DOE/EIS-0380
MAPAR 2015

FISCAL YEAR 2015 MITIGATION ACTION PLAN ANNUAL REPORT FOR THE 2008 LOS ALAMOS NATIONAL LABORATORY SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT

MAY 2016

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Title: **Fiscal Year 2015 Mitigation Action Plan Annual Report for the 2008 Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory**

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Los Alamos
NATIONAL LABORATORY
EST.1943

Front cover: Two juvenile Cooper's Hawks on a nest in White Rock, New Mexico

Contents

Appendices

Acronyms and Abbreviations

^{60}Co	Cobalt-60
^{137}Cs	Cesium-137
^{192}Ir	Iridium-192
ADEP	Associate Directorate for Environmental Programs
ADNHHO	Associate Director for Nuclear and High-Hazard Operations
ASER	Annual Site Environmental Report
BA	biological assessment
BMP	best management practice
BRMP	Biological Resources Management Plan
CRMP	Cultural Resources Management Plan
DARHT	Dual-Axis Radiographic Hydrodynamic Test (Facility)
DD&D	decontamination, decommissioning, and demolition
DOE	Department of Energy
EA	environmental assessment
EIS	Environmental Impact Statement
EM	Department of Energy Office of Environmental Management
EMS	Environmental Management System
ENV-ES	Environmental Stewardship Services (Group)
ESA	Endangered Species Act
EXID	excavation/fill/soil disturbance permit identification
Field Office	Los Alamos Field Office
FONSI	Finding of No Significant Impact
FRS	Flood Retention Structure
FY	fiscal year
HMP	Habitat Management Plan
IRT	Integrated Review Tool
LANL	Los Alamos National Laboratory

LANS	Los Alamos National Security, LLC
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
MDA	Material Disposal Area
MPNHP	Manhattan Project National Historical Park
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NNSA	National Nuclear Security Administration
PCBs	polychlorinated biphenyls
PRID	project requirements identification
RLWTF	Radioactive Liquid Waste Treatment Facility
ROD	Record of Decision
SERF	Sanitary Effluent Reclamation Facility
SERF-E	Sanitary Effluent Reclamation Facility Expansion (Project)
SHPO	State Historic Preservation Office
SWEIS	Site-Wide Environmental Impact Statement
TA	technical area
T&E	threatened and endangered
US	United States
USFWS	US Fish and Wildlife Service
WIPP	Waste Isolation Pilot Plant

Executive Summary

This fiscal year (FY) 2015 Mitigation Action Plan Annual Report (MAPAR) provides a summary of progress made from October 1, 2014, through September 30, 2015, on mitigation action commitments stemming from the 2008 *Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico (DOE/EIS-0380) Mitigation Action Plan* (2008 SWEIS MAP). Since originally released, several of the original mitigation action commitments were completed and officially closed, as reported in the second revision of the 2008 SWEIS MAP. This FY 2015 MAPAR reflects the status of, and the actions taken, for the remaining mitigation action commitments.

Actions taken during FY 2015 include:

- Completion and distribution of the FY 2014 SWEIS MAPAR
- Completion of all key milestones in the FY 2015 Wildland Fire Operations Plan
- Monitoring of sediments and biota for contaminants
- Publication of biological and cultural resources management reports and articles
- Improvements in trail management at Los Alamos National Laboratory
- Completion of deliverables that support annual mitigation action commitments

Appendix A, the SWEIS MAPAR tracking log, is a summary of accomplishments; Appendix B is the FY 2014 Dual Axis Radiographic Hydrodynamic Test Facility MAPAR; and Appendix C is the FY 2015 Trails Management Plan MAPAR.

1.0 Background

A National Environmental Policy Act (NEPA) mitigation action plan describes actions planned in order to mitigate adverse environmental impacts from a proposed federal action, as analyzed in the 2008 *Final Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory* (SWEIS; DOE 2008a), its associated record of decision (ROD; DOE 2008b), and subsequent environmental assessments (EAs). The first ROD for the 2008 SWEIS was published in September 2008. In January 2009, the 2008 SWEIS Mitigation Action Plan (MAP) was finalized and included outstanding 1999 SWEIS (DOE 1999) MAP commitments, continuing mitigations from NEPA decisions made since the 1999 SWEIS, and those made in the September 2008 and June 2009 RODs for the 2008 SWEIS (DOE 2008b, 2009a). After the second SWEIS ROD was published in the Federal Register, the United States (US) Department of Energy (DOE)/National Nuclear Security Administration (NNSA) Los Alamos Field Office (Field Office) issued a MAP Addendum (DOE 2009b). In November 2010, the 2008 SWEIS MAP was revised to incorporate the MAP associated with the *Environmental Assessment for the Expansion of the Sanitary Effluent Reclamation Facility and Environmental Restoration of Reach S-2 of Sandia Canyon at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE 2010a). The 2008 SWEIS MAP was again revised during fiscal year (FY) 2014 (DOE 2014) to close out numerous mitigations that have been officially completed and to revise other mitigations to make them more specific and measurable. This FY 2015 Mitigation Action Plan Annual Report (MAPAR) reflects the status of and the actions taken for the remaining mitigation action commitments. This document is the seventh MAPAR for the 2008 SWEIS.

All work performed at Los Alamos National Laboratory (LANL) must be evaluated for environmental risk. Work performed to mitigate risk or meet contractual environmental commitments is an element of the LANL Environmental Management System (EMS) including the mitigations listed in this MAPAR. The LANL EMS is independently third-party certified to meet the international standard for environmental management systems: ISO 14001:2004. LANL achieved ISO 14001 recertification in the second quarter of FY 2015.

Environmental work is managed at LANL by several different organizations and may include a wide range of programmatic, facility, and support service resources and personnel. Responsibility for risk evaluation and management is distributed LANL-wide to directorates, each with an assigned EMS point of contact. The EMS is centrally coordinated by the Los Alamos National Security, LLC (LANS) Environmental Stewardship Services Group (ENV-ES). This collaborative, cooperative approach has proven a successful model for ensuring that environmental management is focused, responsive, and proactive. In 2015, the ENV-ES staff worked with the directorate EMS

points of contact to ensure that all SWEIS MAP mitigations were incorporated into the appropriate organizational Environmental Action Plans. The EMS point of contact for each directorate is notified annually of mitigations they are responsible for and given due dates for reporting. Information on mitigation actions is reported to ENV-ES for incorporation into the quarterly MAP updates and the MAPAR.

The Integrated Review Tool (IRT) forms the basis of the primary review process used by LANS environmental subject matter experts to

1. identify environmental requirements applicable to a federal activity or project early in the planning and activity process and
2. convey actions and requirements to activity and project owners.

For all new and modified activity, project owners are required to use the IRT to complete a project requirements identification (PRID) and/or an excavation/fill/soil disturbance permit identification (EXID) in order to assure the applicable requirements are identified in a timely manner (LANL 2013). The PRID system, EXID process, and site selection reviews using the Decision Support Application are all accessible from within the IRT. In addition, the IRT provides helpful gateway questions to activity/project owners to guide them to the appropriate tool(s) needed to identify their environmental requirements. Project owners who do not use the IRT are in violation of LANL policy and risk putting their projects in a position of non-compliance with environmental requirements and permits. LANS environmental subject matter experts reviewed and provided comments and requirements for 192 PRIDs and 766 EXIDs in FY 2015.

2.0 Mitigation Action Commitments

2.1 Dual-Axis Radiographic Hydrodynamic Test Facility Mitigation Action Plan (Appendix B)

NEPA Driver:

The *Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Mitigation Action Plan* (DARHT MAP; DOE 1996) requires a DARHT MAPAR to be prepared as part of implementing the DARHT MAP. The DARHT MAP is included in the 2008 SWEIS MAP. All DARHT construction-related mitigation measures and action plans have been completed (LANL 1999). Therefore, the DARHT MAPAR provides only the status of DARHT facility operations-related mitigation actions that have been implemented but not completed. No new mitigation commitments as the result of DARHT operations have been identified.

DOE provided stakeholders with the first MAPAR in June 2004. This MAPAR reports on the full scope of actions that were implemented during FY 2014 (October 1, 2013, through September 30, 2014) and represents 16 years of DARHT facility operations-related mitigation measures and action plans. Appendix B of this MAPAR is the DARHT MAPAR, which provides details of the progress on mitigation action commitments for FY 2014. Because sampling results are not available until the second quarter of each year, the DARHT MAPAR is one FY behind the main SWEIS MAPAR.

Mitigations:

1. Annual monitoring of contaminants by sampling soils, plants, mammals, birds, and road kills adjacent to the facility and at a control site not affected by DARHT operations.
2. Site monitoring and evaluation consisting of periodic soil, water, and other environmental analyses for solid, hazardous, mixed, and radioactive wastes.
3. Conduct annual Tribal tours of Nake'muu, as requested, and LANS maintenance visits.

Actions Taken:

In FY 2014, all radionuclides and chemicals in soil, sediment, vegetation, and small mammals from around the perimeter of the DARHT facility were either similar to background or below DOE screening levels protective of biota.

Bird data collected over an 18-year period show that while bird populations do not change over time, the diversity and composition (types of birds) of these populations change in response to vegetation structure modifications from fire, changes in precipitation, and insect activity.

There are no impacts from DARHT operations to archaeological resources (i.e., Nake'muu Pueblo).

Although 2014 radionuclide and chemical levels were not at concentrations known to be detrimental to human health or to the environment, there were measurable amounts of depleted uranium in all media and the levels increased over time until 2006. Concentrations of depleted uranium in most media decreased in 2007. The decrease may correspond to the success of employing steel containment vessels. However, since increases of uranium in all media were noted until at least 2006 and uranium may linger in soils for some time, monitoring of these media will continue until the concentrations are similar to baseline statistical reference levels. Overall, foam mitigation significantly reduced the amount of blast residues released to the environment compared with open-air detonations, and the use of steel containment vessels further reduced those amounts over foam mitigation.

Sampling data from DARHT were compiled, evaluated, and documented in the 2014 LANL Annual Site Environmental Report (ASER), published on October 1, 2015 (LANL 2015a). All data received is made publicly available on the Intellus New Mexico database[1], which houses environmental data collected in and around LANL by both LANS and the New Mexico Environment Department DOE-Oversight Bureau.

Effectiveness of the Program and the Mitigations:

Mitigation 1: Effective.

Mitigation 2: Effective.

Mitigation 3: Annual maintenance visits are effective. Tours are conducted when requested by the Pueblo de San Ildefonso.

Recommendations to Continue or Close out Mitigations:

Mitigations 1 and 2: Continue annual sampling at DARHT.

Mitigation 3: Continue visits to Nake'muu as requested by the Pueblo de San Ildefonso.

Mitigation 3: Continue annual maintenance visits to Nake'muu and report results in Section 2.11.

2.2 2003 Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program (Appendix C)

NEPA Driver:

In accordance with the 2003 *Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program* (DOE 2003), LANS continues to implement a MAP and MAPAR for this EA through the Trails Management program.

Mitigations:

1. Complete eligibility evaluations when possible for historic trails under the National Historic Preservation Act (NHPA) and identify potential environmental issues on trails use.
2. Evaluate and manage trails to determine appropriate closures and/or restrictions.
3. Prepare a management plan for trails at LANL.
4. Support the use of volunteers for selected trails maintenance projects at LANL.
5. Plan, maintain, repair, and construct trails.

[1] http://www.intellusnm.com/

Actions Taken:

The Trails Working Group met 10 times in FY 2015 and undertook the following actions.

- The LANS Trails Management program lead spoke to the Los Alamos County Parks and Recreation Board in May to address questions about reopening the Los Alamos Canyon Trail to the public.
- A biological assessment (BA) evaluating recreational use of Los Alamos Canyon was approved by the US Fish and Wildlife Service (USFWS) in FY 2015 (LANL 2014a).The Trails Management program continued to address Technical Areas (TAs) 70 and 71 trails issues including trail repair and future trailhead parking. Mitigations implemented at TA-71 in FY 2014 to prevent mountain bikers from cutting new trails were inspected and are effective.

Additional information about FY 2015 is included in Appendix C.

Effectiveness of the Mitigations:

Mitigation 1: Effective. Monitoring of cultural resources adjacent to recreational trails in TAs 70 and 71 was conducted in FY 2015, no issues or impacts were identified. Actions associated with this mitigation were integrated into the revised draft Cultural Resources Management Plan (CRMP) and future work will continue under the CRMP once it is finalized.

Mitigation 2: Effective (see Appendix C).

Mitigation 3: Effective. A draft Trails Management Plan was prepared in FY 2015 and will be finalized in FY 2016 to close this mitigation action commitment.

Mitigation 4: Not implemented. No volunteers were used for trail maintenance in FY 2015.

Mitigation 5: Not implemented. Additional resources are needed to support trail maintenance and repair.

Recommendations to Continue or Close out Mitigations:

The Trails Management Plan for LANL, once finalized, will be used to implement all remaining mitigations; mitigations will be rolled into the plan and any new mitigations will be implemented through the plan. Mitigation 1 should remain open until the CRMP is finalized.

2.3 *Special Environmental Analysis for the Department of Energy, National Nuclear Security Administration: Actions Taken in Response to the Cerro Grande Fire at Los Alamos National Laboratory*

NEPA Driver:

Mitigations were identified in the *Special Environmental Analysis for the Department of Energy, National Nuclear Security Administration: Actions Taken in Response to the Cerro Grande Fire at Los Alamos National Laboratory* (DOE 2000a) for actions taken in response to the Cerro Grande fire. DOE/NNSA issued the Special Environmental Analysis in September 2000 pursuant to the Council on Environmental Quality regulations implementing NEPA under emergency circumstances and regulatory requirements to provide an analysis of the Cerro Grande fire emergency fire suppression, soil erosion, and flood control actions taken by DOE/NNSA and LANL between May and November 2000.

Mitigations:

1. Monitor biota and sediment contamination behind the Los Alamos Canyon Weir and the Pajarito Canyon Flood Retention Structure (FRS) and report results in the ASER.
2. Periodically remove sediment from the Los Alamos Canyon Weir based on sedimentation rate and contamination accumulation rate.

Actions Taken:

Sampling results from 2014 have been compiled, evaluated, and are documented in the 2014 ASER (LANL 2015a). Small mammals and vegetation were collected from the Los Alamos Canyon Weir and the Pajarito Canyon FRS during the summer of 2015 and analyzed for radionuclides, metals, and polychlorinated biphenyls (PCBs). The data is reported in the draft *Radionuclides in Small Mammals Upgradient and Downgradient of the Los Alamos Canyon Sediment Control Structure*, which reports data from sediment and small mammals from 1997–2015; this paper will be finalized in FY 2016.

Effectiveness of the Mitigations:

Mitigation 1: Effective.

Mitigation 2: Effective.

Recommendations to Continue or Close out Mitigations:

Continue annual biota and sediment sampling from behind the Los Alamos Canyon Weir and the Pajarito Canyon FRS. Continue additional cleanouts from behind these structures as necessary.

2.4 *Environmental Assessment for the Proposed Future Disposition of Certain Cerro Grande Fire Flood and Sediment Retention Structures at Los Alamos National Laboratory*

NEPA Driver:

These mitigations are from the *Environmental Assessment for the Proposed Future Disposition of Certain Cerro Grande Fire Flood and Sediment Retention Structures at Los Alamos National Laboratory, Los Alamos, New Mexico* (DOE 2002).

Mitigations:

1. Annually monitor the FRS for structural integrity and safe operations until removed.
2. Recycle demolition spoils from FRS decontamination, decommissioning, and demolition (DD&D) as appropriate.
3. Remove portions of the FRS in accordance with DOE/EA-1408 (DOE 2002).
4. Leave an aboveground portion of the FRS equivalent to the dimensions of a low-head weir to retain potentially contaminated sediments on LANL land.
5. Remove aboveground portions of the steel diversion wall below the FRS.
6. Recontour and reseed disturbed areas to protect surface water quality in Pajarito Canyon after the FRS is removed.

Actions Taken:

The annual inspection of the Pajarito Canyon FRS was conducted on May 20, 2015 (UI-RPT-003, R5). The inspection report states: "The main structure does not have any obvious, significant structural deterioration and appears to be in good condition considering the construction method used and expected structure longevity. No corrective actions are recommended at this time."

Effectiveness of the Mitigation:

Mitigation 1: Effective.

Mitigations 2–6: Not implemented. On hold pending removal of the FRS.

Recommendation to Continue or Close out Mitigations:

Continue annual inspections of the FRS until its removal. The remaining mitigations should remain on hold until the removal of the FRS, which is not planned until Material Disposal Area (MDA) G (TA-54) is ready for capping; material generated by the FRS removal could be used to cover portions of MDA G.

2.5 Outfall Reduction Initiative/Radioactive Liquid Waste Treatment Facility

NEPA Driver:

This mitigation stems from the 2008 SWEIS commitment related to outfall reduction as specified in the 2009 ROD. The EA and a mitigated Finding of No Significant Impact (FONSI) for the Sanitary Effluent Reclamation Facility Expansion (SERF-E) Project were issued in August 2010 (DOE 2010b, c). The mitigation action commitments associated with the 2010 mitigated FONSI (DOE 2010c) also addressed impacts to Sandia Canyon. The BA for the 2008 SWEIS (LANL 2006a) also contributed to the development of this mitigation.

Mitigation:

All further actions affecting water flow volumes in Mortandad and Sandia canyons will be assessed for positive and negative impacts.

Actions Taken:

The expanded Sanitary Effluent Reclamation Facility (SERF) has been operating since 2012. The facility provides a blend of reclaimed effluent from the Sanitary Wastewater System Plant and well water to cool the supercomputers in the Metropolis Center for Modeling and Simulation. In FY 2015, SERF provided approximately 30 million gallons of water (Table 1).

Table 1. Metropolis Center for Modeling and Simulation Cooling Towers FY 2015

	SERF production as make-up (gallons)	City water as make-up (gallons)
Q1 total	6,495,500	370,400
Q2 total	6,498,400	30,500
Q3 total	8,490,200	0
Q4 total	8,551,796	583,813
FY 2015 total	**30,035,896**	

No cooling tower water blow down or SERF product water has been diverted from Sandia Canyon. Therefore, no mitigations associated with hydrologic changes to the S-2 reach of Sandia Canyon have been required. In 2012, LANS hydrologists assessed how much water is needed to maintain healthy Sandia Canyon wetland; they examined acceptable flow reductions and intensity as well as corrective actions to divert remaining flow to sufficiently maintain wetland viability and reduce soil erosion. Annual total flow data (Table 2) are also available in the 2014 ASER (LANL 2015a) and the 2013 SWEIS Yearbook (LANL 2015b).

Table 2. Discharges into Sandia Canyon from each of the Three Permitted Outfalls

FY 2015	Outfall 001 (gallons)	Outfall 03A027 (gallons)	Outfall 03A199 (gallons)
Oct-14	3,756,000	866,900	789,600
Nov-14	4,774,000	685,200	620,600
Dec-14	5,476,000	732,200	628,700
Q1 total	**14,006,000**	**2,284,300**	**2,038,900**
Jan-15	5,571,000	692,500	626,800
Feb-15	5,079,300	644,800	614,900
Mar-15	6,132,600	810,800	679,700
Q2 total	**16,782,900**	**2,148,100**	**1,921,400**
Apr-15	4,618,600	798,000	660,800
May-15	3,721,000	881,100	678,000
Jun-15	4,240,800	1,033,900	869,500
Q3 total	**12,580,400**	**2,713,000**	**2,208,300**
Jul-15	4,874,000	1,050,700	843,000
Aug-15	5,251,400	842,600	871,600
Sep-15	4,979,100	618,200	832,500
Q4 total	**15,104,500**	**2,511,500**	**2,547,100**
FY 2015 Total	**58,473,800**	**9,656,900**	**8,715,700**

DOE and LANS are committed to outfall reduction and the mitigation initiatives associated with the Radioactive Liquid Waste Treatment Facility (RLWTF) Upgrade Project. The RLWTF outfall into Mortandad Canyon is still permitted (under National Pollution Discharge Elimination System Permit No. NM0028355) but there has been no discharge to the canyon since November 2010. The Solar Evaporation Tanks for RLWTF were installed in October 2012. Operation of the tanks is anticipated with the approval of the State of New Mexico groundwater permit expected in late 2015.

Effectiveness of the Mitigation:

Mitigation 1: Effective.

Recommendation to Continue or Close out Mitigations:

Continue to assess projects' potential impacts on water flow volumes in Mortandad and Sandia canyons through use of the IRT (e.g., PRID and EXID).

2.6 Off-Site Source Recovery Project

NEPA Driver:

This mitigation is derived from the 2008 ROD for the 2008 SWEIS (DOE 2008a, b).

Mitigation:

Institute controls on the quantities and methods of storing sealed sources containing Cobalt-60 (^{60}Co), Iridium-192 (^{192}Ir), or Cesium-137 (^{137}Cs) to mitigate the effects of potential accidents. The LANL Off-Site Source Recovery Project does not currently accept sealed sources containing ^{60}Co, ^{192}Ir, or ^{137}Cs, the sources for which mitigation measures were identified in the 2008 SWEIS MAP (DOE 2010a).

Actions Taken:

None necessary.

Effectiveness of the Mitigation:

Mitigation 1: Not implemented.

Recommendation to Continue or Close out Mitigations:

None at this time.

2.7 Sanitary Effluent Reclamation Facility Expansion

NEPA Driver:

This mitigation is derived from the MAP and FONSI (DOE 2010c) for the SERF-E Project EA (DOE 2010b) and the 2008 SWEIS ROD (DOE 2008b).

Mitigations:

1. Follow the LANL Threatened and Endangered (T&E) Species Habitat Management Plan (HMP) (LANL 2014b).
2. Use appropriate erosion and runoff controls.
3. Use best management practices (BMPs) for sensitive species and migratory bird protection.
4. Revegetate disturbed areas.
5. Mitigate actions taken within the wetland of the S-2 reach through wetland restoration or enhancement.
6. Follow wetland and floodplain BMPs.
7. Develop and use BMPs to prevent or lessen the movement of contaminated silt from the wetlands.
8. Follow the LANL CRMP.

Actions Taken:

SERF-E construction is complete. Mitigations associated with S-2 reach (e.g., restoration of riparian habitat in Sandia Canyon) are also complete (DOE 2015).

Effectiveness of the Mitigation:

Mitigation 1: Effective and complete.

Recommendation to Continue or Close out Mitigations:

Formally close out this mitigation through the Field Office.

2.8 Environmental Assessment for the Wildfire Hazard Reduction and Forest Health Improvement Program at Los Alamos National Laboratory

NEPA Driver:

These mitigations are derived from the *Environmental Assessment for the Wildfire Hazard Reduction and Forest Health Improvement Program at Los Alamos National Laboratory* (DOE 2000b), the 2008 SWEIS and SWEIS MAP, DOE's Wildland Fire Management Program (DOE 2004), and DOE Order 450.1A (DOE 2008c).

Mitigations:

1. Implement a Wildland Fire Management Plan with an adequately funded ongoing program.
2. Continue to further reduce wildfire risks by shipping legacy transuranic waste, currently stored in the TA-54 domes, to the Waste Isolation Pilot Plant (WIPP) (3706 Campaign).

Actions Taken:

In FY 2015, LANS implemented the annual Wildland Fire Management Plan (a.k.a. the Wildland Fire Operations Plan), approved by DOE on February 10, 2015. As of September 30, 2015, all FY 2015 activities were confirmed complete, meeting the milestones identified in the plan. Unusual amounts of precipitation received in the Los Alamos area resulted in extremely heavy fine fuel regeneration. This regeneration required a mid-year treatment of areas typically scheduled for annual fall treatment. Treatment of these sites exceeded the plan milestone by 400 acres.

In an effort to further reduce risk to stored legacy waste material at TA-54, seven Fuel Treatment Units, totaling 500 acres, surrounding the site were identified for treatment. As of September 30, 2015, 30 percent of the seven treatment units had been treated. The target date for completion of these seven units is November 30, 2015.

No waste shipments of legacy waste to reduce wildfire risks have occurred due to the current closure of the WIPP site.

Effectiveness of the Mitigations:

Mitigation 1: Effective. This mitigation results in the creation of defensible space and removal of excess fuel from LANL property.

Mitigation 2: Not implemented. On hold until the WIPP facility is operational. However, treatment of the TA-54 area changed potential fire behavior in and around the area and greatly reduced the wildfire risk to the facility. Fuels reduction has modified the fuel type present and changed the predicted fire behavior from a potential crown fire to a potential low-intensity ground fire.

Recommendation to Continue or Close out Mitigations:

Continue to implement an approved annual Wildland Fire Management Plan (a.k.a. the Wildland Fire Operations Plan) with key milestones to mitigate wildfire risks.

Complete fuels treatment for the seven Fuel Treatment Units. Design and implement a fuels prescription for the west side of TA-54. Monitor treated areas and treat again if the current five-year cycle is not sufficient to accomplish fuel management goals.

Resume shipments to WIPP when the facility reopens. Prior to closure of WIPP, 3,227.7 cubic meters of legacy transuranic waste had been shipped as part of the 3706 Campaign.

2.9 Site-Wide Environmental Impact Statement Biological Assessment

NEPA Driver:

These mitigations are derived from the BA for the 2008 SWEIS (LANL 2006a). The T&E Species HMP (LANL 2014b) provides a management strategy for the protection of T&E species and their habitats on LANL property. The T&E Species HMP provides guidance for what, when, and where different types of activities are allowed without further review by the USFWS. If project personnel cannot follow T&E Species HMP requirements, a BA must be prepared. Pursuant to Section 7 of the Endangered Species Act (ESA), 16 United States Code § 1536(a)(2), a BA is used to determine and document whether a proposed activity is likely to adversely affect listed species, proposed species, or designated critical habitat. BAs account for the direct, indirect, and cumulative effects on T&E species from construction and operation of projects at LANL that cannot operate within the T&E Species HMP guidelines.

Mitigations:

1. Evaluate, through the IRT, the use of span bridges instead of land bridges in areas that cross canyons in T&E species habitats to reduce environmental impacts (land bridge proposals will require USFWS consultation under the ESA).
2. Implement all reasonable and prudent measures in the BA through the IRT and implementation of the T&E Species HMP (LANL 2014b).

Actions Taken:

In FY 2015, DOE continued to implement the LANL T&E Species HMP. LANS biological resources staff completed trend histories of T&E species surveys at LANL and incorporated these data into the 2014 ASER (LANL 2015a). T&E species surveys were conducted for the Mexican Spotted Owl, Southwestern Willow Flycatcher, and Jemez Mountains Salamander. Two pairs of Mexican Spotted Owls were identified on site with a total of seven fledglings. Southwestern Willow Flycatchers were not detected, but two Jemez Mountains Salamanders were identified in Los Alamos Canyon. LANS staff attended required training provided by USFWS staff for the newly-listed Yellow-billed Cuckoo.

DOE and LANS staff prepared the following documents in support of the LANL T&E Species HMP.

- *Floodplain Assessment for Enhanced Storm Water Controls in Three-mile Canyon at Technical Area 18 at Los Alamos National Laboratory* (LANL 2015c).
- *Floodplain and Wetland Assessment for Construction and Restoration Activities in Lower Pueblo Canyon* (LANL 2014c).
- *Floodplain Assessment for the Construction of a Parking Lot in Los Alamos Canyon* (LANL 2014d).
- *Biological Assessment for the Addition of the Western Distinct Population Segment of the Yellow-billed Cuckoo and the New Mexico Meadow Jumping Mouse to the Los Alamos National Laboratory Habitat Management Plan* (LANL 2015d).
- *Biological Assessment of the Effects of the Recreational Use of Los Alamos Canyon on Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory* (LANL 2014a).
- *Sensitive Species Best Management Practices Source Document (updated March 2015)* (LANL 2015e).
- *Final Report to the U.S. Fish and Wildlife Service Regarding a Violation of the Habitat Management Plan and Resulting Efforts to Mitigate the Impact* (LANL 2014e). This report was submitted to the USFWS and details how and why requirements in the LANL T&E Species HMP were violated in FY 2014 and describes mitigation

measures implemented to offset impacts associated with the removal of 19 trees and improved internal processes. An Effectiveness Evaluation Plan and Effectiveness Evaluation Report were also completed in accordance with ISO 14001.

- *Field Validation of Predicted Large Game Movement Corridors and Pinch Points at Los Alamos National Laboratory* (LANL 2014f).
- Annual Resource Conservation and Recovery Act report, *Avian Monitoring at the TA-36 Minie Site, TA-39 Point 6, and TA-16 Burn Ground at Los Alamos National Laboratory* (LANL 2014g).

Effectiveness of the Mitigations:

Mitigations 1 and 2: Effective. Implemented through the IRT.

Recommendation to Continue or Close out Mitigations:

Continue to implement Mitigations 1 and 2 through the IRT and the LANL T&E Species HMP.

2.10 Biological Resources Management Plan

NEPA Driver:

The commitment to create and maintain a Biological Resources Management Plan (BRMP) is derived from the 2008 SWEIS ROD. The *Biological Resources Management Plan for Los Alamos National Laboratory* (LANL 2007) outlines the commitment by LANS to conduct site operations using processes that minimize risks to mission implementation and biological resources.

Mitigation:

1. Implement the BRMP (LANL 2007).

The BRMP addresses LANS' commitment to conduct site operations using processes that minimize risk to both mission implementation and biological resources. The BRMP describes objectives, strategies, and actions that fulfill the following goals.

a) Mission Support: Ensure and facilitate compliance with biological resource laws and regulations.

b) Site Stewardship: Identify and mitigate adverse impacts on biological resources.

c) Regional Commitment: Meet responsibilities as a good neighbor and trustee of natural resources.

Actions Taken:

In FY 2015, DOE continued to implement the BRMP. LANS biological resources staff took the following actions to implement the plan.

- Continued an avian monitoring project in the Sandia wetlands for a second year. Population indices will be developed after five years of data collection.
- Received an Honorable Mention for the 2015 Presidential Migratory Bird Federal Stewardship Award Competition.
- Presented seven wildlife safety briefings at LANL.
- Conducted a tour of endangered species habitat at LANL for biologists from Idaho National Laboratory and the Nevada Test Site.
- Presented Biological Resources Management talks at the University of New Mexico, Los Alamos High School, and as part of a webinar for the Annual Council for the Conservation of Migratory Birds meeting with DOE.
- Presented the *Hazards to Birds from Open Metal Pipes* talk at the New Mexico Ornithological Society 53rd annual meeting in Roswell, New Mexico, April 2015.
- Completed annual fall, winter, spring, and summer migratory bird surveys in the Pajarito Wetlands.
- Prepared a summary of calendar year 2014 migratory bird work at LANL for DOE headquarters to be included in the 2014 *Council for the Conservation of Migratory Birds* report of Federal agency migratory bird protection activities in FY 2016.
- Published Hathcock, C.D. and Painter, C.W. 2015. Distribution Note. *Arizona elegans (Glossy Snake)*. Herpetological Review 46(1):60–61.
- Published Hathcock, C.D., M.A. Wright, D.S. Sias, and G.J. Gonzales. 2015. *Morphology and Sexual Dimorphism of the Many-lined Skink in North Central New Mexico*. Western North American Naturalist 75(2):232–235.
- Completed the *Sensitive Species Best Management Practices Source Document* (LANL 2015e).

Effectiveness of the Mitigation:

Mitigation 1: Effective. Implemented through use of the BRMP, T&E Species HMP, and the IRT.

Recommendation to Continue or Close out Mitigations:

Continue to implement the BRMP.

2.11 Cultural Resources Management Plan

NEPA Driver:

The commitment to create and maintain a CRMP is derived from the 2008 ROD for the 2008 SWEIS (DOE 2008a, b). The existing CRMP (LANL 2006b) was revised by LANS and submitted to the New Mexico State Historic Preservation Office (SHPO) in May 2012 and resubmitted in July 2013 for review. The Field Office received SHPO comments in April 2015 and is in the process of revising the document.

Mitigation:

1. Implement the CRMP (LANL 2006b).

The CRMP defines the responsibilities, requirements, and methods of managing cultural resources on LANL property under the NHPA. It provides an overview of the cultural resources program, establishes a set of procedures for effective compliance with historic preservation laws, addresses land-use constraints and flexibility, and makes the public aware of the stewardship responsibilities and steps taken by the Field Office to manage the cultural heritage at LANL.

Actions Taken:

In FY 2015, DOE continued to implement the LANL CRMP (LANL 2006b). A majority of the work executed this year focused on an evaluation of and reporting on archaeological sites within the area of potential effect for a proposed project in Mortandad Canyon, TA-05 (LANL 2015f). In addition, preparations for visits associated with the new Manhattan Project National Historical Park (MPNHP) were also a significant part of the FY 2015 work scope. In December 2014, Congress passed the 2015 National Defense Authorization Act, which included provisions authorizing the MPNHP. President Obama signed the act into law on December 19, 2014, which establishes the MPNHP as a unit of the National Park Service no later than one year after enactment.

In support of the MPNHP, DOE and LANS cultural resources staff worked with LANS personnel and the County of Los Alamos to organize a four-day DOE and National Park Service MPNHP joint-agency team meeting with tours, a public open house, and stakeholder meetings.

LANS cultural resources staff took the following actions to support ongoing projects.

- Marked archaeological site for avoidance in support of LANL-wide wildland fire fuels mitigation projects.
- Consulted on and prepared an iPad application for the original main technical area.
- Completed the 1950s guard station historical context report (LANL 2015g).

- Completed the TA-54 West report (LANL 2015h).
- Completed the annual condition assessment of Nake'muu Pueblo in August 2015.
- Supported monthly technical meetings between DOE, LANS, the Pueblo de San Ildefonso, and Santa Clara Pueblo and quarterly Accords Technical Environmental Meetings between DOE, LANS, Pueblo de San Ildefonso, Santa Clara Pueblo, Cochiti Pueblo, and Jemez Pueblo.
- Five LANS cultural resources staff members achieved Wildland Fire Red Card certification to support Emergency Operations in case of wildfires at LANL.
- Completed a cultural resources inventory of 110 acres of unsurveyed LANL land.

As part of New Mexico Heritage Preservation month, DOE and LANS hosted public tours of the Tsirege archaeological site in May 2015. In July, DOE and LANS hosted a tour of the Mortandad Cave Kiva Complex for a group of students from the Pueblo de San Ildefonso. DOE and LANS staff also provided MPNHP briefings, tours, and presentations for congressional staffers; DOE headquarters staff; National Park Service regional managers; DOE and LANS employees; and members of the National Association of Attorneys General. LANS cultural resources staff supported 28 tours in FY 2015.

Effectiveness of the Mitigation:

Mitigation 1: Effective. Implemented through use of the IRT.

Recommendation to Continue or Close out Mitigations:

Continue to implement the CRMP.

2.12 Commitments to Santa Clara Pueblo

NEPA Driver:

The commitments to Santa Clara Pueblo are derived from the 2008 SWEIS MAP (DOE 2010a; DOE 2014) and the 2008 ROD (DOE 2008b). NNSA recognizes that the operation of LANL over the last 65 years has affected the people of neighboring communities in northern New Mexico, including Tribal communities. These effects, which vary in nature across communities, include alterations of lifestyles, community, and individual practices. While the analysis conducted by DOE/NNSA found no disproportionately high and adverse impacts to minority or low-income populations, based on comments from the Santa Clara Pueblo, the 2008 SWEIS ROD (DOE 2008b) stated:

> "…NNSA will undertake implementation of the decisions announced in this ROD in conjunction with a MAP. The MAP will be updated as the need arises to

identify actions that would address specific concerns and issues raised by the Santa Clara Pueblo as well as those of other tribal entities in the area of LANL."

The SWEIS ROD also stated:

"…with respect to the concerns raised by the Santa Clara Pueblo, the NNSA will continue its efforts to support the Pueblo and other tribal entities in matters of human health, and will participate in various intergovernmental cooperative efforts to protect indigenous practices and locations of concerns. NNSA will conduct government-to-government consultation with the Pueblo and other tribal entities to incorporate these matters into the MAP."

Mitigations:

1. The Field Office consulted with Santa Clara Pueblo and agreed to provide one-time funding to the Pueblo to develop a mutually acceptable work plan to address specific environmental justice and human health concerns and issues identified by Santa Clara Pueblo during the SWEIS process. The work plan will include specific tasks and timelines, and will identify the necessary NNSA and Pueblo resources to help ensure implementation of the plan. In consultation with Santa Clara Pueblo, the Field Office shall then update the MAP to incorporate these actions.
2. The NNSA will continue its efforts to support Santa Clara Pueblo and other tribal entities in matters of human health, and will participate in various intergovernmental cooperative efforts to protect indigenous practices and locations of concern. The NNSA will conduct government-to-government consultation with the Pueblo and other tribal entities to incorporate these matters into the MAP.

Actions Taken:

In FY 2015, the Field Office began a review of the draft *Work Plan for Santa Clara Traditional Human Health Risk Assessment Scenario and Reasonable Maximum Exposure (RME)* received in FY 2015. The Field Office will provide comments and work with representatives from Santa Clara Pueblo to finalize this work plan in FY 2016. The final work plan will be a mutually-acceptable plan to address specific environmental justice and human health concerns and issues identified by Santa Clara Pueblo during the SWEIS process.

Effectiveness of the Mitigation:

Mitigation 1: Effective.

Mitigation 2: Effective.

Recommendation to Continue or Close out Mitigations:

Finalize and begin to implement the *Work Plan for Santa Clara Traditional Human Health Risk Assessment Scenario and Reasonable Maximum Exposure (RME).*

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LANL 2014d *Floodplain Assessment for the Construction of a Parking Lot in Los Alamos Canyon*, LA-UR-14-29451, Los Alamos, New Mexico.

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Appendix A
2008 Site-Wide Environmental Impact Statement
FY 2015 Mitigation Action Plan Annual Report
Tracking Log

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Green indicates a completed action; Yellow is an ongoing effective action; Blue is an ongoing but ineffective action; Red is a closed, not implemented, or on-hold mitigation.

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Effectiveness of Mitigation	Recommendation	Responsible Party
Transition of Previous LANL NEPA Mitigation Commitments into the 2008 SWEIS MAP						
2.1 DARHT MAP	Monitor contaminants by sampling soils, plants, mammals, birds, and road kills adjacent to the facility and at a control site not affected by DARHT operations.	MAP for DARHT Environmental Impact Statement (EIS) (DOE/EIS 0228; Oct. 1996)	LANS staff collected samples around the perimeter of the DARHT facility and submitted them for the analysis of radionuclides and chemicals.	Effective and ongoing	Continue annual sampling.	LANS ENV-ES Group
	Site monitoring and evaluation consisting of periodic soil, water, and other environmental analyses for solid, hazardous, mixed, and radioactive wastes.		Staff collected samples around the perimeter of the DARHT facility and submitted them for the analysis of radionuclides, heavy metals, Dioxin/Furans, and PCB congeners.	Effective and ongoing	Continue annual sampling.	LANS ENV-ES Group
	Conduct annual Tribal tours of Nake'muu, as requested, and LANS maintenance visits.		There are no impacts from DARHT operations to archaeological resources.	Effective and ongoing. Tours are conducted when requested by the Pueblo de San Ildefonso.	Continue visits as requested by the Pueblo de San Ildefonso and continue annual maintenance visits to Nake'muu and report results in Section 2.11.	LANS ENV-ES Group Field Office: Cultural Resources Program Manager and Intergovernmental Programs

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Effectiveness of Mitigation	Recommendation	Responsible Party
2.2 Trails MAP	Complete eligibility evaluations for historic trails under the NHPA when possible and identify potential environmental issues on trails use.	DOE/EA-1431 (Aug. 2003) and FONSI (Sept. 2003)	Monitoring of cultural resources adjacent to recreational trails in TAs 70 and 71 identified no issues or impacts.	Effective and ongoing. Evaluations integrated into the revised LANL CRMP; future work will continue under the CRMP once it is finalized.	Recommend completion of Trails Management Plan and continue to implement under the LANL CRMP.	LANS ENV-ES Group Field Office: Cultural Resources Program Manager
	Evaluate and manage trails to determine appropriate closures and/or restrictions.		Worked with Los Alamos County regarding use of Los Alamos Canyon for recreational trail use. A BA evaluating recreational use of Los Alamos Canyon was approved by USFWS in FY 2015.	Effective and ongoing	Finalize Trails Management Plan.	LANS ENV-ES Group Field Office – Landlord Program Manager
	Prepare management plans for trails at LANL.		Prepared draft Trails Management Plan for LANL trails, including trail repair and future trailhead parking.	Effective and ongoing	Finalize Trails Management Plan and implement.	LANS ENV-ES Group Field Office – NEPA Compliance Officer and Landlord Program Manager
	Support the use of volunteers for selected trails maintenance projects at LANL.		Maintenance of trails occurs on an as-needed basis.	**Not implemented.** No volunteers were used for trail maintenance in FY 2015.		LANS and Field Office Legal Counsel
	Plan, maintain, repair, and construct trails.		Prepared draft Trails Management Plan for LANL trails.	**Not implemented.** Additional resources are needed to support trail maintenance and repair.	Finalize Trails Management Plan and implement.	LANS ENV-ES Group

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Effectiveness of Mitigation	Recommendation	Responsible Party
2.3 Special Environmental Analysis MAP	Monitor biota and sediment contamination behind the Los Alamos Canyon Weir and the Pajarito Canyon FRS and report results in the ASER.	DOE/SEA-03 (Sept. 2000)	Samples of vegetation and small mammals were collected upgradient of the Los Alamos Canyon weir and the FRS, and analyzed for radionuclides, metals, and PCBs. Results available in the 2014 ASER.	Effective and ongoing	Continue annual sampling and analysis.	LANS ENV-ES Group Field Office: Environmental Management (EM)
	Periodically remove sediment from the Los Alamos Canyon Weir based on sedimentation rate and contamination accumulation rate.		Sediment removed and sampled from the Los Alamos Canyon Weir.	Effective and ongoing	Continue additional clean outs as necessary.	LANS Associate Directorate for Environmental Programs (ADEP) Field Office – EM
2.4 FRS EA	Annually monitor the FRS for structural integrity and safe operations until removed.	DOE/EA-1408 (Aug. 2002)	The annual inspection of the Pajarito Canyon FRS was conducted on May 20, 2015.	Effective and ongoing	Continue annual FRS inspections.	LANS Utilities and Institutional facilities
	Remove portions of the FRS in accordance with DOE/EA-1408.		N/A*	**Not implemented.** This mitigation is on hold until the FRS is removed.	Remove portions of the FRS in accordance with DOE/EA-1408.	LANS Associate Directorate for Nuclear and High-Hazard Operations (ADNHHO) ENV Division
	Recycle demolition spoils from FRS DD&D as appropriate.		N/A		Recycle demolition spoils from FRS DD&D as appropriate.	

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Effectiveness of Mitigation	Recommendation	Responsible Party
2.4 FRS EA (cont.)	Leave an aboveground portion of the FRS equivalent to the dimensions of a low-head weir to retain potentially-contaminated sediments on LANL land.		N/A	**Mitigation on hold.** This mitigation is on hold until the FRS is removed.	Consider leaving aboveground portion of the FRS.	LANS ADNHHO ENV Division
	Remove aboveground portions of the steel diversion wall below the FRS.	DOE/EA-1408 (Aug. 2002)	N/A	**Mitigation on hold.** This mitigation is on hold until the FRS is removed.	Remove aboveground portions of the steel diversion wall below the FRS.	LANS ADNHHO ENV Division
	Re-contour and reseed disturbed areas to protect surface water quality in Pajarito Canyon after the FRS is removed.		N/A		After removal, Re-contour and reseed disturbed areas to protect surface water quality in Pajarito Canyon.	
Project-Specific Mitigation Measures Analyzed in the SWEIS						
2.5 RLWTF/ Outfall Reduction	All further actions affecting water flow volumes in Mortandad and Sandia canyons will be assessed for positive and negative impacts.	BA for the 2008 SWEIS (LA-UR-06-6679; 2006); 2009 ROD for LANL SWEIS (July 2009)	No cooling tower water blow down or SERF product water has been diverted from Sandia Canyon.	Effective and ongoing	Continue to assess projects' potential impacts on water flow volumes in the canyons through the use of IRT.	LANS ENV Division, ADEP Field Office: EM

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Effectiveness of Mitigation	Recommendation	Responsible Party
2.5 RLWTF/ Outfall Reduction	All further actions affecting water flow volumes in Mortandad and Sandia canyons will be assessed for positive and negative impacts.	BA for the 2008 SWEIS (LA-UR-06-6679; 2006); 2009 ROD for LANL SWEIS (July 2009)	There have been no discharges into Mortandad Canyon since 2010.	Effective and ongoing	Continue to assess projects' potential impacts on water flow volumes in the canyons through the use of IRT.	LANS ENV Division, ADEP Field Office: EM
2.6 Off-Site Source Recovery Project	Institute adequate controls on quantities and methods of storing sealed sources containing ^{60}Co, ^{192}Ir, or ^{137}Cs to mitigate effects of potential accidents.	2008 ROD for the LANL SWEIS (Sept. 2008)	No actions necessary	**Not implemented.** LANL currently does not accept sealed sources containing ^{60}Co, ^{192}Ir, or ^{137}Cs.	N/A	Nuclear Engineering and Nonproliferation Division, International Threat Reduction
2.7 SERF	Implement the SERF MAP	MAP and FONSI for DOE/EA-1736 (Aug. 2010); 2008 ROD for LANL SWEIS (Sept. 2008)	All mitigations listed within the SERF MAP associated with the S-2 reach have been completed.	Mitigation complete	Formally close out mitigation through the Field Office.	LANS ENV-ES, ADEP Field Office: NEPA Compliance Officer

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Effectiveness of Mitigation	Recommendation	Responsible Party
Institutional Resource Management Responsibilities						
2.8 Wildland Fire Management Plan	Implement Wildland Fire Management Plan with adequately funded ongoing program. (Note: this plan is now called the Wildland Fire Operations Plan)	DOE Wildfire Management Policy (Feb. 2004); 2001 Federal Wildland Fire Management Policy and Implementing Actions (Jan. 2001) SWEIS MAPs (2008; 2014)	All key milestones for FY 2015 completed.	Effective and ongoing	Continue implementing annual plans to mitigate wildfire risks.	LANS Emergency Operations-Emergency Management
	Continue to further reduce wildfire risks by shipping legacy transuranic waste, currently stored in the TA-54 domes, to WIPP.		No waste shipments of legacy waste to reduce wildfire risks have occurred due to the current closure of the WIPP site.	**Not implemented.** Mitigation on hold until the WIPP facility is operational.	Design and implement a fuels prescription for the west side of TA-54. Implement pollution prevention projects to minimize or eliminate waste streams. Identify alternative location(s) for waste until WIPP reopens.	LANS ADEP; ENV-ES Field Office: EM
2.9 SWEIS BA	Evaluate the use of span bridges instead of land bridges in areas that cross canyons in T&E species habitats to reduce environmental impacts (under ESA, land bridge proposals require USFWS consultation).	LANL T&E Species HMP and SWEIS BA	Not the preferred alternative for any projects to date.	Effective and ongoing. Implemented through the use of the IRT.	Span bridges are considered through the use of the IRT and the LANL T&E Species HMP.	ENV Division

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Effectiveness of Mitigation	Recommendation	Responsible Party
2.9 SWEIS BA (cont.)	Implement all reasonable and prudent measures in the BA through the IRT process and implementation of the T&E species HMP.		Efforts included completing trend histories of T&E species surveys at LANL, submitting a floodplain assessment and BA to DOE, supporting a cleanup project, and attending training.	Effective and ongoing. Implemented through the use of the IRT.	Review projects using the IRT and the LANL T&E Species HMP.	LANS ENV-ES
2.10 BRMP	Implement LANL BRMP. The BRMP addresses LANS' commitment to conduct site operations using processes that minimize risk to mission implementation and biological resources.	DOE/EIS-0238 ROD (Sept. 1999) and DOE/EIS-0380 ROD (Sept. 2008)	Efforts included continuing avian monitoring projects, giving talks and creating material for internal and external presentations, publishing articles, and supporting public outreach events.	Effective and ongoing. Implemented through the use of the IRT, BRMP, and T&E Species HMP.	Continue to implement the BRMP	LANS ENV-ES Field Office: Biological Resources Program Manager
2.11 CRMP	Implement LANL CRMP. The CRMP addresses DOE's commitment to conduct site operations using processes that minimize risk to mission and cultural resources.	2008 ROD for the LANL SWEIS (Sept. 2008); NHPA	Efforts included LANS cultural resources staff supporting programmatic work, leading tours and briefings, completing historical context reports, and implementing significant support for the MPNHP.	Effective and ongoing. Implemented through the use of the IRT.	Continue to implement the CRMP.	LANS ENV-ES Field Office: Cultural Resources Program Manager

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Effectiveness of Mitigation	Recommendation	Responsible Party
Commitments to Santa Clara Pueblo						
2.12 Consultations with Santa Clara Pueblo	DOE/NNSA Field Office shall develop a work plan jointly with Santa Clara Pueblo to address environmental justice and human health concerns and issues identified by Santa Clara Pueblo during the SWEIS process. The work plan will include specific tasks and timelines, and identify the necessary NNSA and Pueblo resources to help ensure implementation of the plan. In consultation with Santa Clara Pueblo, DOE/NNSA Field Office will update the MAP to incorporate these actions.	MAP and 2008 ROD for the LANL SWEIS (Sept. 2008)	In FY 2015, the Field Office received a draft *Work Plan for Santa Clara Traditional Human Health Risk Assessment Scenario and Reasonable Maximum Exposure (RME)* and began a review of the document. The Field Office also continued consultations with Santa Clara Pueblo.	Effective and ongoing	Finalize the draft *Work Plan for Santa Clara Traditional Human Health Risk Assessment Scenario and Reasonable Maximum Exposure (RME)* and implement.	DOE/NNSA and EM in conjunction with Santa Clara Pueblo

Topic	Mitigation Action Commitment	NEPA Driver	Actions Taken	Effectiveness of Mitigation	Recommendation	Responsible Party
2.12 Consultations with Santa Clara Pueblo (cont.)	The NNSA will continue its efforts to support Santa Clara Pueblo and other tribal entities in matters of human health, and will participate in various intergovernmental cooperative efforts to protect indigenous practices and locations of concern.			Effective and ongoing	Finalize the draft *Work Plan for Santa Clara Traditional Human Health Risk Assessment Scenario and Reasonable Maximum Exposure (RME)* and implement.	

* N/A = not applicable.

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Appendix B

Dual-Axis Radiographic Hydrodynamic Test Facility

Mitigation Action Plan Annual Report for Fiscal Year 2014

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Dual-Axis Radiographic Hydrodynamic Test Facility Mitigation Action Plan Annual Report for Fiscal Year 2014

Prepared by:
Department of Energy Los Alamos Site Office
National Nuclear Security Administration

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CONTENTS

List of Tables

List of Figures

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Acronyms

ASER	Annual Site Environmental Report
BA	Biological and Floodplain/Wetland Assessment
BSRL	baseline statistical reference level
CFR	Code of Federal Regulations
DARHT	Dual-Axis Radiographic Hydrodynamic Test (facility)
DOE	U.S. Department of Energy
EIS	Environmental Impact Statement
ENV-ES	Environmental Stewardship (Group)
ENV-RCRA	Water Quality and RCRA [Resource Conservation and Recovery Act]
FR	Federal Register
FY	fiscal year
HAZMAT	Hazardous Materials Response Group
HMP	habitat management plan
ISM	Integrated Safety Management (system)
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
LE-ESL	Low-effect ecological screening level
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
NE-ESL	No-effect ecological screening level
NEPA	National Environmental Policy Act of 1969
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
ROD	Record of Decision
RSRL	regional statistical reference level
SHPO	State Historic Preservation Officer
SWEIS	Site-Wide Environmental Impact Statement
SWPPP	Stormwater Pollution Prevention Plan
TA	technical area
TAL	target analyte list
TCP	traditional cultural property
TNT	trinitrotoluene(2,4,6-)
VPB	Vessel Preparation Building
WFO-FOD	Weapons Facilities Operations, Facilities Operations Directorate
WPA	Work Package Agreement

Executive Summary

In fiscal year (FY) 2014 there were no significant impacts from contaminants based on measurements of soil, sediment, vegetation, field mice, and bees from Dual-Axis Radiographic Hydrodynamic Test (DARHT) operations. DARHT operations had no significant impacts on bird populations and diversity; changes in composition (types of birds) were attributed to changes in vegetation structure from fire and insect activity. There were no impacts from DARHT operations on archaeological resources (i.e., Nake'muu Pueblo). The natural environment has a greater effect on the deterioration of the standing wall architecture than operations at DARHT. Although FY 2014 contaminant levels were not at concentrations detrimental to human health or to the environment, there were measurable amounts of depleted uranium in all media and the levels increase over time until 2006. Concentrations of depleted uranium in most media decreased in 2007 and may correspond to the success of employing steel containment vessels. However, since increases of uranium in all media were noted until at least 2006 and uranium may linger in soils for some time, monitoring of these media will continue until the concentrations are similar to baseline statistical reference levels. Overall, foam mitigation has significantly reduced the amount of potential contaminants released into the environment compared with open-air detonations, and the use of steel containment vessels further reduced those amounts over foam mitigation.

1.0 Introduction

This Mitigation Action Plan Annual Report (MAPAR) was prepared by the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) as part of implementing the Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility Mitigation Action Plan (MAP) (DOE 1996). This MAPAR provides status on specific DARHT facility operations-related mitigation actions implemented to fulfill DOE commitments under the DARHT Environmental Impact Statement (EIS) Record of Decision (ROD; DOE 1995) and MAP and the 2008 Site-Wide EIS (SWEIS) MAP (DOE 2008). In January 2009, the SWEIS MAP was finalized; it includes outstanding 1999 SWEIS MAP commitments, all continuing mitigations from National Environmental Policy Act of 1969 (NEPA) decisions made since the 1999 SWEIS, and those made in the September 2008 and June 2009 SWEIS RODs. Although no new commitments were identified for DARHT, some of the earlier commitments were completed; for example, the need to continue the archaeological monitoring of Nake'muu, the only ancestral pueblo at Los Alamos National Laboratory (LANL) retaining its original standing walls.

The DOE/NNSA Los Alamos Field Office (Field Office) is responsible for implementing the DARHT MAP, which is now included in the 2008 SWEIS MAP. In June 2004, DOE provided stakeholders with the first MAPAR, complete with the full scope of commitments and action plans implemented under the DARHT MAP during fiscal year (FY) 2003.

This MAPAR reports on the full scope of actions implemented during FY 2014 (October 1, 2013, through September 30, 2014) and represents the fifteenth year of DARHT facility operations-related mitigation measures and action plans. All construction-related mitigation measures and action plans were completed in FY 1999 (LANL 1999).

1.1 Background

DOE issued the final EIS on the DARHT facility (DOE/EIS-0228) at LANL in August 1995 and published the ROD in the Federal Register (60 FR 53588) on October 16, 1995. The DARHT MAP is being implemented consistent with DOE regulations under the NEPA as stated in DOE's Final Rule and Notice for Implementing NEPA (10 Code of Federal Regulations [CFR] 1021, section 331(a), revised July 9, 1996).

The ROD on the DARHT final EIS states that DOE has decided to complete and operate the DARHT facility at LANL while implementing a program to conduct most tests inside steel containment vessels with containment to be phased in over 10 years (the

Phased Containment option of the Enhanced Containment alternative[2]). In general, open-air detonations occurred from 2000 to 2002 and detonations within a foam medium occurred from 2003 to 2006. A containment vessel qualification shot was conducted at the Technical Area (TA) 39 Firing Point 6 in 2006, and shots within steel containment vessels at DARHT were implemented in May of 2007 to 2014.

The ROD further states that DOE will develop and implement several mitigation measures to protect soils, water, and biotic and cultural resources potentially affected by the DARHT facility construction and operation (DOE 1995). In addition, DOE agreed to an ongoing consultation process with affected American Indian tribes to ensure protection of resources of cultural, historic, or religious importance to the tribes. As discussed in Section 5.11, Volume 1, of the DARHT Final EIS, DOE also committed to taking special precautions to protect the Mexican spotted owl (*Strix occidentalis lucida*) by preparing and implementing a LANL-wide habitat management plan (HMP; LANL 2014) for all threatened and endangered species occurring throughout LANL. The DARHT MAP describes those commitments in detail (DOE 1996).

In December 1995, LANL biologists completed a Biological and Floodplain/Wetland Assessment (BA) for the DARHT facility as required under the Endangered Species Act of 1973 (Keller and Risberg 1995). The BA includes mitigation expected to prevent any likely adverse effect to any threatened or endangered species or modification to critical habitat. The mitigation measures identified in the BA were the basis for U.S. Fish and Wildlife Service concurrence with a finding of "may affect, but not likely to adversely affect," and have been used as the basis for establishing mitigation commitments and action plans for potential impacts to threatened or endangered species and critical habitat as identified in the DARHT MAP. These BA mitigation measures, through implementation of the DARHT MAP, have established some of the guidelines under which the DARHT facility was constructed and will be operated to mitigate the identified potential impacts.

1.2 MAP Function and Organization

The functions of the DARHT MAP are to (1) document potentially adverse environmental impacts of the Phased Containment option delineated in the final DARHT EIS, (2) identify commitments made in the final EIS and ROD to mitigate those potential impacts, and (3) establish action plans to carry out each commitment (DOE 1996).

[2] In addition to containment with vessels, additional mitigation measures for use at DARHT are ongoing. These include aqueous foam for particulate mitigation that is aimed at reducing release of materials from test shots.

The DARHT MAP is divided into eight sections: Sections I through V provide background information regarding the NEPA review of the DARHT facility project and an introduction to the associated MAP. Section VI references the Mitigation Action Summary Table, which summarizes the potential impacts and mitigation measures; indicates whether the mitigation is design-, construction-, or operations-related; summarizes the organization responsible for the mitigation measure; and summarizes the projected or actual completion date for each mitigation measure. Sections VII and VIII discuss the MAPAR commitment and the potential impacts, commitments, and action plans.

Under Section VIII, potential impacts are categorized into the following five areas of concern:

- general environment, including impacts to air and water;
- soils, especially impacts affecting soil loss and contamination;
- biotic resources, especially impacts affecting threatened and endangered species;
- cultural/paleontological resources, especially impacts affecting the archaeological site known as Nake'muu; and
- human health and safety, especially impacts pertaining to noise and radiation.

Each category includes a brief statement of the nature of the impact and its potential cause(s). The commitment made to mitigate the potential impact is identified. The action plan for each commitment is described in detail with a description of actions to be taken, pertinent time frames for the actions, verification of mitigation activities, and identification of agencies/organizations responsible for satisfying the requirements of the commitment.

1.3 MAP Duration and Closeout

The DARHT MAP will be implemented for the operational life (about 30 years) of the DARHT facility (DOE 1996). Within the DARHT MAP, each DOE commitment and action plan specifies a time frame, verification strategy, and responsible agency/organization. The MAP also includes a summary of mitigation actions that identifies the projected/actual period of mitigation action completion. Each mitigation action time frame correlates with one or more of the following DARHT facility project stages: design, construction, and operations. This information generally refers to when an individual action will be initiated and completed. All construction-related mitigation measures were completed in FY 1999 (LANL 1999).

1.4 DARHT Facility Schedule and Status

The court-ordered injunction on DARHT facility construction was lifted on April 16, 1996, and DOE authorized resumption of construction activities on April 26, 1996. The DARHT facility construction contractor was fully mobilized on August 23, 1996, and

full-scale construction was authorized and began on September 30, 1996. In July 1999, with the appropriate DOE authorization, the DARHT Project Office initiated DARHT facility operations on the DARHT first axis.

During the late summer of 2000, two high-explosive shots using 16 pounds of TNT (trinitrotoluene[2,4,6-]) were performed. The purpose of these two experiments was to acquire accelerometer data on the building at the Nake'muu archaeological site. In the late fall of 2000, the first major hydrotest using the DARHT first axis was performed, fragment mitigation measures were in place, and postshot cleanup was conducted to minimize the release of contaminants to the environment.

In the summer of 2001, one major system checkout experiment and three major hydrotests were performed. Fragment mitigation measures were in place and postshot cleanup was conducted to minimize the release of contaminants to the environment. Each of the four experiments returned state-of-the-art quantitative radiographic information. The final three hydrotests illuminated the complex hydrodynamics of mockups of stockpiled systems.

In the fall of 2002, hydrotesting continued with two major experiments that again returned state-of-the-art quantitative radiographic information of mockups of stockpiled systems. Fragment mitigation measures were in place and postshot cleanup operations were conducted. An aqueous foam containment method of particulate containment and blast mitigation was tested at another firing site for implementation at DARHT. Also during 2002, the DARHT Project continued the major installation of the injector and accelerator components of the second axis. Two major DARHT second-axis commissioning milestones were achieved in 2002. On July 2, 2002, the second-axis injector achieved conceptual design-4a early with e-beam parameters of >250 amps at >2.0 MeV. On December 21, 2002, the full accelerator achieved the technical criteria of conceptual design-4d with e-beam parameters of >1.0 kA at >12.0 MeV for longer than 400 nanoseconds.

In 2003, the construction of the Vessel Preparation Building (VPB) was completed. One hydrotest was fired in the fall of 2003 and again returned state-of-the-art quantitative radiographic information of a mockup of a stockpile system. This experiment was the initial implementation of aqueous foam mitigation for a hydrotest experiment at DARHT. The aqueous foam mitigation method achieved at least a 5% reduction in material released to the open air as prescribed for Phase I of the Phased Containment option. Steel plates and concrete replaced surface gravel at the firing pad to enhance cleanup activities following experiments.

In FY 2004, two major hydrotests were conducted. Aqueous foam particulate mitigation was implemented during these experiments to mitigate blast effects. One of these

experiments was the first foam-mitigated experiment to use the new fabric tent configuration for containing the foam.

In FY 2005, hydrotesting continued with three major hydrotest experiments. Fragment mitigation was implemented during these experiments to mitigate blast effects. Aqueous foam particulate mitigation using a fabric tent configuration for containing the foam was implemented during these experiments to mitigate blast effects.

In FY 2006, hydrotesting continued with three major hydrotest experiments. Aqueous foam particulate mitigation using a fabric tent configuration for containing the foam was again implemented during these experiments to mitigate blast effects. The VPB underwent a Phase II readiness review in FY 2006 and was approved to begin operations including staging, preparation, and decontamination of containment vessels.

From FY 2007 through 2014, single-walled steel containment vessels were used for all hydrotest experiments to mitigate the fragments and particulate emissions associated with the experiment. These steel containment vessels achieved at least a 40% reduction in material released to the open air as prescribed for Phase II of the Phased Containment option. The steel vessels are transported to VPB where they were decontaminated and prepared for the next experiment. A major DARHT second-axis commissioning milestone was achieved in FY 2007. The DARHT Axis II team successfully kicked four pulses through to the target on the scaled accelerator. Each of the four pulses was 35 nanoseconds in duration and uniformly spaced 400 nanoseconds apart. The kicker and downstream transport system performed extremely well. Overall, three hydrodynamic test shots within steel containment vessels at DARHT were conducted in FY 2007, two in FY 2008, none in FY 2009, four in FY 2010, three in FY 2011, six in FY 2012, five in FY 2013, and six in FY 2014.

2.0 MAP IMPLEMENTATION

The DARHT MAP is implemented on an annual basis in coordination with the federal FY funding cycle. At the beginning of each FY, the DARHT MAP mitigation actions are reviewed and formalized in a LANL work package agreement (WPA). Following WPA authorization, the mitigation actions are initiated. On an annual basis, critical information and data gathered during the mitigation actions are analyzed and summarized; these results are published in the MAPAR.

The DOE/NNSA Los Alamos Field Office NEPA Compliance Officer, who is ultimately responsible for implementing the DARHT MAP, delegates MAP management and tracking to LANL organizations; currently the LANL Environmental Stewardship Services Group (ENV-ES) manages the MAP. Using the annual WPA, ENV-ES coordinates with the appropriate LANL organizations to ensure mitigation action implementation and to prepare the annual report.

The function of the MAPAR is to fulfill DOE's commitment to the stakeholders to report the general status and critical information regarding activities associated with implementation of the DARHT MAP. The MAPAR reflects new information or changed project and environmental circumstances and changes in mitigation actions or changes to the MAP. In order to ensure the public has full access to this information, the MAPAR is placed in the Los Alamos and Albuquerque DOE Public Reading Rooms.

The organization of the MAPAR is intended to provide the reader with a clear understanding of the scope and status of mitigation actions implemented annually under the DARHT MAP. The MAPAR consists of the following main sections: introduction and background; MAP implementation; MAP scope, schedule, and status including results on potential impacts; and conclusions and recommendations, including future MAP implementation.

3.0 DARHT MAP SCOPE, SCHEDULE, AND STATUS

This MAPAR documents the scope and results of mitigation action tasks implemented throughout FY 2014. Table 3-1 provides a summary of the scope of potential impacts and commitments addressed in this MAPAR.

Table 3-1: Summary of Potential Impacts and Commitments Addressed in this MAPAR

DARHT MAP Potential Impacts/Commitments	DARHT Phase	MAPAR Section
A. General Environment		
1. Contamination of the environment surrounding DARHT facility with radioactive or hazardous material: Commitments (b–e)	Operations	3.1
2. Contamination of the environment with various types of wastes as a result of cleaning out the containment vessels	Operations	3.1
3. Contamination of the environment with various types of hazardous materials as a result of spills within the DARHT facility	Operations	3.1
4. Contamination of the environment with hazardous levels of various substances as a result of discharges of contaminated water from the DARHT facility	Operations	3.1
B. Soil		
1. Loss of soil and vegetation could occur during construction and operation of the DARHT facility as a result of severe stormwater runoff: Commitments (a–c).	Operations	3.2

DARHT MAP Potential Impacts/Commitments	DARHT Phase	MAPAR Section
2. Soil erosion and damage to plants caused by additional construction and operations activities, especially off-road and groundbreaking activities: Commitments (a–e)	Operations	3.2
C. Biotic Resources		
1. DARHT facility construction and operations could impact threatened and endangered species as a result of impacts from firings and other operations and activities at the firing sites: Commitments (b–d).	Operations	3.3
2. DARHT facility construction and operation could impact the Mexican spotted owl as a result of noise from firings and other operations, as well as other activities at the firing sites: Commitments (n–x).	Operations	3.3
3. DARHT facility construction and operation could impact the American peregrine falcon (*Falco peregrinus anatum*) as a result of noise from firings and other operations, as well as other activities at the firing sites: Commitments (a, b).	Operations	3.3
4. DARHT facility construction and operation could impact the northern goshawk (*Accipiter gentilis*) as a result of noise from firings and other operations, as well as other activities at the firing sites: Commitments (a–c).	Operations	3.3
5. DARHT facility construction and operation could impact the spotted bat (*Euderma maculatum*) as a result of noise from firings and other operations, as well as other activities at the firing sites.	Operations	3.3
6. DARHT facility construction and operation could impact the New Mexico meadow jumping mouse (*Zapus hudsonius luteus*) as a result of noise from firings and other operations, as well as activities at the firing sites.	Operations	3.3
7. DARHT facility construction and operation could impact the Jemez Mountains salamander (*Plethodon neomexicanus*) as a result of noise from firings and other operations, as well as other activities at the firing sites: Commitments (a, b).	Operations	3.3

DARHT MAP Potential Impacts/Commitments	DARHT Phase	MAPAR Section
8. DARHT facility construction and operation could impact the bald eagle (*Haliaeetus leucocephalus*) as a result of noise from firings and other operations, as well as other activities at the firing sites: Commitments (a, b).	Operations	3.3
9. DARHT facility construction and operation could impact the Townsend's pale big-eared bat (*Corynorhinus townsendii*) as a result of noise from firings and other operations, as well as other activities at the firing sites: Commitments (a, b).	Operations	3.3
10. DARHT facility construction and operation could impact the wood lily (*Lilium philadelphicum* var. *andinum*) as a result of firings and other operations, as well as other activities at the firing sites: Commitments (a, b).	Operations	3.3
D. Cultural/Paleontological Resources		
1. Blast effects, such as shock waves and flying debris, from shots using high-explosive charges could affect nearby archaeological sites, especially Nake'muu, and the immediately surrounding environment: Commitments (b, e–g).	Operations	3.4
2. Structural or other damage to as-yet-unknown Native American cultural resources within the area of potential effects for the DARHT facility site. This could occur as a result of DOE's lack of knowledge of these resources in the DARHT facility area: Commitments (a, b).	Construction/ Operations	3.4
E. Human Health and Safety		
1. Adverse health effects on workers and the general public from high noise levels associated with the DARHT facility, especially construction and test firings: Commitment (a)	Construction/ Operations	3.5
2. Adverse health effects on workers from radiation from DARHT facility operations: Commitments (a–c)	Operations	3.5

3.1 Mitigation Actions for the General Environment

Summary of Potential Impacts

MAP Section VIII.A.1(b–e)

The DARHT MAP identifies the potential for hazardous and radioactive materials to be released to the general environment surrounding the DARHT facility. Hazardous and radioactive materials could be released to the general environment through the following mechanisms: a structural failure of containment vessels or during open-air firing operations, release of various types of waste as a result of cleaning out the containment vessels, release of various hazardous materials as a result of spills within the DARHT facility, and release of hazardous levels of various substances as a result of discharges of contaminated water from the DARHT facility.

Mitigation Action Scope

The operational mitigation actions associated with these potential impacts are as follows:

b) ENV-ES will monitor contaminants by sampling soil, plants, mammals, birds, and bees at baseline locations and, following the start of operations, within the potential impact area of DARHT, once per year. Note: Starting in FY 2014, soil plus one biota component (on a rotating basis) will be collected per the MAP.

c) Other site monitoring and evaluation will consist of periodic soil, water, and other environmental analyses for solid, hazardous, mixed, and radioactive wastes should spills or other unplanned events occur.

d) Double- and single-walled steel containment vessels will be used appropriately.

e) Vessels will be decontaminated.

Status

MAP Section VIII.A.1(b)

Since 1996, soil, sediment, vegetation, honey bee, and small mammal tissue samples have been collected from around the DARHT facility and analyzed during the construction phase (1996–1999) for baseline conditions. The results from four years of analysis of DARHT samples are summarized in a composite report (Nyhan et al. 2001) and were used to calculate baseline statistical reference levels (BSRLs); these are the concentrations of radionuclides and other chemicals (mean plus 3 standard deviations = 99% confidence level) around the DARHT facility before the start-up of operations, as per the DARHT MAP (DOE 1996). Baselines for potential contaminants, populations, and species diversity in birds were developed at a later date (Fresquez et al. 2007).

In FY 2000, operations-phase environmental monitoring was initiated by collecting a suite of samples similar to those collected during the construction phase. Monitoring environmental media in the years to come will continue to assess cumulative impact by documenting accumulations of contaminants in the environmental media.

This section of the MAPAR summarizes the results of analyses of soil, sediment, vegetation, and birds collected around the perimeter of DARHT during FY 2014 (Figure 3-1). Soil and vegetation samples are collected for chemical analysis, whereas birds are live captured and released for abundance and diversity estimates. All of the raw data can be found in the Annual Site Environmental Report (ASER) (LANL 2015).

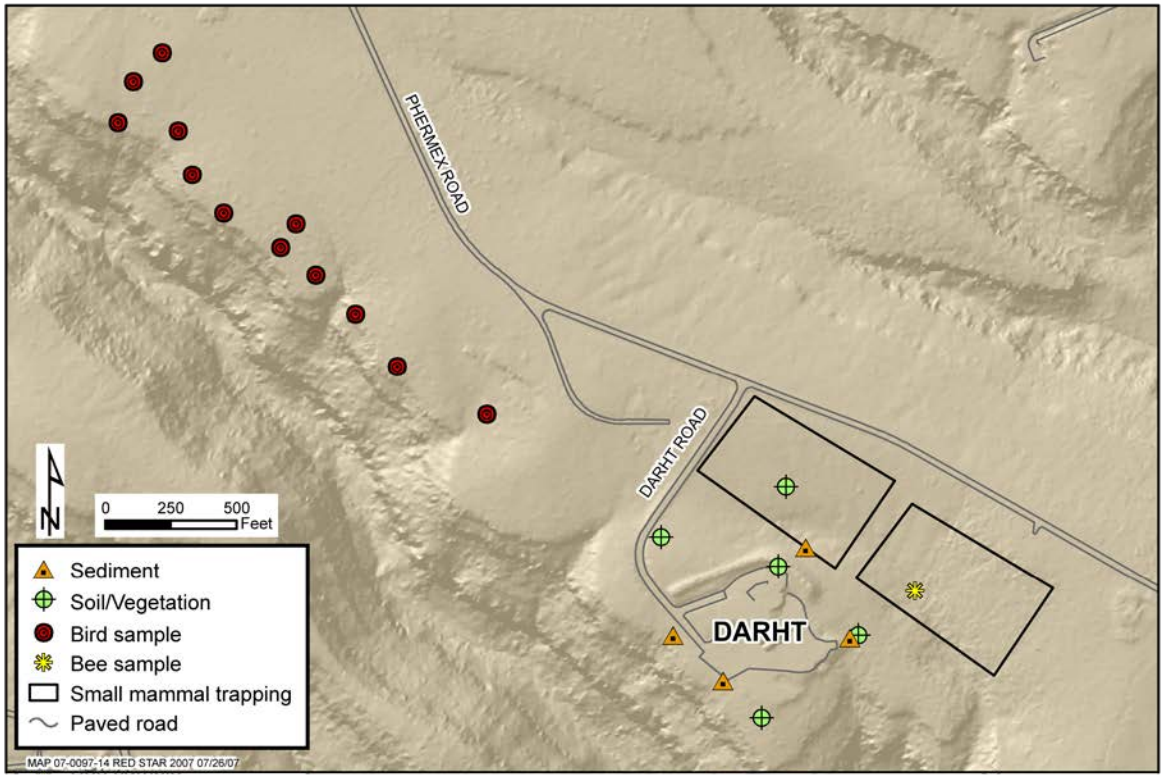

Figure 3-1. Sample locations for soil, sediment, vegetation, field mice, birds, and bees around DARHT.

Soil and Sediment Monitoring. Soil samples were collected north of the firing point and around the perimeter of the DARHT facility on the north, east, south, and west sides (see Figure 3-1). Sediment samples were collected on the north, east, south, and southwest sides. All samples were submitted to ALS Laboratory Group, under chain-of-custody procedures for the analysis of tritium, plutonium-238, plutonium-239/240, strontium-90, americium-241, cesium-137, uranium-234, uranium-235, uranium-238; 23 target analyte list (TAL) chemicals; and high explosives. In addition, dioxins and

furans were analyzed by Cape Fear Analytical, LLC, in one soil sample collected nearest the firing point.

We compared the radionuclide and TAL element results in soil and sediment from the DARHT sampling with both BSRLs and regional statistical reference levels (RSRLs). RSRLs are the upper-level background concentration (mean plus 3 standard deviations = 99% confidence level) derived from soil collected from regional areas away from the influence of LANL. RSRLs represent natural and fallout sources, are calculated as data become available, and can be found in the ASER.

The use of both reference levels is employed because the BSRLs for some radionuclides and chemicals may be biased as a result of changes in pre- and post-sampling locations and the change in analytical techniques.

Most radionuclides in soil and sediment collected from within and around the perimeter of the DARHT facility were either not detected or detected below the BSRLs and the RSRLs. The few radionuclides, including uranium-238, that were detected above the statistical reference levels, however, were far below the lowest NE-ESLs (no-effect ecological screening levels) and thus do not pose an unacceptable dose to any biota.

The only radionuclides in soil and sediments around the DARHT site that have consistently measured above the BSRLs over the years are the uranium isotopes, primarily uranium-238 in the soil sample collected nearest the firing point. Operations have changed to include the use of closed containment vessels and subsequent cleanup of debris around the site; consequently, the uranium-238 activity within the facility has decreased dramatically to BSRLs (Figure 3-2).

Most of the TAL elements, with the exception of selenium, in the soil and sediment samples collected within and around the DARHT facility were below the BSRLs and the RSRLs. The highest selenium concentration (1.1 mg/kg) is above the lowest NE-ESL of 0.52 mg/kg (plant) but below the LE-ESL (low-effect ecological screening level) of 3 mg/kg (plant).

Beryllium, listed as a chemical of potential concern before the start-up of operations at DARHT (DOE 1995), was not detected in any of the soil or sediment samples above reference levels. Beryllium concentrations in soil over the 14-yr operations period have mostly remained below the BSRL over time (Figure 3-3).

None of the 20 high explosives chemicals analyzed were detected in any of the soil and sediment samples collected within and around the perimeter of the DARHT facility, including the sample closest to the firing point. Also, most dioxin and furan congeners were not detected above the method detection limits in the soil sample nearest the firing point. Trace amounts of 1,2,3,4,6,7,8-heptachlorodibenzodioxin; 1,2,3,4,6,7,8,9-octachlorodibenzodioxin; and some tetrachlororodibenzofuran were detected above the

method detection limits but below the detection limits. Similar trace amounts of the two dioxin congeners were detected in 2012 and 2013.

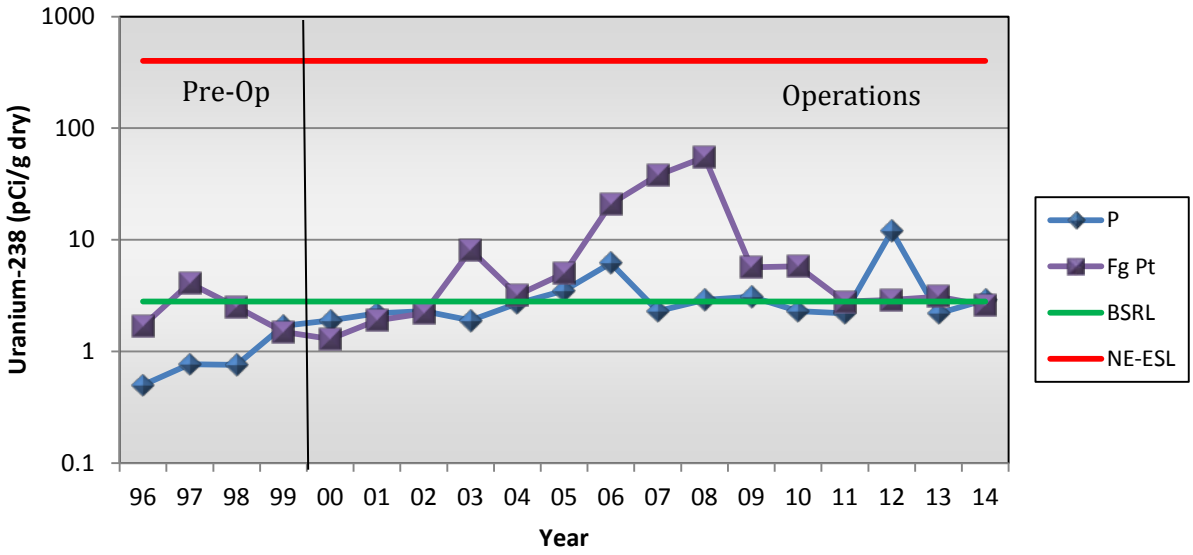

Figure 3-2. Uranium-238 concentrations in soil collected within (near the firing point) and around (north-, east-, south-, and west-side average) the DARHT facility at TA-15 from 1996–1999 (preoperations) to 2000–2014 (during operations) compared with the BSRL and the industrial screening level. Note the logarithmic scale on the vertical axis.

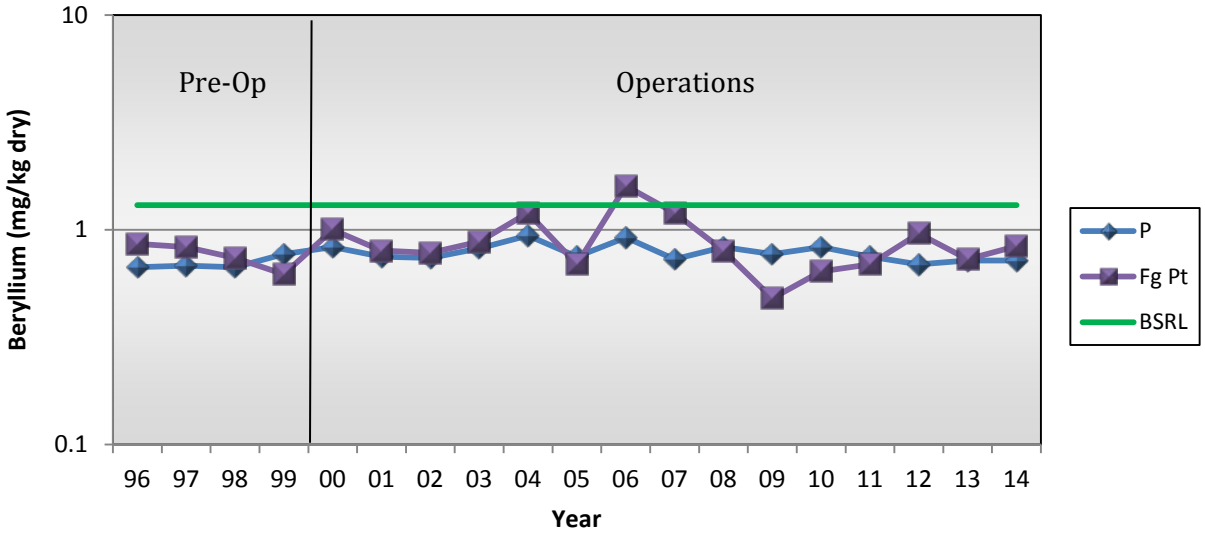

Figure 3-3. Beryllium concentrations in soil collected within (near the firing point) and around the DARHT perimeter (north-, west-, south-, and east-side average) at TA-15 from 1996–1999 (preoperations) to 2000–2014 (during operations) compared with the BSRL and the industrial screening level. Note the logarithmic scale on the vertical axis.

Vegetation Monitoring. Overstory (tree needles and branch) vegetation samples were collected on the north, south, west, and east sides of the DARHT facility and submitted to ALS Laboratory Group for the analyses of the same radionuclides and TAL chemicals as for soil.

All radionuclide concentrations in overstory vegetation collected from around the perimeter of the DARHT facility were either not detected or detected below the BSRLs or RSRLs. Since 2007 the concentrations have generally decreased on all sides of the DARHT perimeter. This general decrease in uranium-238 activities results from the change in contaminant mitigation procedures from open-air and/or foam mitigation (2000–2006) to closed steel containment (vessel) mitigation, starting in 2007 (Figure 3-4). The rapid decrease in a few years indicates that the uranium-238 was on the surface of the vegetation and has since been washed off by rain.

The results for the 23 TAL elements, including metals like beryllium and mercury, in overstory vegetation collected from around the DARHT facility show that all of the metals were either below the detection limits or detected below the BSRLs (or below the RSRLs when BSRL data were not available.

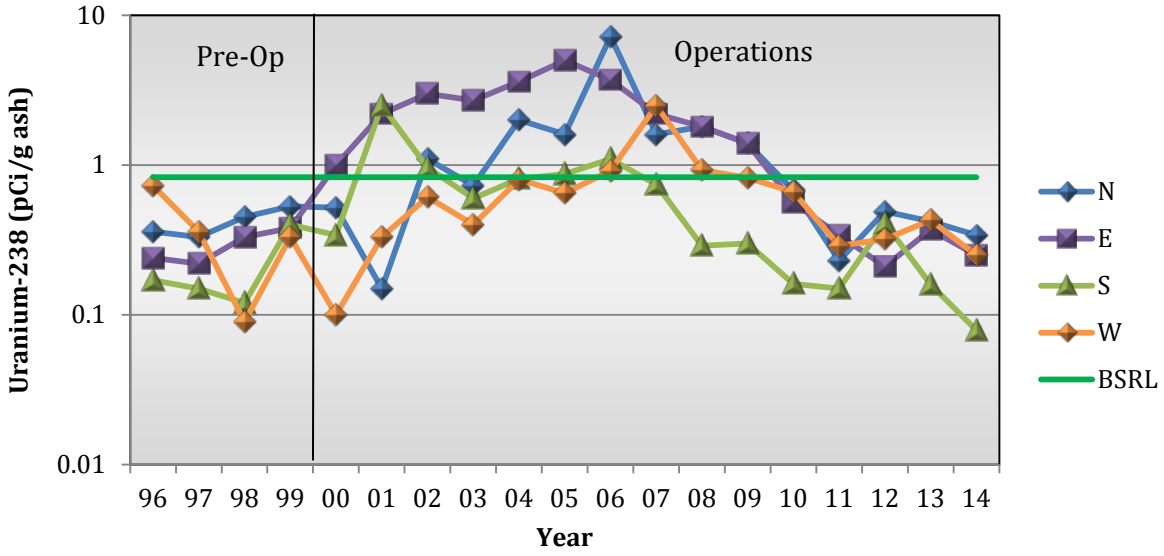

Figure 3-4. Uranium-238 in overstory vegetation collected from the north (N), east (E), south (S), and west (W) side of the DARHT facility at TA-15 from 1996–1999 (preoperations) through 2000–2014 (during operations) compared with the BSRL and the screening level. Note the logarithmic scale on the vertical axis.

Bird Monitoring. Birds were collected for population, composition, and diversity estimates using 12 mist capture net traps spaced about 200 feet to 1,600 feet outward from the west side of the DARHT facility. The objective of the bird monitoring project is

to determine the general (ecological) stress levels around the vicinity of DARHT caused by facility operations (e.g., noise, disturbance, construction, and traffic).

The number of birds, taxa, diversity and evenness (distribution) of birds collected in 2014 are similar to those collected before the start-up of operations at DARHT (Figure 3-5). However, the species of birds collected at DARHT have changed since the late 1990s/early 2000s, likely because the site has exhibited gradual change from a ponderosa pine–dominated plant community to a more piñon/juniper open grassland habitat as a result of drought, wildland fire, and bark beetle activity.

The top seven most common birds found during the preoperational period included the Chipping Sparrow, Virginia's Warbler, Western Bluebird, Broad-tailed Hummingbird, Pygmy Nuthatch, Mountain Chickadee, and Gray Flycatcher. In 2014, the top four birds found included the Chipping Sparrow, Rock Wren, Virginia's Warbler, and Western Bluebird. Birds not collected during the preoperational period but present in recent years (2012–2014) include the American Robin, Black-chinned Hummingbird, Blue-gray Gnatcatcher, Brown-headed Cowbird, Cordilleran Flycatcher, MacGillivray's Warbler, and Rock Wren.

The Virginia's Warbler is listed in the top 100 birds at risk in North America in the Birder's Conservation Handbook (Wells 2007) and is a common inhabitant of the ecosystem near the DARHT facility.

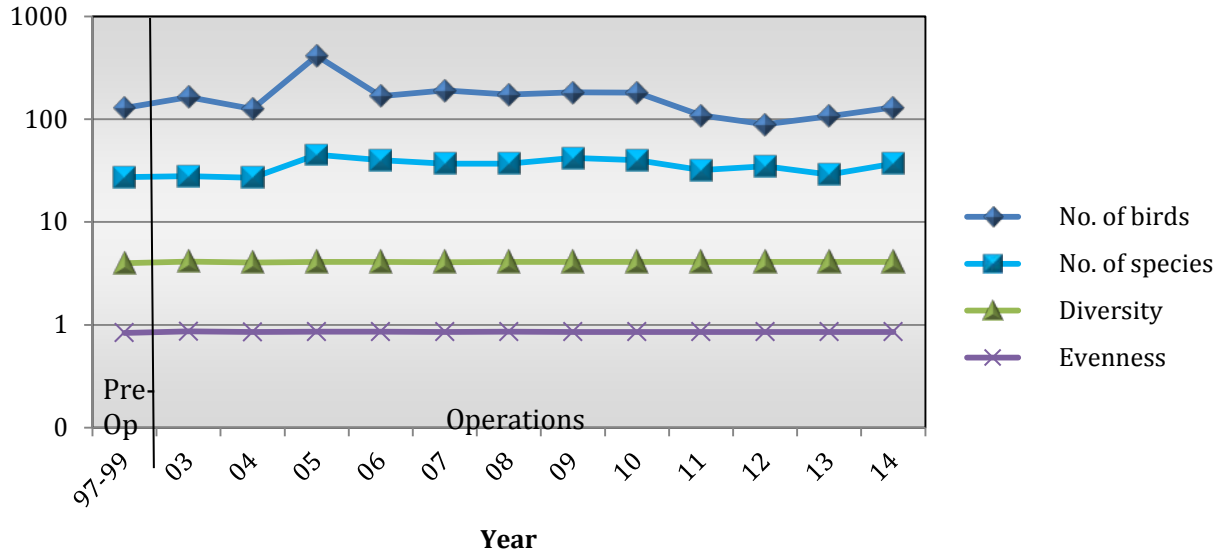

Figure 3-5. Populations, number of species, diversity, and evenness of birds occurring before (1997–1999) and during (2003–2014) operations at DARHT. Note the logarithmic scale on the vertical axis.

MAP Section VIII.A.1(c)

For routine DARHT facility operations, the sampling and analysis methodology used in the environmental baseline monitoring conducted under Section VIII.A.1(b) (see above) was designed to include environmental monitoring requirements under this mitigation action. Should the DARHT facility experience a substantial accidental spill or release of hazardous or radioactive materials, additional environmental monitoring would be conducted under this mitigation action, as necessary. On January 18, 2005, approximately 385 gallons of mineral oil was released from an aboveground storage tank into the secondary containment system during an oil transfer—this released material did not reach the environment.

MAP Section VIII.A.1(d)

In accordance with the ROD for the DARHT Final EIS, DOE was operating the DARHT facility while implementing a program to conduct tests inside single-walled steel containment vessels with containment (Note: current DARHT nomenclature is confinement) to be phased in over 10 yr (the Phased Containment option of the Enhanced Containment alternative) (DOE 1995). In general, open-air detonations occurred from 2000 to 2006 and detonations within a foam medium occurred from 2002 to 2006. A containment vessel qualification shot was conducted at the TA-39 Firing Point 6 in 2006, and shots within single-walled steel containment vessels at DARHT were implemented in May of 2007. Three hydrodynamic test shots within single-walled steel containment vessels at DARHT were conducted in 2007. Two hydrodynamic test shots were conducted within single-walled steel containment vessels at DARHT in 2008. These steel containment vessels achieved at least a 40% reduction in material released to the open air as prescribed for Phase II of the Phased Containment option.

Measurements using a variety of sampling methodologies (e.g., air particulates, adhesive films, surface swipes, and video analysis) at the firing point and sites downwind (mostly) of the firing point at various distances (50, 135, and 200 m) during open-air and foam detonations showed that use of foam reduced the size of a plume generated from a hydrodynamic test and the dispersal of contaminants by an average of 80% (Duran 2008); this is far above the 5% reduction prescribed for Phase I of the Phased Containment option.

Similarly, potential contaminant releases during foam mitigation and the use of steel containment vessels were compared using surface swipes, particulate air sampling, and monitoring of detonation gases at the vessel and around the immediate work area. The use of steel containment vessels shows an additional 20% reduction over foam mitigation in potential emissions of uranium and beryllium as a result of a shot. In other words, the use of steel containment vessels reduced the amount of potential

contamination by 99.9% and was far above the 40% reduction in material released to the open air as prescribed for Phase II of the Phased Containment option.

MAP Section VIII.A.1(e)

The VPB located at TA-15 near the DARHT facility underwent a Phase II readiness review in FY 2006 and the facility was approved to begin operations including the staging, preparation, and decontamination of containment vessels. The containment vessel qualification shot conducted in 2006 provided baseline data/characterization of vessel debris resulting from hydrodynamic testing and analysis of the generated gas byproducts to aid in the disposal of future material, to provide data for personnel safety, and to aid in the development of future cleanout procedures for the containment vessels.

Containment vessel decontamination operations began in FY 2007; during FY 2008 containment vessels continued to be decontaminated on the DARHT firing point. Following decontamination, the vessels were transported to the VPB and prepared for the next experiment.

Summary of Potential Impacts

MAP Section VIII.A.2

The DARHT MAP identifies the potential for contamination of the environment with various types of waste as a result of cleaning out the containment vessels.

Mitigation Action Scope

The cleaning operations will recycle materials as much as reasonably possible and use appropriate operations processes to limit discharges of waste to the environment. Waste minimization techniques will be applied to those materials that cannot be recycled and they will be disposed of in permitted disposal facilities.

Status

MAP Section VIII.A.2

LANL has completed construction of a permanent VPB to be operated at TA-15 near the DARHT facility. This facility is approved to stage, prepare, and decontaminate, as appropriate, the vessels used in the DARHT hydrodynamic experiments. LANL has developed containment vessel cleanout processes in support of the commitment to decontaminate vessels used in experiments.

Process equipment for managing debris from vessel shots has been installed in the VPB. Procedures for vessel cleanout, decontamination, and stabilization of debris from vessel shots have been prepared to support containment vessel experiments. Waste minimization techniques are applied during the vessel cleanout and decontamination

processes. Typically, nonrecyclable materials are placed into 55-gallon drums, fixed with cement, and disposed of at TA-54, Area G (Zumbro 2010).

Summary of Potential Impacts

MAP Section VIII.A.3

The DARHT MAP identifies the potential for contamination of the environment with various types of hazardous material as a result of spills within the DARHT facility.

Mitigation Action Scope

Spill containment (physical barriers or sills) within the DARHT facility will be provided by engineering design to contain all hazardous material spills that could occur. Additionally, a spill prevention control and countermeasures plan will be required before facility operation begins and will be maintained for the life of the facility. Also, a spill response/emergency response team and/or equipment will be available, which can be deployed in the event of an accident.

Status

MAP Section VIII.A.3

Spill containment (physical barriers or sills) within the DARHT facility is in place and is maintained to contain all hazardous material spills that could occur. A spill prevention control and countermeasures plan was completed and approved before DARHT facility operations began. This plan will be maintained for the life of the facility consistent with the requirements under the LANL Integrated Safety Management (ISM) System and Environmental Protection Agency Oil Pollution Prevention Regulation, 40 CFR Part 112. The DARHT facility has not had a substantial accidental spill of hazardous materials. Should an accidental spill occur in the DARHT facility, appropriate emergency actions will be taken in accordance with existing operational procedures. These emergency actions would include deployment of the LANL Hazardous Materials Response Group (HAZMAT). The HAZMAT is on call full-time to respond to all emergency spills within the LANL site and, as needed, the LANL region. The mineral oil release was not considered a spill because it did not reach the environment and did not require HAZMAT deployment.

Summary of Potential Impacts

MAP Section VIII.A.4

The DARHT MAP identifies the potential for contamination of the environment with hazardous levels of various substances as a result of discharges of industrial water from the DARHT facility cooling tower.

Mitigation Action Scope

Water discharged from the DARHT facility cooling tower will be monitored to ensure compliance with outfall permits as stated in the National Pollutant Discharge Elimination System (NPDES) permit for the DARHT facility site. Should discharge levels exceed permit limits, LANL's Water Quality and RCRA (Resource Conversation and Recovery Act) Group (ENV-RCRA) will act to bring the facility into compliance.

Status

MAP Section VIII.A.4

Water flow from the DARHT facility cooling tower is routinely monitored by ENV-RCRA to ensure compliance with the NPDES permit. There was an NPDES chlorine exceedance at the DARHT cooling tower (Outfall 03A185) in FY 2006. The compliance sample result of >2.2 mg/L exceeded the daily maximum permit requirement of 500 μg/L (0.5 mg/L). Corrective actions were taken to get the discharge back into compliance. Since 2010, the cooling tower discharges have been tied into the LANL sanitary wastewater treatment plant at TA-46. Consequently, Outfall 03A185 was removed from LANL's NPDES permit on October 10, 2012.

3.2 Mitigation Actions for Soil

Summary of Potential Impacts

MAP Section VIII.B.1(a–c), 2(a–e)

According to the DARHT MAP, loss of soil and vegetation could occur during construction and operation of the DARHT facility as a result of severe storms and consequent severe stormwater runoff. In addition, off-road and groundbreaking activities caused by additional construction and operational activities may result in further soil erosion and damage to plants.

Mitigation Action Scope

MAP Section VIII.B.1(a–c)

The operational mitigation actions associated with these potential impacts are as follows:

a) Adherence to all soil erosion mitigation measures in accordance with the operational Stormwater Pollution Prevention Plan (SWPPP) to ensure that erosion and sedimentation are minimized and that drainage facilities are in place to control runoff. These measures will include temporary and permanent erosion control, sedimentation control, surface restoration and revegetation, stormwater attenuation in paved and unpaved areas, routine inspection, and best

management practices, which include minimization of fuel and oil spills, good housekeeping practices, and control of stored material and soil stockpiles.

b) Modification of SWPPP if control measures are ineffective.

c) Establishment and continuance of erosion/sediment control best management practices. The best management practices required by the SWPPP shall be continually monitored and maintained.

Status

MAP Section VIII.B.1(a)

The DARHT facility operations are conducted in full compliance with an existing SWPPP. The SWPPP has been implemented to ensure that erosion and sedimentation are minimized and measures are in place to control runoff. The plan includes required measures for temporary and permanent erosion control, sedimentation control, surface restoration and revegetation, stormwater attenuation in paved and unpaved areas, routine inspection, and a best management practices plan, which includes minimization of fuel and oil spills, good housekeeping practices, and control of stored material and soil stockpiles. The scope, implementation, and modification of the operational SWPPP are routinely reviewed by Weapons Facilities Operations, Facilities Operations Directorate (WFO-FOD) environmental personnel and ENV-RCRA.

MAP Section VIII.B.1(b)

If control measures prescribed in the SWPPP are determined to be ineffective, the scope and implementation of the operational SWPPP will be modified, as necessary, by WFO-FOD environmental personnel and ENV-RCRA.

MAP Section VIII.B.1(c)

Best management practices prescribed in the SWPPP are continually monitored and maintained by DARHT facility representatives and WFO-FOD environmental personnel. Current control measures have proven appropriate and effective. If control measures are determined to be ineffective, the scope and implementation of the SWPPP are modified, as necessary, by the WFO-FOD environmental personnel and ENV-RCRA.

Mitigation Action Scope

MAP Section VIII.B.2(a–e)

The operations mitigation actions associated with these potential impacts are as follows:

a) Workers must avoid off-road activities and stay within approved rights-of-way.

b) Any proposed activities requiring the disturbance of mature trees and shrubs must first be approved by ENV-ES to avoid disturbance to threatened and endangered species and other wildlife species.

c) ENV-ES must be notified before any new groundbreaking activities. ENV-ES will review all new sites and evaluate any potential impacts associated with the action. ENV-ES will also provide mitigation to minimize potential impacts, including revegetation as addressed in the SWPPP.

d) The size of a vegetation buffer zone between the facilities and the edge of the mesa tops will be determined by ENV-ES based on topographic aspects and vegetation composition.

e) Indigenous trees and/or other indigenous vegetation will be planted, as appropriate, for erosion control, landscaping, and additional wildlife habitat.

Status

MAP Section VIII.B.2(a)

DARHT facility operations are conducted according to procedures that, in part, restrict facility workers to designated areas. Access to undesignated areas of the DARHT facility site is managed according to procedures that restrict access to authorized personnel on special work assignments such as postshot material recovery or fire-suppression operations. All other workers avoid off-road activities and stay within approved rights-of-way.

MAP Section VIII.B.2(b–e)

Under the ISM System at LANL, all planning, construction, and operations activities must comply with the institutional process established under LANL Implementation Procedure 405.0 (P405.0)—also known as the NEPA, Cultural, and Biological Review. (Note: These activities previously were governed by LANL Implementation Requirement 404-30.02.0.) This implementation procedure establishes the institutional requirements to ensure that contractual work-smart standards for NEPA, cultural resources, and biological resources are consistently met. In addition to requiring full compliance with applicable NEPA, cultural resources, and biological resources Federal regulations, P405.0 requires full and effective implementation of the LANL HMP (LANL 2014). These standards are measured by performance criteria contained in the LANL Performance Requirement 404-00-00 Appendix 3 (Environmental Protection—Ecological and Cultural Resources). ENV-ES is the Office of Institutional Coordination for P405.0 and is responsible for developing, revising, and maintaining the document, as well as technically assisting in its full and effective implementation.

Under the institutional Wildland Fire Management Plan (LANL 2007) and wildfire risk reduction program, some of the forested areas surrounding the DARHT facility site have been thinned. The forest thinning was determined to be necessary to minimize the immediate risk of a wildfire starting in the overgrown forest that originally surrounded the DARHT facility site. The specific location and amount of thinning was planned and implemented in full compliance with P405.0. Additional thinning was conducted along the exclusion fence to eliminate dead, hazardous trees that might damage the fence. The DARHT facility site forest-thinning activities were conducted in consultation with the Ecology Group (now ENV-ES) to ensure appropriate protection of Mexican spotted owl and other wildlife habitat in the area (such as vegetation buffer zones and erosion control). All applicable NEPA, biological resources, and cultural resources regulatory requirements—including MAP Section VIII.B.2(b–e)—for DARHT facility operations and other facility management activities around the DARHT facility site are fully addressed through the ongoing implementation of P405.0.

3.3 Mitigation Actions for Biotic Resources

Summary of Potential Impacts

MAP Section VIII.C.1(b–d); 2(n–x); 3(a, b); 4(a–c); 5(a); 6(a); 7(a, b); 8(a, b); 9(a, b); and 10(a, b)

According to the DARHT MAP, DARHT facility construction and operation could impact federally protected threatened and endangered species such as the Mexican spotted owl because of noise from firings and other operations, as well as other activities at the firing site. These activities could impact other sensitive species potentially residing in or traversing the project area as well. If present, the following species could be affected: American peregrine falcon, northern goshawk, bald eagle, spotted bat, Townsend's pale big-eared bat, New Mexico meadow jumping mouse, Jemez Mountains salamander, and the wood lily.

Mitigation Action Scope

MAP Section VIII.C.1(b–d); 2(n–x); 3(a, b); 4(a–c); 5(a); 6(a); 7(a, b); 8(a, b); 9(a, b); and 10(a, b)

These sections of the DARHT MAP commit DOE and LANL to implementing mitigation measures selected to protect threatened, endangered, and sensitive species in the DARHT facility area. These mitigation measures collectively require DARHT facility representatives to continue to coordinate with ENV-ES on all DARHT facility site threatened and endangered species issues through the ongoing implementation of the LANL HMP. LANL biologists will conduct the necessary species monitoring and habitat protection measures required for the DARHT facility site through the HMP (LANL 2014).

Status

MAP Section VIII.C.1(b–d); 2(n–x); 3(a, b); 4(a–c); 5(a); 6(a); 7(a, b); 8(a, b); 9(a, b); and 10(a, b)

Since January 1999, LANL has fully implemented the HMP. During FY 2000, sitewide implementation of the HMP was included as part of the institutional requirements in P405.0. All applicable NEPA, biological resources, and cultural resources regulatory requirements (including MAP Section VIII.C.1 [b–d]; 2 [n–x]; 3 [a, b]; 4 [a–c]; 5 [a]; 6 [a]; and 7 [a, b]) for DARHT facility operations are addressed through the ongoing implementation of P405.0. The HMP was last updated in March 2014.

3.4 Mitigation Actions for Cultural Resources

Summary of Potential Impacts

MAP Section VIII.D.1(b, e–g)

The DARHT MAP identifies potential impacts from blast effects, such as shock waves and flying debris, from shots using high-explosive charges. These blast effects could affect nearby archaeological sites, especially Nake'muu, and the immediate surrounding environment.

Mitigation Action Scope

MAP Section VIII.D.1(b, e–g)

The operations mitigation actions associated with these potential impacts are as follows:

b) For large, high-explosive-charge experiments, a temporary expendable fragment mitigation, consisting of glass plates (to dissipate energy), a sand bag revetment, or other shielding material, will be constructed as necessary on a case-by-case basis to mitigate blast effects.

e) A long-term monitoring program will be implemented at Nake'muu using photographs or other means of recording to determine if activities at TA-15 are causing any structural changes to the cultural site over time.

f) DOE will periodically arrange for tribal officials to visit cultural resource sites within TA-15 that are of particular interest to the tribes (at least once a year).

g) The DARHT facility operator will periodically pick up metal fragments in the areas where fragments land and will invite local tribes to participate (at least once a year) so that tribal representatives can observe whether there has been damage to any cultural resource sites. DOE will evaluate procedures/measures for mitigation periodically. If damage is discovered, necessary changes will be implemented and reported in the MAPAR. Such changes will be implemented in consultation with the four Accord Pueblos (Cochiti, Jemez, Santa Clara, and San Ildefonso).

Status

MAP Section VIII.D.1(b)

In general, open-air detonations occurred from 2000 to 2006 and detonations within a foam medium and steel containment vessels occurred from 2002 to 2006 and from 2007 to 2008, respectively. None of the large explosive shots in 2002 or 2003 (two shots each year) required fragment mitigation for blast effects, and the employment of foam and steel containment vessels in the latter years significantly reduced the size of a plume and the dispersal of materials (Duran 2008).

Thus, with regard to fragment mitigation measures, all future shots will be evaluated on a case-by-case basis to determine the need for additional fragment protection; however, the current use of steel containment vessels basically eliminates this mitigation concern.

MAP Section VIII.D.1(e)

The results of the 9-yr-long annual assessment of physical conditions at Nake'muu (1998–2006) led to the conclusion that the natural environment, in particular the amount of yearly snowfall and elk moving through the site, is responsible for the deterioration of the standing wall architecture, not the operations at DARHT (Vierra and Schmidt 2006). As a result of this statistically quantitative study, additional annual monitoring at Nake'muu under the DARHT MAP was determined to not be required and was suspended in FY 2007. Note that yearly qualitative assessments of Nake'muu have also been performed as part of the MAP for the Special Environmental Analysis associated with the Cerro Grande Fire (DOE 2000a) and the LANL Cultural Resources Management Plan (LANL 2006). These field checks, conducted by the LANS Resources Management Team, include brief assessments of the standing walls at Nake'muu and checks of the associated fire road and firebreak. From FY 2006 to FY 2009, the Nake'muu field checks were directly tied to annual visits from the Pueblo de San Ildefonso providing visitors with the opportunity to witness and discuss conditions at this ancestral pueblo.

Because of the Las Conchas fire in June 2011, no field assessment visit was conducted at Nake'muu that year. Detailed photographic documentation of the site was resumed in FY 2012 and continued in 2013. The FY 2014 annual photographic documentation of the site was conducted in October 2014 by staff from the LANS Resources Management Team. Natural erosion continues to be seen throughout the site. Mortar and chinking stone loss continues to be noted throughout the site.

MAP Section VIII.D.1(f)

Representatives from the Pueblo de San Ildefonso visited Nake'muu with members of the Resources Management Team on November 10, 2010 (FY 2011). Several attempts for

FY 2012 tours of Nake'muu were canceled because members of the Pueblo de San Ildefonso were unable to attend. No visits to Nake'muu were conducted for members of the Pueblo de San Ildefonso during FY 2013 or FY 2014 because of unforeseen scheduling conflicts. Visits to Nake'muu by members of the Pueblo de San Ildefonso will be provided when requested by the Pueblo. Wildland fire environmental conditions limited safe access to the site during portions of FY 2014.

MAP Section VIII.D.1(g)

Fragment mitigation measures are implemented for experiments that have the potential to generate fragments. Mitigation measures for material releases to the environment include steel containment vessels, implemented in FY 2007, and before FY 2007, aqueous foam. The postshot operations for the experiments were conducted according to experiment-specific integrated work documents and the following established standard procedures:

- WFO-OS-ES-050 General Safety for Firing Site Areas
- WFO-OS-ES-030 General Firing Operations
- HX-DARHT-TP-1039 DARHT Firing Operations
- HX-DARHT-TP-1040 General Explosive Operations at DARHT
- DX-PRO-012 Division Waste Management Procedure
- WFO-OS-HS-025 Radiological Controls

These procedures have been determined appropriate by DOE and are implemented under the LANL ISM System as an integral part of DARHT facility operations and provide the operational basis and procedures for recovery of metal fragments dispersed during operational shots. In addition to the ISM System requirements, these procedures appropriately address DARHT MAP commitments that are designed to minimize the short- and long-term release of contaminants (radioactive and hazardous materials) to the DARHT facility site.

Summary of Potential Impacts

MAP Section VIII.D.2(a, b)

The DARHT MAP identifies the potential for structural or other damage to as-yet-unknown Native American cultural resources within the area of potential effects for the DARHT facility site. Such damage could occur as a result of DOE's lack of knowledge of these resources in the DARHT facility area.

Mitigation Action Scope

MAP Section VIII.D.2(a, b)

The operational mitigation actions associated with this potential impact are as follows:

a) Consultation with the four Accord Pueblos will continue to identify and protect any such cultural resources throughout the life of activities at the DARHT facility.

b) Evaluation of cultural resources in the vicinity of TA-15 will also be coordinated with the New Mexico State Historic Preservation Officer (SHPO), as appropriate, for concurrence of eligibility determinations and potential effects.

Status

MAP Section VIII.D.2(a, b)

DOE and the LANL Ecology Group completed the Phase II cultural resources assessment and cultural resources report for the DARHT facility project. On May 20, 1999, the SHPO officially concurred with a DOE and LANL finding that the construction and operation of the DARHT facility will have "no adverse effect" on cultural resources in the potentially affected area (DOE 1999). In addition, as part of the LANL SWEIS MAP, in FY 2000 LANL completed the "Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at Los Alamos National Laboratory" (DOE 2000b). This DOE plan was approved in August 2000 and provides the institutional framework for identifying and documenting two specific types of cultural resources: traditional cultural properties (TCPs) and sacred sites (DOE 2000b). As part of DARHT facility operations, DOE and LANL will continue to consult with the four Accord Pueblos through annual tours, as necessary, to minimize the potential for structural or other damage to as-yet-unknown Native American cultural resources within the area of potential effects for the DARHT facility site. Cultural resource surveys conducted as part of the Cerro Grande Rehabilitation Project did not identify any new archaeological sites in the vicinity of the DARHT facility. No new TCP or sacred site issues were identified during FY 2007 through FY 2014. Any future TCP and sacred site issues will be addressed as part of the institutional process established under the "Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at Los Alamos National Laboratory" (DOE 2000b).

In FY 2013, the annual visit of members of the Pueblo de San Ildefonso to Nake'muu and the associated rehabilitation monitoring and site condition assessment originally under the Special Environmental Analysis MAP was integrated into the annual implementation of the Cultural Resources Management Plan (LANL 2006), a revision of which is currently being reviewed by the State Historic Preservation Office.

3.5 Mitigation Actions for Human Health and Safety

Summary of Potential Impacts

MAP Section VIII.E.1(a)

The DARHT MAP identifies potential adverse health effects on workers and the general public from high noise levels associated with the DARHT facility, especially from construction and test firing.

Mitigation Action Scope

MAP Section VIII.E.1(a)

Under this section of the DARHT MAP there is a commitment to provide noise protection to workers in the form of ear muffs or ear plugs, depending on the expected noise levels, per Occupational Safety and Health Administration Act of 1972 requirements.

Status

MAP Section VIII.E.1(a)

Under the institutional implementation of the ISM System, DARHT facility operations are managed according to specific procedures that collectively address a wide range of potential impacts to worker safety and health. These procedures fully address potential adverse health effects on workers from high noise levels associated with the DARHT facility during test firing by requiring the use of appropriate personal protective equipment.

Summary of Potential Impacts

MAP Section VIII.E.2(a–c)

The DARHT MAP identifies the potential for adverse health effects on workers from radiation from DARHT facility operations.

Mitigation Action Scope

MAP Section VIII.E.2(a–c)

The operations mitigation actions associated with this potential impact are as follows:

a) Radiation shielding will be provided around the accelerators to limit radiation exposure to workers in the facility.
b) DARHT facility workers will be required to complete DOE-certified core radiological training (minimum Rad-Worker I level) and be enrolled in the LANL dosimetry program.

c) Engineered controls will be installed as visual indicators to notify workers when the accelerators are operating.

Status

MAP Section VIII.E.2(a–c)

Under the institutional implementation of the ISM System, DARHT facility operations are managed according to specific procedures that collectively address a wide range of potential impacts to worker safety and health. DARHT facility accelerator operations are conducted in accordance with the DARHT Operations Standard HX-DARHT-AP-014. This procedure requires appropriate training, radiation dosimetry program participation, and acceleration operations that collectively protect workers from exposure to unacceptable levels of radiation.

4.0 Conclusions

In FY 2014 there were no significant impacts from contaminants based on measurements of soil, sediment, and vegetation from DARHT operations. Also, the comparison of bird species diversity and composition, a qualitative measurement, before and during DARHT operations, showed no significant impacts to the bird populations.

Although FY 2014 contaminant levels were not at concentrations detrimental to human health or to the environment, there were still measurable amounts of depleted uranium in all media, and the levels were increasing over time to at least 2006. Concentrations of depleted uranium in most media decreased in 2007 and may correspond to the success of employing steel containment vessels and/or to cleanup of detonation debris. However, since increases of uranium in all media were noted until at least 2006 and uranium may linger in soils for some time, the monitoring of all or part of these media should be continued to a point where the concentrations are similar to BSRLs for some time.

Foam mitigation significantly reduced the amount of potential contaminants released into the environment compared with open-air detonations, and the use of steel containment vessels further reduced those amounts over foam mitigation.

Regarding potential impacts from DARHT operations on Nake'muu, the natural environment is having a greater effect on the deterioration of the standing wall architecture than the operations at DARHT.

4.1 2014 MAP Implementation

In July 1999, all construction-related DARHT MAP mitigation commitments and action plans were completed. The FY 2014, DARHT MAP activities represent the fifteenth year of operation implementation. The DARHT MAP activities implemented during FY 2014

were a continuation of DARHT facility operations-phase MAP tracking and annual reporting. Should the scope of the DARHT facility project change during the operations stage, as part of the appropriate NEPA review, the scope of the DARHT MAP could be changed by NNSA as necessary and as directed by the DOE Field Office.

4.2 Recommendations

- **Continue monitoring for contaminants that are above BSRLs or are on increasing trends.** Future DARHT operations will likely incorporate more contained tests. As a result, impacts from a given year of DARHT operations on the environment should eventually decrease and this decreasing trend should be considered in future monitoring decisions. However, uranium-238 appears to have accumulated in soils and sediments, particularly near the firing point, and may impact biotic resources over a period of years. These potential cumulative impacts should continue to be monitored, especially for contaminants such as uranium-238 that are above BSRLs or are on increasing trends.
- **Reevaluate environmental monitoring strategy**. The environmental monitoring strategy for DARHT should be reevaluated with consideration of issues such as (1) budget, (2) movement to contained shots in 2007, (3) trend in contaminant concentrations and comparison with the benchmark thresholds of BSRLs (RSRLs) and screening levels, and (4) the results of the 2005 special study on the effects of discontinuity in sample data. Note: Based on a reevaluation of monitoring strategy in early FY 2014, a decision was made by DOE to collect a soil plus one biota component (on a rotating basis) per year. This was implemented in 2014.
- **Continue to issue the DARHT MAPAR annually.** The DARHT MAPAR will continue to be issued annually as part of the SWEIS MAPAR. Detailed analysis of DARHT monitoring data and results will continue to be published in the ASER.
- **Continue environmental rehabilitation activities and annual tribal visits at Nake'muu.** Annual monitoring at Nake'muu has been discontinued, but site visits every 2 to 3 yr for vegetation removal, etc., and annual tribal visits should continue. Future TCP and sacred site issues should be addressed as part of the institutional process established under the "Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at LANL" (DOE 2000b).
- **Continue to manage DARHT facility operations in accordance with ISM.** Under the institutional implementation of the ISM System, continue to manage DARHT facility operations according to specific procedures that collectively address a wide range of potential impacts to worker safety and health including, but not limited to, noise and radiation hazards.

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Appendix C
Fiscal Year 2015 Trails Management Program
Mitigation Action Plan
Annual Report

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Approved for public release;
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Title: **Fiscal Year 2015 Trails Management Program Mitigation Action Plan Annual Report**

October 2015

Prepared by: **Daniel S. Pava, Environmental Protection Division, Environmental Stewardship Services Group**

Los Alamos
NATIONAL LABORATORY
EST.1943

Front cover: Closure of unsanctioned trail at the southeastern end of Ruin Mesa Trail.

Contents

Acronyms

DOE	Department of Energy
ENV-ES	Environmental Stewardship Services (Group)
FY	fiscal year
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
MAP	Mitigation Action Plan
MAPAR	Mitigation Action Plan Annual Report
NNSA	National Nuclear Security Administration
SWEIS	Site-Wide Environmental Impact Statement
TA	Technical Area

1.0 Executive Summary

This Trails Management Program Mitigation Action Plan Annual Report (Trails MAPAR) has been prepared for the Department of Energy (DOE)/National Nuclear Security Administration (NNSA) as part of implementing the 2003 *Final Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program* (DOE 2003a). The Trails Mitigation Action Plan (MAP) is now a part of the 2008 *Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory (DOE/EIS 0380) Mitigation Action Plan* (SWEIS MAP) (DOE 2008). The MAP provides guidance for the continued implementation of the Trails Management Program at Los Alamos National Laboratory (LANL) and integration of future mitigation actions into the SWEIS MAP to avoid impacts to resources associated with recreational trails use at LANL.

This MAPAR includes a summary of the LANL Trails Management Program activities and actions during fiscal year (FY) 2015, from October 2014 through September 2015.

2.0 Context: Trails at LANL

Trails use at LANL is one of the benefits of working and living in Los Alamos County. However, there was never an explicit DOE or LANL policy or mechanism to balance recreational trails use on LANL property with environmental, cultural, safety, security, and operational concerns. In 2003, the DOE directed Los Alamos National Security, LLC (LANS) to establish such a program. DOE/NNSA published the *Final Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program* and a Finding of No Significant Impact (DOE 2003a, b) in September 2003. The NNSA issued a MAP for this environmental assessment on the same date.

The most pertinent trails issues identified in the environmental assessment were:

- DOE/NNSA does not have a public recreational mission established by Congress.
- The public gets conflicting messages regarding trails use on LANL property because signs, access controls, and enforcement at LANL vary.
- Trespassing occasionally occurs from LANL property onto adjacent lands where trails use is not permitted.
- Trails use poses threats to some cultural and natural resources.
- Trails use in certain LANL areas increases the risks of human exposure at potential release sites, and other operational and natural hazards including wildfires.
- Security concerns are posed by the use of certain LANL trails.

The MAP established the Trails Management Program, which is implemented through individual projects, including measures for planning, repair and construction, environmental protection, safety, security, and post-repair and construction end-state conditions assessments. A standing Trails Working Group made up of LANL and neighboring jurisdictions and other stakeholders was established to carry out this program. The Trails Working Group has met continuously and regularly over the past 12 years to provide trails management guidance and to integrate trails management decisions across boundaries.

In FY 2015, a draft Trails Management Plan (LA-UR-15-20807) was prepared and will be finalized in FY 2016. The draft plan includes guidance and requirements for trails management at LANL and has specific management plans for more than 30 trails.

LANL Trails Management Program goals:

- Reduce the risk of damage and injury to property, human life, health, and sensitive natural and cultural resources from social trails use at LANL.
- Facilitate the establishment of a safe, viable network of linked trails across the Pajarito Plateau that traverse land holdings of various private and government entities for recreational use and for alternate transportation purposes without conflicts with DOE mission work at LANL or disrupting LANL operations.
- Maintain security at LANL.
- Respect the wishes of local Pueblos to maintain access to cultural resources by Pueblo members and work to prevent unauthorized public access to adjacent Pueblo lands and lands identified as religious and culturally-sensitive areas.
- Adapt trails use at LANL to changing conditions and situations in a responsive manner.
- Maintain the recreational functionality of DOE lands so that the land remains open to members of the public for non-motorized recreation, in compliance with federal laws and within LANL operational constraints.

3.0 Trails Management Program

The Trails Working Group met nine times in FY 2015. Copies of the Group's meeting notes are available upon request by sending an email to trails@lanl.gov. Typically, Trails Working Group attendees include LANS subject matter experts, representatives from Los Alamos County, neighboring Pueblos, Bandelier National Monument, Santa Fe National Forest, and interested local residents. These meetings provide an ongoing and in-depth forum for discussing and resolving trails mitigation issues that arise from active adaptive management. The Trails Management Program continued to address

Technical Areas (TAs) 70 and 71 trails issues including maintenance, trailhead parking, and mapping corrections. Mitigations to prevent mountain bikers from creating new trails near cultural sites were inspected and are effective

Other issues included long-term closure of Mortandad Canyon trails to accommodate a project in that Canyon, protection of ecological resources at the Anniversary Trail associated with the proposed Los Alamos County Otowi Well Booster and Pipeline Project, issues associated with reopening Los Alamos Canyon Trail between New Mexico State Road 4 and West Road, and use of the Wellness Trails by the Mountain Canine Corps. The following sections include highlights of the FY 2015 Trails Management Plan implementation at LANL.

3.1 Fixing and Protecting Trails

Trail repair and resource protection continued to focus on the 4,000-acres of General Access Area in TAs 70 and 71 located between White Rock and Bandelier National Monument. This area is easily accessed from Pajarito Acres and New Mexico State Road 4, and has been used by the public for decades. In 2013, 11 informational kiosks were installed at the trailheads in the area. Several kiosks have been repaired since then and one (at Gate 7) will be replaced without charge because of manufacturing defects. Problems such as these are often reported by trail users (Figure 1).

Figure 1. The transparent plastic door at this kiosk was replaced in FY 2015.

3.2 Public Information

In April 2015, to commemorate Earth Day at LANL, the Trails Management Program held a public guided interpretive tour of the Lion Cave and Lower Water Canyon Trails for about 40 participants who walked a 3.5-mile route. LANS subject matter experts provided hikers with information about biological, cultural, and geologic resources and about the Trails Management Program (Figure 2).

Figure 2. Phil Noll (fourth from left) explains local geology to hikers on the Lion Cave Trail, April 2015.

In May 2015**,** The Trails Management Program Lead spoke to the Los Alamos County Parks and Recreation Board and addressed questions concerning the future reopening of the Los Alamos Canyon Trail to the public.

Trail wayfinding markers and decals were purchased in FY 2015 and will be installed along trails in TAs 70 and 71 in FY 2016.

In FY 2015, the Trails Working Group began discussions about the role that LANL trails might play as part of the new Manhattan Project National Historical Park, with particular attention to access and interpretation in Los Alamos Canyon.

A segment of the Hidden Canyon Trail was closed in late June at the request of the Los Alamos Field Office so that further environmental remediation could occur in an area below the Timber Ridge subdivision. This trail and Deadman's Crossing/Duran Road remain closed at this time at the request of LANS Physical Security.

The Trails Management Program responded to an inquiry about the LANL Wellness/ Fitness Trails posted in the LANL Readers Forum in June 2015. The use of LANS employee volunteers to repair trails damaged by erosion near the Wellness Center will be evaluated by the Trails Working Group in FY 2016.

In order to provide more information to the public, the Trails Management Program updated the "Taking Care of Our Trails" website (***http://www.lanl.gov/community-environment/environmental-stewardship/protection/trails/index.php***) in FY 2015. The website provides current information about trail closures and restrictions, and additional publications were added. The website states that continued access and use of LANL trails is contingent upon users acting as good stewards of these federal lands. There are also interactive map features and descriptions, and a revised Trails Management at LANL brochure.

3.3 Cultural and Biological Resources Protection

During FY 2015, the Trails Management Program continued to work with LANS cultural resources staff to monitor the trails located within TAs 70 and 71 adjacent to Pajarito Acres, accessible by the public from many trailheads along New Mexico State Road 4. Cultural resource monitoring in the area identified no evidence of site disturbance in FY 2015 and only one trail remains closed. These trails are popular for hiking, biking, and equestrian activities. While these DOE lands are not developed, they are designated in LANL planning documents as reserve/buffer and set aside for possible future mission uses. This DOE-owned land is also deemed a "General Access Area" which allows public access. The Trails Management Program continues to address concerns about use of the area by installing improved signs and trailhead kiosks, by modifications to access points, trail realignments, trail closures, and public outreach/education.

In FY 2015 LANS Environmental Stewardship Services (ENV-ES) staff continued to coordinate with Los Alamos County to protect cultural and historic resources that could be affected by a new water supply line in the vicinity of the Anniversary Trail. The Anniversary Trail cultural survey was completed by LANS staff and Los Alamos County staff will temporarily fence culturally sensitive areas for avoidance when the Otowi Booster waterline project is undertaken. The trail will be closed to the public during construction.

The Habitat Management Plan for LANL (LANL 2014a) provides a strategy for the protection of threatened and endangered species and their habitats on LANL property. The Mexican Spotted Owl (*Strix occidentalis lucida*), Jemez Mountains Salamander (*Plethodon neomexicanus*), and Southwestern Willow Flycatcher (*Empidonax trailii extimus*) are federally listed threatened or endangered species and may occur in areas traversed by trails. Mexican Spotted Owl surveys begin on March 1 and conclude mid-May each year. There are seasonal trail closures when these surveys are conducted. Most trails are reopened when the surveys are complete, but trails in areas where the surveys indicate owls were present remain closed until August 31.

A meeting of LANS subject matter experts was convened in November 2014 to discuss the reopening the Los Alamos Canyon Trail between New Mexico State Road 4 and West Road. A subsequent meeting with DOE/NNSA staff was held in July 2015. Some parts of Los Alamos Canyon are potential habitat for the Jemez Mountains Salamander, added to the federal list of threatened and endangered species in 2013. In FY 2015, a biological assessment for recreational trails use and road repair in Los Alamos Canyon was approved by the United States Fish and Wildlife Service (LANL 2014b).

In FY 2015, the Trails Working Group continued to review the problem of feral cattle in White Rock Canyon, which can be accessed by LANL hiking trails. This has been a trails management issue and safety concern for trail users for several years. The canyon is part of the White Rock Canyon Reserve, established in October 1999 by Secretary of Energy Bill Richardson through a DOE proclamation as part of a nation-wide land conservation initiative at DOE sites. Having feral cattle anywhere in the reserve is a conflict with resource management at LANL and causes visitor safety concerns (LANL 2013). There are sensitive species present and there is a potential for the cattle to damage habitat and cultural resources. Moreover, the introduction of Rocky Mountain Bighorn Sheep (*Ovis Canadensis*) into White Rock Canyon by New Mexico Department of Game and Fish has implications for the spread of disease. Removal of feral cattle would facilitate habitat restoration in the canyon for the Yellow-Billed Cuckoo (*Coccyzus americanus*), recently listed as a threatened species under the Endangered Species Act. Cameras installed in FY 2013 on the Ancho Springs Trail showed wildlife including bear, cougar, bobcat, and cattle. DOE is reviewing recommendations for feral cattle removal.

3.4 Security and Safety

During FY 2015, Trails Management Program staff continued to engage with Bandelier National Monument on patrols and law enforcement in TAs 70 and 71. LANS cultural resources staff members contact Bandelier National Monument personnel when doing field work in the areas patrolled by National Park Service rangers. The Trails Working Group contacts LANS security or the Los Alamos Police Department on matters of

unauthorized trails use and parking to access trails. The Trails Management Program also coordinated with the Los Alamos County Trails and Open Space Program on a variety of issues affecting both Los Alamos County and LANL/DOE, including trails maintenance, closures, and way-finding.

In January 2015, the area outside of Gate 8A in TA 70 at the Potrillo Canyon trailhead on New Mexico State Road 4, which was strewn with trash and dumping, was cleaned up by ENV-ES staff as part of a LANS Worker Safety and Security Team effort. Subsequent illegal dumping at this location was reported to Los Alamos County and it was promptly removed (Figure 3).

There were no trail closures at LANL resulting from rains or flooding in FY 2015. However, pedestrian, bike, and vehicular access to the Mortandad Bench Trail was restricted in late July and early August for security reasons. Trails Management Program staff helped the LANS physical security team to plan and coordinate this closure. The Lower Mortandad Canyon Trail remains closed due to the Chromium Interim Measures project taking place in the canyon.

Figure 3. Trash and debris littering the Gate 8A Potrillo Canyon trailhead was cleaned up in January 2015 by ENV-ES staff as part of a Worker Safety and Security Team effort.

4.0 References

DOE 2003a U.S. Department of Energy, 2003. *Final Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program*, DOE/EA-1431, Los Alamos, New Mexico.

DOE 2003b U.S. Department of Energy, 2003. *Finding of No Significant for the Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program*, DOE/EA-1431, Los Alamos, New Mexico.

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LANL 2013 Los Alamos National Laboratory, 2013. *Feral Cattle in the White Rock Canyon Reserve at Los Alamos National Laboratory*, LA-UR-13-21102, Los Alamos, New Mexico.

LANL 2014a Los Alamos National Laboratory, 2014. *Threatened and Endangered Species Habitat Management Plan for Los Alamos National Laboratory*, LA-UR-14-2186, Los Alamos, New Mexico.

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