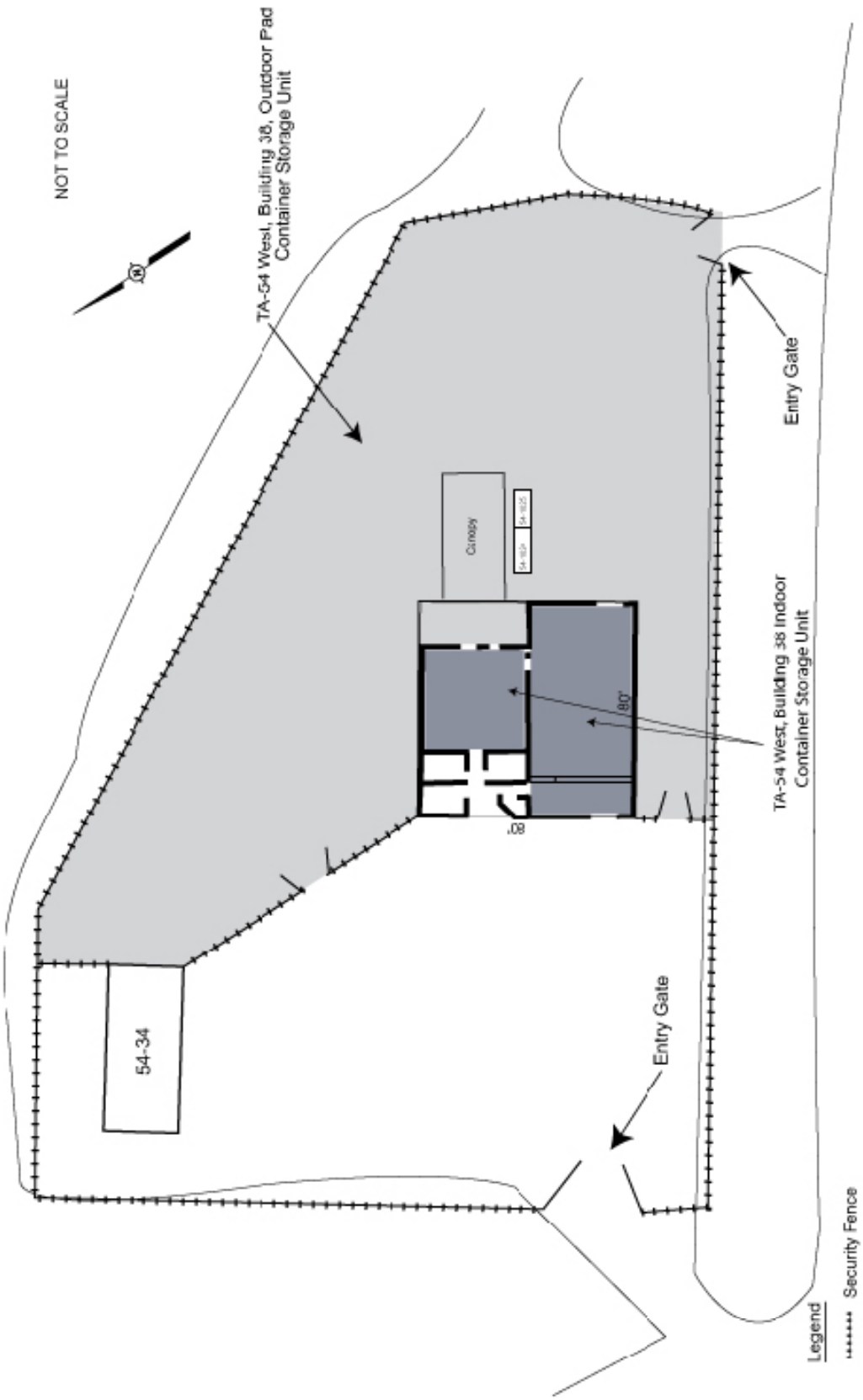


Figure 37
Technical Area (TA) 54 West, Building 38 Indoor (High Bay and Low Bay) and Outdoor Pad

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
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LA-UR-12-27049



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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

Date: JAN 10 2013

Los Alamos NATIONAL LABORATORY EST.1943

memorandum

Earth and Environmental Sciences Division

To/MS: Mark Haagenstad, ENV-RCRA, MS K404
From/MS: Emily S. Schultz-Fellenz, EES-14, MS D452
Elizabeth Miller, EES-14, MS D452
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Document No: EES14-12-018
Date: December 18, 2012

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

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.

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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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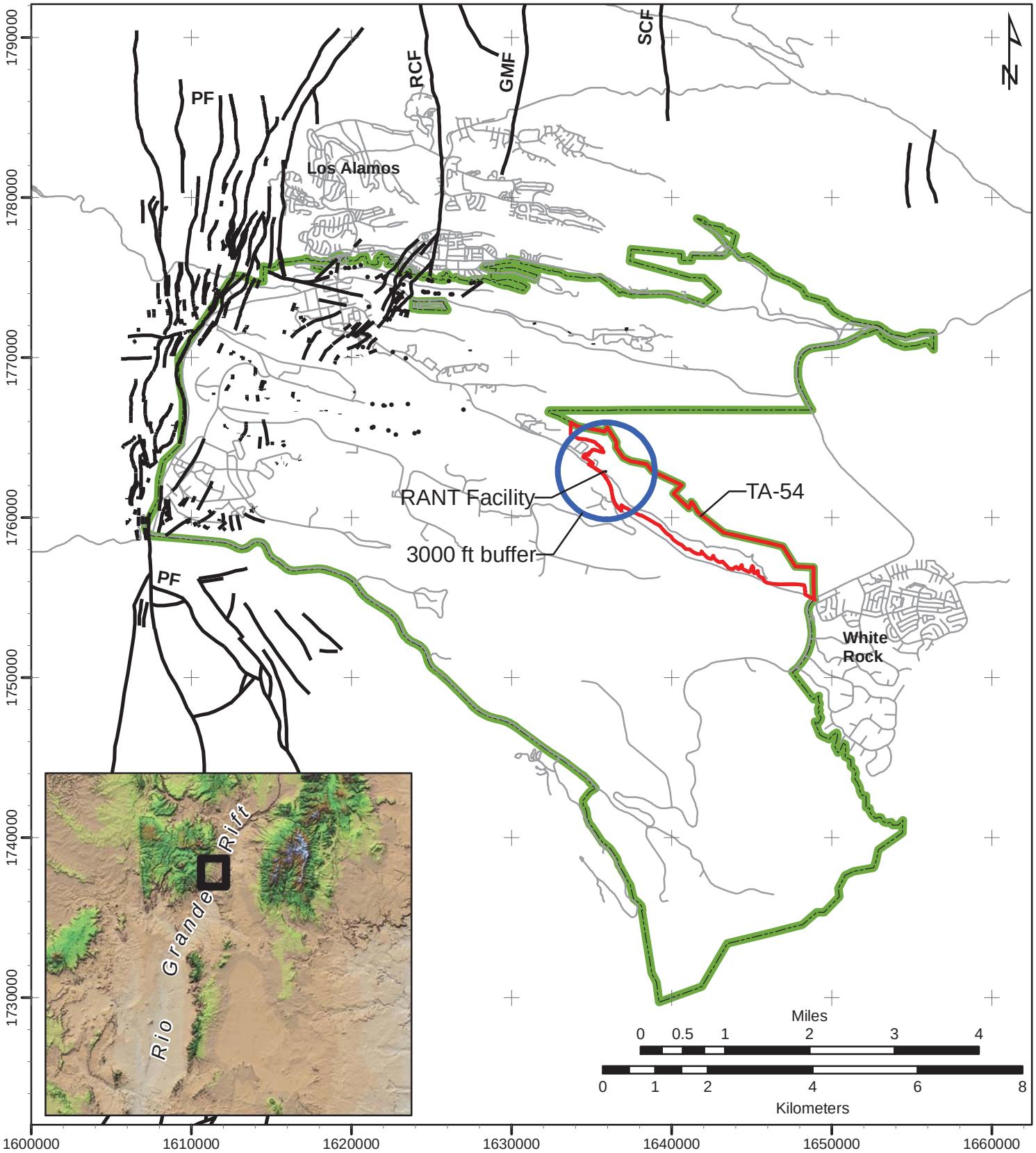
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Attachments (4 figures; 2 plates)



- 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

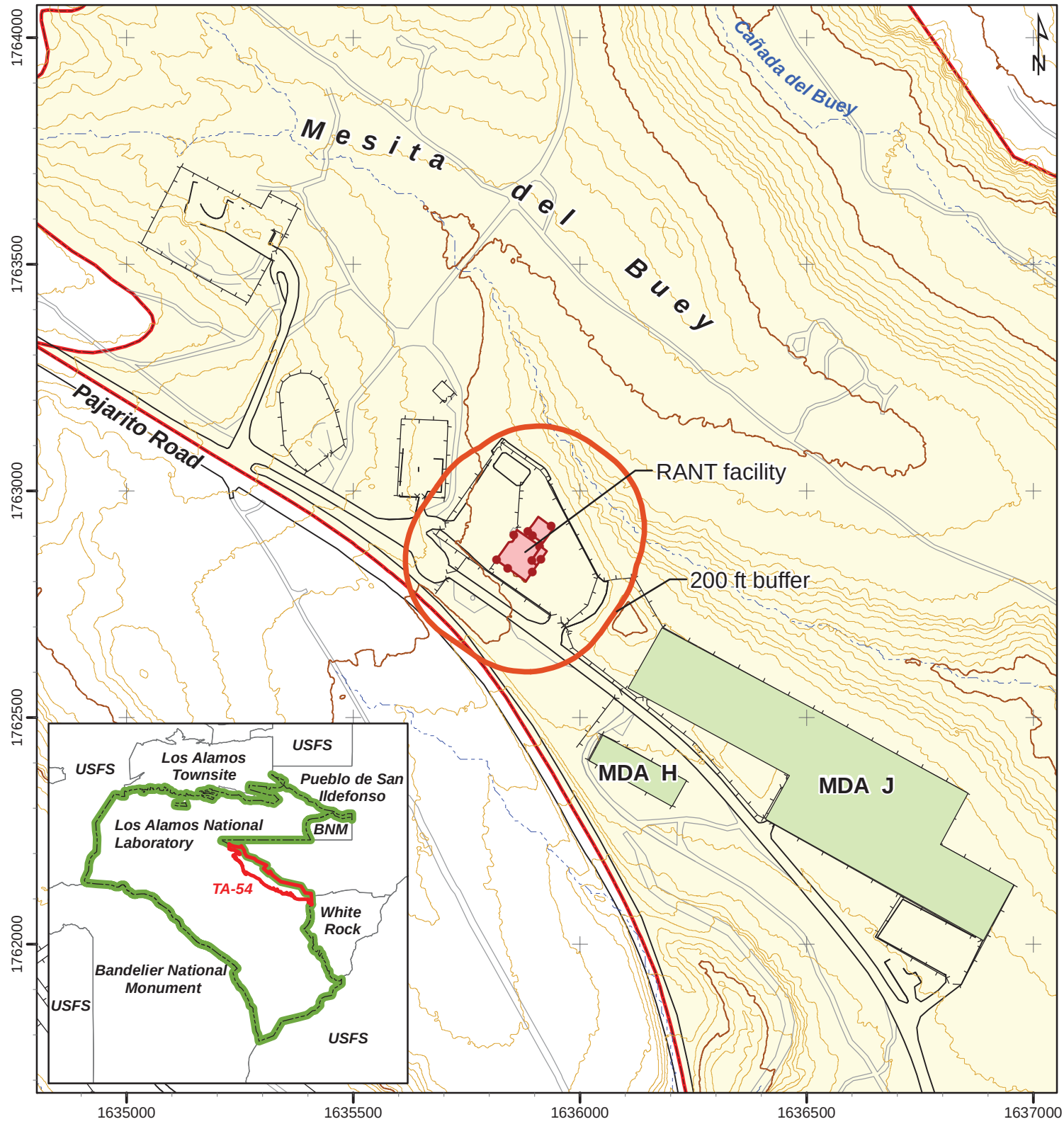
State Plane Coordinate System
New Mexico Central Zone
1983 North American Datum
Grid Provides Units in Feet

LA-UR-12-27035
GISLab Map No. m202391
GISLab Req. No. 14388
Document No. EES14-12-018
Cartography by Liz Miller
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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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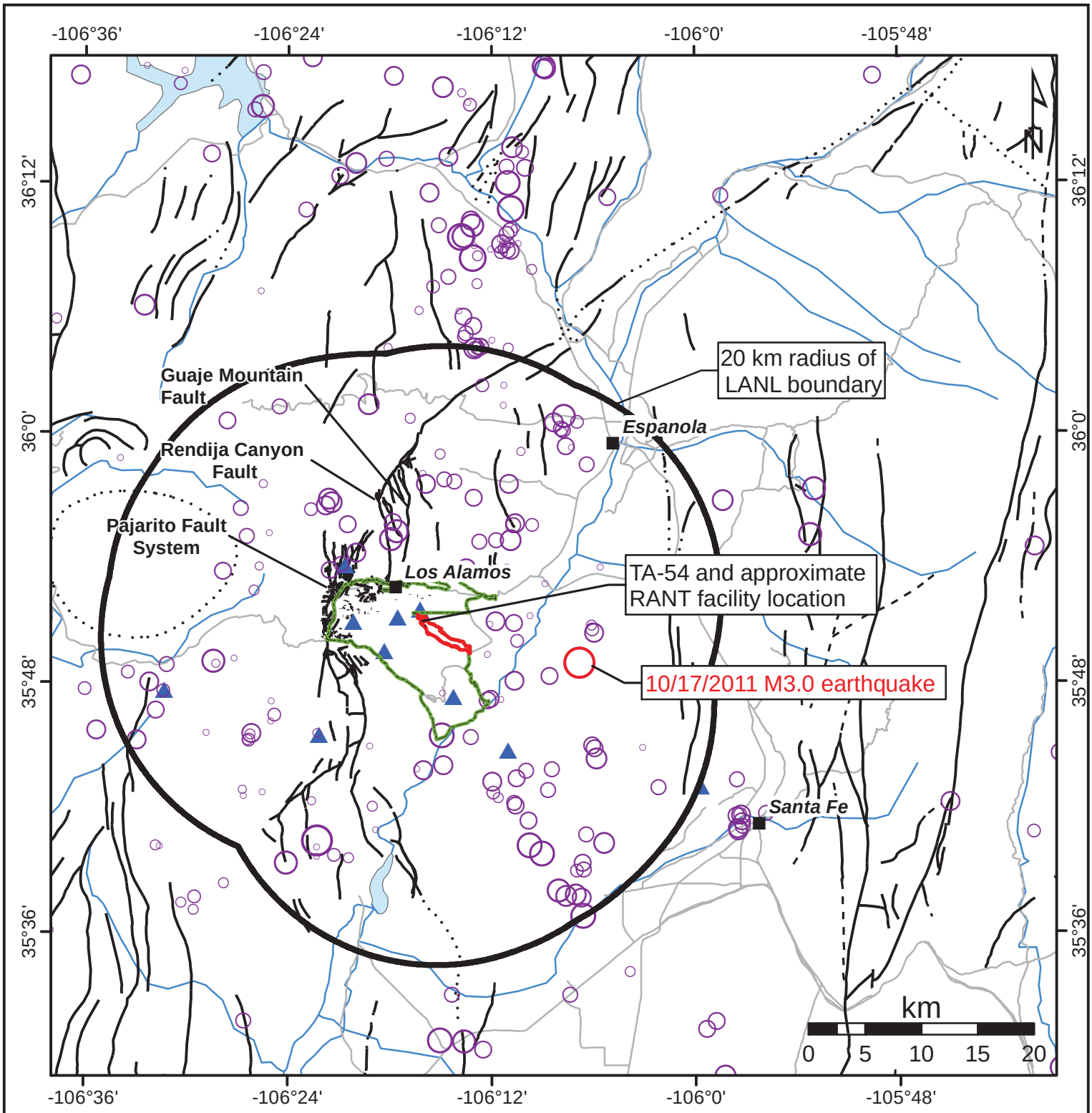
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Feet
0 125 250 500 750 1,000

0 0.05 0.1 0.2 0.3 0.4
Kilometers

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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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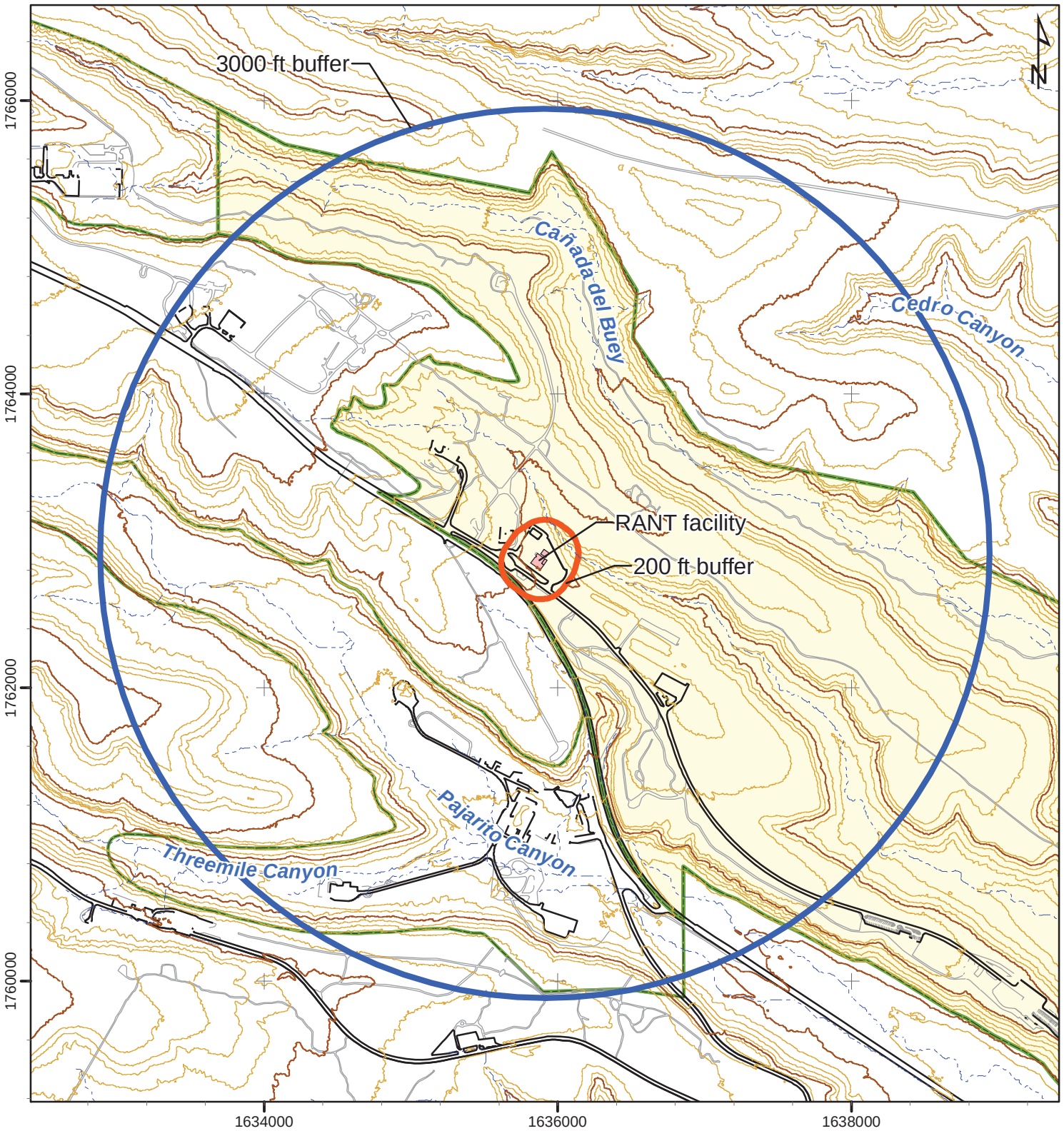


Figure 4. Mapped faults with respect to 200' and 3000' RCRA buffers surrounding the RANT facility, TA-54

- 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
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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
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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

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